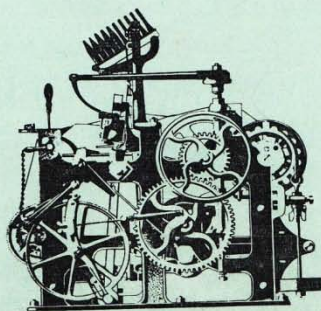


Dundee and its Textile Industry

1850-1914



by

BRUCE LENMAN

CHARLOTTE LYTHE

ENID GAULDIE

DUNDEE
ABERTAY HISTORICAL SOCIETY PUBLICATION

No. 14

1969

THE ABERTAY HISTORICAL SOCIETY

Honorary Presidents :

The Lord Provost of Dundee
ALEXANDER MACKENZIE, Esq., J.P.

The Principal of the University of St. Andrews
J. STEVEN WATSON, Esq., M.A., D.Litt., F.R.Hist.S., F.R.S.E.

The Principal of the University of Dundee
JAMES DREVER, Esq., M.A., F.R.S.E.

President :

W. S. PHILLIPS, Esq.

The Society was founded at a meeting in University College, Dundee (now the University of Dundee) on 29th May 1947 to further the study of local history in Angus, Perthshire and Fife.

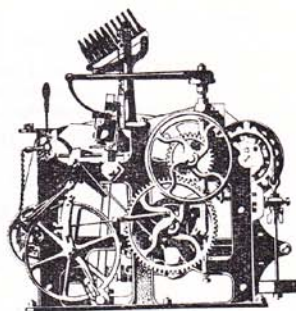
Correspondence on general matters should be addressed to the Honorary General Secretary, Mr B. P. Lenman, Department of History, The University, Dundee DD1 4HN; on financial matters to the Honorary Treasurer, Dr G. I. T. Machin, Department of History, The University, Dundee DD1 4HN; and on editorial matters to the Honorary Editor, Dr R. P. Doig, Department of English, The University, St. Andrews, Fife.

Details of the Society's publications will be found on the inside of the back cover.

Printed for the Society by
HARLEY & COX (PRINTERS) LIMITED, DUNDEE
1969

Dundee and its Textile Industry

1850-1914



by
BRUCE LENMAN
CHARLOTTE LYTHE
ENID GAULDIE

DUNDEE
ABERTAY HISTORICAL SOCIETY PUBLICATION
No. 14
1969

THE AUTHORS

BRUCE P. LENMAN, M.A., M. Litt., is a lecturer in Modern History in the University of Dundee.

CHARLOTTE M. LYTHER, M.A., is a Lecturer in Economics in the University of Dundee.

Mrs ENID E. GAULDIE, M.A., is a research Assistant in the Department of Modern History in the University of Dundee

Contents

Preface		Page 5
General	References	6
CHAPTER I	"Dundee an' nae water, an' Lochee an' nae licht - The State of Dundee c. 1850	7
CHAPTER II	Boom and Slump 1850 - 1914	23
CHAPTER III	Technical Change in the Dundee Textile Trade	43
CHAPTER IV	The working Conditions of the People of Dundee.... ..	57
CHAPTER V	"Dens of Darkness and Filth" - The Living Conditions of the People of Dundee	77
APPENDIX I	Working-class Housing Statistics	103
APPENDIX II	Population and Jute Imports 1851 - 1914	105
APPENDIX III	Some Dundee Wage Rates 1851 - 1914	106
APPENDIX IV	Mill Inventories and Spinning Establishments	111
APPENDIX V	Details of Second-hand Machinery Advertised December 1890 - August 1891	116
BIBLIGRAPHY		118

List of Illustrations

- | | | |
|----|---|--------|
| 1 | Dundee Hamloom - <i>Dundee Public Libraries</i> | (i) |
| 2 | Late 19th Century Loom from an Engineering Drawing in the Office of Baxter Brothers - <i>Baxter Brothers</i> | (ii) |
| 3 | Weaving-Flat - Messrs Baxter Brothers, Dens Works, c. 1908 - <i>Baxter Brothers</i> | (iii) |
| 4 | Beetling-shed, Baluniefield Bleachworks on the Dichty Water near Dundee, during dismantling 1968 - <i>Anders Jespersen</i> | (iv) |
| 5 | Water-Wheel for Beetling Machine, Baluniefield - <i>Anders Jespersen</i> | (v) |
| 6 | Beetling Machine in Baluniefield... .. | (vi) |
| 7 | Messrs Cox, Camperdown Works, Lochee, Dundee, 1908 - <i>Dundee Public Libraries</i> | (vii) |
| 8 | "Back Shift" Leaving Dens Works, c. 1908 - <i>Baxter Brothers</i> | (viii) |
| 9 | Baxter's Old Half-time School and Schoolmaster, Mr Andrew Strachan - <i>Baxter Brothers</i> | (ix) |
| 10 | Typical 19th Century Dundee Tenements with Added Brick Lavatory Towers. | (x) |
| 11 | Housing for Bleachfield Workers at Baluniefield near Dundee | (xi) |
| 12 | The High Land - Dundee's Highest Tenement | (xii) |

Permission to make use of copyright photographs is gratefully acknowledged to the owners named above.

Preface

We have to acknowledge the help and kindness we have received during our researches from Mr. W.S. Phillips; from Mr Gordon Watson, Town Clerk of Dundee and the officials of Dundee Corporation; from Jute Industries Ltd., and from Miss Margot Cox of Seaton House, Nairn, who lent James Cox's diary and letter books; from Baxter Brothers Ltd. and from Major Peter Carmichael of Arthurstone; from Dundee Chamber of Commerce; from the staffs of Dundee Public Reference Library and of Dundee University Library. Members of the Abertay Historical Society have carried out lengthy and painstaking routine research work, for instance on the Dundee Trade Directories, for which we are very grateful, and we are, as always immensely in the debt of Mr David Walker for advice and information on almost every aspect of 19th century Dundee. Professor S. G. E. Lythe has also been very helpful and to Professor D. F. Macdonald we are indebted for help and encouragement over a long period. The opinions expressed in this work are, of course, the sole responsibility of the authors.

The authors and the Council of the Abertay Historical Society are grateful to the University of Dundee for a generous grant towards the cost of this publication.

General References

The following abbreviations are used in the notes: -

<i>D.A.</i>	<i>Dundee Advertiser</i>
<i>D.Y.B.</i>	<i>Dundee Year Book</i>
<i>J.F.M.A.</i>	<i>Jute and Flax Machinery Advertiser</i>
<i>Journ. Ec. Hist</i>	<i>Journal of Economic History</i>
<i>O.S.A.</i>	<i>The (Old) Statistical Account of Scotland, 1791-9</i>
<i>N.S.A.</i>	<i>The New Statistical Account of Scotland, 1845</i>
<i>S.H.R.</i>	<i>The Scottish Historical Review</i>
<i>S.R.O.</i>	<i>Scottish Record Office</i>
<i>Warden</i>	<i>A. J. Warden, The Linen Trade, London, 1864</i>

Frequent references have been made to a manuscript by Peter Carmichael, well known engineer and partner in Baxter Brothers throughout the second half of the nineteenth century. This text is in the possession of Major Carmichael of Arthurstone and not readily accessible to readers. It is to be published in the near future by the Scottish History Society. Because considerable re-arrangement of the papers has been necessary, volume and paper numbers given here, which apply to the manuscript, will be of little use to readers of the published text. However, where possible, dates of letters by Carmichael have been given and these will be useful in consulting the published volume.

Chapter I

" Dundee an' nae water, an Lochee an' nae licht"—

THE STATE OF DUNDEE c. 1850

BY 1850 DUNDEE, which had been a very depressed port and market town in the latter part of the seventeenth and in the early eighteenth centuries, had experienced a century of fluctuating industrial and commercial growth. Legislation in 1831, 1832 and 1833 had not only destroyed the closed oligarchy which had long monopolised Dundee's local government, but had also extended the burgh boundaries to include for Parliamentary and municipal purposes the village of Lochee situated a mile or two to the North-West.¹ By 1846 over 60,000 people lived within the burgh.² The built-up area was, however, still quite restricted.

From a survey executed for Dundee Corporation in 1851 it is clear that building was concentrated within a central area which was merely an expansion of the medieval burgh, and four main axes of development from it.³ Ridges of rock running in an East-West direction had tended to restrict medieval building to an area within ten minutes walk of the shore. By 1823 these ridges blocked communication between the harbour and developing industrial and commercial sites. North-South communications hardly existed. The Edinburgh architect William Burn was consulted and his advice lay behind the 1825 Improvement Act which was in large measure executed between 1825 and 1842, and which set an enduring stamp on central Dundee. Union Street, a new street between the East-West aligned Nethergate and the Ferry Harbour, was typical of several new North-South lines of communication between the burgh centre and the shore. Many rock outcrops were blown up, and existing streets were widened.⁴

These improvements were real but limited and, as a local newspaper complained, opportunities for bold town-planning were neglected.⁵ An editorial in the same paper was later to declare : " If we were asked what was the thing most wanting in Dundee, we would not hesitate in saying it was street improvement."⁶ In a town whose trade in 1851 exceeded that of any other Scots town but Glasgow, many exits from the main High Street were narrow closes, whilst the main streets along and leading to the docks were still inconvenient and, due to an experimental replacement of

granite sets with an early macadamised road surface, usually ankle-deep in mud.⁷

There was a ribbon development along an old route running due north from Dundee into the Sidlaws, but there had long been a suburb there, just outside the Wellgate in the city wall, called at various times, " Rotten Row," " Bonnet Row "⁸ and " Hilltown." There was also a ribbon development in a north-eastern direction along the line of the Dens Burn where streets like Bucklemaker Wynd, Dens Road, Princes Street, and Albert Street were evolving. A third line of development ran north-west from the West Port, along the line of the Scouring Burn. The fourth area of expansion was a small and select " garden city" development near the shore, west of the Ferry Harbour, at Magdalen Green or Yard. Lochee was so separate that there was no regular public transport between the village and Dundee until a horse-omnibus service was set up in 1870. An attempt to organise a coach service in 1850 failed.⁹

From centre to periphery the built-up area was scarred with small quarries,¹⁰ which supplied poor sandstone for building. Before 1840 high-quality Fife sandstone had been imported for major public developments like the Seminaries (now the High School) built in 1832, and the front of a new prison, or even for a big private development like the Exchange Coffee Rooms (now Messrs Winters' Printing Works) designed by the Edinburgh architect George Smith in 1828, but by 1855 quarries in Lochee were exporting stone to North Fife.¹¹ The need for large quantities of cheap masonry had led to a great development of quarrying in and near Dundee. The Harbour Commissioners, for example, greatly expanded Dundee docks after 1810, and by 1837 there were 319 vessels whose home port was Dundee. Their gross tonnage was 39,963 tons, making an average of 125 tons each.¹² The Harbour Commissioners purchased extensive quarry sites in Lochee, from which they drew their supplies of stone.¹³

