

INDUSTRIAL DEVELOPMENT AND LOCATION IN LEEDS NORTH OF THE
RIVER AIRE, 1775 TO 1914

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SUMMARY

Manufacturing industry constituted a factor of prime importance in the economic growth of the town of Leeds throughout the period 1775 to 1914, during which the factory system was introduced to most branches of manufacturing and there was unprecedented expansion in both the population and the built-up area of the borough. The 19th century witnessed steady progress from a system of industrial production essentially workshop based to the factory system, until the close of the Victorian era heralded a new pattern of manufacturing related to new forms of transportation and communication, greatly enhanced labour mobility, and the planned development of urban areas.

With its strong tradition of involvement in the manufacture and marketing of woollen cloth Leeds was not slow to follow the example of capitalists in Lancashire and the East Midlands in setting up textile factories after 1789, initially in the cotton trade, and a few years later the first woollen and flax mills were established.

By 1850 Leeds had become the foremost centre for flax spinning and for cloth finishing, was prominent in cloth manufacture and in dyeing, and also housed a number of worsted mills. In addition individual engineering and leather firms were by now catering for a more than local demand, and during the second half of the century these trades, along with the manufacture of clothing and footwear, rose to prominence, providing employment for almost a quarter of the city's workforce in 1911. There were other important industries besides, so that Leeds by 1914 had come to possess a healthy diverse economy.

The siting of individual industrial concerns within North Leeds exerted a profound effect upon the shape and form of urban growth and reflected the operation of a multiplicity of factors the analysis of which

forms the second part of the thesis. In a period throughout which the dominant source of power was the steam engine, and in a town noted for its textile industries, the key consideration in intra-urban location of manufacturing was frequently the provision of water, and sites alongside the River Aire and its tributaries were favoured alike for workshops and for factories. This choice was reinforced by the general orientation of transportation facilities along these valley corridors and by the nature of the land there available. Also significant were the distribution of the working population and the close degree of interdependence between firms and industries which sometimes produced marked areal association of firms, as for example in the early clothing industry. Access to raw materials, fuel, and markets, though important in attracting industry to Leeds in the first place, was not a critical factor in the siting of factories within the in-township of North Leeds.

Finally the impact of individual circumstances and of individual decisions is given implicit recognition by means of an appendicised gazetteer of all the principal factory sites, detailing their history and development throughout the period.

LIST OF ABBREVIATIONS USED IN THE THESIS

A.A.A.G.	-	Annals of the Association of American Geographers
Econ. Geog.	-	Economic Geography
Ec. H.R.	-	Economic History Review
Eng. H.R.	-	English Historical Review
L.C.A.	-	Leeds City Archives
L.C.D.	-	Leeds Corporation Deeds
L.C.H.	-	Leeds Civic Hall
L.I.	-	Leeds Intelligencer
L.J.	-	Leeds Journal
L.M.	-	Leeds Mercury
Procs. Inst. Mech. Eng.	-	Proceedings of the Institute of Mechanical Engineers.
Q.J.S.S., J.S.S., J.R.S.S.	-	Quarterly Journal of ..., Journal of ..., Journal of the Royal ... Statistical Society.
Sel. Comm.	-	Select Committee.
Trans I.B.G.	-	Transactions of the Institute of British Geographers.
Trans. Newcomen Soc.	-	Transactions of the Newcomen Society.
Thoresby Soc.	-	Publications of the Thoresby Society.
W.R.R.D.	-	West Riding Registry of Deeds.
Yorks. Bull	-	Yorkshire Bulletin for Economic and Social Research.

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INTRODUCTION

In recent years many geographers have turned their attention towards the development of a new methodology, in which their field is treated as a science instead of as an art, and the approach is nomothetic rather than idiographic¹. Through the formation of new theories of the spatial aspects of human activity, deductively reasoned, rapid progress has been made, and it is probably true to say that geography has altered in character more in the past fifteen years than in the preceding half century. One of the most noteworthy aspects of this development has been the shift away from an identification of idiosyncracies, and the search for generality. Search for order displaces the description of the particular.

This does not, however, signify that the individual case study is no longer of value. On the contrary, it is an important part of the scientific process. Testing a hypothesis is the only means by which the reasoning which led to its formation can be validated, and if it is shown that the reasoning has been incorrect, then the case study suggests modifications. In this way concepts are worked over until the original hypothesis becomes an acceptable general theory. This is the essence of scientific method, in which studies of a discrete set of phenomena have a prominent role to play. By way of evidence one may point to the development of Central Place Theory, which commenced with Christaller's abstract geometrical patterns², and by means of numerous works of an empirical nature³ has been transformed into a complex but workable model of marketing

¹D. Harvey, Explanation in Geography, (1969).

²W. Christaller, Central Places in Southern Germany, trans. by C. W. Baskin (1966).

³For example, J. E. Brush and H. E. Bracey, 'Rural Service Centres in South western Wisconsin and Southern England', Geographical Review, 45 (1955), 559-69.

geography and settlement patterns¹.

No apology for the fact that this study deals with a small area is therefore required. Nor can it claim to introduce a whole new theory of urban-industrial development and the intra-urban location of manufacturing. It is hoped, however, that its findings will have a usefulness beyond a contribution to the history of Leeds. Principally it is hoped to be able to add to our understanding of the mechanics of site selection in the 19th century, and the processes of urban-industrial growth.

Studies dealing with the problem of urban growth abound², but urban economics and the study of intra-urban structure and process is still in its infancy³. What work has so far been completed deals in the main with the contemporary urban area which, though containing elements of an earlier structure, is far removed from its 19th century counterpart.

There exist then, but few studies of the internal structure of the 19th century, and as yet research has been confined almost exclusively to the Anglo-American realm⁴. Even fewer have concentrated upon industrial growth and distribution, surely a feature of paramount importance. Of those which do the most significant is Pred's study of the American mercantile city, which suggests a great number of concepts which might usefully be applied to cities of another realm.⁵

¹See B. J. Garner, 'Models of Urban Geography and Settlement Location', in R. J. Chorley & P. Haggett, Models in Geography, (1967), 306-35.

²Usefully summarised in P. M. Hauser & L. F. Schnore, The Study of Urbanization (1965).

³H. Carter, The Study of Urban Geography (1971), Chapter 9.

⁴J. B. Kenyon, Industrial Localization and Metropolitan Growth: the Paterson-Passaic District (1960).

A. Pred, 'Manufacturing in the American Mercantile City', A.A.A.G., 56 (1966) 307-38.

'Industrialisation, Initial Advantage, and American Metropolitan Growth', Geographical Review, 40 (1965).

⁵A. Pred, The Spatial Dynamics of U.S. Urban-Industrial Growth, 1800-1914 (1966).

No similar study for British urban areas yet exists, and Professor Hall, for one, is of the opinion that this constitutes a serious deficiency¹, though he has himself made some effort in this direction². This serious omission is in fact only a part of a wider paucity of research into a geographic location theory. Whilst there has been no lack of an economic analysis of locational problems, geographers have failed to evolve their own concepts and methods, based more upon reality and taking into account 'irrational behaviour, imperfect knowledge, other psychological variables, socially dictated constraints, and the impact of existing patterns on subsequent patterns (processes)'³.

This is not to deny the validity of the optimising approach of the economist, but if geography is to concern itself with the analysis of the spatial dimension, then attention must be focused upon the actual, not the ideal, pattern, taking into account what Ratcliff has called 'the dynamics of efficiency'⁴. In other words, the economist may confine his interest to evaluating alternative locations for a single plant, but the geographer must also seek to understand the entirety of individual choices of location, influenced by economic and non-economic forces.

The last of Pred's contentions - that existing patterns influence subsequent patterns - may best be emphasised by furnishing an example. In Leeds, north of the Aire, there were approximately 240 acres of land devoted to industrial use in 1953⁵. Of this 80%, some 190 acres, was land

¹P. G. Hall, Urban History Newsletter no. 11 (1968), 23.

²P. G. Hall, The Industries of London since 1861 (1962).

³A. Pred, op. cit., (1966), 5.

⁴R. U. Ratcliff, 'The Dynamics of Efficiency in the Locational Distribution of Urban Activities', in R. M. Fisher ed., The Metropolis in Modern Life (1955), 125-48.

⁵Estimated from Ordnance Survey 25" to 1 mile maps of Leeds (1953).

which had been developed for industrial use before 1908¹. Moreover, an estimated four-fifths of this 190 acres had basically the same buildings as were occupied at the turn of the century. Thus, for the area under study and probably also for most towns of Northern England, it is of little use seeking to equate factory distribution with a location theory based upon present-day considerations. For example, in defiance^{of} any theory based upon contemporary urban economics, manufacturing firms may today be found in the heart of the financial quarter of central Leeds - the clothing factories of the Park Square area. Their situation is obviously anachronistic, and inevitably, it seems, redevelopment involves a change in use, manufacturing firms either migrating outwards or simply giving up business².

It is intended that this thesis should help to throw light upon the processes involved in urban-industrial growth, concentrating upon the pattern of intra-urban manufacturing, and the factors which influenced firms in their choice of location. At the same time, however, it is intended that there should be sufficient material to satisfy the urban economic historian, and the first part of the thesis is devoted to an account of the course of industrial development in Leeds, divided into three periods. Whilst any divisions are inevitably arbitrary to a certain extent, these are thought to represent discernibly different phases in that development. These are:

- (1) 1775 to 1800 - the 18th century pattern and the origins of the factory.
- (2) 1800 to 1850 - factory growth and the dominance of textiles.
- (3) 1850 to 1914 - diversification and maturity in Leeds industries; the rise of the engineering and clothing industries.

¹Estimated from Ordnance Survey 25" to 1 mile maps of Leeds (1908).

²M. Bateman, The Nature and Process of Urban Renewal in the Central Areas of Nine Towns of West Yorkshire During the Postwar Period (1968). Unpub. Ph.D. thesis, Univ. of Leeds.

In the second part an attempt is made to separate and analyse the forces involved in the locational development of manufacturing, prefaced by a short analysis of the cost structure of the typical firm in the main industries. These factors are grouped under the headings of land and capital costs (including water supply), raw materials and energy, and market influences, linkage and agglomeration influences, whilst the final chapter deals with labour. The approach adopted is via the development of individual factory sites, and there is therefore an extensive appendix listing the principal factory sites in North Leeds and detailing their development, where known, in the period 1775 to 1914.

The thesis forms part of a study of the building development of Leeds during the Industrial Revolution conducted by the School of Economic Studies at the University of Leeds under the leadership of Professor M. W. Beresford. Of obvious importance in a town which 'has long held a distinguished place among the opulent commercial towns of the kingdom', and was for many years the 'principal seat and emporium of the woollen manufacture',¹ is its industrial development - which provided much of the stimulus for 19th century growth, and contributed in no small way to the principal visual manifestation of that growth, the bricks and mortar of the town's buildings.

Geographers are not alone in paying increasing attention to the genetic study of the urban landscape, an essential part of which involves the understanding of the forces which initiate, and contribute to, this growth². In the opinion of some scholars, residential construction is the mechanism whereby city-wide population growth is translated into urban

¹W. White's Directory (1842), 7.

²F. S. Chapin jr. and S. F. Weiss, Urban Growth Dynamics in a Regional Cluster of Cities (1962).

expansion and redistribution¹. Others, notably Vance, consider that the development of residential areas is dependent upon the pattern of employment nuclei², whilst others, Winsborough for example, feel that, 'the growth of a city is a complex process considerably influenced by the previous growth pattern of the city'³.

Unfortunately, few have attempted to assign values to the inchoating factors and to develop a general model of urban-industrial development. There have been any number of publications on the subject of 19th century industries⁴, on individual towns⁵, or even on single industries within a particular urban area⁶, but there is still a lack of research into generally applicable principles of intra-urban location of manufacturing. Published material which concentrates upon this important aspect is in short supply, and, as has already been noted, one is inevitably led back to the work of Pred⁷.

It is not intended, however, to construct and develop a new theory of intra-urban industrial location, but simply to make some contribution to knowledge of an area of research which has been neglected for too long. The neglect is understandable - there are a great many difficulties

¹B. Duncan, G. Sabagh, and M. D. Van Aredol jr., 'Patterns of City Growth', American Journal of Sociology, lxxvii (1959), 418-29.

²J. E. Vance jr., 'Labor-Shed, Employment Field, and Dynamic Analysis in Urban Geography', Econ. Geog., 36 (1960), 189-220.

³H. Winsborough, 'City Growth and Structure', Journal of Regional Science, 4 (1962), 35-49.

⁴e.g. S. D. Chapman, The Early Factory Masters, (1967).

⁵e.g. R. Church, Victorian Nottingham, (1966).

⁶e.g. W. H. K. Turner, 'The Evolution of the Pattern of the Textile Industry Within Dundee', Trans. I.B.G., 18 (1952), 107-19.

⁷A. Pred, op. cit., (1966).

attendant upon such aims - but it is a problem which needs to be tackled. Until there have been many more studies of this type it will be impossible to make meaningful generalisations about the 19th century urban area and the role which industry played in shaping morphology and the course of change.

The approach adopted in this thesis, therefore, focuses upon the individual factory. An effort has been made to secure as much information as possible about all the principal industrial sites and factory buildings found within the area of North Leeds in the period 1775 to 1914. The principal sources utilised are the returns of the Factory Inspectors and other government investigations into aspects of the industrial economy; the Census tables, including the enumerators' returns for 1851 and 1861¹; directories of which the Leeds Reference library possesses an excellent collection; various manuscripts, principally in the hands of the Brotherton Library, University of Leeds and the Leeds City Archives; insurance policies relating to Leeds firms²; and deeds, principally the large collection held by the City in the Leeds Civic Hall strongroom. Other materials which are made use of to supplement these sources include contemporary published works, the documents and deeds of a small number of firms, maps, both published and manuscript, and the West Riding Registry of Deeds. The latter has proved invaluable in tracing various transactions involving factory property but unfortunately few details are given and no mention of prices was given before 1880. Finally this thesis owes much to a solid foundation of investigation conducted by members of the Department of Economics at the University of Leeds, the bulk of which was published in the Leeds Journal³.

¹The 1871 Returns became available too late for inclusion.

²I have had to rely upon information passed on by Dr. S. D. Chapman and Dr. D. Jenkins, to whom I owe a considerable debt. Undoubtedly there is much more could be gained from this source.

³See Bibliography.

In particular one must single out the work of Professor Rimmer whose articles in the Publications of the Thoresby Society are quoted here with great frequency.

The sources for this thesis then are various and diverse. Unfortunately, they are also not without their problems. Directories are frequently inaccurate, ward boundaries hardly remain unchanged for more than a decade, whilst factory owners were unsure about the age and nature of their property, and sometimes gave misleading information. However, one source is reliable - the deeds. Apart from a tendency to refer to a building as 'that newly-erected mill', for upwards of thirty years, the precision of the lawyer can be depended upon. These have therefore been accepted as the most authoritative source, and used wherever possible.

This disaggregated approach is forced upon the researcher into intra-urban patterns by the lack of data and information for small areas. Statistics for Leeds industry collected by the Factory Inspectors and other contemporaries inevitably refer to the Parish (which was for the most part co-extensive with the Borough), and the smallest unit utilised for the collection of population data, the ward, is too large for present purposes. Instead, therefore, it is chosen to adopt the individual factory as the basic unit for study. This produces many problems, principally that gaps in the information are inevitable, but, it is hoped, ^{it} will enable a more realistic assessment of the course of industrial growth, its location within North Leeds, and the factors underlying this pattern.

The area selected for analysis comprises some four square miles of the Borough of Leeds, basically the in-township minus the South Ward but including Kirkstall and Headingley. It is the area within which the built-up area of Leeds was found right up to 1914, to the north of the River Aire. The South Ward and the important out-townships of Hunslet and Holbeck form

the area of investigation in a companion study undertaken by E. J. Connell, and whilst there is some difference in emphasis it is intended that the two should complement each other to form a reasonably comprehensive account of the industrial growth of Leeds up to World War I. Lest it be thought, however, that this thesis will thus inevitably be a distorted portrait of the town, the first part (Chapters I to III) attempts to outline developments in the whole of the Borough, not just confining its attention to North Leeds.

It remains, therefore, only to explain some of the terms used in the thesis. For the more obscure technical terms involved in various industries (principally the woollen trade) an explanation is given in context, but more serious difficulties are encountered in the use of more familiar terms - the 'industrial revolution', the 'factory system', or more simply the 'mill'.

The industrial revolution is generally deemed to indicate the transition from domestic and workshop production to a system based upon the application of power, power-driven machinery, large-scale organisation, centralised production, and purpose-built (or converted) premises. This transition adopted two forms, however, which existed in parallel. Firstly there was an increase in the relative proportion of total production emanating from factories. Secondly there was the gradual yet deliberate transformation of the workshop into the factory. The latter may be envisaged as a continuum, for there is no precise definition of what constitutes a factory. Wherever possible contemporary conceptions are utilised, but these do not necessarily correspond to our own modern definitions. Thus Gott's mill earned the description of 'factory' mainly because it adhered to the principles of agglomeration of labour and economies of scale rather than for its use of power. In fact the 40 h.p. Boulton and Watt engine installed in 1792 was used only for scribbling and carding, turning shafts and gearing, grinding

dyewoods, and turning the indigo mill, for many years, the remaining processes all being performed much as they had for centuries before¹.

There will be further discussion of what constitutes a factory at appropriate junctures in the text, but in general it is used to describe a large building or group of buildings containing plant and machinery for the manufacture of goods, the term 'workshop' being reserved for a small scale room or building in which few men are employed, and the processes of manufacture are carried on without the use of more than a little power.

The term 'industry' in the context of this thesis refers solely to manufacturing, i.e. the processing of goods and materials, thus excluding activities of a distributive, wholesale, financial and commercial nature. Such 'tertiary' functions display different locational requirements and are felt to merit separate examination.

Lastly, whereas a 'mill' referred originally to a building in which corn was ground, and by extension to an establishment fitted up with machinery rotated by wind or water-power, today it is accepted as 'a building or other place or establishment filled with machinery, in which a certain industry, manufacture, or manufacturing process is carried on'². For much of the period under scrutiny however, it appertained principally to a place where the manufacture of textiles was undertaken. Confusion arises because of the use of the term 'milling' to mean the same as 'fulling', a process in the manufacture of cloth. The medieval 'fullynge mill' became the scribbling and fulling mill of the 18th century which, more often than not, evolved into the 19th century woollen mill. As a result, even as late as 1850 there was no standard nomenclature for industrial buildings which might be 'shops',

¹H. Heaton, 'Benjamin Gott and the Industrial Revolution in Yorkshire', Ec. H. R., iii (1931), 45-66.

²Oxford English Dictionary (1933 edn.).

'workshops', 'works', 'factories', or 'manufactories'¹. Some caution is therefore required since a 'mill' could be either a huge textile factory or a small workshop where power was derived from a small water-wheel or horse-gin. And 'works' might refer to anything from a small dyehouse to a large ironworks or brick-manufacturing concern.

Analysis of urban settlements as points in space has hitherto predominated over study of their internal structure in geographical research, despite the fact that a high proportion of economic activity in advanced countries takes place within cities. One result of this neglect is that studies of urban growth have tended to underplay the importance of internal spatial dynamics, which is detrimental to our understanding of urban structure and processes.

This thesis, therefore, represents an attempt to describe the course of industrial growth in North Leeds between 1775 and 1914, focussing attention upon the location of individual factories and the forces which led to the choice of site. Leeds was the first centre in the world of a factory woollen industry, and as the fourth largest provincial centre in England is fully deserving of our attention. However, it is also hoped that some of the conclusions drawn here will contribute towards an understanding of intra-urban location of manufacturing.

¹ Ordnance Survey 5 ft. plans of Leeds (1850).

Chapter 1 - INDUSTRIAL DEVELOPMENT 1775-1800

Less than a quarter of a mile from the University of Leeds and its precinct is to be found the factory of George Bray & Co. Ltd., where gas fittings and appliances are manufactured. On a cursory analysis there appears to be no satisfactory explanation for its location, disadvantageously sited on the side of a steep hill, far removed from any natural surface water supply and surrounded by narrow streets which hinder communications. However, when the history of the factory is investigated we find that the present works stands upon the site of the old Bagby Mills, which in turn were developed at the place where first Maximilian Fischer, then James Brown, both Leeds cloth merchants, had their warehouses and dressing shops at the beginning of the 19th century¹. Requirements for such workshops were minimal, all labour being undertaken by hand or simple machine, and water being consumed in but moderate quantity.

The location of these workshops expressed the wish of merchants - in whose hands were found the later processes of cloth manufacture - to supervise the work of their employees as closely as possible, so as to produce cloth of a higher quality (and therefore price) than would otherwise have been possible. Finishing and packing workshops were therefore to be found in proximity to the residences of merchants, frequently in outbuildings set a short distance away within the grounds, sometimes even nearer. Francis Chorley of Park Lane, for example was able to pass from his house to his finishing shops (and later mill) without passing out-of-doors².

The latter part of the 18th century witnessed the withdrawal of the mercantile classes from the inner parts of Leeds, particularly from the west end of the town³, in response to the spread of industry and working-class

¹See Gazetteer - Bagby Mills.

²See Gazetteer - Park Lane Mills.

³M. W. Beresford, 'Prosperity Street and Others', in Beresford & Jones, Leeds and its Region, (1967), 186-99.

housing. Setting up residence on the higher areas of Woodhouse and the open moors to the north of Leeds, this migration was sometimes accompanied by movement of their workshops, a process which was not difficult to undertake because of the 'footloose' nature of the activity, and the low degree of capital investment which these shops represented.

It is possible, therefore, that the location today of one of the larger firms in north Leeds represents the desire of one such merchant to escape from the nuisance of manufacturing developments! The example given certainly highlights one feature - that an explanation for industrial location is frequently forthcoming only through study of the past. It is only by historical study that the processes and patterns of urban-industrial growth can be understood. Thus, in a thesis which is itself historical, it is nevertheless necessary to give some attention to that which has gone before.

The early town of Leeds, created a Borough in 1207 by Maurice Paynel, is that part of the present area which extends between Mill Hill, the site of the medieval Manor House, and the Parish Church, some third of a mile distant, near the confluence of the River Aire and the Meanwood Beck. From these nuclei the town has grown to its present size, swallowing up outlying villages and hamlets and today extending over some sixty square miles.¹

Most of this growth has been achieved only during the last two centuries. In 1775, on the eve of the Industrial Revolution, Leeds housed an estimated 17,000 souls², and the physical extent of the built-up area was almost wholly contained by the Headrows, Briggate, Marsh Lane, and East Street, with the river acting as the southern boundary (although development in the Hunslet Lane and Water Lane areas was beginning). Outside this area were found only farms and isolated mansions, plus a few cottages.

¹Beresford and Jones op. cit., (1967), ch.XI.

²Beresford (1967), art. cit., 189.

Leeds, then as now, lay at the northernmost end of the country's richest coalfield, which extends southwards from it along the eastern flank of the Pennines. The Northern Boundary Fault, beyond which the Millstone Grit series outcrop, lies two or three miles to the north of the town centre. Leeds is on the Lower Coal Measure series, and within its boundaries are to be found the Better, Black, Beeston and Middleton seams, of which however, only the last two named have proved to be of enduring importance. This series yielded not only coal for furnaces and steam-engines. Building stone, was quarried in the 18th century along the outcrops of Elland flags, and, of even greater importance for a city built of bricks rather than stone¹, abundant clay beds, of both coarse and fine nature, gave rise to an important brickmaking and earthenware industry. Finally, the Coal Measures also contained bands and nodules of ironstone which had given birth to a local iron industry at a very early date. Kirkstall forge, which lies about three miles from the centre, dates back to the 13th century².

The geological boundary was matched in the 18th century by an important economic divide. The large productive estates to the north and east of the town were in marked contrast to the smaller, more compact holdings of the south and west, a difference both produced by and reflected in the prevailing systems of agriculture. The more fertile soils of the lower Dales, the Magnesian Limestone escarpment, and the Vale of York were given over to large-scale grain farming and animal husbandry, whilst poorer soils and smaller holdings, owner-occupied, forced the farmers of the Coal Measures and the Pennine foothills to supplement the subsistence cultivation of food crops with sheep-herding for wool, a cash crop.

Leeds, astride the boundary of these two contrasting regions, was in an ideal location to exploit the advantages of both, and also to act as the

¹A. Briggs, Victorian Cities, (1963), ch.4.

²R. Butler, A History of Kirkstall Forge, (1954).

area's market centre. Agricultural products were brought into the town from the east and distributed throughout a region which in 1795 did not 'produce grain or feed cattle sufficient to supply one-fifth of the inhabitants'¹. This trade promoted industries like milling and encouraged the development of transport and commercial facilities which were to be a considerable attraction to many other manufacturing industries.

From the south and west came two commodities which were playing an increasingly important part in economic life: wool, the basic raw material of the woollen industry, and coal, the standard fuel for domestic purposes, and in use more and more by the town's dyehouses, maltings and the like.

Lastly, of great importance to the general commercial prosperity of the town, and later to be important also in the development of manufacturing, there was the flow of capital into Leeds from the wealthy landowners to the north and east. Normally their role was a passive one, 'similar to that in agriculture; to encourage enterprise and efficiency, and to be the providers of basic capital facilities necessary for progress', but on occasion they were more directly involved. Such proprietors as the Stanhopes 'brought within their ambit coal mines, iron forges, brick works, woollen mills, canals, turnpikes and docks'². In the Borough of Leeds the owner of a large estate in Kirkstall and Bramley set it out for clothiers and built a mill for one of the more prominent manufacturers³.

Rimmer points out that other towns, notably Wakefield, could have served equally well as the principal commercial centre of the region, were it not for the increasing concentration of wool and cloth merchants in

¹J. Aikin, Description of the Country From Twenty Miles Around Manchester (1795), 574.

²G. E. Mingay, English Landed Society in the Eighteenth Century (1964), 200-1.

³Sel. Comm. on the Woollen Manufacture (1806), 444.

Leeds, and its close alliance with the growing port of Hull¹. Whatever the reasons initially, the 18th century witnessed the consolidation of its pre-eminence with the building of three cloth halls², a number of turn-pike roads³, and two navigational systems which made Leeds an important inland port, linked with both the Atlantic and Baltic trades⁴. It was also, by the end of the century, the largest single market concentration in the Riding, with a population in 1801 of over 30,000 in the in-township alone⁵.

Even before the rise of new methods of production therefore, Leeds was one of the principal commercial and industrial centres in England. In the 18th century 'its prosperity advanced by leaps and bounds. There was an abundance of money available for building cloth halls, a theatre, a library etc., and the increase in population called for so many new houses that in 1786 four hundred new dwellings were under course of construction'⁶. This prosperity was founded principally upon the town's role as the commercial centre of the domestic woollen industry. Fear of

¹W. G. Rimmer, 'The Evolution of Leeds to 1700', Thoresby Soc. L (1967), 125-9.

²E. M. Sigsworth, 'The Leeds Cloth Halls', L. J. 25 (1954), 415-8.

³E. M. Sigsworth, 'The Industrial Revolution' in Beresford and Jones, op. cit. (1967), ch. XII.

⁴G. Ramsden, 'Waterways'. L. J. 26 (1955), 81-4.

⁵Census 1801.

⁶H. Heaton, The Yorkshire Woollen and Worsted Industries (1965), 280

the factory system in the 1790's extended to its tradesmen.

Even the Shopkeepers and Publicans of Leeds itself will be compelled to seek new occupations, when its celebrated Markets fail to attract that Weekly Concourse of Manufacturers, by whom they have long been maintained and enriched¹.

The actual manufacture of woollen cloth took place outside Leeds, in the villages to the south principally, and was largely in the hands of the clothiers, who controlled the processes of clothmaking up to the finishing and dyeing stages, for which it passed into the hands of merchants, the majority of whom resided in Leeds, near to the cloth halls. The population of Leeds in 1775, consequently, was largely engaged either in commerce and service industries, or the dyeing, dressing, shearing and other processes of finishing cloth².

Bischoff catalogued 26 stages in clothmaking, from sorting the raw wool into grades through to the packing of the finished cloth, ready for delivery³. Of these the first twenty were performed by country clothiers who inhabited 'villages and detached houses, covering the whole face of a district of from twenty to thirty miles in length, and from twelve to fifteen in breadth'⁴. These gave out the raw wool to journeyman spinners, and yarn to weavers, who were paid by the piece and usually operated as a family unit. At one time domestic woollen workers had inhabited the in-township of Leeds, but rising rents and better prospects in alternative forms of employment drove them out into the villages about⁵. By 1822,

¹L.C.A. D.W. 986 E Petitions of the Woollen Manufacturers (1794), 3.

²H. Heaton op. cit. (1965), 274.

³B. Bischoff, History of the Woollen and Worsted Industries (1842), ch. XII

⁴Sel. Comm. (1806), 9.

⁵Ibid., 158

when the domestic industry was yet flourishing, it was stated that, 'the first stages of manufacture are carried on in the villages and hamlets of the surrounding country, where the wool goes through the respective operations of spinning, weaving, and fulling'¹.

Clothiers normally purchased their wool either at source, often a whole year's clip at one time, or from fairs and markets in London and the wool-producing areas of East Anglia and Lowland England. A Mr. Armitage of Carr Hall, last of the old cloth makers in Hunslet, journeyed regularly to London on horseback - a trip lasting four days - to fetch his wool, before his death in 1818. Then he gave the wool out in the Oulton and Rothwell areas for spinning and weaving, but performed his own dyeing and finishing at Hunslet, before carrying the cloth to a number of markets, principally Leeds, for sale to merchants².

Once purchased and carried to the clothier's home, the wool was first washed and then, if intended for coloured cloth, dyed, usually in a workshop adjoining the house. The greater proportion was, however, left 'white' until after the cloth had been made. Cleaning and scouring was followed by oiling and carding, by which the wool was worked into a mass of inseparable fibres, ready for spinning. The next stages - preparatory spinning (scribbling and slubbing) and final spinning - were carried out in the homes of the clothier's employees, usually by women and children. Retrieved by the clothier the spun yarn was next put out to journeymen weavers, either in their own homes or sometimes in a small shed, part of the clothier's residence. This concentration of activity under one roof was not connected with the utilisation of any form of power. This was only introduced at the next stage of manufacture, whereby the cloth was fullled, or milled, in

¹E. Baines, History and Directory of Leeds, (1822), 12.

²Porter's Directory (1872), preface by J. Holmes.

buildings often specially constructed for the purpose, driven by water-wheels. At the Nether Mills, Near Bank, in Leeds, four pushing and five pulling stocks were in use for cloth fulling in 1793¹. Picksmall Mill, in School Close, had two stocks in operation in the 1790's for cloth-fulling and the grinding of corn². More often fulling mills were to be found outside Leeds, in the centres of manufacture at Armley, for example, or Kirkstall where, in 1763, apart from the Abbey, were 'few things remarkable else, besides mills for grinding corn and fulling cloath'³.

Milling, along with a further scouring, raised the nap of the cloth and gave it its characteristic homogenous quality. After a further wash the cloth was next tented (dried stretched out on hooks on a frame in the open air), a practice which required that the clothiers had use of a small field, and then transported to market.

It was at this point that the cloth passed out of the hands of the clothiers and into those of the merchants, who normally bought in the halls, but occasionally dealt direct with the country manufacturers. It was their responsibility to dye (if necessary) and finish the cloth before selling it, at home or abroad. Firstly it had to be 'raised' by means of hand-operated cylinders on which were fixed teazles (thistle-like plants) which picked up the nap. Then followed the process of shearing, or cropping, whereby this nap was evened off. After brushing and drawing (... together of any small holes in the cloth) and finally pressing (between rollers to impart a sheen), it was ready for packing.

Careful control was exercised over these stages of manufacture so as to produce a good quality cloth. The merchants therefore required to be

¹L.I., 9.12.1793.

²L.C.D. no. 1123.

³Cox, History of Yorkshire (1763).

close at hand, with the result that dressing and finishing shops were concentrated into those towns which they inhabited, of which Leeds was the foremost by the 18th century. In 1798 the town housed 148 merchants, who were served by 35 specialist cloth dressers, 24 dyers, 7 cassimere printers, 5 glossers, 3 drawers, and 1 hot presser¹. In the same year Leeds had only 22 clothmakers, almost all in suburban villages. (Map 2).

The finishing workshops were on a comparatively small scale, employing no power-driven machinery, and dependent upon a water supply only for washing the cloth. In terms of their locational requirements, therefore, this industry was largely footloose. This meant that not only was it possible for merchants to locate their workshops in the towns which they inhabited, but as often as not they were actually attached to his residence, as in the case of James Brown cited earlier. Available for purchase in 1791 was a

Capital Mansion-house, with the gardens, stable Dressing and Packing Shops, Warehouses and other conveniences thereto belonging, situate at the Town-end, Leeds².

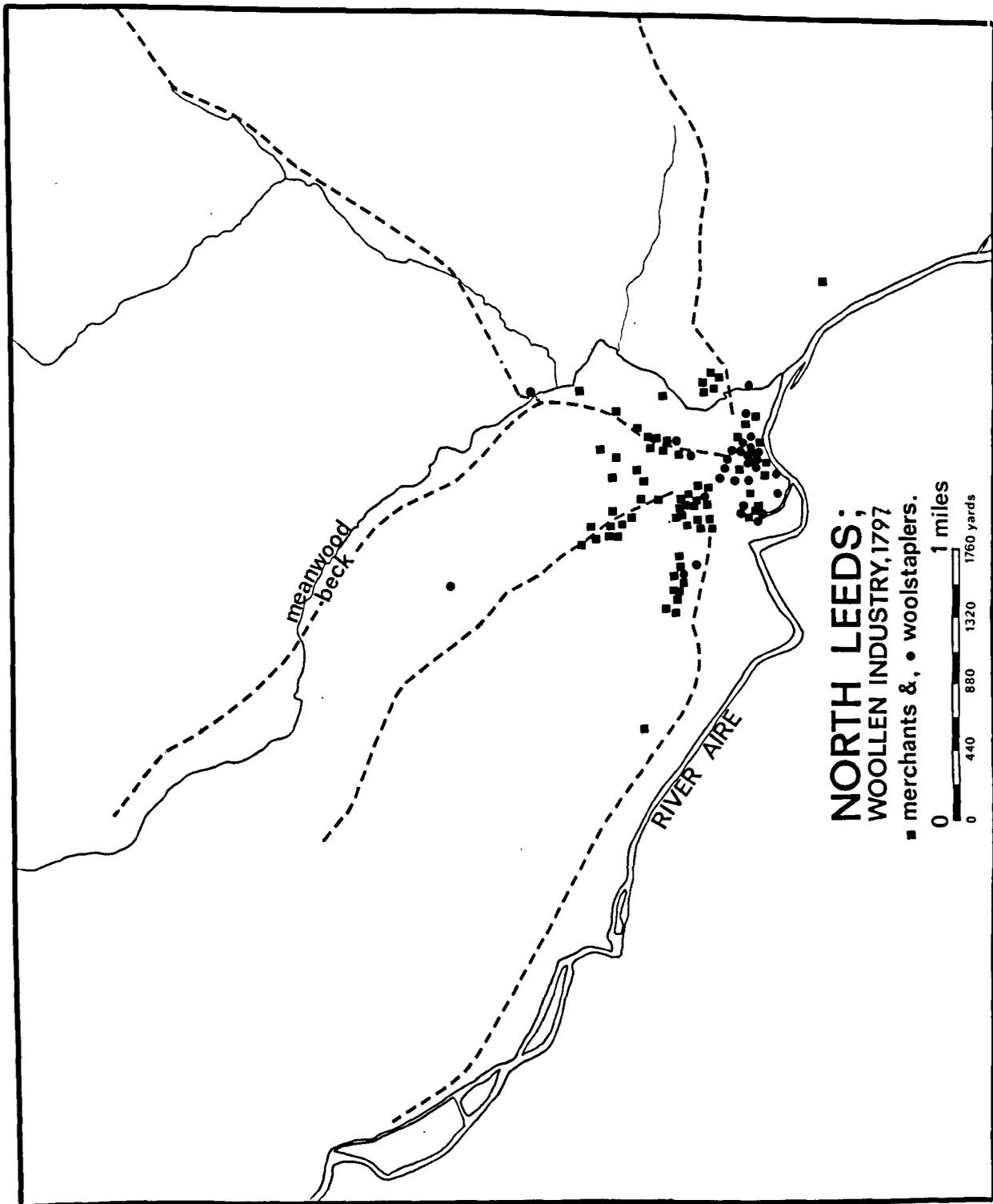
Formerly Dennison's, later Bischoff's house, this was one of the 'first to reject the town centre in favour of a slightly detached site'³. At least ten such associations of residence and workshops may be identified amongst the advertisements in the columns of the Leeds Intelligencer between 1790 and 1799, of which seven were outside the main built-up area of Leeds, in the higher areas to the north and west. In 1750 these were the most highly-rated districts, and therefore the most likely residence of the wealthy merchant class⁴:

¹1798 Directory.

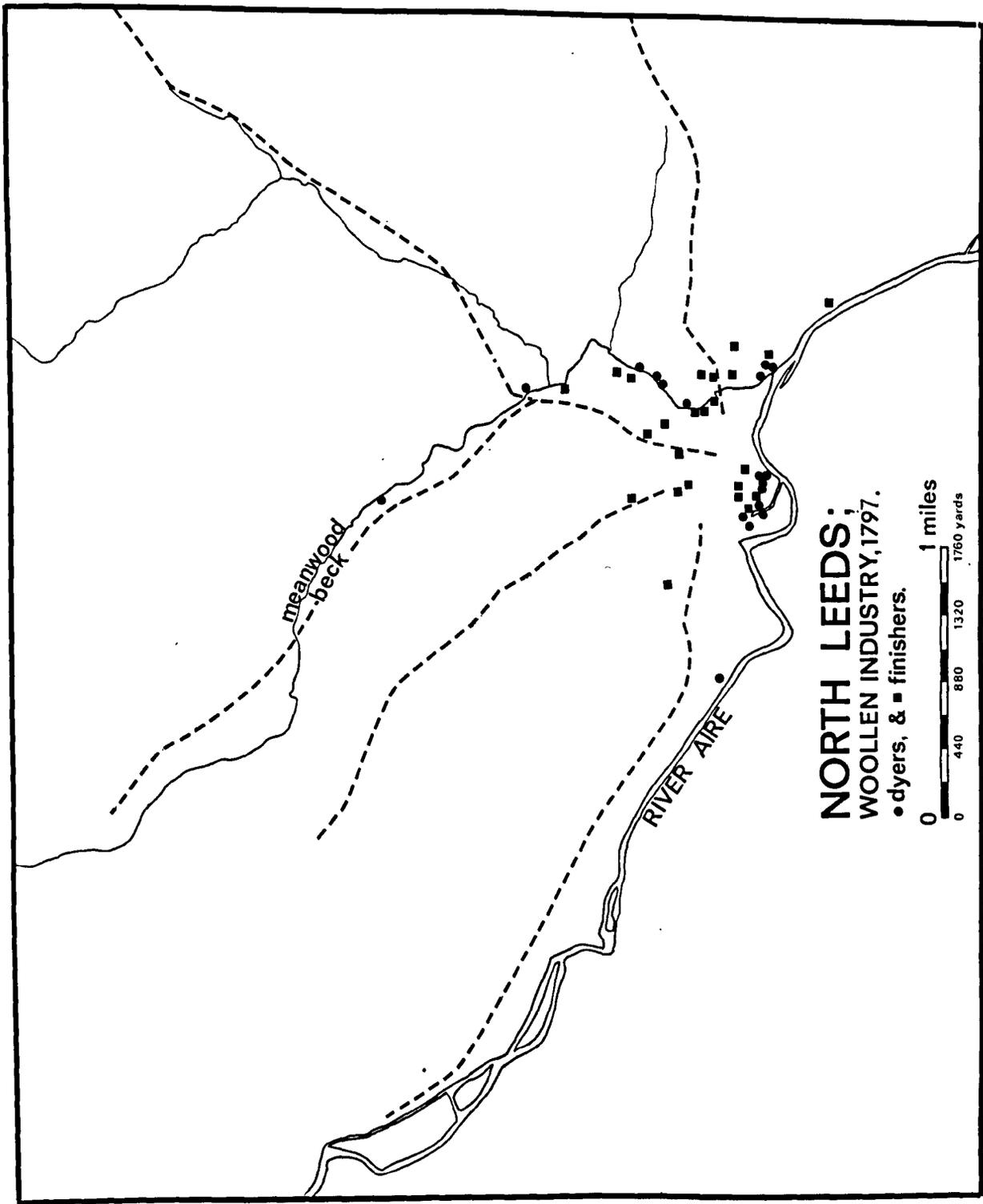
²L.I., 3.7.1791.

³Beresford, art. cit. (1967), 189.

⁴D. Ward, 'The Urban Plan of Leeds', (1961), 73 and Atlas fig. 10B.



Map 2



**NORTH LEEDS;
WOOLLEN INDUSTRY, 1797.**

• dyers, & ■ finishers.



Map 3

Besides workshops for the cloth finishing industry, Leeds in 1775 housed a number of other trades, as befitted a large concentration of population and/^aCommercial centre. Maltsters, brewers, curriers, distillers, printers, hat makers, carpet manufacturers and a large pottery are amongst those listed in the 1781 directory, and the in-township was littered with workshops as well as a number of water mills for grinding corn, fulling cloth and cutting tobacco¹.

All-told, the manufacturing and service industries of the town gave employment to between 10,500 and 13,000 by the 1790's, more than double the number of a half a century previous². Of these perhaps half were involved directly in the woollen industry, though the proportion of non-textile workers had risen rapidly throughout the 18th century³.

The 1797 directory lists 371 masters in textiles, which would mean that the average firm employed only a handful of workers, certainly less than twenty. The premises in Park Lane for sale in 1781 which could accommodate forty men were not typical⁴. Nor were the dressing-shops and warehouse in Park Square which in 1803 housed forty pairs of shears⁵. In the broadcloth industry the characteristic master employed fewer than a dozen men and a few hundred pounds in capital, and even in finishing the usual scale of organisation was little larger. Under the domestic system a 'diligent and sober Weaver, with a Capital of Ten Pounds, becomes qualified for a Master', and a common mode of organisation consisted of the father of

¹L.C.D., nos. 1123, 1785.

²Rimmer art. cit., (1967), 138.

³Ibid., 139.

⁴L.M., 6.3.1781.

⁵L.I., 10.1.1803.

a family, 'enabled to work up the raw material though almost all the Operations and Processes of Cloth-making, solely by the Help of his Wife and Children, or the occasional Addition of Two or Three Servants or Apprentices'¹.

Up until the final decade of the 18th century small-scale organisation dominated in Leeds. There was a large Pottery at Hunslet, two foundries (at Seacroft and Hunslet), and a number of coal pits where numbers employed are likely to have been in excess of thirty, but these were exceptional, and posed no threat to the existing order. North Leeds housed a large number of finishing shops, dyehouses, and small workshops, but the scale of each was very small. A house and currier's shop in Call Lane together covered only 110 sq. yds. in 1794, and a combing shop, two dyehouses and two workshops only 1,230 sq. yds.² Nor was any power applied to machinery, except in a few water mills, save that of human labour.

Before 1790, then, even the town's textile industry gave little indication of the changes about to be set in motion. There was a small number of fulling and scribbling mills, as well as a friezing mill at Mill Garth, but even here the numbers employed were few, and the scale of organisation was small. Henry Mellin's cassimere printing shop in Harper Street had a water wheel but nevertheless only occupied 516 sq. yds.³

This, therefore, was the industrial setting into which Richard Paley introduced his cotton mill in 1790 - unsophisticated, workshop-based, and only occasionally making use of water power. There were no steam engines at work in the Borough before 1789, except for a small number of pumping

¹ L.C.A. D.W. 986 E Petitions, 1.

² J. Teal, Survey Book with Plans of the Estates under the Management and Direction of the Committee on Pious Uses within the Borough of Leeds ... in the years 1792, 1793 and 1794 (1794).

³ L.C.D. no. 1785.

engines at work in the collieries of the out-townships¹. The woollen industry in particular was dispersed and very much the industry it had been for many centuries, unlike the West of England branch requiring little capital and permitting many thousands of workers to be their own masters².

This phase, which was to virtually disappear by the middle of the 19th century is of greater importance than might at first be thought. Firstly because so many early workshops grew imperceptibly into factories, and it is necessary to understand economic conditions when the site was first put to use for manufacturing. A surprising number of the early mills and factories of North Leeds were not totally new foundations but developments of existing buildings to which piecemeal increments were made. For example, the 'warehouse, with the cottages, dryhouse, Dressing-shops, Press-shops and other buildings'³ between Grace Street and Somers Street became a cloth mill in the early 19th century until in the final quarter of the century it was turned into a clothing factory for Clark, Hall and Atkinson. The site was in continual industrial use from the 18th century through to the 20th.

The transition from workshop to factory in the woollen industry in particular was frequently achieved without a firm moving its premises. As it was merchants, rather than clothiers or other classes of men, who provided the capital for early mill-building, it was a natural step for them to convert their workshops by adding a steam engine and erecting additional buildings and machinery. Joseph Oates, a prominent cloth merchant, founded Oatlands Mill in 1810 by adding a gig-mill, a new ware-

¹J. Goodchild, 'On the Introduction of Steam Power into the West Riding', South Yorks. Journal, (1971), 9-11.

²J. Tann, Gloucestershire Woollen Mills, (1967).

³L.C.D. no. 3888.

house, and a 10 h.p. steam engine to his finishing shops at Woodhouse Carr¹. By 1839 the premises had been extended to:

a mill, an engine house, boiler house, oil warehouse, teazle setting shop, smith's shop, sheds, counting house, a building three stories high used as a press curling and drawing shop, and a room used for machines called Lewis machines and for other purposes, a drying house, stable, gas house, cloth warehouse, another hand raising shop, counting house, cottage, and time shop².

Secondly, the domestic and workshop systems of manufacture are worthy of attention because they were such a long time dying out. Indeed, the workshop and small-scale organisation have persisted to the present day, being of especial importance to newly-established firms. In the woollen industry the domestic order of manufacture was still dominant even in the 1820's when Baines dismissed the newer factory system in only three lines:

Of late years, however, manufactories of cloth have been established on a larger scale, and the use of machinery has much increased³.

The domestic system, though 'wasteful and uneconomical' and 'conservative and antiquated', unable 'to meet growing demands, and to a great extent incapable of exerting itself to answer any sudden expansion in the market', nevertheless 'fostered the small unit', and gave 'some measure of independence and freedom of action to the worker'⁴. The clothier needed but little capital to set himself up in business, and the burden of economic fluctuation was passed straight on to the outworker, who himself preferred to keep away from the discipline of factory life and was unwilling to abandon his local community where some subsistence cultivation guaranteed at least a minimum of food. For these, and other

¹See Gazetteer - Oatlands Mill.

²W.R.R.D. NH 576, 501 (1839).

³E. Baines, op. cit. (1822), 30.

⁴H. Heaton, op. cit. (1965), 352.

reasons the last survivors of the domestic system - the handloom weavers - 'formed a class, though a very tiny class, in the Yorkshire Census of 1901'¹. Although not found in the towns, they represented the final stage in the long, drawn-out transition from domestic to factory production.

Finally, with reference to the system of manufacture in Leeds in 1775, it is important to remember that the industrial 'revolution' was in reality a peaceful transition and it is therefore essential to understand from what starting point the transformation was achieved.

'The specialisation of the marketing function of Leeds throughout the eighteenth century stimulated the growth of servicing industries rather than manufacturing', wrote Ward², a statement which is borne out by Rimmer's analysis of the Poor Apprentice Registers:

TABLE 1.i - DISTRIBUTION OF EMPLOYMENT IN THE 18TH CENTURY³

<u>Trade</u>	<u>1728/59</u>	<u>%</u>	<u>1760/79</u>	<u>%</u>	<u>1780/99</u>	<u>%</u>
Textiles	127	58.5	295	46.0	403	41.5
Commerce	2	0.9	11	1.7	25	2.6
Food, Drink, <u>etc.</u>	32	14.7	112	17.3	172	17.8
Others	58	26.3	224	34.5	370	38.4

Textiles, seemingly, were suffering a relative decline, but this was a process which was checked after 1790. Corn Mills, malt houses, dye-houses, finishing shops and many kinds of workshop had been common in North Leeds for hundreds of years, but a factory which Richard Paley began to erect at the Bank in 1790 was something totally new, marking the commencement of the transformation of the urban landscape.

The larger dressing-shops and loom-shops mentioned previously were miniature examples of factory organisation based upon the principle of

¹J. H. Clapham, 'Industrial Organisation in the Woollen and Worsted Industries of Yorkshire', Econ. Journal xvi (1906), 128.

²D. Ward op. cit. (1961), 64.

³W.G. Rimmer art. cit. (1967). Based upon tables 3 & 4, 143-4.

assembling a workforce under one roof so as to reduce transportation costs, facilitate supervision and prevent embezzlement. Theoretically there was no limit to the numbers that could be concentrated in this way, and in certain trades, notably iron-smelting and coalmining, there was a long history of such organisation¹.

The main impetus for the foundation of the factory system in North Leeds came from example set elsewhere. With such advances as the application of water-wheels and horse-capstans to the production of textile yarns it became feasible, and even desirable, to locate a large number of workers at the source of power. As early as 1721 as many as 300 persons were to be found labouring in one building, and the Derby silk mill, built in 1719, employed 200 hands at one time². A similar mill at Sheffield employed 152 at one time³. Nearer Leeds, there was a mill in School Close in Thoresby's time wherein,

the water-wheel carries both the Rape mill, and a mill for grinding logwoods, Brasil etc., also a fulling stock for milling shalloons, serges etc., and a twisting mill with eighty bobbings⁴,

which, although unlikely to have employed more than a handful of men, demonstrates that attempts were being made at bringing industry into the factory.

Samuel Arkwright's first mill was built at Cromford in 1771⁵. In 1783 he erected the first steam-powered mill in Lancashire, in the centre of Manchester close by the River Irwell. Six years later the first Boulton

¹P. Mantoux, The Industrial Revolution in the Eighteenth Century (1961). Part II, ch.2.

²S. D. Chapman, The Early Factory Masters (1967), 34.

³H. Heaton, op. cit. (1965), 354.

⁴R. Thoresby, Ducatus Leodiensis (1716), 79.

⁵S. D. Chapman, op. cit. (1967), 62-7.

and Watt engine to be applied to the textile industries was installed for Messrs. Drinkwater of Manchester, cotton spinners¹. At first Leeds' men of capital showed little inclination to follow suit, despite the lapse of the Arkwright patents in 1781, which had created 'a fever of speculation in Mansfield', where 'no less than eight firms sprang into existence' in the following decade², and despite the acknowledged efficiency of Watt's rotary engine.

The principal reason why the woollen industry did not quickly follow the example set by cotton consisted of technological difficulties in spinning wool, principally its tendency to break when spun at speed. As an old-established industry, moreover, the domestic system of manufacture was strongly entrenched, and opposition from journeymen and cottage spinners and weavers more difficult to overcome.

There is some evidence that attempts were made to change the industry, as for instance the fact that a Frenchman was brought before Leeds Court in 1784 accused of attempting to leave the country with plans of a horse wheel, carding machine, scribbling machine and a billy³. Country clothiers wasted little time adapting those stages of the manufacture which they traditionally controlled, wherever technically feasible, as with scribbling and slubbing. William Rhodes set up what was possibly one of the first water-powered scribbling mills in the country in 1770 in the Leylands⁴. By 1806 it was stated with some assurance that carding, slubbing, and spinning were all performed in mills, where before they had been done at the house;

¹A. E. Musson and A. Robinson, 'The Early Growth of Steam Power'. Ec.H.R. xi, 418-439.

²S. D. Chapman op. cit. (1967).

³W. B. Crump ed., 'The Leeds Woollen Industry, 1780-1820'. Thoresby Soc. xxxii (1931), 6.

⁴R. G. Wilson, 'The Fortunes of a Leeds Merchant House, 1780-1820'. Business History ix (1967).

...within the last ten years or twelve years, I believe the number of mills which I should call domestic mills ... in the district I am acquainted with, have been increased more than three times, perhaps more than four times; those which I speak of are those to which the domestic clothiers resort

...mills seem to be erected in every valley; whenever I go into the country I find a new mill, or a small steam engine erected wherever there is any water I do not mean gig mills or shearing frames, but principally for scribbling and carding¹.

By 1786 there were 170 scribbling machines in operation within the district between Leeds and Huddersfield, of which about 120 were small machines which did the work of three to four men². These developments were part and parcel of the domestic system, however. The scribbling mill had in it the germ of a woollen mill, but there was a long lull before it developed into one. Strong resistance from clothiers and operatives ensured a transition rather than a revolution.

When, however, we find that flax and cotton-spinning were being introduced into water-powered mills after 1788, it seems certain to say that these were part of no domestic system, but represent the early attempts of Leeds' capitalists to emulate their Lancashire counterparts.

The cotton industry was attracted into West Yorkshire in the last part of the 18th century by its advantages for siting water-powered mills. Following the lapse of the Arkwright patents cotton mills sprang up throughout Lancashire; and by 1787 there were already 41 and the search for suitable sites led up the Pennine valleys and over into Yorkshire. In that same year there were 11 cotton mills in the West Riding, though none were in North Leeds³. By 1798 there were at least five, however,

¹ Sel. Comm. (1806) op. cit., 446, evidence of Sir James Graham.

² W. B. Crump, art. cit. (1931), 15.

³ E. Baines, History of the Cotton Manufacture (1835), 387.

but Leeds was only ever on the fringe of the cotton manufacturing area, and the industry departed hastily after the turn of the century as dependence upon Manchester as the marketing centre and ^{upon} the steam engine increased. One firm, J. & J. Holroyd's, actually took their business to Manchester, though the dyeing branch of the family remained in Leeds¹. By 1807 there was but one firm in North Leeds still spinning cotton, and it had been forced to diversify by adding silk waste spinning².

These early cotton mills were not large, with one exception, as the following table indicates: Paley

TABLE 1.ii - SPINDLES AT WORK IN N. LEEDS COTTON MILLS c.1800

<u>Mill</u>	<u>Owners</u>	<u>Date</u>	<u>No. of Spindles</u>
Bank Upper	Paley & Co.	1804	4,688 ³
Bank Low	Wilkinson, Holdforth & Co.	1796	1,400 ⁴
Bank	Markland, Cookson & Fawcett	1792	1,000 ⁵ (+ 800 worsted)
Black Dog	Gowland, Boyne & Co.	1798	1,024 ⁶
Mabgate	Blagborough and Holroyd	1797	2,000 ⁵

Employing Chapman's classification, therefore, one mill belonged to the type C category, the very largest steam-powered mills, whilst the remainder belonged to types B.1 and B.2, with an insurance valuation typically £3-5,000⁷. Bank Mill, however, expanded rapidly and by 1795

¹L.C.A. H - Holroyd Papers.

²Holdforth & Co., formerly Wilkinson, Holdforth and Paley.

³L.I. 28.5.1804,

⁴Boulton and Watt mss. Letter, 20.6.1797, Richard Paley to Boulton and Watt.

⁵Ibid., Box 261 - Memorandum of Leeds engines, 1797 by Lawson.

⁶L.I. 27.5.1799.

⁷S. D. Chapman, 'Fixed Capital Formation in the British Cotton Industry 1770-1815'. Ec. H.R. xxxiii (1970), 235-66.

was rated at £11,600¹.

It is more difficult to estimate the numbers employed, but it is highly unlikely that the total in North Leeds ever exceeded 500 or 600. In 1818, by which time cotton spinning had disappeared from the area, the average Yorkshire cotton mill employed less than 70 workers².

However, it was probably not insufficient size which destroyed the Leeds branch of the industry, but more lucrative opportunities elsewhere. Although some firms, like Whittaker and Co.,³ went bankrupt, others switched their production to other commodities. Markland, Cookson and Fawcett concentrated upon worsted spinning, Gowland and Co., upon wool scribbling, whilst the example of Holdforth and Co. has already been cited (see footnote 2 previous page).

The cotton industry enjoyed only a brief glory in Leeds, therefore, but it was an important development nevertheless, for a number of reasons. Firstly because up until 1800 there were more cotton mills than either flax or woollen mills in North Leeds, and for a time the industry dominated factory employment. Secondly, it was responsible for introducing the steam engine to Leeds' industry. Pim Nevins, the cloth manufacturer, had installed one in his Hunslet mill in 1789, and there was also one at Marshall's flax mill in Holbeck after 1792, but both were used merely to pump water back up to an overshot water-wheel. The first steam engine used to directly drive textile machinery appears to have been the one

¹ Sun CS 8/636966.

² R. S. Fitton and A. P. Wadsworth, The Strutts and the Arkwrights (1958). Ch. v.

³ L.I., 1.5.1795.

installed by Paley at Bank Low Mill in 1790, and this was rapidly followed by other cotton mills in Hunslet and Leeds.

Finally the rise of the cotton industry encouraged the growth of factory manufacture in the woollen trade, not just by demonstrating the possibility, but also because some of the firms were involved in both industries. Gowland and Co., for example, were wool scribblers as well as cotton spinners, and Markland, Cookson and Fawcett spun worsted yarn and manufactured carpets.

Progress in other industries was more cautious, particularly in flax and wool-spinning, for which Leeds had to pioneer developments.

In 1788 John Marshall, the son of a Briggate linen draper, leased Scotland Mill at Adel from James Whiteley, a Leeds merchant and dyer, at the annual rent of £109.

The Lessees have erected within the mill several Machines, Buncher and other things for carrying on their Manufactory of Linen Cloth and the spinning of Linen Yarn¹,

the lease stated. Using similar machinery to that developed by Kendrew and Porthouse at Darlington, Marshall was unable to achieve success until Matthew Murray, newly arrived in Leeds, was taken on as engineer and mechanic. By 1791 Murray had developed spinning machinery sufficiently successful to persuade Marshall to leave Adel and build a new mill in Holbeck, nearer to Leeds and to supplies of coal². Though it was some years before Murray's heckling and spinning machinery was perfected, Marshall's progress was rapid enough to encourage other firms to enter the trade, amongst which were Armistead, Spence and Houseman of Millgarth Mill, and Moore and Pickersgill of the Nether Mills. By the turn of the century there

¹ Marshall Collection, Brotherton library. Lease of Scotland Mill, Adel 5.1.178

² E. K. Scott, Matthew Murray, Pioneer Engineer, 1765-1826. (1928)., W. G. Rimmer, Marshall's of Leeds, Flax Spinners, 1788-1886. (1960).

By the turn of the century there were four or five flax mills in Leeds, and an important new industry was established.

But the most significant development in Leeds, or even West Yorkshire, in the final decade of the 18th century occurred in 1792 when Benjamin Gott, a partner in the mercantile concern of Wormald, Fountain and Gott¹, finding himself managing partner of a thriving business with a demand for cloth which could not be met in the traditional manner of buying in the halls and a large amount of capital, determined to undertake his own manufacture, as Nevins and possibly Brooke had already done. The domestic manufacture was unable to keep pace with the expansion of market caused by increasing population, rising real income and the opening up of overseas markets. Moreover, Gott wished to enter a field of production hitherto the prerogative of the West Country clothiers - the manufacture of 'superfines', high quality broadcloths. For these the work had to be closely supervised and the wool imported from Saxony, both of which operations were easier to carry out if production was centralised into one building.

Initially Gott probably thought of the factory as supplementing rather than replacing the domestic system, and he continued to buy in the halls for many years. Nor in his methods of manufacture did he differ radically from the old system. The application of power was not extended in any way. A 40 h.p. engine was purchased from Boulton and Watt, but was used only for scribbling, carding, willeying, napping, brushing, grinding dyewoods, and turning the indigo mill initially². Attempts were made to introduce new machinery, for example the gig-mill, but failed in response to workers' opposition. But in one important respect Gott was both unique and

¹ A fuller account of the history of Gott and his mills is given in: W. B. Crump ed., op. cit. (1931) and H. Heaton, 'Benjamin Gott and the Industrial Revolution in Yorkshire', Ec.H.R.(2), iii (1931), 45-66.

² H, Heaton, art. cit. (1931), 53.

successful - he was the first manufacturer to assemble all 29 processes of woollen manufacture in one building and on such a large scale.

Gott commenced manufacture at a particularly fortuitous time, total broad and narrow-cloth production having risen rapidly in the second half of the 18th century:

TABLE 1.iii - TOTAL CLOTH PRODUCTION IN WEST YORKSHIRE¹ (Millions of yards)

1770	...	...	...	...	4.91
1780	...	...	...	...	5.37
1790	...	...	...	...	9.73

Between the opening of the War of American Independence in 1776 and the close of the French Wars in 1815 England experienced only eleven years of peace, most of them before 1792, which meant the generation of a high level of demand throughout, especially for blankets and uniform cloths, both of which Gott contracted to supply to the government. His business prospered to such an extent that two further mills were added: Armley Mill, for fulling and scribbling, and Burley Mill, where blankets were manufactured.

Other woollen mills were established in Leeds following Gott's example and by 1806 there were four prominent concerns - Gott's, Nevins', Brook's and Fisher's². The capital for these ventures came principally from the merchant classes and the list of signatories to a petition outlining the advantages of new machinery in 1791 is illuminating. Of the fifteen merchant firms listed all but one (Phillips, Oates and Co.) either already had^{built} or went on to ~~construct~~ build cloth mills³. According to Pankhurst it was rare for capital to be invested from outside the industry in the 19th century⁴, and as the clothiers were men of small capital, it was left to the merchants

¹B. Bischoff, op. cit. (1842).

²Sel. Comm., (1806), 76, evidence of Robert Cookson.

³W. B. Crump, op. cit. (1931), 319.

⁴K. V. Pankhurst, 'Investment in the West Riding Wool Textile Industry in the Nineteenth Century', Yorks. Bull., 7 (1955), 93-110.

to display initiative in this direction. It was, as previously noted, a fairly simple step for them to convert their finishing shops into a factory. Already by 1794 they were doing so in sufficient numbers to cause the domestic manufacturers to petition Parliament:

And whereas the Trade of a Merchant or Dealer in Cloth hath heretofore been carried on separately and distinctly from the Trade of a Maker of Cloth, but of late years sundry Merchants and dealers in Cloth, possessing large Capitals, have established extensive Manufactories of Woollen Cloth, intending to manufacture Cloth therein, through all the several Stages of Manufacture, by means of their own Workmen and Servants, and of selling the same when finished to the different Consumers¹

Such merchants lived mainly in or near the towns of Leeds and Halifax, and thus the early factory woollen industry was established in these towns, and in Huddersfield too. In this initial phase the merchant-manufacturer was the dominant form of investor in Leeds. 'Company Mills', founded by the associated capital of large numbers of clothiers, arose out of the domestic system, and hence were found only outside Leeds in the southern out-townships and outlying villages. Nor was speculative building and renting-out common before 1800, possibly because in such a new trade the risks were too great. In contrast to the worsted industry of Horton near Bradford, for example, where seven out of nine mills built 1817-26 were rented out,² the only positive instance in the Leeds woollen industry is the four mills built and owned by Sir James Graham in Burley and Kirkstall.³

¹L.C.A. D.W. 986E, A Bill to enable the Trustees etc. (1794), 2.

²K. V. Pankhurst, art. cit., (1955).

³See gazetteer - Kirkstall Mills, St. Anne's Mill, Savins Mill, and Burley Mill.

Small firms were not totally debarred from entering factory manufacture however. Renting 'room and power' offered one alternative to building a new mill; a practice more prevalent in the cotton industry¹ but not uncommon in Leeds. In 1791 William Tipping and James Brennard leased a part of the Nether Mills from a Dr. Fearn, the latter agreeing to supply £600 of his capital for rebuilding the part of the mills previously used for cloth fulling². In 1803 a water-mill with two wheels and five separate chambers, suitable for 'scribbling, cotton spinning, carding, tobacco and snuff manufacture, papermaking, rasping and chipping dyewoods etc.' was offered for lease³. Sometimes manufacturers leased out their surplus floor space and power, as for instance a room, 25 yds. by 11 yds., with six to eight h.p. from a steam engine, available in 1803⁴.

Generally however, the earliest factories in Leeds were newly-built and established by men of capital, notably merchants. By 1800 there were mills for spinning flax and cotton, and for the manufacture of cloth, but the factory system did not begin to affect the town's other trades until after the turn of the century. There were already signs, however, that the new methods of organisation, coupled with rising demand from textile mills, were promoting the growth of firms in founding and machine-making. These and other industries are dealt with more fully in the next chapter, but some early developments are worth noting here. For example, Martin and James Cawood came to Leeds from Birmingham in 1791 and started a small

¹Fitton and Wadsworth, op. cit., (1958). Ch. V.

²British Waterways, Deeds no. 107.

³L.I. 10.1.1803.

⁴Ibid., 17.1.1803.

brass foundry in Duke Street¹. Thomas Smith and Company were established as ironfounders in Tenter Lane some time between 1781 and 1793, but most significant of all was the erection of the Round Foundry in Holbeck in 1795 by Matthew Murray, in partnership with Fenton and Wood, where the manufacture of machinery and steam engines was commenced. By 1806 the works employed an estimated 100 hands and it was many years before the firm was surpassed in size by any other Leeds engineering concern².

Most industrial establishments as found in 1800 were the same as their predecessors of twenty-five years before, however. Dyehouses, corn mills, scribbling mills and the like were all expanding in size in response to the growing needs of the area, but there had been only one major change in their nature - the adoption by the bigger houses of the steam engine.

By their steady growth, by the addition of steam power, and with gradual changes in technology and organisation these industrial buildings evolved into true factories, but it is impossible to state at what juncture they ceased to be workshops and became factories. Small dyehouses of the 18th century, for instance, became large-scale establishments in the 19th, their rise being directly related to growth in the textile industries.

Following the announcement that

Joseph Holroyd at Shipscar Bridge begs leave to acquaint all Merchants and others that he scowers, stores and finishes all sorts of woollen and worsted goods³

in 1764 the Sheepscar dyeworks commenced operation. Maps indicate its progress over the succeeding 150 years. By 1825 a 20 h.p. engine was at

¹L.M., 10.5.1884.

²Sel. Comm. (1806), 158, evidence of John Hebblethwaite.

³L.M., 25.12.1764.

work and by 1914 this was the largest works of its type in North Leeds, the company only ceasing operations in the 1930's, after 170 years of continuous activity on the same site.

The complex of warehouses, dyehouses, and workshops found along Meanwood Beck between Lady Bridge and Mabgate Green started in 1767 when William Rhodes, a dyer, bought the land and two cottages off William Blackburn. By 1811, when the estate was sold off to various purchasers, the estate contained dyehouses, warehouses, a callender house, singeing houses, stiffening houses, a press-shop, an unidentified workshop, and several tenements¹.

Dyehouses in the 1790's were small, then. The dyers worked mostly on a commission basis, and were concerned with white cloth rather than raw wool which, as already mentioned, was normally dyed by the clothiers in the country areas. Working to commission meant dyeing cloth according to customers' requirements, at the instructions of the merchants, with whom therefore, it was important to maintain close contact.

The heyday of the Leeds dyeing industry occurred between the period of acknowledged Dutch supremacy (late 17th century) and the ascendancy of Bradford (mid 19th century)². It was during the 1790's that Parliament paid Clerk and Berkenhout of Leeds £5,000 for their attempts to find a fast bright red for cotton, and Gott was experimenting with dyeing by steam at Bean Ing.³

Leaving aside dyehouses attached to cloth mills only one steam engine was installed for the industry by 1797, which is indicative of the small

¹L.C.D. nos. 2346, 2377, 2416.

²E. M. Sigsworth, 'Dyeing'. L.J. 26 (1955), 3-5.

³S. Fairlie, 'Dyestuffs in the Eighteenth Century', Ec.H.R. (2), xvii (1964), 488-510.

scale of operation and lack of capital which characterized it. Even half a century later steam power was only used for moving the cloths about and feeding them into the dye vats and therefore only in the largest of works was their cost justifiable.

In grinding and milling, on the other hand, where power was required in large quantity, steam engines quickly replaced or supplemented water wheels as soon as the rotary crankshaft was developed. The largest engine at work in North Leeds by 1800 was one of 60 h.p. installed at Crown Point Oil Mills.

The principal product which underwent the milling process was grain, although oilseeds (e.g. rape) and dyewoods were also consumed in large quantities. The grinding of corn within the soke of Leeds Manor was the monopoly of the owner of the King's Mills in Swinegate, a monopoly only extinguished for the high price of £13,000 in 1838¹. In fact, because the owner of the King's Mills in the 1790's, John Pate Neville, also possessed other mills in School Close, corn was ground elsewhere - at Flay Crow Mill and Picksmall Mill².

Other grinding mills within the soke, for example Pitfall Mill or Crown Point Mill, were given over to rasping and grinding dyewoods, or sometimes to cloth fulling and friezing in part³. All these mills faced the river and backed onto streets, which indicates the source of their raw materials - along the river by barge.

Beyond the area of soke lay other corn mills, usually water-powered, but sometimes, as at Potternewton, or Clay Pit Lane, driven by sails. These

¹L.C.D. no. 1123.

²Ibid.

³L.C.D. nos. 150 and 4220.

mills served a more local demand and tended to be less specialised. Clay Pit Mill was used for rasping, chipping dyewoods, grinding and crushing seeds, and the making of oil in 1777¹. The mill at Kirkstall was used both for corn milling and cloth fulling. Their location was determined firstly by their need for water for power (except for windmills), secondly by the distribution of demand for their services, and finally by their exclusion from the soke area of the Leeds mills. Each village of the out-township with a large enough population to support one had its small mill to which the inhabitants of the surrounding area resorted. In addition there were one or two mills in Leeds itself but just beyond the soke - Nether Mills, and Falkingham's Mill at Mill Garth, which was the subject of a lawsuit in the 16th century².

The most favourable sites for these mills were along Meanwood Beck, or somewhere along the Aire where it was possible to cut a goit and establish a weir, as in the School Close area where a loop in the river and the flat gravelly nature of the land created a particularly advantageous location. Moreover this area was close to the centre of the town and had transport access via the river, and not surprisingly it remained a centre for the milling industry throughout the period.

The decade 1790-1800 was a momentous one because it saw the first cotton, woollen, and flax factories in Leeds, and the first true engineering works. It also witnessed the substitution of steam power for water power. From 1789 onwards there was a growing awareness that industry was beginning to change, and the Nether Mills, for example, was advertised in 1791 as being suitable for the formation of 'extensive cotton works', worked by the

¹L.M., 7.10.1777.

²E. Wilson, 'A Leeds Lawsuit in the Sixteenth Century'. Thoresby Soc., ix (1899), 1-4.

five water wheels¹. By 1802, however, emphasis had switched to steam power. The emphasis in advertisements for land suitable for factory development changed from 'the considerable fall of water', to its being 'advantageously situated for the erection of manufactories and steam engines'².

Although the number of water-powered mills in the West Riding continued to increase well into the 19th century, and despite the fact that Leeds was highly suitable for their development, no new ones were built in North Leeds after 1800. The steam engine was more efficient and more reliable, and possibly not much more costly. Blagborough and Holroyd exchanged their wheel for a steam engine in 1795 after only four years of operation. The water wheel at Bank Mill was never utilised at all:

We have built a very large and expensive water wheel with every other requisite, to abandon which would be attended with a very heavy loss, but if I could be assured you'd erect a steam engine in three months, we would sustain the loss³

wrote Jonathan Cookson to Boulton and Watt in 1792.

Young noted 6-7 steam engines at work in Leeds in 1796, which is probably an underestimate, though the total is unlikely to have exceeded 10⁴. By the end of the century, if Farey's statement is accurate, there were 20 steam engines at work in the Borough, a total of 270 h.p.⁵ Ten of these were of Boulton and Watt manufacture, installed in six cotton mills,

¹L.I., 24.2.1791.

²L.I., 3.9.1802.

³Boulton and Watt MSS. Box 4-M-S. Letter 7.1.1792 Cookson to Boulton & Watt.

⁴J. Goodchild, art. cit., (1971), 8.

⁵S. Farey, A Treatise on the Steam Engine, (1827).

three woollen mills, and one flax mill¹. Of the remainder one, at least, was in a dyehouse, probably either Sayner's (Hunslet) or Holroyd's (Sheepscar), and the others at Leeds Pottery and a few small concerns. The total power of the Watt engines was in excess of 220 h.p., which means that the other engines were but small. One of them was almost certainly the 3 h.p. engine which Butterworth and Company offered for sale when they went bankrupt in 1802. It would have been used for rotating the cylinders and rollers in their stuff pressing workshops².

The extent to which the factory system had established itself by 1800 is difficult to assess, not so much because of the lack of information, but more because of problems of definition. Thus a witness told the 1806 Select Committee on the Woollen Manufacture that a building which housed twenty hands was not a factory, but that some people would consider it so³. A firm with 24 looms, half rented out, was considered, 'a sort of mongrel, half factory and half domestic'⁴. Others did not recognise a factory until there were more than fifty looms⁵, or upwards of two hundred hands⁶.

Basically it was a question of organisation rather than power, or even scale. The prime features were the application of capital and the assembly of workforce under one roof. The domestic system was carried out chiefly 'by Persons having small Capitals'⁷, whereas factory production was carried

¹Boulton and Watt MSS. 'Catalogue of Old Engines'.

²L.I., 6.12.1803.

³Sel. Comm. (1806), 77, evidence of Robert Cookson.

⁴W. G. Rimmer, art. cit., (1967), 146.

⁵Sel. Comm. (1806), 60, evidence of James Ellis.

⁶Ibid., 77, evidence of Robert Cookson.

⁷L.C.A. D.W. 986E, A Bill to Enable the Trustees etc., 1.

out in

immense Buildings, in which all the Machinery and Contrivances they (the Clothiers) themselves have invented for facilitating Labour, are consolidated and connected in such a Manner, and in such Quantities, as to be worked by a much less Number of Hands, for the sole Advantage of the Merchants ...¹

At the same time the factory master's control over his product was complete. According to one merchant, they 'buy the wool and I believe it never goes out of their hands till it is completely dressed and pressed'², though on occasion specialist finishers and dyers were employed.

But even in the cloth industry the extent to which transformation had taken place was very limited. Production of broadcloth in the West Riding in 1805 exceeded 300,000 pieces, besides which was manufactured a further 166,000 narrow cloths³. The annual production of the Leeds factories was then reckoned to be more than 8,000 cloths⁴, whilst factories elsewhere in the county perhaps produced a similar total. In all therefore, less than one in thirty cloths was factory-made at the turn of the century. In the Borough of Leeds, where there were less clothiers but five factories, the proportion was higher - according to one witness one-sixteenth of the total⁵. Although the number of factories in Yorkshire in 1794 was not great enough 'to give any Just Cause of Alarm'⁶, the number of clothiers which were displaced by one factory was said to be 260⁷. One new factory in Leeds

¹Ibid., Petitions (1794), 2.

²Ibid.

³Sel. Comm. (1806), 10.

⁴Ibid.

⁵Sel. Comm. (1806), 76, evidence of Robert Cookson.

⁶L.C.A. D.W. 986E, Petitions (1794), 2.

⁷Ibid., 3.

(Bean Ing presumably) was capable of manufacturing and finishing a hundred cloths per week, about one-fortieth of the total manufactured in 1792¹.

Yet there was no other factory of such a size anywhere in Yorkshire, and it was many years before one emerged. In fact, factory growth in the woollen industry in the initial phase was extremely cautious, and in North Leeds the next fully integrated woollen mill was not erected until 1812 (Carr Mills), although a few finishing mills were set up in the meantime.

The flax and cotton spinning industries were from their inception factory-based, however, although linen-weaving continued to be a domestic and workshop activity. These mills were established on a large scale normally, and represented considerable outlay on capital. Comparison may be made, for example, between the average insurance value of woollen firms in the 1790's (£1,900 - ,principally stock and utensils), and that for cotton mills (£4,500)². But their number was limited to under twenty within the whole borough at the end of the 18th century, and Leeds was still predominantly a centre of workshop trades.

Finally, the surviving Poor Rate assessment books help to place factory growth in perspective³. Unfortunately, it is not known at what rate mills and other establishments were levied, but dyehouses commonly paid £10 or less, whilst cotton factories contributed between £50 and £100. Smaller finishing mills and water-powered scribbling and fulling mills were rated at between £15 and £80. Over these rose Bean Ing Mills, which was assessed at £217 in 1800, and John Neville's School Close estate, which comprised

¹Ibid., 3.

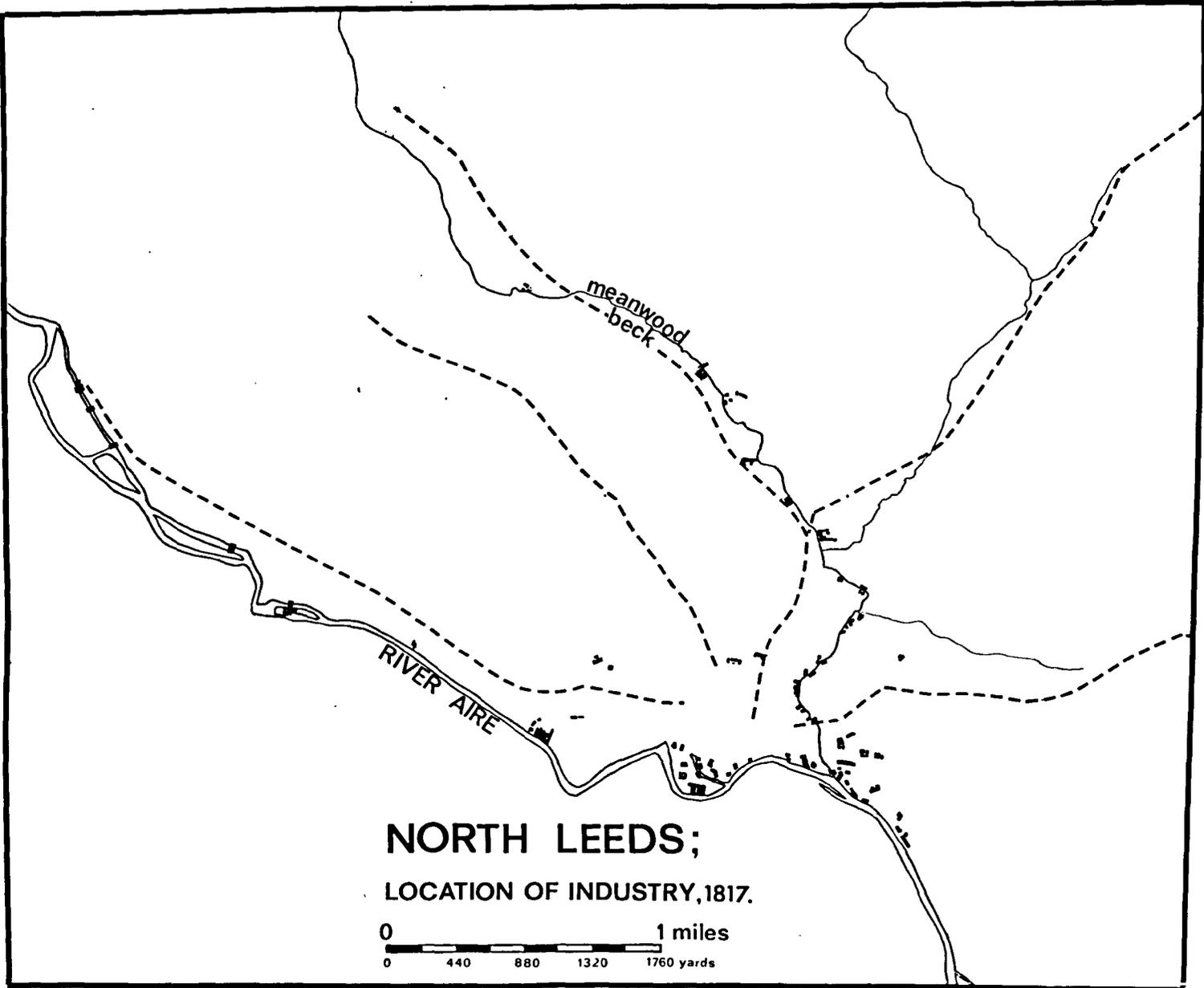
²Calculated from the Sun C.S. and Royal Exchange Insurance Policies.

³L.C.A. Rates Books for 1790, 1795, 1800, 1805.

the King's, Flay Crow, and Picksmall Mills, rated at £435 in 1805. From this evidence it would appear that the number of large factories in Leeds by the first decade of the 19th century was strictly limited, and that the progress of the factory system was only just beginning.

There was little to disturb the urban scene as it had been a quarter of a century earlier. Fields still encroached to within a quarter of a mile of Briggate, and an observer from Cavalier Hill at the Bank in 1797 saw little else besides four cotton factories, and 'a number of mills, dyehouses and various manufacturing machinery, on the River, from Water Lane to Timble Bridge', as well as two factories at Buslingthorpe'¹.

¹G. Wright, History of Leeds (1797), 31.



Map 4

Chapter II - INDUSTRIAL DEVELOPMENT 1800-50

The task of objectively analysing changes in the industrial structure of English towns, made easier in 1841 and succeeding censuses by the inclusion of occupational returns, is hindered by the lack of quantitative data before that year. The momentum and direction must therefore be assessed by reference to other sources of a more sporadic nature.

From these sources some estimation of the size of the various occupational groups may be made, but there remains the problem of assessing what proportion of the workforce was employed in factories. For those industries where there had ever been little tradition of domestic and workshop organisation, this is not too difficult a task. But in others, for example the cloth industry, where all forms of organisation existed side-by-side but not in sharply defined categories, this represents a formidable challenge.

Nevertheless it is precisely with such objectives in mind that this chapter sets ^{out} to chart the course of industrial development in North Leeds. In chapter I it was stated that industry in 1800 was basically still the same as a quarter of a century before, but that the factory system had been introduced into the town in the 1790's by a small number of textile mills and a single iron foundry. A 'revolution' in manufacturing was observable only in flax and cotton-spinning, and cloth manufacture, where the conjunction of capitalism, technological developments, rising demand, and new methods of organisation had fostered the development of large mills, the first true factories. Even in these industries, however, the change was limited. There was little machine spinning in the woollen industry before 1820, for example¹, and 'as far as weaving and finishing are concerned the industry in 1820 was much nearer what it had been in 1770

¹R. M. Hartwell, 'The Yorkshire Woollen & Worsted Industries, 1800-50, (1956), 327.

than what it became by 1870¹. Factory production accounted for a small proportion of the total broadcloths milled in Leeds at the turn of the century, and the system was much further advanced in the town than in other parts of the West Riding. In 1797 production from Gott's mill amounted to 3,690 pieces, the same number as at Knowsthorpe Mill and less than at Kirkstall, both of which served the domestic system. Pim Nevins' mill at Larchfield milled only 208 pieces in the same year².

Even by the middle of the 19th century weaving remained essentially a hand operation, in woollens if not in worsteds, and the remaining manufacturing trades were basically the same as they had been in 1800, with the exception of engineering and tanning where a few large firms had started to emerge.

In 1841, by the time of the first time occupational census, Rimmer concludes, ~~that~~ Leeds was still 'far from being a factory town ... only one out of every four or five occupied persons in Leeds then worked in a factory. And fewer than one firm in ten used steam-power'³. He may be erring on the side of caution, for there were in excess of 7,000 firms in the Borough in 1842, yet only 171 steam engines in the in-township⁴. Even with the out-townships added, it seems reasonable to estimate that only about one firm in twenty had a steam engine, and only a few possessed a water wheel. Handicraft industries still dominated.

The Statistical Committee of 1839 surveyed the town and recorded that of 47,000 persons at work in Leeds (excluding domestic servants),

¹W. B. Crump ed., 'The Leeds Woollen Industry'. Thoresby Soc. xlii (1931), 26.

²Cusworth Hall Museum. 'An Account of the Number of Pieces of Broadcloth milled at the Several Mills undermentioned, from Bradford Sessions 1796 to Bradford Sessions 1797'.

³W. G. Rimmer, 'The Industrial Profile of Leeds 1740-1840'. Thoresby Soc.L (1967), 147.

⁴Ibid., 147 and L.I. 11.2.1843.

'persons employed in the manufacture of woollen, worsted, cotton, silk, and flax goods, by power ... in mills' constituted less than a quarter¹. Even if non-textile, factory employment is added to this total, it is clear that factory operatives were a minority in the working population, whatever definition of a 'factory' is adopted.

Taking the manufacturing sector by itself, and ignoring other occupations, approximately two-thirds of a labour force of 35-36,000 (1841) were employed outside the factories, most commonly in some form of workshop and in many instances in their own homes. This is the most prominent feature of industrial organisation in the first half of the 19th century - Leeds was never a factory town in the sense that mill employment ever dominated the town, as it did in some more rural communities.

The next most significant feature in relation to the industrial structure of Leeds in this period was the overriding predominance of the textile trades, which in 1841 employed almost 38% of the Borough's workforce, greater than all the remaining industries together. The town was 'the principal seat of the woollen manufacture in England', and also the foremost centre for the spinning of flax². In 1837 it was stated that 'the inhabitants of the Borough are principally engaged in the woollen manufacture ... and there are several factories engaged in spinning flax'³. Textiles were the town's staple trades, although Leeds was never so dependent as was Bradford upon its worsted industry⁴. Besides the textile mills, with the associated finishing works and dyehouses, there were 'several iron foundries', whilst 'glass, earthenware, and tobacco are manufactured

¹ Stat. Comm. of the Town Council, 'Report upon the Condition of the Town of Leeds' etc., J.S.S.ii (1839).

² E. Baines, History, Directory and Gazetteer of the County of York (1822), 30.

³ P.P.(1837) XXVII Report on the Municipal Corporation Boundaries, 195.

⁴ E. M. Sigsworth, 'The West Riding Textile Industry and the Great Exhibition'. Yorks. Bull. 4 (1952)

extensively¹. To this list Baines added corn milling and the saw and ware mills².

The possibilities for utilising occupational and directory sources have been fully investigated by Rimmer³, to whose findings little can be added. The following paragraphs attempt to summarise his results.

Rimmer's careful usage of directory sources forms a useful picture of occupational change in Leeds from 1740 to 1840, from which the following table is extracted⁴:

TABLE 2.i - PERCENTAGE OF MASTERS IN VARIOUS TRADES, LEEDS TOWNSHIP

<u>Occupational Group</u>	<u>1797</u>	<u>1817</u>	<u>1834</u>
Bricks, Pottery, Glass	0.4	3.3	1.8
Chemicals, Oils	1.2	2.7	3.2
Metals, Engineering	6.1	6.7	8.9
Precious Metals	1.0	0.7	1.5
Textiles	41.5	18.0	14.4
Leather	2.1	1.9	2.2
Clothing, Footwear	7.9	5.4	10.6
Food, Drink, Tobacco	17.8	24.1	26.8
Woodworking	1.5	4.5	5.2
Paper and Printing	2.1	1.9	2.4
Others	18.4	31.8	23.0

In the 1790's of a total occupied population of between 10,500 and 13,000, an estimated 7,000 (55-65%) were workers in textiles, predominantly the woollen industry. This proportion had been diminishing throughout the 18th century, and it continued to do so during the first half of the 19th, despite the establishment of so many new mills. Decline was only relative in relation to other industries and occupations, however, especially those in the service sector, though leather, chemicals, metals and engineering all

¹E. Parsons and W. White, Annals of Leeds, etc. (1830), 216.

²E. Baines op. cit. (1822), 30.

³W. G. Rimmer, art. cit. (1967).

⁴Ibid., 143-5.

grew at a faster rate, which leads Rimmer to the conclusion that 'in the nineteenth century Leeds became a less favourable place for making textiles'¹. The validity of this assertion will be put to the test later in this chapter. His contention that the woollen industry can be regarded only as 'primus inter pares in the second quarter of the nineteenth century'² may be challenged, but as he himself pointed out, to do so requires an analysis of each major industry in turn.

It is true that the proportion of firms, and possibly of the workforce also, in textiles diminished between 1800 and 1841, but this is not entirely unexpected, and does not indicate the true course of developments. As the factory began to supplant the workshop, the average size of firms rose, whilst the number of masters fell. At the same time the productivity of the individual worker was considerably enhanced. The greatest advance had been the replacement of the single-spindle wheel by the sixty-spindle jenny in the 18th century, which reduced the demand for labour (per unit of production) by 95%. The substitution of the mule for the jenny increased productivity five-fold³. Throstles were said to require only two-ninths of the labour demanded by frames⁴. Thus the high rate of investment in plant and machinery in the woollen industry, which marked the progress of the factory system, permitted vast increases in output with only a much slower growth of the labour force. Whilst increased output was maintained in non-textile industries primarily by augmenting the labour force, in the woollen and flax industries this was not the case. Hence the relative reduction in the number of masters in the textile trades, and in the size

¹ Ibid., 152.

² W. G. Rimmer, art. cit. (1967), 153.

³ Reports from Assistant Handloom Weavers Commissioners (1839), part 3, 587.

⁴ First Report, Employment of Children in Factories, pp (1833)xx, 83 evidence of Mr. Drinkwater.

of the workforce as a proportion of the total occupied population.

It is therefore, more accurate to assert that the textile industries, cloth in particular, were of vital importance to the Leeds economy throughout the years 1800 to 1850, and even beyond that date. Economic effort, in terms of innovation, invention, and investment, was focused upon cloth and flax, and the benefits to productivity which ensued reduced the rate of growth in the demand for labour. ✂

How Leeds came to be an early centre for the flax and woollen industries is not our concern here, for both were well established by 1800. What is important is that, given this initial advantage, and given a concentration of flax and wool businesses in the town, ~~when~~ when the factory system and new methods of organisation, and technological advances were developed, Leeds was the centre in which the experiments were conducted. Once commenced, industrial growth attracted further invention and investment, and Leeds became the destination of many who wished to succeed in the textile industries. William Davis, for example was a shear-maker from Brinscomb in Gloucestershire who decided to try his luck in Leeds in 1829 by setting up the Argus Foundry in Saville Street¹. William Hirst was another who was attracted to Leeds, and his many innovations helped to promote the manufacture of superfines in the town². The demand for textile machinery attracted the attention of both millwright and ironfounder. Matthew Murray, Peter Fairbairn, and Samuel Lawson all commenced as manufacturers of flax machines, and their close liaison with the flax spinners both promoted that trade and played an important part in boosting the Leeds engineering industry.

¹See gazetteer - Argus Foundry.

²W. Hirst, 'History of the Woollen Manufacture' (1844).

Samuel Dixon, a brassfounder from Wolverhampton, settled in Leeds in 1825 to manufacture brass fittings for steam engines and boilers¹, a demand promoted by the growth of the textile industries.

Although towards the end of the 19th century there are signs that manufacturing industry was no longer the prime force in urban economic growth in Leeds, its place having been taken by commercial activities, a characteristic of most large towns in the stage of advanced capitalism², textiles still had an important role to play in supplying the clothing industries and providing employment for a substantial, though dwindling, sector of the workforce. Up to the middle of the century there is no doubting their dominance. Even in 1841 38% of the borough's workforce was employed in textiles and dyeing, whilst a further 7-8% laboured in trades directly dependent upon the demand of this sector, to which may be added a further 5-6% consisting of garment workers and tailors who utilised the products of the mills.

Flax and cloth were the backbone of the industrial economy between 1800 and 1850 and in addition cotton spinning and carpet weaving were important manufactures at the beginning of the century, although they had departed for other areas by 1850, where the concentration of productive capacity enhanced efficiency.

The disappearance of the cotton mill from North Leeds after 1810 was the result of geographical concentration of the industry into areas further west, and carpet manufacture became centred upon Halifax and the Calder Valley, but the worsted stuff³ trade remained. Though a minor centre of the industry compared with either Bradford or Halifax, worsted mills in Leeds nevertheless found employment for 1,380 in 1841, and there

¹Information from S. Dixon & Sons Ltd.

²A. Pred, The Spatial Dynamics of U.S. Urban-Industrial Growth (1966).

³'Worsted stuff', i.e. worsted cloth. By extension the worsted industry was frequently referred to as the 'stuff trade'.

was a substantial force of stuff weavers outside the mills besides, (725 in 1838), principally in the area of the Bank¹. These latter were employed on an outwork basis by mercantile concerns which operated from a central warehouse but had no mill or factory. One company was said to have had 500 weavers on its books in 1834, but the majority of the 15-20 firms employed less than fifty². The number of such weavers had risen steadily throughout the century as the output of the spinning mills expanded, despite the introduction of power-loom in some mills after 1830. However, in the mid-1840's, 'on a sudden panic, during which they supposed that Bradford was about to absorb the whole stuff trade, and that customers would never again be seen in Leeds at all', the stuff merchants 'fled thither with great precipitancy'³. The historian of the worsted industry wrote in 1857 that:

During the past fifty years worsted stuffs have been extensively made in Leeds, principally in the neighbourhood of the Bank, but ... there is not a tithe of these goods manufactured compared with twenty years ago. At that period there was probably a score of manufacturers engaged in the fabrication of these goods, employing many hundred weavers; at the present... the two left ... have not employment for one hundred weavers⁴.

The decline in stuff weaving in Leeds was thus attributed principally to the merchants' panic, but there may have been good cause for their alarm, for the traditional product of the town's weavers, the camblet, was rapidly going out of fashion, being superseded by the woollen railway wrapper, the mackintosh, and lighter cloths made with cotton warps.

¹Assistant Handloom Weavers Commissioners, (1839), 529.

²Sel. Comm. on Handloom Weavers' Petitions (1835), 229.

³A. Ure The Philosophy of Manufactures (3rd edn.1861) Appendix by P. Simmonds, 707.

⁴J. James, History of the Worsted Manufacture (1857), 627.

Of the total number of worsted merchants in the main centres of the industry (the others were Bradford, Halifax and Wakefield) Leeds had 50% in 1830, but only 16% by 1853¹. The number of actual stuff manufacturers fell from 22 in 1826 to only 3 in 1853 if those firms which also spun worsted yarn are excluded². Both Carr Mills and Burley Mills, the two principal centres for worsted manufacture in the 1830's in North Leeds, were up for sale by the mid-1840's³.

Prior to this sudden decline, however, the industry held a strong position in Leeds. The Parish contained six mills in 1835 and thirteen by 1838, according to the factory inspectors, and employment exceeded 2,000 jobs⁴. Progress with power weaving was well advanced, with four of the mills having 846 power-looms out of a West Riding total of only 2,856 in 1835⁵. The spinning mills remained important in Leeds for some years after the demise of stuff weaving, though their number was down to nine by 1855, with a labour force only slightly in excess of 1,000. The mill owners possessed a considerable investment in plant and machinery and were less able to migrate with the rapidity exhibited by stuff manufacturers. These factory owners 'would have flown too, but for their mills, which they could neither carry away nor dispose of', observed Simmonds in 1861⁶. There was however, a sharp decline in the industry

¹E. M. Sigsworth 'Bradford', in C. R. Fay ed., Round About Industrial Britain 1830-60 (1953), 129.

²Directories, 1826 and 1853.

³See gazetteer - Carr Mills and Burley Mills.

⁴Employment of Children in Factories, Reports P.P.(1836) XLV and P.P. (1839) XLII, 272, et. seq.

⁵R. Baker, 'On the Industrial and Sanitary Economy of the Borough of Leeds in 1858'. J.R.S.S., XXI (1859).

⁶A. Ure, op. cit. (1861), 707.

in the 1850's, but worsted spinning retained a foothold and was to revive again later in the century (see chapter III).

The drawback on soap for the worsted industry in Leeds increased from £475 in 1830 to £595 in 1850, a greater increase than might at first appear because the duty was halved in the 1830's¹. There is no contradiction, however, for 'most was claimed in respect of stuff dyeing or combing by machinery', both of which businesses were said to be very extensive in Leeds in the 1850's.²

Worsted dyeing and finishing in particular was a well-developed trade in Leeds by this time. Some of the firms involved were considerable businesses. Thomas George and John Horsfall, whose works were both at Spring Gardens, Kirkstall Road, each employed in excess of eighty men in 1833³ and the number at Sheepscar dyeworks is likely to have been even higher. As with worsted spinning firms, investment in buildings and equipment prevented a hasty move away from Leeds, but more important were other factors such as the town's transport facilities and its specialised labour force, for this branch of trade never deserted Leeds and remained important throughout the whole of the century. Even whilst the stuff manufacturers were fleeing to Bradford, Samuel Kirk had the confidence to build a new worsted stuff dyeworks at Woodhouse in 1846, a concern which was considerably expanded over the following twelve years⁴.

When James wrote of the stuff trade deserting Leeds, therefore, he referred only to the weaving stage, then primarily a domestic operation.

¹R. M. Hartwell, *The Yorkshire Woollen and Worsted Industries, 1800-50*, (1956), 174.

²J. James, *op. cit.* (1857), 627.

³Employment of Children in Factories, Reports P.P. (1833) XX.

⁴See gazetteer - Shayfield Dyeworks.

Spinning, dyeing and finishing remained beyond the middle of the century, and after a slump in the 1850's revived again later.

The fortunes of the Leeds woollen industry were less erratic, fortunately because many more depended upon it. Though production of broad and narrow-cloths had reached 465,000 pieces by 1805¹, the intownship of Leeds made only a slight contribution. By this time the domestic cloth manufacture had virtually deserted the town. Where before there had been 'many hundred clothiers in the township of Leeds' by 1806 there were 'but five ... and the reason is that they are driven out by high rents'². Nor was factory production yet making much of a contribution to output, in all perhaps only 8,000 pieces. The factory owners made but a 'very small proportion to the domestic manufacturers' in 1806³.

At this time, however, more important than the manufacture of cloth in Leeds were the finishing trades. In the first decade of the 19th century there were between 5-6,000 cloth dressers in the West Riding, of whom approximately one-third were to be found in Leeds⁴. In 1811, according to Bigland, there were 1,160 shearmen alone⁵, to which number may be added the raisers, friezers, glossers, dyers and cloth printers.

The labour force of approximately 6,000 in the woollen industry in Leeds about the turn of the century was divided roughly as follows:

Factory labour force	-	1,800
Involved in the domestic manufacture	-	1,700
Finishers, dyers, <u>etc.</u>	-	2,400

¹Sel. Comm. (1806), 10.

²Ibid., 158, evidence of John Hebblethwaite.

³Sel. Comm. (1806), 445, evidence of Sir James Graham.

⁴R. G. Wilson, *Leeds Woollen Merchants, 1700-1830* (1964), 105.

⁵R. M. Hartwell, op. cit. (1956), 487.

Alongside the small number of factories, then, were many finishing workshops and dyehouses. The majority of the town's 150 or so merchants possessed their own finishing works, and in addition there were approximately 50 independent dressers, glossers and printers, plus a further 25 commission dyers, each with their own works, some of which by now were becoming quite large and were utilizing small quantities of power. For example, Liddle & Co's cassimere printing shop measured 40 yds. by 10 yds., was of two storeys, and utilized power from a small water-wheel¹. Joseph Holroyd's dyeworks at Sheepscar was insured for a value of £3,650 even in 1796². These are ~~still~~ small-scale in relation to later developments however.

The expansion of scale in the finishing and dyeing trades was hindered by the specialised nature of the work and the multiplicity of firms involved, and there was little incentive to erect large mills or works whilst opposition from operatives was so strong. The principal advance in finishing in the 18th century was the gig-mill, but attempts to install these machines at Johnson's of Holbeck in 1799, at Gott's in the same year, and at Oatlands Mill in 1812 met with no success³. As a result there were only five gigs at work in the whole of Yorkshire, none of them in Leeds⁴. Though common in the West Country⁵, and increasing in popularity in the Huddersfield area⁶, the first gig was not successfully

¹L.C.D. no. 1368.

²Sun C.S. 450/656783.

³R. G. Wilson op. cit. (1964), 134 & W. B. Crump ed., 'The Leeds Woollen Industry 1780-1820'. Thoresby Soc. xlii (1931), 47.

⁴E. Lipson, The Woollen and Worsted Industries (1921), 189.

⁵W. O. Henderson ed., Industrial Britain under the Regency (1968) 'Report of Factory Commissioner J. G. May in 1814', 133.

⁶W. B. Crump & G. Chorbai, History of the Huddersfield Woollen Industry (1935), 140.

installed at a Leeds mill until 1816, by which time there were almost seventy in the Riding¹. Machine-shearing was not introduced until 1802², and therefore it is not surprising that finishing mills remained relatively small affairs until the 1820's, by which time the improved gig-mills were able to match the quality of hand-finished cloth.

Until machine-spinning of wool got going, only really after 1820, the dressing mills and dyeworks worked principally for merchants dealing in cloth manufactured by country clothiers, and were therefore a part of the domestic system. Most of the factories undertook their own finishing in the early phases of development, which left the cloth finishers to deal with pieces spun and woven under the outwork system, and fullled and scribbled in quite large mills, frequently water-powered, as at those at Armley and Kirkstall.

As the factory-spinning of yarn became more common a transitional stage was achieved whereby some mills supplied country weavers, and the cloth was then returned to the towns for dyeing and finishing³. This situation continued for some time, but gradually the proportion of cloth manufactured wholly within towns like Leeds must have increased. However, the division between the various branches of the industry remained to a certain extent. Even in 1833 the complete clothmaking factory, which turned raw wool into finished cloth ready for the tailor, was not very common. Of eighteen masters from North Leeds questioned by the factory inspectors in that year, only four actually manufactured cloth. The remainder specialised in either the preparatory or the finishing processes.

¹E. Lipson op. cit. (1921), 191.

²A. Ure op. cit. (1861), 197.

³W. O. Henderson ed., op cit. (1968), 135.

Before 1830, Wilson reckons that 'the factory which combined all the stages of manufacture was almost unknown'¹. Though this was less true of Leeds than of other centres elsewhere in West Yorkshire, the majority of its woollen factories in 1835 (there were 71 in the Borough) were finishing mills.

By this time steam-power and the gig-mill were in common use in finishing mills, and many of the earlier workshops had been transformed into factories. These innovations had been adopted primarily in the boom year of 1824-5, when both Bean Ing and School Close Mills were extended², and large new finishing works were built for Sheepshanks and Co. (Perseverance Mills), Bruce, Dorrington and Walker (Wellington Mill), R. and J. Glover (Airedale Mills), and Edward Halliley (Low Close Mills) amongst others.