If Dundee could ignore its lack of a good building stone by using a poor one, it found its lack of good water supplies more intractable. Before 1800 water-wheels were the main source of industrial power but the town was so ill-endowed with sites that the biggest units of the local textile industry — the bleachfields — were not situated in Dundee at all but were strung along the Dighty Water — the nearest substantial stream — which lay a few miles North of Dundee. Within Dundee industrial

development concentrated on the lines of the Dens Burn and the Scouring Burn,¹⁴ and even the Hill-town owed some of its development to streams and springs on the Law Hill at its Northern end. The introduction of steam power did not remove the problem. William Brown, manager of the East Mill in Dundee, wrote in 1819 that the water supply was often scanty and so impure as to be bad for steam engine boilers.¹⁵ To improve the supply wells were dug and ponds constructed. In central Dundee a good well might help to sell a site.¹⁶

There was no adequate piped domestic water supply. There were public wells at the corner of Tally Street, near the Kirks; in St. Clements Lane; at the ancient site of Lady-well at the foot of the Hilltown; and at the Dogwell in the Murraygate. In a dry season water was carted from Inver-gowrie, a village in Perthshire 4 miles West of Dundee; from Smellies Well in Lochee Road; and from Logie Spout in Milnbank Road. Blackness, an area just west of the Westport, was famed for its water which was hawked round the town at two jugs for fd. So scarce was water that a tradesman called " Water Willie" brought a supply from Tayfield Estate, Newport, North Fife, by ferryboat.¹⁷ As late as 1864 a man wishing to erect a public drinking fountain had to rely on piping water from the Lady well.¹⁸ Attempts to organise a regular supply of piped water met stiff opposition between 1868 and 1869 from householders who feared that the water company's rates would be unreasonable.¹⁹ Only in 1876 could the Chamber of Commerce claim that the town had a piped supply adequate for all domestic and industrial purposes.²⁰

Dundee in 1850 was an insanitary place, partly because its inhabitants were often unconvinced of the need for the most elementary forms of public hygiene. One recalcitrant citizen describing himself as a "grocer and cowfeeder, 134 Princes Street," wrote to the press to describe his successful resistance to an attempt by the Dundee Police to seize an accumulation of manure on his premises. To this man the dung was his property, and valuable property at that.²¹ The Dundee Police was not sure of its powers. Prior to 1824 there had been no police, only Watchmen, supplemented by the military if rioting became serious. In 1824-5 a regular force was established²² and in 1850 a Police Act increased its size and powers, but there was doubt as to its powers of enforcing cleanliness. The Cleansing Committee of the Police Commission was prepared to agree that a landlord-occupier had a right to accumulate and retain night-

soil and refuse, but it reserved the right to remove manure accumulated by a number of tenants in a given property.²³

It has been said that the history of British cities in the first half of the nineteenth century is a history of cholera, typhus, and tuberculosis. Dundee was no exception. In 1843 the working classes were hard hit by a combination of fever and unemployment. Despite the return to Ireland of several hundred recent Irish immigrants, there was a shortage of work, with factories working short time.²⁴ Poor wages meant a miserably inadequate diet of meal and potatoes and lowered resistance to disease. The Infirmary could not cope with all the cases, and the disease began to take its toll of the middle classes.²⁵ It is not surprising that members of the local upper-class like Sir John Ogilvy were by 1850 tending to have country seats well away from the crowded, water-starved, and insanitary burghs, in Sir John's case at Baldovan on the North bank of the Dighty.²⁶ What had been the town houses of local lairds or substantial merchants were increasingly converted into tenements or inns.²⁷ In November 1851 'fever' still outranked 'surgical' and 'other medical' as a cause for admission of patients to Dundee Infirmary.²⁸

Yet Dundee society was fundamentally buoyant and expansive. In 1821 the population of the burgh was 30,575. By 1851 it had grown to 78,931. The rate of growth per decade was impressive. Between 1821 and 1831 there was an increase of 14,780; between 1831 and 1841 an increase of 17,439; between 1841 and 1851 an increase of 16,137; and between 1851 and 1861 an increase of 12,733. Nor did the last figure herald a long-term slowing-down of overall growth rates, for between 1861 and 1871 the population increase was 29,060 — the biggest absolute increase of any decade in the 19th century. The second biggest absolute figure — 21,430 — was for the succeeding decade 1871-1881. Needless to say, such a population explosion was not due to unaided natural increase. In the decade 1871-1881, with its absolute growth of 21,430, the natural surplus of births over deaths in Dundee was 17,542.²⁹

Such growth presupposes industrial development to provide a living for more and more workers. But by no means every segment of the Dundee economy had a sustained record of growth. Coarse woollens, for example, had once been a staple product of the town. They were dyed in the Netherlands and there was a big export of the finished product to Germany. After 1707 the manufacture declined to the point of

extinction.³⁰ In the late eighteenth century, the change from buckles to laces for tying shoes destroyed the once-important Dundee buckle manufacture. At one time Dundee manufactured great quantities of tanning leather. There were nine tan-yards in the burgh. Around 1792 over £14,000 worth of leather was tanned annually in Dundee, and it was reckoned that nearly £7,000 worth of boots and shoes were exported. By 1836 the trade had been destroyed by English competitors who were supplying Dundee with its footwear. Another Dundee industry which collapsed in the first third of the nineteenth century was the manufacture of coloured threads for sewing. In 1793 there had been seven different companies employing over 1,700 hands to produce nearly £34,000 worth of thread annually.³¹ Dundee's sugar-refining and glass-making industries shared this pattern of early 19th century decline.

Overall industrial expansion in Dundee more than compensated for these reverses. There were several growth points in the economy of the burgh around 1850. Railways, shipbuilding, and general engineering were all developing. But the most important source of employment and wealth was the growing textile industry which in 1851 employed 11,382 hands, 3,240 of them men and 8,142 women. Steam power was widely if not universally employed. There were 43 spinning mills whose steam engines produced a total of 2,075 horse-power. In the 8 power-loom factories steam engines generated 235 horse-power. There were also 62 hand loom establishments deploying 4,200 looms, and ten finishing, calendering and packing plants. Linen was still the most important fabric produced and in 1851 Dundee imported 40,000 tons of flax.³² A local factory inspector reported in 1851 that Dundee seemed prosperous and that an increase in the cost of flax, which was reducing the profitability of flax-spinning, was being compensated for by an increased production of a new fabric — jute.³³ Because of a lack of precise statistics nobody was in possession of an exact measurement of the prosperity of the region, but a leading manufacturer stated publicly in 1851 that he believed the Dundee linen trade had expanded substantially since Britain had adopted Free Trade in 1846.³⁴

Since plans for further expansion, especially in power-looms, were well under way in 1851,³⁵ it is interesting to notice that the local press was aware of the fact that in the fancier linen lines Dundee was facing severe competition. The press was particularly worried about English

competition, backed by the expertise supplied by Government-sponsored schools of design,³⁶ but comments on the Dundee contribution to the Great Exhibition held in the Crystal Palace in London in 1851 tell a more complex story. In fully bleached linen, made up as for export to the American market, the Dundee exhibits were closely paralleled by exhibits from Ulster and Germany, especially Berlin and Dusseldorf whose exhibits were in fact outstanding in their finer linen lines, heralding the future ascendancy of these lands in this field. In the heavier lines the principal competition to Dundee came from a Belgian industry supported by an export bounty system. Nevertheless, it was said that in lines like osnaburgs, brown Forfar sheetings, hessians, striped beddings and sacking Dundee was clearly superior to any other exhibitor. Supplementing these coarse linens were examples of jute carpeting and cocoa fibre matting produced in Dundee.³⁷

The Dundee exhibits at the Great Exhibition were far from giving a balanced picture of the local textile trade. For example, very little canvas was exhibited. Yet Messrs Baxter Brothers, the biggest linen manufacturers in Dundee, had made their fortune with orders for canvas for the Royal Navy during the Revolutionary and Napoleonic Wars, and they were still supplying the government with over a quarter of its navy canvas in 1851. Baxter Brothers of Dundee and C. & A. Gordon of Arbroath between them supplied just under half the total order for the navy in that year.³⁸ It is therefore desirable to look at the development of Dundee textiles in a longer historical perspective to gain a rounded picture of the situation in 1851.

In the late 18th and early 19th centuries the output of linen in Dundee was considerable. In 1773 the Board of Trustees for Fisheries and Manufactures in Scotland spoke of the " vast quantities of goods manufactured in Dundee ",³⁹ By 1774 the Board was saying that a new bleachfield set up at Douglasfield, north of Dundee, was " the only one near Dundee, where it was much wanted as there is now made there a great deal of linen for whitening ".⁴⁰ In 1777 the Board was saying of the Dundee linen trade that " the demand for white osnaburgs has become considerable ". By then a bleachfield had been opened within the town, at the Stannergate.⁴¹

On the other hand, Dundee textiles did not have a good reputation for quality. In 1773 it was said that the Dundee linen manufacturers were

abusing the trust put in them by the Board of Trustees.⁴² Between 1770 and 1820 there were continual complaints about the quality of Dundee linens and the honesty of Dundee manufacturers.⁴³ In 1839 the *Dundee Advertiser* newspaper said that the reputation of Dundee textiles was lowered by "jute and other rubbish in Dundee materials". There is no doubt that the general standard of production in the town was low.

In the late 18th and early 19th centuries, however, certain individuals did much to raise that standard. One was Archibald Neilson, who as early as 1787 was of sufficient standing to be asked to give a paper to a special committee of the Privy Council on the effect of French duties on British linen manufacture. He was a very important man in the local linen trade who owned the large Kirkland mill in Fife.⁴⁴ Others were James Carmichael of the Lower Dens Works in Dundee, William Brown of East Mill, and George Moon of Fife, who saw the need for improvement and regulation of quality and were interested in its achievement. Finally, men like Edward Baxter and James Cox, of Upper Dens and Lochee respectively, saw the need for publicity and skilled salesmanship to introduce Dundee's improved textiles to wider markets.

Improvement and expansion were only possible in the Dundee textile trade because a complex of business facilities and financial institutions catered for the needs of the trade. Not that Dundee businessmen displayed much *esprit de corps*. In January 1814 the *Dundee Advertiser* remarked that "it has long been a cause of complaint that though no set of men in the world look after their private interests with more anxiety and perseverance than the merchants of Dundee, few have ever shown so little concern in promoting the general interest",⁴⁵ A Chamber of Commerce was established in Dundee in 1814, with John Baxter as chairman, but the movement collapsed in 1831, and was resuscitated only on a small scale in 1836, when it met in the Baltic Coffee House, from which it moved to the Royal Exchange Building only in 1856.⁴⁶

Against this must be set an effective market system. Both in Dundee and in nearby country towns much linen continued to be offered for sale at street markets well into the 19th century. This provides an interesting comparison with Glasgow where it could be said as early as 1795 that linen was "generally brought for sale to the shops of the dealers in that article, and very little of it exposed in the public market",⁴⁷ Banking was another essential service for an expanding industry. There is no doubt that

the Dundee bankers extended very free credit in the late 18th and early 19th centuries. Twice, in 1824 and 1837, the local banks rescued the textile industry by accepting unsaleable warehoused goods as credit to be held until an improvement in the market justified selling. After the 1824 crisis grateful Dundonians wrote to the press to express their satisfaction with the existing local banks. By 1840 credit was much harder to obtain in Dundee, as James Cox of Camperdown Works, Lochee, testified.⁴⁸ But by then freely given credit on minimal security was less essential for further development. There were men of real financial and social standing in Dundee by mid-century.

For overseas trade the Dundee textile industry leaned heavily on a network of middle-men. Despite early attempts by the Baxter family to trade direct with agents in New York,⁴⁹ Dundee was only beginning to eliminate English middle-men from its American trade in the 1840's. Leading Dundee merchants of the period like Alexander Rowan regularly toured the big English commercial centres to acquire both new orders and knowledge of new developments in textile engineering.⁵⁰ An attempt to establish direct trade between Dundee and India around 1840 proved abortive and direct trade only became the norm in this field in the 1860's.⁵¹ With France⁵² Dundee had a flourishing direct trade in yarns and linens between 1839 and 1843 which was curtailed severely in that year by new French import duties.

There was, however, nothing parochial about the way Dundee business manipulated shares and played the world markets. There were no professional stock-brokers or investment managers in the burgh in 1850. Every big firm, however, appears to have had a partner specialising in finance and investment. In Messrs Cox of Lochee, for example, it was Thomas Cox. He and his opposite numbers in other firms were contactable through the Royal Exchange where they met and exchanged information. The important firms had agents in Liverpool or Manchester who were sometimes members of the family. They do not appear to have suffered from their remoteness from metropolitan financial institutions.

The Dundee textile industry had therefore a long record of growth and adaptability before 1850. The ancient woollen manufacture of the burgh was dead and linen was the most important line. At the time of the first *Statistical Account* in the late 18th century no less than seven firms were producing cotton in Dundee, working up the cloth into calicoes,

handkerchiefs and coarse waistcoats.⁵³ Cotton failed to survive far into the 19th century in Dundee, but diversification in the textile trade, encouraged by uncertainties in the supply and price of flax, did. Hemp was the basis of a local rope manufacture which has persisted to this day. Jute was gradually introduced as a cheap natural fibre from Bengal available in large quantities, and possessing certain positive advantages such as the ease with which it could be dyed several popular colours.⁵⁴

Thus, despite depression in world trade such as that of 1836-7, which was accompanied by a financial panic in Dundee's important American market; the occasional bad harvest in Scotland which in a still basically agricultural economy meant a fall in purchasing power; and the chronic instability of Dundee's burgh finances, which led to the bankruptcy of the corporation between 1842 and 1864, conditions favourable to economic growth existed in Dundee, and the foundations of some successful partnerships were laid. Cox Brothers formed their co-partnery in 1841 and began building enlarged premises in 1845. Messrs Grimond built Maxwelltown Works in 1847. Gilroy Brothers' firm was founded in 1849. William and James Scott, who had traded separately throughout the forties, entered into a partnership agreement in 1850. Extensive building of factories both for power-looms and hand-looms took place, especially towards the end of the decade.

Markets for Dundee textiles were expanding rapidly in Australia and Latin America. The experience of the American crisis of 1837 made Dundee manufacturers slow to accept this, but when they did they had the capacity to take advantage of the situation. In America there was recovery. Industrial depression there in the 1840's had actually stimulated agricultural settlement in the Mid-West. By 1847 the United States was receiving an unprecedented volume of emigrants especially from Ireland and Germany. In Ireland famine drove people abroad. In Germany it was a combination of crop-failure and the collapse of the domestic linen manufacture in the face of British competition. On top of this, the discovery of gold in California in 1849 and the gains of the Mexican War confirmed American society in an expansive phase checked by depression only in 1857.⁵⁵

Meanwhile, Scottish investment was greatly assisting economic growth in Britain's Australian colonies. By the late 1830's the Scottish border woollen industry was importing four-fifths of its raw material,

mostly from Australia.⁵⁶ Australian grain and wool exports already had an impressive growth record when the Australian gold-rush of 1851 helped to expand Australia's population and imports. At first Dundee emigrants to the Melbourne area, of whom there were many,⁵⁷ sent back mixed reports. One reported in 1855 that " amongst the vessels lying at Melbourne we saw the steamers Tayfield and North Star, both having turned out bad specs not having found purchasers . . . the markets are at present glutted with all kinds of merchandise ".⁵⁸ Others spoke of the inexhaustible needs of the settlers for all kinds of goods.

Baxter Brothers, the big Dundee linen firm who owned a considerable amount of shipping and used it for general cargo as well as the flax trade, were active in the Australian import-export business before 1851. In 1846 one of their ships was lost carrying Australian copper to Wales.⁵⁹ By 1852, however, Baxters were receiving very large orders for tent ducks on account of the demand for tent fabrics generated by the influx of miners to the Australian diggings.⁶⁰ In 1861 over half the population of the Australian Colonies had been born in the United Kingdom. Between 1851 and 1861 a large percentage of that population lived under canvas or in tents, and the accelerated economic development of the continent was not seriously interrupted until the financial crises of the early 1890's. The Dundee business community gradually learned to forget its fear of an impending contraction in this fundamentally buoyant market⁶¹ for canvas, tarpaulins, corn sacks, wool packs and cordage.

There was also from the 1840's a boom in the Latin American market which, for Dundee, ranked next to the North American one. In 1840 the Peruvian government began to exploit the vast deposits of guano — bird manure — discovered by von Humboldt in 1804. By 1875 perhaps 12,000,000 tons of guano had been exported.⁶² The Dundee press reported in 1854 that " seventy tons of guano are already on the way to this country and many more are expected to follow in the course of the year wholly to be filled with bags [*sic*] of our manufacture ",⁶³ British capital was assisting a very rapid expansion of several Latin American economies at this period. For example, from 1830 British enterprise developed another fertiliser export — that of nitrate of soda from Chile.⁶⁴

The home market for Dundee textiles was also growing. Agriculture prospered. There was an absolute decline in corn prices in the 1850's but Scots agriculture adapted itself swiftly by emphasising its natural

advantage for stock-raising. Orders for sacking for corn, lime, artificial fertiliser, and other agricultural commodities were therefore steady. Railway development meant steady orders for tarpaulin waggon covers. Steam engines required coal and a Dundee manufacturer like James Cox could supply the coal mines with cheap colliers' trousers. By the late 1840's most economic historians would grant that the standards of living even of the bulk of the population of Britain were benefitting from industrial development, and increasing prosperity meant increased consumption. There had been over-expansion in Dundee before the 1837 crisis, but the 1840's were a period of steady growth, interrupted by the great slump of 1842, and by the financial panic of 1847, but blighted by neither because of the long-term buoyancy of textile markets.

When therefore war between Britain and Russia began to loom on the horizon late in June 1853, there were fears that Dundee Manufacturers, deprived of raw materials from Russia, would be unable to continue exploiting the opportunities created by expanding world trade. Jute imports had been rising throughout the forties, but flax was still the most important raw material needed by Dundee, and most of it came from Baltic lands controlled by the Russian Empire, where the very cheap labour and abundant land needed to produce flax in quantity and low cost existed. Apart from small quantities of flax from the Netherlands, Russian flax dominated the Dundee market. Attempts to get farmers around Dundee to grow more flax were being made in the early 1850's but they ignored economic reality too much to succeed.⁶⁵ It paid them far better to produce food crops.

There was, however, no threat to Dundee's prosperity from internal social conflict. Earlier in the century the Dundee working class had shown signs of political militancy. Trade depression and unemployment from the spring of 1837 ensured a warm welcome for representatives of the Birmingham Political Union — a Radical organisation — from a section of the Dundee working class. By the early 1840's Chartism, with its demand for secret ballot, annual parliaments, universal male suffrage, payment of M.P.s, equal electoral districts, and abolition of property qualifications, was strongly supported in Dundee, especially by the unemployed. When local merchants, manufacturers and shipowners led by men like Edward Baxter, mounted an agitation against the Corn Laws, which were designed to protect the landed interest, the Chartists denounced the Anti-Corn Law movement as a mere middle class ramp.

Their own movement was decisively frustrated in its attempt to organise a large-scale strike in 1842. It was reduced to holding a futile march to Forfar, and by 1850 Chartism in Dundee had been virtually destroyed by its own failures and the revival of prosperity.⁶⁶

Conditions of work had in some measure improved in the first half of the nineteenth century. In the 1820's physical violence on the part of overseers and employers towards boys and girls employed in, and often resident in bothies associated with the Dundee mills, is well attested.⁶⁷ Hours of work in this period were often inhumanly long. Boys would work an 18 or 19 hour day, in some mills.⁶⁸ By the 1850's hours of work were to some extent restricted by the Ten Hours Bill of 1847, which restricted women and young persons to a ten hour maximum day.

The bill did not protect adult men, and by working women and young persons in shifts employers were still able to work men very long hours. Nevertheless, contemporaries considered that the hours worked in the Dundee mills were much more reasonable in the 1850's than they had been. Wages had fluctuated in the first half of the century. Female spinners in 1824, which was a prosperous year, attended 36 to 40 spindles for 15 or 16 hours a day for 10/- a week. By 1832 wages had fallen 40% and in the early 1850's they were much the same. Improved machinery enabled a female spinner to watch 100 to 120 spindles for a 10 hour day for 5/9d to 6/- per week.⁶⁹ To the average worker continuity of employment was probably much more important than the spells of relatively high wages which came with booms in the textile trade.