James Brown's finishing shops at Bagby Fields remained small and dependent upon hand labour, until in 1825 a new gig-mill, a dryhouse, and a further press-shop were added³. It was probably typical of other establishments in the town, and the extent to which advantage was taken of the new developments and favourable economic conditions may be adjudged from the fact that steam power at work in the woollen industry in Leeds rose from 739 h.p. in 1824 to 1,884 h.p. in 1830 (See Table 2.iii).

This was a period of considerable experiment and innovation throughout the whole of the industry. Amongst the new developments were steam brushing, steam dyeing, the hydraulic press, the Lewis cutting machine, and the replacement of the throstle and the frame by the mule⁴, all of

¹R. G. Wilson, op. cit. (1964), 124.

²W. Hirst, History of the Woollen Trade (1844), 38.

³George Bray and Co., deeds.

⁴See also page 58.

which William Hirst claimed to have introduced to Leeds!¹

In these, and other developments, Leeds was in advance of most other centres and by 1835 it had one-tenth the total of factories, and one-fifth of the workers of the whole of Yorkshire². But there was still a strong reliance upon the domestic industry, even amongst Leeds merchants and finishers. It has already been observed that many manufacturers still bought in the halls in 1806, and this was still the case ~~in~~ in 1833. 'Messrs. Gotts are extensive merchants, besides being manufacturers. A principal part of the cloths we dispose of are purchased in the cloth halls, and finished by us for sale. This is the case with most manufacturers' a spokesman for the firm told the factory inspectors². The manufacture of coarse cloths, for which Yorkshire was famed, continued to be primarily domestic, whilst Leeds' factories concentrated upon superfines, traditionally a West Country product.

Only after the adoption of mule-spinning and the first tentative experiments with power-loom weaving did the cloth mill really gain the ascendancy, and by 1850 there were more cloth mills than finishing mills in North Leeds, some of them newly-erected and intended from the start to undertake the whole process of production, like Britannia Mills (1836). Others, for example Bagby Mills or Park Lane Mills, had undergone extension, adding new processes to what had formerly been scribbling and fulling, or finishing mills. The number of cloth manufacturers in North Leeds rose from six in 1822 to ~~fully~~ twenty-two by 1841, whilst the number of specialist cloth dressers fell slightly in the same period³. Although employment in

¹W. Hirst, op. cit. (1844), 39.

²pp (1836) xlv, A Return of the Number of Persons Employed in etc.

³Directories, 1826 and 1841

cloth-finishing must have risen considerably in the first half of the 19th century, many of the new jobs were in fully-integrated cloth mills, and the demand for the specialist dresser was also adversely affected by the decline in the domestic woollen industry.

Dyeworks, like finishing mills, had close connections with cloth merchanting and hence the domestic system of manufacture. But as a more specialised activity it was less likely to be drawn into the factory system as the new manufacturers continued to rely upon specialist dyers for all but the simplest colours.

Dyeing was still an art rather than a science, best left in the hands of independent firms who had developed individual techniques¹. Though firms worked principally on commission, each normally dealt with a small number of regular customers, 'whose business he must be able to do when they are most brisk, or he loses it altogether'². Consignments were dyed individually to a customer's requirements, and except that steam was used for power and heating, the dyehouse changed but little in the early 19th century. Dyes were still of vegetable or animal origin, and upon the skill of the dyer rested their colour intensity and fastness.

Change was gradual rather than revolutionary before the 1850's. Copper vats replaced lead ones, and steam-heating was introduced, whilst power from a steam engine could be utilised for moving the cloths about and rolling them through the dyes, and to 'pump water into the dyebaths, to rinse the material after it has been dyed, to remove the material from the bath, and to lift it to the drying rooms which are on a higher level'³. By 1824 there were twenty-five engines at work in Leeds dyehouses, but these were all small save those in the biggest of works.

¹R. M. Hartwell. op. cit., (1956), 603.

²Employment of Children in Factories, Reports, P.P. (1834) XX, 246.

³W. O. Henderson ed., op. cit. (1968), 135.

Most concerns employed only a handful of men, and emphasis was placed upon quality rather than quantity of production. At the time of the 1841 census there were 41 master dyers in Leeds, but only 213 workers in the trade in the township¹, so that the average firm employed less than ten labourers. One or two were much larger than this, but there were concerns which also dealt in finishing. In particular, there were a few companies which dyed and finished worsted stuffs, and which employed in excess of a hundred hands, ~~like~~ Holroyd's, or Thomas George and Co., for example.

Most mills had their own dyehouses where, for example, 'blacks' might be produced, but these too relied upon the commission dyers for 'scarlets' and 'indigos'. But a more serious hindrance to the development of the fully-integrated factory was the lack of any advance in weaving, which in 1840 was still almost entirely performed by hand. Even by 1850 there were only 9,439 power-looms at work in the woollen industry throughout the whole kingdom, and then only in making lower-quality cloths, whereas in both cotton and worsted the system was well advanced².

The delay was occasioned partly by technical difficulties (the high speed of the shuttle tended to snap woollen yarn very easily), partly by opposition from the handloom weavers, but principally because the power loom turned out an inferior product, and at a rate for some time no faster than the hand-loom.³

Much of the production of the cloth mills of Leeds was of superfine cloths, distinguishable by their high quality of both cloth and finish,

¹Census (1841). Occupational Tables and Directory (1841).

²P. Deane and W. A. Cole, British Economic Growth, 1688-1958 (1967), 200.

³E. Baines, 'On the Woollen Manufacture of England' etc., Q.J.S.S. xxii (1859), 3.

which requirements were best fulfilled by employing handloom weavers. This tended to delay the adoption of the power-loom in Leeds. In 1824 there were none in the town, and in 1833 a superintendent at Gott's factory had heard of 'one or two ... but they are not generally used in the cloth trade'¹. The problem was that the power-loom was unable to weave figured goods, and nor could it 'weave the finest fabrics so well as the handloom in skilful hands'². The returns of the factory inspector for Leeds indicate that there were 1,059 powerlooms at work, but only 213 were installed in woollen mills. Gott, for example, who may be relied upon to have adopted any advance where feasible, had only 68³. The Leeds worsted industry, of much less importance, had four times as many.

Handlooms were much more numerous, between 3-5,000 in number. Many of these were located however, not in the weaver's cottage, as was common outside Leeds, but in shops within the factories⁴. Weaving in factory sheds was said to be quite commonplace in the larger towns of West Yorkshire and 'especially in the case of the superfine cloths made in the town of Leeds'⁵. William Hirst had 200 looms at his School Close Mill in 1818⁶, and a shop at Millgarth Street Mills housed 50 looms in 1829⁷.

¹Employment of Children in Factories, Reports P.P. (1833) XX, 101.

²Assistant Handloom Weavers Commissioners, Reports part 3 (1840), 587.
evidence of H. S. Chapman.

³Employment of Children in Factories, Reports P.P. (1836) XLV, 8.

⁴Sel. Comm. on Handloom Weavers' Petitions (1834), 29. evidence of David Brook

⁵Assistant Handloom Weavers Commissioners, Reports (1840), 528.

⁶W. Hirst, op. cit. (1844), 22.

⁷L.I. 23.4.1829.

Bean Ing Mills contained 238 looms in 1830¹.

The twelve principal firms in the woollen industry had about 2,200 looms altogether in 1829², in addition to which there were perhaps a further 500 in loom shops outside mills, and 6-700 domestic handlooms. Chapman recorded 541 cloth handlooms for 1838, and appears to have been referring solely to those set up in workers' cottages³.

Specialist weaving shops were not common, but one of them had been set up in a converted riding-school in the York Road:

Among the few weaving establishments in Leeds is an old riding school in York Road, which has been converted into a loom-shop and gives occupation to nearly a hundred weavers and winders. The place is, of course, merely a shell crowded with hand-loom⁴.

This house also employed many domestic weavers, 'but when work is slack, those under the immediate control and inspection of the firm have preference'⁵, which indicates the principal advantage to be gained from having the labour in a factory.

Other firms, including the principal manufacturers, had outworkers too. According to the Leeds Mercury, Gott, for example, had many looms working for him outside his mills, including 200 which belonged to one house⁶. Unfortunately it was not stated whether these were housed in loom shops or in cottages, but likely it was both.

¹H. Heaton, 'Benjamin Gott and the Industrial Revolution in Yorkshire', Ec. H.R. (2) (1931), 53.

²The Leeds Mercury (28.11.1829) said 2,100; the Leeds Intelligencer said 2,250 (19.11.1829).

³Assistant Handloom Weavers Commissioners Reports (1840), 529.

⁴Morning Chronicle, 25.1.1850.

⁵Ibid.

⁶L.M. 28.11.1829.

Domestic weaving certainly existed in Leeds, and was quite widespread at the Bank, but the total number of domestic weavers probably never exceeded 2,000 in the 19th century, and less than a half of these were woollen weavers. Looms were housed in cellars or in any spare room available, and were tended mainly by Irish immigrants. 'The Irish immigrant families amount to 996', the Statistical Committee reported in 1839, and 'they carry on handloom weaving to a considerable extent'¹. In one row of cottages, built as late as 1850, the attic floor was used as a small loom shop by the inhabitants². The ill-ventilated houses were 'rendered still more deplorable by the intermixture of beds, chairs, looms, and all manner of utensils'³, and weavers suffered 'long days of incessant labour'⁴, although conditions for the woollen weavers were better than for the flax-loom workers, whose wages were much lower.

Few firms then, had adopted power-loom weaving even by 1850, and those that had, for example Hargreaves and Son, usually manufactured cheaper, coarser kinds of cloth. The transformation of this stage of the woollen industry did not take place until the second half of the century, even in Leeds which maintained a place at the forefront of experimentation and innovation throughout. Although the great majority of employees in the woollen industry were factory-based by 1850, many processes were still hand-operated, and the domestic manufacture of the surrounding countryside still provided the 6,000 plus cloth dressers with a large proportion of their work⁵.

¹Stat. Comm., art. cit. (1840), 409.

²Morning Chronicle, 25.1.1850.

³Ibid.

⁴Stat. Comm., art. cit. (1840), 407.

⁵E. Baines, art. cit. (1859), 24.

There was an absence of power-loom weaving in the flax industry throughout the first half of the century also. In 1850 there were only 3,500 linen power-loom throughout the whole of the country, of which a small number, perhaps 75-100, would have been found in Leeds¹. By 1858 there were still only 140 in Leeds linen factories². However, Leeds was never a great centre of linen weaving, preferring instead to specialise in spinning, then sending the yarn to Ireland and to Barnsley and Doncaster.

Most of the linen weavers who did inhabit Leeds were Irish by birth, with approximately three-quarters labouring in their own homes, the remainder in small loom shops or large linen factories. They produced mainly heavy linens, cart canvas and packing canvas.

In 1839 there were an estimated 6-900 domestic linen weavers in and about Leeds, substantially fewer than at Barnsley, for example³. In addition a few mills housed linen weavers, but these were not very great in number. Marshall's, for example, employed only fifty weavers out-of-doors in 1833, but other houses practised this method more widely⁴.

The total number of linen looms, both in factory and outdoor, appeared static to Marshall, and appears to have declined after the 1830's. From perhaps 1,000-1,200 in 1839, the number fell to 665 by 1858⁵, partly in response to a general decline in the Leeds flax trade, but also as factory weaving took over more and more from domestic outworking.

¹P. Deane and W. A. Cole, op. cit. (1967), 206.

²T. Fenteman & Co. An Historical Guide to Leeds and its Environs (1858).

³Sel. Comm. on Manufactures, Commerce and Shipping, (1833), 157. evidence of John Marshall.

⁴Sel. Comm. on Manufactures etc. (1833), 157.

⁵T. Fenteman & Co., op. cit. (1858).

Spinning was by far and away the dominant branch of the industry in Leeds. In 1833 there were said to be between 5-6,000 hands in Leeds flax mills¹, which was probably an exaggeration, for the whole Borough contained 44 flax mills, with a labour force of 6,430 only in 1838, and over a half of these had been erected since 1835².

The industry had been established in Leeds in the 1790's (see chapter I) and by 1806 one observer was able to report that 'within these few years several manufactories for canvas, linen, and thread have been established'³. There were, according to one estimate, almost 2,000 flax and linen workers in the neighbourhood by then⁴, although the number of mills cannot have exceeded one dozen. More reliable figures are available for later dates, and these are summarised overleaf.

In 1821 Leeds was acknowledged as the foremost centre of flax-spinning in England, and its mills housed almost one-half of the national total of steam power at work in the trade. 2,200 operatives laboured in nineteen mills, most of them working Marshall's, Benyon and Co., or Titley and Co., all located in Holbeck⁵.

Factory employment appears to have approximately doubled between 1806 and 1821, which is consistent with the growth in the number of factories, whilst outdoor weaving grew much more slowly. In relation to the cotton industry, its principal competitor, it fared but poorly, yet well enough to excite the interest of Leeds investors and place it in the forefront of Leeds' industrial growth. W

¹Sel. Comm. on Manufactures etc. (1833), 158.

²Employment of Children in Factories, Reports, P.P.(1836) XLV, 48 et. seq., and (1839) XLII, 272 et. seq.

³F. Gillam, A Walk Through Leeds (1806), 18.

⁴L. Ryley, Leeds Guide (1806), 104.

⁵W. Brown op. cit. (1821).

TABLE 2.ii - THE GROWTH OF THE FLAX INDUSTRY IN LEEDS, 1821-58.

<u>Date</u>	<u>Number of Firms or Mills</u>	<u>Horse-Power</u>	<u>Spindles</u>	<u>Workers</u>
1821	19 mills	565	c. 36,000	c.2,200
1824		656		
1829*		678		4,763
1835	19 firms	936		3,927
1838		1,259		6,430
1840		c. 1,250	c. 134,500	7,750**
1841 ¹	23 firms		162,000	5,295
1842 ¹			137,000	7,890
1851				8,614
1855	37 mills		198,076	9,458
1858	32 firms	1,818	149,454	9,020

Sources:

W.Brown, Information Regarding Flax Spinning in Leeds (1821).

W.Lindley, No. of Steam Engines etc., (1824).

L.M. 28.11.1829.

PP (1836) xlv and PP (1839) xlii, Return of the Numbers of Persons Employed in etc.

H.C.Marshall, List of Spinners and Spindles 1837-42, (1842).

T.Fenteman & Co., op.cit., (1858).

R.Baker, art.cit., (1858).

Census (1851).

¹Marshall's estimates for spindles and workers.

*The 10 principal houses only.

**The 12 principal houses only.

As the pioneering centre of the factory production of flax yarn, the town enjoyed almost continuous growth throughout the first half of the 19th century. Employment quadrupled, and labour productivity rose markedly. At Marshall's, for example, output of yarn (bundles) per man per week rose from 11.8 between 1824 and 1828, to 17.9 between 1844 and 1848, despite a slight reduction in working hours¹. This was achieved principally by improvements in machinery - Marshall's changed theirs twice between 1815 and 1833². And steam power was used with greater efficiency, the number of employees per 1 h.p. rising from 3.9 in 1821 to 5.2 in 1858³.

This growth, as with the economy as a whole, was not even. Before 1815 expansion was relatively slow but steady, and thereafter the fortunes of the industry rose and fell, with factory-building tending to follow suit. There were great failures in 1816 as prices slumped and depression set in, but the 1826 and 1836 booms in the woollen manufacture were matched by the flax industry, though their importance was reversed - the biggest leap forward coming in 1836⁴. Each recession in the industry was accompanied by the demise of numbers of smaller firms. For example, seventeen concerns failed in the years 1838 to 1842, most of them having fewer than 2,000 spindles, and only one more than 4,000⁵. Even in these comparatively unfavourable years, however, the larger companies were

¹W. G. Rimmer, Marshall's of Leeds, Flax Spinners, 1788-1886 (1960). Appendix, table 18.

²Report on Manufactures etc. (1833), 159, evidence of John Marshall.

³Calculated from Table 2.ii

⁴Sel. Comm. on the Acts for the Regulation of Mills and Factories (1840), part 5, evidence of John Wilkinson.

⁵Marshall Collection, List of Spinners and Spindles 1837-1842, (1842) by H. C. Marshall.

accustomed to working full-time¹, and there was, therefore, a marked division between a small number of well-established concerns, who operated the larger mills, and the smaller-scale 'fly-by-night' firms which absorbed the fluctuations in demand, by providing hirespinning capacity in better times and being forced out of existence when conditions were less favourable.

The Leeds flax industry was almost entirely factory-based from the start, with a tradition of domestic and workshop conditions only in the weaving sector, which was not well represented in Leeds anyway. The growth of flax spinning in the town was attributable above all else, to the adoption of machinery, power, and the factory system. According to Brown, the greatest advantage possessed by the Leeds manufacturers was the cheapness of their fuel, Scottish masters having to pay twice the price for their coal². But although the steam engine and heckling³ and spinning machinery were in universal use, there was considerable variation in the size of individual mills. This was the case from the very inception of the industry in Leeds, with Marshall's Mill the giant towering over all other factories throughout. In 1842 they had over 31,000 spindles at Holbeck, one-fifth the Leeds total, and almost twice as many as their nearest rivals⁴. They consumed one-tenth of the annual import of raw flax in 1864, and it required an estimated 50,000 acres of land to maintain their raw material supply⁵.

¹Sel. Comm. Mills and Factories (1840), part 5, evidence of John Wilkinson.

²W. Brown op. cit. (1821).

³Heckling is a preparatory process in flax spinning.

⁴Marshall Collection, op. cit. (1842).

⁵A. Warden, The Linen Trade, Ancient and Modern (1864), 378.

There were other large firms besides in 1842. Hives and Atkinson (18,000 spindles), Titley and Co. (13,000), Wilkinson and Co. (11,400), and Benyon and Co. (10,000) accounted for a further 25% of Leeds' output¹, which in 1841 was reckoned to be worth £1,250,000 p.a.², or about one-tenth of the gross output of the U.K. linen industry³. Of the remaining firms, fourteen had in excess of 2,000 spindles and a labour force of between one and five hundred, and finally there were twelve small firms with less than 2,000 spindles and few workers, who sometimes survived to become larger firms, but more often were unable to weather the next financial storm⁴.

Despite the existence of a large number of small to medium-sized firms, flax mills were on average twice the size of Leeds woollen mills, similar in scale to Yorkshire's worsted mills, which is indicative of the greater degree to which mechanisation had been taken in these two industries. The average size of a woollen mill in Leeds was reduced by the great number of small finishing firms and the generally fragmented organisation of an old-established industry. In 1835 the average Leeds flax factory housed 207 workers, compared with which the average woollen factory had only 76⁵. As a result, the labour catchment of the flax mill was generally larger than was necessary for woollen mills, and the importance of orientation towards labour was correspondingly enhanced.

¹Marshall Collection op. cit. (1842).

²Sel. Comm. on the Exportation of Machinery (1841), 210, evidence of P. Fairbairn.

³P. Deane and W. A. Cole, op.cit. (1967), 204.

⁴Marshall Collection op. cit. (1842).

⁵Employment of Children in Factories, Reports P.P.(1836) XLV, 48 et. seq.

Outside textiles, manufacturing industry had shown few signs even by 1850, of any revolution either in technology or organisation. The adoption of steam power was not uncommon and there were even a few firms which employed many hundreds of workers, but these were the exception rather than the rule.

Only in the engineering and metal trades were great changes being initiated, primarily in response to sixty years of expanding demand for steam engines and machinery from the textile industries.

At the beginning of the 19th century, 'engineering' as such did not really exist: there was only machine-making and metal-casting¹. Even by the mid-1820's there was still only one firm in Leeds who had earned the right to be called 'engineers' - Fenton and Co., the firm in which Murray was partner².

Primarily a workshop activity at the turn of the century, the manufacture of machinery was a skilled activity, undertaken by specialist comb-makers, spindle-makers, loom-makers, etc., the whole either directly supervised, or at least commissioned by the millwrights whose primary function was the fitting out and maintenance of mill machinery. / As much wood as iron was used in equipping textile mills before the fire hazard was fully appreciated, and wood-sawing and wood-turning constituted important activities in Leeds at this time.

These activities were dispersed throughout a large number of workshops, located in the industrial quarters of Leeds, where a master craftsman employed a few journeymen and apprentices, and power was only rarely used. William Fairbairn, the famous Manchester engineer, stated that when he first arrived in that town in 1814, all machinery was made entirely by hand³,

¹ J. H. Clapham, The Early Railway Age 1820-1850 (1930), 448.

² A. H. Meysey-Thompson, 'History of Engineering in Leeds'. Procs. Inst. Mech. Eng. (1882), 266-78.

³ J. H. Clapham, op. cit. (1930), 154.

and the same was probably true for most Leeds firms. However, a few years earlier, Smith, Warwick and Co., of Leeds Bridge, one of the oldest Leeds' concerns, announced that they had erected

A NEW STEAM ENGINE for turning shafts, boring cylinders and working barrels and wheels¹.

Providing that this offer was not immediately withdrawn, it would appear that North Leeds was in advance of Manchester in this one respect, although the more typical firm, Cavood's of Marsh Lane for example, confined its business to making 'castings for engines, machinery, mills, merchants, dyehouses, collieries etc.'². They were basically ironfounders, not engineers, who were few in number even by 1850.

In 1824 a more detailed look at the industry, through the medium of Lindley's survey³, makes it plain that metalworking remained essentially a craft. Skill and workmanship were more important than mass-production and the division of labour for which the necessary technical advances had not yet been achieved. Only eleven machine-makers, perhaps one in twenty of the total firms in the trade, employed a steam engine. One which did not, Pullan and Co., of Hunslet, was itself an important supplier of engines to Leeds factories! Even Fenton and Co., required only four small ones, total 32 h.p.

The market for machine-makers at this time was probably primarily a local one, except for Fenton and Co., whose products were distributed throughout the land, and whose reputation was international. Attention was in the main confined to the manufacture of steam engines and textile machinery for mills in the neighbourhood of Leeds.

¹L.I., 6.6.1808.

²Ibid., 22.8.1808.

³W. Lindley, Number of Steam Engines' etc. (1824).

It has recently been contended that Boulton and Watt never supplied more than a small number of the steam engines utilised by early industry in the West Riding¹, Lindley's survey indicates that, for Leeds at least, this was certainly the case, and furthermore it shows that demand was satisfied principally by local firms. Of a total of 129 steam engines installed in Leeds factories in 1824, no fewer than 110 had been erected by Leeds concerns, and a further 5-10 by other West Yorkshire machine-makers. Fenton and Co., had provided almost two-thirds (77 engines), with Pullan and Co., the makers of a further 22, followed by Stirk and Co., (9) and only then came Boulton and Co., with 7, almost all installed before 1800.

The market for textile machinery was ~~then~~ primarily local too, and there were even a small number of firms which combined the activities of spinning and machine-making. Zebulon Stirk had both Flax mill and foundry at his premises in Sykes Yard²; Samuel Lawson was a flax spinner who turned machine-maker³; and Cawood and Co., started as machinists only but later added flax-spinning by taking the adjoining Marsh Lane Mill⁴. Other concerns maintained very close links with textile mills, and John Marshall championed not only Matthew Murray but Peter Fairbairn as well⁵. These linkages as they affected the location of industry are further considered in chapter IX, but it is important to note here that

¹J. Goodchild, 'On the Introduction of Steam Power into the West Riding', art. cit. (1971).

²L.C.D. no. 1785.

³See gazetteer, Hope Foundry.

⁴See gazetteer, Leeds Old Foundry and Marsh Lane Mill.

⁵Various Writers, Fortunes Made in Business, vol.II, 233-93.

development of engineering and other Leeds industry, particularly textiles, were closely associated.

By 1849 there were twenty-four major founders and machine-makers in the township in addition to a host of craftsmen and journeymen, making principally machinery for the textile industries, but also household utensils, milling machinery, gas fittings and innumerable other articles. The number of really large concerns was small - less than half a dozen - but these employed hundreds of workers and produced textile machinery, rolling stock, steam engines, and many other products for a national and international market. Most of these were located in South Leeds, particularly in Hunslet, but Hope Foundry in Mabgate had over 400 employees by 1861, and Wellington Foundry over 1,000 in 1858. Considerable numbers were also employed at Perseverance Foundry: 270 in 1851¹.

By 1851 one in every twelve males (one in sixteen of the whole working population) worked in engineering and associated metal trades, but the industry was even so still in its infancy. The period of greatest growth commenced about 1840 and continued right up to 1914. The application of large-scale production techniques, automation, Whitworth's gauges and other important advances only really began in mid-century, and only then was true 'engineering' really born. In 1850 the largest firms, in Leeds as in the rest of the country, were machine-makers, and primarily connected with the textile trades.

The advance of the factory system was just noticeable in one or two other trades besides textiles and machine-making. In the leather industry for example, though 'for the most part making leather and leather goods remained a small-scale neighbourhood trade'², the discovery by Richard Nichols that shumac and valoria could be used instead of oak bark in

¹See gazetteer, Hope, Wellington & Perseverance foundries.

²W. A. Rimmer, 'Leeds Leather Industry in the Nineteenth Century'. Thoresby Soc. xlvi (1960), 174.

tanning East India kips led to the development of larger tanneries in Leeds, one of which was that at Joppa, Kirkstall Road, started by Nichols in partnership with James Rhodes in 1828. By 1858 they employed two hundred hands and a thirty horse-power steam engine¹. The other large leather works was that erected at Buslingthorpe in 1840 by Benjamin Stocks on a site more than an acre in extent. When it was taken over by Wilson, Walker and Co., in 1857 the site was extended to two and a half acres, and up to four hundred hands were kept in employment².

But most leather firms employed less than twenty workers and had no steam engine in their workshops. As with engineering, the real transformation of the industry did not occur until after 1850.

To assess the extent to which new methods and the factory system were applied to Leeds industries by mid-century, then, is the second aim of this chapter. There is, unfortunately little agreement over the application of the terms 'factory' and 'workshop', either among contemporary observers of the 19th century scene, or among economic historians. Size was the criterion applied by one witness to the 1806 Select Committee on the Woollen Manufacture³ (see above, p14), but Professor Heaton prefers 'the use of capital, the congregation of work people, the division of labour, and the exercise of supervision'⁴, whilst for Chapman the essential feature is the usage of power in some form or other⁵. Dr. Ure combined all three, the factory being a building where 'the combined

¹See gazetteer, Joppa Tannery.

²Ibid., Sheepscar Leather Works.

³Sel. Comm. (1806), 77, evidence of Robert Cookson.

⁴H. Heaton, The Yorkshire Woollen and Worsted Industries (1965), 352.

⁵S. D. Chapman, The Early Factory Masters (1967)

operation of many orders of workpeople, adult and young, in tending with assiduous skill a series of productive machines continuously impelled by a central power' was put to use¹.

The most convenient definition is that proposed by Chapman: convenient because it permits objective assessment, and because the development of both steam and water power in Leeds in the early 19th century is well-documented. Besides which the growth of steam and water power between 1800 and 1858 indicates clearly in which areas the factory system was being applied, and at what rate. The data for this period is summarised in Table 2iii overleaf.

The dominance of textiles and dyeing in this table, which weakened only slightly between 1824 and 1830, reflects the pre-eminent position these trades occupied in the industrial structure of Leeds, and also emphasises the absence of the factory system from other Leeds industries. There were twice as many steam engines at work in textile mills and dye-works as in all other establishments together, and they were typically larger also - an average 20 h.p. as opposed to 13.5 h.p. In 1824 only machine-makers and millers and grinders showed much inclination to install engines, although the tobacco trade had quickly realised the benefits of powered cutting machinery.

What is more, although there is unfortunately no comprehensive data to confirm the notion, dominance of textiles was hardly reduced before 1850. Although an increasing number of trades found a use for power, the growth in the textile industry outstripped all others. In 1824 textiles and dyeing accounted for 77% of the total steam power. By 1842, when Baker reported a total of 6,600 h.p. within the Borough², the proportion

1A. Ure, The Philosophy of Manufactures (1861), 13.

²R. Baker, op. cit. (1842).

TABLE 2.iii - STEAM POWER EMPLOYED BY LEEDS INDUSTRIES, 1796-1858 (AND NO. OF ENGINES)

	<u>1796</u>	<u>1800</u>	<u>1821</u>	<u>1824</u>	<u>1830</u>	<u>1835</u>	<u>1838</u>	<u>1842</u>	<u>1850</u>	<u>1858</u>
Cloth				739(38)	1,884(80)	1,951(81)	2,265(97)			2,924
Flax			695(23)	656(23)	705(24)	915(24)	1,259(41)			1,818
Worsted				81(2)	57(4)	151(6)	334(13)		146	120
Dyeing				245(25)	237(23)					550
Silk				71(2)	36(1)					
Carpets					26(1)					
Ironfounding				)	145(11)					
Machine-				) 107(14)						
Making				)	68(8)					
Shear-making					12(2)					
Seed-crushing				)	160(5)					
Grinding-corn				) 524(27)	282(17)					
Grinding wares				)	82(5)					
Sawing wood					24(2)					
Paper mfre.				44(2)	42(2)					200
Tobacco mfre.				24	25(9)					
Chemicals										400
Others	?(6-7)	270(20)		46(2)	263(31)					
TOTAL				2,318(129)	4,048(225)		6,600(362)			

Sources:

- J. Goodchild, art. cit. (1971).
- E. Baines, History of the Cotton Manufacture, (1835).
- W. Brown, op. cit., (1821).
- W. Lindley, op. cit., (1824).
- E. Parsons & W. White, History of Leeds and District, (1834).
- Employment of Children in Factories, Reports P.P.(1836) xlv and P.P.(1839), xlii.
- × H. R. F. Bourne, 'Leeds and its Merchants', London Society x, (1866)...
- R. Baker, 'On the Industrial and Sanitary Economy of the Borough of Leeds in 1858', J.R.S.S., xxi, (1859).
- R. Baker, 'Report on the Residences of the Labouring Classes in Leeds', P.P.(1842), xxvii, 28.

was probably still in excess of 65%. By this time it is to be expected that ironfounding and machine-making were together making a strong contribution and that the number of trades which would appear in the table would have greatly increased.

There is strong evidence that growth in steam power accompanied fluctuations in the economy as a whole, as indicated by the surges between the 1824 and 1830, and 1835 and 1838 figures. In which case it seems likely that there was a steady, but not very rapid rise in the total horse-power up to 1814, a sharp rise in the boom of that year, but little progress over the next five years whilst the economy remained relatively depressed. A revival in the early 1820's culminated in the boom months at the first part of 1825, when 'money was plentiful' and 'mills sprung up in Leeds like mushrooms'¹. So favourable were conditions and so optimistic the manufacturers that at least ten new mills were being built in North Leeds in 1825 alone, one of which² was for York and Sheepshanks who already had two others. Other factories were greatly extended. A new wing was added at Bean Ing Mills³, and James Brown added a new dressing mill at his Bagby Mills⁴, for instance. The expansion in factory buildings was matched by an increase in steam power, and there were other firms which increased their capacity simply by adding to productive capacity. Black Dog Mill, for example, had a 30 h.p. engine in 1821 and a 40 h.p. in 1829. George Hammond, of Low Fold Mills, increased his power from 15 h.p. to 30 h.p.⁵

¹W. Hirst, op. cit. (1844), 24.

²i.e. Perseverance Mill. See gazetteer.

³See gazetteer, Bean Ing Mills.

⁴Ibid. - Bagby Mills.

⁵W. Brown op. cit. (1821) and L.M. 28.11.1829.

Both these were flax mills however. Of greater importance in this period were developments in cloth manufacture - principally the installation of machine-shearing and gig-mills in the finishing branch, for which extra power had to be found. Gott's, for example, purchased a new 80 h.p. engine from Boulton and Co., in 1829¹.

There was little increment to the total in the flax industry in this same period, which is possibly indicative of strong competition from the cotton industry, but a sharp rise in the 1830's, particularly in 1836, the year of the first railway mania. The same year saw renewed activity in the woollen industry, but the main impact was felt elsewhere in Yorkshire, and progress in Leeds was less spectacular. This trend continued throughout the rest of the first half of the century. The number of cloth manufacturing and finishing firms in Leeds rose from 106 to 128 in the period 1838 to 1858. Against this there was an increase in West Riding woollen mills (numbers of firms would have differed but slightly) of from 537 to 874². Employment in the Leeds woollen industry rose only slightly from 9,738 in 1838 to 10,193 in 1858³.

Steam power in flax-spinning continued to increase right up to mid-century, but thereafter more important than cyclic fluctuations in the economy was the wind of competition from Belgium and Ireland, which precipitated a steady decline after the early 1850's.

Following Marshall's lead, organisation in the flax industry tended to be factory-based and relatively large-scale, which was one reason why in 1830 the average engine installed in a flax mill was larger than the

¹Boulton & Watt Mss. 'A Catalogue of Old Engines'.

²R. M. Hartwell op. cit. (1956), 338.

³P.P.(1839)XLII and R. Baker, art.cit. 1859.

average woollen mill engine by 7 h.p. At the same time, however, of great importance was the general state of mechanisation in textiles as a whole. The flax industry in Leeds was concerned almost exclusively with spinning which, by 1835, was almost entirely mechanised. So too was woollen spinning, and the average size of engines and the degree to which production was conducted in the factory would have reached a similar level if there had been little weaving and finishing in Leeds, but this was not the case. There were still large numbers of small finishing mills, and a considerable proportion of the cloth mill was given over to hand-weaving.

Steam engines at work in the town's dyehouses tended to be even smaller, again only in part a reflection of scale, for their use was restricted to a limited number of operations. There were, however, a great many dyers who managed quite well without a steam engine. There were forty-five commission dyers in 1830, of whom only twenty-three possessed an engine (one firm had two). Of these only six dyers had an engine larger than 10 h.p. and the largest was only 30 h.p.¹ Clearly the degree of mechanisation in the trade was very limited at this date. An engine of only 12 h.p. provided sufficient power for a works of 81 men in 1833, and this was in a firm which finished goods as well as dyeing them². Most firms did not find the use for a large engine, and many probably found the high capital cost prohibitive and unnecessary.

Beyond the textile, dyeing and finishing industries, the use of power was still restricted in 1830, although a growing number of firms in an ever-widening range of trades were beginning to realise its benefits. It is necessary to distinguish, however, between those industries which had previously made use of water or wind for motive power, and were therefore

¹W. Lindley op. cit. (1824).

²Employment of Children in Factories, Reports, P.P. (1834) XX evidence of John Horsfall.

little altered by the advent of steam, and those, like textiles, which were revolutionised by it and other associated developments.

For example, corn, seed and ware mills were buildings in which various raw materials were crushed and ground between pairs of stones, the power for which was supplied by sail, water-wheel, or occasionally horse-gin. As soon as rotary motion could be obtained from the steam engine, its advantages for this process became apparent, and it was used either to replace or supplement existing sources of power. Otherwise, though, there was little change. Steam engines permitted the erection of larger corn-mills and the requirement of a waterside location need no longer be fulfilled, but this was no revolution, to be compared with the advent of roller milling in the 1880's (see chapter III). The addition of a steam engine permitted the enlargement of the soke mills some time between 1807 and 1816¹, and Crown Point Oil Mills had an 80 h.p. engine (still the largest in Leeds in 1824) installed about the turn of the century². In terms of organisation and other machinery used, these differed but little from their 18th century counterparts, however. Tobacco-cutting too, was a relatively unsophisticated process to which steam power might be applied with ease, but which wrought few changes.

Steam was, however, beginning to change the character of machine-making and metalworking, but as already stated, its universal use awaited the development of machine-tools and standardisation. In 1830 the amount of power used by this industry was comparatively small, though increasing rapidly, doubling between 1824 and 1830. It is unfortunate that no further data has ^{yet} been yet uncovered to illustrate its development thereafter.

¹L.C.D. no. 1123.

²L.C.D. no. 175.

For all remaining industries of any significance in Leeds, the application of power was unusual, though becoming less so. In 1824 one was at use in Leeds Pottery, two in paper mills, and one in a cudbear manufactory¹. That was all besides textiles, dyeing, metalworking, and tobacco. By 1830 the range had increased somewhat, but unfortunately it is impossible to state what the 'others' category comprised, except that a tannery, a brewery, a soapworks, sawmills, roperies, and chemical works are the most likely contenders, in addition to those specified by Lindley in 1824.

Rimmer is of the opinion that 1830 constituted a watershed in the industrial development of Leeds - the year in which steam power equalled that generated by human labour for the first time². It might be thought, therefore, that by 1850 the town was well advanced in ^{the} second stage of the Industrial Revolution, but in fact this state of affairs had been achieved in only a handful of activities. The Borough had 362 steam engines totalling 6,600 h.p. by 1842, with approximately 170 of them in the in-township³. Leeds, the foremost centre of the woollen industry and of flax spinning, with its 'many extensive dye houses and dressing shops', 'several extensive iron foundries', with factories where 'glass, earthenware, and tobacco are manufactured extensively'⁴, could therefore compare favourably with Manchester which, together with Salford, had almost 10,000 h.p. in 1839, and Birmingham (only 3,595 h.p. in 1838)⁵. However, it is important to

¹Cudbear is a type of crimson dye.

²W. G. Rimmer 'Engineering', L.J. 26 (1955), 229-31.

³~~R.~~ Baker op. cit. (1842) and L.I. 11.2.1843.

⁴E. Parsons & W. White, op. cit. (1834), 216.

⁵L. M. 4.5.1839 & J. H. Clapham op. cit. (1930), 443.

remember that the use of power was limited to few firms and only a small sector of manufacturing industry; even in 1858 when there was 3,000 h.p. at work in textiles, but only 400 h.p. in the chemical industry.

Moreover, only in the cotton industry had a complete revolution been wrought by 1850¹. Even in the most advanced industries - ~~woollen & worsted~~ and flax - there was still no mechanisation in weaving and in these trades the period after 1850 was to see even greater changes.

Finally, however, a word must be said about water power, which continued to be used in Leeds until the present century, in certain instances. It has been but little mentioned because of its relative unimportance in Leeds - only 275 h.p. in 1835 - and because no new water mill was built after 1800 in North Leeds, (so far as is known). Though it played an important role in the early 1790's, the ease of obtaining coal fuel and the disadvantages of water power (little choice in location; high capital costs in goits, wheel etc; the possibility of drought) strongly favoured the steam engine. Interestingly, when the question of rating sources of power was discussed in 1837, it was given a higher value than steam power - £10 per h.p. as opposed to £6² - but only water mills found it necessary to work nights in the 1830's, and the very fact that such mills as Burley Mill, Savins Mill, Grove Mills, and Sheepscar Mill all eventually added a steam engine is surely indicative.

Locational Change, 1800-1850

The most striking feature of the locational pattern of manufacturing in North Leeds in the first half of the 19th century is its inertia; or

¹J. H. Clapham, op. cit., (1930), 143.

²L.C.A., Leeds City Justices, Petty Sessions. L.C.J.i cta, 9.9.1837. ?

rather, the continuing predominance of those areas of the town which most satisfactorily fulfilled the then locational requirements of industry.

As steam power replaced water power it permitted increasing concentration of industrial activity in the larger towns, which offered external economies deriving from better transportation and commercial facilities, a larger supply of labour, and proximity to market, combined with internal economies of scale and agglomeration. Noticeably, the first woollen factories of West Yorkshire were located in the three largest towns of the time - Leeds, Halifax and Huddersfield.

Whereas, therefore, the 18th century water mills were scattered throughout the West Riding along streams and rivers, with occasional concentrations at nodal points, of which Leeds was only one¹, the adoption of steam power removed the necessity for such dispersal. Factory production of cloth and other goods was essentially an urban activity, where it was possible to take advantage of a pre-existing concentration of labour and facilities. Improvements to transportation and the establishment of a national network, far from reducing inequalities in this respect, emphasised the advantages of those towns which were best placed in relation to the system of roads, canals and later railways.

Alongside these developments, the influence of individuals could still be felt, and on occasions concentrations of industry, and even whole towns grew up around a factory whose location was decided by one man. The role of John Marshall in founding the Leeds flax industry and promoting the industrial growth of Holbeck may be cited as an example. Once established, the importance of person-to-person contact in affecting the diffusion of innovations reinforced the dominance of those locations which also possessed the necessary economic requirements.

¹M. Wild, 'Some Geographical Implications of the Historical Usage of Water Power' etc. (1967).

Trades which did not depend upon the physical peculiarities of sites were early located in urban areas - though not the main concentration of cloth manufacture in the 18th century, Leeds was the commercial focus, and had more dyehouses and finishing shops than any other town¹, these being undemanding in their site requirements. Once the development of steam power freed manufacturing it too became congregated in urban areas.

Such developments affected intra-urban just as much as inter-urban patterns of industrial location. Within the Borough manufacturing was crowded into a few well-endowed locations, with voluntary segregation of land uses helping to maintain this trend.

The industrial pattern continued to be sectoral, along the Aire and Meanwood Valleys, with convergence in those parts which were closest to the town centre, i.e. School Close, the Bank, Mill Garth and the Leylands.

From 1815 onwards these concentrations were reinforced, until they became overcrowded, and firms were forced to look elsewhere. School Close, for example, had largely been developed by 1830.

Water remained important, not for power but for raising steam in boilers and for washing, dyeing and other processes. Though the use of boreholes was increasing, it was still most easily obtained from a water-course, and new industrial development, particularly in textiles, tended to be at the periphery of the built-up area, alongside the River Aire and the Meanwood Beck, with occasional interfluvial concentrations where natural springs occurred, as at Carlton Hill or St. Peter's Hill, or where there was continuing development of an old-established nucleus, as at Bagby Fields or North Town-End.

The two ends of Leeds tended to develop in distinctive ways, however. The earliest factories had been established at the Bank, where water,

¹R. M. Hartwell op. cit. (1956), 176.

riverborne transport, and a predominantly working-class population coincided. Around this area flax mills and foundries tended to concentrate, and the flatter nature of the land, the easy access to coal, and the absence of any substantial areas of high-class housing meant that new mills and factories were well dispersed - at Steander, Far Bank, and Burmantofts, and up Marsh Lane, York Road, and Mabgate. The most rapid development took place early in the century and in the 1830's and 1840's.

The growth of the western end of the in-township, on the other hand, was much more associated with the cloth industry, which expanded particularly in the 1820's along Wellington Street, West Street and Kirkstall Road. The transformation of this area was rapid:

Spring Gardens and North Hall were but a short time ago completely in the country ... the scene is now completely changed. Large dyehouses and immense factories line the northern side of the river; streets of cottages open from the great western road: a vast population pours forth at specific periods of the day to their avocations of industry and toil.

Thus the area was described in 1834. Ten years earlier there was considerable building activity around Wellington Bridge², which although said to be 'too far removed from the centre of the town to afford any general benefit', it was of great advantage 'to the proprietors of the estates through which the new roads leading to it pass'³. Continued developments in the cloth industry and in building housing for the working population meant that in 1831, though the growth of Leeds was not proceeding very rapidly, it most nearly did so in the west, along the Bradford road⁴.

¹E. Parsons & W. White op. cit. (1834), 171.

²L.I. 8.4.1824.

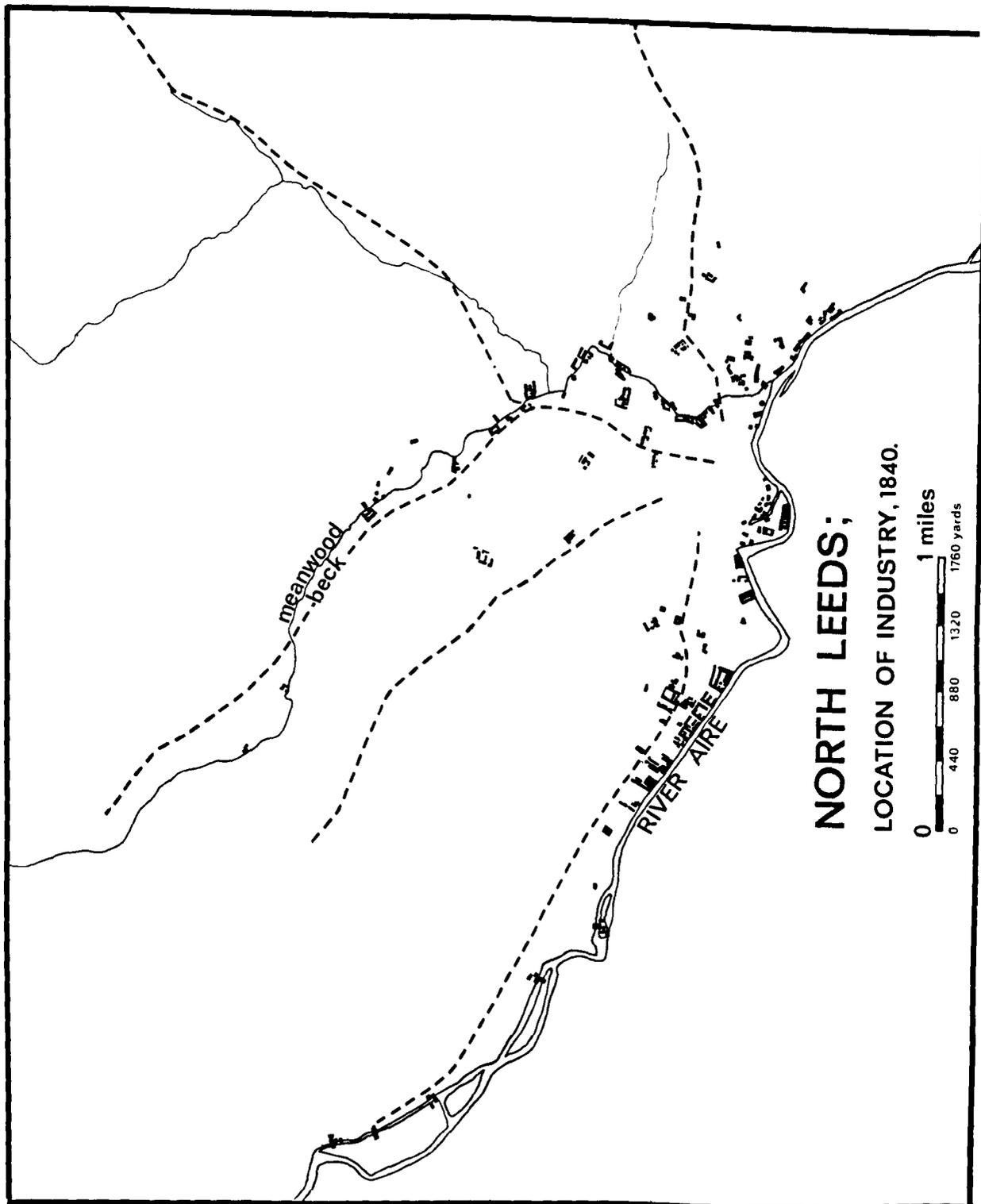
³E. Baines, Directory (1822), 14.

⁴Reports from Commissioners on Proposed Division of Counties and Boundaries of Boroughs (1832) Vol. III, Pt. 1, 195.

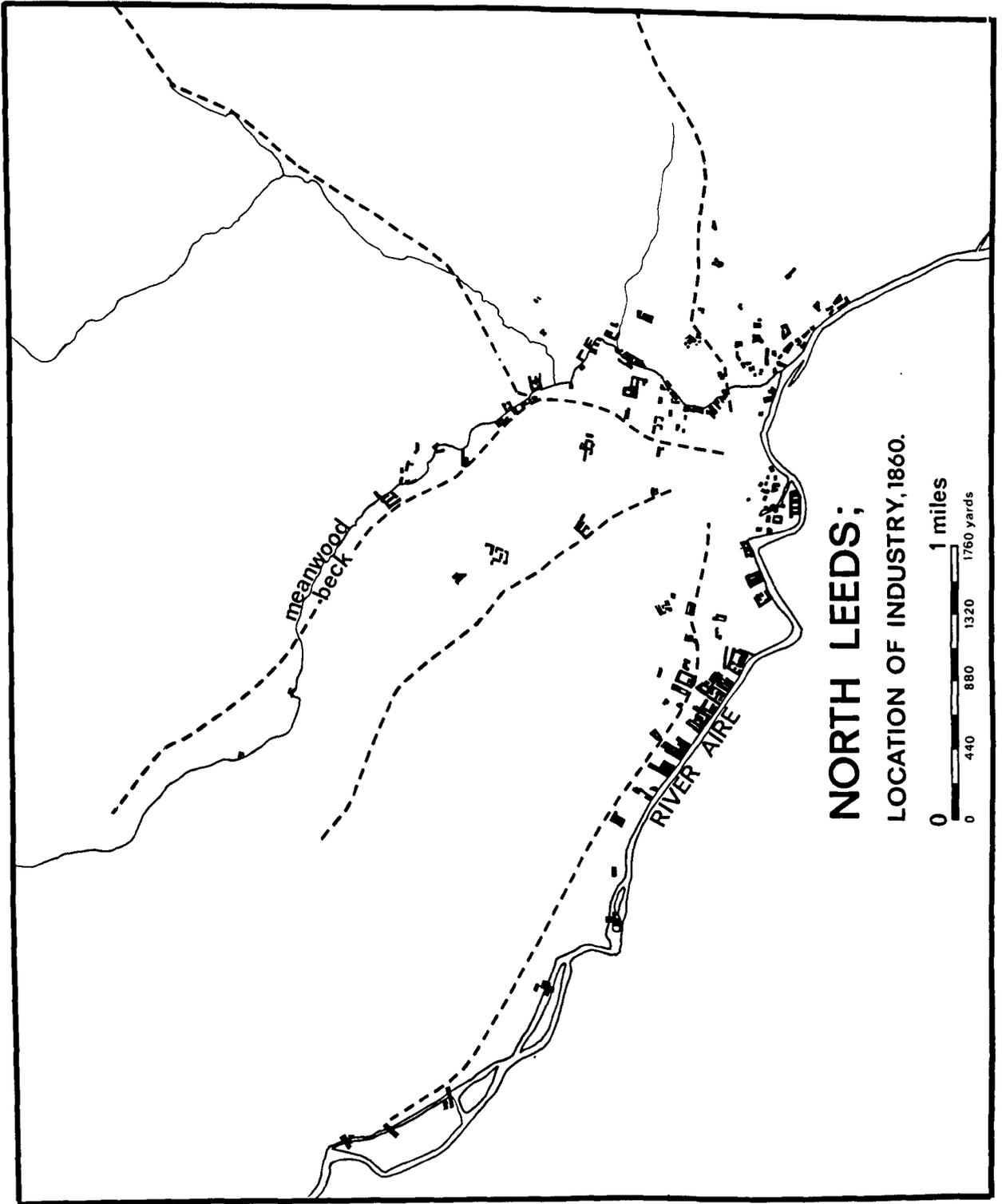
The workshop quarters of the town remained essentially the same throughout Mill Hill, Swinegate, the Tenters, the Kirk Ings, York Street, Quarry Hill, Steander, Mabgate Fold and Lady Lane, with larger factories tending to seek greenfield sites, where space was not at a premium and sufficient land might be bought to allow for foreseeable future requirements. However, the forces governing urban growth remained highly centrifugal, as poor transport over land worsened the friction of distance. Although the population of Leeds rose from 31,000 in 1801 to 101,000 by 1851, the built-up area remained highly compact, and industry locating at any distance from this area was likely to have difficulty in meeting its labour requirements.

Extension to the area under manufacturing, therefore, tended to be in open field sites, close to the roads and water, and no great distance from the town centre and the loci of working-class homes. The main developments in the first half of the 19th century were along Kirkstall Road, East Street and the Meanwood Beck, re-emphasising a sectoral pattern. By 1851 there were factories as far out as Perseverance Foundry (just into Burley), Sheepscar and Woodhouse (though with undeveloped land inbetween), and Burmantofts.

However, it should not be thought that there were no spaces remaining within a short distance of Briggate. Surprisingly, perhaps, flat undeveloped land, by the side of the river, could be found along Whitehall Road well after 1850, and industrial development to the south-east never went beyond Low Fold Mills, on the north bank of the Aire at least.



Map 5



NORTH LEEDS;
LOCATION OF INDUSTRY, 1860.

0 440 880 1320 1760 yards
0 1 miles

Chapter III - INDUSTRIAL DEVELOPMENT 1850-1914

The occupational data for Leeds in the second half of the 19th and the early 20th centuries reveal that its economy moved towards the position which it had occupied prior to 1800 - that is, commercial and distributive / ^{activities} regained their pre-eminent position.

With a vast manufacturing district on one side, and a rich agricultural district on the other, Leeds is calculated to form the most advantageous depot for the commodities which they respectively produce,

Fenteman & Co.

observed in 1858¹ - a comment strikingly similar to Aikin's some sixty years before². By 1914 manufacturing was of diminished importance relative to commercial activities, a fact which is reflected in the occupational returns of successive censuses:

TABLE 3+i - THE DISTRIBUTION OF THE WORKFORCE, 1851-1911³

	<u>1851</u>	<u>1901</u>	<u>1911</u>
Primary Industries	2.8	0.9	0.8
Manufacturing	73.6	68.0	68.4
Service Industries	17.5	26.0	26.7

Occupational figures unfortunately do not allow for differences and changes in productivity, and it cannot be doubted that labour productivity increased markedly in the manufacturing sector, as subsequent analysis of individual industries will demonstrate⁴. However, it is also clear that in the national economy service industries were contributing a growing proportion of the national product⁵, and Leeds was therefore only typical

¹T. Fenteman & Co., An Historical Guide to Leeds and its Environs (1858), 13.

²See Chapter I, Page 21.

³Calculated from Table 1 in W. G. Rimmer, 'Occupations in Leeds, 1841-1951'. Thoresby Soc., L (1967), 158-178.

⁴See below, this chapter and W. H. B. Court A Concise Economic History of Britain (1965), 182.

⁵P. Deane & W. A. Cole, British Economic Growth, 1688-1959 (1967), 170 et seq.

of many other towns, especially larger ones which, through superior communications facilities, were particularly attractive to offices, distribution, the professions and the like.

It can be claimed, therefore, that the first half of the 19th century when manufacturing employment grew at a faster rate than any other sector, was an anomalous period, and therefore the key problem is not to explain why it declined relatively after 1850, but why it had grown so rapidly before that date. Why the industrial revolution and rapid economic growth took place is a key question which will occupy historians for many years to come. It is easier to explain developments in the second half of the century, when higher productivity in manufacturing, increased affluence and, most importantly, increased investment in the service sector, retitled the balance in favour of tertiary employment.

However, this aspect of the economic development of Leeds is not of central importance when attention is to be focused upon factory-building and the pattern of industrial location, except that the growth of certain sectors of manufacturing reflects these trends.

More important is the changing structure of Leeds industry, which again may be adjudged from the employment figures:

TABLE 3.ii - INDICES OF EMPLOYMENT IN MANUFACTURING INDUSTRIES, in 1911¹

Mining and Quarrying	272	(1851 = 100)
Bricks, Glass and Pottery	253	
Chemicals and Oils	335	
Engineering	448	
Precious Metals	752	
Textiles	70	
Skins and Leather	377	
Dress	436	
Woodworking	300	
Paper, Books and Printing	1,042	
Building	248	
Transport	503	
Food, Drink, Tobacco and Lodging	353	
Commerce	1,525	
Government, Defence, Municipal undertakings	509	
Professional	390	
Domestic and Service	209	

¹Based upon table 1 in W. G. Rimmer art. cit., (1967)

The table enables us to see more clearly which areas of employment expanded most in the latter part of the period under study. As already noted, the number of jobs in Commerce rose extremely rapidly, over fifteen-fold in sixty years, and the tertiary sector grew more rapidly than manufacturing. But there were certain sectors of manufacturing which grew with almost equal rapidity, and both Precious Metals and Printing outpaced growth in all other sectors, with the exception of Commerce. It must not be thought, therefore, that all manufacturing industries were suffering a relative decline at this time.

At the same time, the composition of the manufacturing workforce underwent considerable change ~~also~~. Representative figures in 1851 were the male cloth worker and the female flax mill hand, but by 1911 these had been replaced by the engineering worker and the clothing operative respectively. Even if the size and composition of the workforce altered but little¹, the type of factories at which it toiled was very different by the time of the First World War.

The most noticeable feature is the decline in textiles, the only major category in which employment actually fell. Whereas in 1851 one in every three workers was in textiles, by 1911 the corresponding figure was only one in ten. Fortunately, the decline of this staple trade was more than compensated by the growth in other industries, notably engineering, dress, printing and publishing and the service industries. The percentage composition of the workforce in 1851 and 1911 is indicated in Table 3 below:

TABLE 3.iii - COMPOSITION OF THE WORKFORCE, 1851-1911(%)²

	<u>1851</u>	<u>1911</u>
Agriculture	2.6	0.8
Mining and Quarrying	1.8	2.3
Bricks, Glass and Pottery	1.5	1.5
Chemicals	0.6	1.2
Engineering and Metals	6.5	15.9
Textiles	37.8	0.3
Skins and Leather	1.0	1.8
Dress	8.3	18.3
Paper, Books and Printing	1.0	3.7
Others	29.1	38.1

¹Rimmer, art. cit. (1967), 161 et. seq.

²Ibid., Table 1.

In 1851 approximately three-quarters of all factory employment was in textile mills or dyehouses, and the fortunes of many other trades were closely linked. By 1911 there were 89,000 workers in manufacturing, of which textiles and dyeing represented only 15%. This is the single most dramatic feature of the industrial development of Leeds in the second half of the 19th century, and although it caused some hardship amongst flaxworkers in particular, it was ultimately of considerable benefit, for only thus were released the buildings, capital and labour force necessary to foster the infant clothing and footwear industries, and to maintain growth in leather, engineering, and printing and publishing.

Yet it is a measure of the strength and importance of textiles in mid-century Leeds that despite their rapid rise in the period after 1851, leather, chemicals and printing together still employed a total labour force two-thirds the size of textiles in 1911. Nor do crude employment figures tell the whole story.

Really, the term 'decline' is misapplied in relation to textiles, for rising productivity and the reorganisation of the industry after 1860 started a period of continuous growth in output at least in the woollen industry. It was only the flax trade which suffered from both relative and absolute decline, brought upon principally by Scottish, Irish and continental competition whose prices Leeds manufacturers were unable to match, faced as they were with costlier **running costs**.

The woollen industry in Leeds more than managed to hold its own in this period and there was a quite healthy resurgence in the trade in the first years of the 20th century, as the economy recovered ~~from the depression of the late 19th century~~, and exports boomed. Although the number of operatives fell steadily right up to 1901, the 1911 figures indicated a rise of over 12%.

TABLE 3.iv - NUMBERS EMPLOYED IN TEXTILES, LEEDS BOROUGH, 1851-1911¹

	<u>1851</u>	<u>1861</u>	<u>1881</u>	<u>1891</u>	<u>1901</u>	<u>1911</u>
Woollen	14,894	15,357	12,898	13,191)	11,901)	12,561
Worsted	1,671	1,417	1,600	269))	
Flax	8,614	8,461	3,540	2,292	975	749
Other Textiles	1,658	1,034	1,679)	1,403	896)	769
Dyeing	<u>613</u>	<u>677</u>	<u>726</u>)		<u>1,395</u>)	
TOTAL	<u>27,450</u>	<u>26,946</u>	<u>20,443</u>	<u>17,155</u>	<u>15,167</u>	<u>14,069</u>

Employment statistics do not take account of changes in productivity however, and hence cannot be taken as representative of growth in output. Furthermore, they do not give a true representation of trends in output, for the peak output in an industry is not normally reached until after the peak in employment has been reached - in other words, when the size of the workforce is actually declining.

This was almost certainly the case in the Leeds woollen industry, for example, though unfortunately no details of either yarn or cloth output are available. Instead, however, it is possible to rely upon data for machinery at work in Leeds mills, details of which survive for 1855, 1858 and 1904 from which it may be seen that employment figures tell only a part of the story (See table overleaf).

The table indicates that the number of spindles installed in Leeds mills rose by over 25% between 1855 and 1904. Yarn production rose by a much greater amount - about 50% - in response to the adoption of the condenser, which by by-passing the billy, reduced the number of spindles required in making a piece of cloth, and other improvements in machinery. Though a substantial rise, it is clear that Leeds lost ground relative to other centres of woollen manufacture in the second half of the 19th century, national consumption of wool rising from 262 to 650 million pounds between

¹Calculated from Census Returns (1851-1911). Occupations tables. N.B. only males over 20 were classified as to occupation by the 1871 Census and this year has therefore been omitted.

TABLE 3.v - STATISTICS OF MACHINERY ETC. IN THE LEEDS WOOLLEN INDUSTRY IN
THE PERIOD 1855-1914

	No. of factories	Workers	Horse- power	Spindles	Power looms	Rag-grinding machines
1855 ¹ Woollen	54	6,406	1,564	118,637 ²	883	
Dressing	48	3,944	824			
TOTAL	102	10,350	2,388	118,637	883	n.d.
1858 ³ Woollen	68	3,636	1,936		952	
Dressing	48	6,209	860			
Shoddy	12	348	128			16
TOTAL	128	10,193	2,924	n.d.	952	16
1904 ⁴ Spinning only	7			16,394		
Weaving only	9					
Spinning and Weaving	40			107,985	2,382	
Shoddy	18			25,536	586	48
TOTAL	74	n.d.	n.d.	149,915	2,960	48

the late 1850's and the turn of the century⁵. Huddersfield, for example, had almost 200,000 spindles in its woollen mills in 1904⁶.

In weaving too, the Borough lost ground. In 1858 there were less than 1,000 power-looms and about 3,500 handlooms in the whole of the Borough. By 1904 the total of power-looms was approaching 3,000, whilst the number of handlooms was negligible, the revolution having taken place primarily in the 1860's, a decade later than in the worsted industry. Power-looms were

¹T. Fenteman & Co., op. cit. (1858).

²Probably underaccounted. See E. Baines 'On the History of the Woollen Manufacture' etc. Q.J.S.S. xxii (1859).

³R. Baker 'On the Industrial and Sanitary Economy of the Borough of Leeds in 1858'. Q.J.S.S. xxi (1858), 427-43.

⁴P.P.(1904) lxxxvii, 1109. Return of the Number of Woollen, Worsted and Shoddy Factories etc.

⁵P. Deane & W. A. Cole, op. cit. (1967), 196.

⁶P.P.(1904) lxxxvii, 1109. Return of the Number of Woollen, Worsted and Shoddy Factories etc.

twice as efficient as handlooms by 1904, and cloth output may therefore be estimated to have risen by about 10%, whereas U.K. output rose by over 200%¹.

Despite the increases in production there were over fifty less mills by 1904 compared with 1858. ~~However~~ The average number of operatives in the U.K. woollen mills rose from 53 in 1856 to 80 in 1907², and from 100 to approximately 160 in Leeds mills³.

The decades prior to the close of the 19th century were characterized by the relative stagnation of the economy, with only short-lived booms in 1882 and 1890. The low level of prices reduced profits and particularly affected manufacturing industry. At the same time, British industries were facing increasing competition from abroad, and were therefore forced to either rationalize organisation and improve efficiency, or suffer the consequences. In the woollen industry the problem of a slow rise in demand was met by weeding out of the less efficient firms, and increasing integration, principally of a vertical nature. Thus, whereas in the middle of the century the industry had been characterized by small units, and was split up into its component parts of spinning, weaving and finishing, by the end of the century the fully-integrated mill was by far the most common form. This represented a return to methods introduced by the earliest factory owners at the beginning of the century, following which firms had become increasingly specialised and the industry more and more subdivided.

The clothmaking itself is separating more into the old independent branches of weaving, dyeing and dressing, which some of the old firms undertook to do all themselves,

wrote a local observer in 1872⁴

¹P. Deane & W. A. Cole, op. cit. (1967), 106.

²E. Baines, art. cit. (1859) & J. Clapham, The Woollen and Worsted Industries (1907), 130.

³Calculated from Table 3.v. and Census 1901.

⁴J. Holmes 'Foreword' to Porter's Topographical and Commercial Directory of Leeds and Neighbourhood (1872-3), 8.

but thirty-five years later Clapham noted that all operations were most commonly combined in the one mill¹, a fact which is confirmed by the 1904 returns (Table 3.v), and the observation of the Chamber of Commerce in 1913 that, 'very often all processes are now done in one place'².

The main pressure acting upon firms to integrate all processes however, was the rise of power-weaving after 1860. Though Baines considered that the power-loom held no advantage over the handloom in 1858³, and though there were considerable technical difficulties involved, gradually improvements in power-loom weaving caused it to gain the ascendancy, and power-loom sheds were added on to spinning mills wherever possible, as for example at Black Dog Mills in the 1860's. The great weight of the machinery obliged manufacturers to construct single-storey sheds which therefore required considerable ground area which was not always available. As a result many new mills were built in suburban areas where there was sufficient land for development. Despite the availability of many older spinning mills nearer the centre of the town, some woollen manufacturers preferred to build new factories further out. For example, J. G. and T. Chadwick built Cardigan Mills, Cardigan Fields in 1872, which by 1888 comprised:

the willeying shed, engine house, boiler house, tenter house, weaving sheds, warping sheds, dyehouse, milling house, curling or knotting shed, weaving sheds, wash house, drvhouse, wool warehouse, and machinery.⁴

Ridge Mills in Meamwood Road consisted entirely of a large single-storey shed extending over 6,000 sq. yds., although a three-storey warehouse was added in 1910⁵.

¹J. H. Clapham, The Woollen and Worsted Industries (1907), 130.

²Leeds Chamber of Commerce, Yearbook (1913), 55.

³F. Baines, art. cit., (1859), 4.

⁴W.R.R.D. 7 175 97 (1888).

⁵Information from J. Mathers & Sons Ltd.

Cardigan Mills incorporated its own dyehouse, and there was a definite trend in the late 19th century away from the separate, specialist dyehouse, towards the large, integrated woollen mill. A similar observation may be made with regard to the finishing industry. Although some dyeing and finishing firms managed to maintain their independence by associating with other firms in the same line of business, their number declined steadily until by 1914 there were only sixteen finishers and twenty dyers left in Leeds, whereas fifty years before there had been three times that number. Of those that remained over a half were constituent members of companies like the Leeds and District Dyers and Finishers Association (founded 1900)¹, or the Bradford Dyers Association (1898)².

The number of specialist dyers was further reduced by competition from Bradford and because Leeds firms failed to move with the times and develop a new industry based upon synthetic dyes.

The remaining specialist cloth finishers tended to be the older, well-established concerns like Burns and Company of Harcourt Mills (est. 1832) or J. and J. A. King (est. 1837)³.

Most of the thirty-six dyers and finishers remaining in 1914 combined both operations, a large proportion of them for the worsted trade rather than the woollen industry. The dyeing and finishing of worsted cloths constituted 'a considerable industry in Leeds' in 1890⁴. When, in the mid-1840's the stuff manufacture had deserted Leeds almost en masse, the dyeing and finishing sections remained, possibly because Leeds had better communications than Bradford at the time, but principally because, like the

¹L.C.A. Hepper Valuation Books, vol. 8, 28-34.

²W. H. B. Court, British Economic History 1870-1914, 252-9.

³The Historical Publishing Co., Industries of Yorkshire - Part I. (1888).

⁴British Association. Handbook, Leeds Meeting (1890), 114.

worsted spinners, heavy investment in plant and machinery created a strong inertia. Moreover, Leeds possessed a skilled labour force, well-trained in the arts of the industry - a factor highlighted in a report by the United States Industrial Commission in 1901¹.

The departure of the stuff trade for Bradford had a pronounced, though delayed, effect upon worsted spinning in Leeds which, like dyeing and finishing, had a considerable investment in plant and could not migrate as rapidly as the stuff merchants. In the mid-1850's, however, the number of worsted mills fell sharply, from nine in 1855 to four in 1858, although capacity rose slightly to over 10,000 spindles². The Census figures tell a similar story, though the most dramatic fall in employment occurred in the decade after 1881:

TABLE 3.vi - EMPLOYMENT IN THE WORSTED INDUSTRY, BOROUGH OF LEEDS

<u>1851</u>	<u>1861</u>	<u>1871</u> (males over (20 only)	<u>1881</u>	<u>1891</u>
1,671	1,417	501	1,600	269

After 1891 the worsted industry did not even receive separate account in the Census figures, but it is probable that the numbers commenced to rise once more. The revival of the Leeds worsted trade was stimulated by demand from the developing clothing industry after 1870. Initially the revival was limited to weaving, with yarn being obtained from Bradford and other centres, but by 1890 we find that 'Worsted yarn spinning is developed in Leeds on quite a large scale'³.

The worsted industry as a whole grew much more rapidly than the woollen manufacture in the second half of the century, and in terms of numbers of

¹W. H. B. Court, op. cit., 255-9.

²R. Baker, art. cit. (1858).

³British Association, op. cit. (1890), 109.

spindles, was the more important branch by 1904¹. Leeds, only ten miles from Bradford was one centre to which it spread, and by 1904 there were thirty worsted mills in the Borough², and Clapham wrote that the industry was of 'first-rate importance in the Leeds district, which once was almost entirely given over to woollens'³. The British Association in 1890 further underlined the revived importance of the cloth industry:

There is no doubt in the minds of those best qualified to judge that the manufacture is now more extensive than it has ever been before.⁴

Leeds attuned its production to the demands of the clothing industry, where fashion favoured the lighter worsted cloths. Worsted coatings, especially serges which, because of their cheapness began to take over from Bradford all-wool worsteds after 1903, were the main product of Leeds factories, and dyeing and finishing them became an important specialised business in Leeds⁵.

By 1913 Leeds excelled in the manufacture of four types of cloth: plain wool-dyed cloths (the old broadcloth industry); expensive suitings from pure new wool (for the bespoke trade); serges for the wholesale clothing trade; and 'union cloths', cheaper material employing cotton warps⁶. Reconstituted wool ('shoddy' and 'mungo') provided the raw material for the cheaper types of cloth, and rag-sorting warehouses and shoddy mills were a common sight in Leeds by the First World War. Low Fold Mills, East

¹P. Deane & V. A. Cole, op. cit. (1967), 200.

²P.P.(1904) lxxxvii, Return of the Number of Woollen, Worsted and Shoddy Factories, etc.

³J. H. Clapham, op. cit. (1907), 135.

⁴British Association, op. cit. (1890), 109.

⁵J. H. Clapham, op. cit. (1907), 152 & 165.

⁶Leeds Chamber of Commerce, op. cit. (1913), 55.

Street, for example, originally occupied as a flax factory, were tenanted by Roper and Sons, wool extractors and shoddy manufacturers in 1913.

The Leeds branch of the woollen industry languished in mid-century as manufacturers proved unwilling to replace their machinery and adapt their production to changing demand. Machinery which functioned successfully and with which operatives were familiar was continued despite its lower efficiency¹, and the second and third generations of the principal woollen houses had little interest in their businesses. By 1872 a new generation of manufacturers had begun the revival and new names established themselves in place of the Gotts, the Browns, and the Willans. At Bean Ing Mills, for example, Joshua Wilson & Sons, founded in 1873, employed about a thousand hands in the manufacture of worsted coatings by 1888², and thus proved themselves worthy successors to the Gotts, still the owners of the property. Others who specialised in this branch of the industry included Hudson and Company of Balaclava Mills, and Lasseys of Carlton Mills, whilst names like Crawford, Dixon, Lupton, Swithenbank and Mathers revitalised the woollen manufacture. By the turn of the century the only firm still surviving from the first generation of cloth manufacturers was William Eyres and Sons, founded in 1800³.

This new generation of manufacturers succeeded by adapting to demand, especially for suiting materials, cheap, felted cloths, and lighter cloths incorporating worsted and cotton yarns. The most rapid growth was in the shoddy trade, where the number of rag-machines tripled between 1858 and 1904, and the number of mills rose by 50% (see Table 3.v).

¹E. Baines, art. cit., (1859).

²Historical Publishing Co., op. cit. (1888).

³Robinson, Son & Pike, Leeds: Contemporary Biographies (1902)

Far from declining in the period after 1870, the Leeds woollen industry maintained a strong position, and textiles still employed 20,000 workers (9.3% of the total labour force) in 1911¹, and was therefore the third most important industrial activity in the Borough. True its importance had relatively declined since 1850, and certainly dyeing and finishing firms were not such a prominent feature. In addition, Leeds developed more slowly than other centres of the industry, except in the worsted industry. But it must not be thought that it stood still or that the woollen and worsted industries were no longer of any importance in 1914. On the contrary, mills were still a common feature in Leeds, and it is significant that ~~the~~ Prospect Mills in Accommodation Road in the 1870's, ~~they~~ were taken over by a Bradford firm².

The falling-off of employment in the textile trades of Leeds is not therefore attributable to decline in the woollen and worsted industries, which retained some of their traditional importance even in 1914. Rimmer shows that numbers of textile workers fell from almost 29,000 in 1851 to 20,000 in 1911, a drop which therefore must be wholly attributed to the virtual extinction of the flax industry³.

Warden noticed little wrong with the Leeds flax industry in the early 1860's though increasing competition from Belfast and Dundee was beginning to have an effect⁴. By 1890, however, there were only two flax firms of any size remaining in Leeds, and only for the heavy spinning of Russian hemp yarn could Leeds still be reckoned an important centre. Marshall and

¹W. G. Rimmer, art. cit. Table I

²See gazetteer - Prospect Mills.

³W. G. Rimmer, art. cit. (1967), Table I

⁴A. Warden, The Linen Trade, Ancient and Modern (1864), 382-5.

Company, who at one time constituted 10% of the U.K. flax-spinning capacity, folded in 1886, four years later than the second-largest concern, Hives and Atkinson. Employment dropped from 3,540 in 1881 to 2,292 and then to only 975 by 1901¹.

At its peak the Leeds flax industry gave work to over 10,000 operatives, and there were almost 200,000 spindles in operation, but by 1904 the whole of Yorkshire could muster a mere fifteen mills, with 3,000 spindles, a mere fraction of the Irish capacity, and less than one-sixtieth of its extent fifty years previous².

Decline was delayed by the cotton famine of the 1860's, during which the linen industry achieved its highest output of the pre-1914 period³, but was rapid thereafter. A warning note was sounded by one observer in 1865 that the continued prosperity of the industry in face of increasing competition from other centres depended upon its firms combining spinning and weaving and adopting the power-loom. The separation of the Yorkshire linen industry between its spinning branch at Leeds, and weaving at Barnsley and Darlington or by Irish handloom weavers, was proving detrimental to future growth⁴. Leeds had 1,000 power-looms at most by 1868, against which the Scottish and Irish centres had over 13,000 each⁵.

An increase in capital input, in the form of investment in new machinery, weaving sheds etc., might have compensated for the increasing cost of labour

¹Census 1881, 1891 and 1901.

²P.P. (1905) lxxii, 543. Return of the Number of Flax Mills etc.

³P. Deane & W. A. Cole op. cit. (1967), 204.

⁴J. Combe, Suggestions for Promoting the Prosperity of Leeds Linen Trade (1865) MSS in Leeds City Reference Library.

⁵P. Deane & W. A. Cole op. cit. (1967), 206.

but labour cost per bundle at Marshall's Mills rose from 4.39d in 1844-8 to 6.83d in 1874-8¹, and the child and female labour upon which the industry relied was enticed away by the higher earnings of the clothing and other trades. One early clothing firm actually recruited labour in the flax mills². Leeds had relied for its early supremacy upon its greater mechanisation and lower coal costs but these advantages disappeared after 1860. Once these factors were removed, its inland location, which added to the costs of imported raw material, began to prove a disadvantage and decline was swift.

The principal factor, therefore, in the decline of the Leeds flax trade was the increasing competition from other centres, at home and abroad, where wages were lower and labour freely available, Leeds firms being forced to compete with rising trades most notable amongst which were clothing, engineering and footwear.

Whereas in 1851 30% of males and 45% of females worked in the textile industries, by 1911 of much greater significance were engineering, with 22% of all males and the dress trades, with 36% of all female employment. The substitution of one form of employment for another was matched by changes in the usage of industrial buildings, an increasing number of mills being taken over by clothing, footwear, and even engineering firms. Low Close Mills, for example, which were used for cloth finishing in 1850, were occupied by eight tailors and two wholesale clothiers in 1913, and Oxford Mills, Park Lane, were taken over first by a footwear manufacturer and then by the clothing industry.

¹W. G. Rimmer Marshall's of Leeds, Flax Spinners, 1788-1886 (1960), Appendix table 18.

²C. Collett, 'Women's Work in Leeds'. Econ. Journal, i (1890), 460-73.

Close links, as already indicated, existed between cloth maker and clothing manufacturer, and Leeds was a centre of tailoring even before the first clothing factories were established. Clothing manufacturers, especially those in the wholesale bespoke trade, maintained a strict control over the style and quality of cloth, to the advantage of those manufacturers who were close at hand. Some of the clothing manufacturers emerged from the ranks of woollen merchants, like J. May and Company, or cloth manufacturers, like D. Little and Company, whilst one firm laid claim in 1888 to being the only firm in the country which started with raw wool and transformed it into clothing¹.

The existence of the cloth industry was one important factor in locating the clothing manufacture in Leeds, therefore, but possibly its most significant advantage was initiated accidentally.

But the foresight of a Leeds man, who recognised the possibilities of the application of machinery, was the factor which gave an impetus to the local trade²

the Chamber of Commerce opined and the circumstances under which that man, John Barran, arrived in Leeds appear themselves to have been largely fortuitous³. Barran started as a draper, and in 1856 set up a small factory in Alfred Street for the manufacture of boys' clothing, using newly-developed American machinery⁴. By this development, and by the development of the handknife⁵, Barran gave Leeds an initial advantage which others were quick to grasp, and by 1881 there were twenty-one wholesale clothiers in Leeds.

¹Barker & Moody of Perseverance Mills, Kirkstall Road. See Historical Publishing Co. op. cit. (1888).

²Leeds Chamber of Commerce op. cit. (1913), 55.

³J. Thomas 'History of the Leeds Clothing Industry'. Yorks. Bull., occ. paper no.1 (1955), 8.

⁴D. Ryott, John Barran's of Leeds 1851-1951 (1951)

⁵J. Thomas art. cit. (1955), 10.

However, though Barran's factory was a pioneering one, the importance of the hat-and-cap trade should not be overlooked. This trade arose about the middle of the century, the simplicity of its operations encouraging large-scale operation. The most prominent firms were Gaunt and Hudson (est. 1850), and Buckleys, who employed 140 workers by 1861¹. Machinery was soon introduced and by 1882 Leeds firms gave work to over 6,000 hands, mainly female, and turned out about 840,000 hats and caps per week².

The development of this trade, largely independent of Barran's efforts to manufacture clothing by machinery, indicates that Leeds, like other centres of textile manufacturing such as Manchester, would likely have become a centre of the clothing industry with or without Barran, but to this one man must go the credit for establishing Leeds a centre so early, thus acquiring a prominence which it maintained long after 1914.

Barran gave to Leeds an initial advantage which was reinforced by the links with the cloth industry, by the willingness of local engineering firms to direct their attention to the development of clothing machinery, and by the fortunate availability of labour in the crucial early stages.

This labour force was in part provided by the decline in the flax industry, which provided many females with work in the first half of the century, and was ~~was~~ further recruited amongst Jewish immigrants who,

provided a nucleus of skilled tailors, a steady stream of cheap labour, and an influx of businessmen who quickly realised how little capital was required in an industry which did not seem to require any special type of building, and in which almost all the equipment for manufacture could be hired.³

¹Census Enumerators' Returns (1861) R.G. 9 3387.

²A. H. Meysey-Thompson, 'History of Engineering in Leeds', Procs.Inst. of Mech. Eng. (1882), 276.

³J. Thomas art. cit. (1955), 16.

Initially, clothing factories were fairly small affairs - in 1864 Barran's with sixty-four workers, was the largest - but the size of the firm was swelled by the large numbers of outworkers. Barran's, for example, had up to 300 at any one time, though still the more typical was a company like Horseley's of Bond Street who employed only fifteen people, outworkers included, in the same year¹.

Both firms and factories grew rapidly. Joseph Hepworth, for example, started at Wortley in 1867 with only six sewing-machines, later moved to larger premises in Wellington Street and by 1884 employed over 300 workers. In 1891 growth again compelled the firm to move, this time to a new factory in Claypit Lane². J. G. May and Company were another firm compelled by expansion of business to move about, though the greatest mobility was exhibited by Barran's who moved from Alfred Street to Park Row, then to St. Paul's Street, and finally in 1888 to Hanover Lane³. By 1893 the firm had over 2,000 workers and were one of the largest concerns in Leeds.

Other firms grew equally rapidly. James Rhodes progressed from a small tailor to an employer of 600 hands in 1884⁴, and Little and Company, who had started with only forty workers in 1881, had upwards of 350 by 1888⁵.

Alongside the big factories existed a multitude of small workshops, often performing outwork for the big companies, and frequently manned by

¹Ibid., 25.

²Mercantile Age 1.10.1884. Also see gazetteer - Hepworth's clothing factory.

³Robinson, Son & Pike Leeds Sketches and Reviews (1900)

⁴Mercantile Age 1.10.1884.

⁵Historical Publishing Co. op. cit. (1888).

Jewish labour. In 1890 there were 51 factories but 148 workshops in the Leeds clothing trade, and whereas all but one of the factories were English-owned, two-thirds of the workshops were run by Jews¹. Those that were most crowded and housed workers who were poorly-paid and laboured long, irregular hours, were early termed 'sweatshops', in which a handful of men, women, and children tended a few machines and conditions were appallingly unhealthy². The average Leeds sweater had only twenty to thirty machines in 1888, in workshops which formerly housed the cloth, flax and other industries and which depended upon low wages and hard work to compete with the factory masters, whose use of power made them considerably more efficient.

Conditions gradually improved in the industry, though the workshop continued to play an important part in production. However, employment in factories, where conditions were healthier, hours shorter and wages better, rose more rapidly, spurred on by disquiet among certain elements of the labour force. Jewish tailors, for example, struck work in 1888 and asked either to be taken on in the factories, or to be permitted to set up their own co-operatively³.

The number of wholesale clothiers rose from 21 in 1881 to 100 in 1914, to which may be added 16 cloth cap manufacturers and 15 clothing manufacturers⁴. According to Collett there were 51 factories in existence in 1890, to which may be added a further 19 built 1890 to 1911, and perhaps 10 more between 1911 and 1914, making a total of 80 in the latter year⁵. By this time there

¹C. Collett, art. cit. (1890), 469.

²Lancet i (1888), 1146-8, 'The Sweating System in Leeds'. *

³P.P.(1888) lxxxvi, Report by the Labour Correspondent of the Board of Trade on the Sweating System in Leeds, 561.

⁴Kelly's Directory of Leeds (1914).

⁵C. Collett art. cit. (1890) and Leeds City Engineer's Office, List and Number of Factories in Leeds 1889-1909.

were almost 25,000 workers in the industry, of whom the majority were in-workers. The average clothing factory therefore housed some 250-275 workers, with a range in size from the forty workers at Heatons in 1899, to the 2,000 plus at Barrans. Other references to Leeds firms tend to confirm these findings.¹

As with the cloth industry a half a century earlier, the clothing industry at the beginning of the 20th century was by no means based solely in factories. In 1913 there were still about 5,000 independent tailors and outworkers, housed in rented workshops, frequently the former rooms of old cloth and flax mills. Most of the textile mills which were near to the city centre and were available for rent were taken up by tailors and wholesale clothiers by 1914.

Those that were not were likely to be occupied by the footwear industry, the history of which in Leeds bears a close resemblance to that of the clothing trade, though unfortunately less is known of the early details. Like clothing it had one basic raw material, obtainable close at hand in Leeds, and like clothing also factory production was given great impetus by the demand of the Armed Forces, particularly during the Crimean War (1853-6).

The pioneer firm in this instance was Stead and Simpson, who began as carriers and leather factors in Kirkgate in 1834. Some time before 1850 (probably only shortly before) they began to manufacture ready-made boots at their warehouse, and by 1851 employed 124 workers, many of them outside the factory.² At that time it was common practice for the boot uppers to be cut in a central workshop and then put out to journeymen who added the

¹E.g. Barnes & Co. (1888) - 200; Little & Co. (1888) - 350; Horner, Nicholson & Co. (1888) - 150. See gazetteer, various firms for further details.

²Census Enumerators Returns (1851), H.O. 107/2320.

soles in their own homes¹. Stead and Simpson were joined by Conyers of Foar Lane and together they accounted for about two-thirds of the 1858 output of 15,000 pairs a week, by which time their employees in Leeds numbered about 1,000².

Small concerns continued to flourish however, and made a strong contribution to overall production which reached 30-40,000 pairs a week by 1879³. As in clothing, entrance into the industry required little capital. The firm of Robinson and Mortimer commenced business in 1849 with assets of only £49, whilst the firm of L. Frieder and Son of Camp Road, went bankrupt in 1900 with liabilities of £1,716 and assets of only £410⁴.

Machine-cutting of soles and uppers was introduced at the very start, but machine-sewing only arrived after Goodyear's inventions were adopted after 1855. The factory, then, was for many years only the place where the leather was cut up and for this reason outworking and the small workshop survived until relatively late. As late as 1892 nearly half of the employees were outside the factory, but by 1904 the majority were inside⁵. Some firms had centralised their activities much earlier. Stead and Simpson, for example, purchased Sheepscar Mills in 1865 along with the adjoining tannery and here the leather was curried and cut, with the Kirkgate factory becoming the centre for sewing up and finishing boots⁶.

¹W. G. Rimmer, 'Leeds Leather Industry in the Nineteenth Century'. Thoresby Soc. xlvi (1960), 119-64.

²Ibid., and R. Baker, art. cit. (1858), 442.

³G. Dodgson, Guide to Leeds (1879).

⁴Leather Trades Review 11.12.1900 and 12.6.1901.

⁵W. G. Rimmer art. cit. (1960).

⁶Leeds Express 2.6.1883.

Later, all hootmaking was undertaken at Sheepscar, with the factory in Kirkgate becoming a warehouse.

By 1890 Leeds was one of the principal centres of footwear manufacture in the country with 85 wholesale hoot manufacturers, an output of five million pairs a year, ^{and} a labour force of almost 8,000¹. In addition to Stead and Simpson and Conyers, prominent concerns were Blakeys (est. 1857) with five factories in Leeds by 1888², F. Walker and Son of Wellington Street, who had 450 workers in 1888³ and George Russell of Oatlands Mill.

Firms specialised in the manufacture of heavy boots, however, and when the market turned more toward shoes and lighter leathers, after about 1895, Leeds failed to adapt. The result was a decline in direct contrast to the performance of the town's other trades. Employment fell, from a peak of nearly 8,000 in the early 1890's down to 5,500 in 1911⁴, and a large number of firms failed⁵. By 1914 there were still fifty hoot manufacturers in Leeds with Bramley an important centre and the Chamber of Commerce noticed little wrong with the trade⁶, but time was running out.

The growth of the footwear industry in Leeds, like clothing, relied much upon the initiative and innovations of a handful of leading individuals, and is not easy to explain in purely economic terms. However, one important contributory factor which aided its establishment was the pre-existence of

¹British Association op. cit. (1890), 122.

²Hist. Pub. Co., op. cit. (1888).

³Ibid.,

⁴Census (1891, 1901, 1911), Occupational returns.

⁵Details of the failure of individual firms are listed in the Leather Trades Review 1898-.

⁶Leeds Chamber of Commerce, Yearbook (1910), 37.

the leather industry. Indeed, some of the footwear manufacturers - amongst them Stead and Simpson, Conyers', and Ingle and Son - started life as curriers and leather factors, and only added the manufacture of shoes at a later date.

Tanning and currying were old-established industries in Leeds, which until 1829, however, were organised on a workshop scale, the largest concern probably being that run by James and Peter Rhodes at Low Fold, East Street. The most significant development in the industry came when the former, in partnership with Richard Nickols, a tanner from Bramley, discovered that hides could be tanned with materials other than tannin, at a much faster rate, and set up their Joppa Tannery in Kirkstall Road.

Aided by the demand for leather for mill belting and of a large local population, and its leather fairs which started in 1827, and given a further boost by the abolition of duty on English-made leather in 1832, Leeds rose to become the second most important centre of the trade by 1858, with the lead in the tanning of sheep skins¹.

Despite the success of the Joppa tannery, few leather manufacturers followed suit by building their own factories until after mid-century, the only significant development being the Sheepscar Leather Works built in 1839 for B. and J. Stocks. The main boost to the industry came with the widespread adoption of large-scale operation in the 1850's and 1860's, when tanning by chrome became more popular, and employment in the Borough rose from 1,023 in 1851 to 3,400 in 1881². Four new tanneries were established in North Leeds between 1855 and 1858 alone, amongst them the Buslingthorpe Tannery of Wilson, Walker and Company, built 1857, which eventually covered nine acres, employed two hundred workers and was reckoned

¹T. Penteman & Co. op. cit. (1858).

²Census. Occupational tables (1851-81).

in 1888 to be the largest in the country¹. Buslingthorpe and Sheepscar became the main centres of the industry, but there were large tanneries also at Kirkstall, Bramley, Beeston, and Smith's tannery was said to be 'the chief support of the inhabitants of Meanwood' in 1893².

The extent to which the industry rose in Leeds in the period may be adjudged from the fact that Leeds had only 13 tanners out of a national total of 349 and only 3% of the employment in leather in 1851, but by 1871 one in seven masters, and one in seven employees were found in the currying shops and tanhouses of the Borough³. Employment was over 2,500 and the various works represented a considerable capital investment. The largest company, Wilson, Walker and Company, were registered as a limited liability company in 1893 with a capital of over £400,000⁴.

As Rimmer has indicated, the capital required to commence business as a tanner was, by 1914, very great⁵, principally because it took up to six months from raw material to finished product, the hides having to pass through a succession of pits before being washed, dried, oiled, curried, dyed and finished. The advantage lay, therefore, with the large firm and the men of capital, and as the scale of operations grew, this advantage became more apparent. Tanning premises described as 'extensive' in 1829 had only 18 pits⁶, whereas at Joppa in 1858 there were 500⁷. Not surprisingly

¹Historical Publishing Co. op. cit. (1888).

²London Printing & Engraving Co., A Century of Progress (1893).

³Calculated from 1851 & 1871 Directories, 1851 & 1871 Censuses and J. H. Clapham, Free Trade and Steel, 1850-86 (1932), 119.

⁴Leather Trades Review, 14.10.1903.

⁵W. G. Rimmer art. cit. (1960), 147.

⁶L.I., 4.6.1829.

⁷T. Fenteman & Co. op. cit. (1858).

therefore, although the size of the workforce continued to increase in the second half of the 19th century, the number of masters actually fell:

TABLE 3.vii - DEVELOPMENT OF THE LEATHER INDUSTRY 1851-1911¹

	<u>No. of Firms</u>	<u>Employment</u>	<u>Average No. of Workers/Firm</u>
1851	51	1,023	20
1881	73	3,400	46.5
1911	35	3,846	109

Though the small concern, with less than twenty workers continued in existence, particularly in the currying trade, their number declined, and the large firms increased their dominance. One factor which hastened this trend was the troubles which beset the industry in the 1890's, which primarily affected small concerns. Joseph Simpson of Macaulay Street, for example went bankrupt in 1899 with assets of £2,464 and liabilities of £7,053². Some large concerns fared equally badly, however. Joppa Tannery was put up for auction in 1895, and in 1901 Wilson, Walker and Company foundered, though the business was bought by Charles Stead and suffered little interruption.

The problem was a three-fold one. Firstly, many Leeds firms supplied leather to the local footwear industry, despite what the British Association Handbook said to the contrary in 1890³, and the slump in that industry affected tanning and currying. Secondly, as early as 1870 it had been observed that,

During the past five years the Leeds tanners have suffered severely on account of the importation of immense quantities of kips from India already tanned into leather, which formerly came in the raw state.⁴

¹Calculated from Census and Directories for 1851, 1881 and 1911.

²Leather Trades Review 10.10.1899.

³British Association op. cit. (1890), 123.

⁴G. Dodgson op. cit. (1879), 21.

It was this trade in which Leeds specialised, and the import of ready-tanned continued to increase, with detrimental effect. Finally, the Leeds leather industry suffered increasing competition from abroad, especially in light leathers from the German industry.

The result was a slight fall in employment between 1891 and 1901 from 3,874 to 3,778¹, and although there was a revival in the following decade to almost the 1891 level, the damage had been done. However, even in 1913 Leeds was still one of the principal centres of the industry², and its importance in the national market was retained until after the First World War.

The leather industry, important though it was nationally, utilised only small numbers of workmen, and in 1911 accounted for only 1.8% of all jobs in the Borough, 2.3% of all male employees. By comparison the engineering and allied trades employed 15% of all workers, one in five of all males in the same year³.

This industry was closely allied to other Leeds industries of the period. 'The necessities of the woollen trade, involving the replacement of hand labour by machinery, may be said to be the foundation of the Engineering business', stated the Chamber of Commerce in 1913⁴, but as well as textile machinery Leeds was famous for the manufacture of rolling stock, agricultural machinery and was said to be the foremost centre in England for brickmaking machinery⁵. It was the 'first city in the world having a firm dealing

¹Census, Occupational Tables (1891 and 1901).

²Leeds Chamber of Commerce op. cit. (1913), 57.

³W. G. Rimmer art. cit. (1967), Table I.

⁴Leeds Chamber of Commerce op. cit. (1913), 37.

⁵Ibid., 37.

exclusively with machinery for the production and finishing of leather¹. In all, there were perhaps fifty different branches of the engineering trade represented in Leeds by 1914, and an individual firm might produce anything from patent tramway engines to lawn mowers and sausage-chopping machinery².

This diversity was not apparent sixty years earlier, however. Then most firms supplied engines and machinery for local industries, and particularly for use in textile mills. The manufacture of woollen and flax machinery were well-developed activities, a specialisation out of which arose the strength of the town's position in mechanical engineering. The development of one of the larger firms, Messrs. Fairbairn, Lawson and Company is illustrative.

Fairbairn, Lawson and Company existed as separate concerns before 1901, but the courses of their development bore many similarities. Both Samuel Lawson, from 1812 onwards, and Peter Fairbairn, who started in 1828, sought to supply the growing flax industry. Lawson, indeed, was himself a flax spinner in partnership with Mark Walker, whilst Fairbairn formed a close association with John Marshall, who financed him in purchasing the Wellington Foundry in Kirkstall Road. Both concentrated upon this particular area of manufacture and introduced many developments, most significant of which was Lawson's patent for the screw gill. By the middle of the century each employed in excess of 400 workers, and was still expanding.

At this stage the companies began to diversify their production - Fairbairns into woollen machinery and weaponry, Lawsons into hemp and jute

¹Ibid., 38.

²Thomas Green & Sons Ltd. of North St. See Leeds Express 7.7.1883.

machinery, and both into machine tools. The increase in business necessitated regular expansion of both Hope Foundry and Wellington Foundry, until by 1888 they covered twelve and seven acres respectively¹.

Other firms evolved along similar lines, though few attained such prominence. Of those that did, the majority, like Kitson and Company, Fowler and Company, Taylor, Wordsworth and Company, and Greenwood and Batley, were located to the south of the Aire in Hunslet, Holbeck and Armley, where a more extensive site on flat land might be obtained. Heavy engineering was not commonly found in North Leeds, although in addition to Fairbairns and Lawson's there were Witham's of Perseverance Foundry and Greenwood and Batley retained their Albion Foundry in East Street for many years after their move to Armley.

Even in 1858, when Hunslet and Holbeck were still outlying townships, only a minority of the Borough's 11,400 workers in the engineering trades were to be found in North Leeds. These were divided amongst the various branches of the industry as follows:

TABLE 3.viii - EMPLOYEES IN THE MAIN BRANCHES OF ENGINEERING, 1858²

Engineers, boilermakers and millwrights	4,140
In making flax and tow machinery	2,630
In iron manufacture	2,250
In tool engineering and machine tools	1,800
Foundry jobbers	350
In hackle and gill manufacture	230
TOTAL	<u>11,400</u>

Leeds still depended heavily upon making machinery for the textile trades, but machine tools and iron manufacture were on the increase, and by now Leeds 'formed an industrial metalworking district second only to the Black Country'³.

¹See gazetteer - Wellington Foundry and Hope Foundry - for references.

²R. Baker art. cit. (1858), 438.

³S. B. Saul, 'Mechanical Engineering, 1860-1914', Ec. H.R.(2), xx (1967), 111-30.

A contemporary estimate placed the number of employees in engineering and allied trades at 18,000 in 1868¹, a figure which is indicated by the Census tables:

TABLE 3.ix - WORKERS IN THE ENGINEERING AND IRON AND STEEL TRADES, 1851-1911

<u>1851</u>	<u>1861</u>	<u>(1871)*</u>	<u>1881</u>	<u>1891</u>	<u>1901</u>	<u>1911</u>
7,415	12,208	(13,082)	18,149	21,558	28,090	33,156

Whilst it was gratifying to record this continual advance in an industry upon which Leeds so heavily depended, there were other less pleasing features. For example, despite its early start in the manufacture of machine tools (Bucktons were probably the first in 1842), by 1914 Leeds firms were too small and exhibited 'an absurd lack of specialisation', according to Saul². Even at this late date general ironfounding was more important than tools, dies, and machine tools, there being 4,130 employed in the former, and only 3,054 in the latter in 1911³. Also disturbingly, electrical engineering failed to gain much of a foothold in Leeds, despite its being the fastest-growing branch of the trade after 1890. The number of firms in the different branches of engineering in 1914 is instructive⁴. There were 93 mechanical engineers, 4 iron manufacturers, 16 iron founders, 21 brassfounders, and a further 21 metalworking establishments, yet only 56 electrical engineers. Leeds also failed to gain an early start in the motor industry, and it had only three motor manufacturers in the same year. Furthermore, although Leeds and area was established by mid-century as one of the foremost districts in the production of wrought iron, the newer steel industry sought out superior locations elsewhere, and West Yorkshire lapsed into the role of specialist

¹A. C. Black & Co., Guide to Leeds and its Vicinity (1868).

* ²S. B. Saul, 'The Machine Tool Industry in Britain to 1914', Business History, x (1968), 22-43.

³Census (1911), Occupational tables.

⁴Directory for 1914.

*males only

wrought iron manufacturer. Even in 1857 it had been found necessary to import more than 50,000 tons of pig iron into the neighbourhood¹, and more and more ore was being brought in to supply the area's furnaces. Between 1855 and 1885 production of iron ore in West Yorkshire halved, whilst pig iron production doubled- the reason why the iron manufacture remained being the high level of demand from local engineering concerns.

The Borough of Leeds itself was never more than a moderately important centre of iron production - Bradford Low Moor, for instance, was much more significant. It was much more a centre for founding. In 1871 there were only two blast furnaces in Leeds, both of them at Garside's, York Road, but as many as 155 puddling furnaces². 'Yorkshire Best' was a high quality wrought iron, able to command a high price, but unfortunately being displaced by steel in the manufacture of machinery and most other branches of engineering. Leeds, consequently, fell behind. Only those firms which adapted to steelmaking, the Monkbridge Company for example, survived. Others, like Perseverance foundry, did not, and although numbers employed in iron and steel rose from 1,336 in 1851 to 6,331 in 1881, they fell thereafter, to only just over 4,000 by 1911³. Even if allowance is made for rises in labour productivity, Leeds was clearly losing its importance relative to other centres, just as metal manufacture lost significance as an employer of labour in the city. By 1911 it accounted for less than 2% of the total labour force, compared with 4.5% in 1881.

Strongly associated with the fortunes of the iron industry was the nail manufacture, for which Leeds became, temporarily, one of the main centres in the land. The industry was an old-established one and what gave

¹W. G. Rimmer, 'Engineering; the Nineteenth Century'. L.J., 26 (1955), 229-31.

²J. H. Clapham op. cit. (1932), 49.

³Census, Occupational tables (1851-1911).

it its main impetus was the adoption of nailmaking-machinery at a time when Midlands manufacturers persisted with unpowered methods. Though never a very important employer of labour - there were still only 600 hands in 1882¹, output reached 15,000 tons at its zenith in the early 1880's. Thereafter, however, the industry fell into decline, principally through the belated adoption of machinery by Midlands Masters, and output was down to 13,000 tons a year by 1890².

There were certain disquieting aspects of the type of products in which the engineering industry specialised. Leeds was, as Saul has pointed out, a Centre of wrought iron rather than steel, machinery rather than machine tools, and steam engineering rather than electrical apparatus³. Many firms were not large enough to compete in a national market. The average size of firms in 1851 was 120 employees, rising to 185 in 1861, and approximately 300 by 1911⁴, but the size-distribution was actually bimodal. In 1851, ten out of twenty-five firms making a return had fewer than thirty workers, and only eight had more than a hundred. A small number of very large concerns with more than 300 employees, tended to dominate the industry. Amongst these only Fairbairn's, Lawsons, Green's, and Whitham's had their works north of the river, where the more representative concern employed fewer than a hundred men. Scrivens of Leeds Old Foundry, Marsh Lane, had only fifty workers in 1914, and Dixon's, one of the more prominent brass-founding concerns, eighty in 1883⁵. Many firms started out in North Leeds,

¹A. H. Meysey-Thompson, art. cit. (1882), 176.

²British Association op. cit., (1890), 90.

³S. B. Saul, art. cit., (1968). *

⁴Calculated from Census Enumerators Returns H.O.107 (1851) and R.G.9 (1861) Census, Occupational Tables (1911) and Directory (1911).

⁵Leeds Express 20.10.1883.

but when successful found it necessary to move out to larger premises, usually in South Leeds. Grimshaw's nailworks, for example, commenced in Sykes Street in 1867, but moved to Pym Street, Hunslet, when these premises became too constricted¹. The contrast may be drawn also between Atlas Engineering Works, Barrack Street, sold in 1898 for only £4,400², and Perseverance Foundry, valued at £35,000 even in 1855³, or Hope Foundry valued at £67,000 in 1899⁴.

The smaller foundries and machine shops turned out a host of products for local industries. In addition to machinery for the textile industry, of which hackle and gill production formed an important part, firms manufactured wood cutting machinery, printing machinery, machinery for the leather industries, and brickmaking machinery. To this list may be added the four growing trades noted by Meysey-Thompson in 1882 - machinery for the clothing, hat and cap, footwear, and nailmaking industries- whilst by 1910 the list of engineering products included agricultural machinery, colliery plant, generating plant, and locomotives⁵.

The development of engineering for the clothing industry illustrates the close connections which existed between metalworking and the town's other industries. Although it was American machines which initially stimulated the factory production of clothing, a number of concerns were established in Leeds also. For example, five firms are reckoned by Thomas to have achieved an international reputation for the manufacture of sewing

¹Ibid., 15.9.1883.

²L.C.D. nos. 2103.

³L.C.D. no. 15023.

⁴Hepper Books, 7, 287.

⁵Leeds Chamber of Commerce op. cit. (1910).

machines in the 19th century¹, and larger clothing manufacturers all used the Greenwood and Batley hand-knife, developed by the firm from John Barran's invention². The dominance of American machinery fully reasserted itself by 1914, but in the meantime it had appeared that Leeds might become as renowned for its clothing machinery as for its textile machinery.

The period of greatest expansion in the engineering industry of Leeds was between 1840 and 1860, during which time it established itself as one of the leading centres in the country. Thereafter growth continued to be substantial until by 1914 it was the dominant industrial activity, though firms concentrated almost wholly upon mechanical engineering, and the steel industry had only established itself in a minor way, there being only eight open-hearth furnaces in the Borough in 1880³. The largest firms, and those concentrating upon heavy industry, were mainly to be found in South Leeds, especially Hunslet, with foundries in North Leeds being found on small sites and tending to cater for a more local market.

There were other industries located in Leeds in the second half of the 19th century which were of more than local importance. Besides textiles and engineering, Baker considered that Leeds was prominent in the production of coal, earthenware, bricks, paper, tobacco, chemicals, leather and stone, whilst the shoemaking and tailoring trades were 'deserving of special notice'⁴. This list had changed but little by 1914, although the relative importance of the different trades altered greatly. The only major addition was printing, an industry in which Leeds was said to be second only to London by 1914, whilst chemicals must be deleted.

¹J. Thomas art. cit. (1955), 37.

²Ibid., 10.

³W. G. Rimmer, art. cit. (1955), 231.

⁴R. Baker art. cit. (1858), 442.

Always closely associated with the dyeing industry, the chemical industry was said to be only supplying local industries in 1890, with manufacture being concentrated upon acetic, nitric, and sulphuric acid¹, and dyestuffs, in which the most prominent concern was the Yorkshire Dyeware and Chemical Company Limited, founded in 1900 by the amalgamation of two firms from outside Leeds, and Wood and Bedford and Marshall and Calvert, both of Kirkstall Road². Other firms produced oils, greases, and stearines (Foster and Company, A. Hess and Brother, for example), disinfectants and pharmaceuticals (Reynolds and Branson), but they were few in number and small in extent.

The only firm which achieved a national importance in the chemical and allied industries was Joseph Watson and Sons of Whitehall Road, who produced soaps, fats and glycerine in large quantities. Watson started out in the 1830's as a hide and skin dealer and leather dresser, and branched out into soaps and fats when he bought the yard in Whitehall Road in 1861. Production of soap reached 100 tons per week in 1885, which may be compared with an output of 24,000 tons per annum in 1906. When the firm was incorporated as a public company in 1897 its share capital was £1,400,000³.

The story was much the same in the printing and publishing trade, with one or two concerns only being of more than local importance. These included E. J. Arnold and Son, John Waddington's, and Alf Cooke's. By 1914 Leeds contained 6 colour printers, 20 lithographic printers and as many as 101 letterpress printers⁴, but the vast majority were small concerns, 'job' printers who catered for a local market only.

¹In 1895 six firms produced about 750 tons of sulphuric acid p.a. See The Society of the Chemical Industry, Leeds Meeting (1895).

²Yorkshire Post, Leeds Tercentenary Supplement 8.7.1926.

³See gazetteer - Whitehall Soap Works, for references.

⁴Directory, 1914.

The group of industries which Baker noted as being of more than local importance in 1858 provided work for about 46,000 persons, nearly one-quarter of the Borough's population. 'The residual employment' he wrote, 'is made up of those Trades which are common to all congregated populations whose varied wants have to be supplied'¹. Many of these trades were workshop activities even in 1914, but some had begun to re-organise themselves along factory lines. Their progress in this direction varied. Food production, for example, was still almost entirely a domestic or workshop activity in 1914, although a jam factory was built in Compton Road, Harehills in 1898. Brewing, on the otherhand, was centralised in few hands and there were even signs that national concerns were beginning to emerge. It is unnecessary to analyse all such industries in any detail, but a look at the brewing industry will serve to illustrate the kind of changes that were taking place in these activities.

In the first part of the 19th century Leeds had its share of inns and alehouses, of which there were 388 in 1830². Common brewers, who manufactured for as many outlets as possible, were rare - in 1798 there were perhaps two or three, but their numbers grew steadily, and by mid-century some were quite large concerns. Singleton's Brunswick brewery employed 55 workers in 1861, for example³. Singleton, like many other brewers, started out in business as a maltster, and not surprisingly therefore, many of the common breweries grew up around malt-kilns, for example, Burmantofts brewery, or Musgrave and Sagar's in Marlborough Street.

¹R. Baker art. cit. (1858), 442.

²Employment of Children in Factories, First Report, P.P.(1833) xx, 122.

³Census Enumerators Returns (1861), R.G.9. 3373.

Transport improvements extended the market area, whilst increasing standardisation began to favour the large concern. By 1886 there were 33 common brewers and almost 600 workers in the industry¹. To combat competition from outside firms, Leeds concerns sought links with each other, and the 'Leeds City Brewery Company Limited', and 'Leeds and Wakefield Breweries Limited' represent two such efforts. Thus, although the brewing trade continued to expand its output, the number of individual firms and breweries began to decline, and by 1913 had fallen to fifteen, at which time it employed almost 1,500 men².

The increasing size of individual firms coupled with a reduction in their numbers was characteristic of other industries also. Brickmaking, for example, corn-milling, food manufacture and woodworking all rose steadily in employment, but the number of firms decreased. Technical advances furthered change, as in corn-milling after 1870, in which period roller-milling became standard practice, or the adoption of continuous kilns to replace the old Newcastle kilns in brickmaking about the same time. In the latter industry, though the number of workers rose from 2,500 to 3,000, the number of firms fell from 41 to 18 between 1871 and 1911³.

Such industries geared their output to local demand, which rose steadily as both population and purchasing power increased. The concentration of a market of approaching half a million persons attracted many industrial activities, and besides those trades already mentioned, Leeds had a match works, paper mills, paint works, and many other types of factory and workshop. Although 43.5% of all those occupied were workers

¹E. M. Sigsworth, 'The History of Brewing', L.J. 27 (1956), 79-81.

²Directory for 1913.

³Directories for 1871 and 1911. Census (1871 and 1911), Occupational Tables.

in engineering, dress or textiles, Leeds could justifiably boast of a great variety of trades.

The period 1850 to 1914 encompasses many changes in manufacturing. In the older factory industries, predominantly textiles, growth levelled out and was more in the form of improvements in productivity than of additions to the numbers of factories and workers. Other trades, leather and engineering notably, experienced the consolidation of a process begun before 1850, as large-scale organisation and centralisation, coupled with the application of power, made the factory the norm. Finally, in almost all other trades a beginning was made in their reorganisation, and some firms at least adopted factory techniques. The extent to which a complete revolution had been attained by 1914 varied considerably. In both clothing and footwear there were few outworkers remaining, and the main proportion of output came from factories, but food was still prepared predominantly in the home or the shop/workshop, and the only product from factories in 1914 was jam.

The dominant feature of the pattern of industry in North Leeds in 1850 was the correlation of factories and workshops with the valleys of the River Aire and the Meanwood Beck¹. Isolated works were found out at Gibraltar (Knousthorpe) to the south-east, and at Kirkstall and beyond to the north-west, whilst there was a scatter of small mills the whole length of Meanwood Beck. The major concentrations were, however, inside the town, in School Close, at the Bank, along West Street and Kirkstall Road, and along both sides of Meanwood Beck as far as Woodhouse Carr.

The interfluvial areas had fewer factories, which were noticeably absent throughout a wedge of middle-class housing extending between Woodhouse Lane and Park Lane-Burley Road.

¹See Chapter II.

A secondary feature of the industrial pattern was the more frequent occurrence of mills, factories, and workshops in the working-class eastern end of the town. Although the middle-classes had by this time deserted the Park estate for Little Woodhouse and the northern out-townships, an east-west dichotomy could still be observed. An important factor behind this was the greater suitability of the land to the east for industrial development, but just as important was the attraction of a large pool of unskilled and semi-skilled labour inhabiting the courts and back-to-backs of the Leylands, the Bank, Quarry Hill, and the York Road area.

Of the older, pre-1815 nucleations of industry in North Leeds, School Close had been hampered from expanding by the presence of an encircling commercial area, whereas an insanitary mixture of poor housing, factories, and congested streets had been able to spread outwards from both the Bank and the St. Peter's Hill area in two wedges.

Industrial development beyond these wedges and School Close was not common. The woollen mills at Carlton Hill, Bagby Fields, and in Camp Road were the only major exceptions.

By 1913 there had been not only an extension to the number of factories and an outward spread of industry in East Leeds and along Kirkstall Road, but in addition there were now a great many works in the intervening areas, at Burley, Harehills, Little London and Burmantofts (Map 9). Factories no longer depended so heavily upon water courses for their supplies of water and new industries had developed with different locational requirements. Later clothing factories, for example, demanded large, open sites with sufficient room for future expansion. Some newer factories may even have found valley sites with their attendant smoke, dirt, and congestion a positive disadvantage. At the same time important developments in transportation enhanced the mobility of the labour force and urban activities began to decentralize. Improvements to roads, and the introduction of

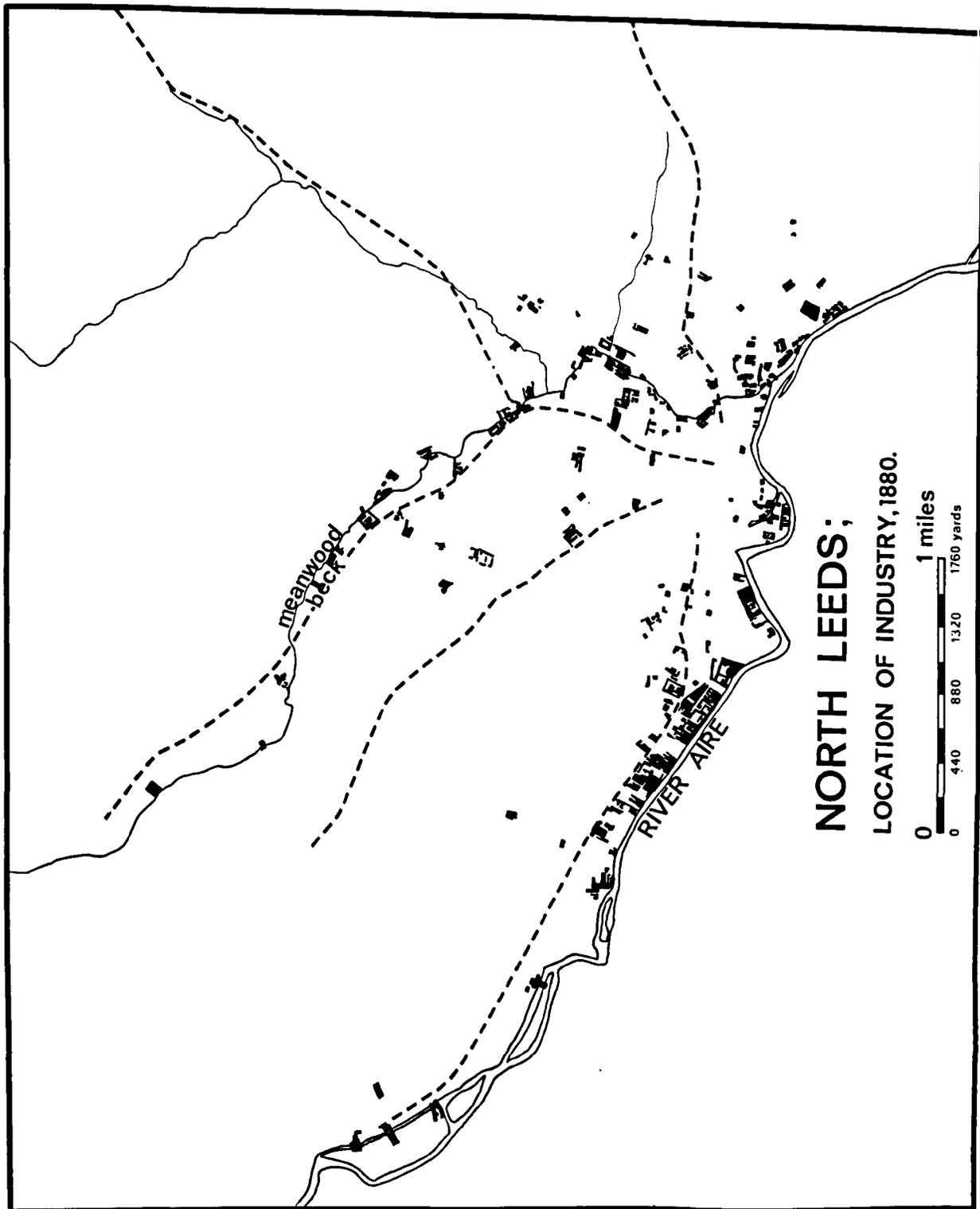
tramways, horse-buses, and finally motor goods transport improved the attractions of areas previously rejected by the high cost of moving goods by land.

The lowland valley parts of the town continued to form the largest concentrations, however. Since the middle of the century industrial infilling had taken place, particularly along the Meanwood Beck, between the Leylands and Sheepscar, and between Sheepscar and Buslingthorpe. The availability of such sites was, however, limited as a consequence of which some firms built factories further out, on what had previously been agricultural land. This was especially true of those larger works for whom land cost was critical. These favoured valley sites, but out beyond the periphery, along the roads to Meanwood and Kirkstall principally, and also throughout the north-eastern sector, in the area between Dolly Lane and York Road.

New foci of industry grew up at Woodhouse Carr, at Burmantofts, in the Cardigan Fields area, along Gipton Beck, but also near the centre of the town, around Park Square, Coolridge Street, Wade Lane and Call Lane. In these latter, manufacturing had invaded or re-invaded commercial property, in contrast to the general outward movement. An explanation for this is not difficult to find. The types of industry involved were those which had a limited requirement for ground space and specialised buildings, but a strong desire to be in proximity to customers, and transport and marketing facilities. Clothing, footwear, and printing firms took advantage of vacated mills and warehouses which were most commonly found in the inner areas, and although by 1913 some firms in these industries had established new factories further out from the centre, they still made a strong impact upon the map.

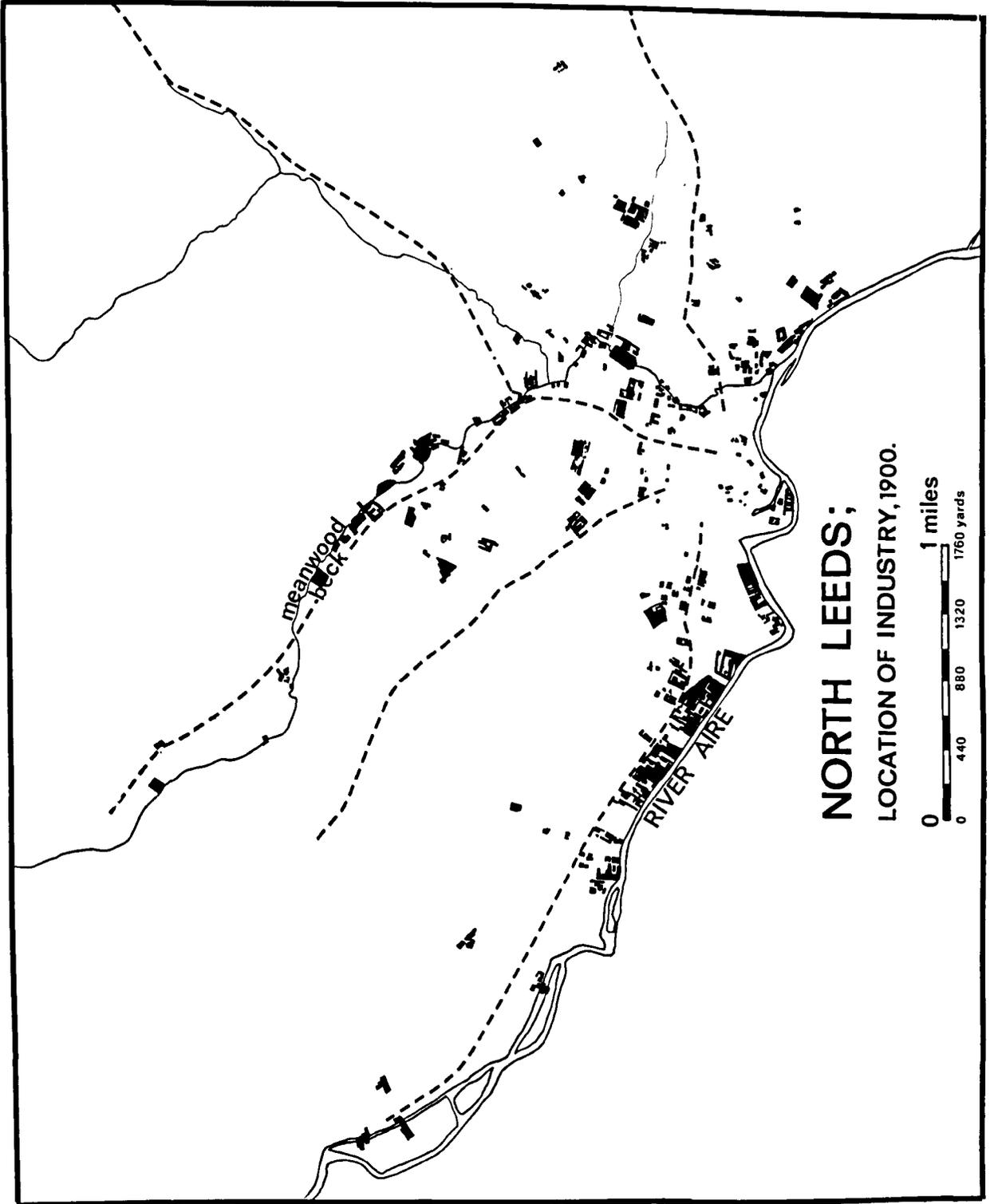
Despite changes in locational requirements and the increase in the number and size of factories, perhaps the most striking feature about the 1913 map

is the resemblance it bears not just to the 1880 map, but also the 1860 and 1840 patterns. It is now time to attempt to explain in more detail why this should be the case.

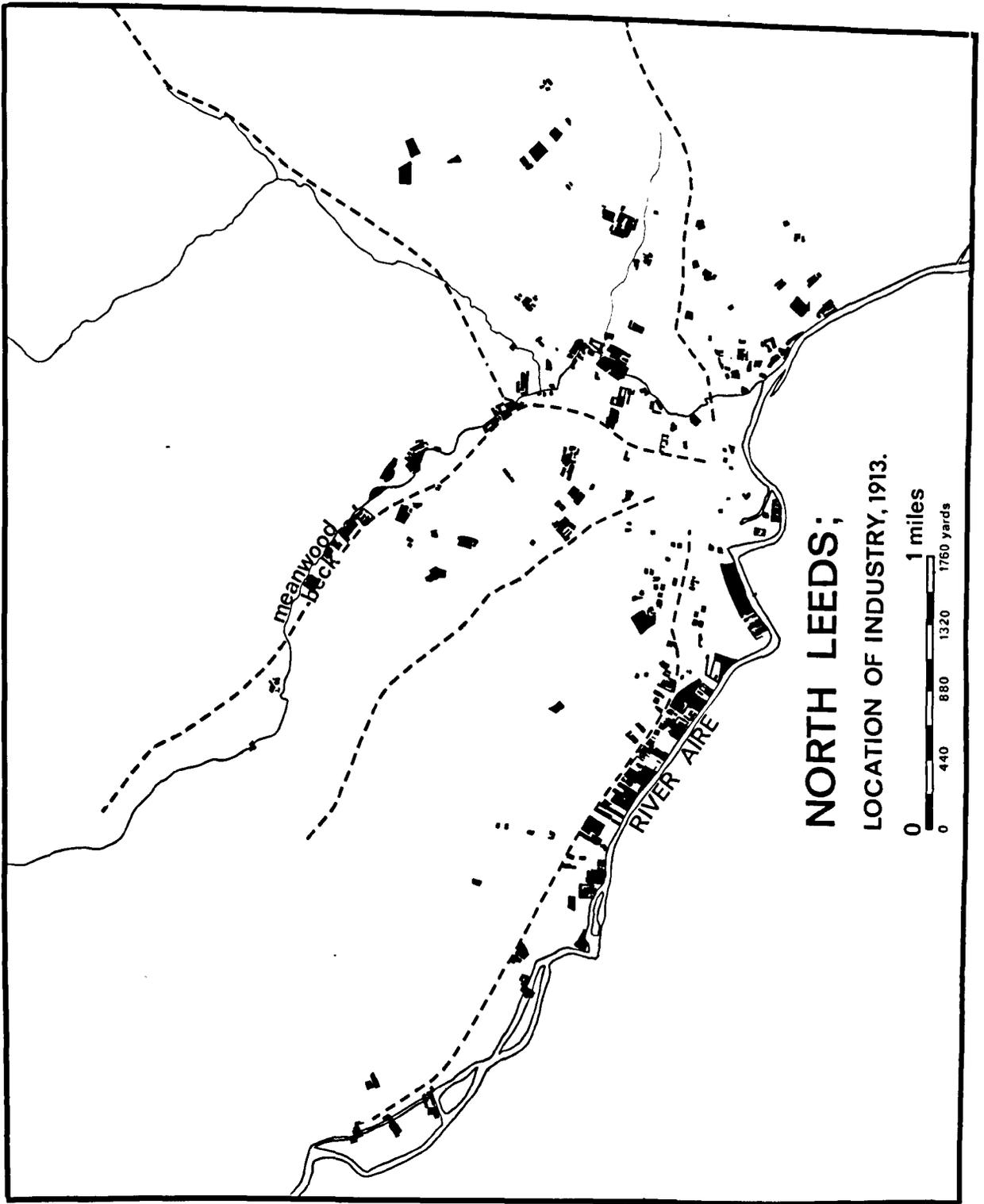


NORTH LEEDS;
LOCATION OF INDUSTRY, 1880.

0 440 880 1320 1760 yards
0 1 miles



NORTH LEEDS;
LOCATION OF INDUSTRY, 1900.



Map 9

Chapter IV - INVESTMENT OUTLAY AND THE STRUCTURE OF COSTS IN LEEDS
INDUSTRY, 1775-1914

It is only possible to effect an imperfect portrayal of the size and nature of the cost structure of Leeds industry in the period under study, principally because there is ~~only~~ a limited amount of data available. For this purpose it is necessary to rely upon three principal sources of information -- insurance records, independent valuations, and conveyance deeds. These may be supplemented by the odd surviving business record or contemporary observation, but the analysis is based upon these sources, whose imperfections must consequently be accepted. Neither insurance valuation nor independent assessment is as precise an indication of market value as are sale prices, but they are more readily available. However, it has fortunately been possible to gain access to the deeds of Corporation property in Leeds¹, and these are utilised wherever possible.

Much of this analysis rests upon insurance records, covering the period 1775 to 1840, whose limitations have already been discussed by Chapman². As for the valuations of a prominent surveyor and estate agent, which are preserved in the Leeds City Archives, and have been made use of for the period after 1870³, the main source of possible error here is that they are only valuations, albeit expert ones, and not necessarily an accurate reflection of what property would obtain on the open market.

¹Leeds Civic Hall Strongroom, Deeds collection (L.C.D.)

²S. D. Chapman, 'Fixed Capital Formation in the British Cotton Industry, 1770-1815'. *Ec.H.R.* (2), xxiii (1970), 235-266. The insurance records utilised for Leeds are the Sun County and Royal Exchange series, in the Guildhall Library, London. I am indebted to Dr. S. D. Chapman and Dr. D. Jenkins for passing on much of their material.

³L.C.A., Hepper valuation books.

There was, for example, some dispute over Hepper's valuation of Mount Mills in Cromwell Street, which he had valued at £10,780 in 1898, but which fetched only £3,300 when sold in 1900¹.

There are even certain difficulties in adopting sale prices for comparison between different trades and different years. Important variations in price might result from whether the land was leasehold or freehold, although fortunately the latter was much the more common, or to what extent the conveyance included goodwill, machinery, or stock-in-trade. Most commonly prices covered land and buildings only, with fixtures if they could be made use of by the new owner.

One difficulty is common to all sources - temporal fluctuations in market conditions make comparison between different years and periods an extremely hazardous operation. By way of illustration some early developments may be cited.

The Napoleonic Wars, which ended in 1815, constituted an age of steadily rising prices, the response to a high level of demand and a shortage of basic raw materials and other commodities. The cessation of hostilities produced an immediate drop in prices, consequent upon which those industrialists unfortunate enough to possess a heavy investment in plant and raw materials were unable to prevent the subsequent plunge in their value. The papers of Wormald and Gott contain accounts portraying a write-down in value for Park Mills of from £10,000 in 1817 to £5,000 in 1818². Many firms were bankrupted by the drop in prices, as they were a few years later when the boom months of 1825 turned into the crash of 1826. 'Immediately after the peace ... and in the year 1826

¹Ibid., 6, 167 and 7,235.

²Gott Papers, Document no. 20, Articles of Co-partnership.

there were great failures', John Marshall later told the Select Committee on Manufactures, Commerce and Shipping¹; one of whom was the prominent Leeds cloth manufacturer, William Hirst. He was put out of business when the value of his stock-in-trade, mills and machinery in School Close slumped from £220,000 to £80,000². So considerable was the fall in prices in the years following the wars that Marshall believed that the cost of erecting a mill in 1833 was down 20% or more. One which had cost £50,000 in 1816 would by 1833 only involve an outlay of £35-40,000³.

This period marks the most extreme fluctuations in prices and values but it is important to bear in mind when comparing values at any time in the 19th century. Fortunately sufficient data survives for sharp fluctuations not to affect estimates too greatly, and as long as some reservations are kept in mind, insurance valuations, sale prices, and the Hepper valuations may be used to build up a fairly accurate picture of investment costs.

The locational considerations facing the industrial entrepreneur relate to costs of two types: those incurred at the outset of the venture (initial outlay); and running costs, which consist primarily of wages, fuel, and raw material costs. Of the two types, the former presents fewer difficulties for analysis - there is unfortunately a paucity of records relating to the day-to-day operations of Leeds manufacturing concerns⁴.

Initial outlay principally comprises investment in land, buildings, machinery and utensils, and fixtures as required, for example the cutting of a goit (leat) for a water mill, or the construction of a reservoir for

¹Sel. Comm. on Manufactures, Commerce and Shipping, Report (1833), 158.

²W. Hirst, History of the Woollen Trade (1844), 24.

³Sel. Comm. on Manufactures, etc. (1833), 158.

⁴See bibliography, manuscripts.

water supply.

There was great variation in the level of investment between a multitude of small businesses and a few really large concerns. Measured by capital value of land, plant, and machinery, the largest enterprise in North Leeds before 1914 was the Burmantofts Company's works in Stoney Rock Lane, the clayworks for which covered 58 acres. It was bought by the Leeds Fireclay Company in 1889 for £101,000¹.

Other large businesses included Lawson's engineering works in Mabgate, valued at £67,000 in 1899², and Fairbairn's engineering works, valued at £75,000 in the same year³. Gott's woollen mills, undoubtedly the largest textile concern in North Leeds, was valued at £157,000 in 1819, but the largest proportion of this was for stocks of wool and cloth⁴. The buildings and machinery at Park Mills were insured for only £18,000 in the same year⁵. Another large woollen mill was that of William Hirst, which was said to have cost £21,000 to build⁶.

Clearly such values were not typical. Both Gott's and Hirst's mills were at the very top of the investment scale in the early 19th century. At the opposite end of this scale were the many workshops and small factories (here the distinction becomes somewhat blurred) which were valued, or changed hands, at less than £1,000. This level of organisation was by far the more normal right up until the middle of the 19th century. The average insurance valuation of 67 North Leeds textile mills in the period 1790 to

¹L.C.D. no. 15982.

²Hepper Books, 7, 279.

³Ibid., 7, 287.

⁴Gott Papers, Document no. 20, Articles of Co-partnership.

⁵Sun CS 127/950612.

⁶W. Hirst op. cit. (1844), 18.

1840 was £3,870, not a high figure when it is realised that approximately half of this figure was for stocks of raw materials, and finished and semi-finished goods. On the other hand, the average policy value for 17 firms in other trades was only £855. It must be remembered, furthermore, that only the more prominent firms were likely to bother insuring their property, especially with a London company.

Only rarely did a factory represent an investment in excess of £5,000, and the great majority of factories and workshops were valued at less than £1,000. This scale of organisation was not confined to Leeds industry. Even in the Stockport cotton manufacture, more than one-half of the firms in 1795 were insured for under £1,000¹. A small workshop was typically valued at about £500 in the 1790's², and a merchant's finishing shops at £1-2,000, although here most of the valuation was for stock-in-trade³. The addition of a steam engine added up to £500, higher for a Watt engine, which places the level of investment in a small factory at between £1-4,000 above which were only a few concerns, all of them prominent in the textile manufactures.

Insurance valuations commonly included an item for stock-in-trade, but land costs and any investment in fixtures of obtaining water and disposing of wastes were excluded. It is unlikely that in all but the more exceptional cases these would have added more than 20% to initial costs. Thomas Clapham advertised his house and finishing shops at £3,600 in 1803, of which £1,000 was in payment for an 'excellent spring of water'⁴, but likely he was

¹S. D. Chapman art. cit. (1970), Appendix D.

²e.g. John Hinchcliffe's coachmaking shop (£550). Sun OS 285/618955.

³e.g. David Farrar's workshops. Quarry Hill (£2,300). Sun CS 33/651789.

⁴L.I., 5.11.1803.

being rather optimistic. A later valuation for Mabgate Mills in 1883 included £878 for a reservoir and its land, only one-fifth of the total valuation of the property¹.

Excluding stock-in-trade, but incorporating investment in non-insured items, valuations of between £300 and £30,000 are arrived at for the period 1775 to 1840. Sale prices and estimates of losses due to fire damage tend to confirm these figures. For eleven different factories between 1790 and 1840, the average sale price was £2,512, ranging from the £60 paid for a press shop in the Isle of Cider in 1807², to the £8,500 which constituted the purchase price of Millgarth Street Mills in 1837³. Estimates of fire damage are a less reliable source of indication, and include a value for stock-in-trade also, but they indicate that a dyeworks and a number of textile mills represented an investment of between £1,000 and £13,500 in the same years⁴.

As the century wore on, a gradual rise in price levels, the greater realisation of economies of scale, and adoption of the factory system by more and more industries raised the general level of investment for the individual concern. Again, however, it must be emphasised that there was considerable variation between different branches of industry, and between different firms in the same trade, a disparity most apparent in the clothing manufacture where small sweatshops, involving an outlay of at most a few hundred pounds, existed alongside large factories run by the major wholesale clothiers. In the latter category were, for example, Gaunt and

¹Hepper books, 1, 303.

²L.C.D. no. 2040.

³L.C.D. no. 2096.

⁴The details are taken from J. Mayhall, Annals of Yorkshire- vols. I & II, (1876).

Hudson's factory in Grace Street, valued at £18,198 in 1904¹, and Little and Company's York Place factory, which cost £23,000 to purchase, alter and equip².

There are 48 entries for North Leeds factories in the Hepper valuation books, covering the period 1878 to 1914. These have an average value of £12,954 which is a good deal higher than the level of investment in the early part of the 19th century as indicated by the insurance registers. They range from £1,900 for Hillhouse Mills in 1906, to £67,000 for Hope Foundry in 1899³. The Wellington Foundry estate was valued even higher at £75,000, but was composed of five different lots, not all coterminous. Most factories were valued at between £8,000 and £20,000, which indicates the level of capital investment which predominated during the latter part of the 19th century and the beginning of the 20th. Further confirmation may be had from sale prices. The average sum involved in 51 separate conveyances was £11,660, ranging from £1,250 to the £101,000 paid for the Burmantofts Works (see page 144). Even if the latter figure, which was clearly unusually high, is eliminated, the average figure only drops to £9,670, which still represents a marked advance in the level of investment over half a century earlier. Even after allowance is made for higher incomes and prices, it is clear that as time progressed it became more expensive for an individual or a company to enter into production at a competitive scale of organisation.

There were however, significant differences between the various categories of manufacturing. Trades which in mid-century were still non-factory based, such as boot and shoe manufacture or clothing, could be

¹L.C.D. no. 8704.

²L.C.A., acc. 1416.

³Hepper books, 11, 158.

entered by men possessing very small amounts of capital. A hand sewing machine could be purchased for as little as £4 10s. in 1870¹, and a small garrett room in an old factory or workshop premises for under £500. As little as £600, therefore, was sufficient capital with which to set up in the clothing industry, without even having to rent premises and machinery.

The scale of organisation in older-established manufacturing industries, the staple trades by 1850, tended to be somewhat greater. In 1841 the eighteen machine-making firms of Leeds employed on average a capital of £17,000². By 1900 even small foundries, such as that of Frederick Dyson and Sons at Steander, represented an investment in excess of £4,000³.

In the woollen industry great changes took place in the second half of the 19th century (see Chapter III), but there still existed considerable variation in the size of its units. Valuations extended from £1,993 for Grove Street Mill in 1891, to £23,636 for Cardigan Mills in 1903⁴, though the age of the buildings is of some account in making this comparison. Entry into this industry was now made very difficult for men of little capital, for the finishing and dyeing branches were organised into larger units by 1914, and the earlier processes were normally undertaken in large, integrated mills. Even well-established small firms were forced to join together, with the Leeds and District Worsted Dyers and Finishers Association one of the more prominent organisations (see Chapter III).

The development of the leather ^{industry} was more conducive to the small businessmen, but even so the trade was a precarious one for those lacking the

¹J. Thomas, History of the Leeds Clothing Industry (1955), 37.

²Sel. Comm. on the Exportation of Machinery (1841), vii, 210. Evidence of P. Fairbairn.

³Private deeds, F. Dyson & Sons Ltd.

⁴Hepper books, 9, 18 and 3115.

capital required to see a concern through adverse times, with the result that such firms tended to be 'weeded out' when demand was slack. The Leather Trades Review contains notice of many such bankruptcies from 1898 onwards, for example T. Robinson, a currier who failed in 1899 with liabilities of £700, and assets of only £20¹.

In Rimmer's opinion, by 1914 an outlay of at least £50,000 was necessary for efficiency in the leather trade². This was only the case however, in tanning, and if a position at the forefront of the industry was required. Entrance was not impossible without a vast sum of capital. Joseph Simpson, a tanner and currier, commenced business in 1893 in premises bought for £850 and expended only £375 upon machinery, though it must be conceded that the business eventually ran into difficulties and folded in 1899³.

It is impossible to generalize about conditions of entry in an industrial economy so broadly-based as was that of North Leeds by 1914. Although the average level of investment had certainly risen by the latter part of the period, the man of small capital was not debarred from setting up business, and some trades, notably clothing and footwear, provided many openings. Ease of entry was one factor which promoted the rapid growth of such manufactures. By comparison, the older-established woollen industry was by now so highly mechanized and technologically advanced that the amount of know-how and capital investment required served to deter new entrants.

It was not always necessary to lay out even small sums of capital to purchase land, buildings, and machinery, however. Instead capital costs

¹Leather Trades Review, 10.10.1899.

²W. G. Rimmer, 'Leeds Leather Industry in the Nineteenth Century'. Thoresby Soc., xlvii (1960), 141.

³Leather Trades Review 11.7.1899.

could be deferred in a number of ways. Money could be borrowed from banks or wealthy individuals, normally by mortgaging the property being purchased. In this way payment was postponed, thus releasing much needed capital for expenditure on machinery and raw materials, in the sometimes mistaken belief that trading profits would quickly enable the mortgagor to repay the purchase price.

A mortgage was much more than a device for deferring expenditure however. It was frequently utilised as a means of procuring capital to expand a going concern, a highly desirable move when trade was healthy. Or it could be used to tide a firm over a period of temporary losses. Whatever the case, new factory or new extension, it meant that the entrepreneur need not risk his own capital in heavy expenditure upon plant.

The finance for the Whitehall Works of Gallon, Lumb and Bean, engineers was raised by mortgaging the property to the North British Insurance Company in 1861¹. The land was bought from A. Montagu Esq., and a mortgage was agreed whilst the buildings were still being erected. Providence Street Mill was mortgaged by its owner as it was being built in 1845², as were Millgarth Mills, built by Clayton and Garsed in 1815³. Mortgages for Dorrington Road Mill in 1874⁴, and for Longclose Engineering Works in 1875⁵, were to raise capital for going concerns. Even some of the well-established firms either preferred, or were forced, to borrow the cost of purchasing new premises. David Little and Company, clothing manufacturers, spent over

¹L.C.A. D.B. 100, Gallon Bankruptcy papers.

²L.C.D. no. 15984.

³L.C.D. no. 4039.

⁴L.C.D. no. 16218.

⁵L.C.D. no. 2571.

£21,000 on a factory in York Place in 1901, of which almost a half - £10,000 - was raised in a mortgage to Middleton and Company, a firm of solicitors¹. The remaining £11,000 was presumably capital accumulated by the firm in fifty years of business.

Little and Company occupied a number of different addresses before York Place, each one of them representing an increase in output and scale of operations. It was possible to build up an extensive business, therefore, by commencing in a small way and expanding gradually as capital from trading profits became available. This was in fact the most common course adopted, being a method possessing other advantages besides that of avoiding heavy capital outlay. Principal among these were that capacity and output were maintained in fairly close harmony (thus reducing the quantity of idle capital) and that each increment to the fabric could be carefully tailored to meet changing requirements.

Reference has already been made (Chapters I and II) to the prevalence of developments of this nature in the woollen industry between 1775 and 1850, particularly the manner in which the warehouses and finishing shops of one generation became the mills and factories of a later period. The addition of a spinning mill, a gig mill, and later weaving sheds are the incremental manifestation of the transition from workshop to factory in the woollen industry, to which the origins and development of Carlton Cross Mills, Park Lane Mills, Oatlands Mill, and many others bear witness².

But other non-textile factories evolved in a similar manner, for example the growth of Fairbairn's Wellington Engineering Works from a small foundry and erecting shop on less than an acre of land, to the huge concern of the 1890's, housing upwards of 1,000 workers, and occupying seven acres³.

¹L.C.A. Acc. 1416.

²See gazetteer - Carlton Cross Mills, etc.

³Ibid., Wellington Foundry.

Or Watson's soapworks in Whitehall Road, which acquired both the adjoining Britannia Mills and the Whitehall Works as it expanded in size¹. Though few firms extended their properties at such a rate, it remains true that as much new employment and production were created by additions to existing factories as by the erection of wholly-new factories in new locations.

Whenever possible, firms usually extended their landholding by purchasing from adjoining owners. The Patent Woollen Cloth Company for example, added 3,440 sq. yds. to their Elmwood Mills estate in 1871-2, and a similar area in 1873, upon which single-storey weaving sheds were then built. In 1876 the part of the adjoining Camp Road Mills estate on which were located two reservoirs was also purchased².

The timing and extent of such purchases were conditioned primarily by two factors: firstly the state, and prospective state of the purchaser's trade and finances; secondly, the availability of land and sometimes buildings of a suitable character and location. The annexation of adjoining property could be gradual, in small lots, as in the case of Elmwood Mills, or on a much grander scale, if the capital was available to meet the cost of a large purchase. The rising output of Wellington Foundry throughout the middle of the 19th century put increasing pressure upon a restricted site until, in the mid-1880's, the adjoining Wellington and Airedale Mills became available and were bought for around £10,000³.

Fairbairn and Company continued to expand its output and were soon faced with the need to expand further, but without any adjacent property being available. The problem was resolved by purchasing two nearby sites -

¹Ibid., Watson's Soapworks.

²L.C.D. no. 12753.

³See gazetteer - Wellington Foundry.

the Old Mill, West Street, and a small works in Primitive Street. The Wellington Foundry remained the principal seat of manufacture, but capacity was extended by adding other premises. Gott organised his cloth business in a similar manner, with Burley Mills used for the manufacture of blankets, and Armley Mills for scribbling and fulling¹.

There was one further course of action for which certain firms opted when their ~~premises~~ premises became inadequate. This involved seeking an alternative location, a step taken reluctantly in view of the considerable degree of disruption it created. The move might be to entirely new premises, probably built specifically for the company, as for example Hudson Road Mills, to which Albrecht and Albrecht, clothing manufacturers, moved in 1898 when their old premises in Oxford Row, became outgrown². Other firms which built new factories in new locations because the old factory was too small included Arthur and Company (Belle Vue Road clothing factory), Joseph Fritch (Springwell Leather Works), and H. Walker and Son Limited (Cardigan Boot factory).

Other concerns moved also, but to a second-hand factory, which could be purchased and altered at lower cost. There was, moreover, no idle capital tied up in the erection of new premises. Firms, especially those in fast-expanding trades whose building requirements were not highly specialised, exhibited a high degree of mobility. Firms in the clothing industry, for example, moved about with surprising frequency. James Rhodes and Company were at St. Paul's Street in 1876, Oxford Row in 1886, and Marshall Street in 1892. Holmes, Richardson and Company moved from Park Place to York

¹W. B. Crump ed., 'The Leeds Woollen Industry 1780-1820. Part 3, The History of Gott's Mills'. Thoresby Soc., xxxii (1931).

²Leeds City Engineer, List and Number of Factories in Leeds, 1889-1909.

Place, to King Street and finally to Water Lane in the short space of twenty years¹. In the woollen industry James Fargreave started at Millgarth Mills in 1819 then moved to St. Anne's Mill, Kirkstall in the 1830's, whilst Obadiah Willans occupied Wellington Mills, Kirkstall Mills, and Britannia Mills at various times².

The number of new factories built in any decade was never very great, whereas firms changed addresses relatively frequently. The capital outlay involved in a change of location was therefore, more often than not, for the purchase and adaptation of existing premises. Only after 1890 was there a noticeable movement of existing firms into new factories. The explanation for this lies in the rapid rate of growth of certain industries at the time, and the beginnings of suburbanization associated with changes in transport, labour distribution, and labour mobility.

The distinction between firms which erected entirely new premises and those which bought a factory second-hand is an important one, for only in the former case was there an actual increment to the stock of factory buildings and sites unless the premises were previously used for non-manufacturing purposes. This was sometimes the case, and at various times a riding-school, a chapel, a drill hall, and many former warehouses were pressed into service.

To return, however, to the initial point, firms normally expanded their capacity gradually, thereby defraying capital costs over a lengthy period, the cost of such additions being financed by trading profit.

If even this proved too much of a drain, however, there was yet a further alternative:

¹Information from Directories (1886, 1892, 1899, 1906).

²See gazetteer - Millgarth Mills, etc.

But the man with little capital need not sink any of it in plant. He could rent space - a single room, a floor, or a whole mill; he could buy power from his landlord, and he might be able to rent the machinery as well!

Heaton's remarks are directed at the woollen industry, but are equally applicable to other trades, especially those without specialised requirements which adapted easily to all types of premises.

There is an overwhelming amount of evidence to support the contention that renting of industrial premises was commonplace in Leeds. The property columns of the newspapers frequently contained more advertisements for premises to let than for sale. All sizes of unit were available, ranging from a 42 ft. by 21 ft. workshop in Tenter Lane offered by Joseph Priestley, whitesmith, 1835, to large mills like Bank Top, or the three Aire Street Mills, and even, after 1872, Bean Ing Mills².

It was possible to rent merely a portion of a room, enough space in which to stand a loom or other piece of machinery. John Parker, a wool scribbler, occupied only a part of the ground floor of Grove Mills, Headingley, in 1832³.

The availability of premises for lease depended upon the number of manufacturers willing to rent out their surplus capacity, and the extent to which capitalist landlords placed their premises at the disposal of manufacturers. The practice of renting out surplus factory capacity, including power, was a common one. James Broadhead, for example, offered two rooms to let at his mill in Sheepscar in 1835, along with 5 h.p. from

¹H. Heaton, 'Financing the Industrial Revolution', Bull. of the Business Historical Soc., xi (1937), 3.

²L.M. 21.2.1835, 19.9.1835, 3.2.1849.

³Sun C.S. 193/1135530.

a water wheel¹. A small room and 1 h.p. from an engine were available for lease at Black Dog Mill in 1798². The frequency with which such properties were advertised increased as time passed, especially after the decline of the flax industry and the reorganisation of the woollen industry threw so many old mills onto the market in the 1860's and 1870's. More and more commonly mills were to let rather than for sale, and landlords were splitting premises up with increasing frequency. In October 1873, for example, rooms and power were available in both Low Close Mill and Burley Vale Mills³. Mill-owners were finding it more difficult to dispose of their properties in any other way. John Hepper advised the owner of Britannia Mills in 1895 to consider selling or letting the property in separate lots⁴. He was even more explicit with regard to the Bank Mills estate in 1882, and his comments to the owner are worth reproducing in detail:

As requested, I give my reasons for advising the reserved prices of lots 1 and 2, to be made so much lower than the value declared. The value declared is that which the Property would be worth in its present condition to a man looking out for and able to utilise, such an estate. But as there is no probability of such a man being found, the property has to be divided into portions whoever buys is scarcely liable to occupy the whole of his purchase.

Like many other of the larger mills in North Leeds, Bank Mills were leased out to a number of occupants by the end of the century, although the newer 'B' and 'D' mills had been sold as one lot to a firm of paper bag manufacturers⁶. Lady Bridge mills housed four firms in 1908, and Hone Street

¹L.I. 19.9.1835.

²L.I. 10.9.1798.

³I.M. 9.10.1873.

⁴Hepper Books 5, 114.

⁵Ibid., 1, 82.

⁶Disposals for 1908

Mill six, and there were many other old textile mills divided into cheap, rented premises. The decline of the leather industry after 1890 released one or two large units onto the market, and as with Buslingthorpe Tannery in 1913 it was generally thought that they were 'not likely to be devoted wholly to the leather trade again'¹. Indeed the premises were divided into two lots one of which became a warehouse, the other a gas-appliance factory². The Joppa Tannery suffered a similar fate in 1895, Hepper being of the opinion that if it were not bought by its lessee, then it would not be sold as a tannery³.

Factories too old or too large, or built for a dying trade, were the major source of rented premises, therefore. Factories and workshops intended from the start to be leased out were not common, a state of affairs not unconnected with the predominance of freehold land in Leeds.

The only major development of this type was connected with the management of the Graham estates in Burley and Kirkstall. Sometime in the second half of the 18th century the goit from the Abbey Mills was extended for almost one mile, to rejoin the river near Armley Mills, and three woollen mills erected along its side. In 1819 the annual rents for these three mills totalled £3,958⁴, the capital value of the buildings then being in the region of £16,750⁵.

These mills were built and equipped by Sir James Graham and let out to prominent manufacturers, who may well have had some say in their construction. Burley Mill, certainly was said to have been built at the request of a

¹Hepper Books, 13, 66-8.

²W.R.R.D.

³Hepper Books, 5, 18-19.

⁴An Act for Confirming Certain Leases Granted by Sir James Graham' etc.(1835).

⁵Sun C.S. 139/998918.

prominent manufacturer¹ (Benjamin Gott) but there is even stronger evidence for the practice of 'building-to-order' in the papers of the Paley bankruptcy case².

Richard Paley was initially a soap-boiler at Crown Point³ who developed a speculative interest in iron manufacture, building developments in East Leeds, a potash manufactory, and at least four cotton mills. In 1799, in addition to these ventures, he contracted to build a small flax mill for George and Job Wright on a piece of land he owned in Marsh Lane. The lease, for 21 years, was fixed by the cost of the venture, 12% p.a. of the cost of building the mill, and 18% p.a. of the cost of installing a steam engine. Total cost came to £1,072.5s.10d, and the annual rent was therefore fixed at £105⁴.

Paley also rented out other industrial properties on his estates in East Leeds, most of them built specifically for the purpose. A foundry was built for the Cawood Brothers in 1800 and leased to them for £200 p.a.⁵ and Paley also made available a drying house in Saxton Lane, dressing shops adjoining the Parish Church, a friezing mill at Millgarth and a number of small workshops⁶. Two cotton mills built in 1790 at the Bank were initially occupied by companies in which Paley was a partner, but his role in this context is not clear⁷.

¹W. B. Crump art. cit. (1931).

²L.C.A. D.B. 233.

³Directory for 1781.

⁴L.C.A. D.B. 233, uncatalogued deeds for Marsh Lane Mill.

⁵Insurance Valuation of Richard Paley's estate, 7.2.1803, Goodchild Loan MSS., Cusworth Hall Museum.

⁶L.C.A. D.B. 233.

⁷See gazetteer - Bank Low and Bank Top Mills.

The developments on the Paley and Graham estates were unusual in North Leeds, possibly unique. They were, so far as is known, the only factory premises built to be leased out from the very beginning. Usually owners of land preferred to sell it to developers, just as owners of factories preferred to sell them outright, with renting out a course only to be fallen back upon if absolutely necessary. Bank Top Mills, for example, were repeatedly offered for sale throughout 1819, but the owner was forced instead to let the premises to C. and E. Heaps¹. Frequently, as with Elmwood Mills in 1839, premises were offered for sale or to let².

There was then, a supply of premises to let from the very beginning of factory production in Leeds, its quantity varying markedly according to market conditions, greatest in times of depression, fewer when conditions improved. When trade was particularly buoyant a shortage of premises was discernible, and this added impetus to the erection of new factories. It is likely that in such times rents were higher, and this persuaded manufacturers to somehow raise the capital to build their own factory. At other times there may have been no great financial advantage in doing so, and one prominent firm of cloth manufacturers, J. and E. Brooke, were quite content to remain as tenants of St. Anne's Mill for over a quarter of a century.

The availability and distribution of premises for rent forms an important item for consideration partly because they reinforced the inertia of the pattern of industrial location, and partly because they were so important in helping newly-formed concerns to get established, leaving valuable capital for other purposes, principally buying in stock and setting up the machinery.

¹L.I., 1819 and Sun C.S. 181/1110686.

²L.M., 9.11.1839.

Rents for buildings varied enormously according to prevailing economic conditions, size, age, fixtures, etc. The £1,338 p.a. which Gott paid Graham for Burley Mills in 1835 is the highest for which evidence survives, but this included 32 acres of land¹. The rents for 38 different premises, excluding the Graham Mills, averaged £295 p.a., with the majority below £200. A dyehouse on the Nether Mills estate was rented out at only £10 p.a. in 1840², and even in 1902 a small workshop in Tenter Lane brought in only £26 p.a. to its owner³.

Once having either bought, built, or rented a workshop or factory, the manufacturer next needed to equip it with machinery and other fixtures. Again however, he was not forced to pay out his capital on new goods purchased outright. Power could be rented along with the premises, and advertisements for 'room and power' are not infrequent. A lease of work-rooms and a warehouse in Park Lane- dated 1824, included:

sufficient mechanical power or motion equal to seven horses to be taken from the first motion of the steam engine attached to or adjoining to the said warehouse communicated by an upright shaft to be made put up or placed at the joint expense of the lessor and lessees for the purpose of working such machinery⁴

A room, 25 yds. by 12 yds., with 6-8 h.p. from an engine advertised in 1803 was fairly typical⁵, whilst a more informative advertisement in 1812 announced that two rooms of Black Dog Mill, measuring 95 ft. by 31 ft. were to let, with 12 h.p. from a steam engine, the remaining part of the

¹'An Act for Confirming Certain Leases Granted by Sir James Graham' etc. (1835).

²British Waterways Deeds, no. 107.

³L.C.D. no. 1557..

⁴L.C.D. no. 3888.

⁵L.I. 31.1.1803.

mill being in use for scribbling¹.

There were fewer advertisements for 'room and machinery' to let, but they were by no means uncommon, and in 1835 a prospective tenant could select from four raising gigs at Elmwood Mills, and the whole of the dressing machinery at Airedale Mills, consisting of 8 gigs, 11 Lewis cutters, 2 perpetualls, 4 brushing mills, and a drybeater².

There was little reason, therefore, for the industrialist to have to use his own capital for setting up a factory, at least initially. Premises, power and machinery might be rented, and even raw materials could be bought on credit. Even if it was decided to buy rather than to lease, the necessary accoutrements could all be obtained second-hand, and capital borrowed by means of a mortgage. A 'second-hand business' could be bought as a going concern - prospective master dyers were offered the fixtures, utensils, and stock-in-trade of Nathaniel Dobson, a bankrupt in 1793, for example, and his old premises were available for lease³. When the question of limited liability was raised later in the century, one member of the Leeds Chamber of Commerce argued:

You all know that a man of more than ordinary ability who gives his attention to business can soon place himself in a position to have plenty of Capital to second his efforts⁴

It was, it would appear, easier to set up a factory or workshop than it was to maintain it in business for a number of years. The next problem, therefore, which the industrial entrepreneur faced was that of the everyday

¹L.I., 27.7.1812.

²L.M., 31.3.1835.

³L.I., 15.7.1793.

⁴Quoted in M. W. Beresford, The Leeds Chamber of Commerce (1951), 40.

costs of production, principally expenditure on raw materials, fuel, transport, marketing, and labour. How important these were as a consideration in locational decision-making will be assessed in the following chapters, but it will be first necessary to outline the approximate expenditure by firms on such factors.

The item 'stock' contained in the insurance registers for Leeds firms is one which, as Chapman has indicated, is difficult to interpret¹. However, with regard to the woollen industry, one is unable to agree with his conclusion that 'stock' excludes raw materials and work in progress. A comparison of the accounts and insurance valuations for Bean Ing Mills, for example, seems to indicate that stock-in-trade was included for valuation purposes:

TABLE 4.i - CO-PARTNERSHIP ACCOUNTS AND INSURANCE VALUATIONS, BEAN ING MILLS
1801-21²

		<u>Copartnership acc.</u>	£	<u>Insurance Valuation</u>
1801	Buildings)			9,900
	Machinery)	23,000		4,700
	Estate	3,000		
	Stock	43,575		21,200
1819	Buildings)			11,300
	Machinery)	5,000		6,700
	Estate	7,526		
	Stock	47,048		21,500
1821	Buildings)			14,800
	Machinery)	5,000		7,150
	Estate	7,526		
	Stock	20,699		15,250

¹S.D. Chapman art. cit. (1971), appendix A.

²Gott Papers, Document no. 20, and Sun Insurance Registers (see gazetteer for full details).

Such large entries for stock and utensils can hardly, as Chapman claims, refer solely to 'tools and other moveable utensils', an argument which is further countered by the policy for Thomas Shann and Sons of Aire Street dated 5th January 1837, which specifically refers to the

stock of wools, woollens, and stuffs in their counting houses, warehouses, handraising, mule spinning, reeling, and burling shops,

Which, together with certain fixtures, were valued at £7,500¹.

Insurance valuations in fact give a good indication of the amount of capital tied up in stock, the major problem being that a significant part of the valuation is for finished and semi-finished goods, to which the manufacturer has added considerable value. Unfortunately, it has only proved possible to obtain sufficient data to estimate the importance of material costs for the woollen industry, but it may be stated with some conviction that figures were highest in this trade.

In the woollen manufacture raw material costs were very high, usually constituting at least one-quarter of the total valuation, and in many cases certainly higher. More realistically, however, the value of stock should be considered against other running costs rather than fixed costs, though it may be argued that the manufacturer was called upon to pay out this sum of money only once - at the outset of the venture - and that the value was merely 'topped up' thereafter. This is much more difficult to calculate, but fortunately Gott's manager made a calculation of the cost of working up £1,000 worth of Saxon Wool into superfines in 1828:

TABLE 4.ii - THE STRUCTURE OF COSTS AT BEAN ING MILLS, 1828²

Cost of wool, other raw materials, cartage, duties, <u>etc.</u>	£1,431
Labour	745
Maintenance and capital charges	<u>505</u>
TOTAL	<u>£2,681</u>

¹ Sun C.S. 233/1242366.

² H. Heaton, 'Benjamin Gott and the Industrial Revolution in Yorkshire'. Ec.H.R. iii (1931), 60.

The costs of materials and production were, accordingly, split approximately 50:50, and if capital charges were excluded the former would increase even further relatively.

The situation in the woollen industry represents the maximum relative cost of raw materials. At the other extreme were the commission dyeing and finishing trades, where the goods upon which the industrial processes were undertaken were held in trust. A dyer, therefore, would have only his dyewares and chemicals to purchase, a finisher only his teazles, sizing, and soap. Raw materials can only have contributed a small part to the running costs of these industries.

Material costs in other trades varied between these two extremes, the consideration of which is postponed to Chapter VI. Similarly there was great variation in the cost of labour, depending upon the numbers required and the prevailing level of skills. Labour costs at Gott's mill constituted approximately 28% of the value of the finished product (see above, page 163). Against this the weekly wage bills of the principal flaxspinning firms in 1842 totalled £2,648, about £140,000 p.a.¹ This compared with Fairbairn's estimate for the value of the industry's output in 1841 which was £1,250,000², from which it will be seen that labour constituted only 13% of total costs, a reflection of the cheaper and more efficient use of labour in flax.

Wage variations and labour productivity differences render the question of labour costs so complex that only a full investigation into the subject in its own right would enable an emphatic assessment of their importance to be made. There are, moreover, considerations other than these, such as

¹ Marshall Papers, List of Spinners and Spindles, 1839-42, by H. C. Marshall.

² Sel. Comm. on the Exportation of Machinery (1841), vii; 210. Evidence of P. Fairbairn.

the distribution of the labour supply, and therefore this question too has been postponed until a later chapter.

Finally, the industrialist had need of two commodities which were necessary in all but a few factories, and which were principally, though by no means exclusively, concerned with the application of power. These are fuel and water. In the period under consideration power was derived principally from the steam engine, and indeed, as already stated (Chapters I to III), steam power acts as a sensitive pointer to the progress of the factory system. Only towards the end of the 19th century did gas engines and electrical power begin to supplant it in a number of industries, and in an earlier period water power, the windmill, and the horse-wheel were of some significance.

To assessfully the cost of steam power involves the consideration of capital outlay, fuel costs, water costs, and maintenance. The purchase price of an engine varied from manufacturer to manufacturer according to its quality, how far it had to be brought, and what fixtures were included, and Boulton and Watt refused in the 1790's to actually name a purchase price, preferring instead that a firm pay an annual premium on the use of their invention.

The prices of engines of early manufacturers are summarised in the table shown overleaf. The capital cost of installing a 30 h.p. engine in a mill was therefore approximately £1,000 to which must be added about £300 for the boiler (if iron, not copper) and installation costs of between £100-200, a total of less than £1,500¹. This applies to all the engine makers with the exception of Boulton and Watt, whose engines were more expensive. The cost of installing the 30 h.p. engine at Bean Ing in

¹G. F. Tyas art. cit. (1925-6). Appendix, letter of Matthew Murray to Simon Goodrich, engineer, 4.3.1813.

TABLE 4.iii - PRICES OF STEAM ENGINES IN THE EARLY PHASE OF INDUSTRIALISATION

(£)¹

<u>Size of engine</u> (h.p.)	<u>Trevithick</u> <u>1804</u>	<u>Fenton, Murray</u> <u>& Wood 1804</u>	<u>Boulton &</u> <u>Watt 1804</u>	<u>Murray</u> <u>1813</u>	<u>Boulton &</u> <u>Watt 1795</u>
1	126				
6	431			400	
8	493 10s.			468	490
10	526 10s.			557	562
14	619 10s.			716	774
20	745 10s.	600	1,083	894	988
24	829 10s.		1,276	1,028	1,201
30	955 10s.	830		1,186	
40	1,060 10s.	1,045			1,888
50	1,270 10s.		1,418		2,322

¹G. Roll, An Early Experiment in Industrial Organization (1930), Appendix XIX.
G. F. Tyas, 'Matthew Murray', Trans. Newcomen Soc. vi (1925-6), 111-43.
Goodrich Papers, Science Museum, Journals and Memoranda Books (1804) -
information from Dr. J. Tann.

1793 totalled £2,031, which was made up as follows¹:

Materials of engine and framing	£ 685
Wrought iron boiler	165
Framing, including wrought iron work	146
Putting together	75
Premium	<u>960</u>
TOTAL	<u>£2,031</u>

Though initial costs were higher, the Watt engines were undoubtedly more efficient users of fuel. In 1796 Boulton and Watt negotiated with Richard Paley for the withdrawal of a patent steam engine installed at Bank Top Mill which, it was claimed, infringed patent rights. The problem was resolved when Paley agreed to replace his engine with one of Soho manufacture, an action which would reduce fuel consumption from 45 cwt. to 12 cwt. per 12 hour period, and save the company £150 p.a.²

In 1814 a steam-engine of 20 h.p. was reckoned to consume two and a half bushels of coal an hour, rising to three and a half bushels for a 30 h.p. unit, varying somewhat with the quality of the fuel³. Coal at this time cost one shilling a corf, between 16 and 25 shillings per wagon, each of which held 45 cwt⁴. To these prices must be added transport cost at a maximum two shillings per wagon in the intownship (see Chapter VII). From which it may be calculated that even in a large mill the fuel bill was no greater than £20 per week, whilst a factory which possessed an efficient 30 h.p. engine expended only about £10 per week, including transport costs. These costs remained fairly steady throughout the first half of the 19th century, as increasing engine efficiency combated rising fuel prices. By 1841 when the fuel bill of a flax mill with 150 hands and a 20 h.p.

¹W. B. Crump art. cit. (1931), 254.

²Boulton & Watt MSS., letter book, B. & W. to R. Paley, 27.7.1796.

³G. F. Tyas art. cit. (1925-6), appendix.

⁴L.C.A. Middleton Colliery Records MCC 188, 189.

engine was in the region of £6-8, wage costs were as much as £60 per week, and this in a poorly paid trade¹.

Coal was not utilised solely for raising steam and generating power, however. It also played an important part as an industrial fuel, providing heat for dyevats, brick and pottery kilns, foundries, drying rooms in cloth mills, breweries and chemical works. Baker estimated in 1842 that the town's engine furnaces consumed 200,000 tons p.a., whilst 'dyehouses, pig-shops, and other furnaces' burnt approximately half this amount². For such concerns it would appear that coal costs were more critical. Dyers feature very strongly in the sales accounts of the Middleton Colliery. William Close, of Drony Laith dyeworks, consumed a regular three or four wagons a week in the 1790's, but by far the best customer was the Leeds Pottery in Hunslet which required upwards of eight wagons per day. A large dyeworks was, therefore, involved in an expenditure of c.£20 per week, and a pottery, brickworks or iron foundry perhaps double that amount.

Steam engine boilers also required a supply of water, for which payment was minimal, but which involved expenditure upon dams, pipes, reservoirs and other fixtures which, therefore, constitute a part of capital costs rather than running costs. Access to water was a factor of such importance to certain industries that it will be considered separately in the chapter following.

So far, therefore, it has been stated that industrial entrepreneurs were faced with the problem of minimising two principal types of cost - those involving initially setting up business, and running costs, the day-to-day organisation of production. All costs however, could be defrayed

¹H. C. Marshall op. cit. (1842).

²R. Baker, Report on the Residences of the Labouring Classes in Leeds, P.P.(1842) xxvii.

by means of loans to offset capital payment, incremental growth, second-hand purchases of buildings and equipment, and renting, whilst raw materials could frequently be bought on credit. The importance of these items of cost varied from industry to industry and from firm to firm, but an attempt has been made to outline cost structures for a number of different trades.

There were other costs of minor significance which have not been considered - maintenance charges and the like - because there is little information on them. But in any case it is felt that these would have varied only vary slightly, if at all, from one location to another.

Evaluating alternative locations is only one decision faced by the manufacturer, frequently the final one after the line and scale of production, size of the workforce, and type of machinery and buildings have been established. It is for this reason that an attempt has been made to outline cost structure first, as this will to a certain extent dictate the choice of location. However, what is important is not whether the wage bill was twice as great as the fuel bill, but what extent of spatial variation in costs existed. For example, wages might constitute 90% of total costs, and fuel only 10%, but if labour costs are the same throughout the urban area, but fuel costs vary, then the key factor in choosing a location will be the price of coal or other fuel.

It is therefore necessary now to proceed to take each variable likely to bear upon the locational choice, to consider to what extent it exhibited locational variation at the intra-urban level, and assess its importance as a determinant of locational choice. This will be undertaken factor by factor, as far as possible following the process through, from the initial erection of the factory to the marketing of the finished product, although labour factors will be considered separately at the end of this analysis.

Chapter V - FIRST CONSIDERATIONS IN SITE SELECTION

Aggregate location patterns are composed of the individual choices of a large number of entrepreneurs, few of whom are possessed of sufficient information to render their selection other than sub-optimal. The process of acquiring this information is too difficult to justify more than a superficial analysis of the situation and frequently the first satisfactory solution to be offered is the one which is adopted.

Manufacturers are forced to operate within economic margins but there is little evidence to suggest that the process of site selection involves a search for an optimal solution. Consequently, it is incorrect to assume that their choice is a free one, for attention is confined to property which is available at a particular time which appears to fulfil requirements. Even then locational considerations are frequently of only second rate importance. If attention has been directed towards second-hand premises, then a manufacturer is more likely to be concerned about the nature and layout of the buildings than their location, especially if specialised facilities are required, as for example in the leather industry or the dyeing trade.

One important aspect of this 'satisficer' maxim is that attention will only be directed to that which is available. Premises which are occupied by another firm and undeveloped land which is not to be released are not normally available for consideration. This is true whether land and premises are to be purchased or leased.

Manufacturers, therefore, are unlikely to examine the qualifications of a property unless it is likely to be made available. The general form of the property market involves the prospective purchaser considering offers made by would-be vendors, usually in the form of advertisements with particulars placed in the relevant hands. In the 19th century newspapers

constituted the principal medium for advertisement, and whereas their columns were filled with announcements of property sales, insertions such as the following were extremely rare:

Wanted to rent, part of a mill with chamber and other conveniences where there is a constant supply of water: to be no further distant from Leeds than two miles.¹

Generally, then, it was the vendor who attempted to draw the attention of prospective buyers to his property, and at any one time there were dozens of estates available, the exact number a reflection of the state of trade prevailing at the time. Logically therefore, the number of alternative land and factory properties available at any one time was strictly limited.

W. and E. Wilkinson, worsted spinners, were tenants of Aire Street Mills from 1824 onwards, but the continued success of the firm by 1838 demanded an extension to the premises which could not be achieved at that site. Having accumulated sufficient capital they therefore began to look around for alternative premises. In that year, amongst other properties, Horsfall's dyehouse at Spring Gardens, Wellington Bridge Mill, Stirk's Mill in Sykes Street, and the Railway Foundry in Upper Accommodation Road were all available². The last-named, the property of the assignees of a bankrupt founder³, was purchased and immediately converted into a mill. It may be that the Wilkinsons considered other properties besides these, or contemplated building their own mill, perhaps on the land in Artillery Place which John Rinder was offering for sale, and which he described as 'valuable Building ground of Factories, Dyehouses etc.'⁴. But the important

¹L.I. 25.8.1789.

²L.M. 13.1.1838, 17.3.1838, 5.5.1838, 12.5.1838.

³W.R.R.D. N.D. 459, 441 (1839).

⁴L.M. 29.10.1838.

feature here is that the company were satisfied to accept second-hand premises and were (in all probability) content to confine their attention to what was available.

The initiative in the property market was therefore normally taken by the vendor, who placed his property before the attention of prospective purchasers. This meant that, in the case of undeveloped land, landowners were capable of exerting a profound influence over the nature of its development. This applied to manufacturing no less than to housing¹. In certain cases there is evidence that industrial development was forbidden altogether, a prohibition achieved by altering the terms of a lease or, in the case of freehold land, by placing covenants in the sale conveyance. For example, in 1865 the trustees under the will of J. Atkinson forbade the purchaser of a plot of land in Hanover Square from erecting any manufacturing premises². Atkinson owned much of the land in the Little Woodhouse area, which was maintained in predominantly residential use throughout the whole of the 19th century³.

The Park Hall estate of the Wilson family in West Leeds was intended to be developed for residential purposes initially, although the proliferation of mills and factories in the area after 1810 prevented the scheme from being completed. Initially leasehold, the freehold was eventually sold to developers when it was realised that little could be done to prevent industrial development in the area, and in the end manufacturing was positively encouraged⁴. (See below, page 175).

¹D. Ward, 'The Pre-Urban Cadaster and the Urban Pattern of Leeds'. A.A.A.G. 52 (1962), 150-66.

²L.C.D. no. 16010.

³R. D. Murphy, The Westward Growth of Leeds, 1800-1850, (196).

⁴M. W. Beresford, 'Prosperity Street and Others', in Beresford and Jones eds, Leeds and Its Region, (1967), ch.XVI.

Even when it was necessary to yield to commercial pressures, and sell land for industrial development so as to obtain the highest price available, the nuisance value and unsightliness of factory buildings could be minimised, either by excluding certain types of user, or by placing covenants upon the nature of the buildings to be erected. On John Neville's School Close estate, for example, buildings along Sovereign Street had to be of at least two stories, and constructed of good brick¹. On the Carlton Close estate in Woodhouse Lane, the purchaser of a plot of land in 1837 was forced to agree to erect a chimney of not less than 75 ft. in height and at the north-eastern end of the premises². This provision indicates at least a rudimentary knowledge of meteorology, although there is some irony in that the vendor was himself a manufacturer with a mill and steam engine on adjoining property. 'Obnoxious' industrial uses were frequently debarred by covenant from residential areas, but there was less control by land-owners over development than was the case in areas where leasehold property was the rule. The predominance of freehold land in Leeds meant that property did not revert to its owner after a time, and therefore there was no great need to ensure that development was not obnoxious, unless the vendor still retained adjoining property, as in the case of Atkinson.

Whilst there is not a great deal of evidence to support the theory that landowners frequently rejected manufacturing development, in some cases it is clear that they were willing to offer strong inducements. These could be general in form - the owner pointing out the positive advantages of his particular plot of land - or might be of a more practical nature. Landowners sometimes layed out streets, installed sewers, and added other

¹L.C.D. no. 2121.

²L.C.D. no. 16244.

facilities, as for example Neville did for his School Close property¹.

On occasions landowners agreed to actually develop their property for an industrial user. The examples of Richard Paley and Marsh Lane Mill, and Sir James Graham and Burley Mill have been cited previously². The lessee of land in Kirkstall Road, G. Taylor, agreed to build the Alexander Foundry for Stephen Cotton, a machine-maker in 1863, though only in part³. The proprietor of the Nether Mills in 1787, a Dr. Fearn (later hung for murder!), solicited manufacturers seeking an 'extensive cotton works', or 'mills for spinning worsted, line, or hemp, making oil, or any other kind requiring great power' with the following advertisement:

Dr. Fearn, the proprietor of the Nether Mills, will give great encouragement to any scheme of improvement new buildings may be erected upon moderate terms.⁴

And in 1791 William Tipping and James Brennand were persuaded to take a fourteen-year lease on a part of the mills, Fearn promising to provide £600 for rebuilding, and for erecting a new race and water-wheel, for their cotton-spinning business⁵.

Most landowners remained fairly passive in their attitude towards industrial development, however. There were no large estates, except perhaps Park Hall, so that it was difficult for any one person to control much more than a small area in any case. The majority of vendors sought merely the highest obtainable price, and most properties were advertised as being suitable for either housing or for factories, possessing the

¹L.C.D. no. 1123.

²See Chapter IV, Page 153.

³L.C.D. no. 15770.

⁴L.I. 10.4.1787.

⁵British Waterways deeds, no. 107.

advantage of 'a considerable fall of water', or being in the midst of a populous neighbourhood¹.

The role which landowners tended to play in urban development may perhaps best be illustrated by reference to the Park Hall estate, the property of the Wilson family, which extended over 202,592 square yards of West Leeds.

The Wilson family had initially attempted to develop their property on a leasehold basis, preference being given to residences for the gentry and the mercantile classes. The erection of Gott's mill at Bean Ing in 1792, allied with the slow rate at which the property was taken up and the absence of any real interest of Christopher Wilson, Bishop of Bristol, made it advisable in 1806 to instead sell the freehold of the property and the estate was therefore divided into lots by Private Act. Instead of its being purchased by developers of good-class residences, however, the few properties that were disposed of were bought by industrialists and builders of working-class housing. This decided the fate of the area, and the Leeds Intelligencer observed in 1822 that the recent erection of three dry houses close to the west end of Park Square, 'will put the finishing stroke to business in that quarter'². The middle-classes left for the more salubrious districts of Woodhouse and the out-townships, capitulation being completed when the Act for vesting the estates stated:

And whereas the Residue of the said Estates ... consist of Freehold Grounds, and of Houses, and other Buildings, the Occupation of which has of late years been rendered less eligible in consequence of the erection of Fire Engines and other buildings on adjoining or contiguous grounds, for carrying on Manufactures it is conceived that they might be sold to great advantage to Merchants, Manufacturers, and other Persons connected with Trade in the said Town.³

¹L.I. 19.7.1791 and 21.3.1800.

²L.I. 5.8.1822.

³An Act for Vesting Certain Estates in the Parish of Leeds ... etc., P.P. (1803) lvii.

Those portions of the estate abutting the River Aire were laid out in strips, clearly intended to be developed for manufacturing purposes¹, and amongst others who bought small parcels of land in the 1830's were two machine-makers, a brewer, and a brickmaker/builder².

Commerce and particularly manufacturing, exerted pressure upon land in two ways principally. Firstly it deterred development of a first-class residential nature, the two types of land use being on the whole mutually exclusive, as in the Park Square area after 1792. James Holdforth believed, in 1842 that 'property within the action of smoke is certainly greatly deteriorated in value', his own house at the West End having halved in value since 1803³. Secondly, industrial development and the type of housing which accompanied it utilised land more intensively than low-density residential property, and was therefore able to outbid it for land. Moreover, since manufacturing was growing at such a rapid rate, suitable land was increasing in value. Land near a mill which had been worth between £300 and £500 in 1813-4 was said to have risen to over £3,000 an acre by 1824⁴.

As in other towns, there existed a hierarchy of users of land in 19th century Leeds, at the top of which was commerce - retail users, offices and warehouses - followed by intensive manufacturing industry and high-density residential development, then less intensive manufacturing and finally low-density residential. This differs slightly from the hierarchy in 19th century Glasgow as observed by Checkland⁵, who placed working-class housing

¹L.C.A. uncat., Tithe award, Leeds township.

²L.C.A. D.B. 58/42 Agreements for the Sale of Wilson's Estate.

³House of Lords Record Office, Leeds Improvement Bill (1842), minutes of evidence, vol.7, L.2, 101. Evidence of James Holdforth 2.6.1842.

⁴L.C.A. D.B. 116 Counsel's brief, R v. Gott (1824) Mr. Atkinson's statement.

⁵S. C. Checkland, 'The British Industrial City as History; the Glasgow Case!' Urban Studies 1 (1964), 34-54.

at the foot of the list, but the same principle holds.

According to one urban economist, 'the price of urban land, and the general level of urban rents, is determined like the price of any other commodity by demand and supply'¹, although the resultant pattern of land use can produce, in Haig's words, 'a confused and baffling welter of anomalies and paradoxes'². At the same time, however, competition for land is resolved through the medium of the 'bid-rent curve' (or rent-paying ability) of the different users. This in turn is determined by:

1. The intensity with which the land is used. The greater the intensity, the higher the bid-rent a user can afford.
2. The extent to which one location benefits a user more than another location, i.e. its economic rent³.

If competition is focused upon a single nucleus, then, given a uniform surface, the pattern of land-users will resolve itself into a system of concentric circles, with commercial uses at the centre, surrounded by wholesaling, light manufacturing, workers' suburbs, heavy industry, and finally low-density residential development⁴.

However, this simple model must be modified in two ways if it is to have any relevance to 19th century Leeds. Firstly inequalities in the land surface appear as soon as the elements of transportation and topography are introduced. Steep slopes hinder access, especially in the era of horse-and-carts, and water courses are to be found only in valley areas.

¹H. W. Richardson, Urban Economies (1971), 45.

²R. M. Haig, 'Towards an Understanding of the Metropolis', Quarterly Journal of Economics 40 (1926), 179-208.

³See M. Chisholm, Geography and Economics (1971), 16-18.

⁴E. W. Burgess, 'The Growth of the City', in R. E. Park et. al., The City (1923).

The frictional costs of distance are reduced along roads, canals, rivers and railways, but increase away from arteries of transport. The pattern of land-uses formed, therefore, takes on a stellar shape, with particular types of land-use tending to develop along select axes¹. Communications and urban development in Leeds were funnelled along the Aire and Meanwood valleys, and later to the south.

Secondly, the assumption of a single nucleus towards which all users are orientated is a false one, although it has more meaning for the 19th century town than for contemporary urban areas. More realistic is a model of urban land-use based upon multiple nuclei². In North Leeds there were separate centres of growth at Kirkstall, Burley, Headingley and Woodhouse, and the inner area itself developed from twin nuclei³. At the same time manufacturing forms its own distinct nuclei, related to communications, water supply and other factors, which, once established deter other users, as already shown.

The rent-surface in 19th century Leeds probably peaked in the centre of the town, with subsidiary high values at intersections in the communications network around which manufacturing tended to cluster. Positive evidence for this pattern could only be established by analysing land-use patterns in Leeds more closely than is possible here, but there can be little doubt as to the existence of a land-use hierarchy.

Commercial users have the greatest need for a location with maximum accessibility, and also make more intensive use of ground area. They are, therefore, able to outbid other users and pre-empt land in the centre of the city. Here were found the principal retail outlets, financial institutions, offices, and warehouses, in the area bounded by Briggate,

¹H. Hoyt, The Structure and Growth of Residential Neighbourhoods in American Cities (1939).

²C. D. Harris and E. Ullmann, 'The Nature of Cities', American Academy of political and Social Science, 242 (1965), 7-17.

³See Chapter I.

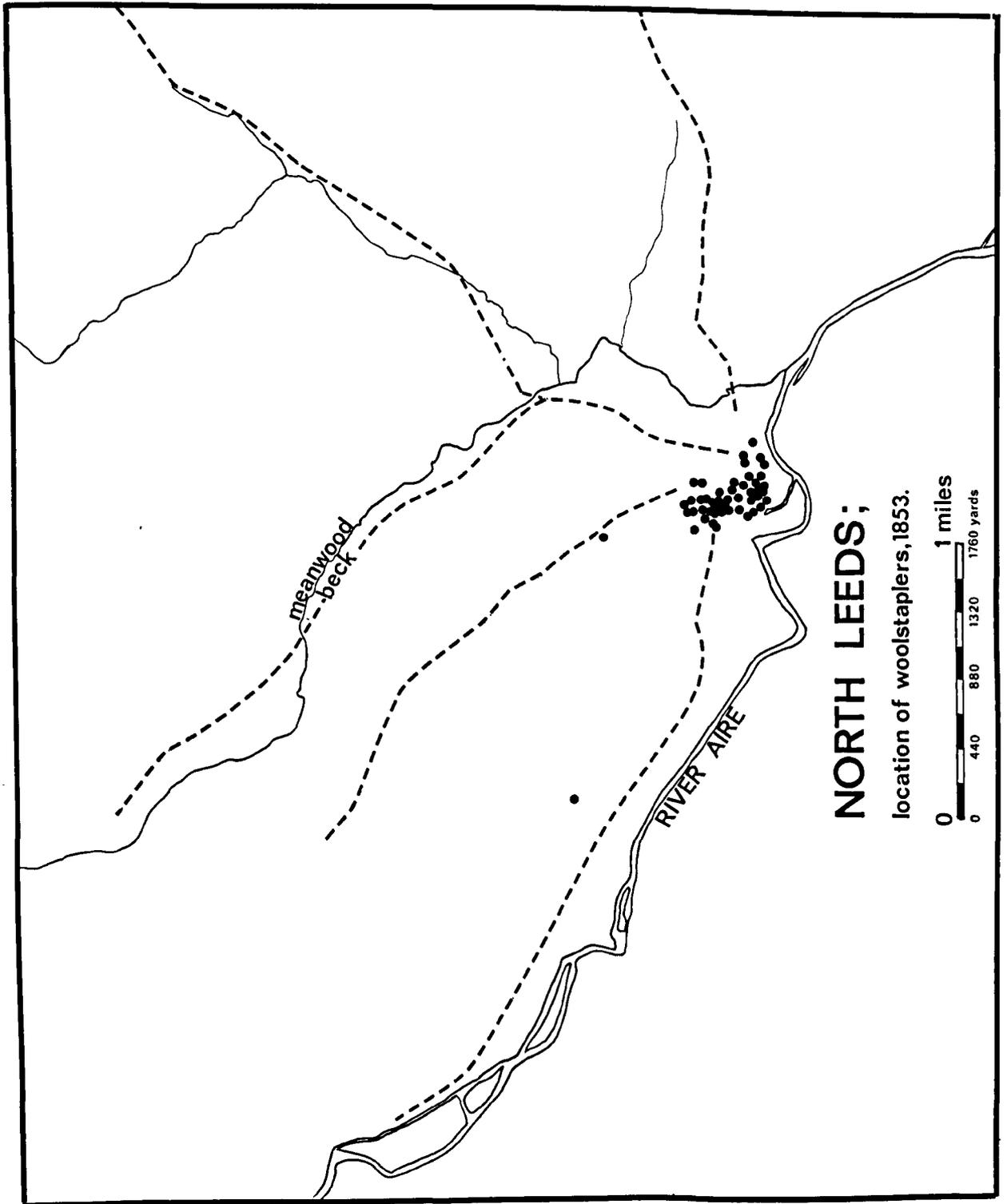
Boar Lane, the Headrows, and Park Row. Map 10 showing the distribution of woolstaplers and merchants in 1853, gives an indication of its extent. No factories were found in this area in the middle of the 19th century (see Maps 5 and 6), although there were a few workshops in the yards off Briggate and the Upper Headrow.

The principal area of workshop industries was found in a belt surrounding this core, intermingled with warehousing, and a few factories built many years before. This belt corresponds to the areas around Kirkgate, Swinegate and Mill Hill, the Wade Lane area, and North Street. This merged almost imperceptibly into the main factory district, with high-density, low-quality housing cramming into the space between the factories.

The land-use slope matched the land-cost pattern. In the west part of Leeds in the 1830's, for example, when the Wilson estate was sold off, it was the part nearest the centre which fetched the highest prices, being purchased speculatively and converted into warehouse property. Land here cost between 12 s. and 16s. per square yard, whilst that further from the centre was sold for as little as 4s. 6d a yard¹. Even land at this price was said to be too expensive for cottage purposes in 1842 and, except where old housing stood, built when land prices were different, residential uses were forced to give way to manufacturing and warehouses.

Manufacturing therefore, was excluded from the centre of the town, but able to pay the price for land anywhere else in the Borough. It is necessary, however, to indicate that different industries had their own rent-bid curves, and that there was competition amongst manufacturing itself for the better locations. Those trades which made more intensive use of the land and which stood to gain more from a central location were in a better position to pay higher rents and land-prices. The footwear and

¹R. Baker, Report on the Residences of the Labouring Classes in Leeds. P.P. (1842) xxvii.



NORTH LEEDS;

location of woolstaplers, 1853.



clothing industries were all located nearer to the town centre than were cloth manufactories or leather works, both of which consumed land in relatively large quantities and, having less need to be close to commercial institutions and transport facilities, benefited less from being closer in. (See Maps 24 & 25).

The most extensive users of land were ironworks, large engineering works, tanneries and large cloth mills (see Chapter VI), all of which tended to be located towards the periphery of the main manufacturing area and frequently beyond it, sometimes set in open fields as were Burley New Mill (1836), Bagby Mills, and even Bank Low and Bank Top Mills, when first they were built.

Other manufacturing industries occupied land intermediate in cost between that chosen by clothing and footwear factories, or printworks (Map 19), and such extensive activities. The significance of land costs is further considered in Chapter VI, before which however, some reference should be made to the movement of these intensive economic margins. These were never static. In addition to moving outwards with the expansion of the built-up area, there were fluctuations which corresponded to changes in costs and the economic rent of locations for different industries. Thus, whilst in the first half of the 19th century it is true that no factories intruded into the central area, the development of the factory system in clothing, footwear and printing helped to formulate a pattern of industry by 1914 which included some works in areas previously reserved for commercial users (see Maps 6 and 9). For example, Barran's first clothing factory was in Alfred Street, Boar Lane, in an area dominated by warehousing activities, whilst Buckley and Company's hat and cap factory in Greek Street was surrounded by offices and warehouses.

For most trades, however, the intensive locational margin migrated outwards as time progressed and as commercial and wholesale activities

expanded to take over their premises. Monk Pit Mills and Aire Street Mills, for example, were both used as warehouses from the 1860's onwards, although significantly enough the former were 're-invaded' by a firm of clothing manufacturers in the 1890's. Millgarth Street Mills were turned into a model lodging house, and Hope Street Mills were not used for manufacturing by 1914. Merrion Square Mill was demolished to make way for the Grand Theatre.

Other factory buildings remained industrial but were taken over by a more intensive use. Most of the clothmaking and finishing mills of the Wellington Street/Park Lane area were turned over to the clothing industry by the end of the century, and Oxford Mills housed a firm of boot manufacturers for a time.

In general, the commercial sector expanded more to the west than to the east, possibly because that way the urban environment was slightly more pleasant. Consequently the area around East Street, Steander, York Street and the Leylands continued in use by manufacturing throughout the whole of the period.

By 1914, although the built-up area of Leeds extended as far as Kirkstall, Potternewton, Roundhay, Harehills and Cross Green, the disposition of the land-use areas remained almost the same as it had been fifty, or even a hundred years earlier. The commercial core had enlarged itself considerably and tongues of industry had extended themselves up both the Meanwood and the Aire valleys and also outwards into north-east Leeds. Manufacturing still took place in School Close, along Whitehall Road, in the Park Square area, and in the Leylands. Perhaps the most striking feature of industrial change in 19th century Leeds is the inertia of the locational pattern.

Such controls were largely beyond the control of the manufacturer, although he was perfectly free to pay a higher rent than he could afford, or to adopt a location which brought a less-than-adequate return. The

individual entrepreneur did not see intensive and extensive margins on the map of Leeds, but a rough evaluation of his cost structure would be sufficient to tell him whether or not a particular site would permit him to run his business successfully. Frequently manufacturers probably attempted to 'play safe'. If an area was already thickly populated with factories, not only would this tell him that it was possible to assemble all the factors of production at a site within that area, but also the existence of many other thriving businesses must have been reassuring.

Factors of land-ownership and competition between different users of land constructed a framework which imposed limitations to the choice of location. Sometimes industrial development was debarred from an area by the opposition of landowners or interest groups, at other times it was encouraged. Sometimes land was too expensive for manufacturing, at other times other land users were deterred from entering an area by the existence of an industrial nucleus which tended instead to attract further industry.

It is against this background that the following chapters should be seen. Industrial entrepreneurs could not begin to evaluate alternative sites until they had determined what alternatives were available. Cost precluded them from some parts of the town, the hostility of landowners and pressure-groups from other parts, and even within the remaining areas their attention was likely to be directed toward property which they knew was available, thanks to newspaper advertisements or word-of-mouth.

Chapter VI - THE INFLUENCE OF CAPITAL COSTS

It was stated in the previous chapter that the number of choices of site available to a manufacturer was subject to the constraints of availability and land-use competition, only after which was he in a position to evaluate alternative locations in terms of spatial variation in the factors of production.

Initial outlay on factory development took many different forms as has already been emphasised (Chapter IV). Land and premises could either be purchased or rented, and, if purchased, either new or secondhand. Likewise machinery and various fixtures could be bought secondhand or on credit, and even sometimes rented.

Capital expenditure at the outset of a new factory fell principally into four categories: land, buildings, machinery, and fixtures, of which only the first and last were influenced to any degree by location, at the intra-urban level.

Reconstruction of the pattern of land prices in 19th century Leeds is a difficult task, although some tentative suggestions have already been made in the previous chapter. The price of land for industrial development was anything from 2s. to 15s. a square yard, according to its location, suitability, and prevailing market conditions. The latter appear to have been influenced more by short-term cyclic fluctuations than by long-term price changes, for it was still possible to purchase land for less than 3s. a yard in the 1870's. For example, land for Ellerby Lane Mill was bought in 1873 for only 2s. 4d per yard¹, whilst six years earlier John Boyle had bought 7,855 sq. yds. in Upper Accommodation Road for £900 for the extension of his brickworks².

¹L.C.D. no. 1450.

²L.C.D. no. 8674.

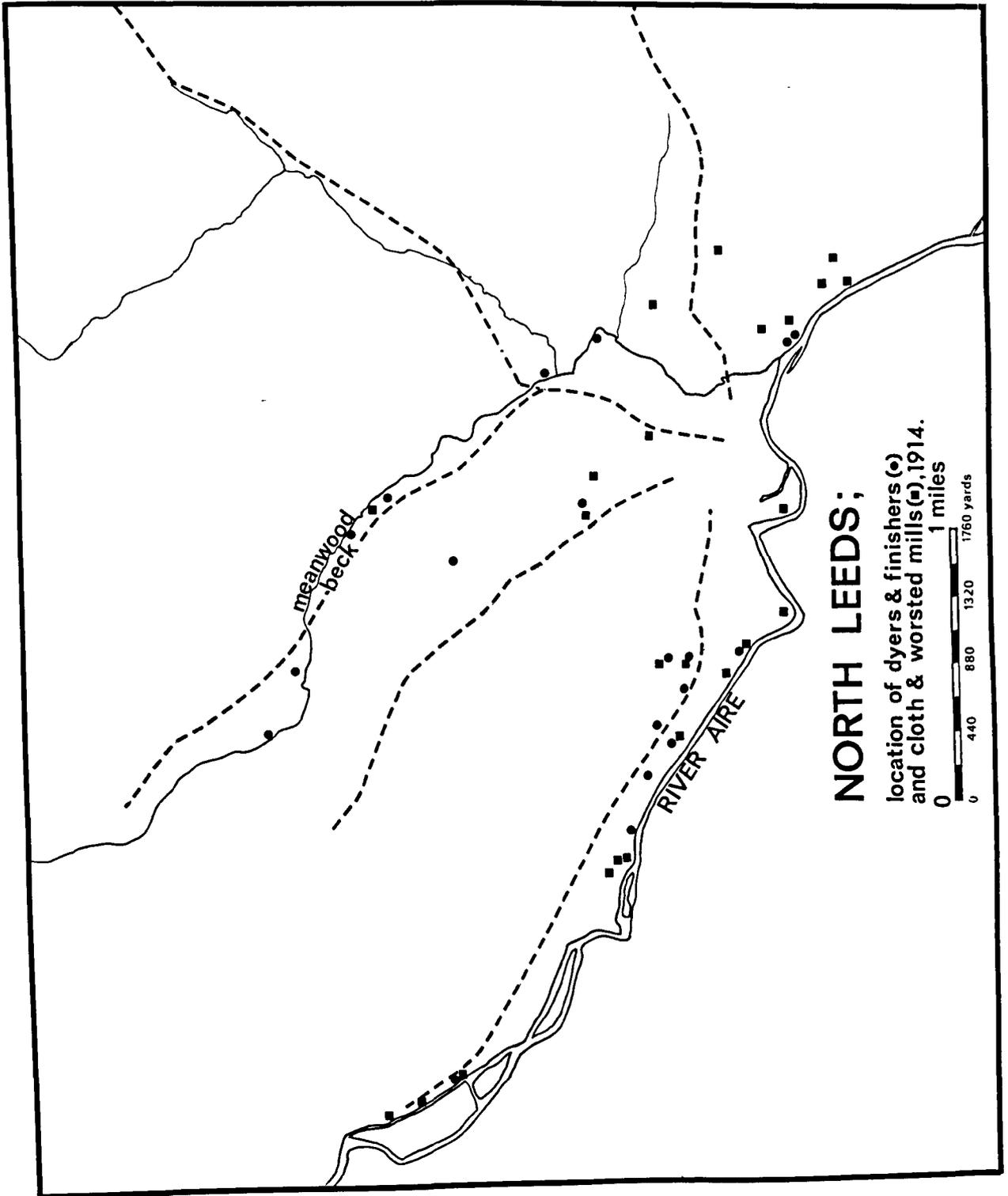
Beyond postulating that the land-cost surface focused upon the city centre in general, and upon additional nodes in suburban areas, it is not however possible to reconstruct the pattern in any more detail because evidence is lacking. The cost of most land used for industrial purposes will probably remain unknown.

The remaining variable which determined the price paid for a plot of land was its size, which was decided by a combination of immediate requirements and the extent to which a firm could afford to make provision for the future. The larger the area required, the more there was to be gained by buying at a cheaper rate, and a large concern was likely to make more of ^asaving by locating in an area of lower land costs than was a small firm. Moreover, it is likely that it would be in a better position to absorb the higher costs thus incurred elsewhere, through the application of scale economies. For example, Richard Paley bought land at Hillhouse Bank in 1789 which was then some distance from the centre of Leeds for as little as 9d per sq. yd.¹, whilst land in the region of Bean Ing cost almost exactly the same when Gott's mills were erected². Against which the land for Marsh Lane Mill, somewhat closer to the centre, was valued at 7s. per yard in 1799³. A location at Bean Ing or Bank Top meant a substantial saving in land costs, but only a marginal increase in transport costs and in the difficulty of obtaining labour. More important were difficulties which ensued from the firm being separated from its daily contracts, a problem which required Gott, and many other manufacturers, to maintain an office in a more central position at 20 Guildford Street. Richard Paley moved

¹L.C.A. D.B. 233 uncatalogued.

²L.C.A. D.B. 116. Counsel's brief, R v Gott.

³L.C.A. D.B. 233 uncatalogued.



NORTH LEEDS;
location of dyers & finishers (●)
and cloth & worsted mills (■), 1914.
0 440 880 1320 1760 yards
1 miles

his soapworks out to Gibraltar, Knowsthorpe in 1803, but maintained a counting house at the old premises at Kirk Ings in the centre of the town¹. Larger firms were in a better position to withstand this cost.

Smaller firms were forced to seek a location near the town centre, within the main industrial districts, whilst larger, more self-sufficient companies were able to tolerate a relatively isolated location. (See also Chapter VIII). At mid-century, for example, the larger factories tended to be located away from the town centre, or rather there was an absence of small firms in such areas. Perseverance Foundry, Burley New Mill, and Burley Mill were all set at some distance from the built-up area, and all were large works, but there were no small factories or workshops in this area. (Maps 5 & 6). In particular there were a number of large, integrated textile mills in the outer areas, at Burley, Woodhouse, and Kirkstall, where land costs would have been appreciably lower.

Land costs were not crucial for many industries however, at least before 1890, Only firms which made very extensive use of ground area were forced to seek a peripheral location, and many of these opted for a site in South Leeds where the topography was more favourable.

In an attempt to assess the intensity with which factories in different trades utilised land, a calculation has been made of number of workers per unit area for a variety of industries, utilising site descriptions for the measurement of area, and census enumerators' returns and other sources for the level of employment. Data was collected for upwards of sixty factories and the number of square feet per employee calculated. Finally industries were arranged into four groups as shown overleaf.

¹W.R.R.D. E.U. 494, 659 (1803).

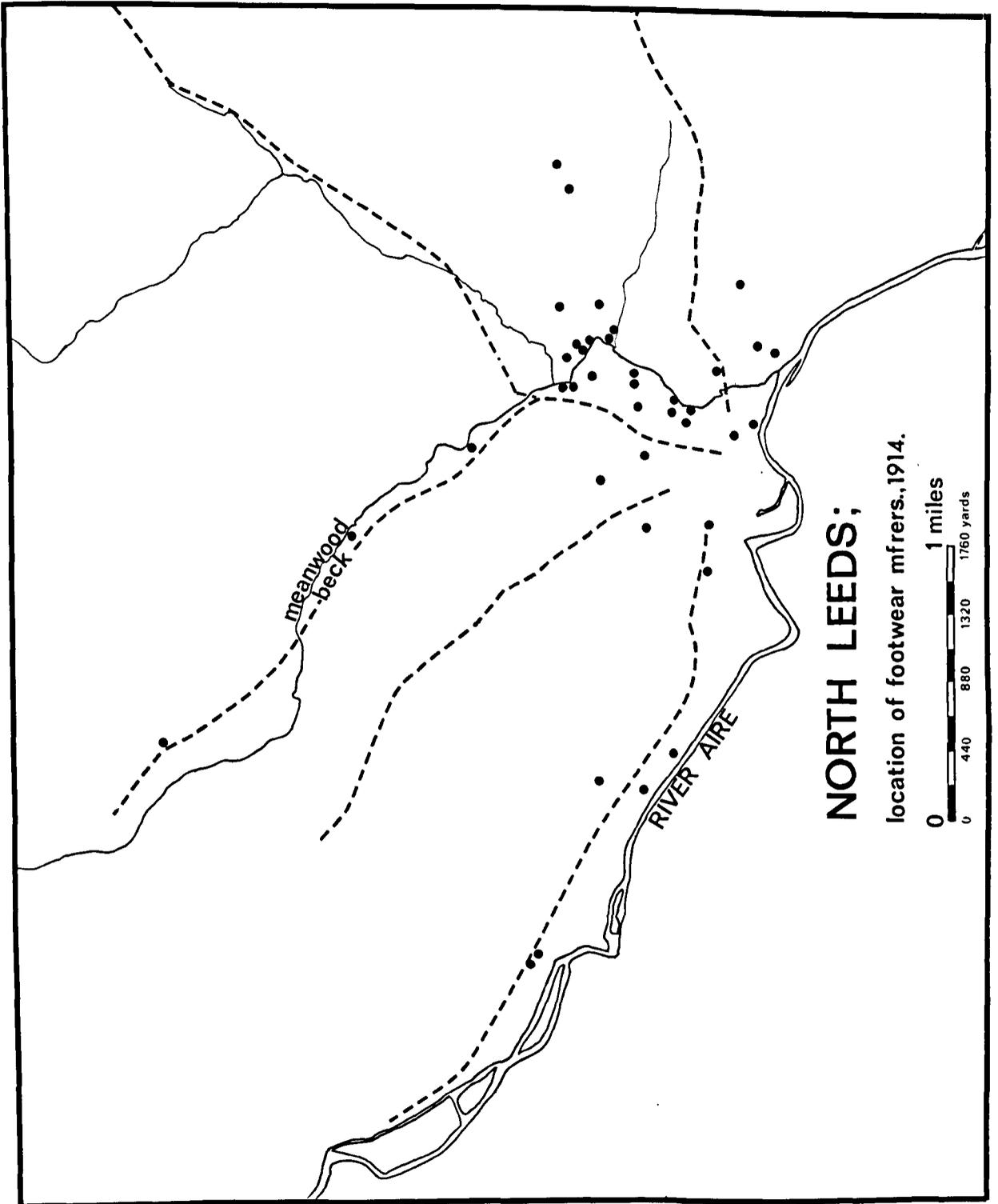
TABLE 6.i - INTENSITY OF SITE USE IN THE PRINCIPAL INDUSTRIES OF NORTH
LEEDS IN THE 19TH CENTURY

		<u>Approx. sq. ft. per Worker</u>
(a)	VERY INTENSIVE: clothing, footwear.	5-50
(b)	QUITE INTENSIVE: cloth mills (pre-1860), flax mills, finishing mills, worsted mills.	50-300
(c)	LESS INTENSIVE: engineering, founding, leather, chemicals, cloth mills (post-1860).	200-600
(d)	EXTENSIVE: brickworks, dyehouses, corn mills, tobacco factories.	600+

Some degree of overlap in the middle categories is tolerated because wide disparities exist in the figures obtained for cloth mills and engineering works. This is in part attributable to differences in organisation and the nature of an individual firm's production, but also to the fact that the site owned by a company was not necessarily fully developed.

Other things being equal, therefore, one would expect to find that the four categories of industry, as defined above, would be located in different areas of Leeds, according to the pattern of land costs. Maps 11, 12, 15 and 20 indicate that there is some validity in the notion of a bid-rent surface peaking at the centre of Leeds and falling away in every direction, though less steeply along the main industrial sectors. It is not possible, however, to extend this argument any further, because other things certainly were not equal. Water supply, for example, a vital factor in a number of industries, was not obtainable with equal ease throughout the town.

Although land costs were of crucial importance to only a few trades, it does seem that space was utilised more intensively near to the centre of



NORTH LEEDS;
location of footwear mfrs., 1914.

0 1 miles
0 440 880 1320 1760 yards

Leeds. Instead, therefore, of distinguishing between different industries, it would perhaps be more meaningful if differences between individual firms were emphasised. For example the cloth-manufacturing mill passed through three stages. In the earliest one, pre-1830, cloths were still dried and tentered out-of-doors, for which extensive space was required. Tenter fields were found adjoining many of the earliest mills - Bagby Mills and Airedale Mills for example. When dryhouses were added on to mills, and production therefore became concentrated indoors, space could be used more intensively, particularly since weaving was undertaken in rooms within the main mill building. The adoption of heavy power-looms obliged cloth manufacturers to construct single-storey weaving sheds which required a large area of ground space, promoting a third phase in the development of the industry. Consequently, the comparison may be drawn between:

<u>Mill</u>	<u>Site area</u>	<u>No.of employees</u>	<u>Sq. ft./employee</u>
Perseverance (1826)	112,230 sq. ft.	200 (1835)	560
Prospect (1837)	43,560 " "	342 (1850)	128
Ridge (1884)	87,120 " "	180 (1888)	484

Although neither Perseverance Mill nor Ridge Mill were at their full state of development at the dates cited, the figures do indicate that there was a difference between the different types of mill. Likewise there was a strong difference between early clothing factories and those built out in the suburbs after 1898. James Rhodes and Company's factory in Oxford Row (c.1880) had a site area of only 8,330 sq. ft., but was of six storeys and housed 600 workers in 1884¹. Against which Messrs. Arthur and Company's new factory in Belle Vue Road (1903) had a similar number of employees but was of one storey extending over 45,000 sq. ft. Messrs. Hepworth's transferred

¹Mercantile Age, 1.10.1884.

their 2,000 workers from a ground site of only 5,700 sq. ft. in Aire Street to a new factory in Claypit Lane which was erected on 46,000 sq. ft. of land.