The bargaining position of labour in the Dundee textile trade was not strong. In the 1820's the hacklers, who carried out the early stages of preparing raw flax for spinning, had been well organised and militant. They worked by hand in small 'cork shops' each controlled by a 'cork' or master-operative. There was a network of 'tramp clubs' amongst the hacklers. They were originally designed to support hacklers tramping around Scotland searching for work, and from 1818 working hacklers paid 1d per week to the club, which rapidly became an embryo trade union controlled by an elected committee and a monthly general meeting.⁷⁰

The tramp clubs organised strikes since they found that the spinners were reluctant to pass on the benefits of good times, and quick to cut the

price they paid for dressed flax whenever there was any depression. In 1822 the flax dressers of Arbroath, who had previously been paid 3d per cwt. of dressed flax less than the Dundee hacklers, forced the Arbroath spinning mills to pay the same price for their flax as the Dundee ones, but had to strike to do so. In 1825 there was a financial panic due to the failure of overseas investments. Hacklers' wages were reduced without any strike occurring because the reigning depression put the hacklers in a weak position.⁷¹ When trade improved in 1827 the hacklers struck for higher wages. By the second week of the strike 13,000 Dundee hacklers were out, being supported financially by working hacklers. After 13 weeks the strike collapsed. The men went back to work at the old rates.⁷²

The doom of the hacklers was sealed in 1834 when they first supported a strike by local hand-loom weavers, who were protesting against an increase in the amount they were expected to weave for the same money, and then went on strike themselves against an attempt to cut their own wages. After 16 weeks they returned to work, defeated.⁷³ During the strike hackling machines were introduced into various works. They had been developed in Leeds and Aberdeen and by 1850 they had eliminated the once vigorous hand hackling trade.

Another hard-hit section of the Dundee textile industry was handloom weaving. Contemporaries remarked on the way in which handloom weavers' wages had been steadily worn down by competition from mechanically-powered looms. Whereas the wages of Dundee masons, carpenters, and wrights were higher in 1850 than they had been in 1846, and all these trades enjoyed remarkably full employment, the handloom weavers were worse off in every way.⁷⁴

Until 1845 kirk sessions were responsible for poor relief in Scotland. An Act of 1845 created parochial boards with inspectors of the poor, and laid down a statutory obligation to make provision for the sick poor. Sick handloom weavers were duly succoured by the Dundee board,⁷⁵ but the system made no allowance for the able-bodied male chronically unemployed through depression or redundancy due to technological change. The handloom weavers survived on the margin of industrial society, used whenever exceptionally heavy orders required extra weaving capacity, and leaning heavily on the wages their children could earn in the mills. Theirs was a dying profession, despite the eighteen-hour day many of them put in good times.

Working-class Dundee was not politically apathetic in 1850. Its

representatives petitioned the government against the shift system for women and young persons, which they believed made a mockery of the intentions of the 1847 Ten Hours Bill.⁷⁶ Yet strikes were less frequent in mid-Victorian Dundee than they had been in the first forty years of the century, although the sufferings of large sections of the working class had not diminished.

The spinners and manufacturers of Dundee were in a fortunate position in 1851. They controlled a vigorous textile industry blessed with expanding markets. Their labour force was abundant. Like other Scottish industries,⁷⁷ Dundee textiles had kept down wage rates by using cheap and plentiful labour from Ireland where a backward rural economy was incapable of sustaining the population density which existed there before 1846. Dundee labour was then relatively docile in the mid 19th century. Increasingly, women predominated in the labour force. Those trades, like hand hackling and handloom weaving with a tradition of male labour and political and industrial militancy had been very severely punished by economic and social change. In local and national government a restricted franchise buttressed the ascendancy of the business community. The Dundee textile employers were well placed to take advantage of any further opportunities that the changing patterns of world trade might offer them.

NOTES

1. A. Elliot, *Lochee: As it was and as it is*, Dundee, 1911, p. 38.
2. S. Lewis, *A Topographical Dictionary of Scotland*, London, 1846, p. 316.
3. Collie's Survey in the City Architect's Office, Dundee.
4. D. Walker, "The Man-Made Landscape", in the forthcoming *Third Statistical Account of Dundee*.
5. D.A. 14 January 1851.
6. D.A. 6 May 1851.
7. D.A. 1 and 14 January 1851.
8. Strictly "Bonat Raw"; see W. C. Skinner, *The Barronie of Hilltowne*, Dundee, 1927, p. 32.
9. Elliot, *op. cit.* in note 1, p. 46.
10. Collie's Survey, *op. cit.* in note 3.
11. James Smith to David Annan, 3 March 1855; *Letter Book of J. Smith*

- 1854-62, Berry Papers, in possession of Dr John Berry, Tayfield House, Newport-on-Tay.
12. "Dundee During the Past Fifty Years", in D.Y.8. 1887, pp. 69-70.
 13. See advertisement in D.A. 22 March 1850.
 14. W. H. K. Turner, "The Evolution of the Pattern of the Textile Industry within Dundee", Transactions of the Institute of British Geographers, 1952, p. 107.
 15. "General Description of East Mill", in W. Brown, Essays on Flax Spinning, 1819 (ms, in Dundee University Library).
 16. See advertisement for site next to Ferguson's Power-Loom Factory in D.A. 29 November 1850.
 17. Mr John Gray's Memoirs in D.A. 26 December 1905.
 18. Council Minutes, Vol. 29, 22 June 1864.
 19. Ibid. Vol. 29, 26 January 1866; Chamber of Commerce Minutes, 1869; D.A. 1 April 1869.
 20. Chamber of Commerce Annual Report 29 March 1876.
 21. D.A. 23 September 1851.
 22. D.A. 26 July 1850; obituary of W. Cruickshank.
 23. D.A. 14 October 1851.
 24. Letter Lord Kinnaird to Lord Howick, 9 February 1843; Grey Papers, Department of Palaeography and Diplomatic, University of Durham.
 25. Kinnaird to Howick, 8 February 1843; Grey Papers.
 26. D.A. 26 August 1851.
 27. Details of several of these houses can be found in the 1905 "Photographic Survey of Dundee"; City Library.
 28. D.A. 21 November 1851.
 29. Census Reports.
 30. C. Mackie, Historical Description of the Town of Dundee, Glasgow, 1836, p. 178.
 31. Ibid., pp. 179-180.
 32. D.A. 18 June 1851.
 33. D.A. 21 February 1851; report of Mr Walker.
 34. D.A. 26 July 1851; statement of Mr David Baxter in Chamber of Commerce.
 35. D.A. 17 June 1851.
 36. D.A. 21 February 1851.
 37. D.A. 13 May and 10 June 1851.
 38. D.A. 16 May 1851.
 39. Minutes of the Board of Trustees, 18 February 1773; S.R.O.
 40. Ibid.
 41. Ibid., 26 February 1777.
 42. Ibid., 13 February 1773.
 43. Ibid., 17 December 1800.
 44. Ibid., 6 January 1787; see also D.A. 1839 *passim*.
 45. D.A. 14 January 1814.
 46. Records of Dundee Chamber of Commerce in Chamber of Commerce, Albert Square.
 47. Minutes of the Board of Trustees, 21 January 1795; S.R.O.
 48. Letter Book of James Cox, 18 March 1840 (mss, in custody of the Cox family); see also C. W. Boase, A Century of Banking in Dundee,

- Dundee, 1867.
49. Dundee Chamber of Commerce Centenary Souvenir, Dundee, 1936, p. 41. Edward Baxter was President in 1844.
 50. Warden, p. 73. Cox's manuscript diary (in custody of the Cox family).
 51. Warden, p. 65.
 52. Warden, pp. 308-9.
 53. O.S.A.
 54. B. P. Lenman and E. E. Gauldie, "The Industrial History of the Dundee Region from the Eighteenth to the Early Twentieth Century ", Dundee and District ed. S. J. Jones, British Association, Dundee, 1968, pp. 162-173.
 55. M. L. Hansen, *The Atlantic Migration 1607-1860*, Cambridge, Mass., 1945.
 56. D. MacMillan, " Scottish Enterprise in Australia, 1798-1879 ", *Studies in Scottish Business History* ed. P. Payne, London, 1967.
 57. D.A. 5 January 1855, where no less than six shipping lines advertise passages to Australia.
 58. D.A. 23 February 1855.
 59. Carmichael mss. II, p. 79.
 60. *Ibid.*, p. 122.
 61. D.A 3 January 1854.
 62. H. Cave, *Fertilisers*, London, n.d.
 63. D.A. 3 January 1854.
 64. Cave, *op. cit.* in note 62.
 65. D.A 12 August 1851.
 66. *Memoranda of the Chartist Agitation in Dundee*, printed by William Kidd, Dundee, n.d.
 67. E. R. Pike, *Human Documents of the Industrial Revolution*, London, 1966, p. 150.
 68. [J. Myles] *Chapters in the Life of a Dundee Factory Boy*, Dundee, 1951 (reprint of work first published in 1850).
 69. *Ibid.*, pp. 11-15.
 70. D.A 25 April 1850, " Rough Notes on Hackling ".
 71. D.A 30 April 1850, " Notes on Hackling ".
 72. D.A 14 May 1850, " Notes on Hackling ".
 73. D.A. 21 May 1850, " Notes on Hackling ".
 74. D.A 16 August 1850.
 75. D.A 21 November 1851; report of law case *Parish of Dundee v. Parish of Kettle*.
 76. D.A 9 July 1850.
 77. A. Slaven, " Earnings and Productivity in the Scottish Coal-Mining Industry ", *Studies in Scottish Business History*, ed. P. Payne, London, 1967.

Chapter II

BOOM AND SLUMP 1850-1914

THE 1840'S were, on the whole, a prosperous period for Dundee textiles. The American financial panic and recession of 1835 hit Dundee hard. Crop failure, over-speculation in Western land, and inflationary note issue by state banks after the demise of the Second Bank of the United States, led to a collapse of business confidence in America¹ just when Dundee textile manufacturers, encouraged by news of the destruction of great quantities of bagging in a fire in New York,² tried to flood American markets with their products in the hope of quick profits. Only the action of the Dundee banks in opening warehouses and receiving goods on deposit, on which they advanced money, checked the crisis. By the 1840's the American market had recovered, the Australian and Latin-American markets were prosperous, and home demand for Dundee textiles was rising. Between 1845 and 1850 Cox Brothers of Lochee, a partnership formed in 1841 though the firm was much older, built most of the Camperdown Works which in 1850 occupied 18 acres of ground on the North side of Lochee. Like the rest of the United Kingdom, Dundee experienced recession when a great bubble of speculation in British railway shares burst in 1847, but confidence soon returned.³

Nevertheless, the outbreak of the Crimean War in 1854 marked an unprecedented acceleration in the expansion of Dundee's already prosperous economy. While children in the Dundee streets sang " Go and get him Charlie ! " as Sir Charles Napier led a British fleet to the Baltic, wiser heads realised that Russian flax was still central to Dundee's economy, and there were fears of recession due to raw-material shortage. Dundee contributed £5,000 to the patriotic fund for the war with Russia. This was a fair sum comparing well with an English manufacturing town like Salford whose 87,000 people raised only £3,000.⁴ The Dundee merchants, however, sent a delegation to Lord Clarendon to seek a policy decision on trade with the enemy.⁵ If the government had reached a firm decision Dundee would have been spared a year of anxiety and her trade might have developed quite differently in the next decade. Fear of industrial paralysis due to flax shortage spurred on the organisation of supplies of jute. Before the 1850's the jute trade was said to have "more the character of an adventitious than of a regularly organised trade ".⁶ The

fibre was normally shipped by small native dealers of no financial standing.