Land costs were much lower in the suburbs, but the savings gained from a location in the outer area were not great enough to persuade most firms to forsake the inner city, where transportation, marketing, and communications costs were much lower. Only industries which required a very large area of ground space were precluded from the central areas, where in any case, they were unlikely to find a large plot of land available. Of these the brickworks (Map 15) with its extensive demand for clay pits, forms the best example.

After the mid-1890's, however, the situation began to change somewhat and land costs became a more important factor. Improvements in transport and communications, combined with the dispersal of the labour force, reduced the advantage of central locations. At the same time the development of single-storey factories was encouraged by new methods of factory layout and organisation and the growing importance of motor transport. The increase in automation which resulted from the adoption of more and more machinery promoted flowline techniques in production, a development attuned to horizontal, rather than vertical, layout. Single-storey factories for the manufacture of clothing, footwear, paper, printed material, and foodstuffs were built in North Leeds after 1897¹. For these land costs were more critical, and as a result many of them were erected in suburban areas, particularly in East Leeds and the Cardigan Fields area where land was flat and available in large units (Map 1).

The site having been purchased or rented, the entrepreneur next faced the cost of erecting his factory or of making any alterations on secondhand property that were needed, and of obtaining the machinery with which to

¹L.C.H. Leeds City Engineer. List of Factories Erected in Leeds 1889-1909.

equip it. Expensive though this was (see Chapter IV) they can have shown little spatial variation. The building work was undertaken by contractors, whose problem it was to raise the labour force and assemble raw materials, neither of which can have been very difficult anywhere in Leeds, which had a workforce of 4,179 building workers in 1851.

Most factory buildings were functional in design, the majority brick built with a slate roof, although stone-built mills were the more normal in the out-townships and at Woodhouse, where stone quarries were found. However, the existence of a few factories of more exotic design - amongst them Marshall's mill, Hope Foundry, and Barran's clothing factory in St. Paul's Street - indicates that building costs were not crucial, and unlikely to have had much influence over the choice of location. Although building costs were probably ~~in~~ higher in areas far removed from either brick-kiln or quarry, and although steep slopes necessitated the addition of an extra horse before the cart¹, variations within North Leeds were at most marginal.

One manufacturer, George Walker of Grove Mills, landscaped the area around his reservoirs with lawns and flower-beds², but this cannot be taken as an indication that capital cost associated with procuring water was not important.

'Leeds will be a Town of Trade and Commerce as long as the river and coals last', it was stated in 1783³. These were also the twin foundations of its prosperity in the 19th century, and water, though not expensive in itself, was required in such quantities that large sums of money were expended on fixtures for its provision.

¹See J. Hepper, 'Leeds', Trans. of the Surveyors' Institution, xxxii (1899-1900), 407-23.

²Leeds Express, 1.9.1883.

³L.I., 15.3.1783. Advertisement for the sale of the Horse and Jockey Yard.

Water was a highly localised factor prior to the full development of the municipal supply, and as such capable of wielding strong influence over manufacturing location. Although its use in large quantities is easily associated with the textile trades, firms in other trades - leather, ironfounding, chemicals, and brewing for instance - were heavy consumers also. It was utilised basically in three ways. Firstly, in an age heavily dependent upon steam power it was used to raise steam in boilers, and thus to convert mineral energy into motive power. Secondly, it was used for washing and cooling purposes, particularly in the dyeing and textile trades, but also in tanneries, foundries, and brickworks. Finally, in some manufacturing processes it constituted an important raw material; most obviously in brewing and the manufacture of other types of drinks, less so in food manufacture and the chemicals and dyestuffs trade. In very few industries was it not of importance - clothing and footwear for example - and only then so long as power was obtained from some source other than a steam engine.

In the cloth mill water was required for washing and scouring the raw wool, scouring and dyeing (if piece-dyed) the woven cloth, and then for fulling and scouring it before it went to the finisher¹. A similar quantity was utilised in a worsted mill, except that there was no fulling of the cloth². In both cases, however, water was again necessary during finishing, for roller-boiling, a process designed to impart lustre upon the cloth.

In flax-spinning moisture minimised the dust raised during the process of heckling, and water was also vital for washing purposes, wet-spinning (whereby the roving was passed through hot water, thus separating the fibres to give a finer yarn), and in bleaching, which was performed with diluted

¹H. Heaton, The Yorkshire Woollen and Worsted Industries (1965).
B. Bischoff, History of the Woollen and Worsted Manufacture (1842).

²J. James, History of the Worsted Manufacture (1857).

sulphuric acid in the 18th century, and later with chlorine¹.

Dyeing, be it of wool, cloth, silk, or linen, utilised water in composing the dyes and in washing the materials thoroughly afterwards. The principal operation involved either boiling these in large vats of dye, or steam dyeing, a process evolved by Benjamin Gott².

Washing was an important and regular process in the manufacture of leather also. Skins were given an initial soaking to dislodge dirt, after which the lime was extracted in bait-pits, followed by a further wash before the actual process of tanning could begin. The tanned 'kips' were subsequently washed, then dried by steam heating³. The washing was usually performed in 'inverts' formed by ponding back a watercourse with a temporary board, which was slid into place in grooves cut out of the bedrock or concrete⁴. Unfortunately, interference with the water level behind this dam sometimes meant that skins and hides floated downstream and were lost. Thus alternative methods had to be found.⁵

The consumption of water in the town's brewhouses, black beer breweries⁶, and mineral water works was related to a firm's scale of production. Small concerns were unlikely to be troubled in obtaining an adequate supply, but larger companies, which characterised the brewing

¹A. J. Warden, The Linen Trade, Ancient and Modern (1864), V. and Employment of Children in Factories P.P.(1833), XX, 165.

²H. Heaton, 'Benjamin Gott and the Industrial Revolution in Yorkshire', Ec.H.R. iii (1931), 45-66.

³Leeds Express 2.6.1883 and 3.3.1883.

⁴L.C.H. Leeds Improvement Commission, Becks Sub-Committee, Minutes 18.4.1871.

⁵L.C.A. Oates Collection 9A2, Survey Report of the Estate of Edward Oates by Jonathan Teal (1798).

⁶'Black beer' or spruce beer, is non-alcoholic and was drunk for medicinal purposes.

industry after 1880, regarded this factor as being more critical¹. Prior to this date the industry was centred in small brewhouses scattered throughout Leeds, the water for which could be obtained from a shallow well, though the existence of a spring was a strong encouragement since it saved the expense of sinking wells, and provided a more pure supply. There were two maltkilns, for example, near to an 'excellent supply of spring water' in Woodhouse Lane in 1844².

Even in industries which made use of water neither as a raw material nor for washing and cooling purposes, it was still an important factor because of its role in providing power. Steam engines varied in terms of their consumption of water, but the figure of 60 gallons a minute for a 20 h.p. engine in 1813 was probably typical after the use of a separate condenser became common practice³.

Accurate figures for water consumption by different industries and individual firms are impossible to obtain except in isolated cases, but for comparison a modern woollen mill of 215 looms, producing medium-quality cloths, requires an input of a million gallons a week⁴. Gott's mill at Bean Ing consumed approximately 1-1.5 million gallons per week in 1832, when it was stated that the two wells then in use were capable of supplying between 324 and 448 gallons per minute, although at the latter figure it was said that 'they work uneasily'⁵.

¹E. M. Sigsworth, 'Brewing', L.J. 27 (1956), 79-81.

²L.M., 6.1.1844.

³G. F. Tyas, 'Matthew Murray', Trans. Newcomen Soc. vi (1925-6), 111-43.

⁴R. H. I. Rhodes, 'Factory Location and Layout in the Woollen Textile Industry' Yorks Bull. vi (1954), 179

⁵Gott Papers, 212. Wells and Boreholes 1812-30. Signed J.D., 14th November 1832.

Rimmer estimated that in tanning 250 gallons of water were required for each hide¹, a figure which accords well with the level of consumption at Sheepscar Leather Works in 1868. Here a daily supply of 150,000 gallons was necessary to maintain a throughput of between 3,000 and 4,000 skins per week².

Other heavy consumers were ironworks where water was used for washing ore and for cooling purposes. There were only two ironworks in North Leeds, Perseverance Foundry and Garside's in York Road³. At each of these a consumption of 200,000 gallons per day may be estimated.

Smaller mills, tanneries, large foundries, breweries, dyeworks and the like probably required up to a half a million gallons per week, with even a small foundry consuming at least 50,000 gallons. Much of this consumption was for the boiler of a steam engine which was a feature of virtually all factories by the second half of the 19th century, and for which, therefore, a minimum requirement of 50,000 gallons per week may be assumed.

There are yet further factors to be considered with regard to the extent and nature of industrial demand for water - its quality, and in particular its hardness. In the absence of systematic records on the subject, it is possible only to utilise contemporary observation combined with recent data from the Yorkshire River Board⁴.

The predominant geological stratum of the Leeds area consists of the alternating shales, sandstones, and coal seams of the Lower Coal Measures. The water obtained from these is generally hard, and frequently

¹W. G. Rimmer, 'Leeds Leather Industry in the Nineteenth Century', Thoresby Soc. xlvii (1960), 119-164.

²L.C.H. Becks, sub-committee, Minutes, 26.6.1871.

³Messrs. Whithams of Perseverance Foundry were puddlers only.

⁴Private communication.

ferruginous. Softer water, particularly important in the woollen industry, could be obtained from surface watercourses; although the Aire itself originates in a limestone area, most of its tributaries (including Meanwood Beck) rise and flow over gritstone country to the north and north-west of Leeds, and its water is therefore relatively soft.

Local geological conditions are too complex to permit any generalisation about the hardness of the water. Millgarth Mills were said in 1829 to possess an abundant supply of soft and beck water¹, whilst at Grove Mill, a mile further upstream, one reservoir contained lime-free beck water, the other hard but much cleaner water from the nearby hillside². Carr Mills at Woodhouse had access to three types of water in 1867³.

Water with a high lime content is unsuitable for washing and cleaning and for use in boilers, but suitable for ^{some} brewing and cooling purposes. — But the natural qualities of the Aire and the Meanwood Beck are of no great importance, because by the middle of the 19th century they were so polluted throughout most of their length that their water had become as hard as any from coal measure sources.

Purity of the water was more important than its mineral content, and was of greatest significance to the dyeing trade. Dirty, polluted water resulted in the cloth being dyed imperfectly, and made washing difficult. The same was true in the leather trade. The surface watercourses remained fairly pure until the beginning of the 19th century. In 1743 even the water in Sheepscar Beck, at the foot of Marsh Lane, was pure enough for one dyer to be able to claim that he could 'white goods sent to

¹L.I. 23.4.1829

²Leeds Express 1.9.1883.

³L.M. 17.8.1867.

him as well as they can be done in Coventry'¹, then still the foremost centre of the art. An indication that it was becoming a problem by 1793, however, is given in an advertisement for a dyehouse in Mill Hill, on a goit from the Aire. The purchaser, it was claimed, 'being first upon that stream (would) have a great Advantage in the Water, which is always clear'².

Contamination increased as time passed. By 1838 Gipton Beck (see Map 1) was said to be the only unpolluted surface stream left in Leeds³, and by 1875 conditions in the Sheepscar Beck prompted the following ironic letter to the Leeds Mercury:

My works are adjacent to the Sheepscar Beck, which beck is in a most filthy condition A few years ago the bed of the beck was paved, and the water dished out, which necessitated every user of its water to have what is called a well The carrying power of the Beck was much improved by this arrangement - more dirt and rubbish came down it than ever before.⁴

Refuse swelled the beck and sometimes choked the wells of industrial premises along its bank, but a more serious problem in this area by the second half of the 19th century was the shortage of water from this source. The flow of water through Sheepscar leather works in 1871 was too sluggish to permit Wilson, Walker and Company to wash their skins properly, and the supply of water in the Mabgate section was reckoned to be 'insufficient, even for mill purposes'⁵. This must have deterred industrial development along the valley, except out at Woodhouse and Buslingthorpe where a new

¹A. Mattison, Vanishing Leeds. Yorkshire Evening Post, 1904-15, Leeds City Reference Library cuttings.

²L.I., 15.7.1793.

³L.M., 29.10.1838.

⁴L.M., 11.12.1875. Letter from J. Stead.

⁵L.C.H. Becks Sub-Committee Minutes, 18.4.1871 and 27.11.1871.

factory could abstract its requirements before other users had a chance.

Water shortage was not a problem along the banks of the Aire. The mean daily discharge of this river in the years since 1960 has been 15 cumecs (approximately 180 million gallons per day), sufficient for 800 mills the size of Gott's, and the flow of water would have been greater in the 19th century. But it too became polluted for some purposes and it proved necessary sometimes for firms to turn to alternative sources.

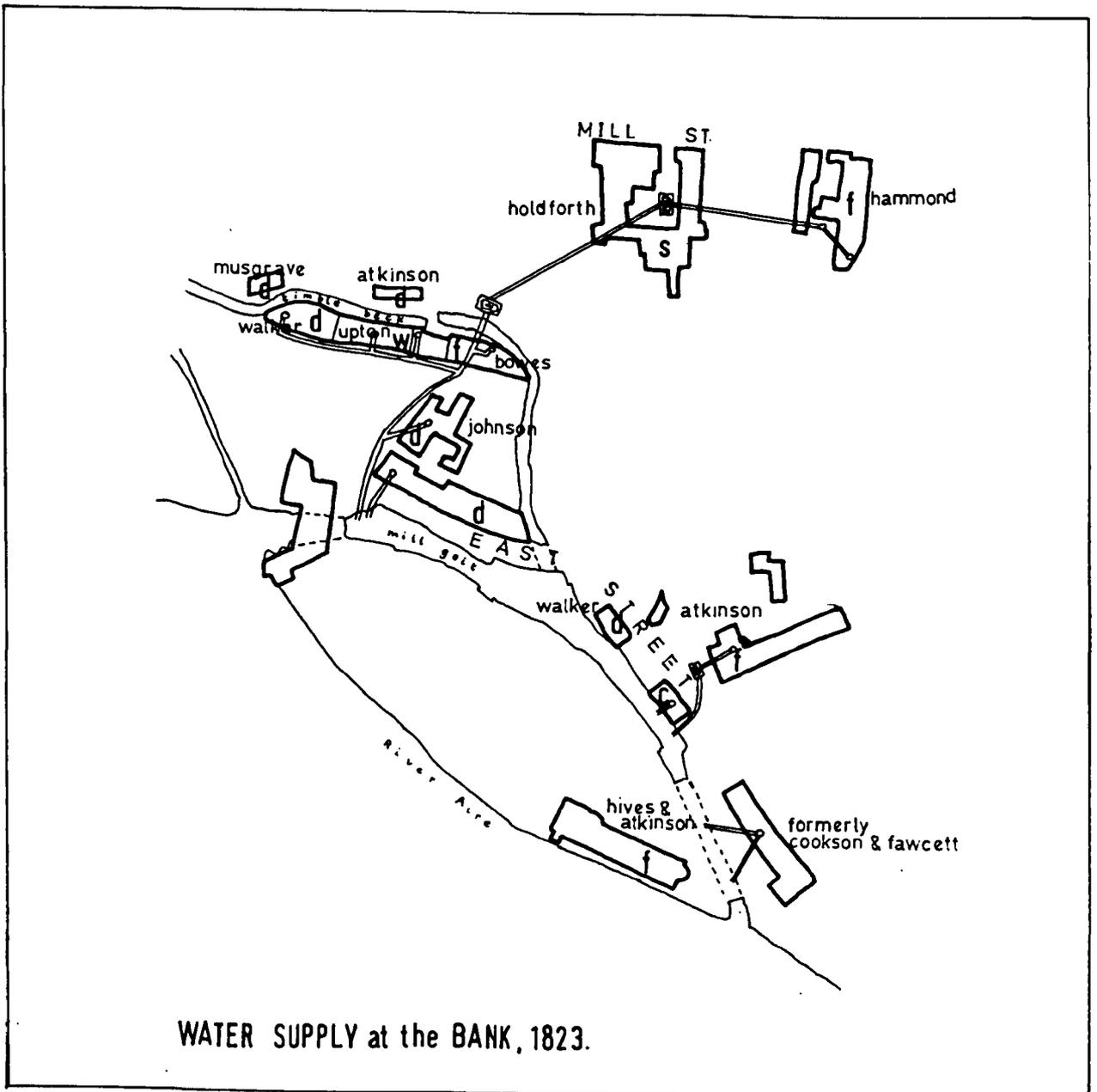
Four basic sources of water were available to industry in Leeds, each of a different quality and plenitude, and each varying in the ease with which they could be obtained.

Surface watercourses were the most obvious and the least costly source. Aside from the Aire itself there were a number of left-bank tributaries in North Leeds, most significant of which was the Meanwood Beck which joined the river at Crown Point. It too had its tributaries, the Gipton Beck and Stoney Rock Beck being the only ones worthy of note however (See Map 1). Elsewhere in North Leeds there were many small streams, but of such insignificance as to be diverted into the general drainage system of the town as soon as the area was built over. The Improvement Commissioners made note of these 'small runners' which had, however, disappeared by the time of the 1893 twenty-five inch maps of the town¹. The Giles map of 1815 shows that one such runner crossed the Droney Laith Estate at Bean Ing and another formed the boundary of the in-township with Burley.

For the purposes of water supply only the River Aire and Meanwood Beck are of real significance. Gipton Beck lay for the greater part of the period outside the town's built-up area although it attracted a dye-works built about the middle of the century². Stoney Rock Beck was an

¹Leeds Improvement Act, P.P.(1847-8) cii, 1161, and Ordnance Survey 25" to 1 mile map of Leeds (1893).

²Roundhay Vale dyeworks.



c: corn mill
 d: dyehouse
 f: flax mill
 s: silk mill
 w: woollen mill

even smaller stream, but it supplied water to a malthouse (later a brewery) and possibly to a chemical works, both in Nippet Lane¹.

Most commonly water was led off to mills and factories via underground culverts, and drawn up into the boilerhouse or some other part of the works from a well. These enabled water to be carried for some distance from the stream or river, and ensured a steady supply to factories so long as the entrances were placed beneath lowest water level.

The existence of many such culverts is revealed by the minutes of the Sub-Becks Improvement Committee, usually when complaints were made about a blockage of some kind. From this source it is possible to see that surface watercourses supplied more factories than might at first be supposed. For example, Henry Thorne's chicory and cocoa works in Lady Lane were fed by a culvert almost 200 yards in length².

The Aire and Calder Company owned the water rights to the lower part of the course of the Meanwood Beck, bought so as to maintain control over the level of water in their dock basin at Crown Point. The rights had been purchased in 1841 as part of the Nether Mills Estate. The deeds of this property, now in the possession of British Waterways, reveal that a number of factories in the Bank area paid for the privilege of drawing their water from this part of the beck, water being taken by culvert as far as Bank Low and Bank Top mills³. (See Map 13). Other factories, located at a similar distance (200 yards) from other parts of the beck, or from the Aire, may well have been supplied in a similar manner.

¹See gazetteer - Burmantofts Brickworks.

²L.C.H. Sub-Becks Committee, Minutes, 16.11.1870.

³British Waterways Deeds, no. 107.

There were a number of works which were too far from, and too high above, a surface watercourse to receive their supply of water in this way. It had then to be obtained from underground sources, either issuing naturally from springs, or drawn up through wells and boreholes. In Leeds where strata of impermeable shales and permeable sandstones alternate with each other, criss-crossed by innumerable fissures and faults, it is not surprising that springs issued at many points. Boring for water was, in these circumstances, a somewhat haphazard venture, though knowledge gained during the long antecedent period of mining probably provided useful information.

There were springs at Little Woodhouse, St. Peter's Hill, and Carlton Hill, for example. About the latter it was said in 1808 that 'water has never yet been wanted, even in the greatest drought'¹. The purity of the water from such springs made it ideal for purposes such as dyeing, as at Spring Gardens, or brewing, as at Kirkstall brewery.

Though springs were numerous in the Borough, their ability to meet industrial demand was limited, so that increasing land use had to be made of artificial wells and boreholes. Geological conditions in the neighbourhood were favourable, even if they did promote 'hit-and-miss' methods. William Brown fully understood the favoured situation of Leeds, low-lying and surrounded by high hills. He noted that boreholes had been sunk to depths of up to 300 ft., this in 1821, though because of its sulphurous quality it was best suited to use in boilers. Surface water was not then good enough even for this task. Though 'widely available', it was 'almost too spoilt by dyestuffs and chemical mixtures to be of any use'².

¹L.I. 4.4.1808.

²W. Brown, Information Regarding Flax Spinning in Leeds, (1821).

Even firms which already had access to surface water were obliged to supplement their supply by means of a borehole. Messrs. Whitehead and Botterill, dyers, of Kirkstall Road, had a 240 foot bore sunk in 1841¹, and Dean Ing Mills drew water from a 62 foot bore as well as from the river², whilst a dyeworks in Templar Street relied upon 'wells and boreholes of great depth' to 'furnish an almost inexhaustible supply of water'³.

Finally, it was possible towards the end of the period to obtain water from the piped, municipal supply. Leeds was an early pioneer of public waterworks, Pitfall Mills being leased for this purpose by George Sorocold in 1693, the water being raised from the river and pumped to a reservoir at the top of Briggate. A further reservoir was later constructed in Albion Street, and a powerful steam engine erected for pumping purposes, but mills and factories were not connected except for water for drinking purposes.

Sorocold's waterworks was taken over by the Leeds Waterworks Company in 1790, which became a joint-stock undertaking in 1837. Finally, the Corporation took over in 1852, but even then water was not supplied for manufacturing purposes until 1872, and even by the end of the century it catered for only a small part of industry's needs⁴.

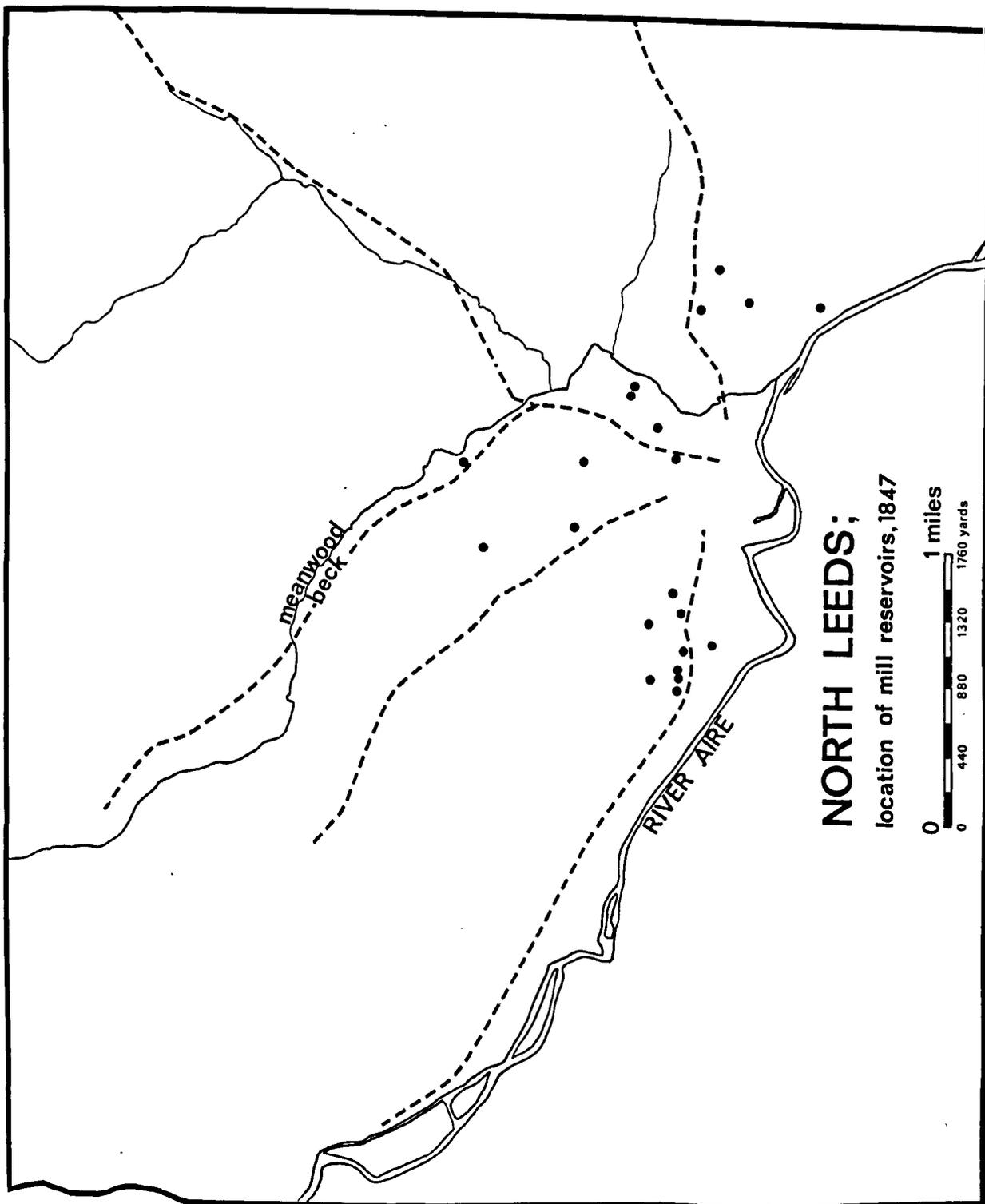
In the main water for manufacturing purposes was obtained from two principal sources, ~~then~~ surface watercourses and boreholes. Both of these were more readily available, the water was cheaper than that from municipal sources, and the supply was reliable.

¹Leeds City Reference Library, MSS. H.125, Account Books 1830-2 and 1841-57 of James Haigh, Well-sinker.

²Gott Papers no. 212, Wells and Boreholes etc.

³L.M., 6.3.1852.

⁴Information from R. Peppard.



NORTH LEEDS;

location of mill reservoirs, 1847



Once fixtures for procuring water had been established, costs were low consisting of maintenance costs and sometimes an annual fee for water rights. In addition, where necessary, there was the cost of power for a pumping engine.

Mention has already been made of the capital outlay required to set up a factory, involving the erection of fixtures for the supply of water (see Chapter IV), about which it is now necessary to be more specific, within the limits imposed by the availability of evidence.

Wells, boreholes, and culverts had to be sunk and erected by specialists, at a cost varying with depth, bore and complexity. A well was sunk at Millgarth Mills in 1842 at a cost of £9 8s.¹, whilst the cost of a culvert to Messrs. Grimshaw's mill in 1871 was £78 18s.² Boreholes, not unexpectedly were more expensive. Gott had two sunk in 1813 and 1814, each at a cost of over £140, and the total cost of five boreholes sunk between 1812 and 1830 was £1,038 12s. 4d³.

From which figures it may be estimated that payments of £10-20 for a well, £50-250 for a culvert, and £100-300 for a borehole were normal. But to these must be added pumping costs, and the expense of storage facilities - tanks and reservoirs - which not only cost money to construct but also took up valuable space.

Reservoirs were not very common in Leeds. Though necessary in upland areas of Yorkshire to regulate the flow of smaller streams, they were confined to the interfluvial areas of North Leeds in the main, and then solely to textile mills. The 1847 O.S. maps of the area portray only twenty such reservoirs of which only one, that at Oatlands Mill, was in

¹L.C.D. no. 2096.

²L.C.H. Sub-Beck Committee Minutes, 25.5.1871.

³Gott Papers, Offor No. 212.

close proximity to a watercourse, and all but two were at cloth mills (Map 14). This indicates firstly that textile concerns relied heavily upon a good supply of water in their business, and secondly that a 'shortage' of supply occurred ~~only~~ in interfluvial areas.

In most cases reservoirs were linked up to a borehole, as at Elmwood Mills for example. The water from its boreholes fed two reservoirs which, besides feeding the mills, supplied the neighbourhood with water at a fixed quarterly rent¹. Clearly boreholes were capable of providing a more than adequate supply of water.

The cost of excavating a reservoir was not high, perhaps £2-300, but the land which it occupied was valuable. Consequently, as time progressed and pressure upon land increased, reservoirs had to be filled in and the land used for other purposes. Park Lane Mills had three large reservoirs in 1847 but these disappeared by 1890², and others to be filled in were those at St. Peter's Old Mill and New Park Street Mill.

The higher cost of setting up boreholes and reservoirs in areas away from a watercourse increased the locational disadvantage of interfluvial sites, but the increase in cost cannot have been prohibitive, and was, in certain instances, offset by compensatory advantages of a different kind.

Fixtures for obtaining a supply having once been established, payment for water rights and maintenance costs were all that remained. The former, if it existed at all, was in the form of an annual fee for water rights, unrelated to quantity consumed, metering only being introduced by the Municipal Waterworks for large companies in the 1870's. Smaller firms were charged at a fixed rate³.

¹L.M., 9.11.1839.

²O.S. 25" plans of Leeds, 1850 and 1893.

³Information from R. Peppard.

Water rights in North Leeds were of medieval origin, being attached to the old mills of the borough. At Kirkstall, for example, the corn mill had priority over the Abbey cloth mills in times of shortage¹. The water rights for the Aire upstream of Leeds Weir, as far as the in-township boundary, belonged to the owner of King's Mills, whilst rights for the lower portion of Sheepscar Beck belonged to the owner of Nether Mills².

The payments for such rights were almost token in value. When the Nether Mills were bought by Christopher Bolland in 1825, lot 20 included

the Water Rent of £30 per annum, paid by Messrs. Upton, Lobley, Walton and Holdforth, for a licence to take water from the Nether Mills Goit, exclusively to their respective premises.³

This agreement was renewed in 1835 at £75 per annum, which for two large mills, two smaller mills, and a dyehouse, was not overly expensive⁴.

Other factories held the water rights to a particular section of a watercourse and no annual premium was necessary, the rights being conveyed along with the rest of the property when it changed hands. For example, when D. Dixon Marshall purchased Cardigan Mills from James and William Chadwick in 1888, specifically mentioned in the deed of conveyance were:

the right, so far as the same can be granted by the conveying parties or either of them, to drain into the said River Aire and to obtain water for all purposes.⁵

The right to lay pipes and put down tanks was specifically included in the original purchase of the land from the trustees of the Earl of Cardigan⁶.

¹Employment of Children in Factories, Reports PP(1833) xx, 94, evidence of J. Sunderland.

²British Waterways Deeds, no. 107.

³British Waterways Deeds, no. 107.

⁴Ibid.

⁵W.R.R.D. 7, 175, 97 (1888).

⁶W.R.R.D. 687, 191, 212 (1872).

The particulars of a paper-staining factory in York Street, which were released from a mortgage in 1856, incorporated

the use and benefit of the water at the back running at the South West corners of the said two thirds parts of the said Closes, called Sheepscar Beck.¹

Additionally, other property deeds mention the right to draw water from a borehole, as at Aked and Ellis's finishing works in Park Lane², or from a well, as at Watson's dyeworks in Templar Street³.

When property was purchased secondhand, therefore, the conveyance inevitably included water rights of some kind, the value of which was incorporated in the sale price of the estate. It is not, therefore, possible to value in monetary terms a supply of water, except in one instance previously mentioned - that of the finishing shops at Little Woodhouse which were valued at £3,600 in 1803, of which £1,000 was in payment for a spring of water⁴.

Those few firms who opted to draw all or a part of their water supply from the Municipal Waterworks had naturally to pay a charge for it. In 1845 only drinking water was supplied⁵, and so far as is known, no factory was connected up with water for manufacturing purposes until the 1870's. Then, small traders were supplied at a standard fixed charge and only larger manufacturers had a meter fitted. There are few applications for water supply in the Waterworks minutes, however, although not all applications came before the Committee for consideration⁶. Amongst those which did only

¹W.R.R.D. TG 541, 631 (1856)

²L.C.D. no. 3888.

³L.C.D. no. 2346.

⁴L.I., 5.11.1803.

⁵L.C.H., Waterworks Company, Minutes, 6.10.1845.

⁶L.C.H., Municipal Waterworks Committee, Minutes 1852-

Fritch's leather works and the Viaduct tannery were substantial concerns, and it would appear that piped water played but a small part in the industrial development of Leeds before 1914.

Water costs should therefore preferably be viewed as a part of initial outlay, despite the fact that its consumption was continuous and that it was sometimes used as a raw material.

Its importance as a factor in industrial location depended upon two points: firstly that it was consumed in varying quantities according to the scale of a firm and the nature of its manufactures; secondly the fact that water was not obtained with uniform ease throughout the area.

Dyeing, textiles, brewing and ironfounding required the largest quantities, but the need to supply water to boilerhouses in firms employing a steam engine rendered the supply of water a factor of importance to all trades. Only those industries which developed towards the end of the 19th century, and which utilised gas turbine or electrical power, were at all independent from its influence. A comparison of maps 20 and 25, for instance is sufficient indication of the degree to which cloth mills orientated towards surface watercourses, a feature of which clothing factories were independent.

In general also, the larger the firm, the more critical became the factor of water. In the brewing industry, for example, whilst production was undertaken by small-scale houses there was no problem of supply, but once large breweries were set up, after 1830, its importance was greatly enhanced. Significantly, the only works besides cloth mills which possessed a reservoir in 1847 were two breweries.

Though Leeds may be described as having been abundantly supplied with water, the ease with which it might be obtained varied considerably from place to place. The Aire was the most abundant source, but less easy to

control than the Meanwood beck, but both provided water more easily than could underground sources, and in greater quantities than any spring. Most mills and factories built before the middle of the 19th century were located adjacent to a watercourse, and those that weren't either had little use for it, as for example, in some of the smaller machine-making shops, or were forced to use boreholes and conserve a supply in reservoirs.

The extent of industrial growth after 1840 reduced the availability of waterside sites within reach of the town centre, and their attraction was further reduced by pollution, and, in the case of Meanwood Beck, by a shortage in the supply. As a result even factories along Kirkstall Road found it necessary to sink boreholes, and industry spread more into interfluvial areas, as maps 7 and 9 indicate. At the same time the use of surface streams as open sewers for waste dyes, chemicals, and soap solution decreased, partly because pressure was brought to bear upon industry by the Improvement Commissioners, partly because the Town began to provide better sewage facilities.

Effluent disposal was a problem faced by all manufacturers and one which was only made easy if an open watercourse ran conveniently nearby. The culverts which led water from beck or river to factory well, therefore, were matched by an equal number of drains, returning polluted water and other wastes to the watercourses. In 1848 there were within the in-township boundaries no less than twenty-four drains on the north side of the Aire, one from each of the major factories along this bank. And many of them were for the express purpose of carrying dyewater from dyeworks and mills¹.

Water, therefore, was used to raise steam, to wash, to cool, to carry away wastes, and as a raw material. Only a handful of firms did not

¹Leeds Improvement Act, P.P.(1847-8) cii, 1161.

consume it in quite extensive quantities. It was, as a result, a factor of prime importance in the location of manufacturing industry, to most industries of 19th century Leeds the most important factor. Industry was markedly concentrated along the Aire and Meanwood Valleys even by 1914, and whilst these locations also provided good communications and suitable land more often than not, it was access to water which was the critical factor.

But the final testimony should come from the owners of manufacturing property themselves, few of whom neglected to mention the abundant water supply to their property when the time arrived for it to be put up for sale. The following are characteristic examples:

To let: 4,500 sq. yds. between Templar and Hope Streets, on Sheepscar Beck ... Wells and boreholes furnish an almost inexhaustible supply of water.¹

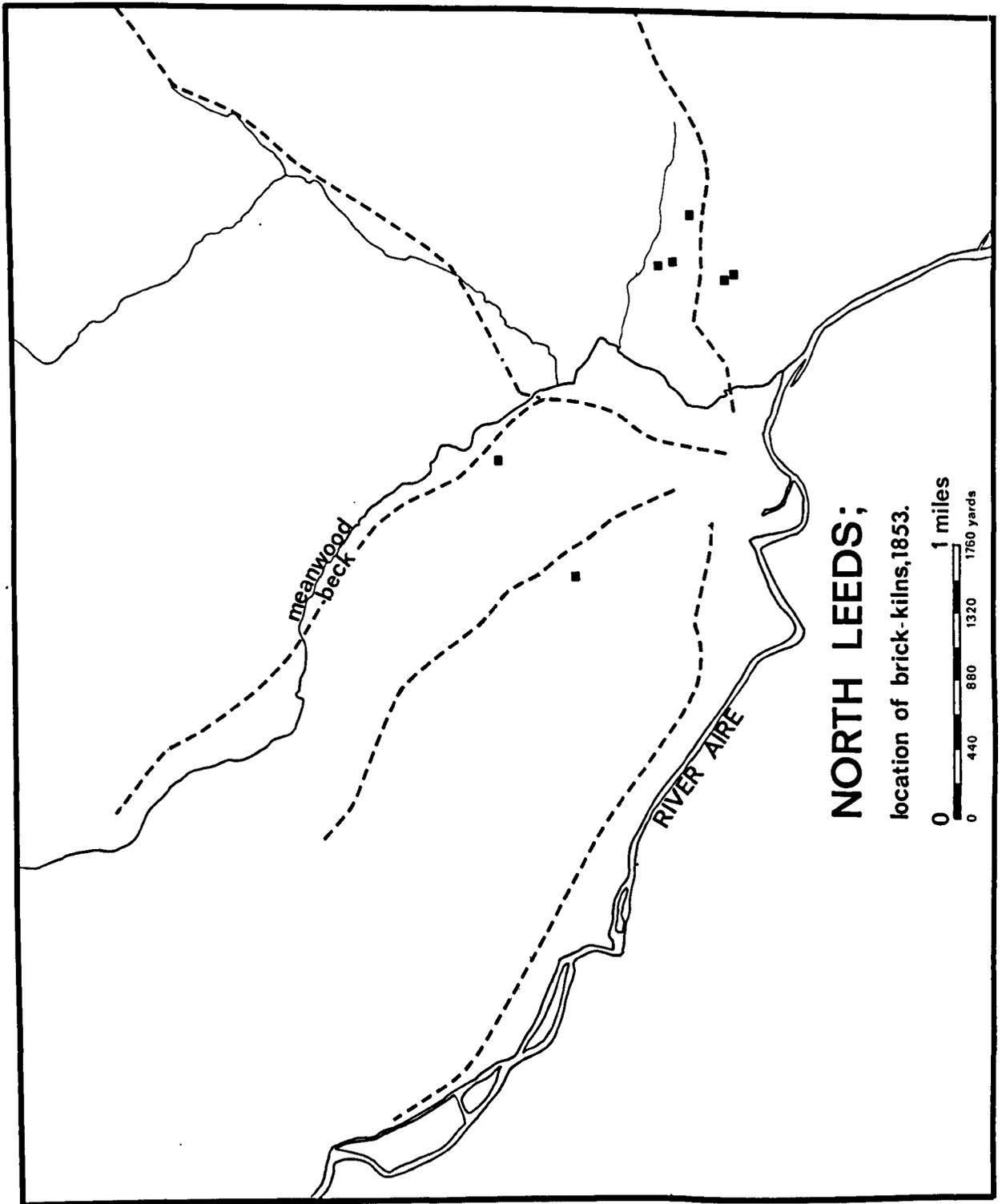
To let: a newly-erected dyehouse, warehouse, press-shop, cylinder house, stable, and tenter ground. At Hillhouse Bank ... exceedingly well supplied with water from the River Aire.²

For sale: Steander Flax Mill ... in the best situation in Leeds for hands, coal, and water.³

¹L.M., 6.3.1852.

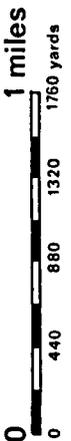
²L.I., 7.5.1798.

³L.M., 26.11.1853.



NORTH LEEDS;

location of brick-kilns, 1853.



Chapter VII - RAW MATERIALS AND ENERGY

In Weberian analysis the importance of raw materials as a factor in the location of industry relates to its interdependence with other factors and to the qualities of the materials used in a particular manufacturing process¹. These qualities consist of the locational arrangement of the source of the material - 'ubiquitous' or 'localized' -, the total weight of the material which has to be moved (its 'locational weight'), and the proportion which the weight of localized materials bears to the weight of the finished product (its 'material index').

These concepts help to understand the location of industry in any situation, including the intra-urban one, according to Weber. The problem is not that the Weberian model is ill-constructed, but that the complexities of the real-world situation make its application extremely difficult. For example, the source of a raw material might at one and the same time be said to be ubiquitous and localized. In the Leeds cloth industry after 1870 supplies of wool were drawn both from rag warehouses (reconstituted wool, or 'shoddy'), and from abroad (pure new wool). Foundries and paper mills are other centres of production which draw their materials from local, scrap sources, and also from elsewhere.

At the same time the transport-cost surfaces, which Weber mapped out in 'isodapanes', is usually so complex as to prohibit its reconstruction. Different rates for different commodities, preferential tariffs, and the possibility of 'back-haul' economies are only three of the factors which distort a simple transport-cost surface related to the friction of distance².

¹S. Daggett, 'The System of Alfred Weber', in Smith, Taaffe & King eds., Readings in Economic Geography (1968), 58-64.

²E. M. Hoover, The Location of Economic Activity (1954).

Nevertheless, the ideas and concepts which Weber raised may be used to analyse intra-urban location of industry. The essential point of his argument was that the 'pull' exerted by raw materials over the location of industrial plant is related to their value per unit weight, less valuable materials being unable to withstand high transport costs.

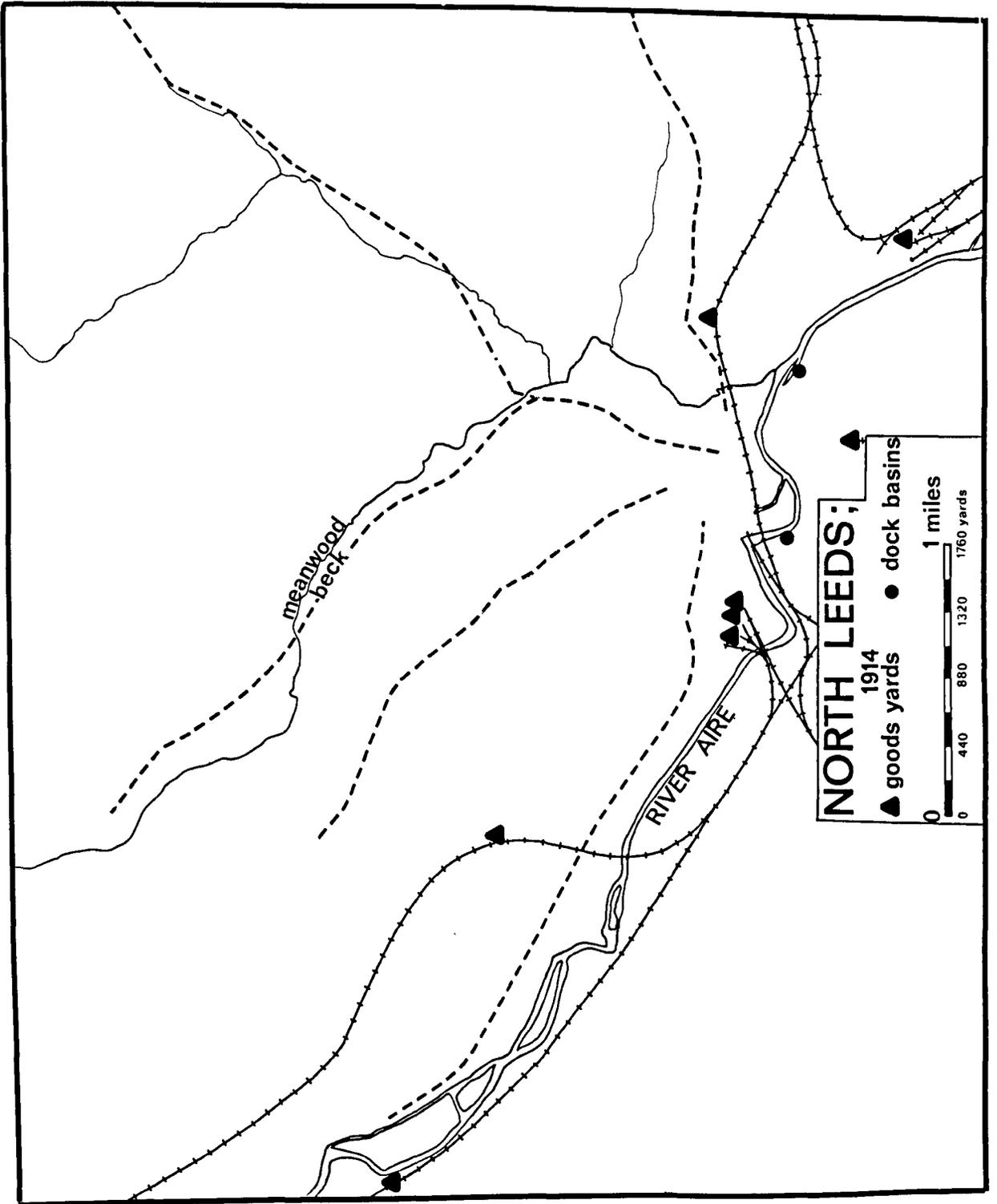
The principal criticism levelled at Weber's model is that it fails to take account of site characteristics, a serious omission at the intra-urban level¹, but this is only true if one is attempting to understand the location of manufacturing in terms of all its variables. In this chapter, however, the factors of materials and energy are separated for detailed consideration, for which purpose it will be convenient to think along the lines laid down by Weber.

Materials used by Leeds industries can therefore be classified according to source, weight, and value, and since the majority of 19th century industries were relatively unsophisticated, rarely using more than one or two main raw materials, it should be possible to construct a typology of manufacturing industries according to raw material influences.

For the study of intra-urban manufacturing location, raw materials may be classified as originating from one or more of three sources: a localised source within the town; sources ubiquitous throughout the town; and from outside of the town.

No raw material, except air, is truly ubiquitous, which leaves those materials which were supplied from locations within Leeds, and those which came from without. The latter may be regarded as originating from points of transshipment in Leeds - the dock basins and railway goods stations primarily, road transport being used only for shorter hauls generally, at least after 1835. The cost of bringing goods to those centres was the

¹M. Yeates & B. J. Garner, The North American City (1971), 375.



Map 16

same for all manufacturers, a difference in transport costs was created only by the varying length of haul from goods station to factory gate.

The location of goods yards, railway lines, and dock basins in 1914 is shown on Map 16, from which it may be seen that transport facilities were located principally in the centre of Leeds. The railway goods yards at Cross Green (Hunslet goods station), and Cardigan Road, Burley, were both late arrivals on the scene. Most traffic throughout the greater part of the century was channelled through Hunslet station, Marsh Lane station, Wellington station and the dock basins at Crown Point and in Water Lane. Heavy carts which carried goods to and from places as far as London in the 18th century, when used also departed and returned to central termini¹. Few firms were large enough to be independent of transport hauliers of various kinds, a step which could only be taken after the development of motor-transport, essentially a post-1914 phenomenon.

Leeds has long been noted for the diversity of its industries, and this was no less the case in the 19th century². The range of materials which its factories utilised was a wide one, too wide to permit more than the analysis of the principal ones in this chapter. Attention will therefore, be directed towards the main categories of industry - textiles, dyeing, metal industries, clothing, footwear, etc. - and only the most important raw materials will be considered.

Following Weber these materials may be classified according to source, value per unit weight, material index, and transportability. Firstly there were materials of high value per unit weight, able to bear a long haul, and which lost little or no weight in processing. Chief amongst these were the raw materials of the textile trades, - flax, cotton and wool; leather and

¹Directory of Leeds (1798). There were then five wagon warehouses, all in the centre of Leeds.

²British Association, Handbook, Leeds Meeting (1890).

tobacco, the processing of which constituted a significant industry in Leeds by the middle of the 19th century.

The initial growth of the English woollen industry was based upon the native crop of wool, towards which Yorkshire and in particular the Pennine moors and dales made a strong contribution. When machine spinning of wool was first introduced into West Yorkshire at the beginning of the 19th century, English wool still played an important, though diminishing role. By 1857 domestic production totalled 175 million pounds, and a further 127 million pounds were imported¹. These figures do not indicate however, that foreign wools were usually of a better quality and were thus preferred by the broad cloth manufacturers of the Leeds district. Of the domestic crop, one-half was consumed by the worsted industry, and most of the remainder was used solely for the lower kinds of woollen goods. It was too coarse for the making of broad cloths, which demanded the fine, delicate wool of merino sheep, imported chiefly from Australia, Germany, Spain and the East Indies. Though within the living memory of Edward Baines in 1858 'Yorkshire cloth was made exclusively of ^{English} wool'², by the end of the 19th century imports accounted for over 80% of the new wool consumed in the U.K.³

The wool consumed by Leeds' mills after 1800 was principally foreign in origin, supplemented by the fleeces of Ireland, East Anglia, and the southern counties, areas which produced the finest English wool⁴. Though the pack horse was a familiar sight in 18th century Yorkshire, much more significant by 1800 were the Aire and Calder Navigation (1699) and the

¹E. Baines, 'On the Woollen Manufacture of England..', Q.J.J.S., xxii (1859), 8.

²E. Baines art. cit. (1859).

³P. Deane & W. A. Cole, British Economic Growth, 1688-1959, (1967), 197.

⁴H. Heaton, The Yorkshire Woollen and Worsted Industries (1965), 328-9.

Leeds and Liverpool Canal (1799 to Leeds), the latter reducing the cost of wool transport from Liverpool down from £5 to £1 per ton¹. Heavy carts were introduced about the middle of the 18th century, but from the poor state of even the turnpike roads and their slowness they were used in the main for local traffic.

Whichever means was adopted in bringing the wool to Leeds, it was to the warehouse of the town's woolstaplers that much of it went rather than direct to the factory, at least before 1850. The more prominent manufacturers had capital with which to make their own purchases both at home and on the London wool market, but smaller firms tended to rely upon the credit of the stapler. Wool constituted as much as 50% of the total costs of cloth production (see Chapter IV), and was subject to violent fluctuations in value. The factor which bankrupted William Hirst in 1826 was the sudden drop in the price of wool, extensive stocks of which he maintained at his mills in School Close². The need of capital for other purposes, and the heavy risk involved persuaded many manufacturers and spinners to buy from staplers, who assembled wool from country fairs and bought in the London market.

The source of wool for many mills, therefore, was the warehouses of the staplers, which were strongly concentrated in an area extending from Albion Street to Boar Lane and Call Lane (Map 10). It was the stapler who bore the cost of transporting the wool to Leeds, and possibly also to the factory from his warehouse. Most mills, however, had their own stables and carts, which suggests that the wool was fetched from the centre of town. In which case time spent travelling back and forth was a factor, and it was desirable that close contact be maintained with the stapler since quality

¹ R. M. Hartwell, The Yorkshire Woollen and Worsted Industries, 1800-50 (1955), 206.

² W. Hirst History of the Woollen Trade, (1844), 24.

and grading of the wool were involved. As a commodity of high value per unit weight, however, the burden of transporting wool from warehouse to factory was only a marginal addition to costs, and mills at some distance from the centre of Leeds functioned quite normally.

The mills of Burley, Kirkstall and other outer areas did however tend to be large concerns, which were more likely to purchase their own wool direct from London, or in some cases, from the country of origin. The importance of the stapler diminished with the passing of the domestic system and as manufacturers increasingly entered the market for themselves¹. Despite the tremendous growth in the consumption of wool in the first half of the century, the number of woolstaplers rose only from 44 to 52 between 1798 and 1853².

In the 18th century those domestic manufacturers who dispensed with the services of the stapler brought their wool into Leeds by pack-horse. One of the last survivors of the system, a Mr. Armitage of Carr Hall, Hunslet, rode to London to fetch his wool, a round trip of four days³. By the time mills began to spring up in Leeds however, wool was normally brought in by water, and later by rail, the terminal points of which were near to the town centre. Gott, for example, had a regular account with the Aire and Calder Company for wool and other raw materials landed at their wharves at Crown Point⁴. After 1834 the development of the railways brought wool into Marsh Lane and later to Hunslet and Wellington Street, and the immediate source of wool for most manufacturers remained the centre

¹E. M. Sigsworth, Black Dyke Mills (1958), 124-9.

²Directories (1798 and 1853).

³J. Porter, foreword to Porter's Directory (1872).

⁴Gott Papers, Offer 10-19, Aire and Calder Navigation Accounts, 1785-92. Offer 85, Account of Wormald, Fountaine & Gott with the Aire & Calder Co., 27.6.1795.

of Leeds. In as much as there was any differentiation in the cost of wool transport, therefore, it was incurred after the packs had reached Leeds, and was related to the distance at which mills were set from the town centre.

Raw flax was also an important local crop in the 18th century¹, but by the time large spinning mills had been set up in Leeds, supplies were drawn mainly from abroad, from the Baltic and Eastern Europe, Ireland, and the Low Countries in particular². The bulk of the raw flax travelled via Hull, then the Aire and Calder Navigation, a final stage which added 20s. a ton to transport costs, but which was less than one-fifth of the land haulage rate³. This additional cost was justified by the lower price of fuel in Leeds, and to a lesser extent by its proximity to the weaving centre of Barnsley. Leeds flax spinning from its inception relied upon foreign flax, imports of which rose to 1.7 million pounds by 1856, home production having declined in the meantime⁴. Later in the 19th century, when Irish and Belgian competition had all but eclipsed the Leeds flax industry, the surviving firms maintained their existence by spinning and weaving heavier Russian and Italian hemp yarns, ease of access to the port of Hull remaining a distinct advantage⁵.

Cotton was always entirely foreign-produced, and during the short period when the industry flourished in Leeds supplies were brought from

¹A. Warden, The Linen Trade, Ancient and Modern (1864), 370.

²Ibid., 367.

³W. Brown, Information Regarding Flax Spinning in Leeds (1821).

⁴P. Deane & W. A. Cole, op. cit. (1967), 204.

⁵British Association, op.cit. (1890), 119.

Manchester and Liverpool via the Leeds-Liverpool canal, which placed Water Lane Basin as the source of materials for the mills of the Bank and South Leeds.

Tobacco manufacture had a much longer history in Leeds. Being a material of external origin tobacco leaf entered the country at the principal ports whence it was brought to Leeds by canal or rail. Here the material was cut and packed for distribution in the surrounding area, production being undertaken by nine mills in 1858, consuming 2.5 million pounds¹.

Lastly, the skins and hides which formed the basic material of the leather industry retained their weight and high value after processing. The principal source of these materials was from abroad, but Leeds tanners bought in the Leeds leather fairs, which were held eight times a year at the South Market, Hunslet². The origin of hides and skins is not of importance however, because there was little or no weight lost during processing, and the industry was therefore located with respect to other factors.

The aforementioned trades had in common a single major raw material of high value per unit weight, which was the major item in running costs, and which lost little weight during processing. The source was external, with warehouses, goods yards, and docks or canal wharves the centres to which materials were brought.

The cost of transportation in each case made only a marginal difference to the price of the raw material. The price of wool, for example, could be anything between £80 and £250 per ton, on top of which the 20s. or

¹T. Fenteman, Historical Guide to Leeds and its Environs (1858).

²W. G. Rimmer, 'Leeds Leather Industry in the Nineteenth Century', Thoresby Soc. xlvii (1960), 119-64.

thereabouts paid for transport from Hull was of no significance. It mattered little, therefore, where the factory was located in relation to raw material source, and other factors of location easily overrode this consideration.

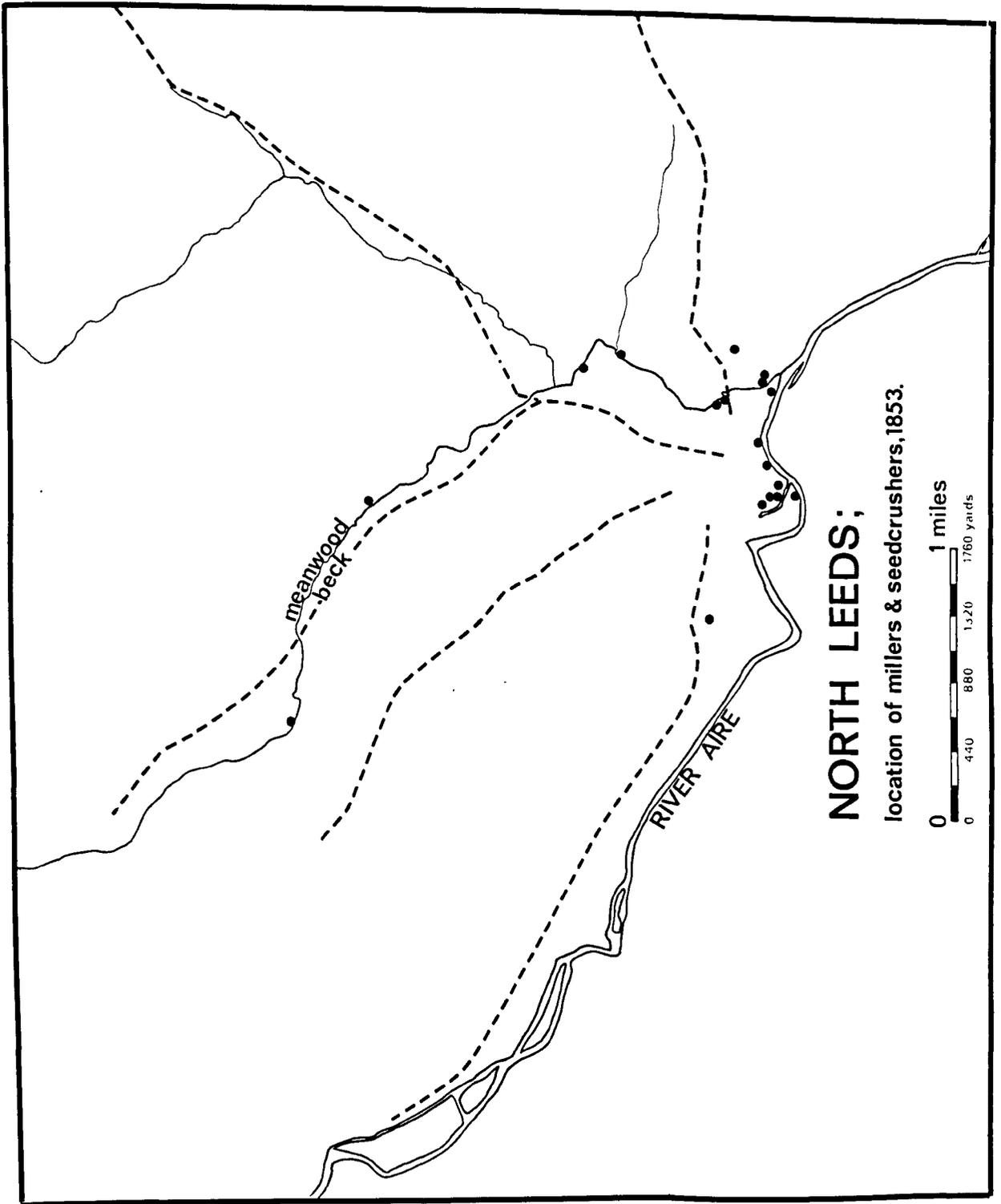
When, however, the raw materials were external in origin, yet weight was lost during processing, industry tended to be ~~market~~^{materials}-oriented. In the intra-urban situation the market, if it is a city-wide one, is best served from a central site, and since weight is lost during manufacture the point of transshipment or break-of-bulk forms the most suitable location. Among the more important industries which utilised raw materials possessing these characteristics were seed-crushing and oil-milling, corn-milling, the grinding of dyewares, and saw mills and timber yards.

As the centre for a substantial market area Leeds had long possessed a milling industry whose influence extended well beyond the area of soke. The demands not only of the town itself, but also a fast-growing industrial region provided business for no less than 26 mills in 1853¹, the corn for which was brought from the agricultural areas of Yorkshire and later from abroad in ever-increasing quantity. The substitution of Canadian, Australian and American grain for British wheat, and the introduction of roller-milling reorganised the industry in the 1880's, for which the country's ports became the principal centres. Leeds, as an inland port, retained a share of the industry and there were still five corn millers even in 1914, but the majority of firms advertising in the 1914 directory had mills located at Hull, Grimsby, Liverpool and London².

It is noteworthy that both the mills in North Leeds which still survived in 1914 were located on the riverside in the centre of the town, as had been

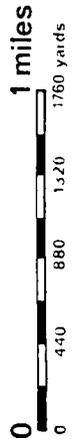
¹Directory (1853).

²Directory (1914).



NORTH LEEDS;

location of millers & seedcrushers, 1853.



most of the earlier mills also. Concordia flour mills, in the Tenters, were refitted ~~was~~ with new machinery in 1873, and were capable of turning out 1,500 sacks of flour in 1884¹. The corn from which this flour was produced arrived at the mill by river, from which it was hoisted by crane to the sixth floor. Most of the corn, therefore, for Leeds mills was shipped via the Aire and Calder, either from Selby and the Vale of York, or from the ports of Goole and Hull. The larger mills were all situated along the banks of the Aire, facing not the adjoining street, but their wharf on the river. Right of wharfage was possessed by, amongst others, Crown Point Mills², King's Mills and Flay Crow Mills³, and the river served as the principal artery of transport in this trade.

A riverside location marked the break-of-bulk point and, so as to serve the market of the town's population most efficiently, mills were located on the section of the river between School Close and Crown Point. Other locations were adopted by corn millers in the 19th century, but these were in water-powered buildings, at sites which formerly milled corn for the surrounding agricultural population. Kirkstall Abbey mill, Scott Hall Mill, and Whitelock's Mill, Sheepscar, are all examples.

Corn milling made use of a single raw material, emanating from sources outside Leeds, and subject to weight-loss during processing. Seed-crushing, dyewood-grinding, and the other industries previously mentioned were similar in these respects. Materials were brought principally by water and hoisted into mills, then stored for distribution in the surrounding

¹Leeds Express 16.2.1884.

²L.I., 5.2.1805.

³Charity Commissioners' Report (1898) xv, 659. Endowed charities return, City of Leeds, return no.45.

area. Locational requirements were more akin to those of warehouses than was the case with other factories. Indeed mills of this type were closely interspersed with warehouses which also made use of water transport, in School Close along Warehouse Hill and the Calls, and at Crown Point. The various uses to which the Nether Mills were put in the early part of the 19th century indicate the type of industries which belong to this category: rasping, chipping, drysaltery, and dyeware grinding¹.

An important element in all these activities was warehousing. The owners of mills not only produced flour but were also corn factors. Distribution was therefore an important side of the business, and the choice of location was a reflection of this consideration and of the fact that weight was lost during processing.

Sometimes, however, weight, or bulk is gained in processing and therefore transport costs are minimised by a location in proximity to the market served. If this market is a dispersed one, then the units of production will either be themselves dispersed, if production is undertaken by small units, or at a small number of centrally-located sites if units are large. As illustration of these principles the brewing and chemical industries may be considered. The market for both covered the whole of the town, and through the addition of water there was a very significant addition to weight during processing.

Water has a very low value per unit weight, and can therefore be transported over only very short distances. Consequently, where it is utilised in large quantities and adds to the weight of the finished product, costs are minimised by a location which provides water in sufficient quantities, and also which minimises distributional costs.

¹See gazetteer - Nether Mills.

The process of brewing utilises three raw materials mainly - malt, hops and water. Of these the first two have a relatively high value per unit weight, far higher than the finished product, and may be assembled from distant sources. The economics of production in the early 19th century favoured the small unit catering for local tastes, and breweries were therefore dispersed throughout the country. Within towns brewhouses were scattered amongst the population, producing for consumption on a highly localised level. When larger breweries, with heavier demands for water, requiring access to a higher threshold population, started to emerge, they were located at or near to the centre of the town. Tetley's, Hallewell's and Singleton's breweries were in Hunslet Road, Woodhouse Lane, and the Leylands respectively.

The hops and malt played little part in influencing the location of brewing, whilst water was important, but only at a very local level. The first consideration was finding a situation from which distributional costs might be minimised, only after which was attention paid to the factor of water supply.

Similarly, the manufacture of various chemicals was located with respect firstly to distributional costs and nuisance problems, and only secondly to the provision of an adequate water supply. The raw materials, nitre, phosphates etc. were nearly all obtained from outside of Leeds, but water, which was consumed in heavy quantities in most branches of the industry¹, could be procured with ease at any one of a number of locations, and therefore played a part only in the choice of the actual site, as apart from location. The location of weight-gaining processes is influenced primarily by market factors, which will be considered in greater detail in the next chapter.

¹H. W. Dickinson, 'The History of Vitriol Making in England', Trans. of the Newcomen Soc., xviii (1937-8), 43-60.

J. H. Park and E. Glouberman, 'The Importance of Chemical Developments in the Textile Industries During the Industrial Revolution', Journal of Chemical Education, 9 (1932), 1143-70.

Water as a raw material was procured from sources within the urban area of Leeds, unlike wool, flax, corn or any of the aforementioned materials. It was not, however, the only primary product of the town, and there were others which formed the basis of important manufacturing industries, notably iron and clay.

As extractive industries, iron-mining and clay-quarrying (and sometimes mining too) naturally had to take place at the source of the raw material, but the next stage in the process, converting the ore into pig-iron, or clay into bricks, earthenware, and pottery also took place at the point of extraction. The reason for this was the considerable weight lost in production, mainly in the form of waste, which made the cost of transporting a bulky raw material prohibitive. This applied even with the short distances involved in intra-urban movement. The Monk Bridge Iron and Steel Company in Whitehall Road, for instance drew its supply of iron from the York Road iron mines, but the ore was first smelted before being taken down to the river and up the Leeds-Liverpool canal to the works¹.

The manufacture of bricks, tiles and related products employed over 1,500 by 1911². The surface clays of the Lower Coal Measures, of East Leeds and Wortley primarily, were made into inferior quality bricks much favoured by the builders of working-class housing. Higher quality products - fire-bricks, terra cotta, and faience work - were made out of the finer, plastic clays deposited in a three foot band beneath the smelting coal of the Low Moor Better bed. At Burmantofts Works for example, the largest of its type in the district, this clay was mined at a depth of 250-300 ft.³

¹Leeds Express 12.5.1883.

²Census, occupational tables (1911).

³Leeds Express 18.8.1883.

Clay, with its low value and loss of weight during processing (mainly water), cannot be transported any distance, except at great expense. Even after it has been manufactured into bricks, value per unit weight remains low, as a consequence of which most 19th century towns had their own brickworks. When, therefore, it was said that Leeds was one of the foremost centres for the clay and earthenware industries¹, the reference was to the manufacture of pottery, firebricks, etc. rather than to brick-making. Not for nothing was the largest concern of this type known as the 'Leeds Fireclay Company', and products travelled far. The famous opera house at Manaus, Brazil, was faced with terra cotta from Burmantofts².

The final category of raw material which must be considered also originated within the town, but from its manufacturing industries not its mining or agricultural activities. Except in the earliest stage of industrial development, before 1825, industries which utilised materials produced by other works in the town formed an important group. The early development of textiles and ironsmelting provided raw materials for a host of newer industries, and the footwear trade drew its leather from the town's tanneries. In addition by-product industries such as bone-milling, glue-boiling, and the manufacture of paper, increased in number as the century progressed.

Firms in such industries relied upon close linkages with suppliers. Fabrication normally involved an increase in bulk or weight, causing a decrease in transportability, but this was compensated by the higher value of the product. For example machine-makers transformed wrought iron and steel into far bulkier products, the greatly enhanced value of which meant that transport charges remained a low percentage of total costs. A location

¹British Association, Handbook, Leeds Meeting (1890), 74.

²Anon., 'Burmantofts Works (Leeds Fireclay Co.) Annual Report of the Yorkshire Philosophical Society (1915), 9-11.

anywhere between supplier and market might therefore be adopted were no other factors involved. This was not the case, however, for manufacturers depended upon close contacts with both supplier and customer to ensure that quality and style were at a maximum. In which case locational cost must be seen not merely as a function of transport and distance but also the ease with which these linkages were maintained, person-to-person contact being a factor of much greater importance in the days before motor transport and the telephone. In the clothing industry, for example, one of the prime advantages which Leeds possessed in 1928 was 'the highly-developed cloth-marketing arrangements, which enable the clothing manufacturer to select his materials with a minimum of delay and inconvenience'¹.

Since it is not actual price and transport costs which are of primary importance to the user of secondary materials but rather the linkages which are established between individual firms, closer consideration of this question is delayed until chapter VIII. The principal point which must be established at this juncture is that whilst there is evidence of materials orientation at both inter-urban and intra-urban levels, only in the former case can location be attributed to savings in transport costs. In the latter instance the distances involved in moving goods are so short as to have a negligible impact upon the location of manufacturing where products are of a high value and do not suffer much loss in weight or bulk. Thus whilst high transportation costs may have reduced the competitiveness of Boulton and Watt's steam engines in the Leeds market², Fenton and Company of Hunslet sold many more engines to firms in North Leeds than did Stirk and Company of York Street³. A difference in haul of one mile or so was

¹S. P. Dobbs, The Clothing Workers of Great Britain (1928), 44.

²G. Roll, An Early Experiment in Industrial Organization (1930).

³W. Lindley, Number of Engines, etc., (1824).

of no account. Production materials were similarly gathered from a large area. Amongst the creditors of Gallon, Lumb and Bean, machine-makers of Whitehall Road in 1865, were only a small number of Leeds firms - less than ten out of fifty-eight¹.

That it was commercial contact rather than savings in transport costs which were the more important is a theory lent some weight by the pattern of the clothing industry. Nationally, the concentration of this trade in cloth-producing areas (with London, however, also very important) may be attributed to the savings in transport charges gained thereby, but clothing factories did not cluster around cloth mills at the intra-urban level (see Maps 11 and 25). The movement of cloth from mill to clothing factory was not an important item of cost. Clothing factories did, however, exhibit a marked tendency to locate around the offices and ware-rooms of cloth manufacturers, the great majority of which were in the centre of Leeds, and especially in the Park Square area. This does seem to indicate that backward linkages in the form of face-to-face contact were a significant consideration, even at intra-urban level, but it is the only manner in which this group of industries could be said to be 'materials-oriented'.

It has been so far stated then that few industries were truly materials-oriented, and that those which were were characterized by a high weight-loss during the manufacturing process. Materials such as clay, ironstone and quarried stone lost much weight, in the form of waste principally, and therefore their sources attracted industries which processed them. There is another commodity which loses all its weight during processing, and though not itself a raw material for Leeds industries, may be considered to have behaved like one.

¹L.C.A. D.B. 100, Gallon bankruptcy papers.

Unlike some other forms of energy, coal has no mobility of its own, and transporting it therefore makes a substantial contribution to overall costs. In the period under study coal was the predominant, almost the only, source of energy, required by all factory industries and obtainable only from distinct locations. Since its entire weight is lost during processing it is to be expected that coal will have an important bearing upon industrial location, and the concentration of 19th century onto the coal-fields requires no elaboration.

The cost of coal as a fuel for steam engines has already been analysed (see above, Chapter V). As a provider of heat its use could be even more costly. For example, the charge of coal required for a wrought iron puddling furnace in the third quarter of the 19th century was 30 cwt. per 12 hour period¹. Perseverance Ironworks had 40 such furnaces in 1873 which, assuming six shifts represents a weekly consumption of 360 tons. Kirkstall Forge, with 24 furnaces must have required something of the order of 200 tons per week². In ironsmelting, the best furnaces of the Cleveland district consumed 33 cwt. of coal for each ton of pig produced³, and the only two furnaces in North Leeds - Messrs. Garsides' at White Horse - were probably much less efficient.

In the clay industries also consumption was substantial. The Staffordshire potteries required 5-12 tons of coal for each ton of clay, in the early part of the 19th century⁴, whilst in 1803 the Leeds Pottery purchased between 18 and 40 tons per day from Middleton Colliery⁵. Brickworks also utilised large quantities, although the coals used did not have to be of

¹J. Carr and W. Taplin, History of the British Steel Industry (1962), 53.

²S. Griffiths, Guide to the Iron Trade of Great Britain, (1873), 278.

³J. Carr and W. Taplin op. cit. (1962), 54.

⁴H. A. Moisley, 'The Industrial and Urban Development of the N. Staffs. Conurbation', Trans. I.B.G., xvii (1951), 149

⁵L.C.A.M.C. 188. 189. Coal sold at Leeds Staith.

such high quality¹. Rimmer has estimated that coal constituted 6% of total costs in the pottery industry in the 18th century, a level almost certainly topped by brickmaking which was far less labour-intensive².

Coal consumption in 1830 was estimated at 300,000 tons p.a. for the whole of the Borough³. It was reckoned in 1835 that 'in no manufacturing town in England' was 'more coal consumed, in proportion to its extent, than Leeds'⁴. Of the 300,000 tons, approximately three-fifths was consumed by the boilers of the town's steam engines, but the remainder was used in large measure by ironworks, brickworks, potteries and the like. By 1858 consumption had risen to about 675,000 tons of which engine furnaces accounted for 277,000 tons, smelters etc., 195,000 tons, domestic consumption 189,000 tons, and miscellaneous users the remainder⁵. The figures probably are not far short of the peak level of consumption, as alternative sources of energy and fuel-saving techniques were increasingly adopted thereafter.

There were very few factories which did not make some use of coal, either as a fuel or as a source of power. It was, according to John Marshall in 1841, the most important factor making for manufacturing prosperity after 'security of property' and possession of the best machinery⁶.

¹Anon., art. cit. Trans. Yorks. Philosophical Soc., (1915), 10.

²W. Rimmer, 'Pottery', L.J. 29 (1958), 185-9.

³W. Rimmer, 'Coal', L.J. 25 (1954), 3-7.

⁴Sir G. Head, Home Tour Through the Manufacturing Districts of England (1835), 132.

⁵R. Baker, 'On the Industrial and Sanitary Economy of the Borough of Leeds in 1858'. Q.J.S.S., xxi (1858), 440.

⁶P.P.(1841) vii, 187. Evidence of John Marshall. Quoted in R. M. Hartwell, The Yorkshire Woollen and Worsted Industries, 1800-50 (1956), 187.

The Lower Coal Measures series terminates along the Northern Boundary Fault in a line running from Seacroft to Horsforth, but the economically most important seams occurring principally in the areas to the south of the river, crossing over into North Leeds only in the east. In the middle of the century the principal collieries were to be found in the out-townships, in particular Middleton, Beeston and Knowsthorpe, there being eleven in the north-eastern part of the Borough, from Burmantofts out to Manston¹.

The early significance and dominance of the Brandling collieries in Middleton have been reported elsewhere by Rimmer². This source of coal had a near monopoly of supply to Leeds by virtue of the agreement negotiated with the Borough in 1758 and the reduction in transportation costs after a railway was built between Middleton and Hunslet. Supplies for all parts of Leeds continued to be drawn from Middleton throughout the second half of the 18th century and the early years of the 19th. The key advantage which the Brandling collieries retained even after their monopoly was broken was the lower cost of transporting the coal into central Leeds. The pithead price for Halton coal was the same as for Middleton coal (8s. per 45 cwt. wagon), but it cost 4s. per wagon to get this to Leeds, as compared with only 1s. 6d³. Other collieries were at a similar disadvantage until they too were able to reduce transport costs. One of the first to do so was William Fenton of Waterloo Main Colliery, Pontefract

¹Directory (1853).

²W. G. Rimmer, 'Middleton Colliery near Leeds', Yorks. Bull., 7 (1955), 41-58.

³Ibid., 45.

Lane, who established a staith on Fearn's Island, East Street, in 1817¹. The coal was transported from the pits on Neville Hill down to the river by tramroad, and thence by lighter to the staith where a crane lifted it up into carts for delivery throughout the town. By 1835 there was a further staith at Crown Point, and 'considerable cargoes of coal' were said to be being brought from the eastern vicinity via the Aire. Coal in abundance was brought in by cart along the turnpike roads from the south, and by rail in the east into Marsh Lane station². Generally, pits were connected by mineral lines to either the river or to the newly-built Leeds-Selby railway, which passed through the main mining areas of East Leeds. The bulk of the supply by mid-century came from the Thorp Hall collieries (Fenton's), Middleton (Brandling's), Rothwell Haigh (Charlesworth's), and also Beeston, Manston, Garforth and Colton³.

Thereafter the number of sources multiplied accompanied by a corresponding increase in the number of termini from which the coal was marketed. The Leeds area had 102 collieries producing 2.5 million tons of coal by 1877, much of which was obtained from pits in East Leeds⁴. In addition colliery agents acted on behalf of pits as far away as Darlington and by 1914 even Swansea⁵. Their coal was brought in by rail to the main goods stations which, along with the dock basins and staiths at Crown Point,

¹Thorp Hall Coals (Fenton's Colliery), 1817. Goodchild Loan MSS., Cusworth Hall Museum.

²Sir G. Head, op. cit. (1835), 174.

³R. Galloway, Annals of Coal Mining and the Coal Trade, Vol. 1 (1898), 474.

⁴T. Baines, Yorkshire Past and Present (1877), 102-4.

⁵Directory (1914).

Kirk Ings, Water Lane, and Wellington buildings, acted as the centres of distribution in the Borough.

The coal dealers operated from the centre of Leeds, and it was also possible to send wagons to the pit-head if nearby, or sometimes to have deliveries made by rail, where possible. Only West Leeds operated at a disadvantage, and even there the areas to the south of the Aire obtained coal from the Leeds-Liverpool canal, whilst the lower parts of Kirkstall Road were only a short distance from the goods yards in Wellington Street.

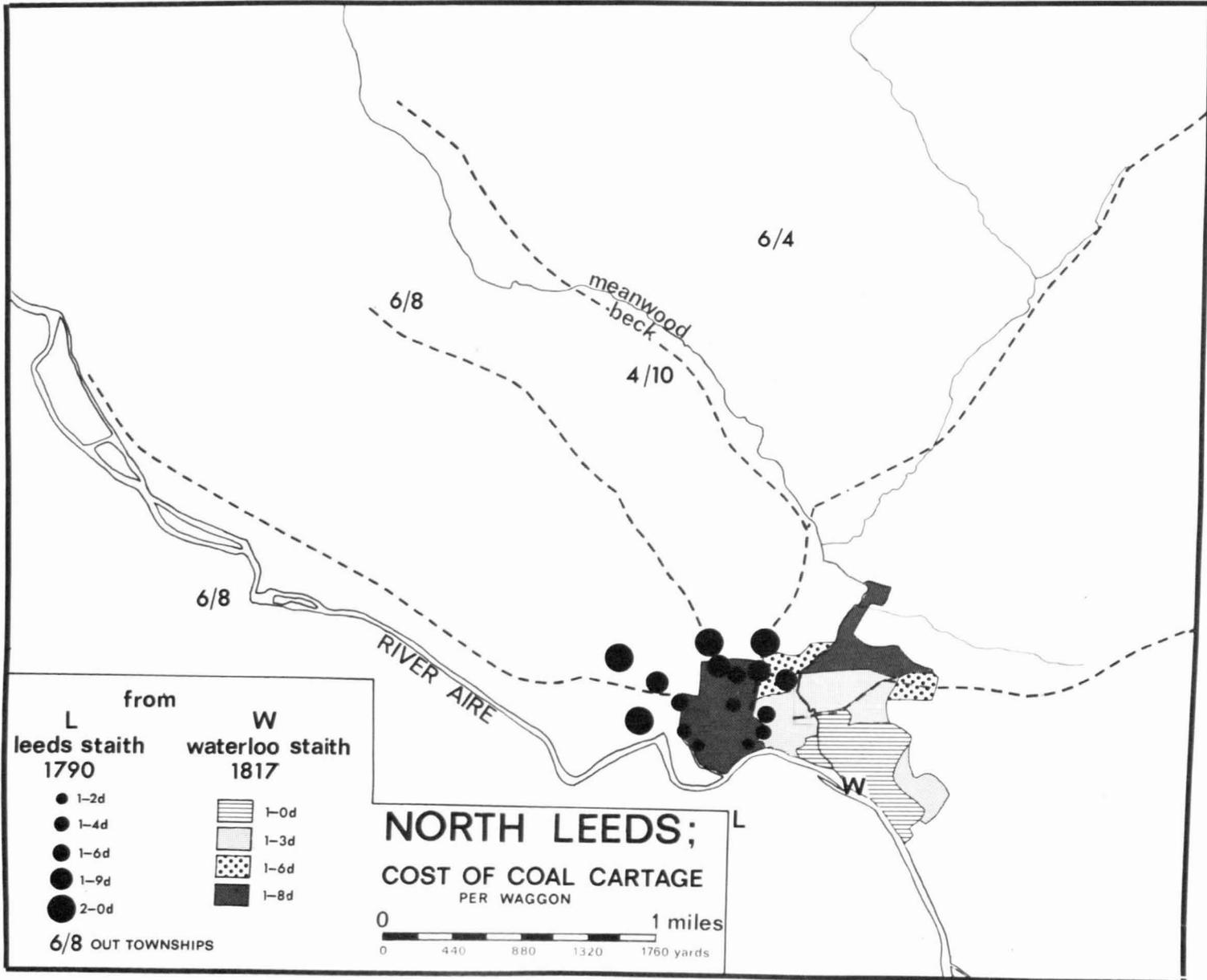
It was said in 1822 that 'the neighbourhood abounds with coal, the very soul of steam engines'¹. This remained the case throughout the period, and it was a factor of considerable importance in attracting industry to Leeds. It now remains to be seen to what extent the siting of factories within North Leeds was governed by considerations of coal costs.

Where a manufacturer required coal solely for a steam engine, the weekly fuel bill would amount to between £4 and £7 for a 30 h.p. engine. Coal consumption in large textile mills in the 1820's was in the order of 5 to 15 wagons per week, at a pithead price of between 20s. and 23s. per wagon, to which were added transport costs.

Where coal was used as a source of heat, for foundries or dye-vats, or drying rooms for example, it amounted to a much more substantial proportion of total costs. Close's dyeworks at Drony Laith, which in the 1790's was the largest in Leeds, consumed 20 wagons per week². The high level of consumption at Leeds Pottery has already been mentioned (page 231). Even at these works however, coal did not figure as prominently in overall costs as wages, or depreciation on capital. It was possible, as Boulton

¹T. Langdale, Topographical Dictionary of Yorkshire (1822), 341.

²L.C.A. D.B. 116, R. v. Gott, Counsel's brief, evidence of John Wilson.



and Watt's letter to Paley in 1796 demonstrates, to make a large saving on running costs of an engine by increasing its efficiency, yet few manufacturers had bothered to purchase one of their engines by 1824¹.

Coal costs were not critical for the majority of firms. Only the largest consumers, such as dyers, brickmakers, or ironmasters, were obliged to give close attention to this consideration. Cloth mills at Woodhouse and Kirkstall, though few in number achieved the transition from water to steam power seemingly without adverse effect, despite the high cost of transporting coal to the out-townships.

The agreements negotiated between the Brandling family and the Borough included the right of the Borough Quarter Sessions to regulate the cost of coal transport. In the latter part of the 18th century the price of coal at Leeds staith was 8s. to 11s. per ton, whilst carriage on 45 cwt. varied between 1s. 2d to Swinegate and Boar Lane and 6s. 8d to Armley². The low price of coal to consumers in the centre of Leeds was maintained only by the use of rail transport from the pit head. Once carts had to be used the cost rose rapidly (Map 18), and even water transport was more costly because of canal dues. Significantly, the Aire and Calder Company, which had been enjoying monopoly profits of more than 250% on trade between Leeds and East Yorkshire, was forced to make an immediate reduction in its prices upon completion of the Leeds-Selby railway in December 1834³.

Coal was, however, brought into Leeds by water at a competitive price from 1817 onwards. The price of coal at Waterloo staith in that year was 10s. 8d per ton, with a further 1s. to 1s. 8d carriage charge to different

¹W. Lindley, Number of Engines, etc. (1824).

²L.C.A. Q.S.11 Leeds Quarter Sessions, 1785-96. f. 204-9 (January 1790).

³H. Parris, 'Leeds and its Railways', L.J. 26 (1955), 157-60.

areas of the in-township (Map 18)¹. From this map it may be seen that the cost of carriage rose by two-thirds in the short distance from Timble Bridge to Quarry Hill, but this meant only a very marginal (less than 3%) difference in coal costs. Even the consumer in Armley in the 1790's paid only 24% more for his coal from Middleton colliery, which is a more substantial difference but meant only an extra £2-4 on his weekly bill, at the very most 5% of total costs. Later in our period, when transportation was vastly more efficient and coal was brought from a great number of sources, the spatial variation in fuel costs was even less marked. By 1914 there were over 150 coal dealers in Leeds,⁴ and a similar number of coal merchants, providing a commodity which, relative to other factors, had declined in price.

It is not to be expected therefore that coal supply was a dominant factor in the location of manufacturing at any time during the period. It must certainly have deterred factories from a location in the northern out-townships where mills initially preferred water power, and it was a significant factor in the siting of brickmaking, pottery, ironworking, and possibly dyeing and malting, but that is all. Of these the first three were strongly coal-oriented, but it is difficult to say how critical a factor this was because all raw materials were obtainable at the same location. Coal and iron were mined together along the York Road, and coal and clay in conjunction at Burmantofts. However, brickworks did exist at various times in other localities well removed from coal pits - at Little Woodhouse, Queen's Road (Burley), and at Little London for example - which suggests that coal could be transported across town without great penalty.

Generally speaking, industries which consumed coal in large amounts tended to be located to the south of the river, and specially in Hunslet.

¹Thorp Hall Coals, 1817, loc. cit.

²Directory (1914).

Here coal could be obtained at a cheaper rate and the topography was more suited to large works. By mid-century there was a definite concentration of large chemical works, potteries, and ironworks in this area. East Leeds was a much less important centre of industry, but the type of works which were found there - an ironworks, clay workings, and a soap works - did tend to be those which consumed large quantities of coal.

Coal was not a factor which could be ignored, as the abrupt cessation of factories to the north of Leeds indicated, but within Leeds it is felt to have been of importance in locating a handful of firms only. One point which may well be worth remembering, however, is that although manufacturing entrepreneurs were possessed of highly imperfect information as to the economic costs of alternative locations, the price of coal in the various parts of the town was well publicised. Potentially, therefore, coal costs had a greater impact upon location than might at first appear.

The history of the application of energy to manufacturing follows a progression from immobile to highly mobile sources, from water to coal and then gas and electricity in the 19th century. Once coal had become the principal source of energy sufficient mobility was achieved for it to have little effect upon inter-urban location of industry. Water power, however, which was of great importance until about 1830, offered relatively few alternative locations to manufacturers.

Water was first harnessed for power at an early date well before the date at which this study commences. The King's mill and Kirkstall mills were both 13 century in origin and there were many other water mills along both the Aire and Meanwood Beck by 1731.

Since energy was transmitted directly by gear and belting, mills were tied to a waterside location. The existence of a stream with sufficient

volume and permanence was the only further requirement, although access and a suitable ground area made some sites more favourable than others. Within North Leeds the becks had a greater fall of water, but the River Aire had much greater potential energy since the flow of water was so much higher. Mills on the former tended to be smaller but more numerous therefore. Between Crown Point and Woodhouse Carr there were six or seven water-powered mills in 1800 but these were too small to merit the designation of 'factory'.

Engineering problems were much more serious on the Aire. A mill could not be built out over the river, and therefore a cut had to be made at some convenient point. Leat-gates and weirs were necessary to regulate the flow, all of which added to construction costs, which became only justifiable if the mill to be built was a large one. Whilst water power was never of very great importance in North Leeds, the few factories that were established lay alongside the Aire, at Kirkstall, Burley and the Bank, and in School Close. The most suitable site was alongside the goits which cut off a bend in the river south of Mill Hill and Swinegate. Originally cut for the soke mills and the Leeds waterworks, the power which the flow of water generated was also harnessed by a number of later mills, such as Flay Crow Mill¹.

The industrial strength of Leeds in 1835 was founded upon steam not water mills, but this form of power played its part in industrial location by creating some of the earliest industrial concentrations. Abbey Mills, St. Anne's Mill, Burley Mill, and Bank Mills were some of the factories which were initially water-powered and whose location was dictated by this factor. However, the advantage of steam power - its greater reliability principally - were soon realised:

¹See gazetteer - Flay Crow Mill, King's Mill estate.

We have built a very large and expensive water wheel with every other requisite, to abandon which would be attended with a very heavy loss, but if I could be assured you'd erect a steam engine in three months, we would sustain the loss.¹

wrote a partner in the firm of Markland, Cookson, and Fawcett of Bank Mills, to Boulton and Watt in 1792. Blagborough and Holroyd erected Mabgate cotton mill in 1791, but took out the water wheel and replaced it with a steam engine only five years later². By 1835 there were 113 steam engines at work in the Borough's textile mills but only 10 water wheels³.

The substitution of coal for running water as the source of energy freed factories from total dependence upon a waterside location, but since water was required for so many other purposes industry was concentrated along the valleys until the final quarter of the century when manufacturing began to disperse more throughout Leeds.

The developments which permitted and encouraged this dispersal included the introduction of new power sources, notably the gas turbine and electricity. There were also attempts to provide hydraulic power and compressed air power which seem, however, to have got no further than being passed by Act of Parliament⁴.

Gas was first manufactured and distributed throughout Leeds on any scale in 1818, but was utilised only for lighting and heating purposes until the development of the gas turbine in the 1860's. Its usage was therefore primarily non-industrial, although the owner of the Albion Brewery in Woodhouse Lane preferred to dry his malt by gas heat to avoid the possibility of contamination by sulphuric acid from coke⁵. In 1830 twenty mills and

¹Boulton and Wat MSS., box 4-M-S. Jonathan Cookson to B & W, 7.1.1792.

²See gazetteer - Mabgate Mill.

³Employment of Children in Factories, Reports, P.P.(1836) xlv, 50.

⁴P.P.(1886-7) lxxxiii, P.P.(1896-7) xlvi, Leeds Hydraulic Power Company. P.P. (1887) xxxi, Leeds Compressed Air Power Co.

⁵Advertisement, Directory (1856).

factories had their own gas plants, but these were for lighting purposes only¹.

The first gas turbine engines installed in Leeds factories were small and therefore suitable for use only in industries which required a moderate amount of power, such as clothing, footwear, and small workshops of various kinds. Hepworth's had a 12 h.p. Crossley engine and James Rhodes and Company a 16 h.p. Otto engine in 1884². George Bray and Company, manufacturers of gas burners, had an 8 h.p. Crossley engine in 1883³. Although firm evidence to support the fact is not available, it is likely that gas engines were installed primarily in clothing factories, and only after 1875.

Electricity was only introduced to Leeds in the 1890's and only used as a source of power after the Corporation took over the supply in 1898. The name of one of the early private companies - the 'Yorkshire House-to-House Electricity Co.' - indicates^{to} what purpose the new source was applied to before 1898, but by 1914 there were 'few parts in the city in which electric power is not available'⁴. Amongst the early industrial users of electric power were Joseph Watson and Sons⁵, and a Leeds woollen mill where it was used for the carding machines⁶.

¹W. Rimmer, 'Gas and Electricity, Part I', L.J. 28 (1957), 223-7.

²Mercantile Age, 2.9.1884 and 1.10.1884.

³Leeds Express 20.1.1883.

⁴Leeds Chamber of Commerce, Yearbook (1913), 46.

⁵W. Rimmer, 'Men Who Made Leeds - Joseph Watson', L.J. 32 (1961).

⁶J. H. Clapham, Machines and Rivalries, 1887-1914 (1938).

In the clothing and footwear industries electricity was quickly harnessed to provide power for the sewing and cutting machinery, and later for buttonholing machines too. The bandknife was replaced by an electric cloth cutting machine¹.

However, with the exception of the clothing and perhaps the footwear industries, electric power was taken up on a very limited scale. The repercussions in terms of industrial location were therefore confined to a small number of firms, for whom the choice of site became a much freer one. Not only did electricity and gas not require large quantities of water, they were pollution-free also. Account could now be taken of other factors - of land prices, labour supply and new transport developments for instance.

Steam was described in 1884 as having been 'the great reorganising power of modern times'², but it was beginning to give way to other sources of energy. However, even by 1914 the use of electrical and gas power was very limited, and coal was still the main fuel for dyehouses, brickworks and the like. Though there were 56 electrical engineers in the Borough on the eve of the First World War, they were heavily outnumbered by mechanical engineers and steam engine manufacturers³.

Though not introduced to the Leeds factory before 1789, steam power and coal fuel characterise the period under study, and since coal is a material with high transport costs it has been considered in this chapter alongside the raw materials of production. The essential difference between coal and gas or electricity as sources of energy is the latter's mobility. Most important of all, there is no spatial differentiation in the price of electricity, which is geared completely to level of consumption.

¹J. Thomas, History of the Leeds Clothing Industry (1955), 40.

²Various Writers, Fortunes Made in Business (1884).

³Directory (1914).

It has been shown that there was a definite spatial variation in the cost of raw materials and solid fuel, caused by the high charges for road haulage, but that this had a limited impact upon manufacturing location. Industry was only likely to be materials-oriented when large quantities of weight-losing materials were involved, which applied to very few trades.

Where there was some evidence of materials-orientation, it was of two types principally. If, as in the case of ironsmelting for example, the material originated within the Borough, then processing will be located at or near its source. When, on the other hand, raw materials came from outside Leeds, arriving in the town at its goods yards, wharves and dock basins, then orientation towards the centre was reinforced. The communications advantages of Leeds were of vital importance. In 1858 they consisted of:

a navigable river, canals accommodating vessels of 120 tons and communicating with the Mersey at Liverpool, the Ouse at Goole, and thence with the Humber ... and railways branching off in every direction.¹

'These advantages', it was stated, 'give every possible facility for bringing raw materials'². Good communications, and hence cheaper raw materials were undoubtedly an important factor in Leeds' industrial growth, but at the intra-^{urban} level the significance of this factor was limited. Finally, it has been contended that though never of prime importance anyway, its significance diminished steadily as time passed, in response to improvements in transportation and the diminishing relative cost of raw materials.

¹T. Fenteman & Co., An Historical Guide to Leeds and its Environs (1858), 3.

²Ibid., 3.

Chapter VIII - AGGLOMERATION, LINKAGES, AND MARKET FACTORS

The site upon which the clothing factory stands is in close proximity to the several railway depots, and is in the centre of the clothing district.¹

This quotation from a newspaper of 1884 provides an appropriate text for the final section of this thesis. This section, which covers two chapters, looks at the operation of scale economies and urbanization economies, in particular the role of the labour force and considers what influence each exerted over industrial location. Industrial sites are again assessed in terms of their accessibility, but to customers, commercial facilities, labour, and other firms instead of to raw materials.

The difficulties which attend this type of analysis are formidable even if the situation is the contemporary one. ~~Even~~ The Philadelphia Input-Output Study which involved a team of distinguished investigators, was unable to proceed beyond linkages within manufacturing, no attempt being made 'to evaluate and compare the strength of other locational attractions in the metropolitan area', particularly linkages with the services sector. Yet to fulfil even these limited aims required the participation and co-operation of one thousand firms, and the application of sophisticated techniques of data processing².

Hitherto few have attempted to analyse intra-urban location of manufacturing along these lines, principally because quantitative analysis of this problem is so difficult and demanding, and even the questionnaire survey is fraught with many hazards. Fortunately perhaps there is no real possibility of applying such techniques to assess entrepreneurial motives in 19th century Leeds. Even had such a survey been undertaken at the time

¹Mercantile Age, 2.9.1884.

²G. Karaska, 'Manufacturing Linkages in the Philadelphia Economy', in L. S. Bourne, ed., The Internal Structure of the City (1971), 256-67.

it is to be doubted whether manufacturers were as aware of, or even as concerned about, the locational question as is modern industry.

What follows therefore is a highly imperfect attempt to assess the importance of factors which researchers into the contemporary environment find extremely elusive.

Nourse classified the benefits of an urban location for industry into three categories¹, and these will be used here to study manufacturing in 19th century Leeds:

- (1) Transfer economies. Savings in obtaining raw materials and in disposing of the finished product to the market.
- (2) External economies to a particular industry, whereby the association of firms produces benefits in terms of shared marketing and research facilities, shared information and a skilled labour pool.
- (3) External economies to all industries, which include a multitude of advantages - shared transportation and commercial facilities, public utilities, educational facilities, and the like.

To these must be added the further consideration of internal economies of scale because it has an important bearing upon the location of individual firms. Generally speaking, the larger a concern, the more independent it is of external economies.

These factors will be considered one by one in application to Leeds in the 19th century. Of necessity the account will be fairly brief, but is hoped to indicate their relative importance in effecting the pattern of industrial location. But passing reference will be made to the importance of labour in this first chapter, because it is felt to be of such importance as to justify a section to itself.

Undoubtedly industry congregates in urban areas principally to take advantage of the benefits listed above, although on occasion it is urban

¹H. O. Nourse, Regional Economics (1968), 85-92.

growth which takes place around manufacturing nuclei¹. The task here is to decide whether these same factors operated within urban areas; whether, for example, firms competed for a location adjacent to a railway station, or whether different sectors of the labour force resided in different parts of the town, and if so whether this influenced factory location.

The first consideration, therefore, is that of the market, its size and its location, and whether industry was so strongly attracted to it as to ignore some of the other factors. It is recognised that at the inter-urban level 'in many industries the significance of the market is growing in relation to such considerations as the cost of labor and materials'², whereas the period before 1914 appears to have been in the main one of materials-orientation. This does not, however, mean that industry was more materials-oriented within urban areas, it having been demonstrated in the previous chapter that this was a relatively unimportant factor.

Like the assembly of raw materials, the cost of moving one's products to their market is related to the friction of distance. In the main, the longer the haul, the higher the cost. At the same time it may be assumed that, ignoring all other considerations, manufacturers will locate as closely as possible to their market so as to reduce this cost to a minimum. There were other considerations involved in marketing such as advertising and face-to-face contact with customers, but these all operate in the same manner.

Proximity to market should not be measured in simple distance terms, however, for time and convenience are also involved. The cost-distance surface is strongly influenced by the pattern of the existing transport system which is largely outside an individual manufacturer's control.

¹J. E. Vance jr., 'Housing the Worker; the Employment Linkage as a Force in Urban Structure', Econ. Geog. 42 (1966), 294-325.
S. Pollard, 'The Factory Village in the Industrial Revolution', English Historical Review, lxxix (1964), 513-31.

²D. M. Smith, Industrial Location (1971), 62.

Three miles out of the centre of Leeds along a turnpike road was a very much better location than three miles out across fields and woods.

The initial transport network was laid down between Leeds and the surrounding villages and towns. Roads linked up with Bradford, Pudsey, York, Harrogate and other places, routes being in the main direct, though topography was of influence in certain instances, ~~as~~ along the Aire valley for example. This network was established largely in the 18th century, preceding industrial development on a large scale.

Road transport was the normal mode adopted for short-distance traffic, except where bulk commodities like coal could be shipped along the waterway system. Factories relied upon horse-and-carts for transporting materials and products to and from suppliers, customers, and the main transport termini, and since many of these carts carried very heavy loads (45 cwt. in the case of coal), it was desirable that roads were paved and well maintained. The turnpikes, though subject to tolls, provided a much more efficient network, especially in winter when unpaved tracks were often impassable. The majority of the streets within the town were paved¹, though frequently narrow and congested, but outside the town bars only turnpike roads had satisfactory surfaces. It is to be expected therefore that industry would be attracted to sites served by these roads. That this tended to be the case is evidenced by the growth of factories alongside Kirkstall Road (Leeds-Bradford Turnpike) after 1819 and the absence of industrial development along the river beyond Monk Pits, where Whitehall Road (Leeds-Halifax turnpike) was not laid down until 1825. Manufacturers willingly invested in road development, especially when it was likely to be of direct benefit.

¹Statistical Committee, 'Report Upon the Condition of the Town of Leeds' etc. J.S.S. ii (1843), 400-1.

Benjamin Gott was the principal subscriber to the Wellington Bridge adjoining his mills. This bridge was said to be:

too far removed from the centre of the town to afford any general benefit; its accommodation is chiefly confined to the village of Armley and Wortley, and its advantage to the proprietors of the estates through which the new roads leading to it pass.¹

J. H. Oates was one of the principal investors in the Meanwood Road Turnpike which was directed past his mill at Oatlands, hitherto reached only via Camp Road². More direct evidence for the importance of roads in factory location is the frequency with which property was recommended for 'the carriage road at the back door'³, or 'the two good carriage roads to Leeds'⁴.

There is however, evidence of a conflicting nature in the development of the Whitehall Road area, part of the estate of the Wilson family. This land possessed ideal facilities for industrial development - flat land, access to the river, proximity to the town centre - and was offered for sale from the beginning of the 19th century. The lack of development before 1825 can be explained by the lack of any carriage road, but there was still no other factory beyond Aire Street Mills before Willans built the Britannia Mills and Rickard and Company built Britannia Foundry in 1836. The probable explanation is the general lack of industrial development anywhere in Leeds between 1826 and 1835, but it is still puzzling that even after 1835 development in the area was slow and there was still sufficient space for extensive new works as late as 1890.

¹E. Baines, Directory (1822), 14.

²L.C.A. O/K 7-17, Oates Papers.

³L.I. , 7.5.1798.

⁴L.I., 10.1.1803.

Non-local traffic was carried not by road but by water and after 1834, by rail. Leeds was particularly fortunate in that by the beginning of the 19th century it formed the terminus of two important waterway systems, with terminals in Water Lane and Dock Street, the intervening section of the Aire serving to join the two together¹.

The termini of the early railway stations, in Marsh Lane and Hunslet, were more eccentrically positioned, thus reflecting the difficulties experienced by railway companies in buying up land in the city centre. However, one axis into the city remained open along Whitehall Road, and in the second railway mania of the 1840's the Central, Wellington, and Great Northern stations were all erected in this area. Further developments took place in the mid-1860's with the erection of City Station and its link with Marsh Lane terminus, and finally the establishment of new goods yards at Cross Green and Cardigan Lane towards the end of the century².

Goods trains left daily from all four stations in the middle of the century, for most parts of the country, whilst a fleet of vessels linked Leeds daily with Goole, London, Hull and Liverpool³.

Our prime concern here is a consideration of the location of transport developments, and the role the system played in the marketing of products from Leeds factories. Since short-distance transport was normally by road, and longer distances by rail and water, it is important to distinguish between industries which served mainly local demand and those which catered for a national market.

¹G. Ramsden, 'Waterways', L.J. 26 (1955), 81-4.

²H. Parris, 'Leeds and its Railways', L.J. 26 (1955), 157-60.

³Directory (1853).

Pred has evolved a seven-fold typology on intra-urban manufacturing location based upon the extent and nature of the market served¹, but since we are dealing here with the 19th century situation, before any 'communications-economy' industries had arisen, the number of categories may be reduced to three, namely:

- (1) Industries or firms which served a dispersed, predominantly local market.
- (2) Industries or firms which served a concentrated predominantly local market.
- (3) Industries or firms which served a predominantly national market.

Certain industries, cloth for example, may be assigned wholly to one category, in this case the third one, but others, notably founding and engineering, were composed of firms of varying size and market-types. The comparison may be drawn, for example, between Wellington Foundry, which manufactured armaments for the nation and machinery for the whole world², and Sheepscar Foundry whose leather and dyeing machinery was said to be in great demand amongst the tanneries of the neighbourhood³.

Most cloth manufacturers and flax spinners catered for at least a national market, and representatives were frequently maintained in countries all over the world⁴. The more prominent firms in engineering, clothing, footwear, leather and dyeing and finishing could also claim to serve a national market. Even some of the smaller concerns frequently undertook

¹A. Pred, 'The Intra-Metropolitan Location of American Manufacturing', A.A.A.G., 54 (1964), 165-80.

²See gazetteer - Wellington Foundry.

³Robinson, Son and Pike, Leeds Illustrated (1892).

⁴For example Luptons maintained a representative in Brazil. See C. A. Lupton, The Lupton Family in Leeds (1965).

work for customers outside Leeds. Crown Point dyeworks, for example, dealt principally with Leeds firms, but also did much work for a West of England billiard cloth manufacturer, who was even prepared to pay the cost of transport on the cloth both ways¹. Other industries, such as brewing, brickmaking, foodstuffs, and, initially at least, printing and publishing, found their customers amongst other Leeds firms. The local chemicals industry also was said to be small and only to serve local demand, principally for dyewares².

Firms who served a national market had first to transport their products to the main transport termini which were all located in or near to the town centre, at least before 1894 when Hunslet Goods Yard was established at Cross Green. Most frequently this was done directly, but larger firms, particularly if they were merchants as well as manufacturers, usually maintained an office and sometimes warehouse in the centre. Obadiah Willans, cloth manufacturer, for example, manufactured at Kirkstall Mills in the 1820's, but at the same time had a warehouse and office in Wellington Street³. William Corson, the noted Leeds architect, designed a shipment warehouse for D. & J. Cooper, cloth manufacturers at Airedale Mills in the 1850's⁴.

It has been shown by Lowry that industrial plants located close to the centre of Pittsburgh, Pennsylvania, make much greater use of rail transportation than do suburban factories⁵. From this it may be surmised that

¹H. Waddington, Crown Point Dyeworks (1953), 12.

²British Association, Handbook (1890), 130.

³W.R.R.D. 12 49 55 (1827).

⁴T. Butler Wilson, Two Leeds Architects (1937), 48.

⁵I. S. Lowry, Portrait of a Region (1963).

as rail transportation was very much more important in the 19th century, attraction towards the rail termini was correspondingly stronger. In the clothing industry, for example, a factory in York Place was especially suitable because of its position near to the railway stations¹.

Where firms were not located near the centre, but access to transport termini was desirable, a site adjacent to one of the turnpike roads was desirable, and where such roads were to be found in conjunction with water and suitable land ribbons of industrial development extended out towards the out-townships. Significantly, there was little industrial development along the Aire valley to the west, or along the Meanwood Valley, until turnpike roads increased the attractions of these locations.

The cost of moving products to rail and water termini made only a marginal difference where the second stage of transportation was a much longer one, and where products had a high value per unit weight. This was normally the case with these 'basic' industries as they have been termed by some geographers².

It has been shown that the transport of coal, a commodity with very low value per unit weight, added at most 25% to fuel costs over the short distances of intra-urban haulage³. Coal varied in value between 6d and 12s. per ton at various times⁴, compared with which flax yarn was sold for 1s. per 1 lb. in 1821⁵ and cloth for approximately 3s.-4s. per 1 lb.⁶

¹L.C.A. Acc. 1416. Sale particulars of York Place Warehouse.

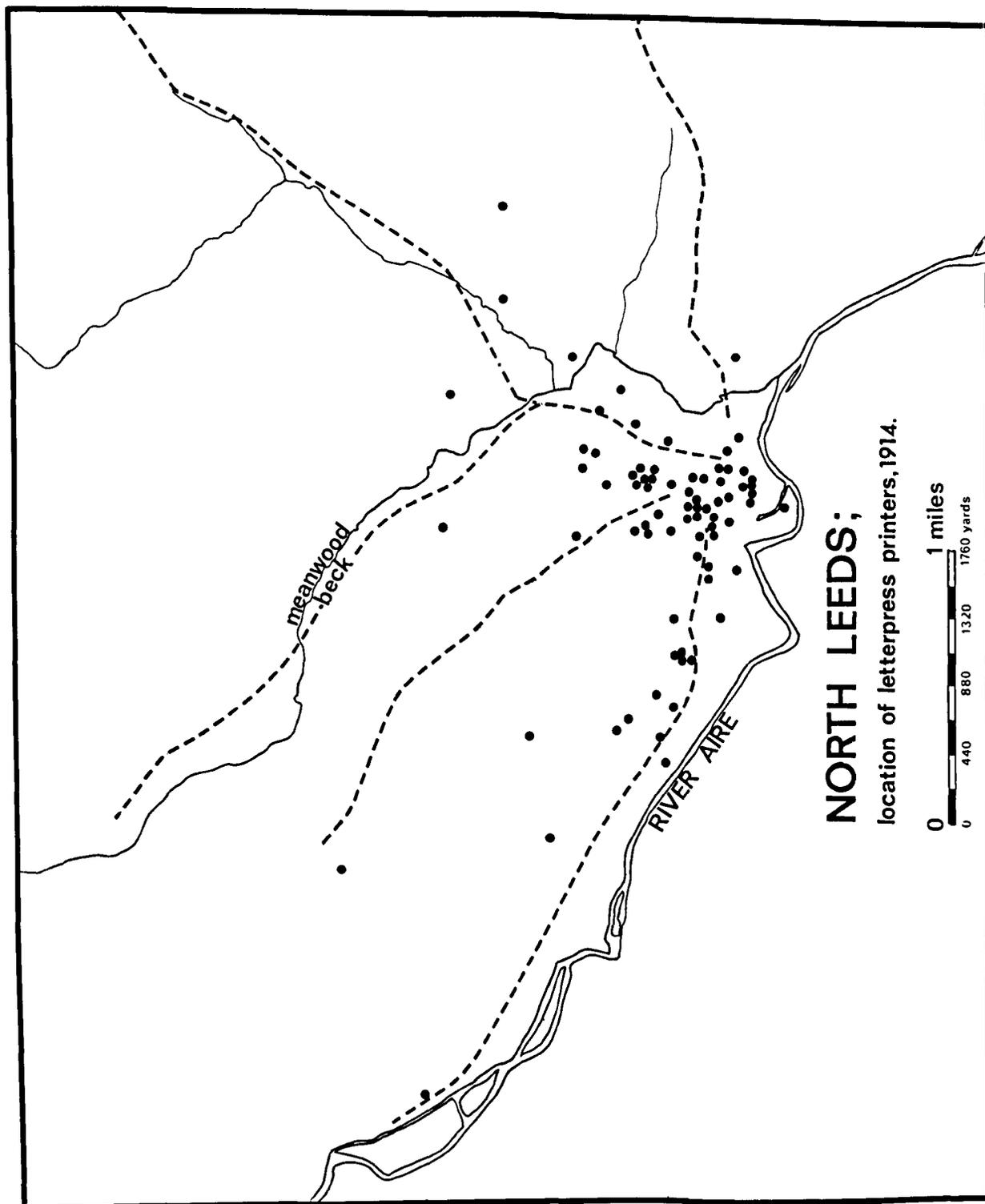
²See H. Mayer and C. F. Kohn, Readings in Urban Geography (1959), Section 4.

³See Chapter VII.

⁴H. Waddington, Crown Point Dyeworks (1953), 8.
W. Brown, Flax-spinning in Leeds (1821).

⁵Ibid.

⁶Sel. Comm. on the State of the Woollen Manufacture (1806), 68.



NORTH LEEDS;
location of letterpress printers, 1914.

0 440 880 1320 1760 yards
0 1 miles

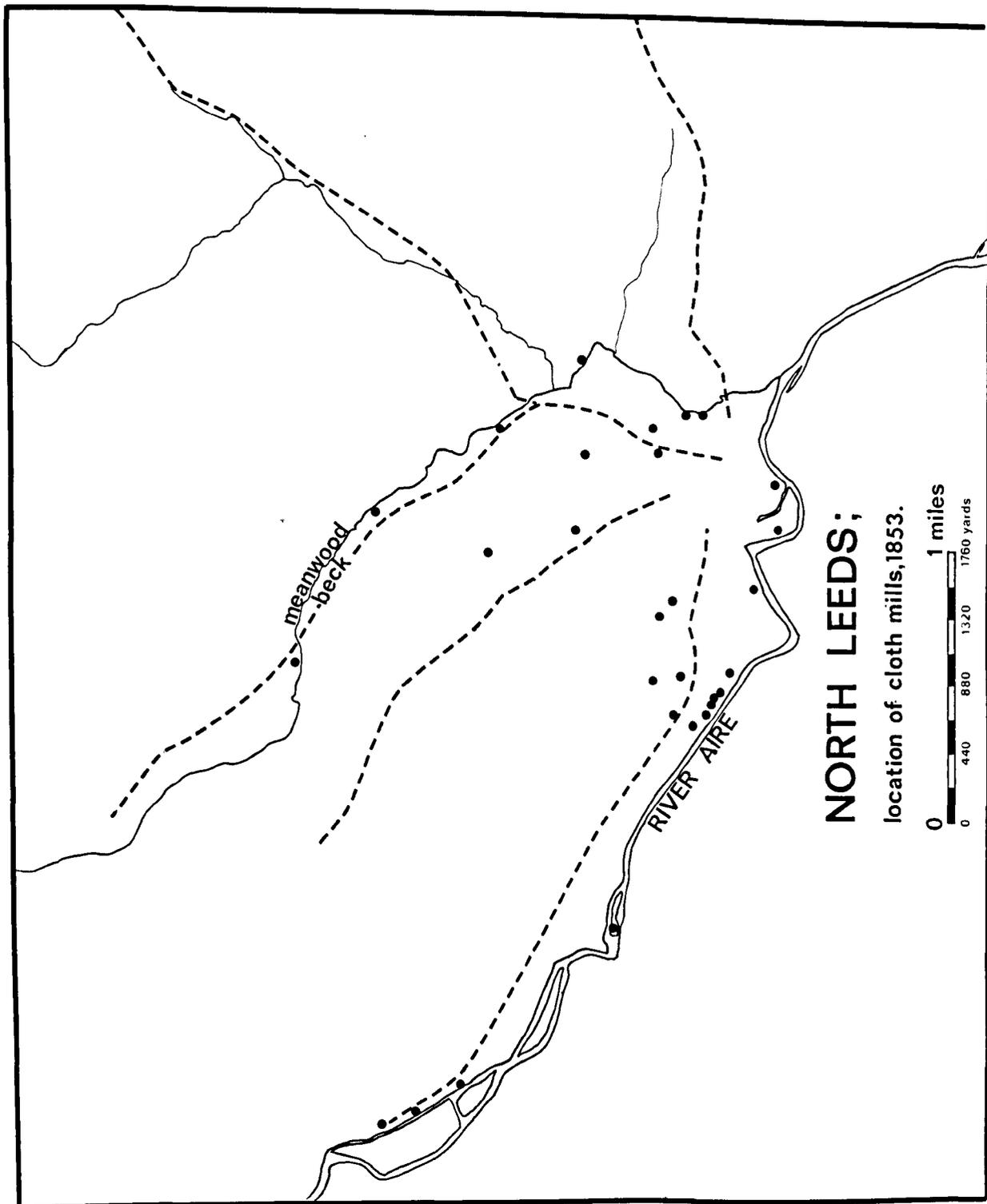
Since rates of transport for different commodities can have varied but little, the cost of carting flax, cloth, and other high value commodities to railway stations and canal wharves must have had a negligible impact upon total costs, and would not therefore have influenced the choice of location.

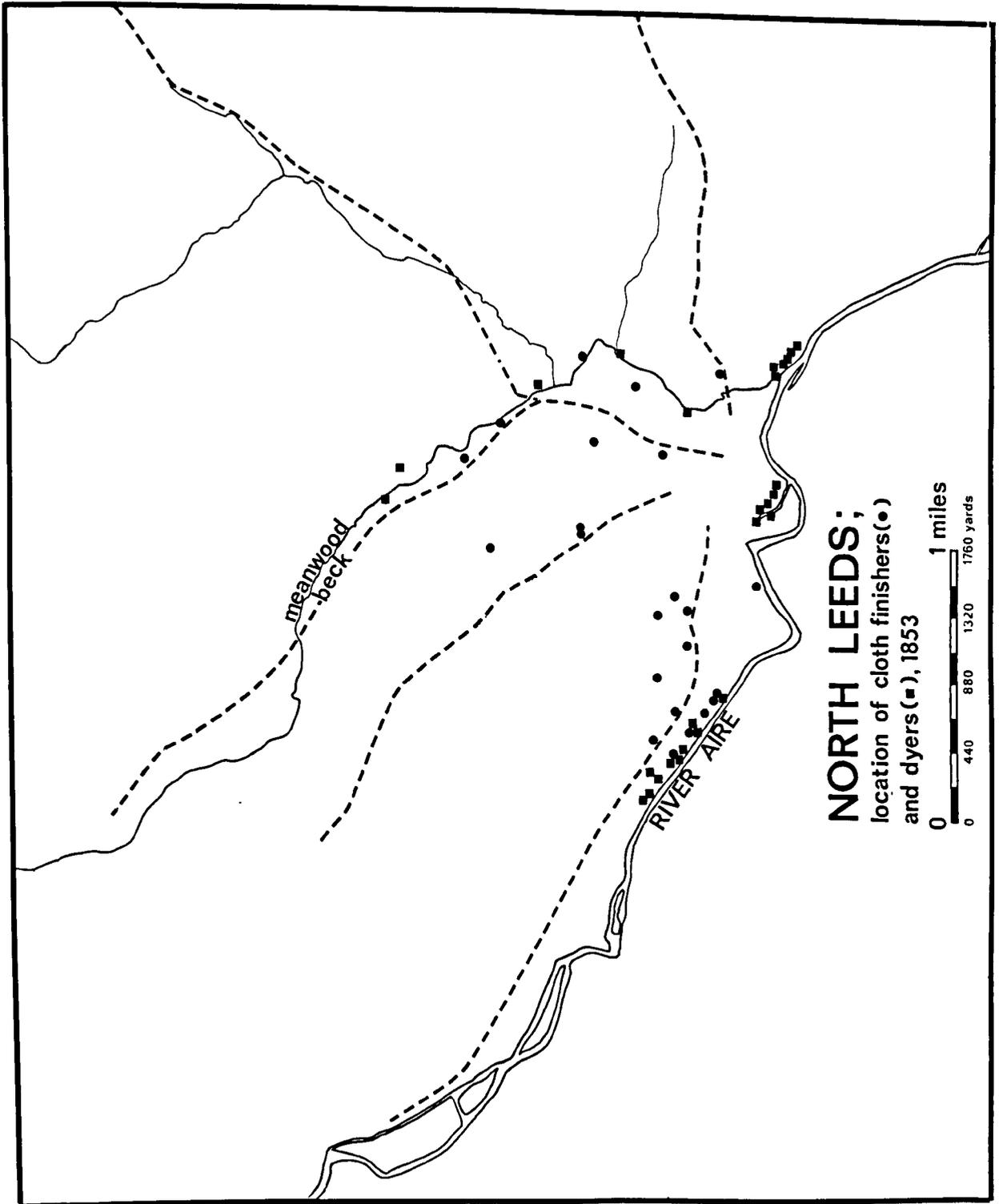
If, on the other hand, only one stage of transport was involved, because a firm's customers were located primarily within Leeds, road haulage costs would have been more significant. The most preferable site would be one which permitted maximum accessibility to market area, in the centre of Leeds if clients were dispersed, or localised in the commercial core, elsewhere if they were localised in another part of the town.

Most firms in the printing industry served a predominantly local market, particularly letterpress printers who relied upon jobwork so heavily. These jobbing houses were generally small - the 42 printers in 1850 employed only about 400 workers¹ - and until 1859 utilised only hand-operated presses. The trade was a miscellaneous one, with short-run contracts which emphasised dependence upon personal contact and proximity to clients. Given that other requirements, of labour, fuel, and raw materials, were not important, it was possible to adopt a location adjacent to the main commercial district which furnished the bulk of their business (Map19).

The market for cloth finishing firms was also a localized one, but clients were themselves manufacturers, and therefore located in the main industrial areas. Both finishing and dyeing were trades which operated largely on commission from merchants and cloth manufacturers, so that to reduce transport costs and to maintain easy contact required a site near

¹Census, Occupational tables (1851) and Directory (1851).





Map 21

to the warehouses and mills of merchants and manufacturers. William Hirst, whilst still a cloth finisher, was offered more work by Charles and Marmaduke Gray, merchants, if he could find premises nearer to their warehouse in St. James Street, and he did in fact move to premises in nearby Clerkenwell Lane in 1804¹. Dyers too needed to be in close contact with their customers:

the trade is of so detailed a character that it is of the utmost importance that the dyer should be in daily touch with his customers whose goods he is treating.²

A comparison of Maps 20 and 21 indicates that this principle was not ignored. Most cloth mills and merchants' premises were located to the west of the town centre in mid-century, and finishing works and dyehouses tended to be in this area also, although the importance of water forced some of the latter to locate elsewhere.

Finally, a number of firms served a local market dispersed throughout Leeds. Such firms characterised the brewing, milling and job-foundry industries, for whom a site in or near to the centre of the town reduced transportation costs to a minimum. The distribution of the brewing industry has already been discussed, and the same observations may be made for the other trades, except that water was less important in siting the factory.

For those industries which met the requirements of local industries the question of intra-urban transportation was likely to be more important than for industries which served a national market; firstly because this was the only stage of transport involved; secondly because products tended to have a lower value per unit weight. That is why such trades were dispersed throughout the country in the first place.

¹W. Hirst, History of the Woollen Trade (1844), 9.

²W. H. B. Court, British Economic History, 1870-1914 (1965), 252-9.

But of greater importance than actual transport costs was the ease with which contact could be made and kept with customers. In the absence of the telephone and similar developments this was a vital factor in most industries. Larger firms, which served a wider market, were able to locate at a greater distance from the centre of the town, but if the distance were great enough an office in Leeds was necessary. Principally this applied to woollen manufacturers from outside the in-township, but it indicates that access to the commercial facilities and activities of Leeds was desirable. Smaller concerns in trades where ease of personal communication was even more desirable were attracted ~~even~~ more strongly towards a central location, and providing that land costs were not a prohibitive factor this was where many of them sought premises.

The second category of urbanization economies as outlined by Nourse consisted of external economies available to a particular trade. These comprised benefits of mutual association such as access to a pool of skilled labour or to a specialised marketing association, factors which were capable of exerting a significant influence over factory location.

The association of small firms in the same trade allows them to obtain scale economies which would otherwise only be available to large firms. This may be of the utmost importance where an industry is newly-established, short of capital and firms are still small, as for example in the clothing industry which is examined in greater detail below.

Where a sufficient number of firms with a similar interest existed in proximity to each other facilities were combined to the benefit of all. Educational facilities, of a specialised nature, might be set up. For example, the Yorkshire College, founded in 1874 housed departments of textiles, colour chemistry and dyeing, and leather sciences from an early date, all to

the benefit of local manufacturing firms. The campaign to set up the college was led by James Kitson, a prominent engineer¹, and other trades of the area were also interested in promoting similar facilities. In 1909 the city was under pressure to increase the provision of classes for young employees in printing, baking and footwear². No one firm was by itself large enough to initiate anything but the most rudimentary training scheme, but there was sufficient demand from all concerns combined.

The same was true of commercial facilities of a specialised nature, for which the cloth halls serve as the best example. There were three by the middle of the 19th century, and though utilised predominantly by out-of-town domestic clothiers, some of the Leeds merchant/manufacturers also bought there³. It was their presence in Leeds which made it the foremost centre for cloth-merchandising, and the mercantile house of Lupton and Company moved from Merrion Square to Aire Street in 1850 so as to be nearer the halls⁴. A considerable proportion of the business of dyeing and finishing firms was for the domestic system, and therefore the cloth halls existed for their benefit also. Domestic clothiers operated on too small a scale to justify marketing their own cloths, and the cloth halls were the type of facility which could only exist by having the support of a large number of manufacturers. Eventually they were forced to close because the domestic system died out and factories were large enough to possess their own marketing arrangements.

¹C. S. Whewell, 'Science in Industries of Special Local Interest', in M. W. Beresford and A. R. J. Jones ed., Leeds and its Region (1967), 278-87.

²G. Taylor, 'Education in Leeds', in Ibid., 295.

³See Chapter II.

⁴C. A. Lupton, op. cit. (1965).

The Corn Exchange, initially in Briggate, but later removed to its present site in Call Lane, fulfilled a similar function with respect to the milling trade, and listed amongst the advantages of a corn mill offered for sale in 1829 was its proximity - only ten minutes walk - to the Exchange¹.

On the whole however, marketing, educational and research facilities were little developed in the last century. The leather industry benefited from the presence in the South Market of a leather fair, held eight times a year², but since this preceded the large-scale development of the industry it cannot be said to have been set up for the benefit of leather manufacturers in Leeds.

The locational impact of this factor was negligible anyway, for facilities came about by reason of the association of manufacturers in Leeds, not vice-versa. More important than formal organisations was the informal exchange of information between manufacturers. Technical development relied more upon entrepreneurial innovation than upon organized research. William Hirst claimed that many Leeds cloth manufacturers were indebted to him for advice, including James Hargreaves whom he persuaded to take Millgarth Street Mill in 1825³. Hirst claimed to have readily passed on his many innovations in the finishing of superfine cloths, and no doubt other manufacturers reciprocated.

Capital too was passed about amongst the community of factory owners. Hargreaves, benefiting from Hirst's advice, prospered and was in a position to finance Henry Gallon in setting up the Whitehall Engineering Works in

¹L.M. 26.9.1829.

²W. G. Rimmer, 'Leeds Leather Industry in the 19th Century', Thoresby Soc. xlvii (1960), 119-64.

³W. Hirst op. cit. (1844), 23.

1861¹. Place and Neuth, linen manufacturers, purchased Hillhouse Mills in 1860 with a mortgage from Tunstalls, linen merchants². John Marshall probably typified the attitude which prevailed when he wrote:

I made use of my surplus capital in accommodating some of my friends who returned the obligation when I afterwards wanted it.³

Both capital and expertise were passed on when partnerships were dissolved and partners set up on their own. Benyon, Hives, and Atkinson were all former partners of Marshall, who between them established flax mills in Holbeck and at the Bank⁴. Mark Walker of East Street Mills was a former partner of Samuel Lawson's in the same trade⁵. In engineering Greenwood and Batley were both former partners of Peter Fairbairn⁶, whilst in the leather industry William Beckwith, shareholder and works manager at Joppa Tannery, left to establish the Viaduct Tannery in 1890⁷. In the cloth trade William Hirst worked for a time at Gott's cropping shops⁸, and no doubt many more similar instances occurred.

The lack of formal institutions for the development of research, before 1875 anyway, assigned a particular importance to social and business contacts, and the entrepreneurial class formed a tightly-knit community, often intermarrying, just as the woollen merchants had done before⁹.

¹L.C.A. D.B. 100.

²W.R.R.D. W.C. 94 109 (1860).

³W. G. Rimmer, Marshalls of Leeds (1960), 65.

⁴Ibid., 58 and 115.

⁵See gazetteer - Byron Street Mills and East Street Mills.

⁶Leeds Express 31.3.1883.

⁷See gazetteer - Viaduct Tannery.

⁸W. Hirst, op. cit. (1844), 7.

⁹R. G. Wilson. Gentleman Merchants (1971).

However, social contact and the exchange of capital were not factors which influenced the siting of individual factories generally, although Marshall encouraged Fenton and Company to establish their foundry on land he owned adjoining his mills¹, and Thomas Greenwood's first works by himself was established a short distance from Fairbairn's foundry².

Of much greater significance in locational terms was the third category of urbanization economies, external economies available to all industries. These resulted from the concentration of social and economic life, and could not be gained where the population was dispersed and greater distances imposed too much friction upon communications. The concentration of activity into a few major centres of settlement is a feature of the advanced, commercialised society, which Britain became in the 18th century. Industrialisation, in particular the adoption of mineral fuels as a source of energy, permitted further concentration and enhanced the benefits of agglomeration.

The significance of agglomeration factors has been fully expounded in both geographic and economic literature³, and in the opinion of one respected scholar at least, most localized industries are neither materials nor market-oriented, but instead are sited in 'swarms' by agglomeration and linkage factors⁴.

¹W. G. Rimmer op. cit. (1960), 64.

²L.C.A. D.B. 58/42. Sale of Wilson's estate, Wilson's trustees to Greenwood, 1838.

³For example, A. Fleischer, 'The Economics of Urbanization', in O. Handlin and J. Burchard, The Historian and the City (1963), 70-3.
A. Pred, The Spatial Dynamics of U.S. Urban-Industrial Growth, 1800-1914 (1966).
P. Hauser & L. F. Schnore, The Study of Urbanization (1965).

⁴P. Sargant Florence, Investment, Location and Size of Plant (1948).
Ibid., The Logic of British and American Industry (1961).

Savings which accrue from locating within a large urban area relate basically to accessibility to facilities which would either be unable to, or would have to be, provided by, the single firm which adopts an extra-metropolitan location. These include transport, public utilities, social utilities, general education and research facilities, financial and commercial facilities, and the existence of a large pool of labour primarily¹.

Such attractions brought industry into Leeds after 1775. For example, one firm of soap manufacturers, established at Castleford in 1889, later moved to Leeds 'as the more convenient business centre'². There is not room to analyse all these attractions and conveniences here. However, some examples will serve to illustrate the point.

Amongst the more often used commercial facilities of Leeds were its banks - five in number by 1853³, including a branch of the Bank of England - and the services of agents, accountants, attorneys, insurance companies, land agents and surveyors, and numerous mercantile concerns. The town also had schools, institutes, libraries, facilities for entertainment³, public utilities⁴, and in fact all the amenities of a large provincial town.

Such amenities were not evenly distributed about the town. In particular, those of a commercial, financial and transport nature were strongly localised within the central area, and the beginnings of a functional separation of zones within the Central Business District (C.B.D.)

¹D. M. Smith op. cit. (1971), 83.

²London Printing and Engraving Company, A Century of Progress (1893).

³W. G. Rimmer, 'Retailing', L.J. 26 (1955), 179-82.
 " 'Stage and Screen', L.J. 28 (1957), 7-11.
 E. Sigsworth, 'Sport I and II', L.J. 28 (1957), 77-9 and 149-50.

⁴W. G. Rimmer, 'Gas and Electricity I and II' L.J. 28 (1957), 223-7 and 299-300.
 " 'Water Supply', L.J. 27 (1956), 375-8.

were recognisable even by the mid-19th century. Insurance, banking and legal services, for example, were located primarily in the area between Park Row and Briggate, whilst warehousing and merchanting took place in the area surrounding this core, but particularly in the area of Wellington Street and Park Square, close by the main railway termini.

Firms wishing to make use of such facilities were oriented towards the town centre, which for many meant the reinforcral of materials - and market-orientation. The business conducted between manufacturing concerns and those involved in service activities constitutes a form of linkage, a factor of some importance in determining the location of industry.

Four types of industrial linkage are recognised by Estall and Buchanan: vertical, horizontal, common roots and diagonal¹. The most important of these is the first-named, whereby semi-manufactured products are moved from one plant to another for further processing. For example, some woollen mills sent their cloths to be dyed and finished by other specialist concerns and leather currying was only infrequently undertaken at the same works as tanning. Mention has already been made (Chapter VI) of the way in which many Leeds industries drew their raw materials from the town's other concerns. The connections thus established between cloth mill and clothing factory, or tannery and footwear factory, constitute vertical linkages.

It is not possible to examine all aspects of the linkage question here, for investigation requires that we have intimate knowledge of the trading records of individual firms. These are not available, and the evidence is therefore mostly circumstantial. However, it is clear that many Leeds firms and industries were closely interconnected, and that in certain circumstances this had a strong impact upon location.

The seven major industries - cloth, flax, engineering, clothing, footwear, printing and leather - were each backed up by a number of

¹R. C. Estall & R. Buchanan, Industrial Activity and Economic Geography (1966), 94-6.

ancillary industries which owed their presence in Leeds to the demand created by these 'location leaders', as they would nowadays be termed. For example, cloth manufacturers called into being wool cleaners and scribbling millers, fullers, dyers, and finishers ('vertical linkages'). Engineers and machine-makers supplied cloth mills with steam engines, going gear and woollen machinery; drysalters and manufacturing chemists provided dyewares and chemicals; the leather industry produced mill belting; and sizing (gelatine) boilers, bobbin turners, spindle and flier makers, and paper manufactures all contributed also ('diagonal linkage'). Cloth manufacture shared with other textile industries access to a pool of skilled labour, versed in the techniques of, and accustomed to, mill labour ('common roots linkage'). Finally, mention has been made earlier in this chapter of the way in which research development was informally shared by manufacturers within the same trade. This constitutes a weak form of horizontal linkage, but there is little evidence before 1914 of the development of assembly methods of manufacture. The only activity in which various stages were put out to specialist practitioners before being assembled for final manufacture was the cloth industry, and here the materials remained the property of the clothier and the merchant, and dyers, scribblers and the like were not always independent firms.

Subcontracting was a common practice in certain industries, notably flax, cloth, clothing and footwear, but was generally to relieve pressure upon the factory in times of high demand. In the earlier part of the century, when business was good, 'hirespinning', at 3s. per bundle was common in the flax trade¹. In the woollen industry a portion of the weaving was often undertaken by outside concerns, Gott, for example, used many looms outside his factories, and in 1829 had as many as 200 working for him².

¹W. Brown, op. cit. (1821).

²L.M. 26.9.1829.

Further mention of this practice in relation to the clothing industry will be made below.

Although not the type of horizontal linkage which Estall and Buchanan would define, the effect was similar. It was a practice facilitated by the association of factories and workshops, and one which emphasised the concentration of an industry within a particular area. Used by many firms as a means of gaining entrance to an industry, it was easier to procure work if the workshop or factory were located in proximity to the firms which did the hiring.

The evidence for linkages of a vertical and diagonal type is quite strong. Even if connections between individual firms are difficult to trace, linkages between various industries undoubtedly existed. As evidence one may cite the number of firms specialising in the manufacture of textile machinery. Most of the larger engineering concerns started off producing either flax machinery (e.g. Lawsons and Fairbairns), silk machinery (Greenwood and Batley), or equipment for cloth mills (Kilburns and Withams), and only later graduated to other branches of the industry. There were no fewer than eighteen flax-machine makers in Leeds in 1841, and twenty-five founders and engineers catering for the woollen industry¹. In addition there were numerous spindle makers, bobbin turners, slay and gear makers (for weaving), and the like. The advertisements section of the 1856 Directory includes the names of a maker of washing, wringing, and flocking machines, a card maker, and a manufacturer of washing machines designed for the woollen industry².

¹Sel. Comm. on the Exportation of Machinery (1841), 210, evidence of P. Fairbairn.

²Gillbank's Directory (1856).

Engineering served more than just the textile trades, however, and the existence of other specialisations was closely linked to the industrial structure and development of Leeds. Besides textile machinery, which occupied one in five engineering workers in 1858¹, individual firms developed an interest in manufacturing machinery for the clothing industry, footwear, cut-nail manufacture, brickmaking, leather, and printing. By 1913 Leeds was, for example, the foremost centre for the manufacture of brick-making machinery in the land, and it was said to house the only firm in the world dealing exclusively with machinery for the production and finishing of leather². The Chamber of Commerce felt that such branches of the trade as colliery plant, hydraulic machinery, and locomotives all merited a separate entry in their yearbook, but they were in no doubt as to the origins of the industry:

The necessities of the woollen trade involving the replacement of hand labour by machinery may be said to be the foundation of the Engineering Business.³

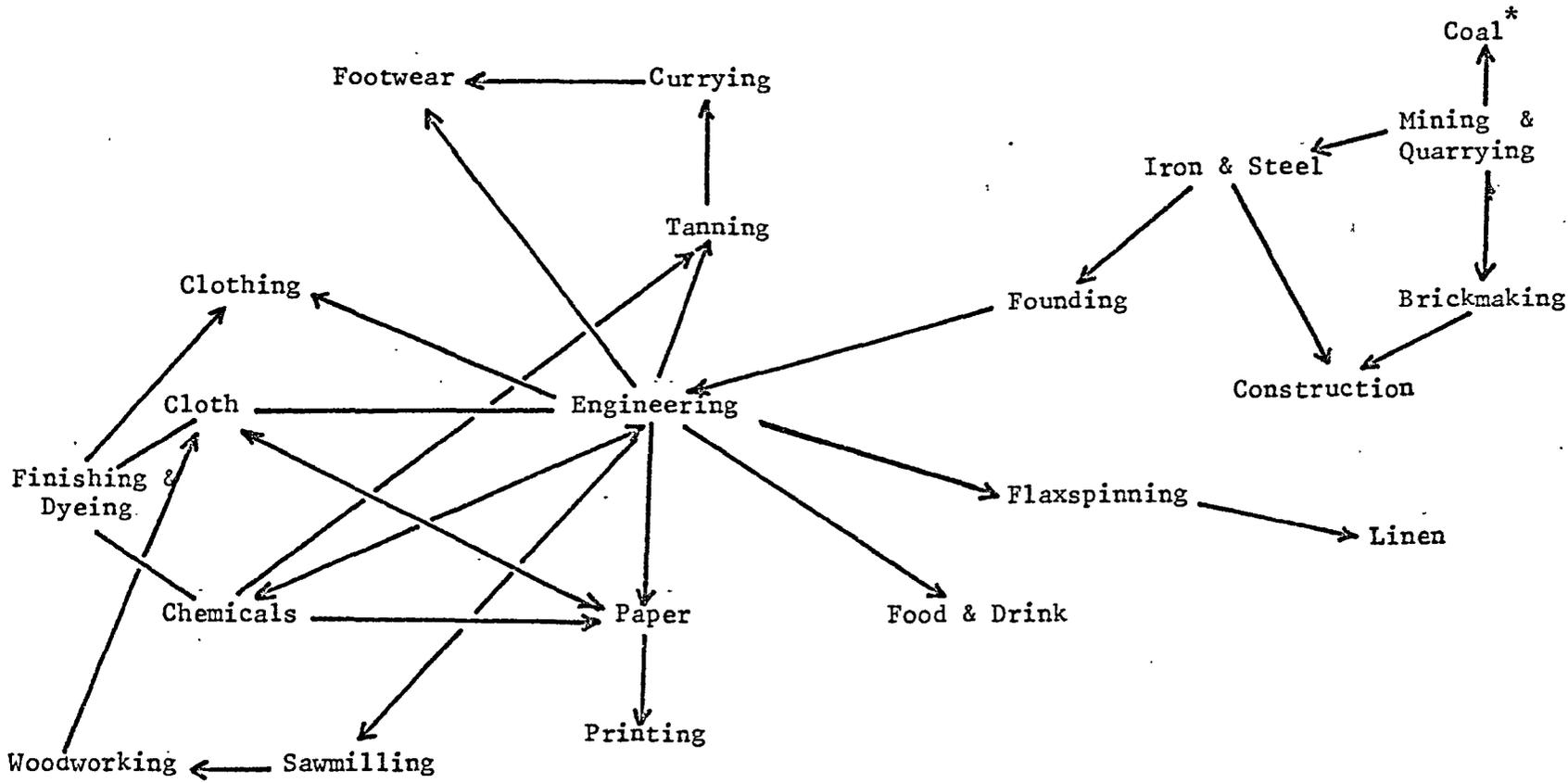
Amongst other industries diagonally linked with the leading trades were brush-making (principally for textile mills), the fireclay industries (materials for ironworks and foundries), and chemicals (for a great variety of trades, but notably dyeing). The principal supply linkages which involved the movement of raw materials, semi-finished, and finished products are portrayed in diagrammatic form on page . From this figure it may be seen that few industries were not related to each other in some way or another.

¹R. Baker, 'On the Industrial and Sanitary Economy of the Borough of Leeds in 1858', Q.J.S.S., xxi (1858), 438. 1)

²Leeds Chamber of Commerce Yearbook, (1913).

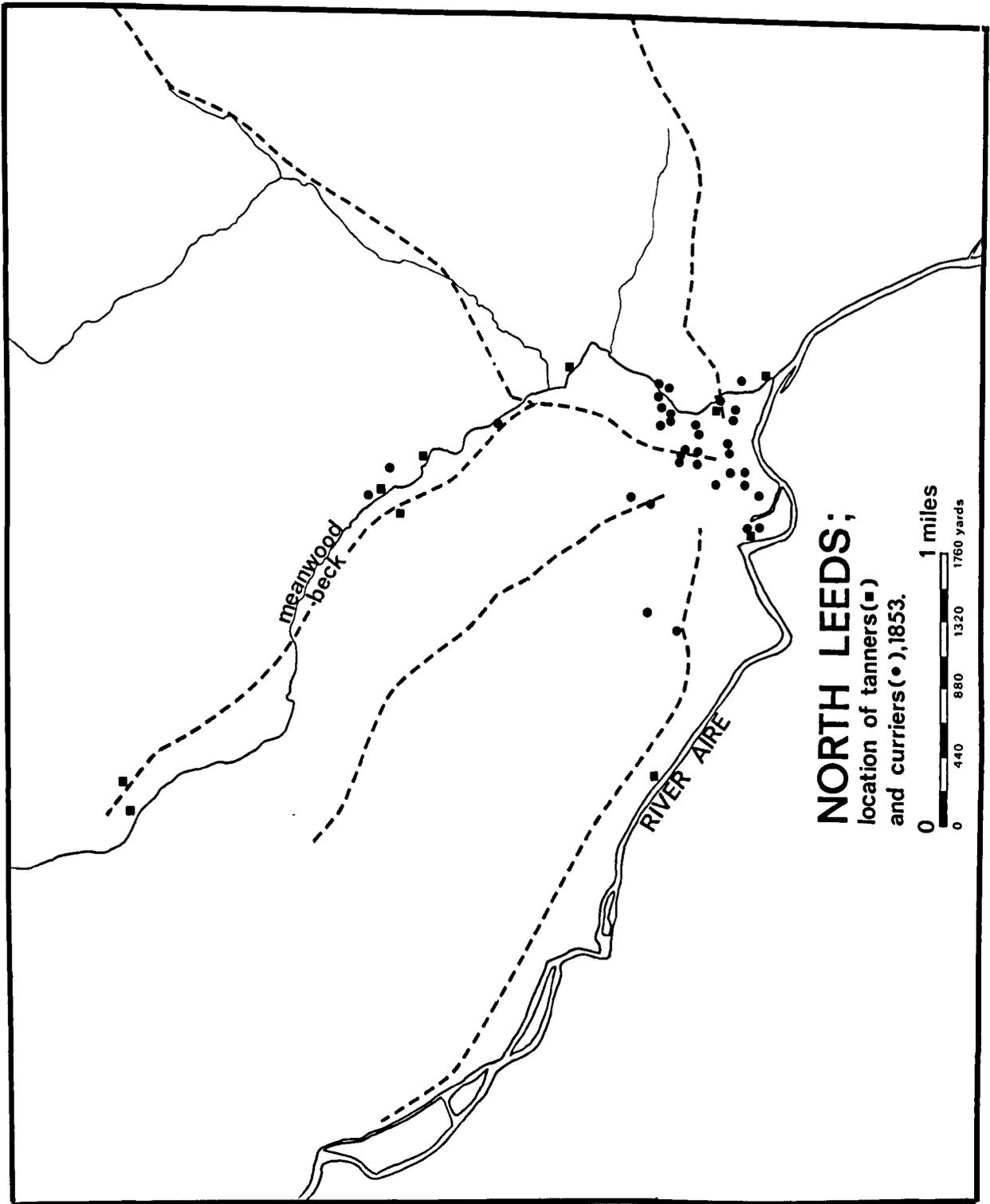
³Ibid., 24.

SUPPLY LINKAGES IN THE INDUSTRIES OF NORTH LEEDS: c.1860
PRINCIPAL INDUSTRIAL GROUPS ONLY



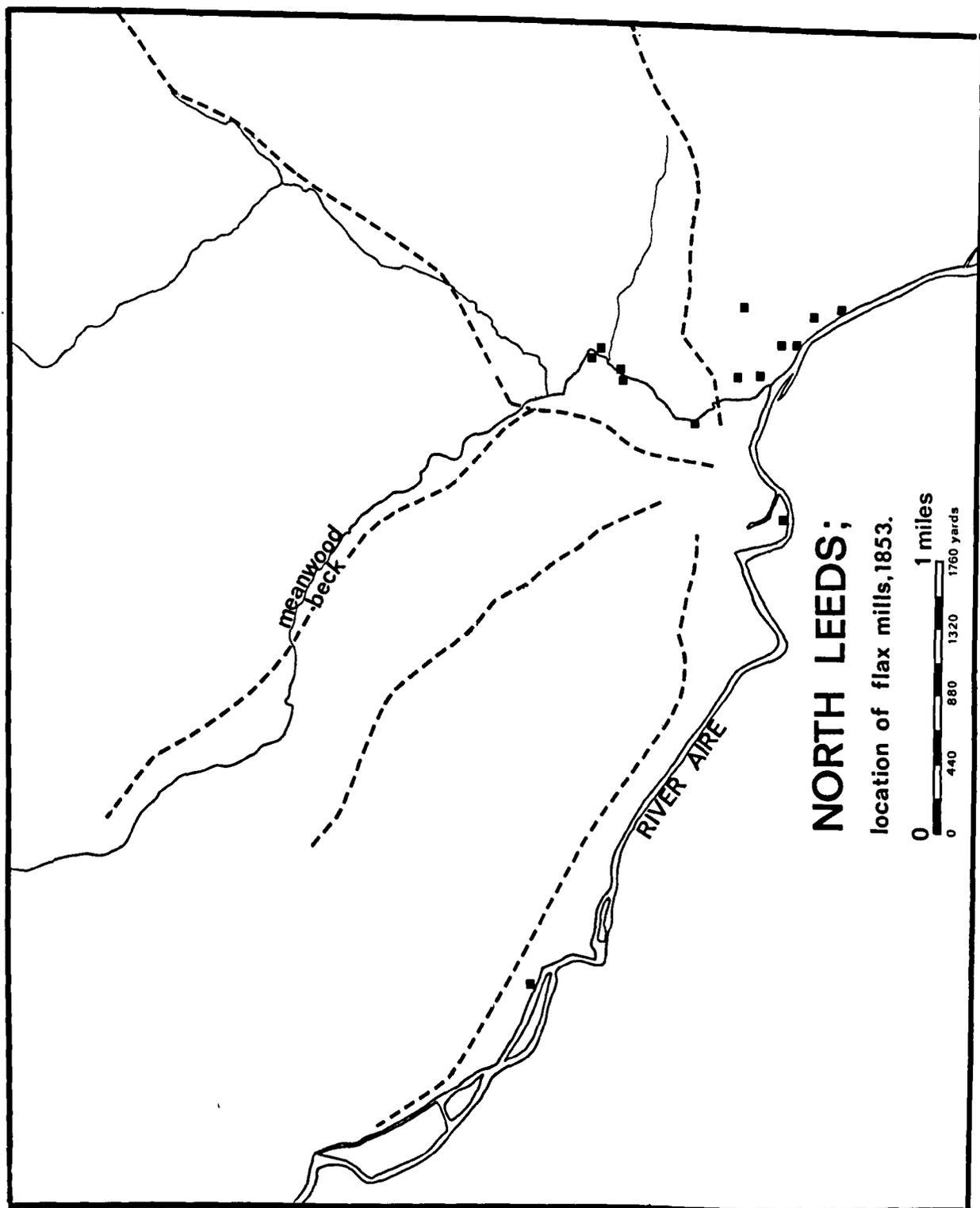
↓ indicates direction in which product moved.

*Note : Coal was utilised by all industries as a source of fuel and power, but in order to preserve simplicity coal supply linkages are not indicated.



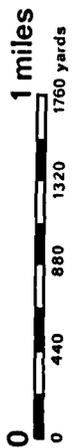
NORTH LEEDS;
location of tanners (■)
and curriers (●), 1853.





NORTH LEEDS;

location of flax mills, 1853.

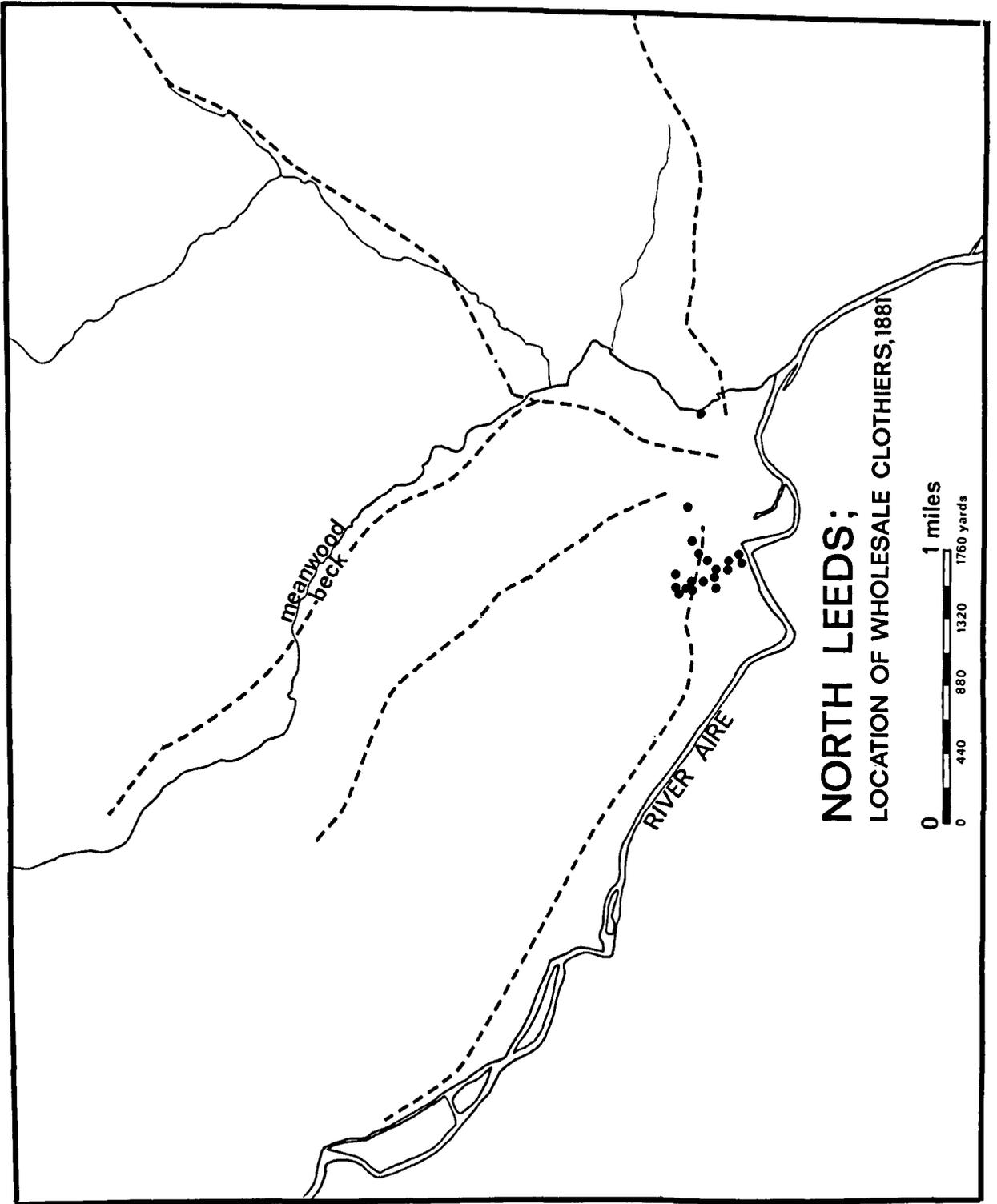


The part played by the factor of linkage in the development of urban-industrial complexes is an important one¹. But this does not necessarily mean that it exerted any influence over the intra-urban location of manufacturing. In the main, diagonal linkages do not appear to have been important in this respect, but vertical and horizontal linkages could be. Connections with the service sector of the town's economy were of particular importance, reinforcing the pull towards the centre already exerted by market factors. The movement of goods between firms probably did not constitute an important consideration, and a factor which must be borne in mind here is that for new firms anyway a location was chosen before customers were solicited.

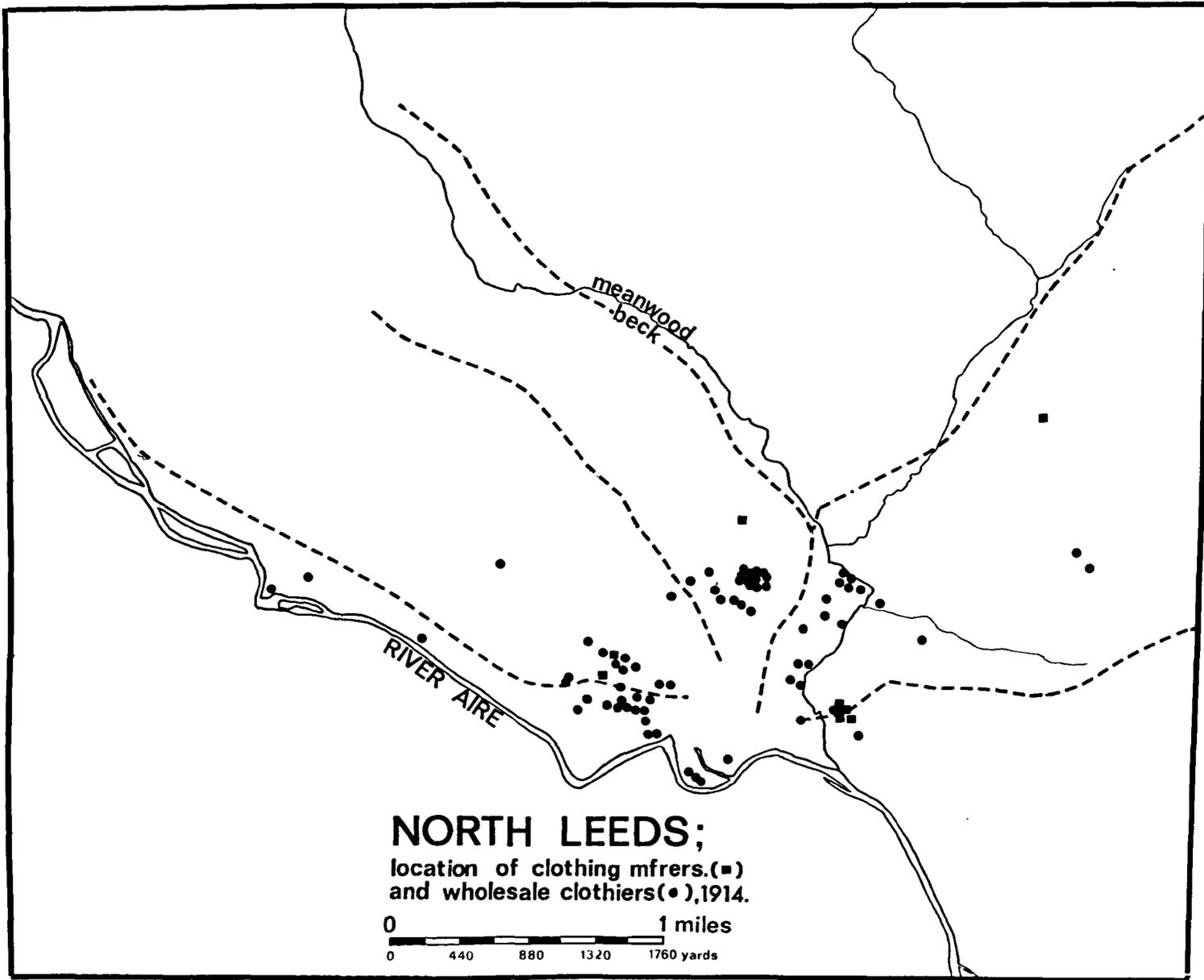
Horizontal linkages were of particular importance, if a broad definition of them is accepted. Different industries often showed a tendency to locate themselves within distinct sectors of the town, and this is not a feature which can always be explained in terms of access to raw materials, or by topographical considerations. The cloth industry exhibited a marked preference for West Leeds, flax spinning for East Leeds, and the Meanwood Valley around Buslingthorpe formed the main concentration of leather manufacturers by 1914 (Maps 20, 22, 23) but the most clear-cut example was the clothing industry which clung tightly to the area around Park Square until 1890. There are a number of explanations for such concentrations, two of which (access to raw materials and topographical constraints) have already been ~~discussed~~. The alternatives are either that firms in the same industry were closely linked, or that the pattern developed out of a

¹The West Midlands Group, Conurbation; A Planning Survey of Birmingham and the Black Country, (1948).

D. Keeble, 'Local Industrial Linkage and Manufacturing Growth in Outer London', Town Planning Review, 40 (1969), 163-88.



NORTH LEEDS;
LOCATION OF WHOLESALE CLOTHIERS, 1881



NORTH LEEDS;
location of clothing mfrs.(■)
and wholesale clothiers(●),1914.

0 1 miles
0 440 880 1320 1760 yards

combination of historical accident and satisficer principles, neither of which is a satisfactory explanation. We are forced to conclude, therefore, that linkage was an important factor, a conclusion which has been reached elsewhere in a similar context¹. But the exact form of these linkages is more difficult to reconstruct because the business records of individual firms have not survived. Nor has there been room here to perform anything more than a rudimentary analysis of the main industries. To illustrate some of the main points, therefore, a closer consideration of the clothing industry is undertaken. An outline of its development has been given above in Chapter III². Here it is intended that attention be focused upon the locational development of the industry.

The location of clothing firms in 1881 and 1914 is depicted in maps 24 and 25. These indicate that the industry was initially concentrated around a nucleus in the western end of the central area of Leeds, whence it spread outwards, firstly into the vacated factory premises of the inner industrial areas, then later into new purpose-built factories some of which were in the suburbs, the main location today. By 1914 firms were well distributed throughout Leeds, although the original concentration in the Park Square area was still observable.

The movement of firms outwards from this nucleus reflects the changing importance of different locational factors, and it will be convenient to divide the years 1856 to 1914 into two periods.

The first of these commenced when John Barran set up his small factory in Alfred Street, manufacturing ready-made clothing, principally for children,

¹P. G. Hall, The Industries of London Since 1861, (1962).

²See also J. Thomas, 'History of the Leeds Clothing Industry', Yorks. Bull. occasional paper no. 1, (1955).

the production of which was more easily standardised. The choice of location was probably much influenced by chance, although it is likely that Barran sought a building close to his shop in Briggate. At the time two warehouses in Bellamy's Court, Alfred Street, built by Matthew Gaunt, were up for sale. These Barran bought and, equipped with American sewing machines, began the factory-production of clothing¹. In 1866 these premises were sold and the firm moved to Park Row. In 1878 the firm moved again, to St. Paul's Street.

By this time there were 15 wholesale clothiers and 7 hat and cap manufacturers, the number of the former rising to 21 by 1881². These, with only one exception, were all located in the Park Square area, within a short distance of competitors.

In its early stages the industry was characterised by a lack of working capital, a high rate of instability, and a rapid rate of entrepreneurial innovation, all of which played a part in restricting the distribution of the industry. Though Barran's stock books indicate that during his years as a draper and clothes dealer he had been able to accumulate over £15,000 in capital stocks³, most entrants into manufacturing were less well endowed. What capital they possessed was required for the purchase of machinery and materials, and the recruitment of a labour force. Also the business had to be tided over until custom was assured and order secured. The high level of uncertainty in the trade meant that borrowing capital was difficult and too much of a long-term commitment. Few firms were therefore able or willing to purchase or build a factory, Barran being one of the few exceptions. The

¹W.R.R.D. U.O. 565 646, (1859).

²Directory, (1881).

³J. Thomas, art. cit., (1955), 9.

availability of rented premises therefore in part determined the early location of the industry. Initially former warehouses in the Park Square area were favoured, but later room was frequently found in part or all of an old mill or factory, a development which was encouraged by the decline in the textile industries and the obsolescence of older premises in the inner industrial area. Amongst the former cloth mills that were taken over, at least in part, by clothing manufacturers were Park Lane Mills (from 1888), Grace Street Mill (from 1878), Camp Road Mills (1876), and Lady Bridge Mills (1897).

Initially however, it was the warehouses of the western part of the central area which were leased and converted into factories. The area around Park Square was the major woollen-merchanting district, an activity which was suffering somewhat from the stagnation of the industry and the propensity for manufacturers to undertake their own marketing. It was in this area, with its further advantages of proximity to communications, labour, and the cloth manufacturers, that the first manufacturers set up their works. The concentration having once been established, other manufacturers were either unable, or unwilling to look elsewhere.

The rapid rate of innovation, which mainly involved developments by the manufacturers themselves, and the importance of external economies in an industry that was young and organised in small units, induced a high level of interdependence amongst firms. This was reinforced as ancillary manufacturers of clothing machinery developed, and as a skilled labour force evolved, to which good access was all-important. Contact between firms enabled them to keep abreast of new ideas and developments, and in touch with changes in market demand, though this latter factor was much more important in the London clothing industry which dealt much more with fashion garments and individual requirements. In Leeds production lines were

¹P. G. Hall, 'The Location of the Clothing Trades in London, 1861-1951', Trans. I.B.G., 28 (1960), 155

longer and production aimed at a mass market.

Since firms tended to be small, initially anyway, and since they utilised space very intensively (see Chapter V), land costs or rents were not important. Nor were factory requirements very specialised. Sewing and cutting machines could be set up in any type of building. There was, therefore, little competition for old warehouses from other industries and the intensity with which the property was used enabled clothing to outbid even some commercial users.

Finally, concentration was further encouraged by the practice of subcontracting, the importance of which was noted above. This type of work was frequently undertaken by small Jewish masters in workshops of up to 100 workers¹, who often took work home to be finished. The main location of Jewish residences and workplaces was in the Leylands, where a secondary concentration of the clothing industry emerged, with which the factories found it necessary to keep in close touch.

From the mid-1880's the industry began to disperse, as new firms were forced to seek premises peripheral to the main concentration. At the same time the importance of close contact with other firms became less important, some firms by now being well-established and large-scale. A labour force of 500 workers, predominantly female, was not uncommon, and many of the houses were nationally famous.

The second phase of the industry's development commenced with these changes, but of even greater significance were certain other developments involving the development of road and passenger transportation and the migration of workers to the suburbs. The size of individual concerns increased, and the growing use of machinery encouraged the adoption of

¹J. Thomas art. cit., (1955), Chapter 2.

flow-line production techniques. The result was that for some firms seeking a new location land costs became more critical. Since it was no longer essential to locate near the centre to obtain access to labour and commercial facilities, firms were able to take advantage of the availability of open, lower cost sites in the suburbs. By 1914 a number of factories had been set up in Burley, Burmantofts, and Harehills. Of thirteen new clothing factories built in North Leeds between 1895 and 1910, six were in suburban areas, and another was in Belle Vue Road, in what was previously a non-industrial area¹. All of these covered a large ground area. J. N. Sharp's factory in Cardigan Row, for example, extended over 60,900 sq. ft. of land and was of one storey².

Factories continued to be built in the inner area. At the same time as Sharp's was being completed, a new clothing factory for Armitage and Hodgson in Camp Road was being built. When finished (1907) it contained a similar floor area - 56,243 sq. ft. - but was of five storeys instead of one³.

In fact, by 1914, despite the advent of the telephone, worker mobility, flow-line production techniques, and the beginnings of road transport, many firms still sought a location in the area of Park Square. Of the seven new factories built in the inner area 1895-1910 five were between Chorley Lane and Wellington Street⁴, perhaps because some manufacturers still believed that a location elsewhere was economic, perhaps because there were yet considerable savings to be made in transport costs and it was still advantageous to be near to the cloth mills and warehouses.

¹L.C.H. City Engineer's Office, Building Surveyors Records. List of Factories Built in Leeds, 1889-1909.

²Ibid.,

³Ibid.

⁴Ibid.

One factor which was of importance in encouraging the dispersal of clothing firms was size. The industry was characterised by the high mobility of its members right up to 1914, and the usual reason for moving was an increase in business. Whilst building requirements were not greatly specialised and the level of capitalisation comparatively low, firms were able to move to new premises when expansion in business demanded. In the early period the more successful firms expanded very rapidly indeed, Messrs. Little and Company increased their balance from £13,800 in 1883 to £61,000 in 1899¹, and ~~therefore~~ exhibited a high degree of mobility. Starting in Quebec Street in 1880, Little and Company moved to Aire Street in 1885 and to York Place in 1901. Joseph May and Sons went from Bean Ing Mills to New Park Street Mills, and then in 1907 to Whitehall Road, all moves necessitated by expansion².

In other industries, however, there was a high degree of inertia, partly because business was not expanding so rapidly, but principally because firms were large and possessed a heavy investment in plant and machinery.

The size of individual firms is therefore a factor which needs to be taken into a consideration of the location of industry. It influenced mobility, as already seen, it affected land costs (Chapter V), and it also affected the extent to which internal economies of scale operated.

Internal economies of scale replaced external economies of scale where individual firms were large enough to provide their own marketing facilities, ancillary services, and transport arrangements. The effects upon location were two-fold. Firstly the larger the individual units, the smaller the number of factories for a given output; thus fewer locations were adopted and

¹L.C.A. Acc. 1416.

²Yorkshire Post, Leeds Tercentenary Supplement, 8-17 July, 1926.

each one assumed proportionately greater significance. The flax and the footwear industries employed a similar number of workers in the late 1860's - approximately 4,500 - but whereas there were over one hundred firms in footwear there were only eleven flax and linen concerns¹. The area over which it was possible for each to spread was therefore markedly different. At the same time the importance of land costs as a part of overall costs was likely to be higher for larger firms, and therefore we would expect the flax industry to be located at a greater distance from the centre. Though comparison is difficult because many of the flax mills had been established half a century earlier, it is true that some footwear manufacturers were located nearer to the town centre, in smaller, but more intensively utilised premises.

Secondly the larger a firm the greater its internal economies of scale and therefore of its independence from other firms and institutions². Whereas it is doubtful if a small cloth finishing firm would have been able to compete from a location in Kirkstall, three large woollen mills did so successfully.

The effect was the same in both cases - the larger the individual units of production the more likely it was that an industry would be located further from the town centre. Against the factors of land costs and internal economies of scale, however, was the increasing difficulty felt by large firms in recruiting labour as distance from the main concentration of population increased.

Labour, in fact, was one of the principal attractions of the larger towns and firms shared a pool of skilled and unskilled labour, which if distinguished by its low cost or special skills served to link firms

¹Census, occupational tables, (1871) and Directory, (1870).

²J. S. Bain, 'Economies of Scale, Concentration and Conditions of Entry in Twenty Manufacturing Industries', in G. Karaska and D. Bramhall eds., Locational Analysis for Manufacturing, (1969), 265-89.

together. This aspect of linkage has been ignored in this chapter because it is considered to be of sufficient importance to merit a chapter by itself.

Chapter IX - THE INFLUENCE OF LABOUR

A point of continual emphasis throughout this work so far has been that there is an important distinction to be made between inter-urban and intra urban patterns of industrial location, or, as Hamilton prefers to put it, between the choice of 'situation' and of 'site'¹. The relative importance of the factors varies according to level and a particular factor may operate differently in the intra-urban context. Perhaps this is particularly so with regards to labour.

Whereas the influence of labour upon the regional location of economic activities has received full recognition from scholars, and has been isolated and analysed for a variety of circumstances², it has been too often ignored at the intra-metropolitan level. Even within a compact urban area all locations do not possess equal access to workers. In the 19th century this unevenness was accentuated by socio-economic segregation and the lack of personal mobility.

Such studies of the intra-urban scene as there have been tend to be of Anglo-American cities in the present century. Caution should be exercised in applying hypotheses born out of such research to European cities, and particularly to urban areas of a different time. Urban population is now dispersed throughout a large area and exhibits a high degree of mobility due mainly to the internal combustion engine. A residence is frequently chosen according to factors other than optimising the trade-off between increased space and a shorter journey-to-work³. In the 19th century the

¹F. E. I. Hamilton, 'Models of Industrial Location', in R. Chorley and P. Haggett eds., Models in Geography (1967), 361-417.

²For a useful summary see R. C. Estall and R. Buchanan, Industrial Activity and Economic Geography (1966), 72-83, and D. M. Smith, Industrial Location (1971), 45-51.

³B. Harris, 'Quantitative Models of Urban Development', in H. S. Perloff and L. Wingo eds., Issues in Urban Economics (1968), 363-410.

situation was different. The working population was less affluent, and the distance at which it could live from its places-of-work was restricted to about three miles at most. Instead of regarding the whole urban area as the labour catchment for any firm within the city we are forced to think in terms of a series of overlapping labour-sheds, with each factory having its own employment-field, usually confined to one part only of the town. Whilst there is some evidence to suggest that the concentration of working-class housing around factories was not absolutely necessary, the distance from their workplace at which people were able to reside was strictly limited, at least until the advent of a cheap, efficient system of public transport.

In regarding the 19th century development of urban areas, therefore, it would be best to classify industry and commerce as 'productive', and housing as 'derivative' as Vance suggests¹, were it not that labour is never quite the passive object which such notions imply. Workpeople could not live far from the factory, but the relationship was mutual - factories could not survive without access to an adequate labour force. The distribution of workpeople was a factor of which manufacturers were forced to take account, and the evidence from the advertisements for industrial property indicates that its importance was indeed acknowledged. A factory near North Bridge previously occupied by R. and T. Brumfit for making carpets was said to be 'in the centre of a populous neighbourhood for labour' in 1796², whilst Steander Mills in 1853 were described as being 'in the best situation for hands, Coal and Water'³. A newly-built factory cannot

¹J. E. Vance jr., 'Labor-shed, Employment-field, and Dynamic Analysis in Urban Geography', Econ. Geog., 36 (1960), 189-220.

²L.I. 21.11.1796.

³L.M. 26.11.1853.

wait for housing to develop around itself; it must locate where labour can be obtained immediately. Only when housing and recruitment of labour formed a part of the development could an isolated location be adopted, and this was generally not the practice in or near urban areas¹.

The importance of the distribution of labour in determining intra-urban industrial location has been acknowledged by Logan², but is only implied in the work of Pred and others³. Yeates and Garner concede that in a large city labour differentials are important, but only due to spatial inequalities in the supply of female, skilled, or non-unionised labour⁴. The general distribution of workpeople, and the importance of mobility levels is virtually ignored. Within the context of the contemporary North American City it is correct to assume a high level of worker mobility and hence that labour is equally available to all firms at all locations. But the 19th century town, without even public transport, was totally different. At the same time, as a part of total costs, labour was undoubtedly of greater importance to manufacturing than is the case today. Industrial development in the 20th century has been characterised by, inter alia, the increasing application of capital and technology, and the consequent diminution in the cost of labour. In the early days of the industrial revolution, and even in 1914, output per worker was far below present levels. As measured by the growth in national income per capita at 1913

¹S. Pollard, 'The Factory Village in the Industrial Revolution', English Hist. Rev., lxxix (1964), 513-536.

²M. I. Logan, 'Locational Behaviour of Manufacturing Firms in Urban Areas', A.A.A.G., 56 (1966), 451-66

³A. R. Pred, 'The Intra-metropolitan Location of American Manufacturing', A.A.A.G., 54 (1964), 165-80.

⁴M. H. Yeates and B. J. Garner, The North American City, (1971), 380-1.

prices, labour productivity doubled between 1913 and 1959¹.

An assessment of the importance of labour in locating industry within an urban area involves attempting to answer the following questions:

- (1) What proportion of total costs do labour costs constitute in different industries?
- (2) What differences, if any, are there in the productivity of the workforce?
- (3) Is there any spatial variation in these factors?
- (4) What geographic variations are there to the labour supply? How mobile is the workforce?

It is proposed to take each of these problems individually, and although time and space dictate that some aspects of the question must be dealt with summarily, geographic variation will be emphasised.

After the advantages of good communications and transport facilities the principal attraction of urban areas for manufacturing in the 19th century was the existence of a large pool of labour, capable of supplying the requirements of all concerns, large and small, and rendering the recruitment and dismissal of workers an easier task. Large towns like Leeds housed a population generally less unwilling to enter into factory life, there being little alternative for the lower classes of workpeople. Reluctance to work in factories was most marked in the early phase of the Industrial Revolution when, according to Pollard,

Recruiting to the textile factories was geared chiefly to overcoming the shortage of labour willing to work regular hours and endure factory discipline²

One of the first problems faced by entrepreneurs in setting up a factory, therefore, involved the recruiting of the workforce, a process hindered by the common mistrust of factory regimentation, and the reluctance with which any measure of freedom was given up. These stemmed from the

¹P. Deane & W. A. Cole, British Economic Growth, 1688-1959, (1967), 284.

²S. Pollard, The Genesis of Modern Management, (1968 edn.), 203.

association of the factory with the workhouse and the criminal institutions which represented some of the earliest attempts at this type of organisation.

To set up a factory successfully the industrialist had first to ensure that there was an adequate potential of labour in the area chosen ~~for siting the factory~~, then next to offer wages sufficient to attract workers from alternative occupations. In which case existing concentrations of population were best able to meet these requirements. Where other firms were already established there was a clear indication that labour was available.

Recruiting and keeping managerial and office staff was also an easier task in the larger urban areas. The importance of this class of operatives is often overlooked, but not all factory-owners organised and supervised their production directly, as William Hirst appears to have done¹. In many factories the owner relied upon the abilities of managers and overlookers. Benjamin Gott knew little about the actual manufacture of cloth, and production was actually in the hands of five under-managers whose 'general relation to the firm appears to have been very much the same as that of a subsidiary company to a modern combine'². In other concerns owned by merchants, production was also supervised by such managers. J. and J. Asquith ran Bagby Mills for James Brown for a long time, eventually taking over the business completely upon the latter's retirement in 1857³.

Larger urban areas possessed a much greater concentration of managerial expertise than did smaller settlements, and it was possible for a new firm to recruit supervisory staff from rival firms. James Kirk, for example,

¹W. Hirst, History of the Woollen Trade, (1844).

²W. B. Crump, 'The Leeds Woollen Industry', Thoresby Soc., xxxii (1931), Chapter 1.

³See gazetteer - Bagby Mills.

started his working career at Camp Road Mill in 1822, joined Lupton's as an overlooker in 1828, and then moved to French and Cooper's in the same capacity in 1833¹.

The number of managers, clerks, overlookers and operatives that were required depended upon the scale at which a firm commenced business, which varied not just between trades but also amongst firms in the same line of business. Gott is representative of one end of the scale, and at the other there were dozens of dressers and finishers, and even cloth manufacturers, who employed less than a dozen men and rented a small workshop. Wages tended to be uniform throughout an industry, however, and as a proportion of total costs varied little with scale. More significant are inter-industry differences.

For such a lengthy period and so great a variety of trades it is impossible to give more than a rough indication of labour costs for the middle of the 19th century and the early years of the 20th century. By utilising the little contemporary data for Leeds wages which survives, allied to information of a more general nature about wage-levels in 19th century England, it is possible however to offer some tentative suggestions as to prevailing wage rates.

Typical wages for managers in the first thirty years of the 19th century were from £100 to £250 p.a., whilst book-keepers and clerks could expect to receive between £50 and £100 p.a., a little more than the better paid overlookers (15s. to 30s. per week). Mechanics and skilled artisans earned the same as overlookers, but other male workers had to be content with as little as 10s. per week, which was however more than most women and children obtained².

¹Employment of Children in Factories, Reports P.P.(1834) xx, 115.

²S. Pollard op. cit., (1968), 163-72.

These are general estimates pertaining to the whole country, but are unlikely to have differed much from Leeds wages, to judge by the statistics collected by a committee appointed by the Town Council in 1839. The general level of wages for different trades as recorded by this survey is indicated below:

TABLE 9.i - AVERAGE WEEKLY WAGES IN LEEDS TRADES, 1839¹

25s. and over:	Millwrights, gunsmiths, iron moulders, brass foundry.
20s. to 24s:	Painters, cloth dresser and drawers, printers, plumbers, slubbers, woolsorters, bricklayers, warehousemen, masons, saddlers, plane makers, paper stainers, hatters, mechanics, dyers, curriers, wood-sawyers, coopers, turners.
10s. to 19s:	Tailors, shoemakers, joiners, smiths, plasterers, wood turners, weavers, wool-combers, wheelwrights.
under 10s:	Woollen piecers and fillers, worsted piecers and preparers.

From this table Rimmer estimated that 25% of the working population earned more than £1 per week, 40% between 15s. and 20s., and the remainder less than 15s. These three categories correspond basically to skilled, less skilled, and handicraft workers². Factory workers fell into his middle category in the main, each operative earning an average 10s. to 15s. a week in the late 1830's.

However, some elaboration is necessary, firstly to indicate the different wages which were paid in the various factory trades, secondly to acknowledge the fact that men, women, boys and young girls were paid at varying rates. For example, whilst the average wage of operatives in the

¹Statistical Committee of the Town Council, 'Report Upon the Condition' etc., J.S.S. ii (1839), 422.

²W. G. Rimmer, 'Working Men's Cottages in Leeds, 1740-1860', Thoresby Soc., xlvii (1960), 165-99.

Leeds woollen industry in 1858 was 12s. 6d, the range of earnings by sex and age were: girls and boys, 4s. to 9s; women 5s. to 12s; young men 12s. to 16s; adult men 15s. to 40s.¹ As women and children were mainly employed as piecers, knotters, burlers and fillers, there was a close correspondence between age and sex, occupation and earnings. The less skilled the job, the more likely that women and children were involved. This should be borne in mind with regard to Table 9.i. Heavier unskilled occupations, for example bricklaying, were rewarded with relatively good wages in 1838 (23s. per week) because of competition for male labour from more skilled trades.

Thus inter-industry differences in wage rates can to a certain extent be explained by the age and sex-structure of the workforce, which was in turn the reflection of the nature of the work performed, particularly the levels of skill and muscle required. Wages in the flax trade were well below those of the woollen industry. The average earnings of workers in the former ranged between 6s. 6d and 10s., depending upon employer, but generally about 7s. per week². Compared with which earnings in the woollen industry in 1839 and 1845 varied between 5s. and 30s.³, seemingly a lot higher than in flax. However, what must be taken into account is the proportion of adult males employed in these industries. According to the returns of the factory inspectors in 1835 the labour composition in Leeds mills was as shown overleaf⁴:

¹E. Baines, 'On the Woollen Manufacture of England' etc, Q.J.S.S., xxii (1859), 1-34.

²Marshall Papers. List of Spinners and Spindles, by H. C. Marshall, (1842).

³E. Baines art. cit., (1859), 25.

⁴P.P.(1836) xlv, 48. Returns of Factory Inspector, R. Rickards.

TABLE 9.ii

	<u>Males under</u> <u>21</u>	<u>Females under</u> <u>21</u>	<u>Males over</u> <u>21</u>	<u>Females over</u> <u>21</u>
Woollen Mills	1,812	631	2,250	727
Worsted Mills	140	456	77	114
Flax Mills	851	1,953	559	564

The disparity in wage levels between the flax and woollen industries was not as great as at first might appear, therefore, and differences in labour costs may be in part attributed to the type of labour recruited, its age and sex, and its level of skill.

Nevertheless, there was some variation in factory wage rates, affecting inter-industry mobility and the ease with which labour was recruited. Up to the middle of the 19th century the highest-paid workers were those in skilled, non-factory trades, though it was possible for some males to earn almost the same amount, as drawers, press setters, or foreman dyers in a woollen mill. Millwrights, iron moulders, mechanics, and other workers under the general heading of engineering received comparatively high wages, over £1 a week in 1839. This was slightly above the level achieved by male workers in the cloth trade, and the woollen industry emerges as a fairly generous employer, despite the fact that piecing and filling, occupations reserved for women and children, yielded wages of only 5s. to 6s., even in 1858¹. Such rates were nevertheless higher than could be obtained by women and children in flax and worsted-spinning, in comparison with whose workforce clothworkers were said to be 'generally better off'². It has already been calculated that wages in flax in 1841 averaged as low as 7s. per person per week, and there is further evidence for inequality in the returns made by individual firms to the factory inspectors in 1833. For the 24 firms listed the range of wage levels was as shown overleaf.³

¹E. Baines, art. cit., (1859), 25.

²Morning Chronicle, Supplement, 25.1.1850.

³Employment of Children in Factories, Report P.P.(1834) xx, C1 40-60, C2 129-256.

cloth mills:	3s. to 23s. 6d.
worsted mills:	2s. 9d. to 6s. 4d.(but only women and) (children employed)
finishing mills:	3s. 2½d. to 32s. 5d.
flax mills:	2s. 8d to 20s.

Though in part the reflection of the preponderance of child and female labour in flax and worsted mills, and of adult males in finishing, these figures do indicate that the woollen-cloth industry offered higher wages to labour, and may help to explain its continued existence long after the demise of the flax trade.

Of those other industries which were beginning to turn to factory methods of production, machine-making and founding offered good remuneration to skilled workers. Leather workers also earned in the region of £1 per week. In 1858 the annual wage costs of Messrs. Wilson, Walker and Company were about £18,500, which was distributed amongst 380 workers, mainly adult males¹.

In those manufacturing occupations which were still organised on a workshop or domestic basis in the middle of the century wages varied according to skills required and the degree to which the supply of workers met the demand. Handloom weaving for example, though skilful, was an overcrowded profession after 1830, and wages fell steadily, the plight of the weavers attracting the attention of the government in 1835². The problem was not that demand for cloth was falling, or that the power-loom was taking over. 'The great evil is, that the looms have increased rather too much, that is, on rather a greater ratio than the demand', largely thanks to an influx of Irish weavers who were prepared to accept lower wages than their English counterparts³. Tailoring and shoemaking also provided a relatively poor

¹T. Fenteman & Co., An Historical Guide to Leeds and its Environs, (1858).

²Culminating in the Reports from Assistant Handloom Weavers' Commissioners, (1839)

³Ibid., 587, evidence of H. Chapman.

livelihood for adult males in 1839, and it is interesting to note that both trades, along with weaving, were on the verge of experiencing their own revolution in organisation and mechanisation.

There was, then, a hierarchy of activities in terms of wage levels in the first half of the 19th century. Managerial and clerical workers occupied the top position, followed by the skilled jobs in dyeing, engineering and cloth finishing, then the leather trades and wood turning, less skilled jobs in the woollen industry, handloom weaving and tailoring, and finally the unskilled occupations found in flax and worsted mills, and in the spinning rooms of woollen mills.

With the exception of the handloom weavers this was the order maintained throughout the period. Wage levels as a whole had risen steadily in the latter part of the 18th century, reaching a peak during the French Wars when, however, prices reached a maximum also. Both wages and prices dipped markedly in the post-war years recovering to the 1815 level only in 1830; from then until 1850 wages remained fairly steady, although prices fell¹.

In the second half of the 19th century and continuing into the 20th century - there was real progress in income levels, accompanied by the advance of the factory system in a growing number of trades. The index of wage levels with its base at 1850 shows a rise to 137 by 1871, to 162 by 1891, and to 179 by the end of the century².

Although the living standards and real income of the average worker indisputably rose between 1850 and 1914 this does not mean that labour costs to the employer rose to a similar degree. On the contrary, increasing labour productivity, outstripping the rise in wages, meant that the importance of labour as a factor in overall costs was diminishing. In the woollen

¹P. Deane and W. A. Cole, op. cit., (1967), 278-83.

²Ibid., 18.

industry, ~~which figures in Table 9 illustrate~~, productivity rose remarkably as capital was substituted for labour. Developments in engineering, clothing and many other industries told the same story.

The rise in wage levels on a national basis has been charted by Bowley and Wood, at least for the more important sectors of employment. Leeds almost certainly differed ~~but~~ little from the national wage levels. For example, a printer's compositor in Leeds in 1898 could expect to earn 34s. a week, slightly above the national average but lower than in London or Manchester¹.

Wages advanced steadily throughout the period in all industries, and there was little change in the order, except that textiles slipped back and women now found that better pay could be obtained in clothing and footwear industries. The average weekly wage in engineering rose from 26s. in 1886 to 31s. in 1900²; printing workers were paid 34s. in 1886 and a little more in 1900³. Average pay in the woollen and worsted industries in 1886 was 23s. per week⁴, but here a reminder must be made to the effect that these industries employed a much higher proportion of female labour.

From these and other sources⁵ it is possible to estimate the wage bill of the average size factory in the principal sectors of manufacturing for the middle of the 19th century and the end of the period (See Table 9.iii, overleaf).

¹A. L. Bowley and G. H. Wood, 'The Statistics of Wages in the United Kingdom During the Nineteenth Century', Q.J.R.S.S., lxxix (1906), 148-92.

²Bowley and Wood, 'Engineering and Shipbuilding', Q.J.R.S.S., lxxviii (1905-6), 1.

³Bowley and Wood, 'Printers', Q.J.R.S.S. lxxii (1899), 708-15.

⁴A. L. Bowley, 'Worsted and Woollen Manufactures of the West Riding', Q.J.R.S.S., lxxv (1902), 102-26.

⁵Report of Inquiry by the Board of Trade etc., P.P.(1908) cvii, 256-61.

TABLE 9.iii

	<u>Average No. of Workers per Factory (1871)</u> ¹	<u>Estimated Wage Bill 1850 (£)</u>	<u>Estimated Wage Bill 1914 (£)</u>
Woollen mill	70	45	70
Worsted mill	175	70	125
Finishing mill	70	58	95
Flax mill	202	80	-
Engineering works	85	70	120
Clothing factory	136	-	100
Footwear factory	133	-	100
Printing works	14	-	25
Leather works	18	-	25

There was a steady increase in wages in all trades between 1886 and 1901, with the exception of the woollen industry where money wages fell by 5%², and the growing inability to compete for labour encouraged the industry to grow elsewhere. By 1901 Leeds had less woollen and worsted workers than Halifax or Huddersfield, and only one-fifth as many as Bradford³.

Wage costs could form a large proportion of total costs especially in the clothing, footwear and textile industries. In the latter the annual costs of a shoddy mill with 40 looms, covering 6,000 sq. yds. of floor space were estimated to be as follows in 1908⁴:

Depreciation upon capital	£2,495
Fuel	716
Water	141
Wages	6,522 (120 employees)
Miscellaneous	<u>3,950</u>
	<u>13,824</u>

¹J. H. Clapham, Free Trade and Steel, 1850-86 (1932), 117-19.

²A. L. Bowley and G. H. Wood art. cit., (1906).

³Census, Occupational Tables, (1901).

⁴W. A. G. Clark, The Manufacture of Woollen, Worsted and Shoddy in France and England, and Jute in Scotland, (1908-9), 114-23.

Labour, therefore, was the single most important item of cost in the woollen and worsted industries, and in finishing, footwear, clothing, and printing.

However, wage costs by themselves do not influence the intra-urban location of industry, unless there is an element of spatial variation in wage rates and/or labour productivity. The location of manufacturing on a regional scale is known to be influenced by labour costs, and there are also differences between size-categories of cities¹, but Gitlow has indicated that within a smaller unit area an employer wishing to keep a constant share of the labour force must maintain the attractiveness of his jobs in relation to other firms². It should not be expected, therefore, that there was any geographical difference in wage rates for the same job within Leeds. Certainly, different firms offered different wages - the principal manufacturers offered markedly different rates to their handloom weavers in 1831³ - but this was unconnected with any spatial variable, and consequently would not have affected intra-urban location.

Average wages in different parts of the town reflected local occupational structure not a variation in labour costs to individual industries. An area housing flax mill labourers and handloom weavers would be bound to have a lower average income than a district populated principally by woollen workers. As the Morning Chronicle observed in 1850:

The clothworkers, having better wages, are very generally better off; and the quarter which they principally inhabit - the west part of the town - is, of the operative districts, decidedly the best.⁴

¹V. R. Fuchs, 'Hourly Earnings Differential by Region and Size of City', in G. Karaska & D. Bramhall, Locational Analysis for Manufacturing, (1969), 125-9.

²A. L. Gitlow, 'Wages and the Allocation of Employment', in ibid., 130-51.

³Reports from Assistant Handloom Weavers' Commissioners, (1839), 552, evidence of H. Chapman.

⁴Morning Chronicle, 25.1.1850.

Not unnaturally workers tended to seek the highest possible wages, and given the opportunity would find work in a cloth mill or engineering workshop, though the main obstacle was the lack of skills amongst many of the population, in particular the Irish immigrant families. But even they were able to move on when the opportunity presented itself:

...Workers in flax mills ... now that machines do the work that formerly was done by men, migrate very quickly, rarely staying for a continuous period, and they do this, not so much because the occupation disagrees with them... but because they seek and obtain other situations by which they are ultimately to earn their livelihood.

The better-paid trades were therefore able to maintain a constant supply of labour by attracting workers from other industries. The early clothing industry took many of its female workers from the flax trade, and one factory even recruited in the flax mills².

As a result the lower-paid industries were virtually debarred from setting-up in a district where workers were accustomed to better wages and conditions. Because of this it would have been very difficult for flax spinners to set up in business in the western end of Leeds, but there was nothing to prevent a woollen mill being set up in East Leeds. The maps of flax and woollen mills in the mid-century indicate that whereas the former were confined exclusively to the eastern end, woollen mills, though mainly in the west, were also to be found at the Bank, Burmantofts, and the Leylands (Maps 20 & 23).

The flax mills depended therefore upon a continuing influx of unskilled workers, prepared to accept (at least temporarily) low wages and unhealthy conditions. The question of labour cost was very much bound up with the socio-economic pattern of North Leeds, and the supply, distribution and different qualities of the workforce. It is these factors which must be

¹R. Baker, Report on the Residence of the Labouring Classes in Leeds, P.P. (1842) xxvii,

²C. Collett, 'Women's Work in Leeds', Economic Journal 1, (1890), 460-73.

next considered.

With a population rising from 75,000 in 1801 to 445,000 in 1911, the Borough of Leeds was able to provide an adequate, varied labour force for a host of different industrial activities. This was one of the most important factors in encouraging the development of manufacturing in Leeds in the 19th century¹. The growth of this workforce as measured by the Census is indicated below:

TABLE 9.iv - OCCUPIED POPULATION OF THE BOROUGH OF LEEDS, 1841-1911²

	<u>1841</u>	<u>1851</u>	<u>1861</u>	<u>1871</u> ³	<u>1881</u>	<u>1891</u>	<u>1901</u>	<u>1911</u>
Total	59,784	83,889	98,607	90,952	135,178	169,541	197,846	217,248
Males	44,009	56,802	66,809	67,276	94,257	114,162	137,671	145,673
Females	15,775	27,087	41,798	23,676	40,921	55,379	60,175	71,575
% of all) males) occupied)	58		68		64		67	
% of all) females) occupied)	20		30		26		25	

The rise in population - approximately eight-fold between 1801 and 1911 - was the response both to a high birth rate and falling death rate, and to large scale immigration into the town from the towns and villages of Yorkshire, and from Scotland and Ireland⁴. The occupied population grew even more swiftly than the Borough total, at a rate of 2% p.a., after 1840 as compared with 1½% p.a.⁵

¹W. G. Rimmer, 'The Working Force', L.J., 25 (1954), 87-90.

²Abstracted from W. G. Rimmer, 'Occupations in Leeds, 1841-1951', Thoresby Soc., L (1967), 158-78.

³Males and females over 20 years of age only.

⁴F. Beckwith, 'The Population of Leeds During the Industrial Revolution', Thoresby Soc., xli (1948), 118-96.

⁵W. G. Rimmer, art. cit., (1967), 161.

One significant element contributing to the rise in employment level was the growing proportion of women out at work, particularly in factories. In 1851 45.4% of all females were employed in trades which were distinctly factory-based, almost all of them in textiles. By 1911 the proportion had risen to 60%, but with over one-half of these in clothing and footwear factories and only one-quarter in textile mills¹.

Women played an unusually prominent role in the development of factory industries in Leeds, and the flax, worsted, woollen, clothing, footwear and paper trades depended very heavily upon them. The preponderance of female workers in the flax industry has already been noted, whilst in textiles as a whole 12,000 out of 29,000 operatives in 1851 were women and girls². They were used wherever possible, in the lighter tasks of production primarily, for their labour could be obtained at a lower rate than that for male workers, at a considerable saving to the employer. This was a continuing feature of the industrial development of Leeds throughout the second half of the 19th century. By 1901, in addition to their strong representation in textiles women provided 38% of the labour force in paper manufacture and printing, and over 60% of the labour force in footwear and clothing³. They also made a smaller but nonetheless significant contribution to manpower in the engineering trades.

The demand for large numbers of low-paid unskilled workers also resulted in the employment of many children, even after the Factory Acts of 1833, 1844 and 1847, which restricted hours of labour and forbade the use of children under nine years of age in textile mills. The exact number of children at

¹Ibid., Table 3.

²Census, Occupational Tables, (1851).

³W. G. Rimmer, art. cit., (1967), Table 3.

work in factories in the first part of the 19th century is difficult to determine with precision, but almost 6,000 out of a total of 10,287 textile factory workers in the Borough in 1835 were under twenty-one years of age¹. The greatest offenders were the worsted and flax industries, but even at Bean Ing Mills children supplied 18% of the labour force in 1830².

Generally speaking, the population of a country is considered to be passive until fifteen years of age; but in England, with its manufacturers, mines, and other species of employment for labour, it is passive only until nine years,³

wrote the Statistical Committee in 1839, when less than 7,000 out of 37,000 young persons resident in Leeds were undergoing full-time education⁴. Of the remainder fully one-half were occupied, slightly more females than males⁵. The importance of young persons in the workforce diminished thereafter, those under twenty years of age accounting for 27% in 1851 but only 22% by 1911. However, the actual number of young males employed doubled, whilst that for girls rose three-fold, and a larger proportion of young people went out to work than ever before, a continuing source of cheap labour for Leeds factories⁶.

As with females, children were employed in performing the lighter tasks, particularly in textiles, but increasingly also in clothing and

¹P.P. (1836) xlv, 48 et. seq. In 1838 5,400 of a total 18,400 textile mill workers were under fifteen years of age. See P.P.(1839) xlii, 272 et. seq.

²H. Heaton, art. cit., (1931), 51.

³Statistical Committee of the Town Council, art. cit., (1839), 409.

⁴Ibid., 410.

⁵W. G. Rimmer, art. cit., (1967), 163.

⁶Ibid., 163-5.

footwear factories. In 1906 almost one-third of the workers in clothing factories were boys under twenty years of age or girls under eighteen¹.

The engineering, mining, brickmaking, cloth, and leather industries provided the main areas of opportunity for adult male workers. In textiles they provided the mechanics, overlookers and finishers, and occupied most of the jobs in the other industries where skill and muscle were called for.

In general the predominant social unit in 19th century Leeds was the family, although there were single persons who lodged in most working-class homes as well as in the lodging-houses of the town centre². The choice of residence for the family in the majority of cases would have lain with the senior adult male, as the head of the household, an important point to note because for women and children the choice of residence was thereby restricted. Those industries which employed a high proportion of females and children would therefore have to pay greater attention to the distribution of the population. A flax concern for example, was less entitled to expect to attract its workers into the area surrounding its factory than was a firm of cloth finishers or an engineering works. The concentration of flax mills within the principal working-class residential areas, many alongside other works which gave employment mainly to men, reflects this factor to a certain extent, whilst the early clothing and footwear factories were located near to the centre of the town, in a position which facilitated the assembly of female labour from a wide area. There is evidence for this supposition in the census enumerators' books. At 24 Sykes Yard, off York Street lived an adult male cloth gigger, husband to a flax rover, and father

¹J. Thomas, 'History of the Leeds Clothing Industry', Yorks. Bull., occ. paper no.1, (1955).

²Census Enumerators' Returns, (1851), HO.107 and (1861), R.G.9.

to three young girls, all flax mill hands in 1861¹. The occupant of 13 Union Court in the same year was a 32 year old tanner, whose wife and daughter both worked in a flax mill². And there were many more examples.

As well as the age and sex-structure of the working population industrial location was affected by the birthplace of workers. The continuous growth of employment was only partly met by natural population increase, immigrants from all parts of the United Kingdom meeting the remainder of the demand.

Chief amongst these immigrants were the Irish in the first half of the 19th century, and East European Jews in the second half. Irish immigration on a large scale commenced at the beginning of the 19th century, gathered pace after 1822, and reached its peak at the time of the potato famine in 1845-6. Though directed primarily towards the cotton towns, Leeds also received the Irish in large numbers, many of them handloom weavers and their families, forced to leave the overcrowded labour market of their home area. The introduction of the power-loom in the 1830's and the following decades forced the males to turn elsewhere for employment, often to the flax industry which had given work to their wives and children from the beginning. In 1842 the Irish were said to be 'almost exclusively limited to plaid-weaving, flax-spinning and bricklayers' labourers', working especially 'in those departments of mill-labour which are obnoxious to English constitutions, and to some unendurable'³.

In 1839 one in eighteen of the families of the in-township was Irish,⁴ who, having larger families than average, comprised about 7% of the

¹Census Enumerators' Returns (1861) R.G.9 3377.

²Ibid., R.G.9 3378.

³R. Baker, op. cit., (1842), 15 and 24.

⁴Statistical Committee of the Town Council, art. cit., (1839), 410.

population of Leeds, a proportion which was maintained until the 1860's but fell off thereafter. They provided a cheap labour force for a number of industries. 'We are indebted to the Irish peasantry for the extension of some kinds of manufacture', it was reported in 1839;

The flax and worsted spinning trades of Leeds and Bradford, in periods of great demand, have derived material assistance from immigrant labourers; so much so as to have been relieved from a pressure, which would have exceedingly curtailed the active operations of their respective machinery¹

The Irish were also said to have lowered wage-rates in linen handloom-weaving, the type of accusation which was also levelled against the Jewish immigrants of a half a century later. If the Irish peasantry was strongly associated with the flax industry, there was an even closer connection between the arrival of East Europe Jews following the pogroms of the 1870's and the rise of the clothing industry.

Jewish immigration provided a nucleus of skilled tailors, a steady stream of cheap labour, and an influx of businessmen who quickly realised how little capital was required to set up in business in an industry which did not seem to require any special type of building, and in which almost all the equipment could be hired.²

From fewer than two hundred in the early 1850's their numbers rose to an estimated eight thousand in 1888³. Many of these were employed in the clothing industry, frequently in workshops where subcontract work, long hours, and seasonal lapses in employment had to be endured.

That such a high proportion of the labour force of two prominent industries were immigrants is an important factor in attempting to understand their locational development, for, as with most newly-arrived communities, the Irish and the Jews tended to locate in 'ghettos'. Irish immigrants

¹Ibid., 410.

²J. Thomas, art. cit., (1955), 16.

³Ibid., 20.

congregated around the east end of Leeds, at the Bank, in York Street and in Marsh Lane, and in the crowded courts off Kirkgate and Mabgate. The Jews favoured the Leylands district, from whence they gradually migrated along an axis towards Chapeltown and Moortown. The reason behind such ethnic nucleations do not concern us here¹; the important feature to note is that they were generally unconnected with considerations of journey-to-work. Therefore industries which made use of such immigrant labour were geographically restricted because their labour supply was not evenly distributed throughout the town. As a result, the Jewish clothing workshops were located predominantly in the area of Lady Lane and North Street, whilst the concentration of flax mills in East Leeds has already been noted (Maps 23 and 25).

It is important to bear in mind that the composition of the labour force has a bearing upon the potential supply area (labour-shed) of different types of factory. The more specialised the requirements in terms of age, sex, ethnic composition, or levels of skill, the stronger the pull this factor exerted.

Most industries were however not so specialised in their labour requirements as were the clothing and flax industries. The catchment area (employment-field) of these factories was therefore related to the distribution of the population, the location of the factory, and the mobility of the workforce.

It is necessary to rely upon census data for separate wards of the in-township area of North Leeds to portray the distribution of the workforce in the period 1801-1911. Only from the census enumerators' returns is it possible to obtain a more accurate picture, and map 39 indicates the

¹See D. Ward, 'The Emergence of Central Immigrant Ghettos in American Cities, 1840-1920', in L. S. Bourne ed., The Internal Structure of the City, (1971), 279-90.

distribution of population and workers in manufacturing for 1851. For the remainder of the period then population distribution can only be mapped in generalised form (maps 26 to 37), supplemented by the table set out overleaf.

Whilst alterations in the divisions caused by the census and changes in ward boundaries hinder comparison, a number of features of significance emerge from this table.

Firstly, throughout the whole of the period the eastern side of Leeds housed a majority of the population, this dominance being strongest in the early part of the period, waning somewhat between 1831 and 1891, but reasserting itself about the turn of the century.

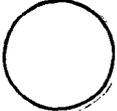
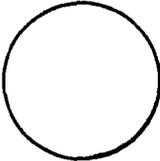
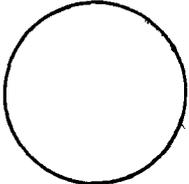
A secondary concentration in the western divisions, focused upon the Kirkstall and Burley Roads, emerged in the 1820's and enjoyed continuous and sometimes rapid growth thereafter, although this is not reflected in the table because development reached the northwestern limits of the in-township in the 1880's. The out-township immediately beyond, Headingley-cum-Burley, grew from 31,000 in 1881 to over 48,000 in 1911.

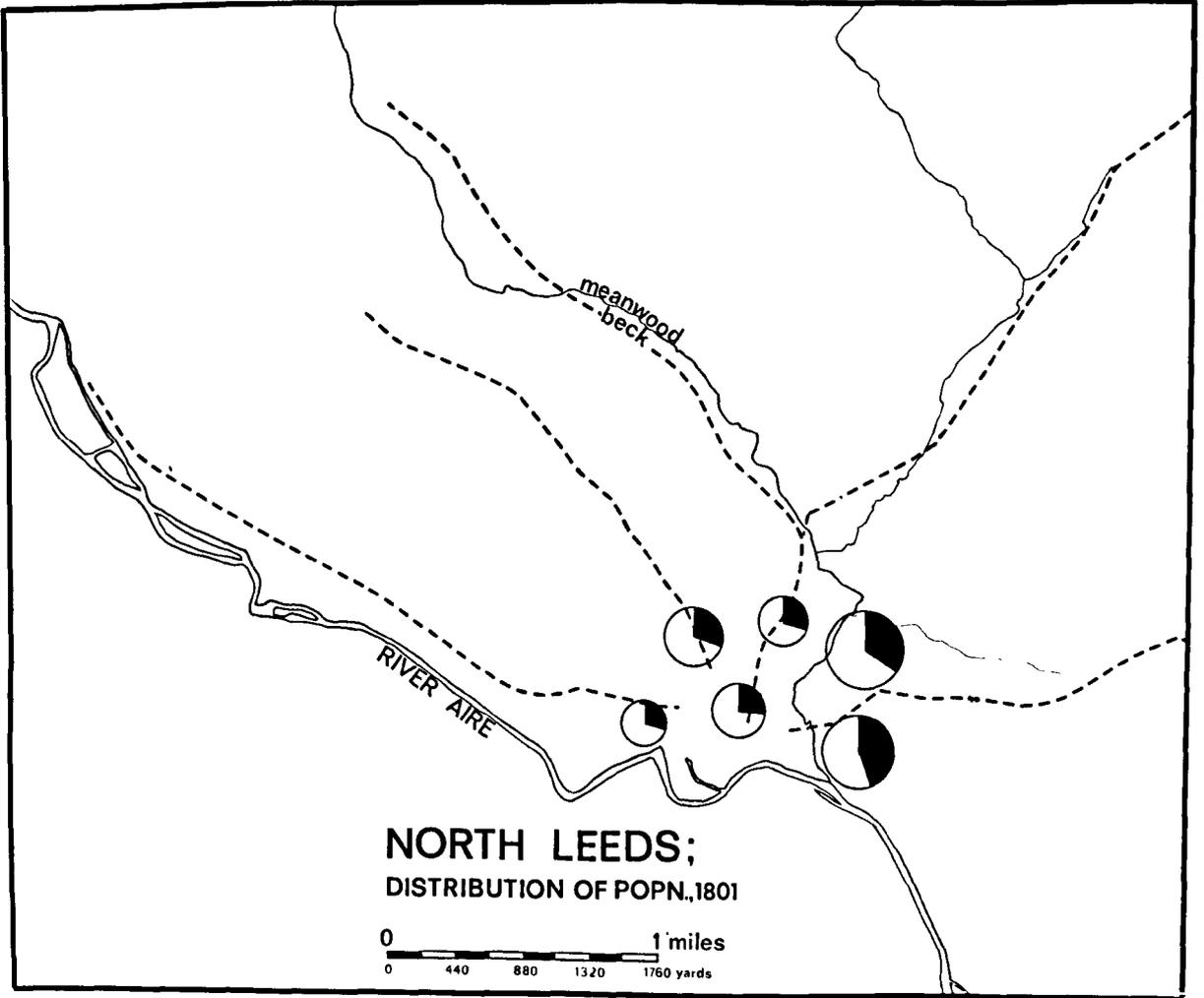
The main areas of growth were therefore to the east and west of the town, and the area to the north did not experience such rapid expansion until the final thirty years of the period.