By the end of the Crimean War, most native dealers had been squeezed out, important British shippers controlled the shipping of raw jute, and its price had risen from c. £11 per ton to c. £26 5s Od per ton.⁷ Many Dundee firms switched all or a large part of their production to jute. Those who had already made the change and had geared their works to jute production before the war, like Cox and Gilroy, gained a head start which they never lost.

Ironically, fears about Russian flax supplies proved groundless. When George Duncan, Dundee's M.P., approached the Admiralty to ask that stocks of flax already bought by his constituents but held up at Archangel, be allowed into Britain, Sir James Graham, some of whose own constituents were also interested in flax,⁸ replied officially " I cannot authorise direct trade with the enemy ". Privately he sent word to flax merchants to "get their goods away as soon as you can ".⁹

Though the Royal Navy announced a blockade of the main Russian Baltic ports, an effective blockade of Russian shipments of flax to Britain proved impossible. An alternative overland route through Poland and Prussia was quickly organised.¹⁰ In the long run, by stimulating the German flax trade, this route helped to breed a future competitor for Dundee, but in the short run it kept supplies of flax flowing to Scotland, at a price. Fear that the British government might take action against shipments coming from Russia via a doubtfully neutral country like Prussia, contributed to a sense of uncertainty and wildly fluctuating prices in the flax market. In Dundee it was said that 1854 was " pre-eminently a year of panic to the linen trade, intense and racking uncertainty its distinguishing characteristic ". The inability of the London government to reach a firm decision on the trade made this inevitable. Indeed the local press was surprised to find that the year did not prove so disastrous as at first feared.¹¹

Early in 1855 " the reasonable demand of all business men that a definite and intelligible announcement of future policy of the government on this question still remains to be complied with ",¹² Faced with a demand for vigorous prosecution of the war the government could not openly

condone a lively trade between Dundee and Russia. " Gentlemen in Dundee in pursuit of great wealth "were already having to bear slurs on their patriotism. Dundonians felt it necessary to "dispose of the calumny that the prosperity of the Dundee bagging and hessian trade arose from the fact that our looms were supplying the enemy ",¹³

The government had nevertheless to bear in mind the effect upon the flax towns if barriers to trade with Russia were made effective. Dundee's M.P., Mr Duncan, remarked that " it would not be easy to feed 40,000 people dependent on that trade ",¹⁴ In the end Dundee merchants realised that the government would neither help the flax trade nor hinder it, but merely wink at the importation of Russian flax. This left the Dundee mills free to meet the huge demands generated by war. The Dundee press not only carried advertisements for Russian caviare at the height of the war,¹⁵ but also notices inviting tenders for " contracts for supplying Her Majesty's Victualling Stores at Deptford and Gosport" with seamen's clothing.¹⁶ Baxter Brothers had for some years supplied the Admiralty with linens through a contractor in the South of England," but it was in this year that they first, by painstaking attention to quality, overcame the known Admiralty prejudice against power-loom cloth, and secured the direct order. Government contracts not only helped buttress the financial position of Baxters throughout the 19th century, but also buttressed the prosperity of Dundee, for Baxters had a good record for offering steady employment with few wage cuts. Baxters supplied the forces with fabrics ranging from heavy sail canvas and tarpaulins to gun covers, biscuit bagging, and sailors' gaiters.

It was said that: "It is to war demand that we chiefly owe the wonderful development of the linen trade of Forfar-shire during 1855. There is hardly one of its staple manufactures that has not been required for consumption of the Army or Navy or by the swarming population congregated at the chief seat of operations ",¹⁸ To meet these new demands old mills which had gone out of production in the recession of the late 40's were again refurbished and set going, many of the mills already working were extended and their productive capacity increased. Between November 1854 and December 1856, 6,700 spindles requiring 510 hands and using 150 horse-power, which had been redundant, were restarted, and 3,000 new spindles employing an additional 626 persons and using 130 horse-power were added. A number of new power-loom factories

were also built, with 767 new looms employing 1,894 hands. There was also expansion in existing power-weaving. Baxter Brothers, Cairds, and Duncan and Blakely, owners of previously existing power-loom factories added 60 looms employing another 1,070 people. By the end of 1856 several firms, including Gilroy Brothers, were installing 700 more looms representing 1,000 more jobs.¹⁹

As it was still much easier for a manufacturer with limited resources and credit to multiply hand-loom than machinery, this increase in capacity involved a proportionately greater increase in the number of hand-loom than of power looms. Pirn-winders, sack sewers, calenderers and bleachers were required to cope with increased production by spinners and weavers. But the labour required by the boom was relatively scarce. Many textile workers had gone to Australia in the previous decade, and the flow of cheap Irish labour hitherto used to keep down wages in the preparing trades had dried up. It was said that: " we believe that if 1,000 steady, well conducted young persons were to enter the town at this moment they would all be readily engaged by employers anxious to obtain their services; and it cannot be too well known in Aberdeen, and other places where business is less active and trade is scarce, that there is in Dundee a far greater want of labour than is likely to be supplied ". Spinners' weekly wages rose from 5/9d in 1852 to 7/6d in 1856, rovers' from 4/4d to 6/6d.²⁰

Aberdeen did not share this boom. Injections of London capital had enabled the Northern city to set up power-loom factories for the linen trade ahead of Dundee in the second quarter of the 19th century, but the failure of the big firm Maberley and Co. was not followed by the sinking of much local capital in the linen trade. Dundee's bolder financiers, added to the equal convenience of her harbour for the Baltic trade, sent her ahead. Because conditions favourable to expansion existed in Dundee before the war, the town could benefit from the war boom so much that Aberdeen workers were attracted South.²¹

The 1850's saw other developments which were to have important long-term repercussions on the Dundee textile industry. Some were favourable. In 1847 a Kirkcaldy canvas manufacturer, Michael Nairn, founded the firm of Nairn's of Kirkcaldy to manufacture floor cloth. Printed canvas was already widely used as a heavy-duty floor covering but the new firm

was to become, after a difficult start in the first two years, dramatically successful, and later the pioneer of the Scottish linoleum industry. Nairn at first wove great webs of coarse cloth from flax tow yarn on big two-man handlooms to act as a base for floorcloth.²² Soon, however, it was realised that Dundee jute would provide an excellent backing, and a most important connection was established which grew in importance as the Kirkcaldy linoleum factories expanded. Nairn's was the giant of the Scottish market, but in 1864 Shepherd and Beveridge launched the Kirkcaldy Linoleum Co. followed in 1872 by the Patent Floorcloth Co. and many others.²³ Nor was Kirkcaldy the only Fife town to absorb the products of Dundee's textile works. Dunfermline bought Dundee linen yarn for its damask table-wear manufacture which was finding ever-increasing markets at home and abroad in the 1850's.²⁴

Against all this must be set the genesis of a future competitor — the Indian jute industry. Bengal, the source of the raw material, had a tradition of spinning and weaving jute by hand and in the 1840's the products of this hand-industry began to be exported from Calcutta to the Bombay coast of India and to North America where they were used for cotton packing or as bagging for commodity exports like sugar.²⁵ As late as 1854 there were no power looms or steam machinery for spinning and weaving jute in Bengal. In 1853-54 an Englishman called George Ackland began experiments in India with a view to growing rhea grass as a cheap substitute for flax and hemp. In 1854 he was in Dundee with rhea samples, interviewing makers of textile machinery. John Kerr of the Douglas Foundry,²⁶ the leading maker of flax and jute preparing machinery in Dundee, discounted the possibility of developing a trade in a tough gummy substance like rhea, but suggested that jute machinery might well be taken to Bengal to spin and weave jute there. Ackland returned to Bengal with a group of Dundee mechanics and overseers, after arranging to be supplied with a few systems of preparing and spinning machinery and plans for buildings and driving systems by Kerr. In 1855 Ackland opened the Rishra mill near Serampore in Bengal. It produced 8 tons of jute yarns per day. About 1857 Ackland began to weave his own canvas on a few frame hand looms. Two years later another Bengal mill introduced power looms.

The Rishra mill was managed by a Dundonian, Charles Smith. It expanded but ran into financial difficulty as early as 1857. The company

was wound up in 1868. By then fresh capital had been injected into the Bengal jute industry. The Borneo Company, registered in London in 1856, had a capital of £60,000 and strong Scottish connections. It was dominated by the Glasgow firm of MacEwan and Company. Its primary purpose was to trade in Sarawak under the aegis of the Brook dynasty. Its Calcutta agents persuaded it to sink a little of its capital in a jute mill at Barnagore four miles from Calcutta. This was the first Bengal mill to have power-looms. It doubled its capacity by 1864 and had cleared its capital twice over by 1872.²⁷ Before 1870, however, there were still only five jute mills in Bengal, and they disposed of not more than a thousand looms between them. Nevertheless their obvious advantages over the Dundee mills in terms of geographical location and access to unlimited cheap labour boded ill for the future.²⁸

Indeed by 1857 the Dundee textile industry was definitely feeling the effects of post-war depression. The local press was alleging that there had been gross over-expansion of capacity in the mills on the assumption that demand would never slacken. There had also been furious speculation in raw jute which forced its price up. By 1857 prices of raw material had tumbled by 40 per cent, and many of the new workers drawn into the expanding textile trade faced unemployment and destitution.²⁹ Writers in the press were arguing that the mere expansion of the local textile trade did not necessarily imply huge profits. It was alleged that the biggest fortunes made during the war had been the result of astute speculation in raw materials and that spinners in particular had always had relatively narrow profit margins.³⁰ There was no doubt that spinners had tended to expand their businesses, but this had been done largely on credit. They bought their yarn on a six month credit, and as they could, in good times, turn over their stock in two or three months, they rode on a wave of credit liable to break at the first hint of depression.³¹

Those spinners who had built up a capital reserve and had sought to diversify their interests by weaving at least some of their own yarns were well placed compared with the many spinners who had over-extended themselves. Even more precarious were the many weaving establishments in the town. In the days of hand-looms little capital was required to set up a weaving business and the owners of these establishments, known locally as manufacturers, tended to be of lesser social status than the owners of spinning works. Furthermore the manufacturers were locked in

bitter competition with one another. By 1857 their section of the local textile industry was undergoing rapid change. The large, if speculative, market for bagging for the American cotton crop had been lost to cheap hemp bagging manufactured in Kentucky or gunny sacks from Calcutta. Its place had been taken by an increased demand for better quality sacks and woolpacks. The power-looms introduced to Dundee to weave finer fabrics and sailcloth were in process of adaptation to these rougher fabrics. Adequate capital was becoming the essential pre-condition for successful expansion and survival. Exporting required a long purse and patience to wait for a return, yet the export market was exceptionally important for Dundee textiles. The United States was the most important customer, but Canada and Latin America loomed large, as did Australia.³²