The second feature to note is that whereas much of the growth in population was accommodated by infilling and an increase in density during the first half of the century, later on peripheral extension to the built-up area was more important. Indeed, there was an actual decline in numbers in the most central parts of the town after 1840. Here not only was there a lack of room for building expansion but also commercial uses were extending into areas previously reserved for residential purposes.

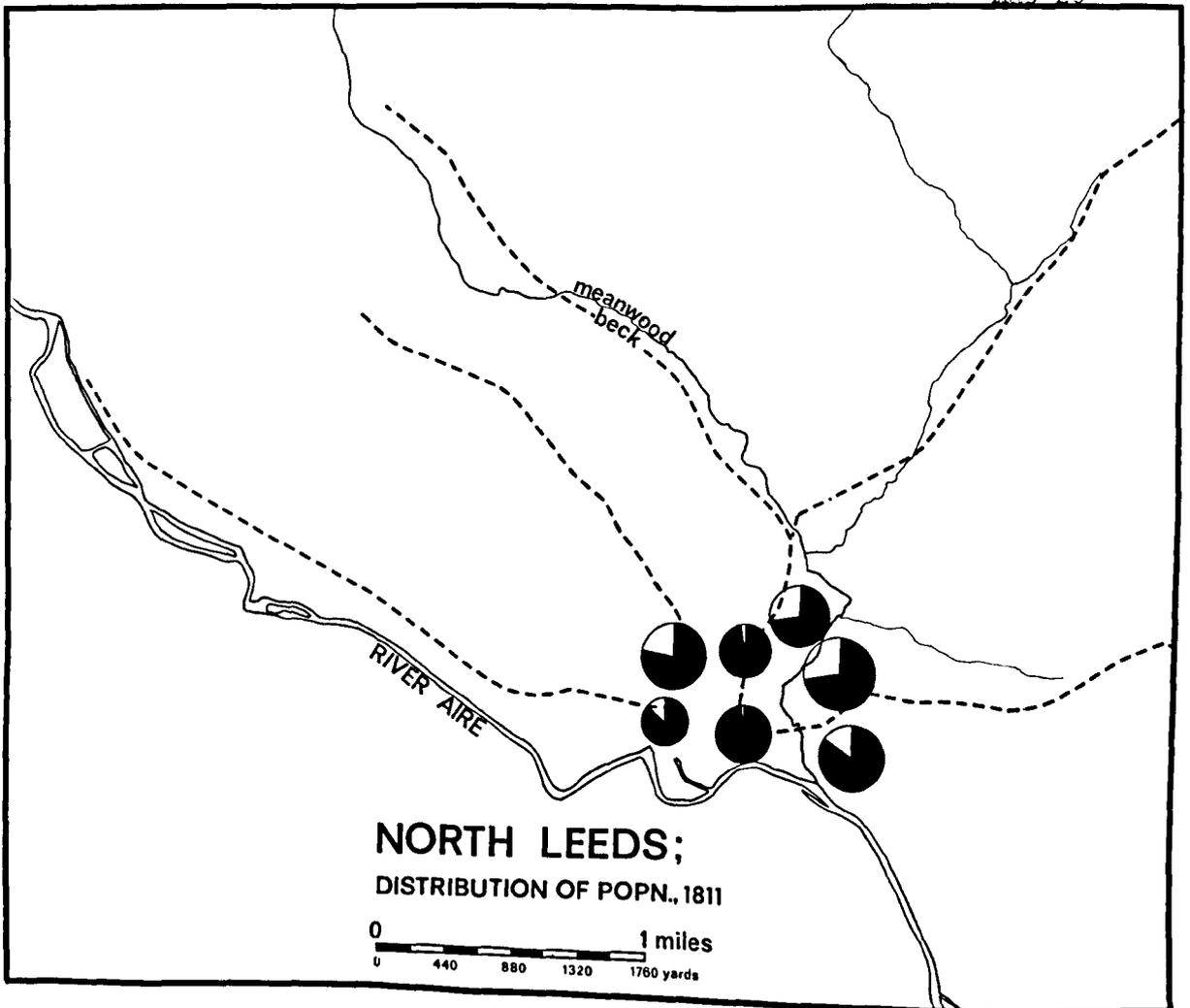
Maps 26-37 portray the distribution of population by the divisions and wards of successive censuses. Maps 26, and 29 also indicate the proportion (shaded) of persons in trade, commerce and manufacturing, whilst Maps 27 and 28 indicate the proportion of families in the same category.

KEY

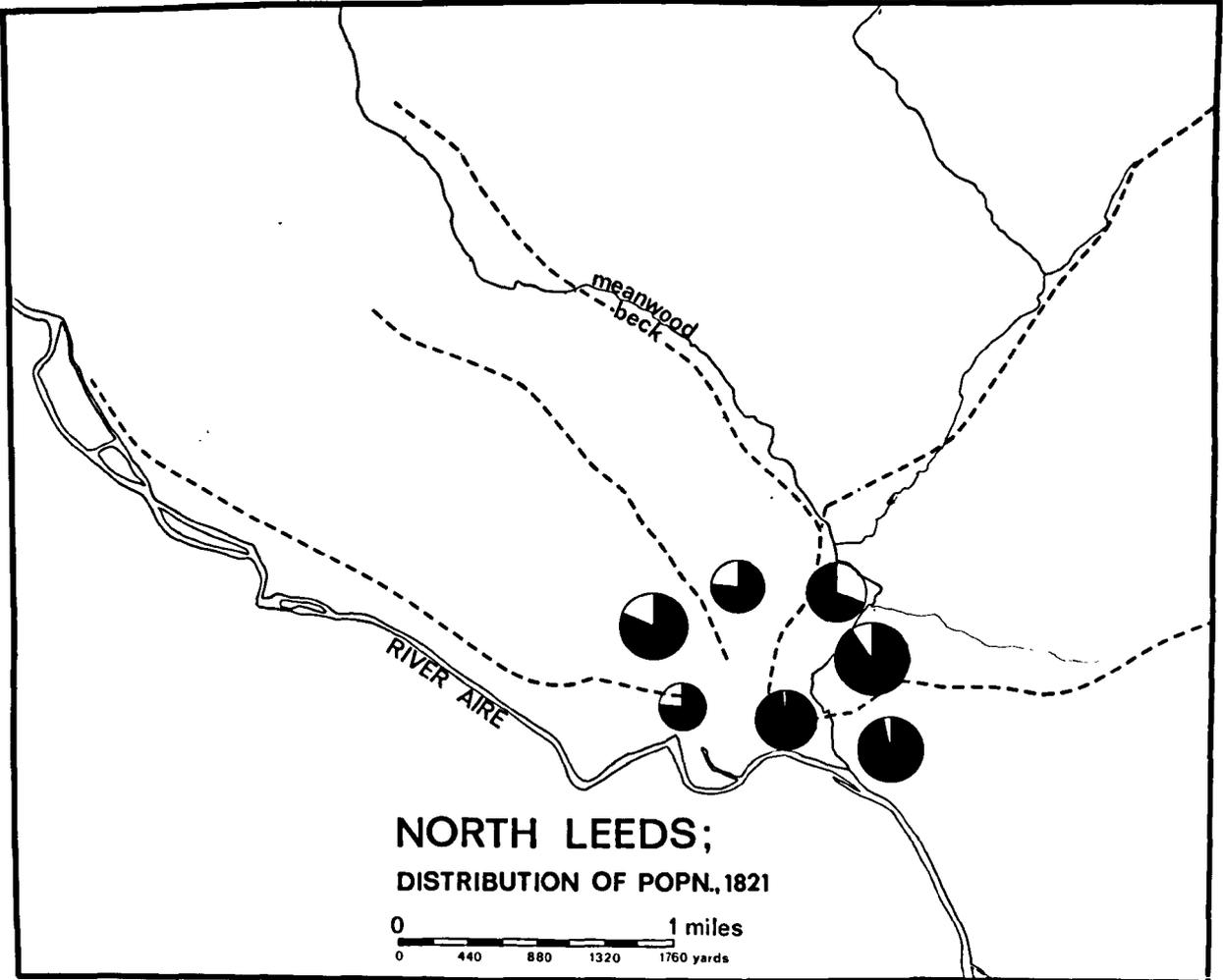
	2,500 persons
	5,000 "
	10,000 "
	15,000 "
	20,000 "
	40,000 "



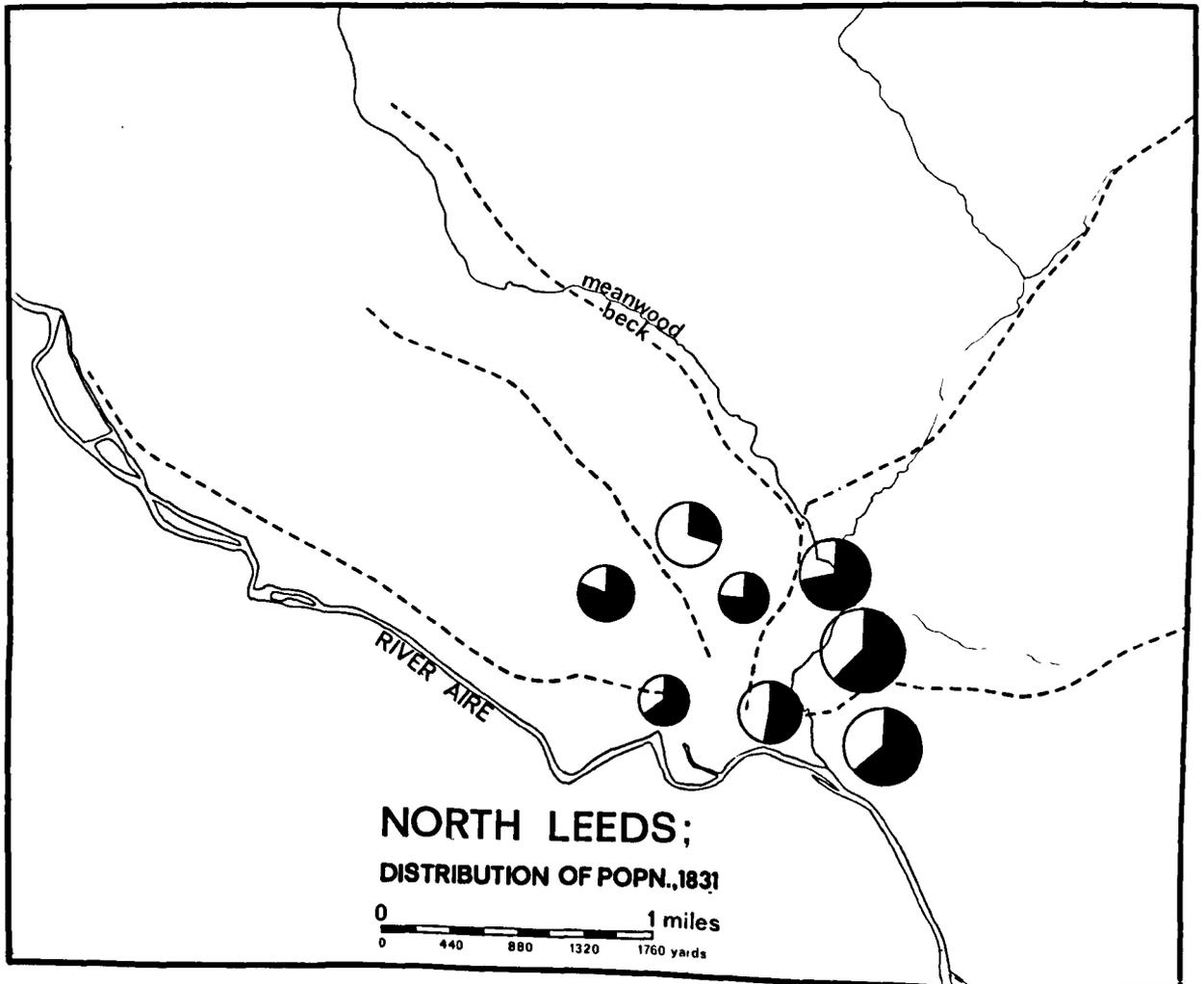
Map 26



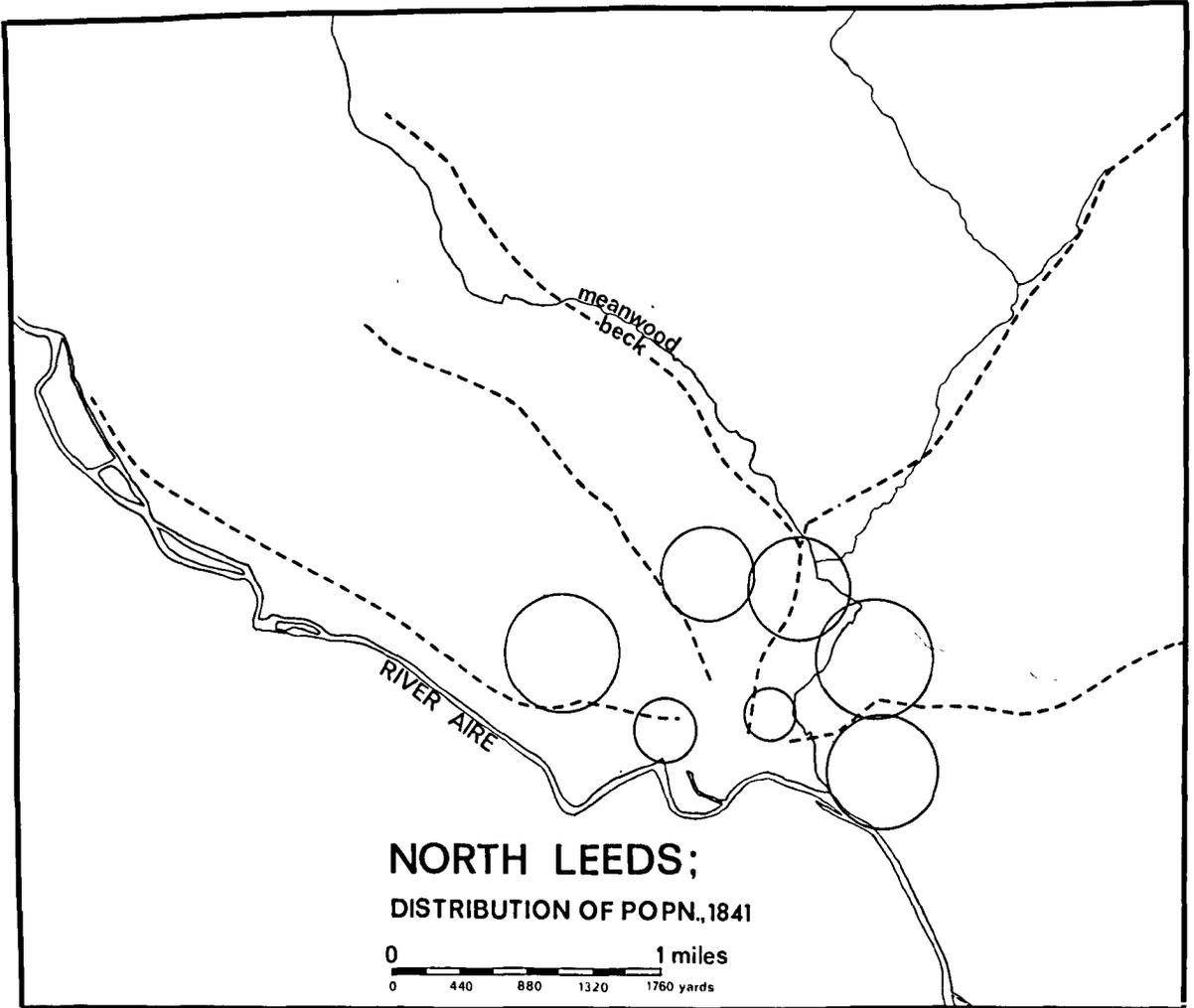
Map 27



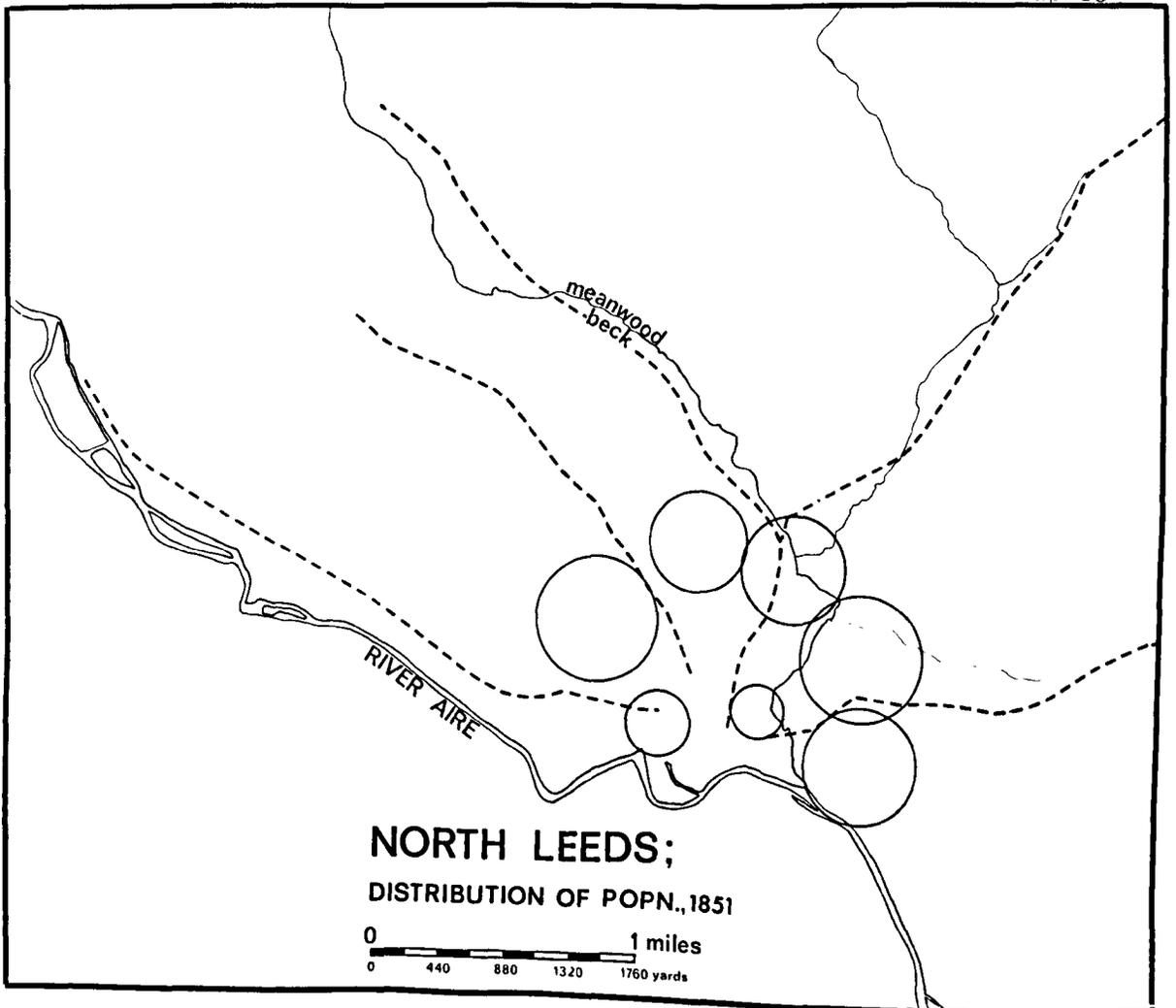
Map 28



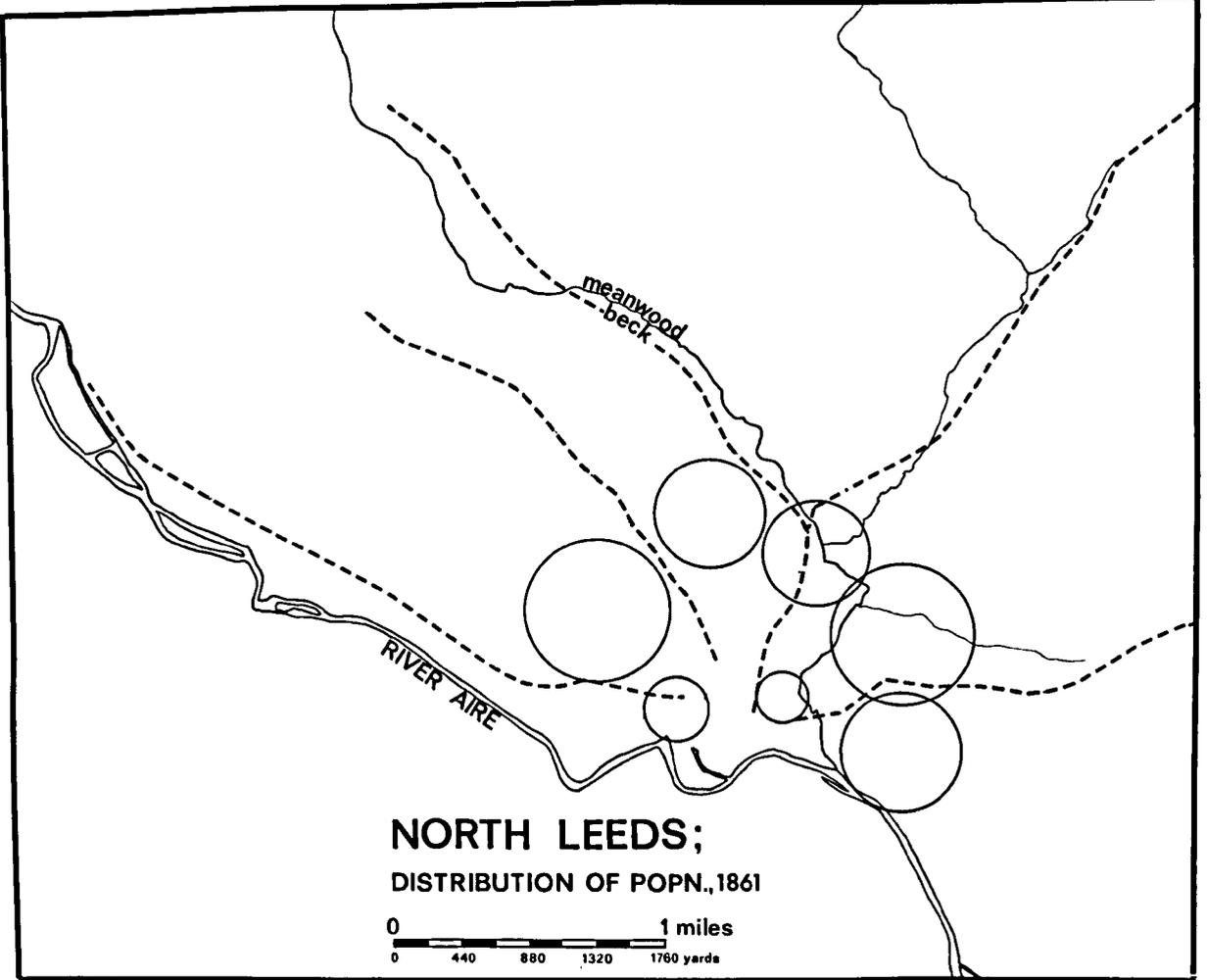
Map 29



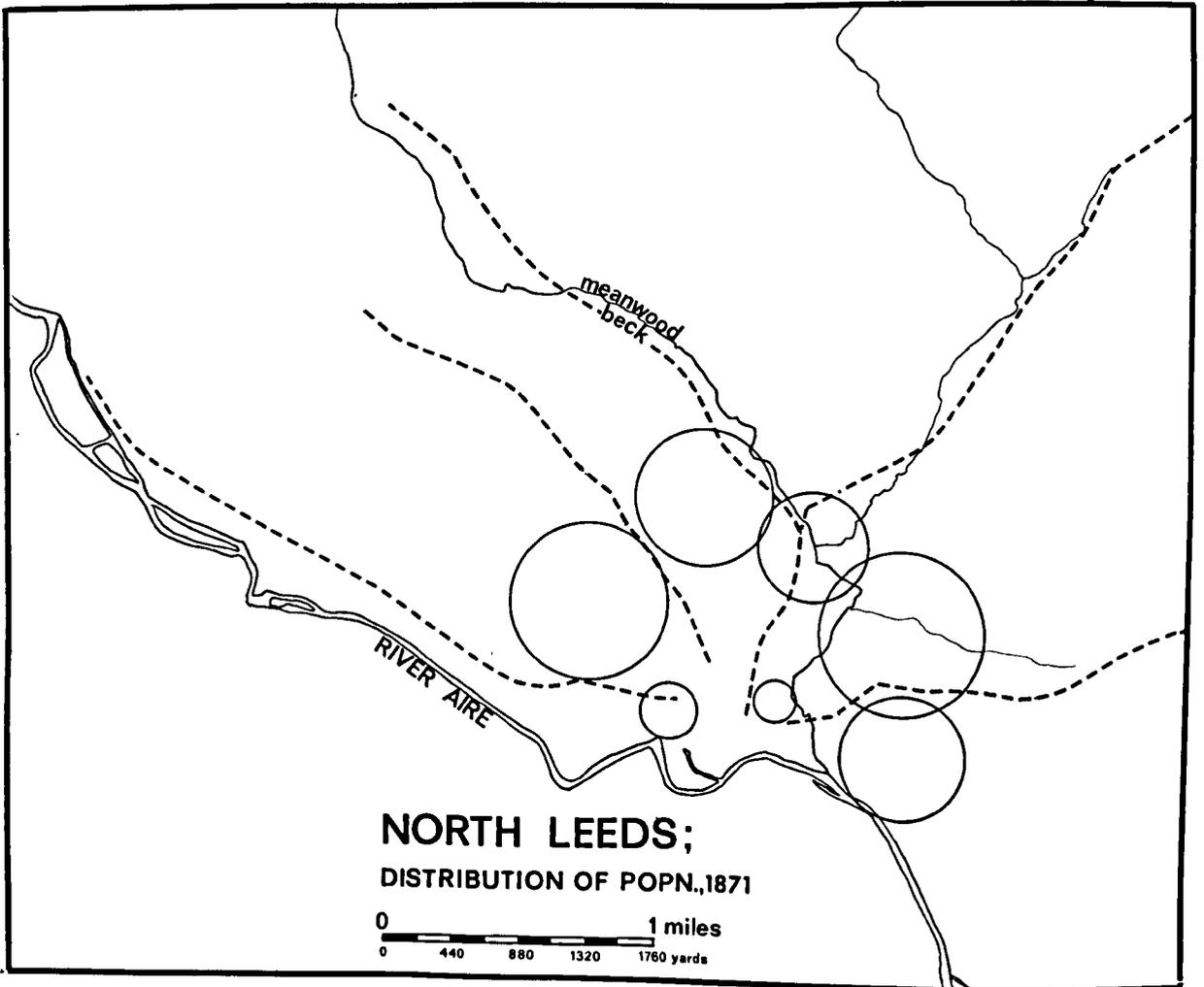
Map 30



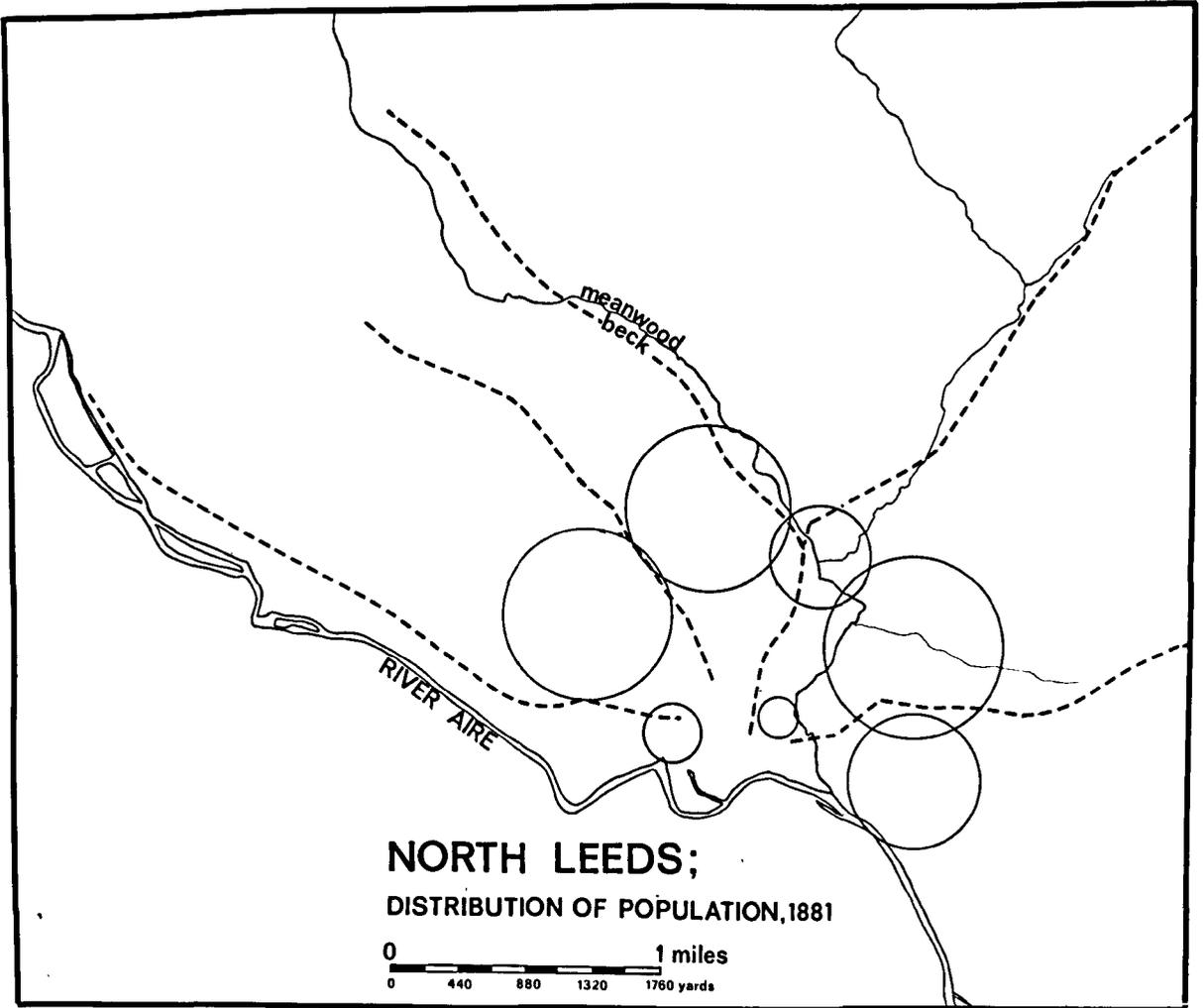
Map 31



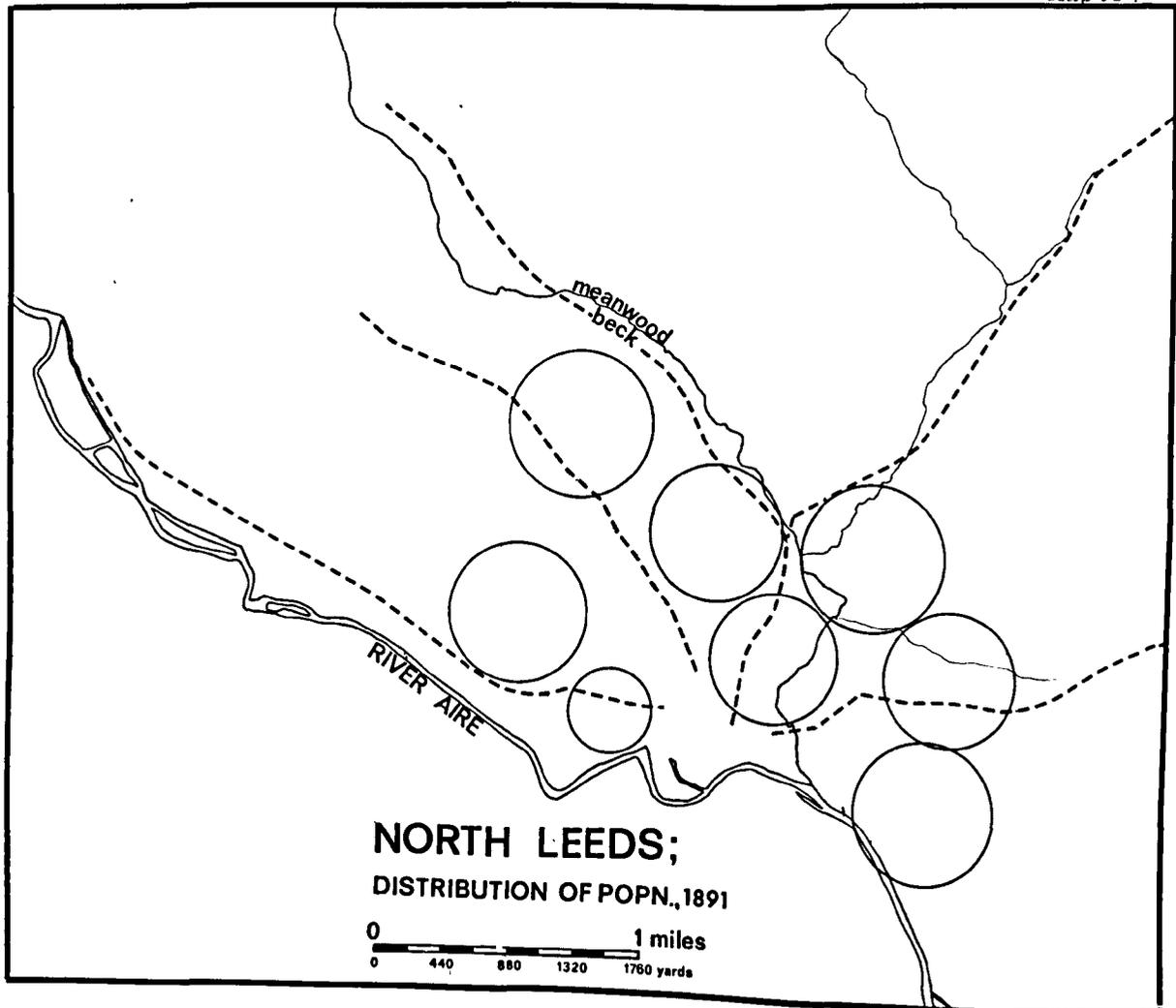
Map 32



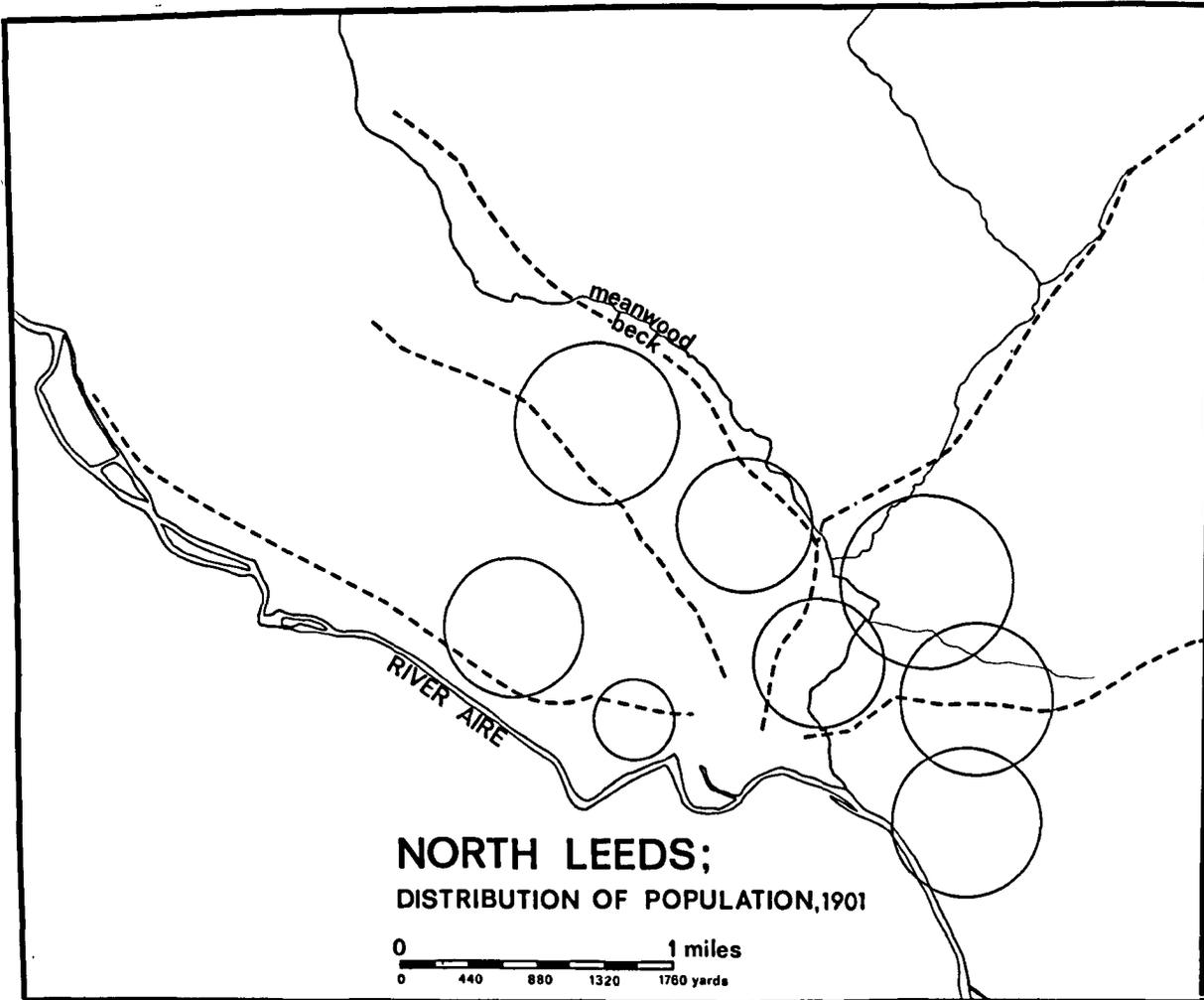
Map 33



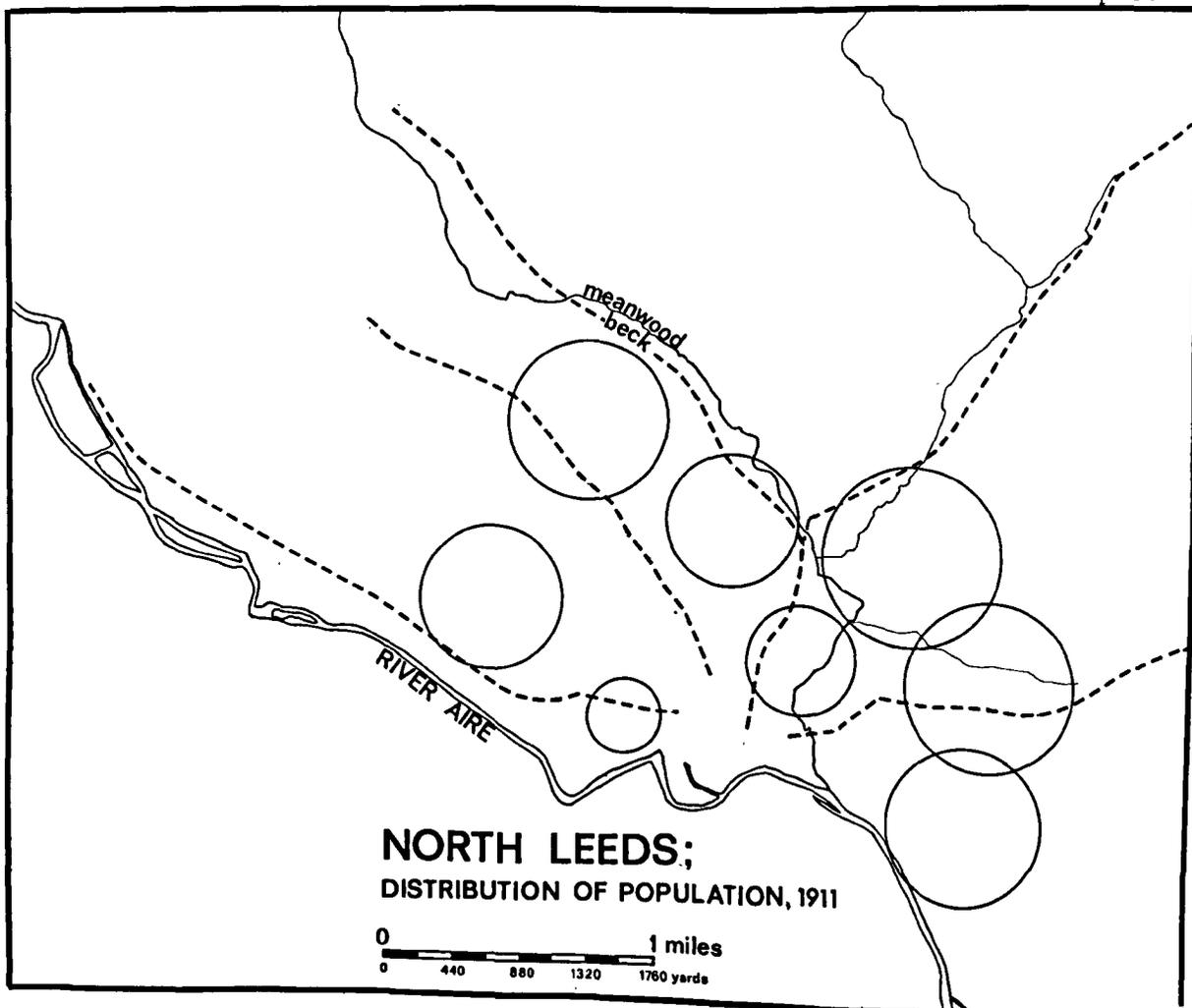
Map 34



Map 35



Map 36



Map 37

TABLE 9.v - THE DISTRIBUTION OF POPULATION IN NORTH LEEDS, 1801-1911

<u>Date</u>	<u>Division</u>	<u>N. West</u>	<u>Mill Hill</u>	<u>Middle</u>	<u>Upper</u>	<u>N. East</u>	<u>East</u>		
1801		4,058	2,676	3,803	3,554	8,547	5,124		
						<u>N.E. Lower</u>	<u>N.E. Upper</u>		
1811		5,710	2,636	4,212	3,243	6,354	4,425	5,580	
		<u>N.W.Lower</u>	<u>N.W.Upper</u>						
1821		3,804	4,877	3,031	4,769	3,208	9,194	6,518	7,701
1831		9,797	7,602	3,3031	4,927	3,262	14,402	9,619	12,413
	<u>Wards</u>	<u>West</u>	<u>N.West</u>			<u>North</u>	<u>N. East</u>		
1841		16,616	10,609	5,222	3,411	13,001	18,142	15,530	
1851		20,176	12,270	5,414	3,337	14,454	21,301	17,421	
1861		25,361	16,561	5,312	3,008	14,554	26,582	18,594	
1871		32,481	24,227	3,902	2,271	14,728	34,900	20,664	
1881		35,980	34,867	3,045	2,068	12,508	43,341	22,350	
				<u>Central</u>	<u>Brunswick</u>				
1891		24,668	28,363	9,214	23,009	22,752	26,752	24,190	25,598
1901		23,914	32,239	7,736	20,996	22,893	38,762	29,084	28,297
1911		20,553	30,570	5,856	14,503	23,219	41,968	36,239	34,701

The wealthier classes were accommodated principally to the north-west of the centre, in an axis extending out along Woodhouse Lane towards Headingley, and also in the out-townships to the north: Chapel Allerton, Potternewton, Meanwood, and Roundhay. The urban proletariat, who provided labour for the town's factories, occupied most of the rest of North Leeds, except where commercial buildings and manufacturing population were concentrated. Rates per capita were also lowest here in 1839:

TABLE 9.vi¹

	<u>Division</u>	<u>Amount of Poor Rate Collected on Property</u>	<u>Rate/Person</u>
North	12,506	£1,705 0s. 8d	2s. 9d
N. East	16,269	£1,491 18s. 0d	1s. 8d
East	14,271	£1,504 13s. 8d	2s. 1½d
Kirkgate	3,138	£1,659 17s. 8d	5s. 9½d
Mill Hill	5,167	£3,890 17s. 8d	15s.
West	15,483	£3,457 8s. 4d	4s. 6d
N. West	9,656	£1,631 13s. 8d	3s. 4d

The principal working-class areas indicated by this survey were in the east, north-east and north divisions. However, the limitations of the census data are exposed when comparison is made with map 39 which gives a much more detailed picture of the distribution of population for 1851. From this it may be seen that there were important concentrations of factory workers within the West and Middle divisions also. The main residential areas of the operative classes were as follows:

The Leylands (7,000); The Bank (9,000); York Street/Marsh Lane/Quarry Hill (9,000); Kirkstall Road/Burley Road (3,500); Woodhouse Carr (2,000).

The figures in brackets are estimates of the population in 1851.

Each of these areas formed a concentration of industry, and consisted of close, narrow, often unpaved streets of back-to-backs and court dwellings.

¹ Calculated from Statistical Committee of the Town Council, art. cit., (1839), 406.

The low wages earned by most factory operatives afforded little choice to them in the housing market¹. The highest densities of population, as indicated by the distribution of court dwellings in 1847 were around Kirkgate, Marsh Lane, Timble Bridge, the Leylands, Near Bank, and Quarry Hill. Back-to-back housing which supported densities almost as great, predominated in the following areas: Richmond Hill, Mill Street, York Road, Burmantofts, Woodhouse Carr, the Far Leylands and Kirkstall Road.

As the town grew the distribution of the working population maintained approximately the same pattern, extending outwards along axes towards Burley, Meanwood, Harehills, Burmantofts, the York Road and Cross Green.

Although by 1911, as Table 9.vi demonstrates, the bulk of the population was housed in the suburbs, there were still centres of high density in inner Leeds, for example at Quarry Hill where redevelopment was not started until 1909². The most rapid gains in population in this later period were however, in suburban areas in Woodhouse, Burley, Harehills, and Burmantofts. New factories wishing to avail themselves of such concentrations of population were therefore encouraged to locate either within these districts or near the centre of the town, which was the focus for the newly-established public transport system.

Factory operatives laboured long hours in the 19th century. Most textile mills in 1833 operated one shift, from 6 a.m. to 7 p.m., with barely an hour for lunch³, and conditions did not improve very greatly even by 1914. Not surprisingly therefore the amount of time each operative

¹W. G. Rimmer, art. cit., (1960).

M. W. Beresford, 'The Back-to-Back House in Leeds, 1787-1937', in S. D. Chapman ed., The History of Working-class Housing, (1971), 93-132.

²F. J. Fowler, 'Urban Renewal 1918-66', in M. W. Beresford & G. R. J. Jones eds., Leeds and its Region, (1967), 175-85.

³P.P.(1834) xx, C.1 40-60, C.2 129-257.

was willing to spend in travel to and from work was strictly limited, being hindered even further by the absence of street lighting and paving in many districts. Such conditions were a strong deterrent to lengthy journeys-to-work, and workers therefore sought shelter within easy walking distance of their place of employment, as the Royal Commission on the State of Large Towns pointed out in 1844¹.

Some of the witnesses before the Children's Employment Committee of 1833 spoke of journeys of quite long duration. Matthew Crabtree, for example, lived two or more miles from the mill at which he was employed², whilst some of the hands at Willan's Mill, Kirkstall, travelled four miles each day³. The strong admixture of factory buildings and artisan dwellings suggests however that such distances were not representative. Further support for this hypothesis is provided by comparing maps 29 and 38 which portray the distribution of textile employment, and of families engaged in trades and manufactures in 1831-2. A close correspondence is evident. Especially noticeable are the concentrations of factory employment in the east, north-east, and west wards, which were also the principal centres of working class residences. Map 38 also indicates that there was a strong imbalance in the type of industrial employment found in different sectors of North Leeds. If the hypothesis is correct therefore, this will also be reflected in the occupational composition of the different areas. Cloth workers would be resident in the western areas, while the east end would have a high proportion of flax workers. The returns for two small sample areas bear this out:

¹Second Report of the Commissioners for Inquiring into the State of Large Towns and Populous Districts, (1845), vol. II, 355.

²P.P. (1833), xx, 90.

³P.P. (1833), xx, 94.

TABLE 9.vii - OCCUPATIONS OF RESIDENTS IN FOUR STREETS OF N. LEEDS, 1861¹

	<u>East Leeds</u>		<u>West Leeds</u>	
	<u>East Lane</u>	<u>Upper Cross Yard</u>	<u>Fartham Street</u>	<u>Durham Street</u>
Flax	16	23	0	0
Cloth..	6	0	10	23
Engineering	3	2	2	9
Mining	2	1	0	0
Dyeing	0	1	5	4
Others	1	2	1	2

In 1861 there were no flax mills in West Leeds whatsoever, and instead the Kirkstall Road was lined with cloth mills, engineering works and stuff dyeing and finishing works principally. In East Leeds on the other hand there was greater diversity, though flax mills strongly predominated.

There is yet further evidence of an irrefutable nature. James Holdforth, initially a partner in the cotton-spinning concern of Wilkinson and Company established in 1790², turned to spinning silk-waste after the partnership was broken up. Never an industry which became established in Leeds, silk waste spinning was said to be 'more analogous to cotton spinning than the ordinary silk manufacture'³ which helps to explain the graduation from one activity to another. The firm was probably engaged in spinning silk yarn for incorporation with wool to make 'bombazines', a mixed fabric produced in a few Yorkshire mills, and was able to survive until 1878.

The industry never really established itself in Leeds, however, and although Holdforth prospered and came to own three mills in Leeds and another in Horsforth by 1861, his was the only concern. The three Leeds mills, which, together employed about 550 hands, were grouped within 200 yards of each other in Mill Street, Hillhouse Bank. It is possible to plot the residences of all silk mill workers recorded by the census enumerators in

¹Census Enumerators' Returns, (1861) P.R.O. R.G.9 3377 & 3391.

²See gazetteer - Bank Low Mills.

³P.P. (1833) xx, 163, evidence of R. Baker.

1851 and 1861 (Maps 41 and 42)¹, from which it may be seen that the catchment area for the three mills was very limited in extent, with a radius of at most three-quarters of a mile. Most of the employees were housed within a quarter of a mile of the mill, but this is largely attributable to the fact that Holdforth was one of the few factory-owners who provided dwellings for his employees.

'In the locality of my own mills ... I have a great deal of building property', he informed the Committee office of the House of Lords in 1842², most of which was inhabited by workers at the mills³. The Holdforth family property in 1870 comprised 61 cottages in Mill Street, Spinner Street, Beck Street, Flax Street, and Richmond Road, 12 cottages in Holdforth Square, 9 in Copper Street, and 4 more on the east side of Richmond Road⁴.

Nevertheless, there still remain some 200 or more employees who did not inhabit Holdforth's property, a sufficiently large sample to indicate that individual mobility in most of the 19th century was at a very low level. Wages were not very good in the silk industry (2s. to 20s. per week in 1833⁵), and it might be that workers were willing to travel longer distances for better money, but the long hours of labour restricted journey time to about 20 minutes walking time - a distance of approximately one third of a mile from home to factory.

Coal mining was also a localised activity in Leeds, but in the hands of a number of concerns. In the south there were collieries at Beeston and Middleton, whilst to the east of Leeds lay Seacroft and Menston,

¹Since many workers were returned as merely 'mill hand', or 'factoryhand', there is an unavoidable discrepancy between the Census figures (300 in 1851 and 389 in 1861) and contemporary accounts, e.g. T. Fenteman & Co. op. cit. (1858).

²House of Lords Record Office, Private Bill Committee Evidence, vii (1842) 101.

³P.P.(1834) xx, C.1, 46, evidence of James Holdforth.

⁴W.R.R.D. 634, 399, 464 (1870).

⁵P.P.(1834) xx, C.1, 46, evidence of James Holdforth.

Knowsthorpe and Osmondthorpe, Neville Hill and Pontefract Lane, all centres of mining¹. Within the Borough in 1861 there were over 3,000 miners, most of them housed in the out-townships. But 720 of them lived in the in-township north of the river, and it has been possible to plot their distribution on Map 43, which indicates that the vast majority sought residences on the outskirts of the town, as close as possible to their places of work. Rock Colliery, Burmantofts, Osmondthorpe Colliery, and the Neville Hill Collieries all lay within walking distance, up to half a mile from the main built-up area, although there was the added factor of the descent to the coal face to be taken into account.

It would seem from this evidence that residence and workplace were divorced as little as possible. Long hours, low wages, and the prohibitive cost of what little public transport there was combined to impose a limit to commuting of about one mile and a half, with the majority of workers preferring within three-quarters of a mile of their place of work.

This pattern continued until the last twenty years of the period under scrutiny. Even in 1880 the main built-up area stretched barely two and a half miles in each direction, and most parts of the town were easily reached on foot. Outside the in-township the association of factory and residence was even stronger. At Mearwood the tannery of S. and W. Smith was said in 1888 to be 'the chief support of the inhabitants'². Again, the three mills and forge at Kirkstall drew their employees chiefly from the village and from neighbouring Bramley.

¹T. Baines, Yorkshire Past and Present, (1877), Vol. 1, 102-4.

²Historical Publishing Co., 'Industries of Yorkshire, part I', (1888).

These conditions persisted until worker mobility was radically altered by the improvements in travel facilities which took place after 1880.

Public transport in Leeds developed at an early date compared with many other towns, and by 1853 horse-drawn omnibuses ran between the town and Burley, Kirkstall, Chapeltown, Halton, Whitkirk, Headingley, Hunslet, Roundhay and Scarcroft¹. But fares were high, services infrequent, and the buses did not commence running until long after most people were at work. Mass usage had to await the onset of cheap workingmen's fares, the provision of services at more suitable times of day, and the extension of routes into the artisan residential sectors.

The Leeds Tramway Order of 1871 was intended to initiate these improvements; thus section 11 called for workmen's cars, to be run before 7 a.m. and after 6 p.m., at fares of $\frac{1}{2}$ d per mile, which were specifically stated to be for the benefit of 'artisans, mechanics, and daily labourers'². These improvements were not really implemented until the late 1880's however, though some attempts to profit from a mass market were made by the horse-bus companies, and even by tramway companies, who pioneered a few new routes into working-class areas (Map 44). Of the five tramway routes opened between 1871 and 1874, three were to strongholds of artisan residences³.

This extended network continued to serve principally the well-to-do classes, however, and, as Dickinson writes, 'it seems likely that in Leeds really large-scale use of urban transport by the masses dates from around

¹White's Directory, (1853).

²Quoted in G. C. Dickinson, 'The Development of Suburban Road Passenger Transport in Leeds, 1840-95', Journal of Transport History, iv (1960), 214-23.

³G. C. Dickinson, 'Passenger Transport Developments', in M. W. Beresford & G. R. J. Jones eds., op. cit., (1967), 167-74.

the turn of the century'¹. The turning-point came when the Corporation bought out the tramway companies for £139,000 in 1894, and rapidly set about extending the system and introducing electric trams².

The extensions to the system made between 1894 and 1914 fall into two categories. Firstly there were new routes, linking the city centre with all the larger villages, such as Morley and Pudsey, which lay at some distance from Leeds, which served the in-township only incidentally. In North Leeds this meant the extensions to Horsforth and Moortown. Secondly additional routes were established within the in-township, principally to areas of working-class population, where high densities compensated for low fares and a lower rate of individual use. Most notable were the circular route through Woodhouse Carr, Hyde Park, and Little Woodhouse, and the extensions in the Marsh Lane/York Road/Burmantofts area (Map 46). By 1910 few places were more than a quarter of a mile from a tramway route, and the low fares were within reach of all classes³.

In the period after 1880, but particularly after 1894, the segregation of workplace and home became for the first time a real possibility, paving the way for the suburban development which is so characteristic of the 20th century. It meant that the worker could for the first time take into account considerations other than nearness to his place of work in choosing a home, and for the factory-owner the growth of passenger transport meant the potential extension of his labour-shed, for workers could now be drawn from all over the city.

¹Ibid., 168.

²Leeds Corporation Tramways, Official Guide, (1910).

³G. C. Dickinson, art. cit., (1967).

At the same time it meant that the city centre was no longer such a powerful attraction to manufacturing, since workers were able to travel across the city for the first time. The beginnings of a dispersal of industry towards the suburbs could be observed as early as 1897, when Midgeley's boot and shoe factory was built in Conway Road¹, Harehills, and other developments followed at Burmantofts and Burley, though the repercussions of the changes in the transport system were not fully felt until after World War I.

By 1906 tram services started as early as 4.30 a.m. and ran until midnight, a penny fare covering an average of a two-mile journey, more than twice that possible in 1894². With real incomes rising nationally by 10% between 1889 and 1914³ the cost of transport to the individual fell markedly, and by 1910 a mass transportation system had truly evolved.

At the same time the nature of factory production was itself changing. More and more activities were adopting mass-production methods and building factories for the purpose. The first jam factory was built in 1898 in Compton Road³, and large-scale laundries appeared for the first time. Footwear and clothing manufacturers were adopting more streamlined methods of production and building large factories.

Of 27 new factories erected in North Leeds between 1897 and 1911, no less than 14 adopted a suburban location, a choice made possible partly by the changes in transportation, which permitted the working population to find houses in the suburbs.

¹L.C.H. Leeds City Engineer's Office, Building Surveyor's Records. List of Factories Erected in Leeds, 1889-1909.

²G. C. Dickinson, art. cit. (1960).

³L.C.H. Building Surveyor's Records, 1889-1909.

The close association of house and factory, home and workplace, is not difficult to demonstrate, but it is more difficult to assess the importance of labour supply in influencing the location of manufacturing. This association could have been the product of workers following industry, or of factory-owners choosing a location in the neighbourhood of a dense concentration of operatives. The answer must be that both processes took place simultaneously, although with differing importance at different times according to conditions in the industrial economy and the labour market. Whilst labour was in short supply firms would have been strongly attracted to concentrations of population. When the economy was slack and unemployment high it was probably possible to erect a factory with less regard to the question of labour distribution. The development of different parts of North Leeds took on different forms. In Kirkstall Road, Meanwood Road, and Mill Street, for example, factories were built in open fields before housing development on any scale had commenced. On the other hand factory development at Woodhouse Carr and in Harehills tended to follow the movement of population after 1860.

The distribution of the labour supply was not a factor that could ever be ignored. Occasionally mills and other industrial buildings were erected at some distance from existing concentrations of population - Burley Mill, for example, in 1799 - but it was frequently necessary to attract workers by providing houses for them. Thomas Stansfeld, the tenant at Burley Mill after Gott, built 70 cottages, a library, an infants school and an evening school for his 400 or so employees¹. There were also a number of cottages attached to Carr Mills, Woodhouse, when they were up for sale in 1867²,

¹P.P. (1834) xx, 55, evidence of Thomas Stansfield.

²L.M., 17.8.1867.

and Edward Kitchin built 60 houses alongside his tannery in Meanwood Road from 1866 onwards¹. Possibly workers could have been recruited without such developments, but there was a further attraction where workers depended upon factory-owners for both job and accommodation, they were likely to become 'as much a part and parcel of the property of the master as his machinery'².

In the town itself, however, almost all manufacturers relied upon their labour force being served by the general housing market. The one significant exception was James Holdforth. Normally, as Pollard wrote, 'city firms might own a few houses for key workers, at best, and if small firms provided a row or two of cottages, these had no further social significance'³. The family of Croisdales, dyers at the Near Bank, owned a substantial area of property at the Bank, but it was not tenanted by their own workpeople⁴, and although industrialists sometimes invested in housing it was only as an outlet for their surplus capital generally.

Where no provision was made for workers' housing, reliance upon access to labour already housed was emphasised. In the main therefore it is to be expected that industry would be drawn to population rather than vice-versa, though once established a factory would attract housing development in its locality. An important element in the process of urban growth was the erection of factories at the margins of the built-up area, followed by new housing developments shortly afterwards.

¹W. G. Rimmer, 'Leeds Leather Industry', Thoresby Soc. xlvi, (1961), 119-64.

²P. Gaskell, Artisans and Machinery, (1836), 294.

³S. Pollard, art. cit., (1964), 528.

⁴See gazetteer - Fearne's Island Dyeworks.

The high valuation placed upon the Crown Clothing Works in Harehills in 1902 was justified by its being,

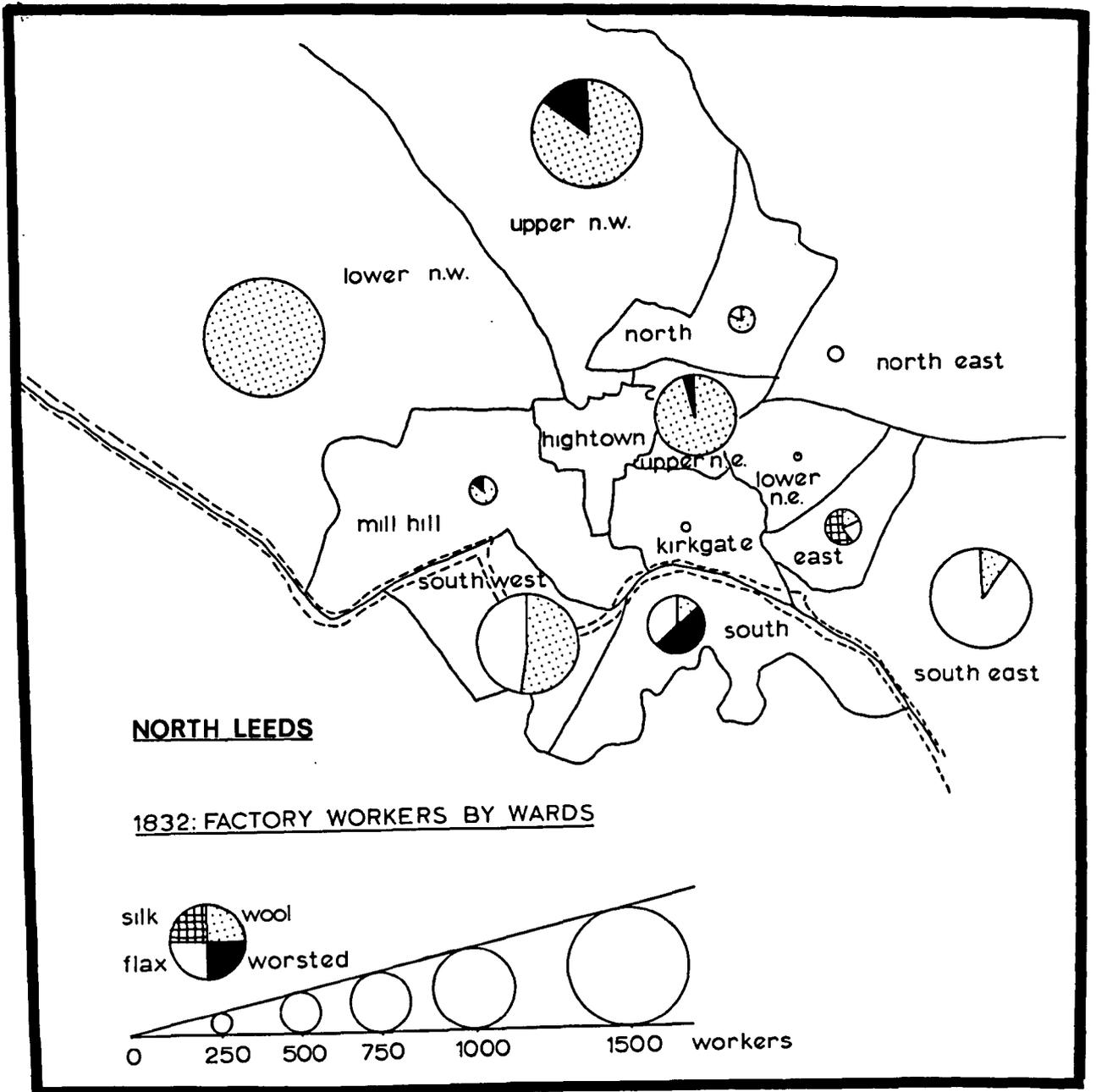
within the delivery area of the Railway Companies, in the vicinity of a working-class population, and near two lines of tramways communicating with the markets and the centre of the city,¹

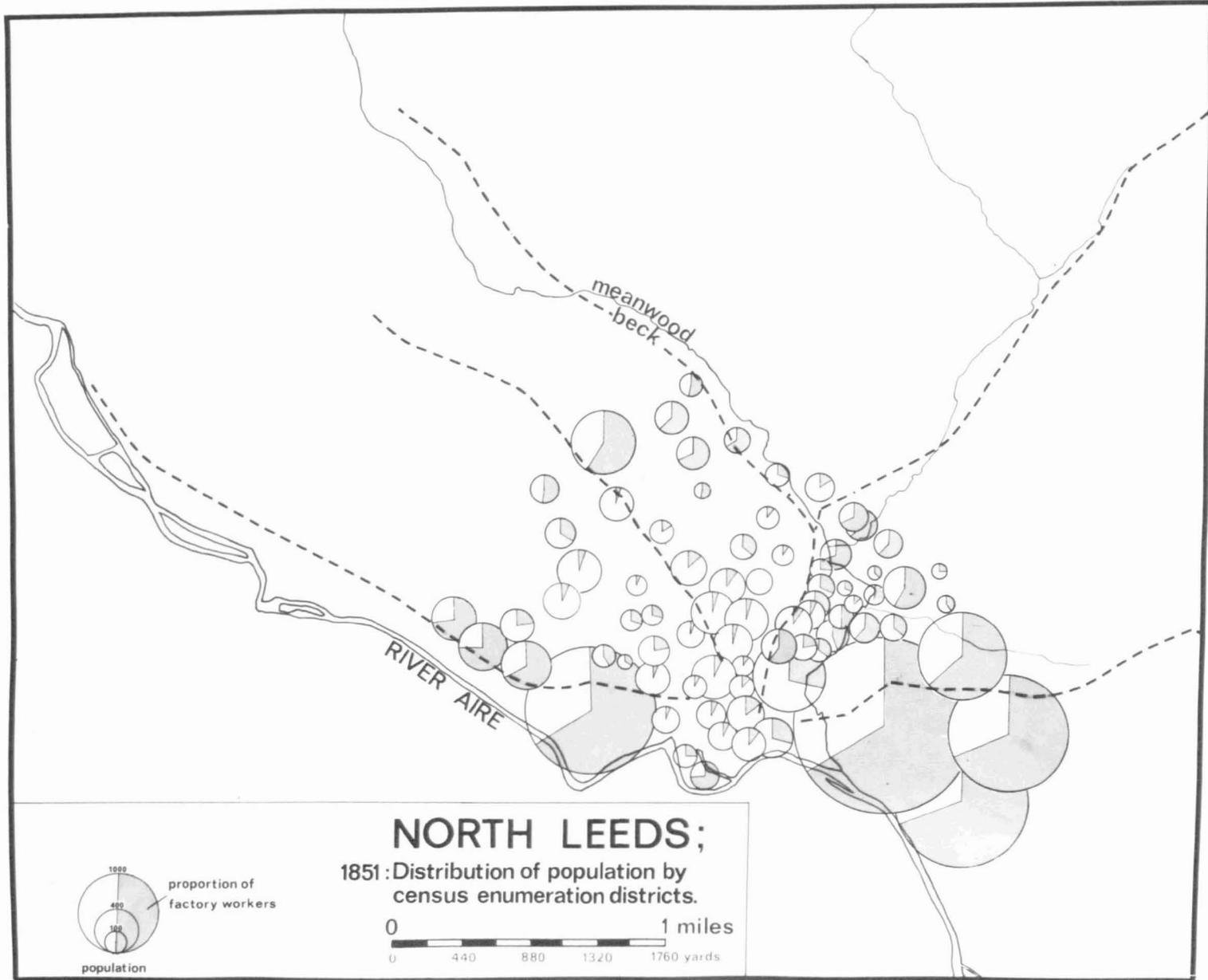
a clear statement of, amongst other things, the importance of labour in /location.

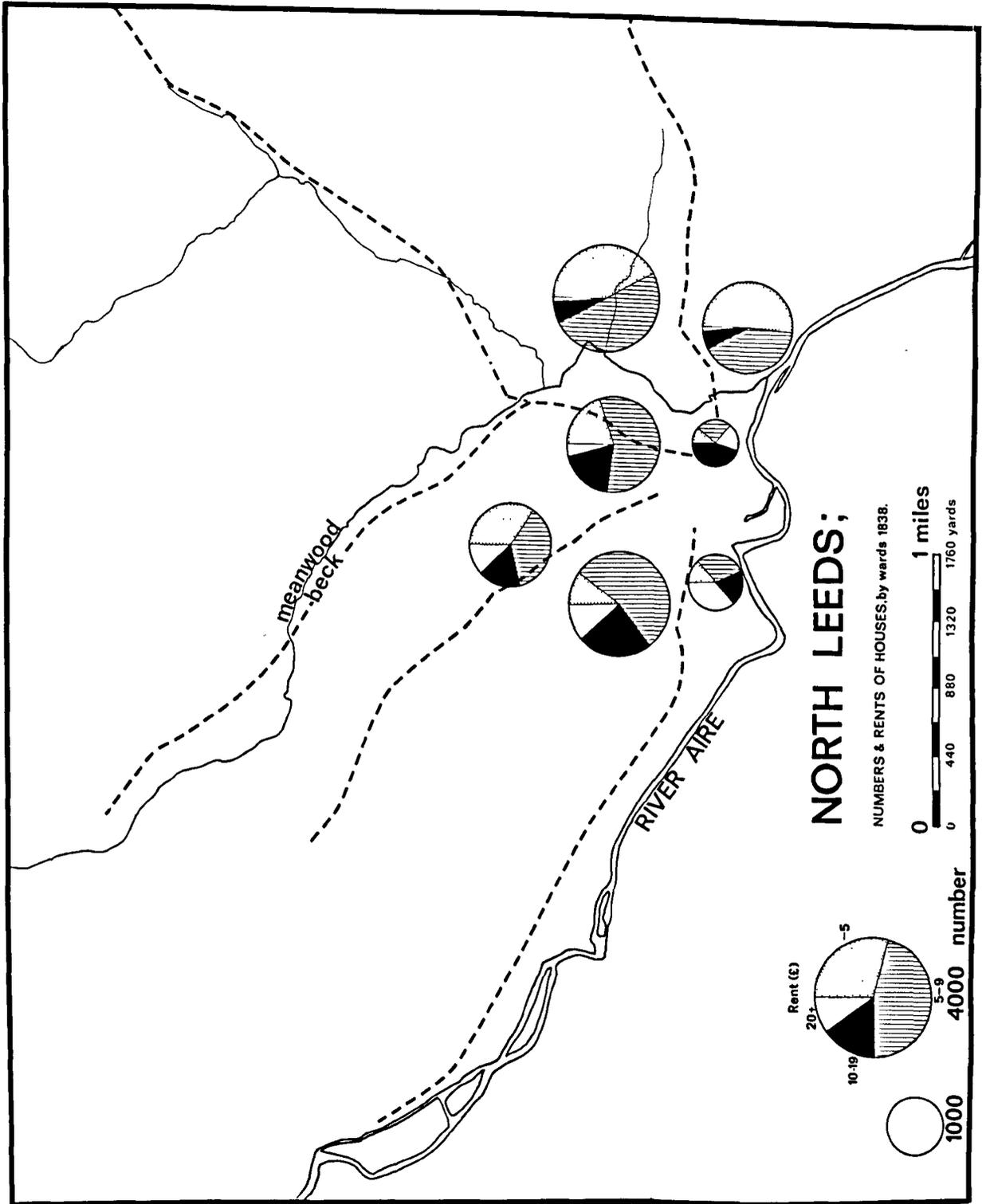
This importance, it has been decided, was due not to intra-urban differences in the cost of labour, as measured by wage rates, but to the supply of operatives, both in terms of numbers and quality. This importance was heightened in those trades which, like dyeing for instance, which relied upon a workforce with particular skills.

To summarise therefore, it is considered that labour as a factor in the location of industry in North Leeds between 1775 and 1914 was of the greatest significance. Its impact varied from industry to industry, depending upon wage levels in that trade, numbers required, the sex and age structure of the workforce and what skills were expected of it, but no firm could afford to ignore this factor. Though significant changes took place after 1880 in the distribution and mobility of labour, its importance diminished only slightly, and relative to modern-day manufacturing, industry remained labour-intensive, and the population limited in its mobility.

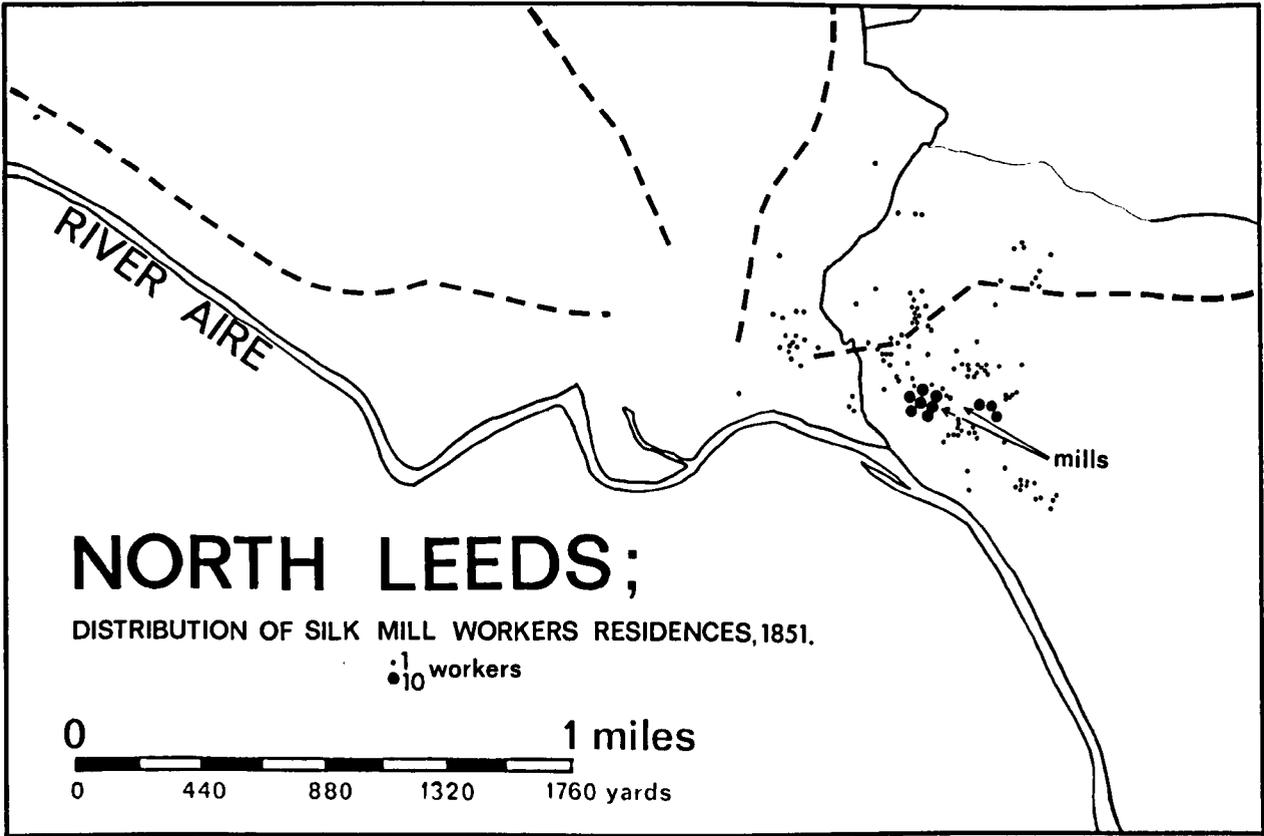
¹Hepper Books, 9, 8.



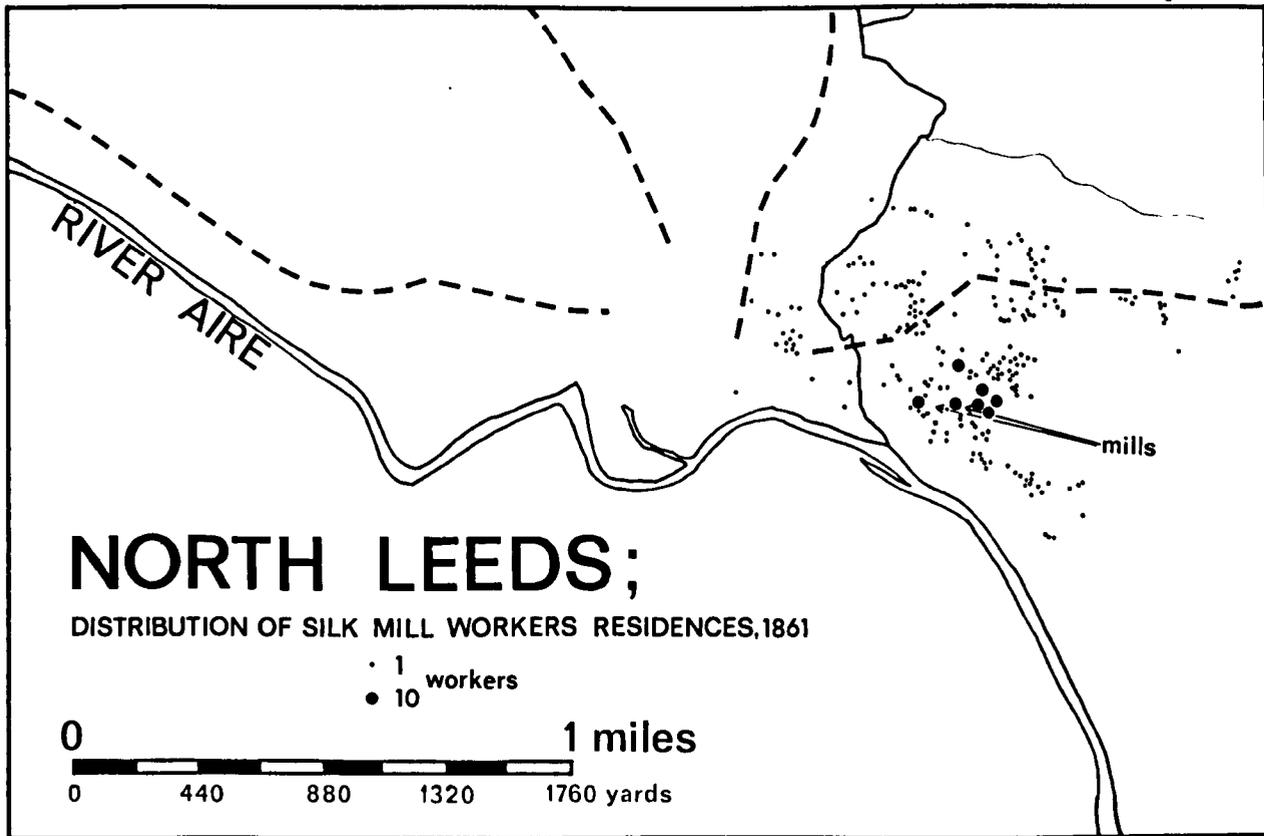




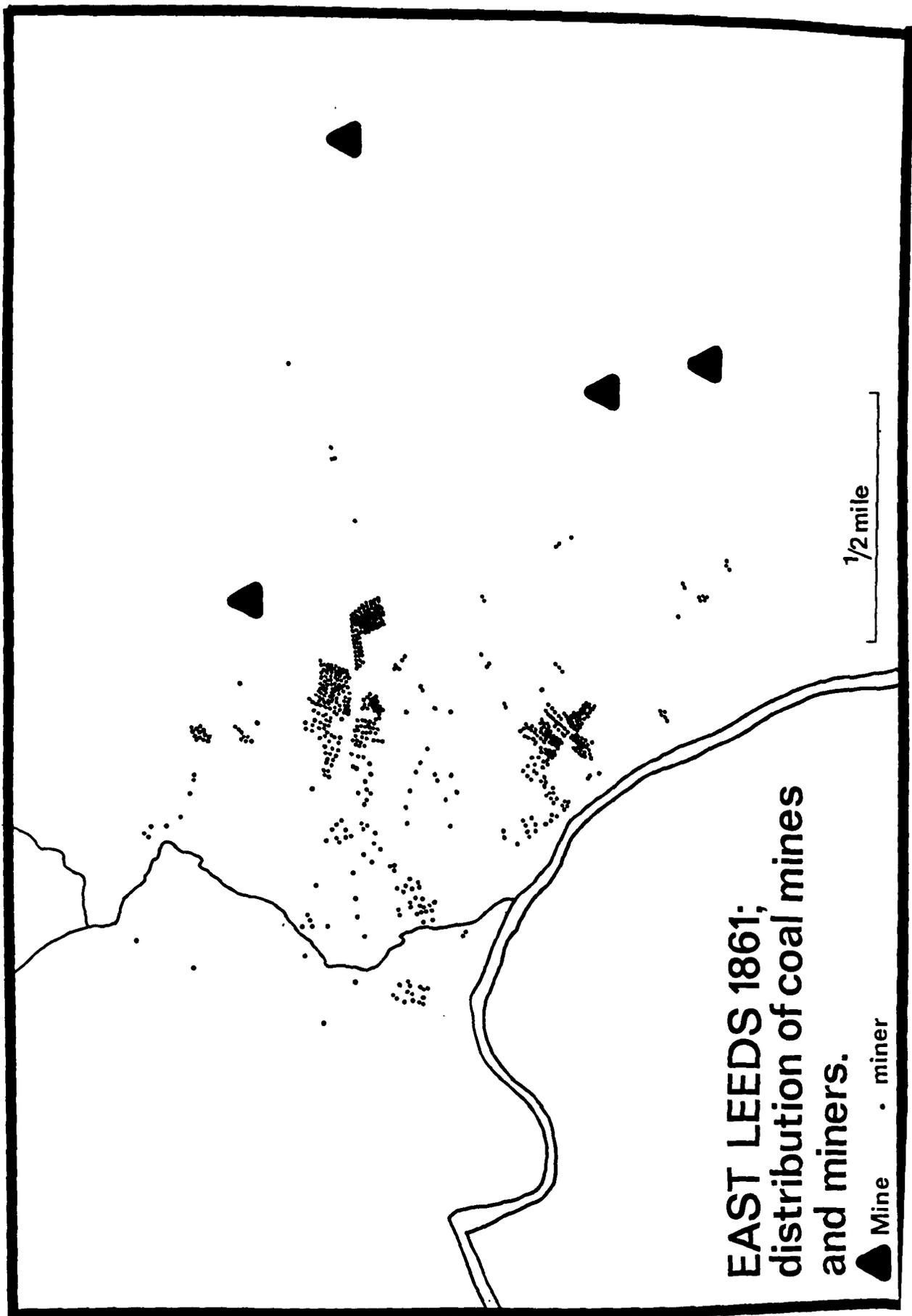
Map 40

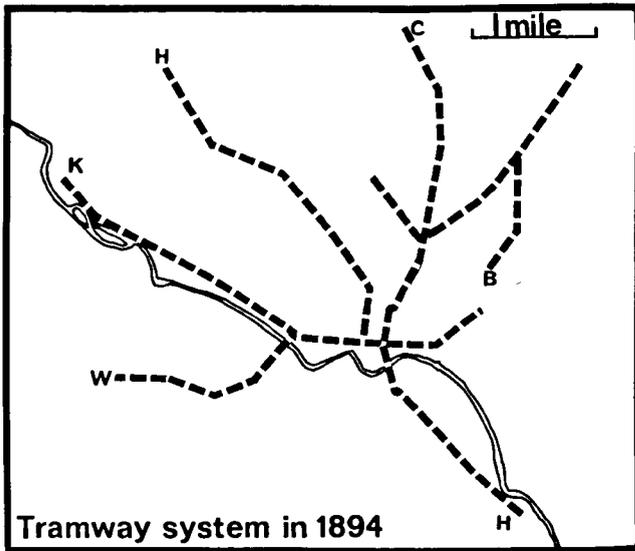


Map 41

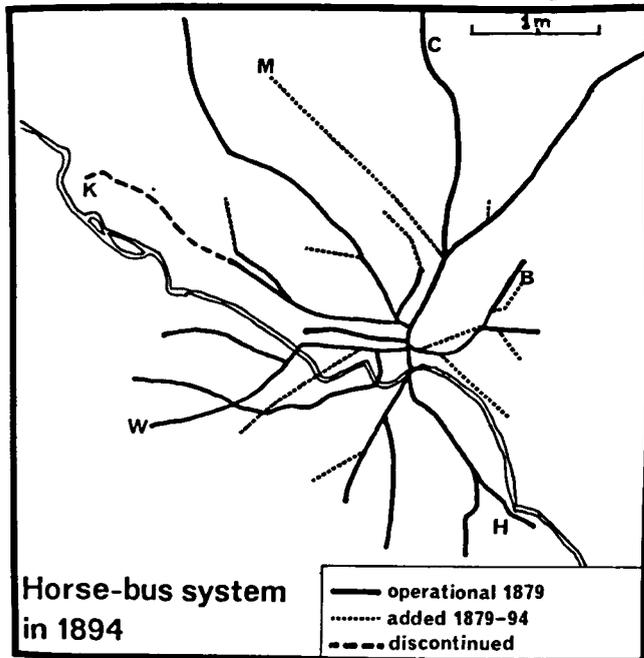


Map 42

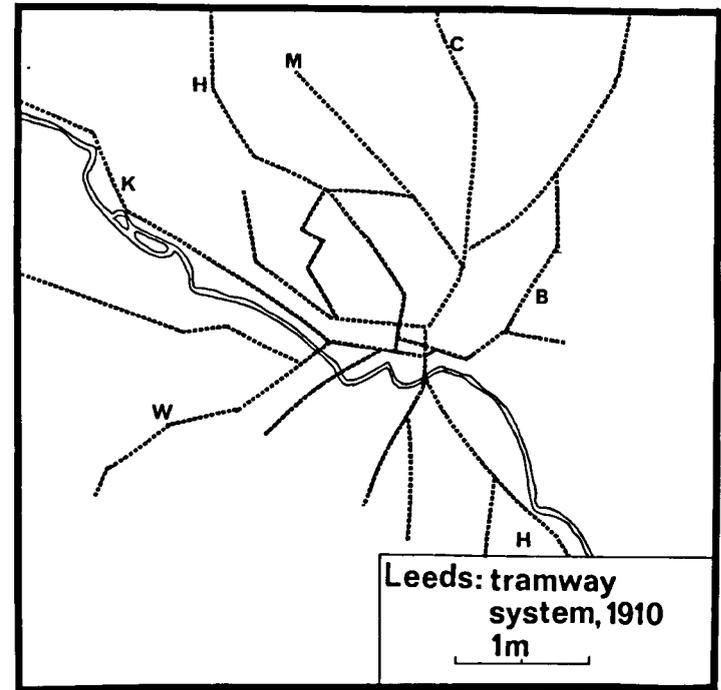




Map 44

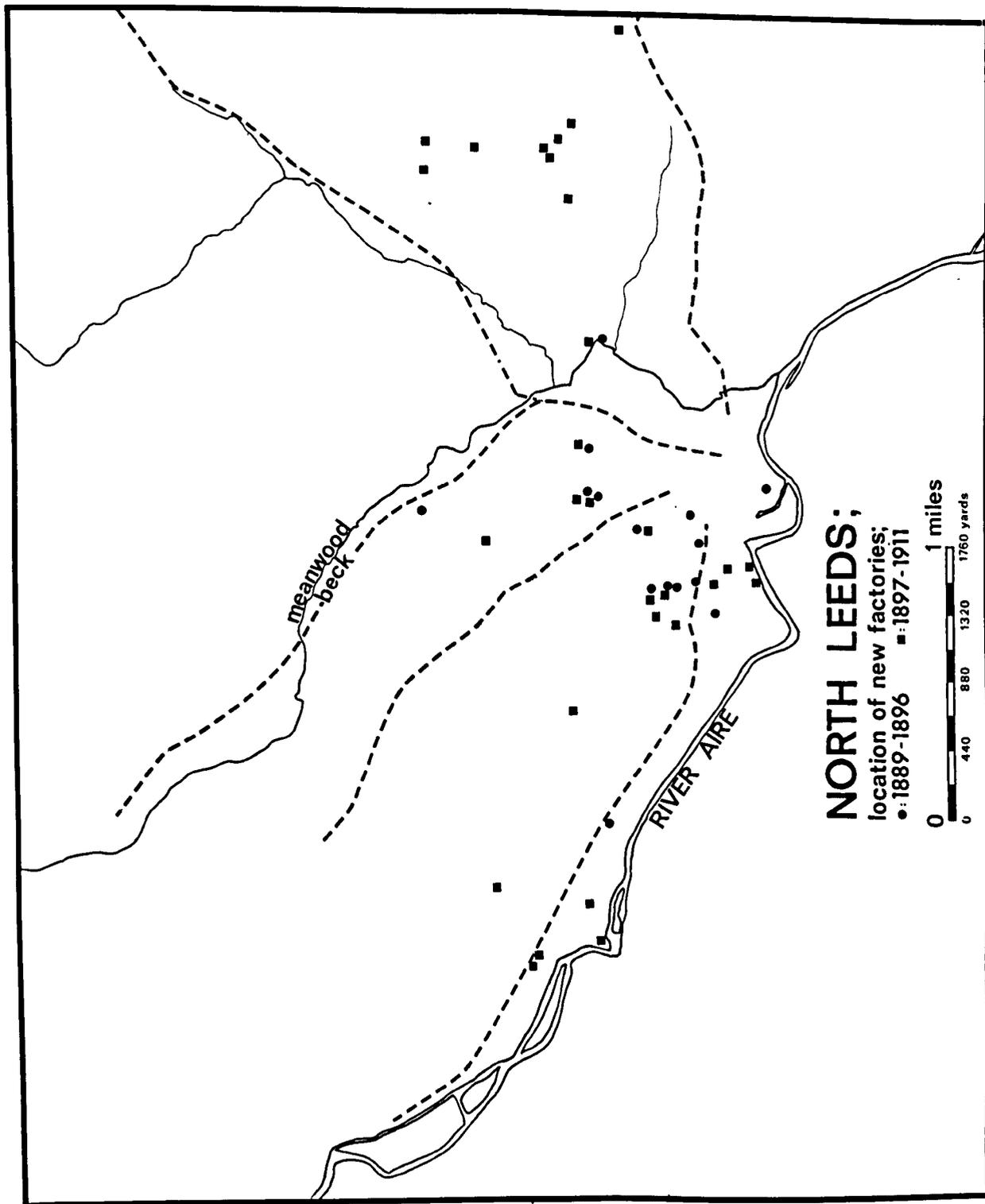


Map 45



Map 46

- B - Burmantofts
- C - Chapeltown
- H - Headingley
- K - Kirkstall
- M - Meanwood
- W - Wortley



NORTH LEEDS;
location of new factories;
●:1889-1896 ■:1897-1911



Map 47

Chapter X - SUMMARY AND CONCLUSIONS

Within the one hundred and forty years over which this investigation extends Leeds evolved from a medium-sized market town involved principally in the domestic woollen industry into one of the largest concentrations of industrial activity in the United Kingdom, with a national and international reputation for its cloth, footwear, and leather and engineering products.

In the first half of this period the town underwent its industrial revolution, during which factories and housing were erected at a rapid rate, the population of the Borough rising from c.25,000 in 1775 to 172,000 by 1851. The first true factory in North Leeds was the cotton mill built by Richard Paley on a close of land off Marsh Lane in 1790. By 1850 there were 150 factories and large workshops in North Leeds alone, of which fully two-thirds were textile mills and dyehouses.

The second phase of development was represented by the increasing maturity of the town's economy as the factory system was extended into a wider range of trades, and engineering and clothing manufacture surpassed textiles in importance. The population continued to expand, though at a reduced rate, reaching 445,000 by 1911, of whom approximately 120,000 were employed in manufacturing. By this date North Leeds had no fewer than 300 works and factories.

Throughout this development there was a strong degree of association between the different classes of manufacturing. Thus for example the growth in textiles encouraged the engineering trades. Clothing manufacture benefited from the local cloth market and co-operation with local engineering concerns. The leather industries supplied the footwear factories with their principal raw material.

Growth was both causative and cumulative¹. Expansion of production

¹A. Pred, The Spatial Dynamics of U.S. Urban-Industrial Growth, 1800-1914, (1966), 24-41.

and employment in one trade increased the local population until a new threshold level was achieved, attracting firms which benefited from the concentration of both market demand and labour supply. The machine-making industry, for example, was initially attracted by the size of the local market; at one time Boulton and Watt contemplated setting up a foundry in Leeds¹.

Chance was also a factor in industrial development. The impetus given by certain individuals to the establishment and extension of the cloth, flax, and clothing trades for example, explains in large measure the pre-eminence attained by Leeds in these fields. In all the town's trades there were men who led in the reorganisation of production and the introduction of new inventions and techniques; for example, Richard Nickols in the leather industry, Stead and Simpson in footwear, and Matthew Murray in engineering. Though the town's commercial and industrial interests provided a highly conducive setting, it was by good fortune that such men were either born in, or came to live in, Leeds.

There was no element of chance, however, in the advantages which Leeds offered to manufacturing. Raw materials which could not be procured locally were brought in by rail or water, transport facilities being deliberately developed to serve the town's interests. Of particular importance was the local production of coal, a commodity which, because it was widely used and yet had a low value per unit weight, greatly restricted the locational development of manufacturing. In Lancashire, for example, only one centre of cotton spinning - Preston - developed off the coalfield, whilst of those settlements which were also centres of mining only St. Helens

¹W. G. Rimmer, Marshalls of Leeds, (1960), 64.

did not become a focus of the industry¹. Similarly the woollen industry of the West Riding was in the main confined to a coalfield location, after steam power was adopted in the mills. Leeds, at the northernmost end of the coalfield, was at the margin of large-scale industrial concentration, but coal was produced in plenty in the eastern and southern areas of the Borough.

The concentration of population in Leeds furnished industry with an abundant supply of labour, male and female, skilled and unskilled. The town had excellent marketing and financial facilities, and factory growth was further encouraged by the lack of opposition from landowners. The in-township was divided up into a multiplicity of small freeholdings. Thus the power of those landowners who fought to prevent industry from developing in Leeds was necessarily circumscribed.

Finally, Leeds possessed an excellent situation with respect to the national transportation system, a factor which favoured both the assembly of raw materials from all over the world, and enabled industry to ship its products to a wide market at relatively low cost.

The first factories set up in Leeds were largely cotton mills which in the first flush of development spread into the West Riding. Leeds formed a minor outpost of the industry until production became concentrated into Lancashire, Scotland and the East Midlands. Once cotton had set the example, the introduction of the factory system into the woollen industry was perhaps inevitable, though the pioneering role of Benjamin Gott played a large part in its early establishment in Leeds. However, although his factory was completed by 1793, and there were five cloth factories in Leeds

¹H. B. Rodgers, 'The Lancashire Cotton Industry in 1840', Trans. of the I.B.G., 28(1960), 135-53.

by 1806, the main expansion of the factory system in this industry awaited improvements in machine-spinning, and the acceptance of the gig-mill in finishing works. This occurred principally in the 1820's when cloth mills sprang up all over Leeds, particularly in the area around Gott's mill and Droney Laith.

The introduction of the factory system into the Leeds woollen industry was the logical outcome of an interest in the trade, and significantly mills were in the main built by merchant-manufacturers. The development of the factory production of flax yarn was more accidental, though once John Marshall had set the example, the advantages of Leeds as a centre for the trade became apparent to many others, frequently speculative investors with little or no knowledge of flax spinning.

The engineering industry catered for a rapidly rising demand for machinery and steam engines from the textile trades, its modern development commencing with the establishment of Fenton, Murray and Wood's foundry at Mill Green in 1795. Some large concerns evolved in the first half of the 19th century and Leeds became well-known for its manufacture of flax and woollen-machinery.

There were some steps taken towards factory development before 1850 in other industries also; for example, Nickols and Rhodes' tannery, Martin's paper mill, and Johnson's vitriol works. In the dyeing and finishing trades the growth in production encouraged the emergence of a few large-scale companies, for instance Holroyds of Sheepscar, and George and Sons of Spring Gardens.

But the first half of the period under study, the first sixty years of factory production in Leeds, belongs primarily to the yarn-spinning industries and also to cloth production. The extension of large-scale organisation and the use of power to other trades did not really occur on

a significant scale until after 1850, when the clothing and footwear manufacturers established themselves as leading industries, and engineering outgrew a local market and became the principal employer of labour. The staple trades of the early 19th century maintained their output, except for flax spinning, but declined relatively.

To serve these industries and the needs of a large population, other manufacturing trades and firms were established. The chemicals industry, for example, met the demand from dyeing, clothmaking, leather and engineering concerns. Food industries, commercial laundries and the like were set up to serve local consumers. By 1914 Leeds had a highly diversified economy and was one of the foremost centres of manufacturing in the country. Its locational advantages had been further enhanced after 1850 by extensions to the rail and canal networks, and by improvements in road transport. In 1914 manufacturing industry in Leeds was enjoying considerable prosperity, and if there were few electrical and automobile engineers compared with some cities, this did not seem to represent any great problem.

The account of industrial development in Leeds from 1775 to 1914, which occupies the first three chapters, was intended to fulfil two objectives. Firstly it represented an attempt to illustrate the course of industrial progress and to suggest explanations for the changes which took place. This, it is hoped, will make some contribution to knowledge about industrial development in an important provincial town, as which, despite Professor Rimmer's pioneering efforts, has hitherto received insufficient attention.

The second objective was to provide a context for subsequent analysis by establishing a back-cloth against which the intra-urban location of manufacturing may be viewed. In the second half of the thesis the individual factors behind industrial location for all trades between 1775 and 1914

were discussed, and their importance analysed.

From this it has emerged that the distinction, made by Hamilton¹, between 'location' and 'situation' in industrial geography is an important one. To these it is possible to add a further aspect - that of site. In each case the factors operating upon the choice made by the individual or a type of manufacturing are different. In the leather industry, for example, a concern first had to select a location, normally an urban area or a region which could satisfy certain requirements, notably of raw material supplies and of transport efficiency. Secondly it was necessary to choose a situation within the town or region accessible to markets, financial and commercial facilities, and to labour supply, to specify only the key factors. Finally, a specific site had to be selected from those which were available at the time, and which were suitable in terms of topography and site costs.

The importance of site costs has been reintroduced into intra-urban analysis in recent years by Logan and by Goodall². Whilst it is possible to agree with these that site factors are of the greatest importance, it is necessary to emphasise one essential difference between metropolitan areas in the 20th century and Leeds in the 19th century. The extent of the latter was still only about thirteen square miles even in 1914, and, despite the primitive nature of road transport, haulage costs were not a critical factor.

More critical in the days before motor transport and the telephone was communication with ancillary firms and service industries. This difficulty could however, be overcome by establishing offices and representatives in the centre of the town, as did most of the more prominent woollen manufacturers whose mills were located out of Leeds. Distance was not therefore a factor of great significance, save in two

¹F. E. I. Hamilton, 'Models of Industrial Location', in R. Chorley & P. Haggett eds., Models in Geography, (1967), 361-424.

²M. I. Logan, 'Locational Behaviour of Manufacturing Firms in Urban Areas', A.A.A.G., 56 (1966), 451-66.

B. Goodall, The Economies of Urban Areas, (1972), Chapter 5.

types of case: firstly where large volumes of commodities of low value per unit weight had to be moved - as in brickmaking or quarrying for instance; secondly when access to a market focused upon the commercial district of the city centre played a large part in inter-firm competition, as with printing and perhaps cloth finishing.

Topographical site factors were much more important. There is evidence, for example, that firms in the leather and the dyeing industries competed for sites further away from the town centre, up the Aire and Meanwood valleys, so as to be able to obtain access to cleaner water for washing skins and cloths. Firms nearer to the Head of the river obtained less polluted water, thus gaining an important competitive advantage. A great many of the industries of North Leeds utilised water in large quantities - up to half a million gallons per day - and water obtained from boreholes or supplied by the municipality was much more expensive. Hence there was a strong orientation of industry towards sites along the banks of the River Aire and the Meanwood Beck, the latter possessing the further attraction of having the softest water in the Borough. This orientation was reinforced by other topographical factors, such as the slope of the land, and the use of valley corridors as avenues of communication, also the unsuitability of these sites for certain non-industrial uses.

A location near to the centre of the town was favoured not so much because transportation costs were thereby reduced, but because of the greater ease of communicating with other firms and with various service facilities, and because of the factor of labour supply. Each firm had to compete with other firms and activities from a source which was relatively immobile, the typical worker preferring to work in a factory near to his home rather than in one set at some distance. The effective range of

commuting was less than half a mile. Since the principal concentrations of working-class population were at the east end of the town, and in the Leylands, at Woodhouse, and in the Kirkstall Road area (after c.1810), firms which located their factories in these districts could recruit labour more easily than those which did not, unless their rates of pay were significantly lower.

The strong association of workplace and residence is perhaps the essential feature of urban growth during the 19th century¹, and it is true that workers were attracted to localities in which employment opportunities were more favourable. The class of housing development at the west end of Leeds altered markedly after Gott and others established factories in the area, and developers began to cater for a lower class of people than had hitherto been the case².

However, newly-established factories could not expect to recruit an adequate labour force if ~~its factory~~ sited away from the working-class districts, unless, as at Burley Mill³, some provision was made for housing the employees. Normally industrialists relied upon the Leeds housing market to provide their workers with homes, and it was clearly to their advantage to locate their factory within the town or in the neighbouring villages. If labour requirements were at all specialised - for example a preference for female labour, or Irish workers - choice of locations was further constrained, for the distribution of such elements was not even. Flax mills tended to be located in East Leeds, where the Irish had

¹J. E. Vance jr., 'Labour-Shed, Employment-Field, and Dynamic Analysis in Urban Geography', Econ. Geog., 36 (1960), 189-220.

²L.C.A. D1Bt 116, Regina v. Gott.
M. W. Beresford, 'Prosperity Street', in M. W. Beresford & G. R. J. Jones eds., Leeds and its Region, (1967),

³See gazetteer - Burley Mill.

congregated, and where wage levels were lower; cloth finishers, on the other hand, sought out more skilled labour, preferring the west end of Leeds.