At the very top of Dundee Society were a few families controlling great private companies whose, often very handsome, works were marked by a system of vertical integration gathering all the textile processes from hackling to dyeing under one roof. A few specialised lines like bleaching escaped this process of concentration, but the sections of the industry like yarn milling (a preparatory process which made yarn smooth before weaving) where there were still a great many small firms, were becoming increasingly competitive and marginal. To supply labour for the great firms immigrants were crowding into Dundee from the Angus countryside, the Highlands and Ireland. Adequate accommodation or social services simply did not exist for them, and contemporaries were worried about the long-term consequences of this, but without the immigrants it is difficult to see how the Dundee textile trade could have expanded as it did in the 1850s.³³

By 1861 there had been a great increase in power-looms in Dundee. There had also been a growing tendency to specialisation. In the linen trade Dundee was spinning much finer yarns, but all by dry-spinning techniques. The wet-spinning techniques which produced the very finest yarns were the province of Leeds and Belfast. Dundee had a virtual monopoly of the jute trade. Within its region there was further specialisation. Dundee concentrated on jute goods, heavy flax and tow fabrics, Arbroath was the seat of the canvas trade, though, of course, Baxter Brothers of Dundee were very famous for their naval canvas. Forfar and Brechin produced heavy linens like osnaburgs, sheetings and dowlas, while North Fife, as well as producing dowlas, specialised in the

finer linens, bleached goods, diapers and damasks.³⁴

The regional textile trade was quite resigned to the idea of a business cycle lasting about ten years. They saw it as building up steadily for about nine years to a feverish speculative boom which collapsed into a depression which gradually lifted before the next boom.³⁵ Circumstances in the early 1860's lent credence to the pattern. By 1860-1 Dundee was in a deep depression. The important American market was badly affected by the Merrill Tariffs which imposed a duty of from 15 to 20 per cent on jute goods entering America. Some big Dundee firms were hard hit. Exports of linens from Dundee to the U.S.A. in April 1861 were only a third of those for April 1860 and a fifth of those for April 1859.³⁶ In April 1861, however, the American Civil War broke out. In the late autumn of that year the course of events nearly led the United Kingdom into war with the Federal Government of the United States. Dundee's American trade was virtually paralysed, but the crisis passed, the Federal Army needed great quantities of canvas, and by January 1861 the Dundee linen manufacturers were busy supplying it. By April 1862 Dundee was finding it easy to dispose of great quantities of jute bagging. Works which had been closed like the Seafield, Douglas, and Anchor Mills, were reopened, unemployment ceased to be a major problem and the jute market expanded in an unprecedented way. The stricken state of the Glasgow and Lancashire cotton industries, due to shortage of their raw material which came from the blockaded confederate States, removed a serious competitor in the textile markets of the world. 1863 was an even better year for Dundee than 1862. There was a brief check to the town's prosperity early in 1864 due to heavy competition from the Indian jute industry and a war in Europe, but 1864 was, overall, a good year, as was 1865, despite the confederate surrender at Appomattox in April. Only in 1867, as the U.S. Government sold vast surplus stocks of jute and linen did depression hit Dundee. By 1868 this boom had run its course. Short time and unemployment were common.³⁷

This period of expansion was, in absolute terms, the greatest in Dundee's history. Between 1861 and 1871 there was heavy immigration to the city, mostly from the Angus countryside. Total population grew from 91,664 in 1861 to 119,141 in 1871. The great firms of Cox and Gilroy began to import jute direct from India during the war. Previously it had been transhipped from London by rail or coaster. By 1863 Cox Brothers had

their own baling plant near Calcutta.

In stone and mortar the war left an enduring legacy to the local textile trade. There were big extensions at Cox's, Gilroy's and Baxter Brothers' works, as well as a quite new mill in Douglas Street for Henderson's. In Brook Street Messrs Edward's mill was extended in 1865. These are only the best-known examples of a general growth in all branches of Dundee textiles. As was the case after 1857, a period of relative depression then weeded out the weaker firms which had over-expanded in prosperity and left a fairly healthy textile industry for the next period of growth.

The outbreak of the Franco-Prussian War marked the beginning of yet another phase of prosperity not only for Dundee but also for the textile region around it where there had been substantial expansion in the 1860's, especially in Fife around Kirkcaldy.³⁸ By 1872 it was being said that of Dundee's flax and jute products, forty per cent went to the United States, but that the Indian and Colonial markets were also very good. Profits were known to be high.³⁹ 1873 saw the beginnings of a downward swing. By 1874 the position was grave enough for outsiders to be forecasting long-term decline for Dundee textiles.⁴⁰ The Dundee press was not too distressed. It agreed that there had been excess production, that markets were glutted and that jute mills were springing up all over Europe to supply the European market and that textile machinery works in Dundee and Leeds were busy preparing machinery for jute mills in Calcutta, but it felt that after the usual period of slackness the trade would recover, as it had before.⁴¹

There were various reasons why recovery was in fact long delayed. Expansion in Calcutta jute mills had been encouraged by the high profits earned by the earliest Indian mills. The Barnagore Company, for example, declared a 15 per cent interim dividend on its first half-year's working. It may be true, as Scotsmen believed at the time, that these earliest Indian mills merely displaced the crude products of the Indian hand-loom weavers,⁴² but by 1875 the Samnugger Company floated by a Scots consortium including J. J. Barrie of Dundee in 1873, was setting a new precedent for Bengal jute firms by systematically assaulting overseas markets like the Californian wheat bag market and the Australian corn-sack market. Its principal marketing expert was a Mr W. Smith who had trained under Cox Brothers of Lochee. Only one new mill was built in Bengal between 1865 and 1882, but already the area's successes boded ill

for Dundee.⁴³

If a reasonably prosperous flax trade helped Dundee in 1875, 1876 was marked by depression in all branches of the textile trade. Only capital reserves built up in the Civil War boom enabled the big firms to weather frequent stoppages. Competition made overseas markets tough, and many local export agents went bankrupt. In December 1876, 22 Jute works which had employed 5,618 hands were standing idle in the town.⁴⁴ Messrs George Armitstead and Company reckoned that if it was the high cost and scarcity of flax which was at the root of the linen trade's troubles, the depression in jute was due to long-term factors, such as the trend for important Dundee markets like San Francisco, Australia and Egypt to buy jute goods from Calcutta.⁴⁵ To make matters worse, coarse cottons were so cheap that they were competing effectively with linens and jute in several fields.

Such was the labour shortage in Dundee that up to 1877 depression and closures had caused little unemployment. By 1877, however, the working classes began to be hard hit by the crisis in jute and linen. Demand for jute hessians was perhaps the steadiest department of the local textile trade, but it was not very remunerative.⁴⁶ Just when there were signs of recovery in a generally depressed Scottish economy the failure of the City of Glasgow Bank in October 1878 wrecked business confidence⁴⁷ and it was not until two-thirds of 1879 had passed in depression that there was a real recovery. Partly this was stimulated by a rush of orders for the German market designed to beat the limit set by a prohibitive tariff which came into effect on 1st January, 1880. More lasting was the stimulus provided by an upswing in the American economy and market.⁴⁸ This lasted until May when a sharp reaction to feverish speculation set in and lasted throughout 1881. Demand for jute goods was not too bad, but prices were so low as virtually to eliminate profit.⁴⁹

By 1882 recovery was marked. By Autumn not only was there a steady demand for jute and linen goods, but it could also be said that prices were high enough to offer some prospect of profit. Very few mills remained closed. Jute was especially buoyant, with a large export trade to Austria helping to replace the German market largely lost in 1880. Linen was slower to recover. Despite repeated warnings by observers with long experience of the Dundee textile trade that over-expansion and over-

production were the roots of future depression, the industry responded to the more favourable business climate with a wave of factory extensions in 1883. That was a good year. Raw jute was cheap. There was full employment and wages rose, especially in the engineering trades, while even the linen trade took a turn for the better.

The cycle of over-production leading to glutted markets and depression proved extraordinarily swift in the early 1880's, for by 1884 it was being said in Dundee that " the history of the trade of the district for 1884 is a record of low prices, glutted markets, and slow demand as the natural and direct result of over-production ",⁵⁰ It is, however, possible to get behind these generalisations, for the fate of individual firms varied considerably. Messrs O. G. Miller and Sons closed their linen works, which had employed over 1,000 hands. Jute manufacturers complained that they could not sell their stocks. Yet Messrs J. & A. D. Grimond appeared to be unaffected by the depression. They actually extended their works in 1884.⁵¹ The explanation almost certainly lies in the fact that the Grimonds' concentrated on the finer jute products like carpeting and other lines popular in the domestic market. Vertical integration, whereby a firm controlled every aspect of production from importing and storing raw material to marketing the finished textile, enabled a firm to secure itself against the worst uncertainties of the market, for it was possible to store raw material and manufacture it when price-levels warranted the risk. By concentrating on a relatively high-priced domestic market Grimonds' further protected themselves against the uncertainties of the trade.