Site costs - topographical constraints, the price of land, and access to labour - therefore appear to have been the most significant influence upon the distribution of manufacturing in North Leeds in the 19th century. Factors which operate at a wider level, in particular the costs of transportation, were of minor importance. They help to explain why manufacturing was found in Leeds, but do not account for its distribution within the town. Similarly factors of scale economies and linkage can be used to account for the concentration of industrial activities into urban areas, but offer only a part of the solution for intra-urban location. In most industries such factors were insignificant, and only in clothing, and possibly cloth-finishing, was their influence discernible, unless a very broad definition of scale economies is adopted.

In the main this thesis has been concerned with a group of industries for which raw materials were of external origin, in which water was consumed in large quantities, and enterprise was in the hands of individuals rather than corporate bodies. During most of the period dealt with communications - relatively relatively were/poor, labour/immobile, and industrial organisation unsophisticated. Topographical considerations and other site costs normally overrode other factors in the choice of factory location.

However, some decisions lacked a rational economic basis. Decision-making in location is subject to limitations of knowledge and intelligence¹. Entrepreneurs tend to exhibit a marked preference for locations with which they are familiar, and in many instances continued to use a site long after

¹A. Pred, Behaviour and Location, (1969).

it had ceased to be adequate. The personal factor in industrial location is especially important when a genetic view of the pattern of distribution is adopted. Many a factory developed around an old workshop nucleus, whose location related to factors which were often outdated by the time that the factory was erected. Mention has already been made of the substantial number of cloth mills which evolved in this manner. It follows that unless the pattern of manufacturing industry is considered from an evolutionary standpoint there is a danger that investigators will be tempted to impose their own rationale, ignoring the real factors which were actually taken into account when areas were first put to industrial use. Nor should it be assumed that industrial entrepreneurs were deeply concerned with the locational problem. The choice of location probably came after all other decisions were made, and was limited to those sites which were known to be available.

In this respect the influence of land ownership upon urban development may be considerable. Some attention has been paid to this question, and in particular to the exclusion of industrial uses from certain areas of towns because of pressures exerted by the land-owning and professional classes¹. In Leeds, although there is evidence of attempts to maintain the Little Woodhouse area as a wedge of upper-class residences, there was nothing to parallel the development of the Calthorpe estate in Birmingham². As the land ownership pattern was a fragmented one, and as the land was predominantly freehold, it was difficult for individuals or even pressure groups to control the pattern of development. They were more likely to yield to commercial

¹D. Ward, *The Urban Plan of Leeds and the Factors which have Conditioned its Growth*, (1961), unpub. M. A. thesis, University of Leeds.
B. Goodall *op. cit.*, (1972), Chapter 3.

²M. J. Wise, 'On the Evolution of the Jewellery and Gun Quarters in Birmingham', *Trans. I.B.G.*, 15 (1949), 57-72.

pressures. Outside the central business district it was manufacturing which could pay the highest price or rent for land, and there was a strong temptation to sell and take up residence outside the in-township. Leeds society appears to have had a fairly strong commitment to commercial and industrial development anyway, and the dominant attitude of landowners was probably therefore one of laissez-faire.

These are all factors which are not normally given much account in studies of intra-urban location of manufacturing. On the other hand, the factor of land-use competition has received widespread attention¹, and many investigators have considered industrial distribution in urban areas in terms of the interplay of centrifugal forces (high land costs, congestion, etc.) and centripetal forces (proximity to facilities, agglomeration economies etc.)².

Approaches have varied from the purely descriptive³, to the current attempts to construct an economic model of intra-urban manufacturing location⁴. There is a need, however, to develop a behavioural theory of intra-urban location, one which does not ignore the fact that industrial patterns are the composites of individual decisions. At the same time the role of topography needs to be better understood.

¹L. S. Bourne ed., The Internal Structure of the City, (1971), Section II.
L. K. Loewenstein, 'The Location of Urban Land Uses', Land Economics, 39 (1963), 406-20.

²C. Colby, 'Centrifugal and Centripetal Forces in Urban Geography', A.A.A.G., 23, (1933), 1-20.
M. H. Yeates & B. J. Garner, The North American City, (1971), 392-3.

³W. H. K. Turner, 'The Evolution of the Pattern of the Textile Industry Within Dundee', Trans. I.B.G., 18, (1952), 107-19.
H. Moisley, 'The Industrial and Urban Development of the North Staffs. Conurbation', Trans. I.B.G., 17 (1951), 149-65.

⁴M. A. Goldberg, 'An Economic Model of Intra-Metropolitan Industrial Location', Journal of Regional Science, 10 (1970), 75-9.

In 1961 Tiebout wrote that the problem of industrial location within urban areas, as distinct from that of inter-urban location, was relatively unexplored¹. A decade later, despite efforts made by Pred and others in this area, this remains substantially true². There is need for much more research of an empirical nature before the situation can be modelled satisfactorily, and a general theory evolved. It is hoped that the empirical content of this thesis, derived from sources hitherto largely unexplored, will provide a contribution towards this end.

✓ 6/10
Must try harder

¹C. M. Tiebout, 'Intra-urban Location Problems; An Evaluation', American Economic Review, 51 (1961), 271-8.

²A. Pred, 'The Intra-Metropolitan Location of American Manufacturing', A.A.A.G., 54 (1964), 165-80.

P. A. Groves, Towards a Typology of Intrametropolitan Manufacturing Location, (1971).

APPENDIX - THE PRINCIPAL FACTORIES

Factories are numbered 1-154, and their location indicated on the map in the end pocket of the thesis.

1. ABBEY MILLS, ABBEY ROAD, KIRKSTALL.

Located on the mill goit, near Kirkstall Bridge, just down from the Abbey.

Set up by the monks in the 16th century as a fulling mill, and later part of the estates of the Graham family. By 1738 there were 6 fulling stocks and 2 pairs of stones for grinding corn, all water-powered. Some time in the 18th century the function of scribbling was added.

Burnt down in 1796 they were immediately rebuilt, and production of milled cloth reached 11,140 pieces in 1797, the mills being tenanted by Obadiah Willans, a prominent Kirkstall clothier. The corn mill was occupied by Snowden and Rhodes. Successive insurance valuations were:

	<u>Cloth mill</u>	<u>Corn mill</u>
1799	£1,250	
1805		- £3400 -
1823		- £3850 -
1824		- £10950 -
1829		- £11320 -

This was broken down as follows in 1829:

Mill	£2900
Building for fulling and dressing cloth	£900
Cloth drying house	£800
Porter's ledge and counting house	£300
4 cottages, stables and smith's shops	£300
Dyehouse	£270
Cottages	£2750
Corn Mill	£1400
Wheel and machinery	£1000
Tenement and stable	£700

There was a 60 h.p. steam engine installed by 1829 as well as the water wheel which was also capable of yielding 60 h.p. Willans had 120 looms in the weaving rooms over a block of four cottages. Production had continued despite a fire in December, 1827, which caused £12,000 worth of damage. The corn mill retained its priority over the water supply, but was much smaller. By 1833 Willans had 513 workers and had installed Richard Morley, from Nottingham, as manager.

The corn mills were tenanted by Isaac and Ephraim Elsworth from the early 1820's onwards, and they added scribbling and later worsted spinning to their business. When Willans left for Britannia Mills (q.v.) in 1836, E.Elsworth took over the whole of the mills for worsted spinning, and then

the corn mill was let to Brady and Rowntree. Their lease expired 1850.

About 1845 Elsworth gave way to A. Webster, woollen manufacturer, who had 265 hands in 1861. In 1888 J. Bradley & Son took the mills over for the manufacture of cloth, paying £2,000 p.a. rent in 1900. They were eventually allowed to buy the mills in 1919.

Sun CS 139/998919; 146/1018687; 147/1025189; 166/1071452; 172/1085010;
172/1085745; 172/1085746; 243/1258239; 256/1314074

Pp (1834) xx, 59.

Pp (1833) xx, 94 & 126.

L.M., 28.11.1829.

LCD. no. 15377.

2. KIRKSTALL TANNERY, MORRIS LANE, KIRKSTALL.

Located above the valley, in the centre of Kirkstall village. Water supply possibly from a spring.

Joseph Conyers jr. was a tanner at Kirkstall from early date. In 1859 he was prosecuted for making a nuisance with the smoke from his chimney. By 1861 J. & W. Conyers had 71 workers at Kirkstall and at Water Lane, York Street. They were then only curriers. In 1869 a house and garden, with a gighouse and land were bought from a Mr Binks, and a tannery erected. The firm remained in occupation through to 1914.

WRRD 629 87 104 (1869)

W.G. Rimmer, 'Leeds Leather Industry in the Nineteenth Century', Thoresby Society xlv (1960), 119-64.

3. SAVINS MILL, COMMERCIAL ROAD, KIRKSTALL.

On Abbey Mills goit, just below the bridge, within the village of Kirkstall.

Built by Sir James Graham in the mid-18th century when the mill goit was extended. By 1799 tenanted by Charles Wood as an oil and scribbling mill, and by Wood and Burrows in 1802. Wood paid £1,320 p.a. rent in 1819 to Sir James Graham. They remained until 1822 (then T. Wood & Co.) when replaced by Johnson, Hudson, & Co; scribblers and millers, who became

Hudsen & Bottemley. They remained until 1850.

Insurance valuations in this period were:

- 1799 - £1,600 (mill building £550; water wheel & fulling machinery £800; Clockmaker's Werk £200; Steek £50).
 1805 - £850
 1824 - £4,700 (Mill £1,500; Wheel etc. £750; Dryhouse and Dyehouse £150; Stable £50; 2 cottages £150; Clockmaker's werk £1,700; Steek £400).
 1829 - £3,915.

T.H.Gray, woollen manufacturer, was the tenant from 1850 until 1886, when he was succeeded by W.J.Cheetham, woollen manufacturer. From 1904-14 the mills were shared by Henry Jenkinson, a printer, and Percy Ackroyd & Co, fibre spinners.

SUN CS 29/696279; 34/705774; 48/734116; 139/998918; 147/1025189;
 156/1040859; 159/1052240; 166/1071452; 172/1085751;
 183/1118967.

4. ST. ANNE'S MILL, COMMERCIAL ROAD, KIRKSTALL.

The second mill built by Sir James Graham on the extension to the Abbey Mill gate, some time in the mid-18th century.

By 1799 tenanted by John and Edward Brooke as a cloth mill. They were prominent merchants who remained in possession until about 1832. The rent in 1819 was £1,300 p.a., and insurance valuations were:

- 1799 - £2,400 (Fulling and Scribbling Mills £1,000; Water Wheel, Stecks etc. £1,400).
 1805 - £2,200
 1823 - £8,450 (Mill £3,000; Water Wheel £1,000; Weaving and Spinning Rooms £150; Spinning Rooms and warehouse and pressing shop £1,550; Wool dryhouse £200; 22 Cottages £1,400; Burling Room and Dyehouse £300 etc.).
 1828 - £8,450.

James Hargrave & Sons, woollen manufacturers, succeeded to the mills about 1832, specialising in the production of muslins and cashmeres. They were followed by J.&E.B.Padgett, woollen manufacturers (1855 to 1895),

then Earnshaw and Bannister, dyers and finishers (1896 to c. 1906), and finally Baxter and Thrippleten, and W.Lord & Sen, both woollen manufacturing firms. Earnshaw and Bannister paid rent of £400 p.a.

SUN CS 29/696462; 34/705774; 48/734116; 139/99818; 147/1025189; 156/1040859; 166/1071452.

Hepper books, 8,34.

5. JUMBO BOOT FACTORY; KIRKSTALL ROAD.

Built in 1900 by Thomas Peel, footwear manufacturer, and in his occupation until after 1914.

6. CARDIGAN BOOT FACTORY, KIRKSTALL ROAD.

Adjacent to the above, and built in 1898 for H.Walker & Sons. Ltd., boot manufacturers, who were previously in Washington Street.

7. BURLEY MILLS, KIRKSTALL ROAD; BURLEY.

The third mill along the Abbey Mill goit extension, originally in open fields off the road to Kirkstall, near the village of Burley.

Built 1799 by Sir James Graham for Benjamin Gett of Park Mills (q.v.), who used this water-driven scribbling mill specially for the manufacture of blankets. In 1819 Gett was paying £1,338 p.a. rent, for the mills and 32 acres of land. Successive insurance valuations were:

1800 -	£4,000 (mill £2,500; Water Wheels and machinery £1,500)
1802 -	£5,000
1805 -	£3,500
1823 -	£7,450
1829 -	£3,480 (buildings only).

The 1823 valuation was made up as follows:

Worsted spinning mill	- £4,000
Water wheels etc.	- £1,000
28 cottages	- £1,600
Yarn drying storehouse	- £500
Miscellaneous	- £350

The mill had been taken over by Thomas Stansfeld & Co., worsted manufacturer and stuff merchant, in 1822, who added 2 storeys to the mill and installed a 36h.p. Fenton & Co. steam engine. His rent was

£1,535 p.a., the lease being renewed for 300 years in 1830 at the same value, of which £322-10s. was ground rent for almost 25 acres of land.

In addition to providing 70 cottages for his workers, Stansfeld built a library, an infant school and an evening school, but the shortage of labour in the neighbourhood forced him to employ about 50 children under 12 years of age, out of 610 workers in 1833. The water wheel was then rated at 35 h.p. and the steam engine, of similar capabilities, was only used to supplement it. By 1836 there were only 418 workers, but as many as 479 power-looms, over one-third of the total in Leeds. He was still having difficulty obtaining hands.

Stansfeld & Co. became Stansfeld and Prichard, then Prichard & Co., who remained until 1844 when John Howard, carpet manufacturer, previously of Low Field Mills, moved in. He remained until about 1852 when the mill was taken by Holdsworth & Co., flax spinners, who also had a mill in Helbeck; they had 420 workers in 1867. They left about 1870 when the mills reverted to the woollen industry, tenanted by T. Birchall & Co. until 1897. Thereafter a part remained in the industry, occupied by Clough and Ramsden. The other main occupant was Harold Nickels, the currier, but there were dyers and other trades also. Nickels remained until after 1914.

W.B. Crump, 'The Leeds Woollen Industry, 1780-1820', Thoresby Society xxxii (1931).

SUN CS. 29/696462; 34/705774; 48/734116; 139/998918; 147/1025189;
156/1040859; 166/1071452.

Pp (1834) xx, C1, 55 and C2, 129.

Pp (1836) xlv, 48.

8. CARDIGAN SHEDS, CARDIGAN ROW.

A clothing factory of one storey only built for J.N. Sharp Ltd., adjacent to the River Aire, in 1906. It had a ground floor area of 60,900 sq.ft.

Building Surveyors Records, City Engineer's Office, LCH.

9. CARDIGAN MILLS, MILFORD PLACE.

In 1872 J.G. and T. Chadwick, woollen manufacturers, bought 5 acres and 3 roods adjacent to the River Aire, from the trustees of the Earl of Cardigan's estate, including the right to obtain water from and dispose of wastes into the river.

The mills which they built were occupied by them until 1888 when sold to D. Dixon Marshall, woollen manufacturer who occupied them thereafter. They then comprised a willeying shed, engine and boiler houses, a tenter house, weaving sheds, warping sheds, a dyehouse, a millinghouse, a burling shed, a wash house, a dry house, a wool warehouse, and all the machinery therein.

Marshall died in 1903, at which time the mills were valued at £23,636. Thereafter they were owned by his trustees and occupied by D. Dixon and Sons Ltd. The premises were the same as in 1888 with the addition of a rag-sorting place, a new willey house, and a new 2-storey mill.

'Our Water supply is derived from the River Aire, for which five guineas is paid annually to the owners of the King's Mills'. There were also 2 wells, and the rateable value was £660.

Hepper Books, 9, 18.

WRRD 687 191 212 (1872) and 7 175 97 (1888).

10. BURLEY VALE MILLS, MILFORD PLACE.

In Cardigan Fields, Burley, adjacent to the River Aire.

Built in 1868 for James Wilkinson & Co., worsted spinners, who stayed in occupation until about 1885 when they were taken over by Windsor and Firth, woollen manufacturers, in 1898, and a further two woollen manufacturers after 1900.

11. BURLEY NEW MILL, MILFORD PLACE.

Adjacent to the above, adjoining its north side, between Milford Place and the railway viaduct.

Robert Green, a tobacco manufacturer, bought South Barley Hurst, a close of 5176 sq.yds., in 1835, on which he built a 4-storey mill with a steam engine house. Initially the mill was occupied by C. Parkins & Co.,

worsted spinners, then by R.F.Green & Co. who by 1851 had 360 workers and were also worsted spinners. For a short spell the company was run by J.Martin, Green's partner, then by Robert's son, William. In 1874 the premises were sold to William Lawson & Co., carpet manufacturers, previously of Columba Street and Woodhouse Lane. They made considerable additions to the buildings which in 1888 covered 2,600 sq.yds. They remained until after 1914.

Historical Publishing Co., Industries of Yorkshire, (1888)
WRRD MA 652 592 (1835) and TK 136 172 (1860).

12. BURLEY VALE DYEWORKS, VIADUCT ROAD.

Adjacent to the River Aire, to the south of Viaduct Tannery.

2,830 sq.yds. of land at Burley Vale were bought by William Dixon, dyer, in 1872, and the dyeworks built. He was succeeded by John Austin, dyer, and then Joseph Lowden and Co., who bought the works in 1886, when they consisted of:

a dyehouse, crabhouse, ware rooms, engine and boiler house, chimney, office, cart shed, weigh house, cottage and stable.

This firm also had a works at Melbourne Mills (q.v.), and employed a total of 200 workers in 1888. In the same year a further 825 sq.yds. were bought from the Corporation, for expanding the premises.

In 1900 the firm joined the Leeds and District Dyers Assocn., at which time the premises were valued at £11,488. The main building was of three storeys, the other two, and there was also a block of ware rooms and stables. A condensing beam engine was installed and also a horizontal condensing engine. Water was pumped up from boreholes.

The firm continued in occupation until after 1914.

Hepper Books, 8,28.

Historical Publishing Co., op.cit., (1888).
WRRD 31 297 161 (1886), and 19 308 184 (1888).

13. VIADUCT TANNERY, VIADUCT ROAD.

On corner of Kirkstall Road, forty yards from the River Aire, to the north of Burley Vale Dyeworks.

Built 1890 by William Beckworth, formerly managing partner at Jeppa Tannery. The land area was 7,020 sq. yards. By 1909 the premises were valued at £17,321, which included a 100 h.p. horizontal steam engine, and the main building of three storeys.

Beckworth went bankrupt in 1915, having become a limited liability company only in 1914. The works were sold for £43,000.

W.G.Rimmer, art.cit., (1960).

Hepper Books, 12, 89 and 13, 164.

LCD no. 6128.

14. PERSEVERANCE IRONWORKS, KIRKSTALL ROAD.

Between Kirkstall Road and the Aire, just beyond the in-township boundary.

In 1824 Stephen and Joseph Whitham, millwrights, of Kirkstall, leased a half an acre of land from Sir James Graham, on which they erected a foundry. They specialised in milling and fulling machinery, and later added steam engines. A further 540 sq.yds. was added in 1829, then in 1847 the land was actually purchased. Total area was then 4,507 sq.yds.

By 1854 the business was in a very healthy state. Over 270 hands were employed and the premises valued at £31,352, with a further £4,000 for materials and effects. £25,000 of debts were outstanding, whilst Whithams owed only £5,452.

In 1858 a further 13,325 sq.yds. were added, bought from Beckett's devisees, and in 1865 another 7,744 sq.yds., bought from T.W.Lloyd.

In 1863 the premises consisted of:

an entrance ledge, offices, a model shop, engine shop, smith's shop, erecting shop, mechanics' shop, boilermakers' shop, iron foundry, stores, forge, iron warehouse, stables, and a house.

The fixtures comprised:

engines, boilers, steam hammers, rolling mills, furnaces, lathes, pinching and shearing machines, pruning machines, smiths' hearths, cupolas, furnaces and cranes,

By 1873 they were the largest re-rollers in Leeds, with 40 puddling furnaces (including 11 doubling furnaces), and 4 mills and forges.

The business appears to have come into difficulties about this time. By 1884 the firm owed £13,000 to Beckett and Co., bankers, alone, and in 1891 they went bankrupt, the premises being placed in the hands of the mortgagees.

The works were sold off in three parts, to the British (later American) Screw Co., who built a new factory on the site of the old railway sidings, which were valued at £15,000 in 1891. It had even been suggested that the Great Western Railway buy these sidings to use as a goods station.

The second part was sold to Jonas Woodhead and Sons of Bradford, axle makers, and the third part (5,450 sq.yds.) to W.Wainwright, a machine broker, who paid £6,154. This latter plot was sold to Joseph Watson & Sons Ltd. of Whitehall Soap Works (q.v.) for £4,990, who also bought a part of Woodhead's property - 11,177 sq.yds. for £10,250. This land was used in an exchange with the Leeds Corporation. Watson's gained an extension to their land in Whitehall Road, and the Corporation built premises for its Highways Dept.

LCD no. 2103.

W.R.R.D.	IB	228	235	(1824)
	KL	708	607	(1829)
	OC	318	278	(1841)
	PL	545	537	(1846)
	PX	706	702	(1848)

S.Griffiths, Guide to the Iron Trade of Great Britain (1873), 278.

E.K.Scott, 'Early Cloth Fulling Machinery', Trans. Newcomen Soc. xii (1931-2), 32-50.

15. AIRE TANNERY, KIRKSTALL ROAD.

Aire Place, adjoining the river and the Perseverance foundry estate.

Built 1864 by Walker and Dixon, tanners, who continued in occupation until 1901 when the company failed with liabilities of over £14,000 and assets of only £9,687. Valued at £4,291 (excluding tanpits) in 1888.

The site was then bought by A.Hess and Brother, manufacturers of oil and stearine who rebuilt the works in 1911 after a disastrous fire.

Hepper Books 2,34.

16. WELLINGTON TANNERY, KIRKSTALL ROAD.

In Washington Street, adjoining the River Aire.

Theodore Talbot bought 6,936 sq.yds. of land from Beckett's Trustees in 1864 and proceeded to erect a tannery which by 1867 employed 24 hands.

In 1877 the tannery was sold to Richard Nickels (of Jappa Tannery), but in 1883 was occupied by J.Greenwood and Bond, cloth finishers, who renamed the works 'Valley Mills'. This was taken over by William Cheatter, a currier, in about 1886. He was also a boot manufacturer at St.Peter's Mill (q.v.). By now known as the 'Valley Leather Works', but vacated in about 1902. Remained empty thereafter.

W.R.R.D. YE 41 38 (1864)
ZN 95 107 (1866)
782 607 701 (1877)

17. WHITEHEAD AND BOTTERILL'S DYEHOUSE AND OAK TANNERY, KIRKSTALL ROAD

Adjoining the River Aire, on the west side of Jappa Tannery.

John Betterill and James Whitehead bought 5,820 sq.yds. off Beckett's trustees in 1834, on which they proceeded to build a stuff dyeing and finishing works, which became one of the largest in Leeds. Water was obtained from the river but in 1841 a 240-foot well was sunk to provide cleaner water.

By 1861 Betterill (now the sole partner) employed 206 workers, and in 1867 the number had reached 275, by which time Betterill was an alderman of the Borough.

In 1876 the premises were sold to William Pane, a tanner and currier, previously of Rockingham Street. He built his Oak Tannery on the land, a four-storey building on three sides of a square, with a 2-storey workshop on the other. In the middle was an open shed which housed the tan pits. By 1883 the firm were dealing with 20-30,000 hides a year, undertaking all processes, including finishing the leather,

A new tanyard was added in 1887, when much of the water was obtained from a 380-foot borehole.

The firm remained until 1969.

W.R.R.D. LT 515 508 (1834).

Leeds Express, 3.3.1883.

Historical Publishing Company, Industries of Yorkshire part 1. (1888).

18. JOPPA TANNERY, KIRKSTALL ROAD.

Adjacent to the River Aire, originally built in open fields, near to Spring Gardens.

James Rhodes and Richard Nickels leased 5198 sq.yds. of land from Beckett's trustees in 1828 and built the tannery which in 1836 - the year in which they actually purchased the land - was described as:

a large building used as a tanhouse, an engine house, a work house, bark houses, a currier's workshop with a cellar underneath and a workshop over, and a yard with tanpits.

Nickels had started in Bramley, where he retained a works, and Rhodes had been at Low Fold (See Albion Foundry). They were pioneers in building a large-scale tannery and also in substituting gambier, valerian and shumac for oak bark in tanning.

By 1858 the premises covered more than 2 acres and dealt with 7-9,000 hides a week. There were 200 hands, 500 tan pits and a 30 h.p. steam engine.

In 1867 there were 300 workers, 320 pits, and an output of 12,000 skins and hides per week. In one week 25 tens of leather^{were} produced. This required 9½ tons of lime, 42 tons of coal and 20 tens of tanning materials, plus 120,000 gallons of water, mostly from a 120ft. well up which water had to be pumped. River water only used for the engine because too hard. Works now cover 3 acres and 3 reeds.

By 1888 the largest tannery in Leeds, with William Beckwith the works manager. In 1891 however, the firm folded and the works were auctioned in 1895, the works having in the meantime been partly leased to Beckwith, the remainder staying empty. Eventually Harold Nickels (of Burley Mills) took the premises over still as a leather works.

W.R.R.D. KF 164 167 (1828)
 MK 92 103 (1836).

19. T.GEORGE & CO.'s DYEWORKS; SPRING GARDENS; KIRKSTALL ROAD.

Thomas George bought an acre of land adjacent to the River Aire from Thomas Beckett, and in 1825 built a countinghouse, a dyeworks, an engine house, a black dyehouse and a copperas dyehouse, and cleaning, crabbing, singeing, grease, ware, and other rooms. He had previously had a dyehouse with a 6 h.p. steam engine on the Isle of Cinders.

In 1829 a press-shop and a pattern dyehouse were added, then in 1833

a new grease room and stables. By this time George was one of largest stuff dyers and finishers, with 88 men and a 12 h.p. steam engine.

By 1867 one of seven large stuff dyers in Leeds, working almost exclusively for the Bradford trade. When busy 160 hands were employed and 180 tons of dyewares per annum. Other materials consumed were 20 tons of coal a day, and 270,000 gallons of water a day, of which only 20,000 gallons for dyeing, the rest for washing. The works housed a 60 h.p. steam engine and 30 dye vats, varying in capacity from 60 to 20,000 gallons. 150,000 gallons were obtained from the Aire, the rest from a borehole and the natural well which gave the locality its name.

The firm became 'Hammond and George' in the 1870's, and then just 'T. Hammond & Co.', who in 1888 employed over 200 hands. The firm left the works in 1892, but there was no other occupant until after the turn of the century when the Globe Chemical Manufacturing Company moved in.

Pp (1834) xx, C1, 44 and C2, 238.

Commission on River Pollution, (1867) vol.II, 214-6.

Historical Publishing Company, op.cit., (1888).

20. SCHOFIELD AND REFFITT'S DYEWORKS, KIRKSTALL ROAD.

Between Thomas George's dyeworks and Farrar's dyehouse; John Schofield and James Reffitt bought 5,250 sq.yds. off Beckett in 1827, on which they had erected a dyeworks, in about 1825.

About 1837 Schofield left to set up on his own at Aire Place but the firm continued as J.&J.Reffitt, and later Reffitt & Co. One of the partners was Henry Fawcett, another was - Penny. Both of these left to set up their own works.

By 1851 the company employed 110 men, rising to 205 in 1861. In 1867 between 240-50 hands were employed in stuff dyeing and finishing, exclusively for Bradford manufacturers. The firm handled up to 1,000 pieces per day, consuming 400-500,000 gallons of water, almost all abstracted from the river. There were four steam engines of 30, 20, 12 and 5 h.p.

The firm continued in occupation of the works until about 1902 when their place was taken by C.Swithenbank, rice miller, and the Triumph Engineering Company.

W.R.R.D. IU 780 727 (1827).

Commission on River Pollution, (1867), vol.II, 258-61.

21. FARRAR'S DYEHOUSE, SPRING GARDENS, KIRKSTALL ROAD.

Probably built about 1824 between Reffitt's dyeworks and Hersfall's, adjacent to the River Aire. First occupied by John Farrar, then George Farrar, then Farrar & Woodcock, but by 1850 the works were tenanted by Walker and Hirst, though owned by Farrar still.

Walker & Co. were wool and cloth dyers, who employed 38 hands in 1867. The firm was still in occupation in 1914.

22. HORSFALL'S DYEWORKS, SPRING GARDENS, KIRKSTALL ROAD.

John Hersfall and Joseph Wood built in 1824

a dyehouse, store house, engine house, dressing shops
and two cottages,

on 5,430 sq.yds. of land adjacent to the river, leased off the Beckett family. There was a 12 h.p. steam engine by Fenton & Co.

Hersfall was a stuff dyer who employed 81 men by 1834, mainly on a subcontract basis. For example, the press shop was let to four men, who employed nine more workers. The company went out of business soon after, however, and the works were up for auction in 1838, complete with machinery.

The property passed into the hands of J.Murgatroyd, but was later occupied by William Broadbent, dyer, then a Frederick Blackburn, finisher, who employed 100 hands in 1867, and afterwards S.M. and H.Lee, dyers. Thereafter there was an assortment of tenants, including H.Foster, grease manufacturer, and the Yorkshire Vinegar Company.

PP (1834) xx, C1, 47, and C2, 246.

W.R.R.B. KF 164 167 (1828).

22. PICKARD'S WORKS, KIRKSTALL ROAD.

Adjacent to the River Aire, to the west of Perseverance Mills. George Pickard bought part of the Dreny Laith estate from Thomas Beckett in February 1825, 4,926 sq.yds. in all, on which Pickard had built and was still building dyehouses, press shops etc.

He remained until 1834 when the premises passed to William Scott, dyer. After 1840 the occupants were J.Bateman, dyer (until 1848), then

W.Blackburn dyer (1848-56), Then finally Wood and Bedford.

The owner in 1847 was J.Wood, but even after Wood & Bedford moved in a part of the premises was let to Messrs. Musgrave, dyers, and the works became known as 'Airedale Dyehouse'. In 1867 the Musgraves employed 20 workers, and Wood & Bedford, who were manufacturing chemists, employed 16. Musgraves, who were woollen dyers, remained until approximately 1888 when they were replaced by B.Haigh, dyer.

They left by 1899 and in 1900 Wood & Bedford took over the whole works and joined the Yorkshire Dyeware and Chemical Co. (see Calvert's dyeworks, below). In 1898 the works were valued at £9,752.

Hepper books, 7, 7.

W.R.R.D. IE 308 282 (1825).

24. CALVERT'S DYEWORCS, KIRKSTALL ROAD.

Adjacent to the works of Messrs. Wood & Bedford, lying next to Perseverance Mills on the east.

John Calvert bought 5,333 sq.yds. off Thomas Beckett in 1823, with the dyehouse 'lately erected and erecting'. By 1824 there was a 10 h.p. engine by Stirk & Co. installed.

The firm later became Marshall and Calvert, turning over to the manufacture of chemicals for dyeing, and in 1900 the firm became a constituent member of the Yorkshire Dyeware and Chemical Co.

W.R.R.D. HS 296 303 (1823).

25. PERSEVERANCE MILLS, KIRKSTALL ROAD.

Joseph Sheepshanks, cloth merchant, bought land from Thomas Beckett, part of the Droncy Laith estate, next to R. & J.Glover's property, over two and a half acres in all.

On this they built a mill, but not until about 1826. By 1833 they employed 187 workers and had a 47 h.p. engine. The mills were to the south of the land, with open tenters extending to Kirkstall Road. York & Sheepshanks, as the firm became, were one of the first cloth manufacturers to try power looms - they had 30 in 1836.

York & Sheepshanks continued to occupy the mills until 1865 when, after remaining empty for a short time, they were let to numerous tenants, the principal of whom were Barker and Moody, flannel manufacturers,

and John D. Jehnstone, woollen manufacturer.

Barker and Moody occupied rooms in the east wing, making shirtings and flannels from cotton and wool, one of few firms to transform raw wool into finished products of clothing. They also occupied the north wing, and by 1888 had 2,000 spindles and 44 power looms. They left in 1911.

J.D.Jehnstone still (1971) occupy a portion of the mills, which in 1913 formed a square with sides of 5,1,6, and 2 storeys.

PP (1834) xx, C2, 258.

PP (1836) xlv, 48.

W.R.R.D. GR 740 720 (1818).

Historical Publishing Co., op.cit., (1888).

26. AIREDALE MILLS, KIRKSTALL ROAD.

Robert and Jeremiah Glover bought land off Thomas Beckatt, part of the Drony Laith estate, and built their mill probably in 1817-8. By 1823 it was one of the largest in the town, with as many as 11 chimneys and a 32 h.p. steam engine by Fenton & Co.

In 1822 Robert transferred his moiety to Jeremiah in

that factory or mill, called the Aire Dale Mill,
with the dwelling house, and the several warehouses,
workshops, erections, buildings, offices, steam engine
and other appurtenances.

The firm continued in occupation until 1844 when they were replaced by William Beevers, cloth finisher, B.F.Mann & Sons, cloth manufacturers, and Holdsworth and Hansen, scribblers. By 1863 Laycock & Co., cloth millers, were also in.

Glovers only ever occupied a part of the mills probably. Pim Nevins and Co. rented part in 1832, where they had a 30 h.p. steam engine, remaining until about 1840.

Mann & Sons left in 1871 and by 1872 the occupants were Beevers and Hudson Brothers, fullers. Beevers had gone by 1885, by which time the mills housed J.Batley & Co., woollen manufacturers, J.Dodgson, woollen manufacturers.

In the 1890's a beet manufacturer was added and Ledgard and Coldwell turned to the manufacture of worsted coatings. By 1904 the occupants were:
Ledgard and Coldwell; Galloway & Co., engineers;
H.Butterfield, electrical engineer; Hinchcliffe & Sen, woollen

manufacturers; J. Batley & Co., cloth finishers; and the Airedale Clothing Company.

In 1905 the mills were bought by Fairbairn, Lawson & Co. to extend their Wellington Engineering Works (q.v.).

W.R.R.D. HS 298 304 (1823).

LCA DB 116, Counsel's brief. R. v. Gett. (1824).

27. WELLINGTON MILLS; WELLINGTON BRIDGE STREET.

William Bruce, Robert Derrington, and James Walker started to build a mill on part of the Drony Laith estate, adjacent to the River Aire, in 1824. In 1825 they bought the land from John Wermald - 8,864 sq.yds.

Part of this estate was used to build an iron and brass foundry, and on the remainder was built by 1826,

a dyehouse, a dryhouse, a weaving shop,
an engine house, gas house, stables etc.

Walker sold out his share in 1833, by which time the mill was used mainly for cloth finishing, and had a 40 h.p. steam engine.

Derrington sold his share to Bruce in 1842, but in 1844 the mills were bought by D.J. Cooper, cloth manufacturers and merchants of Park Lane. When they were prosecuted for smoke nuisance in 1857 they also owned Helbeck Mill.

In 1861 they had 200 employees here and at their Park Lane Mill. By 1867 they had 500. The Coopers remained in occupation until about 1884 when Fairbairn & Co. bought the estate to extend their premises. (See Wellington Engineering Works).

W.R.R.D. IK 466 484 (1825)

LO 217 211 (1833)

OF 534 418 (1842)

RE 235 253 (1845)

PP (1834) xx, Cl, 41.

28. WELLINGTON DYEWORKS AND VICTORIA MILL, WELLINGTON BRIDGE STREET.

Obadiah Willans, cloth merchant and manufacturer, bought 8,514 sq.yds. from John Wermald, at Wellington Bridge, in 1824. Instead of using it himself he sold the land to Benjamin Musgrave, who built a dyehouse and scribbling mill, and added a dressing and friezing mill, the latter let to W. Atkinson.

In 1828 the mills were valued at £2,850 and in 1831 at £3,950. The cloth mill part was let to Daysen, Home, and Hindle in 1835, who occupied it until 1848. The insurance valuation in 1836 was £4,850.

The Musgrave family retained the dyehouse and occupied it throughout, but the cloth mill was sold to - Wartzburg who let it to Peter Willans and Son., cloth manufacturers. They used it as a cloth dressing mill, having 100 hands in 1867.

J. Todd & Sons succeeded Willans in about 1870, and were in turn followed by Lupton & Co. in 1886, who left for Whitehall Mills in 1896. Thereafter the mills were occupied by various woollen manufacturers and cloth finishing firms.

The dyehouse was still occupied by Musgraves when it was sold to Fairbairn and Co. in the 1880's.

W.R.R.D. HY 339 321 (1824)
 LQ 51 56 (1833)
 SP 761 861 (1855)

L.M., 5.5.1838.

SUN CS 170/1083057; 184/1114596; 193/1131689; 234/1237252.

29. WELLINGTON ENGINEERING WORKS, KIRKSTALL ROAD.

Between Wellington Road and Kirkstall Road, immediately to the north of Victoria and Wellington Mills.

The original iron and brass foundry and workshops were erected in 1825 on land bought by Bruce, Dorrington, and Walker (see Wellington Mills), and let out to William Hawkshaw. This had a small 4 h.p. steam engine.

In 1828 it was bought by Peter Fairbairn, previously of Lady Lane, with financial aid from John Marshall, the great Helbeck flax spinner. A new machine shop was added in 1829.

Fairbairn was of a famous north-eastern family - his brother William was one of the most noted engineers in Manchester. He arrived in Leeds

early in 1826 with only £500 capital and set up shop in Lady Lane with only 2 employees. His interest in the flax machinery trade attracted Marshall's attention, and the move to Wellington Foundry was financed by the latter. His first patent for slivering and reving machinery was taken out in 1834, and was followed by many more in subsequent years.

The works were extended as business grew. By 1845 they covered 8,500 sq.yds., had about 500 workers, and represented a capital investment of about £50,000. £60-70,000 worth of machinery and goods were turned out each year. In addition to flax machinery the firm began to produce woollen and ropemaking equipment, and later machine tools.

A large new shed was built in 1847 and by 1858 the works covered four acres, drove all its machinery by steam, and employed over 1,000 hands. The Crimean War was a great fillip to production, and although the specialisation in textile machinery was sustained, cannon-boring and rifling machines contributed to the war effort. In 1867 there were 2,000 hands at the works, which now covered all the land between Kirkstall Road and Wellington Bridge Street.

Fairbairn, who had a distinguished career in local politics, died in 1861. The firm was continued, however, first as Fairbairn, Kennedy and Naylor, then as Fairbairn, Naylor, McPherson & Co. Ltd.

In 1884 the works were extended by the purchase of the adjoining Wellington Mills and Wellington dyehouse, to form a unit of nearly seven acres with over 2,000 workers, of whom 150 were in the brassfoundry department. The specialisations of textile machinery and machine tools remained, and attention had also been turned towards railway tools.

In 1899 the works were valued prior to the amalgamation with Lawson & Co. of Hepe Foundry (q.v.), and Cembe, Barbour Ltd. of Belfast and Dundee:

The Wellington Foundry estate	- 19,527 sq.yds.
The South Mills estate (Wellington Mills)	- 11,831 sq.yds.
A Belt and Nut Works, Primate Street	- 390 sq.yds.
The West Street Works	- 8,773 sq.yds.
Stables in Brigley Street	- 281 sq.yds.
4 cottages in Bingley Street, annual rental of £33-16s.	
2 close of agricultural land near York	- 4 acres.
TOTAL VALUATION	- £285,251.

The cottages had been bought to protect the water from St. Peter's Well from being interfered with. This supplied the West Street Works, the former St. Peter's Old Mill (q.v.), which had been bought sometime in the 1880's.

Fairbairn, Lawson & Co. Ltd. were the biggest manufacturers of flax machinery in the world in 1900 and they still occupy the premises today.

In 1905 a further extension was made by purchasing the adjoining Airedale Mills estate (q.v.).

PP (1834) xx, Cl, 43.

PP (1841) vii, Report of the Select Committee on the Exportation of Machinery, 210.

T.Fenteman & Co., op.cit., (1858).

A.C.Black, Guide to Leeds and its Vicinity, (1868).

Historical Publishing Co., op.cit., (1888).

Communication from G.T.Danby of Fairbairn, Lawson Ltd.

30. NORTH HALL MILL, ANGEL STREET, KIRKSTALL ROAD.

There was a small horse-gin scribbling mill at North Hall in 1810, insured for £100 by J.Packer, but the cloth finishing mill was not built until 1837, when James King, cloth finisher bought the land on which he was erecting a mill. When built, in 1838, the land was valued at £550 for 2,756 sq.yds., and the buildings and machinery at £1,920.

A further 925 sq.yds. at the northern end of the premises was bought from Beckett's trustees in 1853, and then in 1871 there was a further extension when 1,035 sq.yds. to the north of that was bought from Beckett's trustees again. By this time the firm was being run by James King and James Abbott King, although the title of 'J.King and Sons' was retained for business purposes.

In 1876 however the firm was renamed J. & J.A.King, and the premises were formally conveyed for £3,483.

In 1900 the company joined the Leeds and District Dyers and Finishers Association Ltd., at which time the mills were valued at £9,509. This company still occupied the premises in 1914.

LCD no. 5943.

31. CYCLOPS FOUNDRY, SALE STREET, KIRKSTALL ROAD.

William Brittain, bought lots 19 and 20 off the Kemplay estate in 1854, and proceeded to erect a foundry workshop. This was sold in 1860 to Charles Tayler, also an ironfounder, who added an adjoining plot of land in 1863.

By the time of a mortgage in 1883 the works were described as:

All that building sometime ago erected and built upon the

said land by William Brittain deceased, and occupied by him as and for a workshop, with the boiler, engine, going gear, fan, crane, cupola, and other fixtures, whilst on the second plot of land Tayler had built that building erected upon the said plot of land or on some part thereof, and then used by the firm of 'C.H. Taylor and Sons' as a foundry, and the boiler, cupola, and engine therein. In 1902 Taylers registered as a limited liability company, and the premises and contents were conveyed for £15,000, by which time they covered 3,649 sq sq.yds.

The works were demolished in 1923.

LCD no. 18261.

32. ALEXANDER FOUNDRY, DARLINGTON STREET, KIRKSTALL ROAD.

George Tayler, cloth finisher, and Stephen Cotton, machinist, entered into an agreement in 1863 whereby Cotton bought land in St. Andrew's Place, Darlington Street, and was to build a foundry, whilst Tayler was to provide all the power and plant for the concern.

By 1864 the foundry had been built by Cotton, but Tayler was still erecting an engine shed and a smith's shop. A £2,000 limit had been set for Cotton's share but this was exceeded. In agreeing to construct a boilermaker's shed therefore, Cotton obtained the right to buy Taylor's moiety at any time.

In fact Taylor bought Cotton out in 1866, with the aid of William Easton who became his partner. In 1868 the firm of Easton and Tattersall bought the premises and used it as the location for their machine-making activities. In 1875 the works were described as:

All that ironfoundry, engineer's workshop, and other erections built by Stephen Cotton ... and also all that boilermakers shed and smith's shop, steam engine, boiler, shafting, and fixtures.

Easton and Tattersall went bankrupt and in 1899 the premises were sold off to Harold Nickols for £5,750. He used them as a carrying works until in 1904 they were sold to the Leeds City Brewery Co. who were still in occupation in 1914.

LCD no. 15770.

33. SPARK STREET MILL (ST. PETER'S FOUNDRY), KIRKSTALL ROAD.

The land, originally part of the Drony Laith estate, was sold in 1838 by Beckett's trustees to Simon Harker, millwright - 1,865 sq.yds. for £452. On this he built

the workshops, foundry buildings, and premises, with the steam engine, and all the machinery,

which were occupied

by himself and by Ardill and Pickard; who were later at Britannia Foundry, Whitehall Road (q.v.). They were replaced by 1843 by J.Hattersley & Co., machine makers, and then William Tetley, manufacturer of woollen machinery.

In 1875 Harker's trustees sold the premises to F.Firth, who converted it into a woollen mill, occupied by T.Brayshaw. W.H.Rinder & Co, woollen manufacturers, and T.Vause & Co., shoddy manufacturers, followed for short spells, and then from 1898 the occupants were J.Exley and Son, carriers and tanners. The mills housed 60 workers in 1888, when Vause & Co. were in occupation, and were of three storeys.

LCD no. 15955

LCA DB 58/42 Agreements for the sale of Wilson's estate.

Historical Publishing Co., op.cit., (1888).

34. DEAN STREET MILL, KIRKSTALL ROAD.

Immediately to the south of Spark St. Mill, between Spark and Abbey Streets. The works were built up in stages, commencing with the purchase of 470 sq.yds. in 1833 from John Calvert, dyer, by Thomas Greenwood, machine maker. On this land Greenwood had recently erected workshops and other buildings.

A further 500 sq.yds. on the north side of this was bought from Beckett's trustees in 1834 for £100, then the remaining 1,015 sq.yds. from the same source in 1838 for £253, secured with a £12 deposit.

The foundry was sold to Kilvington and Vickerman, cloth dressers in 1841, who had 46 workers ten years later, but left about 1855 when they were succeeded by R.M.Carter & Co., cloth finishers. They had 41 hands in 1861. They were followed by T.Kitson & Son (c.1870 to c.1900), then W.Jacques & Co, both also cloth finishers, and finally by 1913,

J.Clark, dyer.

DB 58/42.

WRRD LK 424 361 (1833)
 LU 730 691 (1835)
 NZ 486 370 (1841).

35. ST. PETER'S OLD MILL, WEST STREET.

Built by Thomas George, later of Spring Gardens, in 1815-6, at the site of St. Peter's Well, an excellent natural spring. In 1817 was advertised a mill, gig-mill, and 12 h.p. steam engine at St. Peter's Well.

The takers were Messrs. Sheepshanks, of Hope Street Mill (q.v.), one of the most important cloth merchanting houses in Leeds. By 1824 they had an 18 h.p. engine by Fenton & CO.; and there were eight chimneys at the works. They built a new mill in Kirkstall Road in 1825 (q.v.), and the premises were taken over by Rickard, Deckray, and Pinder, machine makers.

They remained in occupation until about 1850, but York and Sheepshanks reappeared at the mills about the same time, and they were definitely used for cloth dressing in 1850.

By 1861 at least a part was occupied by C.Bottom, finisher and scribbler, who employed 80 hands. Others to follow were W.Tetley & Co, ironfounders, the West Street Cloth Finishing Company, and Dearden, Penny, Blackett and Beck, dyers.

Some time in the 1880's, however, Fairbairn and Co. purchased the mills and used them as a spindle and flyer works until 1914 when they were demolished. In 1899 the West Street Works, covering 8,773 sq.yds., and of 2,3,and 5 storeys, with a reservoir in the centre, possessed a well,

an ancient spring of water, conducted with the aforesaid reservoir ... the exclusive property of the firm.

L.I., 7.6.1817.

Private communication from Fairbairn, Lawson Ltd.

36. HARCOURT MILLS, WEST STREET.

William Atkinson, cloth friezer bought Stanley Close, West Street, in 1828, on which stood eight houses. On the vacant ground he built a cloth friezing mill, which he occupied himself, and partly let to Austin and Pullan, cloth manufacturers,

In 1839 was conveyed to his son, Peter Law Atkinson:

2,025sq.yds. with the mill and machinery, including fulling stocks, and the warehouses and dryhouses.

The contents of the cloth mill were insured by Austin and Pullan in 1831 for £2,000.

Various members of the Atkinson family continued to occupy a part of the mills for cloth dressing, but they left c.1885. The rest of the premises were tenanted at various times by Thompson and Yeaden, cloth finishers, who employed 40 hands in 1861, then W.Yewdall, cloth manufacturer, plus J.Musgrave and Race & Co., both woollen manufacturers.

After Atkinsons left the principal occupant was J.Burras & Co, cloth finishers, previously titled J.Binns & Co. of New Park Street Mills (q.v.). By 1888 they had 100 workers at the mills. Other occupants up to 1914 were S.Peel, cloth fuller, J.Fletcher, cloth manufacturer, H.J.Rebinsen, cloth manufacturer, Shaw Bros., woollen manufacturers, and the Harcourt Mill Co., woollen manufacturers.

W.R.R.D. KC 242 235 (1828)
 KP 153 150 (1829)
 LT 38 46 (1830)
 SUN CS 190/1129168.

37. ST. PETER'S MILL, PARK LANE.

One of a number of mills which originated as a merchant's finishing shops, which explains its location, at the top of St. Peter's Hill, where water had to be drawn from a well. The shops were attached to a house, owned by Michael Wainhouse, and insured in 1794:

house £650
 finishing shops £350
 utensils, stock £500

It probably remained simply as workshops until about 1830 when William Helroyd bought the premises and added a dressing mill. In the meantime

it was quite possibly occupied by J.Marks, cloth dresser, who insured in 1816:

Buildings and utensils near St. Peter's Hill	£1,300
Steck	£2,200

Wm. Holroyd & Co. continued to own and occupy the mills until 1883, a part having been let out to William Cheatter, currier. Holroyd had employed 40 workers in 1861, and the premises had been mortgaged in 1854 for £2100, when they were described as being:

1,425 sq.yds. at St. Peter's Hill, with the mill, engine house, press shop, warehouse, counting shop, handraising shop, houses, boilerhouse, yard, and reservoir.

The premises were the same in 1871 when William left them to Henry, Frederick, John, and Thomas Holroyd in his will. The firm also owned Burley St. Mill (q.v.) for a time.

After 1883 Cheatter remained in occupation, alongside D.Dixen & Bros., woollen manufacturers (see Cardigan Mills), and J.Dodgson, woollen manufacturer. Cheatter occupied a 2-storey warehouse, 70ft. by 30ft. where he manufactured boots. Water for the boilers came from a well and was stored in a reservoir.

Cheatter was the sole occupant from 1888 to 1892, when the mill was taken over by M.Blackstone & Sons, hat and cap manufacturers. They were succeeded by F.Muff & Sons, cloth manufacturers, in 1896, who were still there in 1914.

LCD no. 3027.

SUN CS 115/918880.

Historical publishing Co., op.cit., (1888).

38. BURLEY STREET MILL.

Originally the warehouse of David Cooper, cloth merchant, whose executors sold the land and buildings to William Holroyd, of St. Peter's Mill (q.v.), in 1850. On this he proceeded to erect work rooms and glossing shops, all of which was mortgaged in 1887 for £2,000. By this time a part had been let out to William Cheatter, boot manufacturer, but the rest remained a cloth finishing mill which by 1899 was occupied by Westerman & Co., and described as:

all that mill situate in Burley Street and on the south side of Park Lane ... with the Boiler house, Dry house, Press shop, and outbuildings ... together with the

steam engine, boiler, shafting, going gear, presses, ovens, cropping machines, steaming mill, and other machinery.

They retained possession until after 1914.

39. NEW PARK STREET MILLS, WEST STREET.

Built in 1824, but by whom is obscure. The mill was entered by James Binns and Sons, cloth dressers, in 1830, before which the 1826 Directory records 'Jeremiah Binns, cloth dresser, New Park Street'. Yet James did not know who had built the mill.

However, it was still occupied by James Binns in 1834, when there were 164 hands employed, and a 28 h.p. engine installed. The workers were almost entirely male, as with most finishing mills. Water was probably obtained from a well or borehole, and there was a reservoir.

By 1867 the occupants were Burras & Co. and Binns and Boyd, both cloth finishers, and both owned by members of the three families. Eventually Burras & Co. succeeded to both businesses (see Harcourt Mills).

There had been other occupants, however. In 1849 part of the mills, with 10 gigs and 4 hydraulic presses were advertised for let. In 1851, when Burras employed 110 hands, J. Foster, also a cloth finisher, had 38 hands at the mills, and in 1861 Burras had 66 hands, and Thomas Wadsworth, woollen manufacturer had 120.

About 1889 the mills were sold or let to S. Camrass & Co., wholesale clothiers, and then in 1901 J. May & Co., clothing manufacturers moved in. They remained until 1908, after which the occupants were W. Caulton & Sen, and G. W. Atkinson & Co., both wholesale clothiers.

40. GROVE STREET MILL, WELLINGTON STREET.

Part of the buildings were erected before 1815, but their function is not known. The mill was built alongside a small runner, probably from St. Peter's Well, which may have provided the water supply.

According to one source the mill was built in 1815 by a Mrs. Bulmer. In 1821 it was owned by Thomas Walker of Killingbeck Hall, who let it to Thomas Bischoft & Co., cloth merchants, who used it for dressing. The contents were insured for £1,000, including £100 for a 7 h.p. steam engine

by Fenton & Co.

They continued in occupation until after 1826, were followed by Birchall & Laycock, cloth dressers, then in 1832 Avens and Netherwood, cloth dressers. In 1834 they employed 48 workers, nearly all of them male, and they had a 12 h.p. steam engine.

In 1851 Avens & Co. employed 67 workers, but were shortly after displaced by J.Wade, cloth finisher, who had 82 hands in 1861. He remained until c.1878 when Harrison and Mathers moved in. They were followed by T.Hardcastle and T.Brunten, both finishers. About 1890 the mill was let to the Leeds Clothing Manufacturing Co., and Burten & Herbert, clothing manufacturers.

Before the end of the century these left and were replaced by a paper box manufacturer and a disinfectant manufacturer, and then W.Rhodes & Co., oil merchants.

In 1891 the owner was Henry Hall, a solicitor, and the mills and machinery were valued at £1,993.

LCA DB 116 R.v.Gott, Counsel's Brief.

SUN CS 135/986097.

HepperBooks, 3, 115.

41. BEAN ING MILLS, WELLINGTON STREET.

The famous factory, sometimes called Park Mills, built by Benjamin Gott on part of the Drony Laith Estate in 1792-3. The early history of both the firm of Wermald & Co. and the mills has been detailed in W.B. Crump ed., 'The Leeds Woollen Industry, 1780-1820', Thoresby Sec., xxxii (1931), which is based upon the Gott Papers in the Brotherton Library. Here attention will be confined to a brief history of the mills after 1820, and of knowledge which has come to light in recent years.

The original factory was built 1792-3 on a site adjacent to the River Aire, next to Close's dyeworks which had been built c.1767 and were the largest in Leeds, consuming 20 waggons of coal a day in the 1790's. These works were bought by Gott in 1802 and incorporated into the mills, although a part was demolished in 1817 to make way for the Wellington bridge.

Successive insurance valuations document the growth of the mills:

<u>Date</u>	<u>Buildings</u>	<u>Stock & Utensils</u>	<u>Machinery</u>	<u>Steam Engine</u>
1794				£1,200
1796	£6,340		- £9,660 -	
1798	£4,800		- £15,750 -	
1800	£8,500	£23,820	£5,700	
1801	£9,900	£21,200	£6,700	
1816	£11,300	£21,500	£6,700	
1821	£11,300	£21,500	£6,700	
1827	£13,800	£14,850	£5,750	

Gott milled 3,690 broadcloths, less than most country mills, but far more than any other manufacturer. His contribution to the Poor Rates was the third highest after John Neville and the Aire and Calder Co. He paid £169 in 1795, £217 in 1800, and £241 in 1805.

J.C.Fischer visited the mills in 1815 and again in 1825. In the meantime a new 80 h.p. Boulton & Watt engine had been installed (the original one, also Boulton & Watt, was 40 h.p.), and a gig-mill also. Employment throughout was in the order of 1,000 hands.

Gott also had Burley Mills (q.v.) for a time, and had leased Armley Mills in 1800, where 180 workers performed the tasks of scribbling, carding, slubbing, and fulling. He was an extensive merchant as well as manufacturer, having over 200 looms outside the mills in his employ in 1829. He bought in the cloth halls and dressed a great many cloths for other manufacturers, principally because as a merchant he was unable to produce all the types of cloth demanded by his customers.

A new wing was added to the mills, fronting Wellington Street, in 1829, and by 1835 Gott was experimenting with power loom weaving - he had 68 looms. These were still the largest mills in the Leeds woollen industry, specialising in the manufacture of superfines.

In 1841 William Chambers described activity in the mills:

Steam is employed throughout; it boils the great tin cauldrons in which the dyeing is effected, lifts the enormous wallets which are employed in fulling, turns the cylinders to which the teazles are applied for raising the naps, dries the cloth on tenter-racks ... works the hydraulic presses, packs the bales, and, in short, is the universal agent of power and heat.

Trade was depressed at the time and there were only 700 workers but by 1858 employment had increased to 900 jobs, the works covering 5 acres.

Full details of the use of this area and of the 190 h.p. then applied are contained in Gott Papers, Offer no.218, of which the following is a summary:

	<u>sq.yds.</u>	<u>h.p.</u>
Warehousing	3,472 $\frac{1}{2}$	-
Preparation of wool, carding, slubbing	1,867	40
Spinning	19,380	20
Weaving and Warping	2,786	30
Knetting, burling etc.	604 $\frac{1}{2}$	
Milling, scouring, and drying	815 $\frac{1}{2}$	30
Finishing	3,517 $\frac{3}{4}$	40
Dyewood-grinding & dyeing	<u>1,302$\frac{1}{2}$</u>	<u>24</u>
TOTAL	33,745 $\frac{1}{2}$	184

In 1867 the firm, now run by John Gott, had 700 workers at Park Mills, and a further 100 at Armley, still the largest cloth manufacturing firm in Leeds, but the demand for superfines was declining as the ready-made clothing industry started to emerge. The firm ceased business in 1870 and the mills were let out to Birchall & Co., woollen manufacturers, then the following:

- Gilpin & Marshall, dyers.
- J.Wilson & Co, worsted mfrers.
- J.Richardson & Co, blanket mfrers.
- W.Hawkesworth & Co., silk spinners.
- T.White & Sen, machinists.
- Threapleton & Co, finishers.
- Cox & Co, finishers.
- Boot & Co, woollen mfrers.

The main tenants were Joshua Wilson & Sons, who moved in in 1873. By 1888 they had almost 1,000 workers and 350 power looms, specialising in the manufacture of worsted coatings, an expanding trade. They were still there in 1914, as were Threapletons and Richardson & Co., the latter having moved in in 1878.

W.B.Crump, art. cit., (1931).

H.Heaton, 'Benjamin Gott and the Industrial Revolution in Yorkshire',
Ec.H.R., iii (1931), 45-66.

H.Bourne, Leeds and its Merchants, (1886).

SUN CS 4/637124; 13/653406; 23/679117; 27/693626; 30/698306;
31/699424; 40/719778; 114/916911; 127/950612; 133/975082;
156/1040865; 166/1071445; 185/1118972.

Gett Papers, Brotherton Library, University of Leeds.
 Boulton and Watt mss., Birmingham Reference Library.
 Historical Publishing Co., op. cit., (1888).
 LCA LORB Leeds Rate Books.
 PP (1834) xx, 127.
 PP(1836), xlv, 48.

42. ARGUS FOUNDRY, SAVILE STREET, WELLINGTON STREET.

Built in 1829 by William Davis, a machine maker originally from Brinscomb in Gloucestershire, where he had worked as a shearmaker. He occupied it until 1850 when the premises were let to Blackburn and Stibel, machinists.

In 1854 the foundry was up for sale and was bought by Joseph Bedford who had 36 employees by 1861. He specialised in the manufacture of corn-milling machinery and of gauze, weaved by power loom. The foundry was in a building along West Street, whilst the fitting and turning shop was along Castle Street.

In 1889, however, the premises were sold to J. & J. Hilton, pianoforte manufacturers, for £4,200, who continued in occupation until 1905. They rebuilt one wing, replacing the foundry with a four-storey building. The firm originated in Morley.

Between 1905 the premises were occupied by Culress and Spreston Ltd., printers, and after that by Cerson & Co., mantle manufacturers.

LCD no. 15208.

Robinson, Sen, & Pike, Leeds Sketches and Reviews, (1900)
 Leeds Express, 8.3.1884.

43. GRACE STREET MILLS, WEST STREET.

The exact date when this mill was built is not known, but it was between 1815 and 1821, with the southern portion being added some time between 1821 and 1826. James Binns was an overlooker at the mills in 1822, and the mill was built by Thomas Beckett, but it is not known who the earliest tenants were, although William Eyres & Son may have been there in 1822.

By 1826 T & J. Peniston, woollen manufacturers were in occupation and in 1829 W. Eyres, J. Binns, cloth dresser, and F. Sedgwick, cloth dresser. The mills were advertised to let in that year as

a gig house, press house, engine and boiler houses on the ground floor. Also a cloth dryhouse with 1,200 sq. yds. of cast iron tenters, a cottage, and an everleoker's house.

The machinery was also to let:

a 24 h.p. steam engine, 2 boilers, 12 gigs, 4 brushing mills, 72 pairs of shears, 10 patent Lewis cutting machines, and 7 screw presses.

In that year Beckett had formally bought the land - Cloudsley Close - from Wilson's trustees, and it remained in the family until 1854 when it was sold to G. & J. Wright, cloth dressers, who had 191 employees in 1851, and who had occupied the mill since 1845, when vacated by Binns.

They remained in the possession of the Wright Bros. until the premises were sold to Gurnit and Hudson in 1878, for £8,650. Immediately prior to this the tenants were Hebbert & Co., finishers, and Gledhill & Co., also cloth finishers.

After the premises became a clothing factory there were 350 hands at the mill, turning out 20,000 caps a week by 1883. A 13 h.p. engine powered about 100 sewing machines, but cutting was still performed by hand.

They remained in occupation until the mid-1890's, after which the mill was let to a number of tenants, including Rider and Lee, printers, and Beaumont & Co, stuff merchants. They were valued at £18,198 in 1904. Besides the 12 h.p. engine there was a 30 h.p. beam engine. By 1908 the premises were used solely for warehouse purposes.

LCD no. 8704

LCA DB 32 Sale of Wilson's Estate.

Leeds Express, 6.1.1883.

44. CLOTH MILL, PARK LANE.

Between Grace Street and Somers Street, originally the cloth dressing shops of Phillips, Oates & Co. built in 1796, on land leased from Christopher Wilson. In 1801 the lease passed to Simon Spence, then in 1819 to James Seel, who also bought the freehold from Wilson's trustees.

The premises were then described as:

All that warehouse, with the cottage, dryhouse, dressing shops, press-shops, and other buildings ... late in the occupation of Simon Spence, but then of Aked and Ellis and Tayler, Hardcastle & Co.

Seel renewed Aked & Ellis's lease, and then in 1824 leased a part to French, Beverly, & Cooper, with

sufficient mechanical power or motion equal to 7 horses to be taken from the first motion of the steam engine attached ... with water from the bore or well situated in the yard adjoining.

The lease was for seven years at £290 p.a.

In 1836 Seel sold the property to D.&J.Cooper, cloth merchants and manufacturers, (see also Wellington Bridge Mill) who are recorded at 60, Leighton Lane until c.1860. The 1847 map shows a cloth mill with a reservoir.

Sometime between 1864 and 1889 the premises were sold to David and John Eastwood, brush manufacturers, they having been occupied by Wilkinson & Co., brush manufacturers, in 1881. They were mortgagees in 1889 for £20,000, then being described as a line of shops and warehouses, one of which was new, occupied by 10 different firms including Bertram Eastwood, wholesale clothier, S.Camrass, and Bainbridge & Co., clothing manufacturers.

Thereafter leased out to a mixture of workshop firms and clothing manufacturers.

LCD no. 3547.

45. CLOTHING FACTORY, PARK LANE.

Originally a warehouse built by D. & J. Cooper, cloth merchants, on land between Park Square and Semers Street bought from Charles Kirby £3,200.

This was bought by Arthur & Co., wholesale clothiers, in 1880 for £2,750, who also purchased a small plot to the north from William Emsley, and 12 houses and workshops adjoining Park Lane to the north of that, costing £8,000. These were demolished and in 1888 a new warehouse was erected.

An undated insurance policy valued the premises at:

5-storey factory and machinery	- £6,500
Steam engine	- " £300
Boiler etc.	= £200
Stock-in-trade	-£49,000

The firm continued in occupation even after they had built a new clothing factory in Belle Vue Road (q.v.).

LCD no. 3547.

46. CLOTHING FACTORY, PARK LANE.

Built c. 1889 by Bainbridge & Co., wholesale clothiers on the site of houses and open space, between Grace Street, Parliament Street, Princess Street and Park Lane. They were previously at St. Paul's Street and then Somers Street (see no.44.)

The buildings were extended some time in the late 1890's, and in 1914 the property was valued at £25,350.

Hepper Becks, 13, 188.

47. PARK LANE MILLS.

Probably built in 1812 by Francis Chorley and J.G.Uppleby on land bought from Robert Fearnley in 1811. The early history is confused. In 1818 Chorley obtained the warehouse, dyehouse, dryhouse, weaving shops, and other workshops late in the occupation of Messrs. Umpleby (Uppleby?) and since Messrs Glever. This formed the second part of the estate, and may well be of earlier date.

In 1812 was for sale a fulling and scribbling mill, dyehouses, dryhouses etc. in Park Lane, with a tenter-croft, occupied by Messrs Wainwrights and Messrs Glevers. The estate belonged to Scott, Smith, and Nicholson, D bankrupt bankers.

Wainwrights occupied Little Woodhouse Mill in 1826 and 1830, whereas Glevers left for Airedale Mills (q.v.) in 1818. It would seem, that Chorley & Uppleby continued to lease out the northern portion of the estate after 1835 when Francis conveyed to his son:

a mill now used for the finishing of woollen cloth, with the warehouses, countinghouse, press shop, dyehouses, dryhouses, workshops, stables, and a dam and reservoir, occupied by Chorley and Uppleby. Also the dressing and finishing shop, formerly a weaving shed, and the counting house adjoining

(formerly four cottages) now occupied by Benjamin Sherwood, John Brownridge, and Thomas Beeth, but all built by Cherley.

The mills had a 25 h.p. Fenton & Co. engine, and extensive reservoirs and tenter-fields at the back. The area of the property was 4 acres, of which over one-half was used for the reservoirs and tenters. Jehn Uppleby came from Lincelnshire and was originally a cloth merchant. With Cherley he also had a factory at Huddersfield. He retired from business when Francis Cherley died in 1849. (See L.I., 26.2.1861.). Thomas Beeth first leased his pertien in 1832, originally for 14 years, but he stayed until c.1895. In 1861 he employed 148 workers, and J.Armitage, also a cloth finisher, rented another part of the mills where he had 71 hands.

In 1866 was insured by Cherley's trustees:

a warehouse on the corner of Cherley Lane & Park Lane	£400
3 cottages	£100
A 4-storey mill occupied by J.Vevers & Co. and J.Armitage, both cloth dressers	£500
Press-shop	£100
Warehouse and handloom weaving shop occupied by Vevers & Co.	£300
Cloth dryhouse	£400
3-storey dressing mill occupied by Beeth & Co.	£300
Joiner's shop	£40
Press-shop	£50

In 1888 the property was placed in the hands of William Emsley, a solicitor, and it was recommended that he should try to sell the property off either in its entirety, or in two lots, for about £12,500. The property was described as:

All that building then or lately used as a Mill for making and finishing of woollen cloth, and all those warehouses, counting house, press shop, dyehouses, dryinghouse, workshop, sheds, stables, and other buildings... formerly in the occupation of Francis Cherley and John Gylby Uppleby his partner, their undertenants or assignees, afterwards by Messrs Hibbert & Co. ...

also all that building situate on the north side of the premises hereuntobefore described, and on the west side of a certain lane now called Chorley Lane ... formerly occupied as weaving shops, afterwards as a packing shop and warehouse but since converted into and occupied as a mill for the dressing

and finishing of woollen cloth, and all these ponds or reservoirs, and all that piece of ground.

The northern part was sold in two lots of 5,196 and 6,459 sq.yds. to John Barran & Sons, clothing manufacturers, and the south east portion to J.T.North who sold it to Clark, Hall, and Atkinson in 1899 for £5,085. They built a new clothing factory on the land in 1899-1900. The remainder was let out to various firms, and sold to Andrew Prickard.

In 1904 the south-east portion, hitherto open land, was sold to Leckhart & Partners who built a new single-storey clothing factory, running it under the name of the 'Headrow Clothing Co.'

Barrans built a new factory in 1887 and extended it in the 1890's. By 1903 they employed 2,000 workers here and issued a stock of £100,000 when made a limited company.

The tenants of the south-east portion (the old buildings) in 1914 were E.Iredale & Co, cap manufacturers, and S.Smith & Co., skirt manufacturers.

W.R.R.D GR 458 455 (1818).

LCD nos 12930, 15990, and 15093.

Hepper Books 2, 95.

L.I., 21.9.1818.

LCA DB6, unsorted.

D.Ryett, 'John Barran's of Leeds, 1851-1951, (1951).

48. CLOTHING FACTORY; PARK LANE.

Between Park Street and Chariot Street. Built in 1888-9 on property bought from Wm. Emsley, solicitor, by Stewart and Macdonald, clothing manufacturers of Glasgow.

In 1914 the buildings were valued at £12,177, the machinery at £2,497, and the 1,129 sq.yds. of land at £5,080.

Hepper Books, 13, 186.

LCD co. 2944.

49. OXFORD MILLS, PARK LANE.

George Hardisty, merchant, bought land in Park Lane in 1819 on which he built:

All that freehold warehouse ...

consisting of a countinghouse, packing shop, stuff room, c
crepping shop, press shop etc.

This was between Chariot Street and Park Street. After Hardisty it was occupied by a Mr. Blakey, and then in 1825 Hardisty sold his property to William Smith for £2,340.

In 1864 the property passed to John Helmes, a corset weaver by power loom. In 1867 the buildings were insured as follows:

4-storey mill in Oxford Terrace. On the ground floor Craven & Carrick, machine makers. Helmes occupies the upper three floors -	£720
Adjoining engine house -	£50
A former gig house, now an iron warehouse -	£30
A former press shop now a drying room -	£100
A linen warehouse occupied by Helmes -	£800

In 1872 Helmes sold the mills to Scales and Salter, footwear manufacturers, for £4,450. By 1884 this company had retail outlets in sixteen towns, mainly in Lancashire and the North East. The premises were then valued at £7,398. Then in 1899 the firm put them up for sale:

In the midst of the great clothing manufactories of Leeds ... for many years occupied by Scales and Salter ... who have become a limited liability company, and are erecting large premises and concentrating their business near their other work at Pudsey.

The mills were sold to R. Wilson and T. Winn for £10,000 and thereafter occupied by J. Peacock & Co., clothing manufacturers.

LCD no. 5929.

Hepper books, 1, 355.

50. CLOTHING FACTORY, LEIGHTON LANE.

Built in 1903 by Gaunt and Hudson, previously of Grace Street Mill who also had work in Luton. Primarily they manufactured hats and caps.

51. BELLE VUE ROAD CLOTHING FACTORY.

Built in 1904 by Messrs. Arthur & Co. of Park Square, on one storey only. There were 400 sewing machines installed there.

52. CLOTHING FACTORY, OXFORD ROW.

Not known when built, but converted into a clothing factory ca. 1880 by James Rhodes & Co., clothing manufacturers. Having been founded only twenty years previous, Rhodes and Co. employed 600 workers in 1884, and had 250 sewing machines, for which a 16 h.p. 'Otto' gas engine provided power. 30,000 suits were kept in stock in the six-storey building which measured 74 by 108 feet.

They were succeeded by Albrecht and Albrecht, wholesale clothiers, who moved out when they built Hudson Road Mill (q.v.) in 1898. They were followed by Hepton Bros., mantle manufacturers who became a limited liability company in 1906, at which time the buildings, machinery etc. were valued at £16,000.

Mercantile Age,

LCD no. 4926.

53. CLOTHING FACTORY, OXFORD ROW.

Originally the drill hall of the Leeds Volunteer Rifle Corps, built about 1863, yet marked as a clothing factory on the 1893 25" plan, and occupied by Messrs. Arthur and Co., though not for long. Then became a cabinetmaker's workshop.

LCD no. 3328.

54. ST. PAUL'S STREET WAREHOUSE.

Edmund Stead sold 2,710 sq.yds. and eight houses between Park Square and St. Paul's Street to John Barran, clothing manufacturer, in 1878. The houses were demolished and the elaborate six-storey Moorish factory erected in their place.

This continued as headquarters of Barran's operations until 1888 when the firm moved to Park Lane Mills (q.v.), this building being retained only as a warehouse.

In 1888, before the move was made, it housed 2,000 workers. It was sold in 1904 to the Public Benefit Footwear Co., formerly Dickinson & Co. of Bramley, who used its 63,000 sq.ft. of floor space for manufacturing

footwear.

D.Ryott, op. cit., (1951).

Historical Publishing Co., op.cit., (1888).

W.R.R.D. 812 116 123 (1878).

55. MONKBRIDGE WORKS (WHITEHALL MILLS), WHITEHALL ROAD.

. G.& R.Mortimer of Neville Street outgrew their premises in 1866 and built a new works in Whitehall Road, near to the Monk Bridge. Here they employed more than 150 hands.

By 1884 they had 180 workers and apart from making textile bobbins also produced horses for fairgrounds, malt shovels, beer barrels, and many other wood products. The machinery was powered by a 56 h.p. steam engine.

In 1896 Mortimers left and the premises were bought by Lupton & Co., cloth manufacturers, who renamed the premises 'Whitehall Mills', and remained until after 1914.

Leeds Express, 10.5.1884.

C.A.Lupton, The Lupton Family in Leeds, (1965).

56. WHITEHALL WORKS, WHITEHALL ROAD.

Henry Gallen, Joseph Bean, and Samuel Lumb, iron merchants, bought 3,787 sq.yds. of land between Whitehall Road and the River Aire from A.Montagu in 1861, on which they proceeded to erect

mills, manufactories, foundry, workshops, and other buildings.

In 1863 a further 1,288 sq.yds. was purchased from the same vender, on the west side of the works.

The purchase price was raised by a series of mortgages, principally to James Hargreaves of Burley, a prominent cloth manufacturer, In 1865 the firm went bankrupt, possibly because of the fire in 1861 which destroyed the works almost as soon as they were built, but were allowed to continue trading as the Whitehall Company.

This was liquidated in 1868, at which time the accounts read:

Debit	£19,107-17s-10d.
Credit	£8,449- 5s-7d.
Deficiency	£10,656-3s-5d.

In 1866 the management of the works had been put into the hands of Beckett & Co., bankers, who leased them to other firms as well as the Whitehall Company. The occupants in 1866 were:

Hill & Co., linen manufacturer	(61 hands)
C. & E. Roberts, cut nail manufacturers	(100 hands)
James Winder & Son, scribbler and spinner	
Joshua Todd & Son	
Exley & Meller, curriers	
The Whitehall Engineering Co.	(40 hands)

When Gallon & Co. had occupied the whole of the premises they had more than 200 workers.

In 1872 the occupants were Roberts, Wilder & Son, two woollen manufacturers another linen manufacturer, and a cloth weaving firm.

About this time the works were sold to George Whitley, linen manufacturer of Perseverance Mill, Woodhouse (q.v.), and by 1881 the occupants were Winder, Whitley & Son, linen manufacturers, S. & I. Winder, woollen manufacturers, and J. Doyener, canvas manufacturer.

Later Winder, Whitley & Co. were replaced by Fox & Co., woollen manufacturers, and then the works were sold to J. Watson & Sons of Whitehall Soap Works (q.v.)

W.R.R.D.	WH	301	330	(1861)
	WH	302	331	(1861)
	XH	700	767	(1863)
	XH	708	774	(1863)

LCA DB 100 Gallon bankruptcy papers.

57. WHITEHALL SOAP WORKS, WHITEHALL ROAD.

Joseph Watson was originally a skin trader and leather factor in East Street, born 1814 in Kirkstall. By 1847 he was operating from Reckingham Street, and then in 1861 bought a yard in Whitehall Road, from which he sold hides and skins, and started to manufacture tallow candles, soap, and heavy engine grease.

By the time of his death in 1873 the firm of Joseph Watson & Sons

had four factories, of which three were in Leeds, viz. Whitehall Road, Leadenhall Street, and Manor Street (see Roundhay Vale dyeworks).

The firm started to concentrate upon soap making, using imported fats and oils, and from only 72 workers in 1872 employment rose to more than 700 in a few years. Production of soap reached 100 tons per week in 1885, and a new glycerine plant was added in 1886.

By 1897 soap production had reached 400 tons per week, and then the Whitehall Werks were bought and a new mill, equipped with electricity, built on the site. This increased capacity by 1,850 tons a week.

In 1904 Watsons bought part of the Perseverance Foundry estate (q.v.) from Woodheads, but this was only used in an exchange with the Corporation whereby Watsons paid a balance of £3,000 and obtained 6,000 sq.yds. in Whitehall Road, formerly the yard of the Highways Department.

By 1906 soap production had reached 24,000 tons p.a., and annual profit averaged £65,000. In 1908 the old part of the works was rebuilt and re-equipped.

W.G.Rimmer, 'Men Who Made Leeds - Joseph Watson', L.J. 32 (1961).
LCD no. 2103.

Private Communication from Joseph Watsons & Sons Ltd.

London Printing and Engraving Co., A Century of Progress, (1893).

58. BRITANNIA MILLS, WHITEHALL ROAD.

Built in 1836 by Obadiah Willans, cloth manufacturer, on 5,703 sq.yds. of land between Whitehall Road and the River Aire bought from Wilson's trustees in 1834. Described as:

a woollen mill, countinghouse, dyehouses, engine house, willey house, wool boiling house, press shops, teazle house, witho reserveirs and wells.

These were insured in 1837 for £9,750, plus a further £20,000 on a cloth warehouse in Wellington Street, and in 1838 a 3-storey building used as a warehouse and hand weaving shop.

Willans continued in occupation until c.1850 when the mills were let to Curtis and Haigh, cloth finishers who had 260 hands in 1851.

In 1860 Willan's trustees sold the property to Little, Cousins, and Leach, cloth manufacturers who employed 400 hands in 1861. They continued in occupation but sold the property to J.Bannister & Sons, dyers and

finishers, who had 200 hands and finished 20,000 cloths a week by 1888. The occupants in 1872 were Leach & Co., Oddy and Bannister, and J. Wilkinson, scribbler.

Bannister & Sens. continued in occupation, alongside a large number of woollen manufacturers, until 1895 when the mills were put up for sale in four lots. In 1888 they had been valued at £17,409, but this was now reduced to £11,500. Hepper wrote,

It is so seldom that so large a site is wanted in one block, that I have thought it best to consider its value in separate lots ...

... The proximity of the Soap Works and of the River Aire is a depreciatory influence for some purposes and the smoke and dust from the Railways impuriously affect it for business requiring a cleanly atmosphere.

The premises were taken over by the adjoining Electricity Works when it was taken over by the Corporation in 1902. This works had first been established in Aire Street in 1892 by the Leeds Electric Light Co.

WER.R.D. LX 146 138 (1834)
 MI 177 163 (1836)
 NK 520 167 (1840).

Hepper Books 2, 253 and 5, 114.

Historical Publishing Co., op. cit., (1893).

59. BRITANNIA FOUNDRY, WHITEHALL ROAD.

Built in 1836 by Ardill and Pickard, machine makers, and demolished c.1859 in connection with the building of Central Station.

60. AIRE STREET SAWMILLS.

Built in 1838 by J.&C. Townsend, formerly of Castle Street, and occupied by them until 1850 when the property was sold to the Midland Railway Co.

However, they did not use the site for station development as at first planned, and it was advertised to let in 1867, then sold to Thomas Brooke and thereafter used only as warehousing.

61. AIRE STREET MILLS AND MONK PITT MILLS, AIRE STREET.

L.T. Crossley, cloth dresser and merchant, bought four plots of land between Aire Street and the River Aire in 1826 from James Green of Bradford, a total of one acre. On these he had built three mills, the first in 1824 and occupied by Shann Driver & Co., cloth finfishers, who had an 18 h.p. Fenton & Co. steam engine.

The second mill was initially occupied by Crossley & Robinson, and then advertised for let in 1826. It was taken by John Walton who insured it for £3,500 in 1828.

The third mill was tenanted by W. & E. Wilkinson, worsted spinners, from 1827 onwards. They took 7 h.p. from the steam engine next door, and had 47 workers by 1833.

The mills were all mortgaged in 1831 by Crossley, at which time the occupants were Shann, Driver & Co, woollen manufacturers, Eyres & Sons, cloth dressing, and Wilkinsons, worsted spinners.

Shann & Co. remained until 1849. Their part of the mills, or rather its contents, was insured for £11,700 in 1837, at which time a small part was in the tenure of Shann & Bros., cloth dressers. Shann & Co. were now woollen manufacturers.

The other two mills were offered for letting in 1835, power included, and by 1845 the occupants were: Knapton & Co., dyers; Crowther & Walker, scribblers; Sewant, Sykes & Co., cloth finishers; and Samuel Shann.

Shann & Co. were replaced by Spence, Burnby & Co., worsted manufacturers, but by 1861 most of the buildings were used as warehousing by out-of-town woollen manufacturers, or by small firms such as H. Wilson, finisher, or J. Ladley, cloth manufacturer, who employed 28 hands.

This remained the case until the late 1870's when a part of Ellis's Buildings, as the property was now called, was taken by Blackburn & Co., wholesale clothiers, and then Joseph Barnes & Co., also clothiers. These premises were of four storeys. The ground floor was used as a cutting room; the second floor as a pressing room, and the third housed nearly 100 sewing machines. Power was derived from a Crossley Bros. gas engine, and there were nearly 200 hands in 1888. This factory was still occupied by Barnes & Co. in 1914.

W.R.R.D. IQ 713 689 (1826)

LA 429 376 (1831)

SUN CS 166/1071461; 233/1242368; 245/1264502; 247/1264502.

L.I., 2.11.1826 and 10.1.1835.

Historical Publishing Co., op. cit., (1888)

62. SCHOOL CLOSE MILLS, NEVILLE STREET.

Built in 1815-6 by William Hirst, cloth manufacturer, at a cost of £21,000. Hirst also built mills in Sovereign Street at the same time (q.v.), at both of which production was concentrated upon superfines, and a great deal of new machinery introduced. The power was supplied by a 30 h.p. steam engine by Fenton & Co.

The production was run by Hirst, Bramley & Co., formed by a partnership of Hirst plus his brothers' mercantile concern. One brother left in 1822 and was bought out for £1,186. The other, Thomas, sold his share to Richard Bramley for £2,500 in 1829.

Though William Hirst and Hirst Heycocks & Co. of Sovereign Street Mills were bankrupted in 1825, Hirst, Bramley & Co. continued until 1855. Production continued to be mainly of superfines, and there were about 80 looms installed in 1829. Additional spinning and weaving rooms had been added in 1824 and 1829, insured for £10,800 in 1837.

In 1845 the firm were forced to let part of the mills to Messrs. I. & W. Whiteley, cloth manufacturers, and then, following a mortgage for £30,000 in 1849, the mills were sold to Whiteleys in 1855.

They continued in occupation until 1890, although after 1865 parts were let out to other firms in the cloth trade, including W. Pearson & Co., who had 100 workers in 1867.

In 1894 the property was sold to the N. Eastern and the London & N. Western Railway Companies for £20,000, for the building of City Station. Not all the mills were demolished, however, and the remainder was leased to G. Lockwood at £320 p.a.

Thereafter it was occupied by Harrison & Co., cloth manufacturers, and a number of small firms, including a lock manufacturer and two clothing manufacturers.

British Rail Deeds nos. 49 and 50.

W. Hirst, History of the Woollen Trade, (1844).

63. SOVEREIGN STREET MILLS.

Built 1815-9 by William Hirst, cloth manufacturer, on land between Sovereign Street and the River Aire, and applied to the manufacture of superfine cloths. There was a 15 h.p. Fenton & Co. steam engine.

In 1825 the crash in wool prices bankrupted Hirst and his partner

Heycocks. He claimed that the value of his mills, machinery, and stock fell from £200,000 to £80,000. Despite bankruptcy, the mills were restarted by Hirst and Heycocks, and then Parker was taken on as a partner.

However, business ceased altogether in about 1835, and the mills were sold to Titley, Tatham, & Walker, flax spinners of Water Lane Mills, Holbeck. At both these mills they had 12,800 spindles in 1842, and 1,200 hands, the third largest firm in the trade in Leeds.

They remained in possession of the mills until 1883, in which year the partnership was broken up. Apart from the Water Lane Mills their property consisted of:

6,438 sq.yds. of land in Sovereign Street, with a warehouse, weaving shed, mill, engine house, boiler house, dryhouse, dyehouse and another mill. Also malkilns and stables leased to Smith Brothers.

Part of the property had been let out since the late 1850's, to B.Stocks, papermaker, and then Goodall & Backhouse, druggists and manufacturing chemists. In 1867 Titley and Co. had 200 workers at Sovereign Street, and Benjamin Stocks & Son had 100.

The works were bought by Goodall & Backhouse who for a time occupied all parts, but after 1905 were forced to lease out part as a warehouse.

W.Hirst, op.cit., (1844).

H.C.Marshall, List of Spinners and Spindles, 1839-42, Marshall Papers. Hepper Books, 1, 263.

64. VICTORIA OIL AND WARE MILL, SOVEREIGN STREET.

Built in 1836 on land adjoining the River Aire in School Close by the Victoria Ware Co., who were in occupation until 1843, when the mill with its 60 h.p. steam engine was advertised to let.

The next occupant was the Victoria Mill Co., until c.1865, followed by Wild & Crossley, drysalters, who employed 36 men in 1867. By 1880 it was used only for warehouse purposes, and was only revived as premises for manufacturing after 1909 when Hudson & Co., millers, took it over.

65. PROVIDENCE WORKS, ISLE OF CINDER.

Originally the site was occupied by the dyehouse, callendar house, warehouses, singeing house, and press shop, owned by Seth Dawson and leased to L. & W. Wray, who bought part of the property in 1806 for £305.

The remainder was sold to William Adam, stuff merchant, in 1811, who also bought the Wrays' property in 1813. Part was leased to Thomas Prince, dyer, part to Lumley and Bell, dyers, whilst the remainder was occupied by Aldam (-Adam). Pease & Co., stuff merchants and dyers. Prince bought his premises in 1825 for £2,500, of which £1,500 was borrowed from the vendor at £4% p.a. Prince never completely repaid this debt and forfeited the property to Aldam in 1848. The two had shared the power from an 8 h.p. Fenton & Co. steam engine, and drew their water from Flay Crow Mill goit.

In 1855 the property was sold to William Lynd, oil merchant, at which time it was occupied by Aldam & Co. In 1858 Lynd's trustees sold it to Roger Shackleton, corn miller, who demolished the old premises and built a new corn mill. This was of six storeys and had two engines, of 20 h.p. and 30 h.p. The grain arrived at a nearby wharf and was hoisted into the mill, where there were 10 workers in 1861 and 50 in 1892.

The mill was bought by the Corporation in 1903 for £16,300, who then demolished the premises.

LCD no. 1839.

British Rail, Leeds City Station Acquisitions, no. 34.

London Printing and Engraving Co., op.cit., (1893).

66. KING'S MILLS ESTATE, SCHOOL CLOSE and ISLE OF CINDER.

The estate of the Neville family from the 16th century onwards, in 1764 consisting of:

Leeds Soke Mill (water corn)

Picksmall Mill (fulling)

Flay Crow Mill (water corn)

all occupied by William Banks.

In 1793 Hodgson & Snowden possessed the lease. Their stock and utensils at all three mills were insured in 1797 for £4,200. They moved to Crown Point Mill in 1797 and the tenancy was sold to Edward Sykes.

The Neville family actually owned only a half share in the Flay

Crow Mills; the other belonged to the trustees of Harrison's Hospital.

By 1807 the King's Mills were occupied by Jehn Pate Neville, the Picksmall Mill was used for rasping and the manufacture of tobacco, and the Flay Crow Mill was tenanted by a Mr. Sandford. Shortly afterwards two cottages and an oil shed adjoining the King's Mill were demolished, and a new steam mill built on the site.

In 1816 the estate was first leased, and then sold to Edward Hudson, for £32,000. Harrison's Hospital retained its moiety in Flay Crow Mill, and there was an annuity of £13-8s-8d payable to the Duchy of Lancaster.

The significance of the mills may be assessed from the fact that Neville paid twice as much in rates as did Wormald & Gott in 1795 - over £425 - and from the fact that it cost the town £13,000 to extinguish Hudson's right of soke in 1838.

The estate remained the property of the Hudson family throughout, and in 1872 the other moiety of Flay Crow Mill was purchased for £7,500, by which time there was a steam engine installed. Hudson & Co. had two steam engines in 1824 - one of 45 h.p. the other 40 h.p. The latter had been installed at Flay Crow Mill by 1803.

The Picksmall Mill, later called Wood Mill, was sold to the North Eastern Railway Co. in 1868, it then being occupied by Moorhouse and Thistlethwaite, corn millers. The leasehold was sold for £1,865, and the mill was powered by a water wheel and a steam engine, having six pairs of French Stones.

The Flay Crow Mills were let out to various tenants, principally J. Dyson & Sons (1838-1850), then Moorhouse and Thistlethwaite, and then Robert Hudson & Co. took occupation from about 1859 to 1870. They had 77 hands in 1861, and about 100 in 1867. Hudson also owned collieries in the eastern part of the Borough. Later occupants were Boyle & Son, hemp and yarn merchants, and Henry Rishworth, corn miller.

In 1900 the estate was sold by Edward Hudson's trustees to the Corporation for £26,500, when it consisted of:

The New King's Mill, occupied by H. Rishworth

The Old King's Mill, occupied by C. Copping

Flay Crow Mill (Concordia Mill), now disused.

Warehouse in Tenter Lane, occupied by Goodall, Backhouse & Co.

Atlas Works, occupied by J. Hudson & Sons, oil merchant

A small spice factory, a saw mill, 12 cottages and two warehouses.

The King's Mills were occupied by Boyle & Son for some years, but demolished c.1913.

British Rail, City Station Acquisitions, nos. 32, 32A.

L.I., 19.5.1772.

LCA LORB; Leeds Rate Books 1790, 1795, 1800, 1805.

67. LEEDS BRIDGE FOUNDRY, TENTER LANE.

Joseph Warwick, who had a hardware shop in Briggate, reopened his new foundry at Leeds Bridge in 1799, but it is not known whether he was a partner in Pryer and Warwick, of Simpson's Fold in the south division, or in Smith, Warwick & Co. who in 1808 begged leave to inform the public that they had

erected A NEW STEAM ENGINE for turning shafts, boring cylinders, working barrels and wheels.

In 1824 Warwick & Co. were accredited as possessing a 5 h.p. Pullan & Co. engine.

Smith & Co. continued in occupation until 1904, having bought the adjoining workshop, originally a press shop, in 1868, when the foundry was sold to the Corporation for £5,350, and then demolished.

There were only 12 workers on the premises in 1867.

LCD no. 2040.

Historical Publishing Co., op.cit., (1888).

L.I., 3.6.1799 and 6.6.1808.

68. CROWN POINT MILLS, EAST STREET.

Built c.1793 on the Dennison estate at Crown Point, Kirkgate, and let to Messrs. Sewden and Hodgson, who also tenanted the King's Mills (q.v.), Scot Hall Mill (q.v.), and a mill at Castleford, at various times. In 1795 they paid £120 in rates for the mill, the contents of which were insured for £2,000 in 1798.

The lease was renewed in 1800 for 21 years, but the company went bankrupt in 1808, selling the lease on

a corn mill at Crown Point, with 6 pairs of stones,
2 dressing mills, 1 shelling mill, 1 bean mill, malt rollers,
and a drying kiln
an oil mill with 4 pairs of rollers, and 4 presses.
With a 60 h.p. engine.

The next occupant appears to have been Joseph Medley, oil miller, although the millswere advertised for sale, with an 80 h.p. steam engine, in 1813. In 1821 the mills were going to be sold to R.E.N.Lee, when the occupant was Joseph Medley, but this does not appear to have been carried out.

The property remained in the hands of the Dennison family, leased to Joseph Medley until about 1850 when E.Joy & Sons took the lease. They remained until 1867 when the mills were sold to the Corporation for £6,350, and demolished to make way for Crown Point bridge.

LCD no. 175.

Dennison mss., Nottingham University Library.

SUN CS 186/688898.

69. CROWN POINT DYEWORCS, EAST STREET.

Started as a small dyehouse tenanted by William Brayshaw, on the goit leading to Nether Mills, on property owned by the Fearn family. This was built some time between 1772 and 1795.

The estate was sold to Christopher Bellard, but Brayshaw remained tenant, paying £50 p.a. in 1840, by which time considerable extensions had been made. There was a steam engine, installed between 1824 and 1829. By 1861 the firm employed 21 men, and the foreman dyer was James Waddington.

At this time a 54-hour week was normal, extended to 72 hours when the works were busy, sometimes even 110 hours. Much of the work was done for West of England billiard cloth manufacturers. Wages for a 60 hour week were 18s to £1.

In 1869 Brayshaws sold the business to Waddington, who was joined by Alfred Wilkinson as partner. By this time the property had passed to the Aire & Calder Co., to whom Waddington paid £80 p.a. rent.

In 1881 the east side of the works were purchased by the Corporation for street improvement, and a new dyewood mill was therefore built to the west of the main dyehouse. For this a replacement steam engine was bought from Lax's, the brickmakers.

Waddingtons were still in occupation in 1914.

H.Waddington, Crown Point Dyeworks, (1953).

70. NETHER MILLS, EAST STREET.

An old fulling mill sited at the confluence of the River Aire and Sheepscar Beck, on Fearne's Island, the property of the Fearne family. In 1774 there were five water wheels to provide the power: mainly for cloth milling, but also for James Rhodes, leather dresser, who had tan pits at Low Feld (see Albion Foundry). In addition to power from one wheel and the use of two stocks, he rented the

liberty, licence and authority to wash, lay, hang and dry leather in the piece of ground adjoining.

In 1791 seven-tenths of the power was leased to Cowlard and Johnson, cloth fullers and driesalters, and part of the rest was tenanted by Tipping and Brennan, cotton spinners. Dr. Fearne agreed to provide £600 for rebuilding their part of the mill, which was previously used for cloth milling, and for erecting a new water wheel.

The mills were comparatively large. James Rhodes & Co. paid £58-10s. in rates in 1795, and Johnson & Co. paid £88. In a 1791 advertisement it was stated that the mill was

finished in a stile far superior to any other in this country.

Johnson & Co. and Rhodes & Co. were joined by - Ingham in 1798, and in 1800 parts were let to Richard Lobley, woollen manufacturer, and W. & T. Reed, dyewood grinders. The main part of the power was kept for cloth fulling, however; in addition to Johnson & Co., Samuel Pickard leased a part of the mills (see Pickard's work) - he paid £39-15s rates in 1805.

By 1818 the mills were mortgaged to Christopher Bollard, and the occupants were Samuel Pickard, G. Pickard, dyer, John Lee, and Elizabeth Heward & Son, both carpet manufacturers. In the same year a staith on adjoining land was leased to William Fenton of Neville Hill Colliery.

Bollard bought the estate in 1825, at which time the occupants of the 3-storey mill, which had five wheels and a 3 foot-9 inch head of water, were:

Croysdales, dyers - a ware mill and 10 h.p.

John Lee - a scribbling mill with 16 h.p., and 3 carders;
3 scribblers, 3 devils, 3 billies, and 14 pairs of looms.

S. Pickard - a fulling mill, with 10 h.p.

Mrs. Whitworth - a fulling mill, with 14 h.p.

J. Redshaw - a scribbling mill, with 6 h.p.

J. Lee - a dyehouse, dryhouse, and fuller's earth place¹

In addition to which there were other buildings - a dyehouse, a dryhouse,

a warehouse, and some houses.

Mrs Whitworth, a saw mill owner, continued to rent part of the mill, paying £70 p.a. in 1840. In the same year Croysdales paid £120 p.a. for their ware mill, and John Lee paid £125 p.a. for his property. The rent on Fenton's coal staith was £66-10s p.a.

The year following the property was sold by Belland to the Aire and Calder Co., for £31,000, but they continued to rent it out, after c.1865 to J. Richardson and Co., manufacturing chemists and dyewood cutters. They were not the sole occupants, but the only firm of any size, and the only manufacturing firm. They still occupied the mills in 1914.

British Waterways Deeds no. 107.

LCA DB 69 unsorted, Fearne-Bollard papers.

L.I. 24.2.1792, 9.12.1793, and 14.10.1799.

LCA LORB, Leeds Rate Books.

71. FEARNE'S ISLAND DYEWORKS; EAST STREET

The East Street/Steander area was the location for many small dyehouses in the last quarter of the 18th century. One of these was tenanted by the Croysdale family.

They prospered sufficiently to enable them to rent a part of the Nether Mills (q.v.) for grinding dyewares, and to buy 630 sq. yds. of land nearby on Fearne's Island in 1825, from Fearne's trustees. On this they built a dyeworks, which also had a right of wharfage on the river nearby.

In 1838 the works were considerably extended by the purchase of the adjoining Waterloo Iron Works (q.v.) from the trustees of George Rawson - 1,350 sq. yds. to the north west of Hainswerth's mill on Fearne's Island. This had a 26 h.p. steam engine.

By 1851 there were 31 hands at the works; by 1861 more than 50. There were other dyers on the Island - Musgrave Bros. (15 workers), S.D. Dixon & Sons (12), and Jeshua Waddington (12), and later E. Wilson and Blackburn and Teasdale.

Eventually, there were only two - Croysdales, and Pattinsons, wool dyers. In 1900 Croysdales became a founder member of the Yorkshire Indigo, Scarlet, and Colour Dyers Ltd., which specialised in the dying of worsted stuffs. They were still there in 1914.

W.R.R.D. IB 585 557 (1824)
 IF 590 520 (1825)
 LI 302 296 (1832)
 NC 107 101 (1838)

72. WATERLOO IRON WORKS, EAST STREET

Built c.1826-7 on Fearn's Island, on lot 11 of Fearn's Estate, which was auctioned in 1825. Occupied by Thomas and James Brown, sheargrinders until c.1835, then Clayton and Wordsworth, until bought by Creysdale's of Fearn's Island Dyewerks (q.v.) in 1838.

73. BANK MILLS, EAST STREET

Built by Markland, Cookson and Fawcett, cotton spinners, in 1791-2, originally as a water mill, but immediately changed to steam. Jonathan Cookson wrote in 1792 to Boulton and Watt:

We have built a very large and expensive water wheel...
 ... but if I could be assured you'd erect a steam engine
 in three months, we would sustain the loss.

This they did. A 30 h.p. engine was bought from Soho, and the 14 ft. by 7 ft. wheel put up for sale in 1796.

The company were previously involved in the manufacture of carpets, for which they had a manufactory in Kirkgate, and this interest was retained when they started spinning cotton. They also scribbled wool. In 1792 the steam engine was used to drive:

1,000 cotton spindles

800 worsted spindles

5 scribbling and carding engines for coarse carpet yarns.

2 scribbling and carding engines for fine wool and worsted.

One mill was used for cotton, the other for wool and worsted spinning. This latter was insured for £5,100 in 1795; the cotton mill for £15,300 in 1796, of which one fifth was on the buildings, the same on stock, the rest on the steam engine and machinery. In 1797 the cotton mill was described as unused, and the firm went over to wool and worsted completely thereafter.

The rates paid on the mills were:

1795: £150 (of which £45 for the engine)

1805: £80-11s.

The firm continued in occupation until 1819 when the mills were advertised for sale. They probably remained empty until 1823 when they were bought and entered by Hives and Atkinson, former partners with John Marshall at Holbeck flax mills.

This immediately became one of the largest flax mills in Leeds. It had a 60 h.p. Fenton & Co. engine installed, and there were 420 employees by 1829.

Two new mills were built in 1831-2 on adjoining land bought from Fearn's executors and a new 60 h.p. Fenton & Co. and three 30 h.p. engines (by the Bewling Co., and Whithams) added. By 1834 the number of employees was 554 (364 of them female) and the company was the second largest in its trade in Leeds.

There were 16,698 spindles by 1839, and 18,086 by 1842, with 923 workers, representing a weekly wage bill of £338.

In 1861 Hives and Atkinson had 953 workers, and in 1867 Hives and Tennent had between 1,200 and 1,400 employees. At the latter date some 2,000 - 2,500 tons of raw flax, mainly Irish and Russian, were consumed each year, whilst the mills required 600,000 gallons of water a day from the river, and 800 h.p. Most of the water was used in 'scutching' the raw flax, and also for the twelve boilers employed.

The company was forced to quit business in 1882, and the mills were sold off in five lots. There were four mills:

A mill, rebuilt 1824 after a fire. The original cotton mill.

It had a 70 h.p. Fenton and Co. beam engine.

B mill, built 1831-2, six stories high, with a 60 h.p. engine.

C mill, built 1832, with 3 engines, each of 30 h.p.

D mill, four stories high, built 1856, with a 40 h.p. engine.

Parts were sold to R. Varley, drysalter, and Roberts, Mart & Co., printers and paper manufacturers, whilst J. Crawford & Sons, of East Street Mills took the rest as warehousing. In 1914 the occupants were Roberts, Mart & Co., H. Leetham, corn miller, and the Worth Manufacturing Co., shirt manufacturers.

LCA LORB Leeds Rate Books.

W.G. Rimmer, Marshalls of Leeds, (1960).

Boulton and Watt Papers.

SUN CS 8/636966; 13/653223; 17/666225; 22/674510; 24/681849;
27/693428; 32/701514; 45/731375.

Marshall Papers, List of Spinners and spindles, 1839-42 by H.C. Marshall.

3rd Report of Commissioners on Pollution of Rivers (1867) vol.II, 216-9.
 LCA DB/m/221 Particulars of the Bank Mills Estate, 1882.
 Hepper Books, 1, 181-2.
 W.R.R.D. KJ 123 100 (1829).
 LG 676 685 (1832).

74. ALBION FOUNDRY, EAST STREET.

Originally the site of the tanpits of James and Peter Rhodes, leather manufacturers, possibly established in 1790 when they offered a large number of bricks for sale.

They sold the land to Lord & Brook, machine makers in 1843, but the firm had been in occupation since the the mid-1830's, paying a ground rent of £18-16s. p.a.

In 1851 their partnership was dissolved and Lord bought Brook out. The firm ceased altogether in 1855 when the Yorkshire Banking Co. exercised their right of mortgage, and the premises were leased to Messrs. Greenwood and Batley for £380 p.a.