There is no doubt that continental tariffs and Calcutta competition were cutting into Dundee's traditional markets for the cruder jute fabrics. Between 1882 and 1885 the capacity of the Calcutta industry grew from 5,150 looms to 6,700. Four new mills were established, one of them — the Victoria — being Dundee owned. By 1884 the bigger Calcutta mills were combining to fix prices. Assisted by stricter attention to quality they had by 1885 secured regular orders for twills, and flour and other bags from the United Kingdom where London firms like Messrs Walter H. Hindley were building up a marketing system for the Calcutta mills. Levant orders for grain sacks and other twill goods flowed steadily into Calcutta, but the main overseas outlets for that industry remained wheat bags, Australian bran bags, and Egyptian cotton packs. Hessians remained a relatively backward section of the Calcutta trade, which helps

to explain hessian's relative buoyancy in Dundee during the depressed years of the 1870's.⁵² Charges that the Dundee capitalists controlled the Calcutta industry were simply not true. By 1885 Indian capital was prominent there. Glasgow firms controlled more Calcutta looms than did Dundee firms, which owned a mere 10 per cent of the Indian industry.⁵³

Wages in the Dundee textile trade declined steadily until June 1886. Unemployment was rife, so there was little organised resistance. The linen industry was also depressed. In Perth and Angus it declined in importance while in Dundee the tendency was for linen firms to switch part of their capacity to jute or union (i.e. linen and another fabric) goods. Recovery from this depression followed the pattern of a relatively short cycle established in the early 1880's. By Autumn 1886 business was improving. 1887 saw a continual, if slow, upward trend, and by 1888 the local textile trade was prosperous despite some short-time. Jute hessians remained the staple, but there were encouraging signs of willingness to diversify. 1889 and 1890 followed the pattern of high rates of prosperity and employment, with substantial expansion of works, despite the hostile McKinley tariff in the United States. Most of this prosperity was, however, concentrated on jute. The linen trade was more affected by the McKinley tariff and much affected by competition in its finer lines from Ulster and the Continent.⁵⁴ When in 1891 a representative of Dundee Chamber of Commerce went as a witness before the current Royal Commission on Labour, he spoke with confidence, as the representative of a prosperous jute industry, in which his own firm, Harry Walker and Sons, had in eighteen years — from 1873 to 1891 — expanded from nothing to employ 1,300 hands. At the same time, he gave some indication of the dependence of the jute trade on overseas markets. He reckoned that three-quarters of its products went abroad, and only a quarter went to the home market.⁵⁵

The 1890's showed how precarious such a pattern of trade could be. 1892 was a year of sharp vicissitudes. The linen trade was steady enough, but jute fluctuated in price until the year ended in depression with raw jute scarce and at its most expensive just when cotton, that potential substitute, was abundant and cheap on world markets. Between 1893 and 1894 depression deepened. Calcutta was blamed, as usual, and all sorts of fads aired as nostrums, but informed opinion deemed that jute had only a relative value and in a general trade depression with flax and cotton

abundant and cheap, Dundee jute was bound to suffer. High hopes of the American market early in 1895 proved delusive. Failures were commonplace in 1894. Fortunately the jute trade steadied at a relatively low level of profitability in 1895. An increased importation of continental yarns led to complaints that Dundee producers had singularly failed to adapt and improve their goods compared with foreign textile industries. And yet by 1896 the Dundee textile trade was enjoying a steady flow of orders and virtual full employment. 1897 saw no advance, though no relapse. Expansion in Latin America was restricted by political unrest and war, while the confrontation between Britain and America over the Venezuela crisis had a bad effect on the vital American market. The employers considered 1898 a poor year, with some notable failures, but in fact there was full employment in the Dundee textile trade, with machinery standing idle for want of hands.

Early in 1899 there was a scare because of signs that Calcutta was breaking into Dundee's vital Latin American market, but this came to naught and with the outbreak of the great Anglo-Boer War the usual rush of military orders jerked the Dundee textile economy on to a high level of prosperity which lasted as long as the war did. Both jute and linen were extremely prosperous. In addition to the orders generated by the war, the continued expansion of cotton and sugar production in Central America meant that the market for good bagging was a dynamic one. When in 1901 the linen industry in Dundee suffered a temporary setback due to a combination of a shortage of raw material and a temporary recession in some important markets, the sheer weight of British government orders carried it through its troubles.⁵⁶ The inevitable downturn in trade hardly had a chance to make its effect felt when yet another war created artificially favourable conditions for the Dundee textile trade. By 1902 the British government was cutting its orders for jute and linen at the conclusion of the South African war. As it happened, there was a very large jute crop in Bengal that year, This turned out a fortunate circumstance, for though 1903 was an uneven year, marked by sharp fluctuation in prices for Dundee textiles, the volume of business done in all branches of the trade was gratifyingly high. Even the finer grades of linen found the American market rewarding and at the other extreme the Hessian bagging trade was well sustained by home demand for grain, cement, potato and coal bags, Central American demand for coffee and sugar bags, Levant demand for soap and nut bags, demand from the West

coast of Latin America for rice bags, and above all a huge volume of business from the Argentine republic to cope with a superabundant wheat harvest. By the end of the year the prospect of war between Russia and Japan was worrying observers.

By 1904 the war was a reality and Dundee's textile trade was booming. Both Russia and Japan needed Dundee textiles for war. Calcutta could not cope with the volume of its own orders and had to call on assistance from Dundee. South America continued to absorb a great deal of Dundee bagging. 1905 confirmed this pattern of relative prosperity. It began with low profits and scarce orders, but the last five months were wholly satisfactory. 1906 was an astonishing year in which Dundee broke away from " the low level of values, which for a generation had been the lot of the staple industry ". Despite a complete absence of war demand the volume of business was high and so were prices for the finished product.

It would be difficult to exaggerate the importance of the American market for Dundee even at this late stage, for when there was a business depression in the U.S.A. in 1907, Dundee's 1906 profits were punctured, although the volume of business and employment in the city remained high enough in 1907 and even 1908. If the U.S. market was dull, the Argentine remained buoyant. Nevertheless, 1908 was a difficult year for Dundee. On top of difficult conditions and low profitability in textiles, especially spinning, the great shipbuilding firm of Gourlays finally went into liquidation after desperate attempts to re-equip itself and survive. Naturally, the American Presidential Election of 1909 was watched with great interest in Dundee and when the American tariff on 60-inch hessians was reduced to the same level as that on 40-inch hessians, the prospects for Dundee manufacturers brightened notably. Even so 1910 and 1911 were dull years for the local textile trade with a deal of short time both in Dundee and in the Calcutta mills, relieved only by spasms of activity for the Argentine market.

In 1912 revival in the American market heralded the last pre-war boom in Dundee textiles. Despite oft-repeated fears of Calcutta competition and high-priced raw materials, Dundee went from strength to strength in 1915. It was said that:

" There have been years, and notably during the time of the

American War, when higher prices were obtained for cloth, and when a limited number of members of the jute industry made their fortunes, but never was there a year when paying rates were so unwaveringly maintained ..."

Raw material prices soared until jute approached flax. It made no odds except to make substantial financial resources even more important, so when in August 1914 war supervened on a relatively slack period in Dundee textiles, the industry was bigger and more heavily capitalised than ever before. The situation was unhealthy for Dundee had entered the twentieth century as a one-industry town set in a one-industry region. Furthermore both wages and profits in the overwhelmingly preponderant textile industry were gravely threatened by foreign competition. Viewed with historical hindsight the steps which led to this situation possess an inexorable quality. Unreliable and costly flax supplies led able entrepreneurs to substitute the cheaper jute fibre. Enormous profits in the 1850's and 1860's led to concentration on a narrow range of products and to gross over-extension of the industry which continued in the more troubled 1870's and 1880's in an attempt to squeeze a big return from a very large production of materials which were yielding only the most slender profit-margin. The traditional dependence of the towns of the hinterland on Dundee for supplies of spun yarn made it switch to the cheaper fibre, though Brechin and Inverbervie, with their own water-powered flax-spinning mills, and Montrose and Arbroath, with their own port-facilities, retained a degree of industrial autonomy.

By 1900 many different shades of opinion in Dundee realised that the economic development of the town was dangerously lop-sided. The Dundee Social Union's Reports on the condition of the working people,⁵⁷ the reports of the Chamber of Commerce on the uncertainty of profits,⁵⁸ the Town Council's minutes on the unemployed,⁵⁹ all led to the conclusion that the town needed some diversification of industry.

Unfortunately factors leading to investment in new industry were absent. First, the longevity of many able Victorian jute and flax barons tended to stultify initiative amongst their sons, while the sometimes capricious speculative investments indulged in in the 19th century taught caution rather than enterprise in handling money. Some observers, like Professor Saul, have asked why more progressive entrepreneurs with capital at their disposal did not break into Dundee jute. Even if the fierceness of foreign

competition had not discouraged outside investment, the intimate network of personal relationships within which trading was conducted in Dundee textiles would have made it difficult for a new man even to buy and sell. The Chamber of Commerce, the 'Cowgate' market, and the shipping interests were inter-connected by ties of tradition and intermarriage not easily stretched to accommodate a stranger. Significantly, the class of wealthy German Jews who had been indispensable as raw material dealers during the great decades of expansion in Dundee textiles were beginning to fade out of the picture by 1914, and they quite failed to establish a lasting foothold on the manufacturing side.⁶⁰

Transport facilities, which had played a key role in making Dundee a regional capital, ceased to have much attractive power for industry. The port of Dundee, whose development was so crucial in the 19th century, stopped developing in the early 20th century. Two shipping fleets were sold entire by local firms. A third moved to a new base on the Tyne.⁶¹ Many skilled jobs for males went *with* them, and Dundee was short of these. Indeed, its overwhelmingly female and relatively unskilled labour force seemed to offer no attraction to more sophisticated industry, though after 1945 it was repeatedly proved that Dundee workers could in fact acquire new skills rapidly.

Thus Dundee in the early 20th century was left dependent on its textile trade which was itself subject to violent fluctuation as the trade cycle waxed and waned. A broader range of products would have changed the very nature of the city. As it was, some new development did occur. The first biscuit factory north of the Forth was established in Dundee. Linoleum production, made possible by broad looms for heavy fibre which produced jute backing, had begun in Dundee and expanded. Dundee pioneered electrical engineering in Scotland. George Lowdon, an associate of James Bowman Lindsay, the Dundee scientist, set up the first dynamo in Scotland to light the Tay Bridge works in 1876. A number of factories and foundries in Dundee installed electricity in 1876-9. Lowdon introduced dynamo-driven lighting to Glasgow at Stobcross Docks and to Edinburgh at Blaikie's works. By 1912 Lowdons employed 300-350 men. It was a prime example of the failure of a new and promising industry to attract the sort of capital necessary to let it develop on a big scale.⁶² The whaling industry, which in the third quarter of the 19th century had been a growth industry in Dundee, and a heavily capitalised one at that, was

declining to extinction by 1913, because mineral oil was underselling it as an agent for 'batching' or softening raw jute, while Norwegian competition from mother ships with steam powered whale catcher vessels in attendance was more than the old-fashioned Dundee wooden-hulled whalers could cope with.⁶³ Even the development of Dundee's port was almost entirely dictated by the fortunes of the local textile industry, modified by the impact of competition from rail transport. Imports of raw jute explain most dock-development in Dundee after 1860.⁶⁴ Yet by the end of our period even the unique dynamic of textiles was waning a little.

Few mill or factory extensions occurred between 1900 and 1914. The erection of tenements virtually ceased because the return on capital was so poor.⁶⁵ Quarry owners and the only substantial local brickfield were affected by lack of demand. There was a certain amount of middle-class prosperity of a new kind. Cheap tramcar fares encouraged the construction of small villas in Downfield and Maryfield, residential suburbs of Dundee. Partly this prosperity may reflect incomes earned by the many small shareholders in the investment trusts set up in Dundee in the late 19th century. Large fortunes were undoubtedly made by a few investors especially in the Alliance Trust, but the numerous small shareholders also prospered. Undoubtedly some of the new middle-class villa owners had emerged from the artisan class by means of a period of employment in Calcutta where a mechanic could quickly become a works manager or a clerk could become a manager. Good advice on where to invest savings accumulated in India was freely to be had in Dundee and was freely taken.