Lord & Co. had 220 workers in 1851, whilst Greenwood and Batley had 390 by 1861, by which time they had also started up in Armley Road. They made textile machinery (both were former partners of Fairbairn's), armaments and machine tools. The premises were bought in 1862 for £3,625, and by 1867 the firm had 250 hands.

In 1880 production was removed entirely to Armley Road, and the buildings were entered by J.Purchon & Son who converted them to a cloth finishing mill. They were succeeded by Miller and Harridel, cloth finishers, and then Wilcox & Pratt, furniture manufacturers who were still there in 1914. Part of the works was by now disused.

LCD no. 5725.

LEEDS EXPRESS, 31.3.1883.

75. LOW FOLD MILLS, EAST STREET.

It is not possible to say exactly when these mills were first established on a site adjacent to the River Aire, about a quarter of a mile from the Parish Church. The main mill, parallel with the river and about 400 feet long, is clearly indicated on the 1815 map of Giles and Giles.

Possibly it was an early cotton factory, perhaps occupied by Robinson & Co. in 1797, or Sutcliff, Robinson & Co. in 1798. Both had mills somewhere at the Bank in 1798.

Only after 1820 does the history become clear. In that year John Howard, carpet manufacturer, built a new mill at Low Fold, and another in 1823. However, the plan of the mills hardly altered. The other part of the mills was used for flax-spinning, being tenanted by Joseph Moir & Co., who had a 18 h.p. engine.

The flax mill passed to I. Hunton by 1824, who then possessed a 24 h.p. engine by Fenton & Co., and then to George Hammond, formerly of "Bank Top Mill. In 1829, this firm had a 25 h.p. steam engine and employed 174 workers.

Howard continued to occupy a cotton mill (for coverlets) and the woollen yarn mill (for carpets), where in 1834 he had a 24 h.p. engine and employed 74 workers.

Until this time both Howard and Hammond only leased the property, but in 1834 they appear to have bought it. It was then described as a flax mill, a cotton mill, and six cottages on a parcel of land known as the Tanyard. This was the old tan yard of James and Peter Rhodes (see Albion Foundry). Possibly the mills were built by the Rhodes. In 1795 James Rhodes & Co. paid £58-10s. in rates for a factory and a steam engine.

Howard sold his moiety to Hammond in 1834, and the latter occupied the whole of the mills until 1853. In 1839 he had 4,322 spindles, and in 1842 there were 5,500 spindles and 184 workers.

In 1853 Hammond offered a 35 h.p. engine for £200, and the mills were to let. They now had 9,000 spindles.

The occupants c.1865 were:

Brown, Rhodes & Co.,	woollen manufacturers,	with 50 employees.
J. Carter & Co.,	"	" " 15 "
Booth & Sons	"	" " 20 "
Ellis & Whittaker	"	" " 30 "
J. Laycock,	cloth finisher	with 7 employees.

By 1867 the mills had been taken over by J. Hartley & Co., woollen manufacturers, and Hartley & Turner, wool extractors. Hartley & Roper, as the first firm became, were manufacturers of shoddy and mungo, and they continued to occupy the larger part of the mills until 1914.

In 1899 the part owned by J. G. Roper & Sons was two mills of three and four storeys, separated by a footpath, a warehouse, carbonising chambers, a dyehouse, and an engine and boiler house, with a compound

beam engine. This was valued at £18,090.

FP (1834) xx, C1, 49 and C2, 247

W.R.R.D. LR 567 559 (1834)

LR 568 560 (")

PQ 114 114 (1846)

Hepper Books 7,157

L.M. 22.10.1853, 2.9.1854.

76. GIBRALTAR SOAP WORKS, KNOWSTHORPE.

In 1803 Richard Paley, soapboiler of Kirk Ings, Leeds, bought three pieces of land from Sir William Milner, totalling over five acres and known as the Kirk Boles. These were adjacent to the Knostrep Cut of the Aire & Calder Navigation.

A mortgage in the same year mentioned:

The warehouses, furnaces, buildings, engines, machinery, and other works erected and standing thereon... used for carrying on the trade and business of a soapboiler and ashmaker.

After Paley's bankruptcy in 1803 the works were run by Paley & Co., which had 24 shares, divided between

George Paley of Leeds, soapboiler

John Seaton of Pentretract, banker

3 other members of the Seaton family, all bankers

John Wilks of Leeds, banker

Paley & Co. remained until 1829 when the works were taken over by Thomas Pemberton, formerly a cow-keeper. In 1833 he was able to purchase the works, from Benjamin Pullam of Leeds, oil merchant, who was probably either a shareholder in Paley & Co. or a creditor of the company.

Thomas P. was succeeded by Matthew P. then another Thomas P, who was joined in the 1860's by - Watson, and the scope of production was extended to include tanning.

Part of the works was let out to James Carr, a manufacturing chemist, and then in 1869 half the works were sold to George Lister, tanner and currier.

By 1878 the works were occupied by a number of firms, all tanners and curriers, including Lister and T. & J. Proctor, probably of the Meanwood family of tanners of the same name.

In 1894 the works were sold to the Hunslet Railway Co. at which

time the occupants were C. Gough, J. Fogden, Nicholson & Brown, and G. Hall, all leather manufacturers.

They were demolished to make way for the Hunslet Goods Station shortly afterwards.

W.R.R.D. EU 494 659 (1803)
 EU 590 807 (1803)
 LQ 227 241 (1833)
 LQ 234 246 (1833)

British Rail, Hunslet Goods Station Acquisitions.

L.M. 23.10.1828.

77. ELLERBY LANE MILLS

In 1873 James Crawford of East Street Mills bought 8,276 sq.yds. of land on the east side of Ellerby Lane from Mrs. Sarah Dawson, for £981. On this he proceeded to build a new cloth finishing mill which he occupied throughout until 1914.

LCD no. 1450

78. HILLHOUSE MILLS, ELLERBY LANE.

The original building on the site may well have been a weaving shed owned by Henry Hall, stuff merchant, built before 1815. This was later known as "Hall's Buildings".

In 1851 it was converted to a linen mill by William Place, canvas manufacturer. The firm of Place and Neutb employed 22 workers in 1851, but 239 in 1861, indicating the expansion which resulted from the erection of mills. A new mill on the south side was added in 1866.

The firm of Hill & Co. remained until 1903, whereafter Lee, Whatmoor & Co., wholesale clothiers, took possession. The owner in 1906 was Charles Appleton and the mills were valued at £1,900. They covered 4,400 sq. yds. and comprised a 3-storey mill and a large shed, the former unoccupied, the latter let to Lee and Whatmoor at £80. p.a.

W.R.R.D. WC 93 108 (1860)
 Hepper Becks, 11,158.

79. EASY ROAD BRICKWORKS.

Elizabeth Clark conveyed the Great Shovel Board close in East Leeds to John Clark Muff, brickmaker, in 1868. It comprised 17,120 sq.yds. for which Muff paid £1,680. On this he built a new brickworks, which by 1875 consisted of three kilns, two horizontal steam engines and boilers, and the brickmaking machinery.

This works was sold in 1875 to Thomas Statham, brickmaker, who ran it until he went bankrupt in 1883, when his liquidators sold the property to J.W. & W.R. Harrison, brickmakers, for £1,350.

The second part of the works was built in 1876 by William Brown, builder, on 8,720 sq.yds. of land in Clark Lane, bought from Sarah Bell. He remained in occupation until 1891 when the brickworks were sold to W.Ward & Sons Ltd.

This firm took over J.& H.Helroyd, brickmakers, who had bought the Harrisons' property in 1898 for £5,250, ~~in 1898~~. The business was bought for £9,500 and it included

kilns, steam engines, boilers, a tramway, rollers, brickmaking machines, a brick press, three more kilns, and 2 more steam engines.

Further land for the works was purchased by Wards from M.Ingram and E.Mande, and by 1909 the holding totalled 37,145 sq.yds., on which was:

An office, a five-ton weighbridge, a glass-bottle shop, furnaces, an overhead-traveller, a smithy, a chimney, 2 disused brick kilns, a new 14-chamber Hoffman kiln, a 90-foot chimney, a Lancashire boiler, a small horizontal engine, a bucket elevator, a Fawcett brickmaking machine capable of producing 1,000 bricks per hour, plus the old brickworks, now in a state of disrepair.

The whole had been standing idle for two years and was valued at only £4,337. It remained in that condition in 1914.

LCD no. 2850.

80. BLACK DOG MILLS, EAST STREET.

Originally a warehouse at Far Bank, converted into a scribbling and cotton spinning mill in 1795 when a 20 h.p. steam engine was installed by Benjamin Gowland, a partner in the firm of Gowland, Boyne & Co. The premises were owned by Edward Markland, merchant, and only leased by Gowland, who paid rates of £28 in 1795 and £42 in 1805.

- Clark was the third member of the partnership, which was however dissolved in 1798, after which Gowland continued with Henry Cooper as his partner. The cotton-spinning business appears to have met with little success, however, as in 1799 the mills were offered to let with their machinery. They consisted of 3 rooms, each 30 yards by 10, with

16 frames of a total 1,024 spindles

10 carders

2 drawing frames

3 roving frames

1 cotton picker

with the 20 h.p. engine and 2 acres of land adjoining.

The mills were let to Gowland & Co. again, but this time for wool scribbling. In 1805 they insured £1,400 worth of the contents of the mill, rising to £5,400 in 1806.

The firm continued in existence until 1809, though parts of the mill had been let to other concerns. A room and 1 h.p. was offered in 1798, and two rooms and half the share of the power in 1800, whilst in 1806 Joseph Hellewell, cloth dresser, was a tenant of Gowland's.

When the firm went out of business in 1809, however, the premises were offered, firstly for sale then to let, in one unit, comprising:

A four-storey mill with a 20 h.p. Boulton & Co. engine.

3 double scribbling engines

3 single scribbling engines

1 willey

5 billies and carders.

The fourth floor was then occupied by Hellewell, and there was a room on the ground floor suitable for a tobacco cutter, and also a dyehouse and filesmith's shop, let at £15 p.a.

The tenancy was taken c.1812 by Robert Herries, flax spinner, who occupied all the premises except one room which he offered to let with a secondhand steam engine in 1819.

The Boulton & Watt engine had been replaced with a 24 h.p. engine by Hird, Dawson, & Hardy of Low Moor.

By 1821 Herries & Co. had about 2,000 spindles, and in 1829 they

had 280 workers. In the meantime, in 1825, they were able to buy the mill off Markland in 1825, and add a new warehouse behind it, the capital being raised by mortgages to P. Rhodes, solicitor (1830), and the Yorkshire District Bank (in 1841).

By 1838 the number of spindles had reached 2,800, the same as in 1842, by which time over a half were standing idle. They then had about 135 workers, few more than in 1861 when G. Herries employed 122 hands.

In 1862 the mill was sold to Hinchliffe & Son, woollen manufacturers, who added an extensive weaving shed on the remainder of the property. They continued in occupation until 1898 when they were replaced by Lister & Scargill (later Lister & Co.), also woollen manufacturers.

W.R.R.D. IE 698 655 (1825)

KP 419 404 (1830)

NW 707 537 (1841)

L.I. 1.1.1798; 10.9.1798; 27.5.1799; 8.3.1800; 13.12.1809; 15.3.1819.

W. Brown, op.cit., (1821).

H.C. Marshall, op.cit., (1842).

SUN CS 65/778523; 72/797915; 73/794641.

81. EAST STREET MILLS.

In 1792 the site was occupied by small warehouses and dyehouses with 2 cottages. These were bought by Walter Gibson, who turned the property into a carpet factory, which lasted only two years, however. One part was then let to Messrs. Pickering, paper stainers - the warehouse and the sizeing house. The other part - a dyehouse and warehouse - was let to John Marsgill.

The whole premises were leased in 1795 to Moore, Shaw & Cobb, flax spinners, who paid £52 rates in 1795, and £32 in 1805. They bought them off Miss Gibson in 1798 and continued in occupation until 1818, despite a disastrous fire in 1811. Fortunately the mills were insured in 1809 for £6,000:

On a flax spinning mill & engine house, five storeys,	
1,500 sq.yds.	£1,500
Millwright's work etc.	£400
Clockmaker's work etc.	£3,200
Steam engine	£400
Stock	£500.

Tennant & Co., as the firm were now called, went bankrupt in 1818, and the property was leased to Moses Atkinson, flax spinner. He had a 36 h.p. engine in 1821 and approximately 2,300 spindles. He bought the property in 1825 from James Tennant, when it was described as:

4,160 sq.yds. with a flax mill, formerly a paper factory, before that a carpet factory.

A warehouse, formerly two cottages.

A countinghouse and packing shop, formerly three cottages

A flax dressing shop, formerly a house

Another flax dressing shop formerly a cylinder house

and before that a stiffening house.

Atkinson largely rebuilt the mills in 1825, and by 1834 he had a 36 h.p. engine by Fenton & Co. and over 200 workers. By 1839 the number of spindles had risen to 6,000, but he failed shortly afterwards and the property passed to Mark Walker, flax spinner, formerly of Byron Street Mill (q.v.). In 1857 he left for Steander Mills (q.v.) and the property passed to Jonathan Crawford, cloth manufacturer, previously at Carlton Cross Mill (q.v.). He remained in occupation until after 1914, adding another mill at Ellerby Lane (q.v.) in 1873. Walker had had 600 workers in 1851, whereas Crawford had only 72 in 1861, but the number had risen to 150 by 1867.

LCD no. 861.

L.I. 29.1.1796; 5.7.1817; 16.3.1818.

SUN CS 85/829552.

W.R.R.D. IF 591 521 (1825)

IG 405 393 (1825)

GA 652 779 (1814)

82. DOLPHIN FOUNDRY, STEANDER LANE.

The Steander area of East Leeds was sold by the Molyneux family to J.Fearne in 1745 for £2,400. On this property were then built a number of small dyehouses and workshops, and the Nether Mills (q.v.).

The foundry estate was in two parts. The first consisted of a dyehouse built by Thomas Upton and J.Skelton some time after 1798 when they bought the Near Steander from Fearne. This was tenanted by William Johnson and then sold to Messrs. Croysdales in 1850, at which time it was occupied by Messrs. Heatherington & Thompson, ironfounders.

The other part remained in the hands of Heatherington & Thompson,

and was also formerly part of Johnson's dyehouse, then from c.1830 to c.1840 Messrs. Reynolds' & Co.'s foundry.

This was later occupied by T.Campbell & Sons, engineers, who had 90 workers in 1867, then W.Ward & Sons, founders, who left in 1888 when the premises were sold by Mrs Louisa Skelton to William Pitts, machine broker.

The part which the Croysdales had bought and used as a warehouse was bought from them by Pitts in 1890 for £700. The whole property was leased to F.Dyson & Sons who eventually bought it in 1920.

Private deeds of F.Dyson & Sons Ltd.

83. STEANDER MILLS, EAST STREET.

T.E.Upton and J.Skelton bought the Near Steander from Thomas Fearne in 1798 and proceeded to erect a flax mill and other mills along the side of Sheepscar Beck. The flax mill Upton occupied himself, but a woollen mill was leased to Richard Lobley, scribbler and worsted manufacturer, previously of Nether Mills. He also spun cotton for a time.

The insurance on Lobley's mill was:

1803 ;	£1,150	(of which £250 for a steam engine)
1807 :	£3,400	
1809 :	£4,700	
1810 :	£4,900	
1812 :	£5,700	
1815 :	£9,000.	

The main mill was of four storeys, and was at some time purchased from Upton & Skelton, the purchase being confirmed in 1815, by which time R.& M.Lobley were worsted spinners only.

In 1814 the mills were extended by the purchase of 3,075 sq.yds. on the other side of the beck from Paley's assignees, on which a new mill was built.

Lobleys ceased business about 1821 and then leased the mills to Bowes and Kilham, flax spinners, and to Blaxland, Rinder & Co., cloth dressers. Bowes had use of 6 h.p. from a steam engine. Blaxland, Rinder & Co. left in 1832 and Lobleys advertised a mill and 11 gigs, screws, brushing mills, and other machinery to let.

About this time the firm of J.Lobley & Co., flax spinners, was

founded, taking occupation of a part of the mills, and remaining until they declined business in 1853. Bowes & Co., who had employed 140 workers and had a 20 h.p. engine in 1829, left in 1830.

Lobley & Co. had 122 workers and 2,590 spindles in 1839, but still did not occupy the whole of the mills. A part was let out to Messrs Braithwaite, worsted spinners, although later Lobley & Co. took this over also.

By 1856 the flax mill was occupied by Mark Walker and the woollen mill by Craven & Teale. By the 1860's the whole of the mills were occupied by Ladley & Co., woollen manufacturers, who remained until the early 1890's. They still belonged to the Lobley family and its executors and were rented out, after 1890 to a number of firms including J.Grimshaw, R.Mills, and MacDonald Bros., all footwear manufacturers, and then Pinder & Co., shirt manufacturers, who bought the property in 1918 for £5,500.

LCD no. 12646.

Private deeds, F.Dyson & Sons Ltd.

SUN CS 34/705561; 74/797722; 81/826132; 89/840116; 101/874767;
114/910362; 181/1106602.

84. BANK LOW MILL, MILL STREET.

Originally a cotton mill, built by Richard Paley on land bought from Darcy Molyneux in 1789, and occupied by Wilkinson, Holdforth & Paley, cotton spinners. Initially it was equipped with a 45 h.p. Sturges & Co. steam engine (Paley was a partner in this firm at Low Moor, Bradford), but after trouble over patent rights it was scrapped in 1797 in favour of a 36 h.p. engine from Boulton & Watt, which cost £665 but used only 18 cwt. of coal per 12 hours instead of 45 cwt.

The mill had 1,400 spindles and paid rates of £53 in 1795 and 1800, and £70 in 1805. Paley's relationship to the business is difficult to discern, Though a partner he appears to have had nothing to do with the running of the business. In 1797 he wrote to Boulton & Watt concerning the Low Moor steam engine:

I let it part of the Building and the frames I had in it, say 10, to receive a quarterly rent but am afraid the Parties will not be able to muster any rent for me ... as they are people of little or no property I am afraid I shall have the whole thrown upon my hands again.

The mill was described in a 1796 mortgage as:

all that large edifice or Buildings with the
Steam Engine ... lately erected and built by
Richard Paley for the purpose of spinning cotton
wool ... occupied by Thomas Wilkinson, and Joseph
Holdforth, and Richard Paley.

The firm of Wilkinson & Co. continued despite Paley's bankruptcy and under Joseph Holdforth's control turned to silk waste spinning besides cotton. In 1803 the mill was valued at £2,000 and the firm paid Paley a rent of £200 p.a.

Holdforth bought Bank Low Mill from Paley's assignees in 1807, and then in 1816 added Bank Top and Little Top Mills (q.v.), but only occupied the first factory.

By this time the firm dealt solely with silk waste, a material the spinning of which was akin to cotton spinning.

By 1833 the firm employed 240 hands, 80% of them female, and the 36 h.p. Watt engine was still the source of power. A new mill had been built on adjoining land in 1822.

In 1857, when his property was bequeathed to his son, James Holdforth was using all three mills, where he had about 550 workers, and he also had a works at Cookridge. He died in 1861 after a distinguished career in politics, and was succeeded in the business by J.D.Holdforth. He had 450 workers in 1867, but the firm lasted only a few years longer and in 1878 Bank Low was let to James Swithenbank, woollen manufacturer, who was still there in 1914.

Swithenbank bought the mill some time before 1899 at which date it was valued at £14,220. It covered 4,971 sq.yds. and consisted of:

a large 5-storey mill; a small 5-storey mill;
2 4-storey mills; a basement engine; a 120-foot
chimney; rag-shaking, -grinding, and -willeying
houses; a mechanics' shop; a dyehouse; a tentering
house; a 2-storey warehouse; offices and stables.

In which was installed:

12 sets of scribbling and carding machines
17 selfacting mules (8,784 spindles)
108 looms
5 warping machines
7 twisting and grinding frames
2 tentering machines
5 hydraulic presses
a compound tandem Corliss engine

boilers, and a Green's economiser
 pressing, milling, scouring, grease-extracting
 and rag-grinding machinery.

Boulton & Watt Papers.

LCA LORB Leeds Rate Books

W.R.R.D. FA 276 308 (1807)

FT 537 576 (1812)

XB 406 675 (1862)

LCA DB '233 Paley Bankruptcy Papers.

PP (1834) xx Cl, 44.

85. BANK TOP MILL, MILL STREET.

Built by Richard Paley on Skinner's Close, which was bought from the trustees of Darcy Molyneux in 1789 for £410, and initially occupied by T. Whittaker & Co., a partnership of the Whittaker family of Burley-in-Wharfedale and Richard Paley, which was dissolved in 1795.

Thereafter the mill was occupied by Paley & Co, as cotton spinners, until Paley's bankruptcy in 1805. It was described in 1796 as

all that large edifice of building with ye
 Steam Engine thereunto belonging also lately
 erected by Richard Paley on the Croft, for
 spinning Cotton Wool, and occupied by R.P.

The rates paid by the companies were £30 in 1795, and £55 in 1805. The mill was put up for sale in 1804. It was 123 feet by 32 feet, of four storeys and an attic, had a steam engine and two boilers, which drove 15 frames (848 spindles) and 20 mules of 192 spindles each.

The mill was not sold until 1816 when it was bought by Joseph Holdforth for £2,100, but in the meantime it had been rented by J. & W. Petterson, fullers and scribblers, who insured the contents for £5,000, of which £160 was for the steam engine.

The next tenant was George Hammond in 1819, flax spinner, later of Low Fold Mills (q.v.). He was succeeded by Batty, Hirst & Co. and J. & T. Walker, scribblers and cloth manufacturers, and then, by 1830, Heaps, Jackson & Heaps, scribblers, woollen manufacturers, and cloth dressers.

They insured the contents of the mill in 1830 for £3,450, and for £2,400 in 1835. A part of their machinery was rented from James

Holdforth. It consisted of gigs, shear frames, and other dressing machinery, and was insured for £400. They remained until 1849.

By 1857 Holdforth & Co. occupied the mill, and after they ceased business it was sold to John Marsland, in 1880, for £2,850.

In 1902 the Corporation bought the mills and demolished the outer half to widen Richmond Road. The remainder was sold to H. & S. Green, the tenants of the mills at the time, who were boot and shoe manufacturers.

LCD no. 4621.

LCA DB 233 Paley Bankruptcy Papers.

LCA LORB Leeds Rate Books.

L.I. 28.5.1804.

SUN CS 101/882786; 181/1110686; 181/1110687; 222/1207685.

86. LITTLE TOP MILL, RICHMOND ROAD.

The third mill built by Richard Paley in the mill street area. Initially used as weaving sheds it was converted into a Sunday School and then put up for sale after Paley's bankruptcy, in 1807.

It was built in 1792-3 on land bought from Zacchariah Wilson, along with 28 cottages, and was originally occupied by Whittaker & Co., cotton spinners (see Bank Top Mill).

In 1817 Paley's assignees sold the property to J. Holdforth who later used it as a silk mill. Thereafter it was used as a warehouse and was demolished by 1893.

Sources ³as for Bank Low & Bank Top Mills, plus

W.R.R.D. DN 178 238 (1792)

EC 555 860 (1793).

87. LEEDS OLD FOUNDRY, MARSH LANE.

Martin and John Cawood came to Leeds from Birmingham in 1791 and set up a small foundry in Duke Street. In 1799 they dissolved their partnership and Martin started on his own.

Richard Paley built a foundry for him in land off Marsh Lane, and an announcement in 1800 heralded its completion:

Martin Cawood ... begs leave to inform ... that he has

just erected a foundry near the bottom of Marsh Lane, where work of all kinds, both in brass and iron, will be cast and finished, having erected an engine.

This foundry was valued at £1,600 in 1803 and was rented by Paley to the Cawoods for £200 p.a. He paid £20 in rates on it in 1805.

The engine was of 7 h.p., made by Fenton & Co., and Cawood undertook manufacture of household utensils as well as castings for all types of industry.

Cawood & Co. remained until 1849, having bought the foundry and also taken over Marsh Lane Mill (q.v.). They advertised the foundry to let, with its 8 h.p. engine, and it was taken by Woodhead, Scriven, and Holdsworth engineers and founders, later just Scriven & Holdsworth, manufacturers of machine tools. They remained until after 1914.

LCA DB 233 Paley bankruptcy papers.

L.I., 20.8.1800 and 7.4.1849.

LCA LORB Leeds Rate Books.

88. MARSH LANE MILL.

Built by Richard Paley in 1799 for George & Job Wright, flax spinners, at a cost of £615 for the mill, reservoir, and well, and £457 for the steam engine. The lease was to be for 21 years at £12% of the cost of developing the mill, and £18% of the cost of the steam engine but the Wrights went bankrupt in 1800.

The mill was next leased to William Farmery, a machine maker, after it had been advertised as being 11 yards square with a 10 h.p. engine, and 6 flax spinning frames of 30 spindles each.

Farmery used only a part of the premises, however. In 1805 he advertised 3 rooms to let, with up to 6½ h.p. from his engine. He paid £15 rates in 1805.

It is not known who tenanted the mill after Farmery, but by the mid-1820's Cawoods had started flax spinning in addition to their foundry. By 1839 they had 50 workers and 1,900 spindles at the mill.

They were followed in 1849 by T. & J. Blakey, flax spinners, and then in c.1865 by Richard Wilson, flax spinner. From the mid-1870's the occupiers were Russum Bros., brush manufacturers, and then after the turn of the century J. Percival & Son, leather manufacturers.

LCA DB 233 Paley Bankruptcy Papers.
L.I., 7.4.1800, and 15.4.1805.

89. YORK STREET MILL.

Built by Thomas Button, cloth dresser in 1825 on land previously owned by a Mr. Naylor. Button was formerly at Mill Hill. In 1827 he insured the mill for £4,300, including £300 for a steam engine. In 1835 T.Button & Son insured again, but only for £2,650.

They remained in occupation until about 1852 when the occupants became first Scaife, Sykes & Co., cloth dressers, and then Henry Wilson, cloth finisher, who bought in 1861,

a dressing mill, dryhouse, press-shop, stables,
 engine house, boiler house etc. and 2,490 sq.yds.
 of land in Stainburn Sq.,

from Joseph Appleyard of Halifax.

Wilson remained until the 1880's, by which time parts of the mills were let out to other finishers. In 1867 John Purchon, cloth finisher, had 60 hands.

After the turn of the century they were occupied by Crosthwaite Bros., woollen manufacturers, Rogerson & Pinder, manufacturers of worsted coatings, J.Nicholson Ltd., woollen manufacturer, and the Crosthwaite Fire-Bar Syndicate Ltd., ironfounders.

M.R.R.D. WK 159 177 (1861)
 XT 153 143 (1863).

90. TRUMBLE'S PAPER FACTORY, YORK STREET.

Developed in two parts initially. One was the dressing and finishing shops of G.& F. Roper, cloth manufacturers, originally Roper and Cookson of St. Peter's Square.

On the site of their former press shops and stables were erected printing and machine shops, drying rooms, an engine house, and a boilerhouse, probably by Sedman and Weddill, paperhanging manufacturers, in about 1824. These were bought by J.Trumble in 1844.

The other part consisted of a house and warehouse, formerly the

Ropers' finishing mill, but converted into a paperhanging warehouse by Trumble. It was bought in 1856 and special mention was made of
the use and benefit of the water at the bank
running at the south west corners ... called
Sheepscar Beck.

Trumble's continued to occupy the site, rebuilding the works towards the end of the century (probably in 1878), until 1904 when they became the owner of 'Wallpaper Manufacturers Ltd.' This firm had a new factory built in Harehills Lane in 1904, (see Wallpaper Works, Berkeley Road).

W.R.R.D. TG 541 631 (1856).

91. ALBERT NAIL WORKS, SYKES STREET.

Adjacent to Sheepscar Beck, off York Street. On land bought from Henry Hall, stuff maker, in 1787 Richard Paley built a water mill which was leased to Messrs Liddle & Co., cassimere printers. This later formed the Union Foundry (q.v.). The rest of the land was sold by Paley's devisees in 1813 to Zebulon Stirk, machine maker who was in partnership with - Horsfield and specialised in making steam engines and flax machinery.

By 1824 Stirk was using a 10 h.p. engine of his own manufacture to provide power for machine turning. He did not occupy the whole of the building, however, parts being let to C. Atkinson, cloth friezer, and J. Hilton, tobacco manufacturer. Stirk also started spinning flax in the 1830's, and by 1838 he had 3,000 spindles at work. In that same year, however, he gave that side of the business up, sold the foundry and moved to larger premises in Hunslet. The property was then described as:

a six-storey mill, formerly a flax mill, now a foundry,
and a dryhouse, with a 30 h.p. engine.

a three-storey machine factory and brass foundry
6 houses in York Street, with a room over used as a warehouse
2 houses and a two-storey fitting shop.

The premises were bought by T. & W. Bolland, iron manufacturers, who turned them into a cut-nail factory. They were in occupation until 1867 when the Bollands sold the factory to Grimshaw & Burniston, also nail manufacturers.

In 1869 Burniston sold his share to Grimshaw, then in 1893 the property was sold to R. Dower, iron merchant, and used as an iron warehouse. This

was bought by Walter Longley in 1897 for £4,000, and then to the Corporation in 1903 for £10,000.

The factory was demolished to make way for the market extensions shortly afterwards.

LCD no. 1785.

92. UNION FOUNDRY, HARPER STREET.

Originally a cloth printing shop, built by Richard Paley on land bought from Henry Hall in 1787, and occupied by Liddle, Rogers & Co., and a friezing mill built on land belonging to Samuel Harper.

This latter mill, which had two water wheels was sold by Harper's trustees in 1814 to Joshua Barrett, tobacco manufacturer. It was of two storeys. Barrett and Hornby occupied this building until 1834 when Hornby moved to Meanwood Road, and the premises were entered by Bingley & Sons, ironfounders and machine makers.

The old cloth printing shop was sold by Harper's trustees to Mary Vickers in 1819 for £520, and then by her to William Umpleby, hat manufacturer, in 1824, at which time it was occupied by Harralls and Taylor.

By 1839 the firm of Bingley & Sons were in occupation, and they began to convert the mill into a foundry, buying the property in 1844 for £950. They had 25 workers in 1851.

Bingley & Co, remained in occupation until the 1880's when the premises were leased to Smith & Co., ironfounders, and then the Leeds Co-operative Wholesale Society. In 1895 Mary and Godfrey Bingley sold them to J.Redman, clothing manufacturer, for £3,000.

He shared the premises with Bayliss & Co., wholesale clothiers, until 1901 when the Corporation paid Redman £5,000 for what were now known as the 'Market Street Mills'. They were demolished a few years later.

LCD no; 1368.

93. MILLGARTH MILLS, EAST LANE.

The trustees of the Rev. Samuel Harper sold 5042 sq.yds. at Mill Garth, adjoining Sheepscar Beck, to Clayton & Garsed, flax spinners in 1814 for £1,776. They immediately built a new flax mill on the land, which was mortgaged to Thomas Rothwell in 1815.

The firm did not enjoy great financial success, however, and the mill passed to Rothwell, who was however certified a lunatic so that executors had to be appointed. In 1819 the mills were leased to James Hargreave & Co., woollen manufacturers, who bought them when they were put up for auction in 1837, by which time they consisted of:

a large mill, 110 ft, by 40 ft., of seven stories
 a new mill, 56 ft. by 24ft., of two stories
 weaving shops, 129 ft. by 20 ft., partly six and partly four stories.

a 40 h.p. engine by Fenton & Co.

Hargreaves paid £8,500 for these premises and continued in occupation until c. 1850, when the mills were let to Thomas Vevers, cloth dresser, and Thomas Hall, cloth manufacturer.

Hargreaves had built the new mill in 1828, and had another steam engine of 14 h.p. besides the one mentioned in 1828. He employed 140 hands in 1833, two-thirds of them male, and was one of the pioneers of power loom weaving, with 36 power looms in 1835.

After Vevers the mills were occupied by Thomas Robinson, cloth manufacturer, who bought them in 1874 for £14,000. He went bankrupt in 1885, but had had 400 workers in 1867.

His mortgagees sold the property in 1888 to Hirst, Brooke & Hirst, manufacturing chemists, who became a limited company in 1896. They retained possession until 1930. From 1885 to 1888 the mills were let to a number of firms, amongst them Sunderland & Wilton, clothing manufacturers, who had the two main buildings, and Thompson Bros., gas engineers, who had 40 workers by 1888.

LCD no. 4039.

PP (1834) xx, C2, 239.

Historical publishing Co., op. cit., (1888).

94. MILLGARTH STREET MILLS.

In two parts. The first, the northernmost was a flax spinning mill entered in 1797 by Bowling and Atkinson on land bought from Alexander Turner, merchant. (See Lady Bridge Mills).

This was sold in 1800 to Armistead, Spence, & Houseman, flax spinners who in turn sold it to Clayton, Milburn & Garsed in 1803 for £2,500.

The mill had been advertised as having 630 spindles, a double starching frame, two warping mills, one callender, fourteen pairs of hackles, and a number of looms.

By 1811 this firm employed almost 100 workers, wet spinning then being done in cold water, and heckling still performed by hand. There was a 20 h.p. steam engine for the spinning machinery.

In 1808 the firm bought land to the south of the early mill from Harper's trustees, but did not build a second mill until 1814.

The lack of business success thereafter, possibly occasioned by the slump after 1814, forced them out of business, and in 1817 the mill with its 20 h.p. engine was up for sale.

The early mill had to be sold also in 1821. In 1818 it had been valued at £9,900, of which £900 was for the steam engine, £3,900 for machinery, and £600 for stock and raw materials.

Both mills were sold to Ikin, Branckner, & Brown, woollen manufacturers, in 1825, for only £2,500 because they had been burnt down the year before. After rebuilding they were mortgaged for £5,000 to C. Hardcastle. There was a new 24 h.p. steam engine by Boulton & Watt installed by 1824. Ikin & Co. had leased the mills prior to buying them, insuring the contents in 1823 for £3,000.

In 1831 they insured the old mill for £2,000. By 1833 Brown and Andrews, as the firm was now called, employed 157 workers, nearly all males, and had two steam engines, both of 36 h.p. Room and power was let off to T. Rushter, worsted spinner. They continued in occupation until about 1850, but part was let to F. Clapham, worsted spinner in 1846, and after him Bellshaw & Phillips,

After Brown and Andrews the mills were occupied by J.T. Fleck, cloth manufacturer, and Thomas Dixon, cloth manufacturer, who remained until 1862 when he offered for sale:

- 6 scribblers and carders
- 4 piecing machines
- 4 billies of 100 spindles each
- 1 pair of mules, 600 spindles each

2 mules of 1000 spindles each
 1 woolley and 1 teaser
 40 looms

In 1867 the mills were occupied by Fleck, who had 70 workers, and T. Smith & Sons, cloth manufacturers, who had 40. They remained the property of the Andrews family until 1876 when they were sold to W. Dennison and William Wray for £7,250. and were converted into a model lodging house.

LCD no. 2096.

SUN CS 122/939201; 145/1009556; 188/1127922; 190/1134692; 225/1221721.
 PP (1834) xx, C2, 236.

L.I., 5.8.1799, 9.9.1799, 10.1.1803, and 22.3.1862.

95. LADY BRIDGE MILLS, LADY LANE.

Originally the site of the dyehouse of Brumfitt & Sons, carpet manufacturers, which was built before 1783, and on which they built a mill some time before 1790. The land was owned by George Turner, and in the tenancy of Brumfitts.

There were two mills. One lease was sold to Bowling and Atkinson in 1797, the other Brumfitts continued to occupy until 1815 when it was sold to Clayton & Atkinson, flax spinners. Richard Brumfitt paid £25 in rates in 1800 and £36 in 1805, a part of which was levied on a steam engine.

When sold in 1815 the property was described as

a mill or carpet factory, with the steam engine and engine house, three dyehouses, five workshops, and various warehouses, all built by Richard Brumfitt.

Atkinson sold his moiety to Clayton in 1818, but the firm folded in 1821. The mills were offered for sale with one 28 h.p. and one 12 h.p. engine.

The mills were sold to Ripley & Ogle, cloth manufacturers, who remained until about 1854, when they were let out to G. Snell & Co., cloth dressers. In 1834 Ripley & Ogle insured for £16,150 the following:

A fireproof mill

The Old Mill, five stories high

2 boiler houses

A counting house; warehouse, hot pressing shop,
 hand weaving and burling rooms

A large steam engine

Various other workshops.

Snell & Co. remained until 1887, having 200 workers in 1867, In 1887 the mills were sold by the Ripley family to J. Mosley, and a number of tenants followed.

These were mainly footwear and clothing manufacturers. One of them was Walker Bros., boot manufacturers, who had 70 employees in 1888. Others were Daly & Langbridge, and B. Sanderson, both boot manufacturers, and in 1897 Morton & Joynt, wholesale clothiers, leased a part.

When the mills were sold to the Corporation in 1902 for £10,500 the occupants were:

Morton & Joynt, wholesale clothiers

E. Goldman, boot mfrer.

Bainbridge Bros. Ltd., clothing manufacturers

Daly & Langbridge, boot mfrers.

The Corporation continued to lease the mills out, to, amongst others, B. Symon & Co., wholesale clothiers, and Goldman. They were still not demolished in 1914.

LCD no. 1596.

LCA LORB Leeds Rate Books.

L.I., 21.11.1796, 7.5.1797, 23.5.1814, 7.5.1821.

Sun CS 210/1177577

96. WATSON'S DYEWORKS, TEMPLAR STREET.

In three main parts, all of which were originally the estate of Matthew Rhodes, merchant and cloth dyer. The land in the Leylands was bought by William Rhodes off William Blackburn in 1767. On this he proceeded to build dyehouses, warehouses, a callender-house, a singeing-house, and other workshops.

The first part formed Hope Yard and was sold by Rhodes' trustees to William Watson & Co., dyers, in 1811. It comprised the dyeworks as built by Rhodes. Another part of Hope Yard was sold by Rhodes' trustees to E. Matteson, in 1821, who then erected a brewhouse. This was bought by William Watson in 1836 for £145. The dyeworks part had been leased to Matthew Wilkinson between 1794 and 1811.

The second part formed Metcalf Yard, which was sold by Rhodes to Samuel Brownridge, cloth dresser, in 1793, with its dryhouses and cylinder-house. Brownridge sold it to David Mercalfe, dyer, in 1821, prior to which the occupants were D. & J. Farrar, later called Farrar & Metcalfe. About 1840 the dryhouse etc. plus 6 other workshops built

by Farrar & Co. were leased to George Burniston, dyer.

The third part formed the remainder of Hope Yard, and in 1812 comprised land and a disused leadhouse and dryhouse. These were sold to Watson & Co. in 1820, along with the dyehouse, countinghouse, engine-house, stock-house, dressing-shops, joiners shop, and stables. By 1826 Watsons had added 3 aquafortis warehouses, a distillhouse, a dyehouse, a cloth warehouse, a mill, a scouring-house, and three more dyehouses.

In 1843 these were occupied by Watson & Co., dyers, and W. Watson jr., vitriol manufacturer.

By 1856 the whole estate was occupied by George Burniston, but was subdivided amongst many tenants thereafter. The mill, for example, was occupied as a bone mill in 1867 by J. Pearson, who had 12 workers.

These workshops were an important source of small, cheap, rented premises for manufacturing. They remained in the hands of the Watson family throughout, and there is evidence that they were carefully managed for this very purpose, for the estate was increased in 1880 by the acquisition of the Metcalfe estate, and in 1897 of a currier's shop in Lower Templar Street.

The estate was eventually sold to the Corporation in 1907-8 for £12,750, and demolished as an unhealthy area.

LCD nos. 2346 and 2416.

R.G. Wilson, Gentleman Merchants, (1971).

97. HOPE STREET MILLS.

Built in Sheepshanks Yard, North Street, by the Sheepshanks, a prominent family of cloth merchants. There were dressing shops behind their house from the year they moved into it (178?), but there was no mill built before 1821.

The dressing mill was built in the yard some time between 1821 and 1826, probably towards the latter date. At the time York & Sheepshanks already had factories at St. Peter's Old Mill and Perseverance Mill (q.v.).

This mill was advertised to let in 1844 and again in 1853, with 16 gigs, but it is not clear whether this was the whole of the premises or just a part. Whatever, York & Sheepshanks remained in occupation until the early 1860's.

Thereafter the mills were occupied by Wilson & Webster, cloth finishers, who had 124 workers in 1861. They remained until the mid-1880's, then

were succeeded by S. Timms, hat and cap manufacturer, and Wormald & Redshaw, boot manufacturers.

By the beginning of the 19th century the mills were divided up between a cycle manufacturer, a footwear manufacturer, a rag merchant, and two wholesale clothiers.

R.G. Wilson, Gentleman Merchants, (1971), 247.

98. MERRION SQUARE MILL, NORTH STREET.

In 1788 David Lupton, cloth merchant, bought property between Dennison's estate in North Street and the Free Grammar School, from Elizabeth Preston for £2,100.

The Luptons had previously had their dressing shops in the Leylands, but new ones were built on the part of the site adjoining the grammar school in 1789, and a small beam engine installed. The water was obtained from a well and stored in a reservoir.

The firm of Lupton & Co. had various partners - Luccock, Mellin, and Sharpe for example - but remained primarily a mercantile concern. They only finished a part of the cloths they handled, and when the firm vacated the mills in 1849 they sold it to Francis Darnton who let it to John Snell who had done much business for Luptons. He had 200 workers in 1861.

Snell remained in occupation until 1873 when the mills were let to Penny, Blakett, & Beck, also cloth finishers, who had close connections with Waddingtons, the dyers at Crown Point. They left the property in 1884 when it was sold and demolished for the redevelopment of the Grand Theatre.

C.A. Lupton, The Lupton Family in Leeds, (1865).
L.M., 27.1.1844 and 29.1.1853.

99. SMITHFIELD FOUNDRY, NORTH STREET.

Started in 1849 by Thomas Green, ironfounder, previously of the Lower Headrow, and developed gradually by his firm thereafter. The foundry was built on land bought from John Rhodes for £3,600, a sum not finally paid until 1861.

By this time Green employed 120 workers, as compared with only 26 in

1851. The works was by the 1860's the largest manufacturers of lawnmowers in the country, having produced 2,000 machines in four months in 1861.

The firm continued to grow, and the works expanded also. They were made a limited company in 1879, and by 1883 the works covered $1\frac{1}{2}$ acres and housed 400 employees. There were three foundries by this time, for cast iron, malleable iron, and one for brass, plus several annealing furnaces, a boilermaker's shop, an engine erecting shop, tool shops, and a machine-fitting shop.

Besides lawnmowers they made steam-engines, especially for tea plantations, and Wilkinson's Patent Tramway Engine, which were to be used by Leeds Tramways. Output of these reached 75 a year by 1898.

Having started as Whitesmith in Sheffield, coming to Leeds in 1835, to Hunslet Lane, the firm is still active in 1972.

LCA DB 39/35.

Leeds Express, 7.7.1883.

100. BRUNSWICK BREWERY, BRIDGE STREET.

Built by William Singleton in 1830 and occupied by him until 1883 when the firm was renamed the 'Brunswick Brewery Co.'. Singleton had 55 workers in 1861, and it was one of the largest breweries in Leeds. It was taken over by Bentley's Breweries in 1892, at which time it controlled 30 licensed houses, which, together with the brewery, were valued at £20,315.

Hepper Books, 3, 272.

Historical Publishing Co., op. cit., (1888).

101. MELBOURNE STREET MILLS.

Originally known as Low Fold Mill, it was built by Robert Jackson, cloth finisher, in 1832, and extended in the following years. The mill was insured for £800 in 1833 and £3,700 in 1835, made up as follows:

On a warehouse, countinghouse, dressing and hot pressing shops, not heated by steam	£600
On the dressing machinery	£500
On a cloth drying house	£900
On a handle drying house and pressing rooms	£200

Stock and goods in trust	£1200
Stock of teazles in a warehouse	£300

The mill had an 18 h.p. steam engine and 83 employees, almost entirely men. It had been built on 2,870 sq.yds. of land bought from William Westwood in 1831, and water was drawn from the nearby Sheepscar Beck.

Jackson's firm continued in occupation until 1878 when the mills were taken over by Joseph Lowden & Co., cloth finishers, who also had works at Burley Vale (q.v.). They specialised in finishing worsted coatings, and by 1888 had 200 employees here and at Burley Vale Dyeworks.

They left in 1889 and the premises were taken by T.Clarkson, mineral water manufacturer, and also a large number of small firms. These were joined by Watney, Combe, Reid, brewers of London in about 1902, who probably only used the premises as a depot. By 1914 besides Watney & Co. there was a boot and shoe manufacturer and 9 small non-industrial concerns.

W.R.R.D. KY 571 578 (1831).

PP (1834) xx, C2, 248.

Historical Publishing Co., op.cit., (1888).

SUN CS 209/1176896; 219/1207990.

102. MELBOURNE BREWERY, PLUM STREET.

Established in about 1832 by J.Watson, brewer, and later passing to Kirk & Swales who later became Kirk, Matthews & Co., a founder member of the Leeds and Wakefield Breweries Ltd. who still occupied the property in 1914.

103. BYRON STREET MILLS, MILLWRIGHT STREET.

A small cloth dressing mill was built by John Summers on land adjacent to Sheepscar Beck in the Leylands in 1823. This was bought in 1834 by Mark Walker, flax spinner, who had also bought 1,450 sq.yds. of adjoining land from Rhodes & Hebblethwaite, merchants, in 1832.

The mills were built on this land, and by 1839 Walker had 6,000 spindles in operation. The number of spindles rose to 7,000 by 1842, but only a half of them were working. In 1839 a further 140 sq.yds. was bought from Rhodes & Hebblethwaite, and the area of the site now totalled 2,820 sq.yds.

Shortly after this Walker left for East Street Mills (q.v.) but retained possession of the property, advertising room and power to let in 1853, for example. By 1861 the occupants were Thomas Barber, calenderer (10 workers), H.Mellor, linen manufacturer (26), J.F.Stead, linen manufacturers (59), and Watson, Woodcock & Co.(65).

Shortly afterwards Charles Atkinson, linen manufacturer, took possession of the whole of the mills. He had 170 workers in 1867. He was replaced by Wood & Grimshaw, woollen manufacturers, in 1883, and then after 1897 the mills were tenanted by small firms in the clothing and footwear trades, and also four firms in the leather trade.

W.P.R.D. HY 139 124 (1823)
 LI 130 133 (1832)
 LI 137 140 (")
 LU 540 522 (1834)
 NF 20 22 (1839)

104. HOPE FOUNDRY AND FLAX MILL, MABGATE.

The foundry was started by Samuel Lawson in 1812, in partnership with Mark Walker, flax spinner, who left in 1832 to start on his own at Byron Street Mill (q.v.). They ran two businesses side-by-side, the foundry concentrating from the start on the production of flax machinery.

In 1820 a new foundry was built and this was followed in 1824 by a new mill for flax dressing and spinning. Strangely, no mention was made by Brown of any activity here in flax spinning in 1821, and it may be that production was not started seriously until 1824.

By this time a 12 h.p. steam engine had been installed for use in both machine-making and flax spinning, and by 1829 the premises had a 20 h.p. engine and 140 workers. Of these flax spinning consumed 6-7 h.p. and employed 66 workers, mainly female, by 1833. In the same year Lawson invented the screw gill in conjunction with John King Wesley, a very important advance in spinning.

Thereafter the works prospered and expanded, taking over the adjoining Mabgate water mill and extending to the other side of the beck and over on to the east side of Mabgate. By 1861 John Lawson employed 400 workers. The firm continued flax spinning until about 1850, having had 3,000 spindles in operation in 1839. The specialisation in flax machinery continued long after 1850 however.

By 1888 the works covered 12 acres and employed 1,400 workers, the largest factory in N. Leeds. Employment reached 1,600 in 1899, the year in which the company amalgamated with Fairbairns to form Fairbairn, Lawson, Combe, Barbour Ltd.

At that time the foundry covered 25,795 sq.yds., and a further 5,000 sq.yds. of adjacent land had been purchased to cater for future expansion. The property was then valued at £67,195.

Private communication from Fairbairn, Lawson Ltd.

PP (1834) xx, C2, 249.

L.M., 28.11.1829.

H.C.Marshall, List of Spinners and Spindles, (1842).

Historical Publishing Co., op.cit., (1888).

Hepper Books, 7, 279, and 287.

105. MABGATE MILLS.

Samuel Blagborough and Joseph Holroyd bought a close of land and a house in Mabgate from Hannah Crood in 1791, on which they proceeded to erect a cotton mill, powered by the flow of Stoney Rock Beck.

This mill cost £2,000 to develop, the money being raised by a mortgage to J.Lucas in 1791. By 1795 it was valued for insurance purposes at £2,300, with a further £1,000 worth of stock. In 1795 the water wheel was scrapped in favour of a 20 h.p. Boulton & Watt steam engine, and by 1797 they had 2,000 spindles in operation.

Blagborough was bankrupted by his other activities in 1805 and he sold his share to John Holroyd and the firm became J.& J.Holroyd. The company had paid £30 in rates in 1800.

About 1806 the firm moved their business to Manchester and the mill was let out, the occupants by 1818 being J.& S.Shann, cloth dressers, who insured its contents for £1,600 in 1820. They remained until 1828 when they moved to Aire Street Mills (q.v.). They had a 24 h.p. Boulton & Co. engine in 1824, and were for a time the only cloth dressers by powered machinery (i.e. gig-mill).

For the next four years the mill was occupied by James Pearson, woollen manufacturer, previously of Skinner Lane, who insured stock worth £2,000 in 1830.

In 1833 the 3,120 sq.yds. and the mill were bought by John Morfitt, a bleacher of Cookridge, from Holroyd's devisees. He turned it into a

flax mill, with 4,000 spindles at work by 1839. A further purchase of land (844 sq.yds.) in 1841, and one of 645 sq.yds. from A.Lupton in 1844 enabled Morfitt to almost completely rebuild the mills.

Morfitts continued in occupation until c. 1870 when the mills were entered by Wadsworth, Binns & Co., woollen manufacturers. They remained until 1883 at which time the property was valued at £9,387, of which £878 was for a reservoir and land. There were two mills, an engine house and a press shop, and a 60 h.p. beam engine. The reservoir covered 1,437 sq.yds.

The mills were let to many firms thereafter, initially cloth manufacturers and finishers, later clothing and footwear manufacturers. W.Albrecht & Co., wholesale clothiers, were one of the tenants in 1906.

W.R.R.D. ET 668 836 (1805)

LR 181 166 (1834)

NY 11 5 (1841)

OX 61 66 (1844)

LCA DB 27 Holroyd Papers.

SUN CS 7/638885; 13/653405; 128/963774; 173/1091553.

H.C.Marshall, List of Spinners and Spindles, (1842).

Hepper Books, 3, 158.

106. SKINNER LANE WORKS.

On the north side of Skinner Lane, adjacent to the Sheepscar Beck. Originally the site of a tannery belonging to the Skinners Company, the land was known as Fish Pond Close, and in 1791 had only a dwelling house on it. It was bought by Richard Paley and in 1802 had workshops and warehouses, tenanted by Francis Sharpe and Armitage & Co.

By 1828 the property was owned by George Webster and tenanted by Hopton & Peniston, fullers and dyers. There was a small steam engine (not recorded by Lindley in 1824), and the whole buildings, comprising a fulling mill, a dyehouse, and a singeing house and hot pressing shop, were insured for £500.

Hopton & Peniston continued in occupation until about 1846, when they were succeeded by J.Richardson, cloth dresser, and William Crowther, prussiate manufacturer. On the adjoining site of 1,592 sq.yards Mark Richardson, built a foundry in 1847 - the Sedan foundry.

Crowther employed 12 workers in 1867, by which time he also manufactured nitric acid, sulphuric acid, archil, indigo etc., all for

use by the dyeing trade.

In the 1870's the works were occupied by William Walkington, engineer, J.Hilton, boilermaker, and J.Stott, ironfounder. Then followed B.Clark, ironfounder, and B.Foster, manufacturing chemist.

Foster was still there in 1914, by which time he had been joined by Henry Iredale, engineer.

LCA DB 233 Paley bankruptcy papers.

L.I., 19.7.1791.

SUN CS 166/1071444.

W.R.R.D. PX 483 486 (1847)

PX 497 502 (")

107. MOUNT OR BALACLAVA MILLS, CROMWELL STREET.

In 1846 John Gilpin, cloth manufacturer, bought 3 plots of land totalling 5,770 sq.yds. in Burmantofts, lots 9,11, and 12 of the estate of John Heaps. In 1856 a further plot of 1,260 sq.yds. immediately to the north was added.

The mills, described as a flock manufactory, do not appear to have been built before 1858, however, until the land had passed to Joseph Gilpin. This Gilpin built

a Flock Manufactory, Warehouse, Engine House,
Boiler-House and shed

in Cromwell Street, and a warehouse in Fairfax Street to the north of the mills.

Gilpin employed 78 workers in 1861, and the firm stayed in occupation until 1876, although parts were let to James Wadsworth and to Martin Widdop.

In 1876 W.H.Gilpin sold the mills to Grayson & Fawcett, engineers, for £5,500, and they immediately converted them into

all the turning and erecting shops, formerly a mill
or cloth factory; a smith's shop, engine house,
boiler house, office and other buildings.

Grayson & Fawcett did not remain long, however, and by 1887 the factory had passed into the hands of their mortgagees, a part having been let to H.Williamson & Co., woollen manufacturers, a few years before.

The mortgagees sold the mills in 1890 to William Brown & Co., cloth manufacturers, who let a part to William Roslington & Co., cloth

manufacturer. In 1898 Roslington & Co. bought the mills from Brown & Co., for £5,250, whilst the mills plus contents were valued at £10,780 in 1898.

In 1900 they were sold to Haigh & Hudson, woollen manufacturers, for £3,300, who used the main shed for scribbling and weaving, and the rest for rag-grinding and shoddy manufacture. Hudsons remained until after 1914.

LCD nos. 11241 and 11258.

Hepper Books, 6, 167.

108. SHANNON STREET MILL.

Built in 1839-- and originally called the victoria Mill - by J.Settle & Co., flax spinners, who had 1,150 spindles in that year. They were probably hirespinners, unable to ride out the adverse economic conditions of that period, and had disappeared by 1842. Their insurance shows that the finance for building the mill came from a mortgage to John Shepherd of Yeadon. The value of the factory was reckoned at £2,900 made up as follows:

The mill	£1,000
Steam engine	£250
Millwright's work	£150
Machinery	£900
Stock	£600

In 1845 the mill was advertised for sale. It was said to be of four storeys, with four fooms each 73 ft. by 23 ft., and 3 rooms each 30 ft. square; with a two-storey warehouse, a steam engine, and a reservoir.

In 1874 the property was bought by W.Hudson & Co., cloth manufacturers, who had been in occupation for many years. It covered 2,560 sq.yds. and as well as the reservoir there was mention of a borehole.

They continued in occupation until c. 1902 when the mill was entered by J.Green & Co.Ltd., skirt manufacturers, and afterwards the Leeds Skirt Manufacturing Co.

L.M. 25.1.1845.

SUN CS 252/1301390; 252/1301391.

H.C.Marshall, List of Spinners and Spindles, (1842).

109. PROVIDENCE STREET MILL.

Built by William Brooksbank, flax spinner, on land leased from James Dufton, in 1843. The mill was mortgaged by Dufton to Barr and Shackleton in 1845 for £400. It had an engine house.

Brooksbank continued in occupation until 1850, after which Dufton started flax spinning for himself. In 1853 the premises were offered for sale, and then in 1854 to let, with 7 carding engines, a complete set of drawing frames, and 50 roving spindles. Again, in 1857, Dufton tried to sell the mill, but with no success.

Instead it was let to Turner & Co., hat body manufacturers, who remained until 1872, then were succeeded by Tomlinson & Gurney, wool extractors.

In 1881 the mill was leased to E. Riley & Co., flag and bunting manufacturers, who stayed until after 1914. They seem to have bought it from Dufton's trustees in 1897 for £845.

LCD no. 15984.

L.M., 2.9.1854.

110. YORK ROAD LINEN FACTORY.

Originally a Riding School, it was bought by George Robinson from the assignees of G. Walker in 1828, and converted into a linen factory.

By 1851 there were 105 weavers in the employ of Robinson, but many of them were outside the factory. The factory was described in 1850 as merely a shell crowded with hand-loom.

By this time Robinson was concentrating upon weaving woollens, sometimes with cotton warps. Whole families were grouped together in the factory, which by 1861 housed 130 persons.

G. & R. Robinson left in 1865, after which the building became a school-house.

Morning Chronicle, 25.1.1850, Supplement.

111. PROSPECT MILL, UPPER ACCOMMODATION ROAD.

In 1837 John Bolton, machine maker, bought land adjacent to the Leeds and Hunslet Turnpike, on which he immediately built the Railway Foundry. By 1838, however, he was bankrupted, and the mills put up for sale.

The property was bought by W. & E. Wilkinson, formerly of Aire Street Mills (q.v.). It consisted of a 4-storey mill, a foundry, a smith's shop, countinghouse, warehouses, and sheds. Total area was 4377 sq.yds. and there was a 30 h.p. steam engine.

Wilkinsons extended the mills in 1843 when they bought 2,590 sq.yds. to the south of their worsted mill, from T.E.Dennison. By 1851 they employed 342 hands. They remained until 1861 when the premises were entered by H.V.Martin & Co., worsted and cotton warp spinners.

In 1871 the Bradford firm of Lister Brothers, worsted spinners, took the mill and remained until after 1914.

W.R.R.D.	MG	683	585	(1837)
	ND	459	441	(1839)
	NI	112	111	(1839)
	OI	508	461	(1843).

112. BURMANTOFTS BRICKWORKS.

In 1836 Robert wood sold off his estate in Burmantofts, of which fourteen out of thirty-three lots were already occupied as brick ground. 'There is an excellent bed of clay for brickmaking in most of the lots', stated the sale particulars.

One of the lots was bought by J.Sykes, brickmaker and builder, who was recorded by the Tithe Commissioners as possessing almost 3 acres in 1847. In the same area there were other brick grounds owned by the Garlands, who had 6 acres, W.Hodgson, who had 1 acre and 30 poles, and Cadmans, who had 4½ acres adjacent to Stoney Rock Beck.

In 1847 J.Boyle, farmer and brickdealer, bought lot 21 of Wood's estate, having already bought Hodgson's land a little earlier. In 1852 he added a further 4,040 sq.yds. bought from Skelton and Naylor, maltsters, by which time Boyle had built a brick shed on it. Part of this, which had the malkiln on, was sold in 1866 to Joseph Mitchell, brewer (see Nippett Lane Brewery). In that same year Boyle bought Cadman's estate.

In 1867 the Sykes brickground was bought for £900. The Garland estate was sold in 1876 to James Ormerod. It then contained
 a chemical works ... and all vitriol chambers,
 aquafortis stills, retorts for rectifying Vitriol,
 Ammonia Stills, Cisterns, Tubs, steam pipes, boilers, and
 apparatus for making Iron liquor.

This had been built by Garlands some time in the 1850's.

Ormerod's mortgagees sold this land to John Boyle in 1886 for £1,275.

In 1872 Boyle added land to east of their property, bought from William Holt, and also 4,567 sq.yds. at Black Bank bought from J.& C. Smith. Then in 1893 a plot of land on the west side of Saville Green and to the east of the brickworks was bought from the trustees of Mrs. Wood.

In 1897 the brickworks covered 69,622 sq.yds. The rest of the land bought by Boyles had been used for housing development. They built Hall Lane, part of St. Stephen's Road, and the 'Ainsty' streets. The estate was valued at £27,989.

The brickworks were further augmented in 1900 by the purchase of the brickworks to the east of Bickerdike Road, the property of T.& J. Moody. This had

an engine and boiler, clay pans, a mortar pan,
 a brick machine, presses, and other machinery.

This had been established by Moodys in 1873 on land bought from Thomas Haigh, a butcher. It totalled 1,601 sq.yds, and Boyles paid £4,000 for it.

The Corporation bought part of the Boyle estate in 1901, but leased it to Boyles at £52 p.a. and Burmantofts Brickworks was not closed until the 1930's. At its height, around the turn of the century, it had about 60 workers, compared with 13 in 1861.

LCD no. 8634.

Private communication from Colonel H.Boyle.

113. NIPPET LANE BREWERY.

Sometimes called Burmantofts Brewery. Originally a malthouse owned by Skelton & Naylor, and sold by them in 1852 to John Boyle. The land was leased then to Joseph Mitchell, who added a brewery which he sold to J.& C.Boyle in 1890 for £1,400 when his lease ran out.

In 1891 Boyle's leased the brewery and 1,520 sq.yds. of land to Findlay's Brewery Ltd., who bought it plus 1,799 sq.yds. of land adjoining for £4104 in 1897. They remained until after 1914. The brewery was valued at £16,141 in 1913.

LCD no. 8634.

Hepper Books, 13, 90.

114. BURMANTOFTS WORKS AND ROCK COLLIERY, TORRE ROAD.

The Rock Colliery was established by Lassey and Wilcox in 1858 and from the start besides coal the company also produced firebricks and sanitary tubes, the clay being mined also.

This business continued successfully, and then in 1882 a large new works was built, covering 15 acres, 100 with the clay and coal mines. By 1883 it employed between 350 and 400 workers and had started the manufacture of pottery. This latter venture was short-lived, but the manufacture of terra-cotta, firebricks, pipes, and sanitary ware provided plenty of business for the Burmantofts Co., as it came to be called.

Bricks were sent all over the country and all over the world, and amongst other erections made of Burmantofts Bricks were the railway arches near Leeds City Station.

The manufacture of terra-cotta had been started at the works in 1878 by Mr. Holroyd, the managing partner. The clay was mined at about 250 feet, and lay beneath the smelting coal of the Better Bed. It was raised to the surface, left to weather, then sorted into different types. Water was then added, the bricks moulded, and then fired in the kilns.

The land from which the clay was obtained was leased from the Reverend Torre, and was not finally sold until 1904, by which time the Leeds Fireclay Co. had bought out the Burmantofts Co. for £101,000.

LCD no. 15982.

Leeds Express, 18.8.1883.

Annual Report of the Yorkshire Philosophical and Literary Society for 1915, 'Burmantofts Works'.

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115. LONGCLOSE ENGINEERING WORKS AND DOLLY LANE BRICKWORKS.

The site originally formed a part of the brick ground of W.Beckett and J.Garland, both builders, in the 1840's.

In 1868 Pollock & Pollock, engineers, bought 18,000 sq.yds. in Dolly Lane for £2,050. On the portion abutting upon Dolly Lane they built the Longclose Engineering Works in 1869-70, which specialised in the manufacture of brickmaking machinery,

The remainder of the estate was leased to Ingham & Cliff, brickmakers, and then in 1888 it was sold to Palmer & Oakes, brickmakers, for £2,777. The Pollocks needed the money. They raised three loans by mortgage in 1888 alone, but were unable to prevent from going out of business in 1891.

The engineering works was sold to West's Syndicate Ltd., engineers, but was later occupied by A.Holderness, boot manufacturer.

The brickworks remained the property of Palmer & Oakes, who changed the title of their company to the 'Leeds Patent Brick Co.'. In 1899 their property, excluding buildings and machinery, covered 39,940 sq.yds. and was valued at £5,994.

LCD no. 2571.

Hepper Books, 7, 190.

116. COMPTON ROAD BOOT FACTORY (STANLEY SHOE WORKS).

Built in 1898 by C.Davison, boot manufacturer, previously of Lovell Street, where the firm was founded in 1888.

117. CROWN PRESERVE WORKS, COMPTON ROAD.

Built 1898 by John Hudson, jam manufacturer, of Harehills. The factory was of one storey, covering 1,469 sq.yds. at the junction of Compton Road and Hudson Road. In 1906 it was valued at £1,750.

Hepper Books, 10, 270.

118. HUDSON ROAD MILL.

Built in 1898 by Albrecht & Albrecht, wholesale clothiers, previously of Oxford Row and occupied by them until 1920 when it was bought by Burton's. Single-storey.

119. MORTON & JOYNT'S FACTORY, HUDSON ROAD.

To the west of Hudson Road Mill. Built in 1904 for Morton & Joynt, clothing manufacturers, previously of Lady Lane. Single-storey.

120. BOOT FACTORY, ASHLEY ROAD.

In a triangle between Ashley Road and Ashfield Road. Built in 1897 by Emmott & Wood, who later became the Ashley Road Boot Co.

121. CROWN WORKS, CONWAY ROAD.

Built in 1897 by Midgley & Sons, boot manufacturers. Single-storied, it covered 4,282 sq.yds. In 1902 the business was valued for stocktaking purposes at £10,278. Soon after the property passed to the Airedale Clothing Company, formerly of Airedale Mills.

122. WALLPAPER WORKS, BERKELEY ROAD.

Built in 1904 for the Wallpaper Co. Ltd., formerly Trumble & Co. of York Street. Single-storied.

123. LOW CLOSE MILLS, TELEPHONE STREET

Edward Halliley, cloth merchant, bought a parcel of ground at Sheepscar, adjoining the beck, in 1825. On this he erected

a scribbling, carding, and fulling mill, press shop, dyehouse, and other buildings, with a steam engine, engine house, and boiler house.

These were occupied by Halliley, Stanley & Co., woollen manufacturers.

In 1827 a dressing mill was insured, with contents, for £8,000, and in 1828 the mills were insured for £12,000.

Halliley & Co. continued in occupation until c.1858 when the mills were taken over by Hardwick Bros., dyers and finishers, who had 120 workers in 1867.

Later the mills were let to numerous small firms, principally tailors. In 1913 there were 8 tailors and 2 wholesale clothiers in the mills.

W.R.R.D. IC 416 395 (1825)

KC 70 65 (1828)

SUN CS 166/1068920; 170/1081634; 203/1162580; 208/1177313.

124. ROUNDHAY VALE DYEWORCS, MANOR STREET.

In 1838 the Earl of Cowper sold a close of land covering 4,206 sq.yds. adjoining Gipton Beck, to J.& F.Rinder, dyers. This had a dyehouse on it soon after, and was occupied by Rinders until at least 1857.

By 1872 it was occupied as a tallow works by Joseph Watson & Sons (see Whitehall Soap Works).

In 1876 they sold 4,202 sq.yds. and the buildings thereon to David Pickles, dyer, who occupied them until they became a sauce and pickle factory, owned by S.T.Holroyd, but tenanted by Thomas Kidney.

W.R.R.D. MT 469 474 (1838).

755 728 872 (1876).

LCD no. 3505.

125. SHEEPSCAR DYEWORCS, SHEEPSCAR BRIDGE.

Started in 1763 by Joseph Holroyd on land bought in 1763 by Stephen Todd, merchant, dyeing entirely for local and London merchants. The main works were built in 1780.

By 1824 they were the largest establishment of dyers in Leeds, with a 20 h.p. Pullan and Son engine. They had had to pay £45-15s rates in 1805, whilst the dyeworks and steam engine had been insured in 1796 for £3,650.

In 1867 the firm employed about 130 hands, and specialised in dyeing high-quality Bradford and Halifax stuff goods - they handled 3,000 pieces

a week. Power was obtained from a steam engine of 20-30 h.p., one of the first to be installed in Yorkshire, and they consumed 20 tons of coal per day.

The water was all obtained from Gipton Beck and was completely free of pollution. They consumed 200,000 gallons per day, and this was stored in a reservoir on their land behind the works. This source of water was reckoned to save the company between £1000 and £1500 a year, though it was not as soft as water from Sheepscar Beck.

Holroyds were still in occupation in 1914.

L.H. 25.12.1764.

SUN CS /656783.

LCA LORB Leeds Rate Books.

LCA DB 27 Holroyd Papers.

Committee on River Pollution, (1867), vol. II, 245-8.

126. SHEEPSCAR FOUNDRY, MEANWOOD ROAD.

Developed in four parts principally, The first was originally a tobacco mill, built by Joseph Simpson, formerly of Lady Lane, in 1833, on land bought from William Smith, 5708 sq.yds. in extent.

In 1856 this was sold, with its steam engine, to William Hornby, also a tobacco manufacturer. In 1861 he employed 38 workers at the mill. W.Hornby & Co. occupied the mill until 1890 when it was sold to Robert Middleton.

The second part formed the original Sheepscar Foundry, built by Thomas Hezmalhalch of Millwright Street in c.1840, on land leased from William Watson. This land was bought in 1856 by Hezmalhalch.

The third part consisted of land bought off William Watson by Robert Asquith, engineer, in 1852. He built an engineering works on it in the early 1870's, but it did not become a part of the Sheepscar foundry until 1919. It was on the other side of the beck, next to Watson's chemical works.

The fourth part was the plots of land bought off Watsons, firstly by Hezmalhalch, in 1867, then by Robert Middleton in 1877.

Middleton had bought the foundry from Hezmalhalch & Sons in 1869 for £5,550, and was already in the process of making 'considerable alterations to the said hereditaments', which had 'much increased the value thereof'.

Hezmalhalch had employed only 18 workers in 1861, and Middleton had

only 15-20 when he started, but by specialising in leather and dyeing machinery for the factories of the neighbourhood the size of the works was increased until in 1892 there were about 150 employees.

Middleton was still in occupation in 1914.

LCD nos. 18064 and 18530.

London Printing and Engraving Co., op.cit., (1892).

127. SHEEPSCAR MILL, MEANWOOD ROAD.

An early water-powered fulling mill attached to Sheepscar Mill, built before 1775. In the 1790's it was occupied by Cadman, Glover, and Darnton, snuff and woollen manufacturers, who insured the contents for £600 in 1795. The owner was J.Ord, and rates of £25 were paid in 1790, £35 in 1800, and £19 in 1805. Part of the mill was tenanted by John Nicholson, woollen manufacturer, in 1795.

It is not clear who occupied the mill thereafter, but Cadman and Darnton were tobacco manufacturers in Lady Lane in 1809.

In 1830 the Sheepscar Hall estate, which included the mill, was auctioned, and it was bought by John Kirkby, merchant, for £1,250. In 1833 it was conveyed to Kirkby's daughter, the wife of John Bateson, to whom the premises were formally conveyed in 1834. They then consisted of a mill, dryhouse, press shop, engine house, and stable.

In 1836 the mill was let to John Snell, cloth dresser, who remained until 1853 when it was advertised to let, complete with machinery.

From 1853 to 1855 the occupier was W.Conyers, currier, and he was followed by J.Ripley, cloth finisher, who left in 1868. He had 50 workers in 1867.

From 1868 to 1871 the mill remained empty, but then it was bought by Stead, Simpson & Co. who converted it into a currying works, from Bateson's trustees. They had already bought a tobacco mill next door which had been built in 1832.

By 1883 Stead & Simpson's works in Meanwood Road covered two acres and gave employment to 400 hands. In the tanning department 300-400 hides were dealt with each week. The currying department was in the old Sheepscar Mill, and the bootmaking processes were housed in a new factory fronting Meanwood Road, which had 60 steam-driven bootmaking machines. Power came from a 30 h.p. engine.

Stead & Simpson remained until the turn of the century when they

were succeeded by B. & D. Wright, carriers, who also had an engineering shop on the other side of Meanwood Road.

LCD no. 270.

SUN CS 12/648178.

LCA LORB Leeds Rate Books.

Leeds Express 2.6.1883.

128. WATSON'S CHEMICAL WORKS, SHEEPSCAR STREET.

William Watson jr., manufacturing chemist of Hope Yard (see Watson's estate) bought a large area of land in the Sheepscar mill area in the late 1830's and early 1840's. In 1845 he used a part of this - 3,320 sq.yds. - to build a chemical manufactory, specialising in the production of indigo, ammonia, soap, copperas, and china blue, all for the local dyeing and cloth trades.

The firm later became Watson, Walker & Quickfall, but remained until after 1914.

LCD no. 270.

129. ATLAS WORKS, BARRACK STREET.

Built in 1869-70 on 1,808 sq.yds. of land bought in 1869 by James Rathbone and Thomas Crabtree, hackle and gill manufacturers.

They sold it in 1888 to James Rhodes of Tenter Lane, also a hackle and gill manufacturer, who occupied it until 1898. In 1888 a further 132 sq.yds. had been added. Rhodes paid £1,043.

Having been valued at £3,000 in 1895 the property was sold to Provincial Laundries Ltd. in 1898 by Harding, Richardson, Rhodes & Co.Ltd., now of Globe Road, Hunslet, for £4,400.

They turned it into a commercial laundry.

LCD nos. 12985 and 15023.

130. OATLANDS MILL, MEANWOOD ROAD.

Originally the finishing shops of Josiah Oates, merchant. In 1810 a mill was added, and the finishing of cloth by machinery started. Oates was probably one of the first to construct and work a gig-mill in Leeds.

By 1813 the premises consisted of

a warehouse, dressing shops, press shop and
two houses, in the tenure of Oates, Wood & Simpson.

They had been partly rebuilt after Luddites had set fire to the mill in 1812, but cloth finishing by machinery continued, and Oates was able to refuse an offer of £1000 p.a. rent by William Hirst. A 10 h.p. Fenton & Co. engine was installed.

By 1834 the mill was tenanted by Taylor & Duffield, cloth finishers, who had added a 12 h.p. engine, and employed 170 workers, mostly male.

In 1839 they bought from Oates

a mill called Oatlands Mill, an engine house,
a boiler house, oil warehouse, teazle setting shop,
and a countinghouse; a building three stories used
as a press curling and drawing shop, and a room used
for machines called Lewis machines and other purposes,
a drying house, a stable, a gas house, a cloth warehouse,
another hand-raising shop, counting house, cottage,
and time shop.

All set on 5120 sq.yds. of land.

T. Wright & Co., leather dressers, took over. Part of the buildings was let to George Russell, footwear manufacturer, who occupied a 3-storey building, 150 ft. by 75 ft., and had 120 workers.

By 1893 the Kingfisher Lubrication Co. had also moved in, and there were other tenants also. In 1913 the mills were occupied by:

The Kingfisher Co.

T. & D. Wright

C.H. Johnson, manufacturing chemist.

W.B. Crump, art. cit., (1931).

W. Hirst, op. cit., (1844).

W.R.R.D. FX 156 167 (1813)

NH 576 501 (1839)

PP (1834) xx, C2, 253.

Historical publishing Company, op. cit., (1888).

131. SHEEPSCAR LEATHER WORKS, SHEEPSCAR STREET.

In 1839 Benjamin Stocks, fellmonger, bought 5,531 sq.yds.of land at Sheepscar from A.Rhodes, on which he proceeded to erect a skinhouse which by 1857 consisted of

a warehouse, fellmonger's shop, dyehouse, skinhouse, drying sheds, bark mill, bark house, wash house, offices, counting house, cottages, stables, pits, tanks, wells, a reservoir, a steam engine, hydraulic presses and other machinery.

In 1857 this was sold to Wilson, Walker & Co., leather manufacturers who bought a further 3,748 sq. yds. of land from Rhodes' trustees and greatly extended the works.

By 1858 the works were capable of handling 20,000 skins a week, producing 200-300 tons of glue. There were 360-400 hands, working in 32,000 sq. ft. of floor space, and being paid a total of £17-20,000 p.a. The main building was seven storeys, the rest mainly of three storeys. The site covered 2½ acres.

In 1867 the firm was processing 8-9,000 skins a week. This provided labour for 360 workers, and required the use of 100-200,000 gallons of water per day and the power of a 50 h.p. engine. The engine required 200 tons of coal a month.

The water was obtained partly from the beck, which was particularly suitable because of its softness, and the rest from a borehole 300 ft. deep. When supply was short it was supplemented by spring water impounded in a reservoir, and occasionally by town water.

The firm not only tanned the leather - they had 130 tan pits - but also dyed and finished it. They dealt mainly with sheep skins, but also calf and goat skins.

In 1893 the firm went public with a capital of £400,000, but they foundered a few years later and the works were put up for sale. In 1901 the works had been valued at £19,775. They now had 173 tan pits and covered 16,021 sq.yds.

The business was bought by C.F.Stead for £79,000, in whose hands it still (1972) remains.

W.R.R.D. NL 411 352 (1839)

NZ 284 215 (1841)

TW 61 67 (1857)

TW 77 82 (")

652 498 597 (1871)

657 737 784 (")

661 674 769 (1872)
 705 596 696 (1874)
 725 173 199 (")
 798 156 178 (1878).

T.Fenteman & Cow, op.cit., (1858).

Committee on River Pollution, (1867), vol. II, 235-9.

W.G.Rimmer, art.cit., (1960).

132. BUSLINGTHORPE TANNERY.

The tannery was built by W.Jackson, who commenced as a journeyman tanner in Otley, arriving in Leeds in the 1840's. He started business at Buslingthorpe in 1857, buying tanyards and a leather works from William Bulmer.

These tan yards were erected in 1840 by Bulmer on land bought from William Eastburn & Co., which had formerly been used as a dyeworks. The premises were completely rebuilt by Jackson who passed the business on to his son William Lawes Jackson in 1858, by which time there were 80 employees, and the tannery dealt with 4,000 hides and kips a week.

By 1867 there were 90 workers, by 1888 over 200, by which time it was probably the largest tannery in the country, covering nine acres. This land had been bought mainly in the 1870's, in the following lots:

1871: 12,480 sq.yds. from Richardson's trustees.
 19,480 sq.yds. from the trustees of Jenkinson's Hospital.
 14,520 sq.yds. from " " " the Leeds Bank
 1872: 13,850 sq.yds. from the Lords of Leeds Manor.
 1874: exchange with Stocks (of Hill Top Tannery), acquiring
 3,350 sq.yds.
 1878: 1,200 sq.yds. from - Hartley.

The premises remained the property of W.L.Jackson & Co. until 1913, when they were valued at £16,323 and sold in two lots, to P.Laycock & Co., and to G.Bray & Co.

W.G.Rimmer, art.cit., (1960).

Historical Publishing Co., op.cit., (1888).

Hepper Books, 13, 66-8.

W.R.R.D.	NQ	65	55	(1840)	661	674	769	(1872)
		652	498	597	705	596	696	(1874)
		657	737	784	725	173	199	(")
		658	611	738				(1871)

133. HILL TOP TANNERY, BUSLINGTHORPE LANE.

The site was originally occupied by a dyeworks, occupied by R. & A. Pullan at the beginning of the 19th century, but probably even earlier in origin. There is reference to the dyehouses at Lorry Bank, Buslingthorpe, as early as 1797.

About 1820 Pullans were succeeded by William Norfolk & Co., who became Norfolk & Barker and remained until 1844 when they were succeeded by Elizabeth White, dyer and finisher.

After White & Sons the premises were occupied by Whittaker & Crow, dyers, and then Edward Bale, leather dresser. In 1857 B. & J. Stocks sold their skinhouse at Buslingthorpe to Wilson, Walker & Co. (see Buslingthorpe tannery), and moved to Hill Top. In 1864 they bought the works which had formerly consisted of

warehouses, dyehouses, a calendar house, a singeing house, sheds, an engine house, copper vats, pans, rollers, cylinders etc.

Further land was bought in 1868 - 13 cottages bought from Richard Simpson - and in 1874 - 3,147 sq.yds. from Samuel Croft and 3,965 sq. yds. from W.L.Jackson, formerly the site of Eastburn & Co.'s dyeing and stoving works in the late 18th century. Eastburn & Myers, who had a 7 h.p. steam engine in 1824, sold their property to Jackson in about 1860. In return Stocks conveyed 3,350 sq.yds. of land to Jackson for the extension of Buslingthorpe Tannery.

Stocks & Co. remained in occupation until after 1914. They had 108 workers in 1867.

W.R.R.D.	YM	43	45	(1864).
	ZO	308	357	(1867).
		612	484	603 (1868).
		704	573	669 (1874).
		874	249	296 (1881).

134. SPRINGWELL LEATHER WORKS, BUSLINGTHORPE.

Originally the site of Sharpe's dyeworks, which were rated at £3 in 1795 and £12-10s. in 1805. Sharpe & Nicholson remained in occupation until c.1820 when they were succeeded by J. & J. Norfolk, who also had Spring Hill Works for a time (see Springwell Leather Works).

In 1856 J.J.Fritch, leather dresser, bought 3,945 sq.yds. at Lorry

Bank from the Lords of Leeds Manor, with the
dyehouse, press shop, engine house, and dryhouse
and tenterground adjoining.

By 1858 he had rebuilt the property as a
skinworks, Spanish leather works, dyehouses,
engine house, warehouses, a countinghouse,
boiler house, and seven cottages.

These continued in his occupation until 1912, having 88 employees in
1861 and 120 in 1876. Fritch died in 1900. His executors sold the works,
which had two principal buildings, one of six storeys, the other of four,
to Thomas Chadwick & Sons, wool and hair merchants.

W.R.R.D. TM 241 291 (1856)
TN 517 575 (")
TX 643 765 (1858)
US 188 207 (1860)
XC 219 260 (1862)
37 52 18 (1912)

Historical Publishing Co., op.cit., (1888)
G.Wright, History of Leeds, (1797).

135- SCOTT HALL MILLS, BUSLINGTHORPE.

The corn and fulling mills for the manor of Potternewton, built on
a goit from Meanwood Beck some time in the 18th century. In the 1790's
attempts were made to harness the power of its water wheel for cotton
spinning and other activities.

In 1796 was insured by William Burrows, corn merchant and woollen
manufacturer:

new water corn and scribbling mills	£600
millwright's work etc.	£300
clockmaker's work etc.	£600
stock and goods	£700
millstoned and dressing mills	£50
sacks and other maveable utensils	£50
TOTAL	£2,300.

This was raised to £3,000 in 1798, and then in 1802 a steam engine was
added and insured for £300, plus £100 for an engine house. The mills

were insured for £5,000 in 1809, and then £8,650 in 1815 at which date they consisted of a steam- and water-powered corn mill, oil and scribbling mill, and warehouse, all under one roof. With a water wheel, steam engine, carding and burling engines, five mill stones, and other equipment.

After Burrows the mills were occupied by T.Wood & Sons, and then J.& G.Smith, seed crushers; then J.Robinson, hair dealer, W.Oldroyd, glue manufacturer, and possibly W.Foster, prussiate manufacturer, who employed 16 workers in 1867.

After about 1885 it was not used for manufacturing purposes.

SUN CS 13/651631; 24/179828; 44/728169; 87/838585; 114/907712.

136. CARR MILLS, MEANWOOD ROAD.

Abraham Rhodes, of the dyeing and cloth merchant family, built Carr Mills on land adjacent to Meanwood Beck at Woodhouse in 1810, and by 1815 it was one of the largest factories in Leeds, having been insured in 1813 for £21,500.

This may have been built on the site of either Dunderdale's woollen mill or Blakeborough & Co.'s cotton factory which were observed at Woodhouse and Buslingthorpe in 1797.

In 1818 Rhodes bought a further three closes of land from Pease and others, and in 1825 he bought land and a dyehouse occupied by Robert Eastburn, dyer and stover. This was on the other side of Buslingthorpe Lane. He also bought another close of land near Woodhouse Ridge from Henry Teale.

By this time the mill was using the power from a 45 h.p. steam engine by Sturges & Co., and was one of the largest worsted mills in Leeds. In 1832 it employed 235 workers, two-thirds of them male, which indicates that it was not just a spinning mill, but had weaving also.

About 1830 the mills had been leased to T.Clapham & Sons, worsted manufacturers, who remained in occupation until 1845, when they were offered for sale. The principal buildings were a mill for worsted spinning and power-loom weaving, and a stone-built building used for cloth manufacture, There was a 40 h.p. engine.

From 1846 until c. 1855 the mills were occupied by Foster, Fletcher & Co., cloth finishers, and thereafter they were tenanted by many firms. In 1861 these were

Wright & Bailes, finishers
T.Wright, dyer

Wither & Wood, millers

Jackson & Co., cloth manufacturers.

In 1867 the occupants, with numbers of workpeople were:

Wright & Bailes (50)

B.Wood (3)

J.Clarkeson, dyer, (3)

G.Dixon, dyer, (10).

Another attempt was made to sell the mills in 1867, when they were described as

a woollen factory, a cloth mill, a dressing mill,
and two dyehouses.

In 1872 there were 3 woollen manufacturers, 1 cloth finisher, and 1 dyer in occupation, and the mills remained predominantly in use by textile firms until after the turn of the century when there were also a chemicals manufacturer and a fellmonger in.

R.G.Wilson, op.cit., (1971), 247.

SUN CS 184/1122031.

W.R.R.D.	FO	225	295	(1811)
	FO	226	296	(")
	FR	672	727	(1812)
	GU	178	192	(1818)
	IG	411	400	(1825).

137. RIDGE MILLS, MEANWOOD ROAD.

James Mathers & Sons, woollen manufacturers, bought land in Meanwood Road in 1884 and built the main shed by the end of that year. In 1887 an additional tenterhouse was built, in 1891 a new shed, in 1892 a new boilerhouse, in 1910 another warehouse, and in 1915 a new rag-pulling mill.

The site covered $2\frac{1}{2}$ acres and the buildings were largely single-storey, with 5-6,000 yards of floor space. They employed 180 hands in 1888, and had 2 rag machines, 6 sets of machines, 3,600 mule spindles, and also dyeing, milling, and finishing machinery. Power was supplied by a 250 h.p. horizontal steam engine.

Historical Publishing Co., op.cit., (1888).

Private communication from J.Mathers & Sons Ltd.

138. VALLEY LEATHER WORKS, MEANWOOD ROAD.

Built by Horsfield & Sons in c.1875, between Meanwood Road and Meanwood Beck. Occupied by them until after 1914.

139. VALLEY MILLS, MEANWOOD ROAD.

Built by W.E.Bale, leather dresser, on part of 9,880 sq.yds. of land bought from W.Coo in 1874. By 1878 the tannery covered 8,045 sq.yds. and had 20 tan pits.

In 1896 the works were sold to Robinson & Mackay, dyers and finishers, who remained in occupation until after 1914. They were the victims of a disastrous fire in 1903 after which the property was valued at only £2,500.

W.R.R.D. 706 214 250 (1874)

808 311 368 (1878).

Hepper books, 9, 13.

140. CLIFF TANNERY, MEANWOOD ROAD.

Built in 1866 by Edward Kitchen, currier, leather factor, and now tanner. He was previously at Meanwood. The land was bought in four lots from the trustees of Abraham Rhodes, totalling 20,350 sq.yds. In 1874 a further 4,733 sq.yds. was bought from William Coo.

Not all of this property was used for the tannery, however. Kitchen built 66 houses, and also sold land to the Corporation in 1892.

Historical Publishing Co., op.cit., (1888).

W.G.Rimmer, art.cit., (1960).

141. VALLEY DYE WORKS, MEANWOOD ROAD. (CLIFF CHEMICAL WORKS).

Built in 1873 by Henry Foster, oil and tallow refiner previously of Lorry Bank, on 2,180 sq.yds. of land bought from William Coo. In 1890 this was sold to Edward Wilson, dyer, previously at Fearn's Island who enlarged and reconstructed the premises, adding a new one-storey

block. He specialised in dyeing jute, linen, and cotton yarns.

By 1913 the premises were occupied by a building firm.

W.R.R.D. 698 323 370 (1873)

17 198 103 (1890).

London Printing and Engraving Co., op.cit., (1893).

142. GROVE MILL, MEANWOOD ROAD, HEADINGLEY.

Originally a water-powered country mill, built probably about the middle of the 18th century. By the 1790's it had passed into the hands of the Walker family. In 1798 was offered for sale:

a messuage at Woodhouse Carr, and the mill adjoining
... and the machinery and utensils for scribbling and carding
of wool ... the whole of which premises now in the occupation
of Mr. Samuel Walker, the owner.

The same premises were insured in 1819 for £1,500, and for £3,000 in 1821. Besides the mill building and scribbling and carding machinery there was a 16 h.p. engine by Barnett of Chatham Street. In addition the mill house contained a hand spinning room.

Walker was a domestic clothier who started to assemble his workforce in one group of buildings in the 1790's. The factory later turned to yarn spinning but remained in the family, although a dyehouse was let out by 1864 to Lee & Sharpe. They had 20 workers in 1867.

By 1883 it spun mainly carpet yarn for Kidderminster Mills. When busy 12,000 lbs. of yarn were spun each week. There were 60 workers, 20 more than in 1867, and a 10 h.p. engine had been added to the old 25 h.p. one. Water was obtained from the beck, from boreholes, and also from a spring, and kept in three reservoirs.

About 1900 the works were sold to Wilson Sharp, who leased the 3-storey mill to J.Davenport, printer for £215 p.a. The whole property was then valued at £6,052.

L.I., 5.3.1798.

SUN CS 123/950413; 133/982662; 144/1671265; 193/1135530,

Leeds Express, 14.9.1883.

Hepper Books, 11, 229.

143. MEANWOOD TANNERY.

Built in 1858 by Samuel Smith, tanner, of Meanwood, on a five-acre site adjacent to Meanwood Beck.

By 1861 it employed 52 men, by 1867 sixty. In 1888 it was said to form 'the chief support of the inhabitants of Meanwood', and had 300 tanpits, in a square yard surrounded by 2-storey buildings.

It has remained a tannery ever since.

Historical Publishing Co., op.cit., (1888).

144. WOODHOUSE CHEMICAL WORKS, WOODHOUSE STREET.

Built in about 1842 by G. Johnson Crowther & Co., manufacturing chemists, on part of a nine-acre close of land they owned in Woodhouse Carr. It was originally a vitriol works, but was greatly extended as time passed.

By 1867 the firm manufactured nitric acid, sulphuric acid, nitrate of iron, archil and indigo, mainly for the dyeing trades. The works were demolished about the turn of the century.

145. SHAYFIELD DYEWORCS, WOODHOUSE STREET.

First established in about 1843 by Samuel Kirk, dyer and stover, on land leased from - Tolson, brickmaker, who had built Tolson Street and other houses in the area. The property was bought from Tolson by Kirk in 1851.

Kirk made further purchases of land - a plot from Bischoff in 1857; 6984 sq.yds. from John Wood in 1857; and land and houses from Christopher Rider in 1864 for £500.

The dyeworks was progressively extended over these, and by 1888 it covered four acres, employing 250 workers. In 1883 it was valued at £12,000.

In 1899 the firm joined 21 other firms (including Reffitt's of Kirkstall Road) to form the Bradford Dyers Association Ltd., in whose hands the works remained in 1914.

LCD nos. 9803 and 9807.

Historical Publishing Co., op.cit., (1888).

W.H.B.Court, British Economic History, 1870-1914, (1965), 252-9.

146. PERSEVERANCE MILL, WOODHOUSE CARR.

Built in 1869 by George Whitley, linen manufacturer, previously of Whitehall Works, on 11,597 sq.yds. of land bought from G.I.Crowther & Co.

In 1878 this was sold to Peter Laycock, woollen manufacturer, who mortgaged it for £5,000 in 1879. He had been in occupation since 1876. By 1888 he employed 160 workers, and had 2,184 spindles and 79 looms.

In 1890 he added a single-storey shed which was used for manufacturing clothing.

The firm remained until after 1914.

W.R.R.D.	ZP	517	617	(1867)
		639	226	248 (1870)
		802	663	788 (1878)
		827	68	70 (1839).

Historical Publishing Co., op.cit., (1888).

147. BAGBY MILLS, WOODHOUSE CARR.

Originally the finishing shops and residence of Maximilian Fischer, cloth merchant, sold in 1815 to James Brown, cloth merchant, when they were described as:

extensive and substantially built warehouses, press-shops, row shops, cottage, stable, a dry-house about 56 yards long with tenters complete

all situated on 17,320 sq.yds. of land at Bagby Fields. Brown paid £3,760.

In 1825 Brown added a gig-mill and a steam engine, and a dryhouse and press-shop in 1826, and began finishing by machinery. The steam engine was of 30 h.p. By 1833 they had about 200 workers, mainly from the surrounding area.

In 1816 Brown had bought two closes of land to the north of the workshops - "Stoney Royds and Nether Close - which together totalled over four acres from S.Musgrave for £1,050.

Brown retired from business in 1857 and the mills were leased to Asquith Brothers, originally overlookers for Brown. They were cloth finishers, remaining in occupation until 1894.

In 1895 the mills were sold to George Bray & Co., gas engineers, previously of Blackman Lane. The property consisted of 9,883 sq.yds. plus the mills, for which Bray paid £3,706.

They considerably altered the premises in 1902-3 and 1904-5, and

have remained in occupation ever since.

L.M., 7.10.1809.

Private communication from G. Bray & Co. Ltd.

PP (1834)xx, C2, 40.

148. CARLTON CROSS MILLS, EXETER PLACE, WOODHOUSE LANE.

An early centre for cloth finishing, attractive because of its natural spring of water. In 1803 William Brigg bought land at Carlton Hill, with warehouses, workshops, stables etc., previously occupied by Jones, Howard and Bustard, then Appleby & Sawyer, then Page and Cordingley. This property was bought from Benjamin Gott.

A mill was built in 1806, but dressing was not done by machinery until 1819 when the gigs were erected and a 12 h.p. engine by Pullan & Co. installed. By 1833 Brigg & Sons employed 55 hands, mainly men, and they continued in occupation until 1896.

In 1831 the contents of the mill were insured for £5,000, the mill for £500, and a hot pressing shop for £500. It was situated on an estate covering 17,760 sq.yds., owned by William Briggs.

In 1896 the mills were conveyed by William Brigg's trustees to Sarah Brigg for £11,370. Briggs & Co. continued in occupation until 1905, after which the mills were tenanted to various firms - two wholesale clothiers, one cloth finisher, and a flock and bedding manufacturer.

LCD no. 16276.

W.R.R.D. EN 582 777 (1803)

KQ 701 558 (1830)

KU 117 120 (").

PP (1834) xx, C1, 235.

SUN CS 180/1110558; 191/1134145.

149. CARLTON MILLS, CARLTON HILL.

Originally the site of a press-shop, roving and packing shop, and cropping chamber,

in a most airy situation, and where water had never been known to be wanted, even in the greatest drought.

These workshops were occupied originally by Shann, Driver & Co., cloth dressers, and after about 1827 by James Holroyd and Benjamin Wilson - J. Holroyd & Co.

Holroyd built a machinery-finishing mill on the site in 1828, then purchased the property in 1830, by which time it consisted of:

a warehouse, dryhouse, engine house, dressing and pressing shops, a steam engine of 16 h.p.

In 1835 a further 946 sq.yds., immediately to the north, was bought from Henry Wormald. Holroyd had 66 workers in 1833, 86 in 1861.

James Holroyd conveyed the mill to Thomas Holroyd for £10,000. In 1899 'James Holroyd & Son' became 'Holroyds Ltd.', then in 1901 they joined the Leeds & District Worsted Dyers & Finishers Asscn., the mills being formally conveyed for £27,823. They consisted of:

five mills of 3 and 4 storeys
 five workrooms of 2 storeys
 a compound steam engine
 a horizontal condensing engine.

This firm were still in occupation in 1914.

LCD no. 16249.

PP (1834) xx, C2, 245.

Hepper Books, 8, 34.

150. DORRINGTON ROAD MILLS.

William Vanse bought 5102 sq.yds. in Dorrington Road from James Watson in 1864 for £650, previously brickground. On this he built a woollen mill which was leased to Thomas Ibbotson, woollen manufacturer.

In 1874 this was described as

a 5-storey woollen mill, 4-storey brushing mill, weaving sheds, warehouse, dyehouse, rag-grinding room, willey room, wool scouring room, smith's shop and stables.

In 1877 the part of this in Dorrington Street was sold to John Iredale, woollen manufacturer, who named it 'Dorrington Street Mill'. Iredale was bankrupted and his mortgagees sold the property to G. Lucas who let the buildings to first R. & W. Wainwright, machine brokers, then S. Leadbitter & Sons, engineers.

After this they were tenanted by the Vanguard Chemical Co., paint

manufacturers, and Morgan & Son, manufacturing chemists.

The other part of the mills remained the property of Vanse, whose mortgagees sold it to Henry Ingle, boot manufacturer, in 1892 for £3,500. In 1895 J.H.Ingle sold the works to W.L.Ingle for £7,050, then in 1899 they were bought by S.Camrass, wholesale clothier, who mortgaged the premises for £1,500 in 1901. He was still in occupation in 1914.

LCD nos. 12493 and 16218.

151. CAMP ROAD MILL AND ELMWOOD MILLS, LONG BALK LANE.

Two mills developed on adjacent sites which are difficult to separate. The original mill on the site, which was called Camp Road Mill, was built before 1815, but it is not known by whom. It was probably only finishing shops until c.1822 when the buildings were extended and came into the occupation of Lord & Robinson, cloth dressers. This mill had a 12 h.p. engine by Fenton & Co. in 1824.

In 1825 the mills were entered by J.P.Dickinson, cloth manufacturer. By 1833 he had a scribbling, slubbing, carding, and scouring mill, employed 36 hands, and obtained power from a 24 h.p. engine. The Elmwood Mill was the property of Henry Stead, cloth manufacturer, by 1838, who then occupied it. In 1840 he sold it to J.Wilkinson of the Patent Woollen-Cloth Co., after it had been advertised as having

a 30 h.p. engine, 8 fulling stocks, scouring machines,
a cloth press, and 4 large mules, also a dyehouse.

Water was obtained from a borehole which fed large reservoirs capable of supplying not just the mill but the whole neighbourhood as well. The estate covered 6,050 sq.yds.

Camp Road Mill, which was to the south of Elmwood Mill, was occupied by Robinson & Co. until about 1835, and then possibly by Robert Reynard, after c. 1848 by William Morphet, cloth dresser. He remained until 1876 when S.G.Fenton, who had owned the mills since about 1840, advertised for sale:

Camp Road Mills, with a reservoir, dry house, two gig places, a shed, a press shop (all on the west side of Camp Road), and a mill on the east side, which is of 5 storeys. There is a 40 h.p. engine.

The east mill was later demolished, whilst the remainder was let to various tenants, including a cabinet manufacturer, a grease extractor,

a tinplate worker, and a boot manufacturer in 1881.

The Patent Woollen Cloth Co. continued to occupy Elmwood Mills, although there was an advertisement for their sale in 1857. They then covered 7,520 sq.yds., and had a 20 h.p. and a 30 h.p. steam engine. This property was extended by the purchase of 278 sq.yds. in 1871, 3,162 sq.yds. in 1872, two more small plots in 1873, and then in 1876 by the purchase of 5,846 sq.yds. with the reservoirs thereon, part of the Camp Road Mills estate.

In 1895 the firm became the Patent Woollen Cloth Co. Ltd. with a nominal capital of £200,000, but they went into liquidation a few months later, and were officially wound up in 1899.

The liquidators sold the mills to Mitchells, Ashworth, Stansfield & Co. Ltd. of Boddham for £22,436, in 1904. In the interim the mills had been let to Preston, Brooke & Co., clothing manufacturers.

By 1906, however, Preston, Brooke & Co. were still in occupation, and they remained in 1914. Camp Road Mills were then occupied by numerous small firms, an engineer and a printer, but mainly clothing firms, including Montague Burton.. Elmwood Mills were occupied by 11 wholesale clothiers, and two printers, besides Preston, Brooke & Co. Ltd.

LCD no. 12753.

PP (1834) xx, C2, 237.

L.M. 10.10.57.

LCA DB M 107. Sale of Camp Road Mills, 1876, by S.G.Fenton Esq.

152. GROVE WORKS, CLAY PIT LANE.

Built 1858 by William Cooke, paper stainer, who bought part of Carlton Cross Estate from Briggs in 1857 for £800. By 1860 there stood on this site

warehouses, a colour shop, a block cutter shop, a counting house, engine & boiler houses, a smith's shop, stables, gig house, and a shed.

The company he founded continued in occupation until 1894, but the controlling partners after 1891 were T. & E. Wild. They had 300 hands in 1803.

A part of the works was sold off to R.P. Brindley, wine and spirit merchant, who turned it into a bottling plant. In 1896, two years later, Emsley & Mosley bought the premises for £6,900, the extent of a foreclosed mortgage. They let the remaining part of the works to W. Burgh & Co.,

wholesale clothiers at £80p.a.

After 1896 the tenant was S. Sharpe & Co., textile printers, and they were still there in 1914, as were Brindleys. The part occupied by Sharpe's in 1900 covered 3,347 sq.yds., and consisted of two 3-storey factories, a 2-storey warehouse, plus another 2,600 sq.yds. with a 3-storey factory and a water tower. They also had a factory in Park Lane let out at £250 p.a. Together these were valued at £22,736.

LCD no. 12753.

Hepper Books, 8, 12.

153. HEPWORTH'S CLOTHING FACTORY, CLAYPIT LANE.

Joseph Hepworth started in Wortley in 1868, moved to Wellington Street in 1878, then, having more than 2,000 workers, found it necessary to buy 5,088 sq.yds. of land in Clay Pit Lane and build a new factory in 1890.

This was subsequently extended in 1897 by the erection of a new factory in Queen's Square, then in 1907 when another new factory was built in Dorrington Street, at the back of the old works.

W.R.R.D. 1 519 266 (1890).

LCH City Engineer's Office, Building Surveyor's Records.

154. ALBION BREWERY, WOODHOUSE LANE.

Built by Benjamin Hallewell, wine and spirit merchant, in 1851 on land bought from the Wormald family. It previously had only stables on it.

In 1860 it was bought by John Young for £11,000; he had 26 employees in 1861.

In 1882 a bottling plant was added, and in 1887 Young died, but by this time the firm of Young & Co. was controlled by William Holroyd and George Nelson. They sold all their shares in 1887 to John Gordon in:

The Albion Brewery ... comprising the several malting houses, storehouses, warehouses, counting houses, boiler houses, cellarage, stables, cottages ... and also all the steam engine, boilers, ... and fixtures.

In 1897 it became the Albion Brewery Ltd. In 1894 John Gordon & Co. had had a 10 h.p. beam engine, and the estate covered 3,772 sq. yards. It was then valued at £14,663, and it was stated that 'the water supply has not been known to fail'.

The Brewery was still occupied by the Albion Brewery Co. Ltd. in 1914.

LCD no. 6980.

Hepper Books, 4, 167.

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LEEDS

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Miles 11.1



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