But if a more comfortable style of living came within the reach of a growing middle-class, the vast bulk of Dundee's population was still harnessed to a vicious pattern of over-population followed by slump which seemed to be repeating itself at shorter and shorter intervals. Of course in the good years recreational facilities for workers improved. The picture-postcard and photographic firms of Valentines enjoyed prosperity. On one afternoon charabanc outing by Cox's workers 200 picture postcards were posted home from Montrose.⁶⁶ A roller-skating rink and several cinematographic theatres were opened.⁶⁷

On the other hand, the textile industry was incapable of checking its own propensity to over-produce. It is significant that the two exceptional

boom years of 1908 and 1912 both followed seasons when large-scale strikes had compelled employers to close plant. It was said that " The lessening of production was a factor of importance in resolving the balance between supply and demand ",⁶⁸ Yet the industry really made its profits before manufacture began, by speculating in the fluctuating raw jute market, where accurate forecasting of supply was virtually impossible. Manufacture was such a small proportion of final cost that in years when jute was cheap vast supplies of goods were rushed into world markets regardless of ultimate saturation of demand. Most of Dundee's population was enmeshed in a system of production almost peripheral to profit-making, and therefore undertaken with reckless disregard for long-term consequences.

The First World War brought temporary prosperity because the armies consumed heavy linen and jute goods in great quantities. Some acceptance of technical innovations long rejected, not by manufacturers but by buyers, was at last forced. For instance, Macgregor's hose-pipe factory finally dispensed with the last of its hand-loom and admitted publicly to power-loom weaving. The use of chlorine gas in war taught the means of transporting liquid chlorine and caused a minor revolution in bleaching methods.

But temporary boom conditions of the war did not last long enough to produce the revolution in the organisation of the industry which was needed to rescue Dundee and its region from recurrent depression. In the period which followed, the extreme individualism which characterised 19th century jute had to give way to forms of collective ownership and eventually to a degree of state control and protection. The jute barons of the Crimean War era would have surveyed this development with emotions stronger than distaste.

NOTES

1. H. U. Faulkner, American Economic History, 7th edition. New York, 1954, chapter 9.
2. Warden, p. 617
3. D. Bremner, The Industries of Scotland, Edinburgh, 1869, p. 214
4. D.A. 23 January 1855.
5. D.A. 23 February 1855.
6. D.A. 3 March 1854.

7. Ibid.
8. Graham had sat since 1852 for Carlisle, where railway development had stimulated industry, including textiles.
9. D.A. 30 January 1855.
10. D.A. 16 February 1855.
11. D.A. 2 January 1855
12. D.A. 23 February 1855.
13. Ibid.
14. Ibid.
15. D.A. 16 January 1855.
16. D.A. 5 January 1855
17. Haywards of Crewkerne, who were sail-makers. Baxters supplied the cloth which they made up into sail.
18. D.A. 1 January 1856.
19. D.A. 26 December 1856.
20. Ibid.
21. Carmichael mss. VII, p. 249.
22. Bremner, op. cit. in note 3, p. 344.
23. A Preliminary Investigation into the Industrial Archaeology of Fife by the Adult Students of Kirkcaldy Technical College, 1967.
24. Bremner, op. cit. in note 3, p. 242,
25. D. R. Wallace, *The Romance of Jute*, Calcutta, 1909, p. 7.
26. John Kerr was the surviving partner of Umpherston and Kerr, mill wrights and machine makers, with whom Charles Carmichael, the future partner in the distinguished Dundee engineering firm of J. and C. Carmichael, was apprenticed when he first came to Dundee.
27. D. R. Wallace, op. cit. in note 25, and H. Longhurst, *The Borneo Story*, London, 1956.
28. *The Jute Mills in Bengal*, Dundee, 1880, p. 3.
29. Northern Warder, 1857, clippings in Lamb Collection, Dundee Public Library, 196 B.
30. D.A. 23 January 1857.
31. "The Trade of Dundee No. 1", Lamb Collection, 196 A.
32. Ibid, Nos. 2-5.
33. Ibid, Nos. 6-15.
34. Speech by R. Sturrock reported in *Courier and Argus*, 12 October 1863.
35. "Our Periodical Convulsions in Trade", Lamb Collection, 196 B.
36. D. C. Carrie, *Dundee and the American Civil War, 1861-65*, Dundee, Abertay Historical Society Publication No. 1, 1953, p. 12.
37. Ibid, pp. 13-22.
38. D.A. 14 April 1871.
39. "Rise and Progress of the Jute Trade", *Dundee Journal*, 19 October 1872.
40. Address to Greenock Chamber of Commerce by Sir George Campbell; cutting in the Lamb Collection, 196 B.

41. Dundee Journal, 10 October 1874.
42. Campbell, op. cit. in note 40.
43. Wallace, op. cit. in note 25, chapter 5.
44. Cutting dated 30 December 1876, Lamb Collection 186 B.
45. George Armitstead and Company's letter dated 1 January 1877, Lamb Collection 196 B.
46. " Review of Local Trade in 1877", *ibid.*
47. " Review of Local Trade in 1878 ", *ibid.*
48. " Dundee Staple Trade in 1879 ", *ibid.*
49. " Extracts on Local Trade in 1880-1881 ", *ibid.*
50. D. Y. B. 1884, " Review of Local Trade ".
51. *Ibid.*
52. Wallace, op. cit. in note 25, chapter 5.
53. D. Y. B. 1885, Appendix, p. 84.
54. D. Y. B. 1886, 1887, 1889, 1890.
55. D. Y. B. 7897, " The Labour Commission—The State of the Jute Industry ", pp. 125-139.
56. D. Y. B. 1890-1902, Reports on Local Trade.
57. Dundee Social Union Report 1911.
58. Chamber of Commerce Minute Books, 1899-1900.
59. Council Minute Books, 1877-1908.
60. C. C. Aronsfeld, " German Jews in Dundee ", *Jewish Chronicle*, 20 November 1953, Lamb Collection 408(4).
61. British Association Handbook 1912, p. 264.
62. W. C. Keay, " Electrical Engineering in Dundee ", *ibid.*, p. 307.
63. S. G. E. Lythe, "The Dundee Whale Fishery", *Scottish Journal of Political Economy*, June 1964, p. 158.
64. N. J. Beckles, "Textiles and Port Growth", *Scottish Geographical Magazine*, Vol. 84, No. 2, September 1968, p. 90.
65. D.Y. B. 7972.
66. " Camperdown Jute Works ", Lamb Collection 196 B.
67. Duplicate Plans, Dundee Corporation; and D.Y. B. 7972.
68. D. Y. B. 7972.

Chapter III

TECHNICAL CHANGE IN THE DUNDEE TEXTILE TRADES

IT WOULD BE a misleading oversimplification to describe the picture of the Dundee textile trade in 1850 as the manufacture by hand of linen products and that of 1914 as the manufacture by machinery of jute fabrics. This would be misleading for two reasons: firstly, because, as has been discussed in chapter II, there was a substantial output of jute by the late 1840's; and secondly because there was fairly extensive mechanisation of the textile processes in the years before 1850. To take a very early example, we know that there was a Boulton & Watt sun and planet type engine of 20 h.p. operating in a Dundee flax mill in 1799,¹ and with the aid of Warden's list² supplemented as appropriate³ we can trace the increasing mechanisation of the Dundee mills from 1790 onwards. In 1847 there were 36 spinning mills in Dundee, with a total motive power of 1,242 h.p. and with 71,670 spindles.⁴ These experiments in mechanisation were not confined to the spinning side of the trade—Cox's had started using power looms in 1845,⁵ and Baxters' had tentatively imported skilled power-loom weavers from Aberdeen as early as 1828 and were using power looms successfully in 1836.⁶ In 1850, there were 1,587 power looms in Forfarshire and this number was growing very rapidly.⁷ As early as 1852, there was a significant emigration of displaced handloom weavers. Thus, by the beginning of the period of study of this paper, mechanisation was fairly well advanced in at least the basic processes in the textile trades in Dundee, and there was plenty of opportunity for Dundee's inventors to observe in practice the deficiencies of existing equipment and to suggest modifications. And there was by 1850 a thriving local textile machinery industry. " The steam engines which furnished the motive power for these mills (i.e. those operating in 1832) were made chiefly in Ward Foundry and some of these are still (1892) working. Others were constructed in the West of Scotland and a few in Dundee Foundry. The spinning machinery was made chiefly in Leeds and subsequently by Messrs Low, Monifieth and others among whom may be mentioned Daniel Duff; Umpherston & Kerr, by whom many of the water-wheels were made; and by Peter Borrie, Trades Lane Foundry ".⁹ The firms which served the Dundee shipbuilding and marine engineering industry could handle some of the textile engineering contracts, and as time passed the larger local textile firms tended to establish their own foundries, whilst specialist firms like

T. C. Keay's grew up as required to supplement the existing machinery and accessories industry.

A good example of the versatility of the Dundee foundries is provided by Kinmond, Hutton & Steele at Wallace Foundry. In 1838 as part of their textile engineering activities they made a breadthning machine (which stretched linen cloth after it had come from the drying stoves) for Turnbull & Co., Claverhouse, Dundee.¹⁰ In October of the same year, their railway engine "Wallace" made its first run for the Dundee & Arbroath railway. By 1856 Kinmond, Hutton & Steele had built four locomotives for the Dundee & Arbroath Railway, but they seem to have kept their textile connections throughout.¹¹

Thus, for the period of our study we have the background of an increasingly mechanised industry, and of ample opportunities for building or adapting machinery to meet a particular need. Before we go on to discuss the way in which these opportunities were used, the non-specialist reader might be helped by a brief digression on the basic processes in linen and jute manufacture.

Looking first at linen we find that after being pulled, fermented and dried the flax is "hackled", whereby with a combing action the wood is separated from the fibre and the fibre takes on a silky appearance. The next process is that the hackled fibre is twisted into a sliver of even thickness by being "roved", and the roves are then spun and bleached or dyed. Once the linen has been woven it goes through a variety of finishing processes the chief of which are 'cropping' (shearing off superfluous fibres), 'calendering' (passing through rollers to give a smooth surface), and 'mangling' (which has a less pronounced flattening action). For jute, the processes are much the same, but the different nature of the fibre imposes problems. Jute is hard and dry and therefore needs initial treatment before hackling is possible. Even after this jute is still a harder fibre than flax, and therefore imposes greater strain on the hackling machinery. The fact that jute is relatively impervious to moisture made it difficult to devise a fast dye for it and produced particular difficulty in bleaching it. So one set of urgent problems confronting Dundee manufacturers in the period around 1850 was that of overcoming the deficiencies of the process and machinery devised for flax when used for the jute fibre.

The intractable nature of jute fibre was partly overcome very quickly by the batching process, whereby jute was soaked in a mixture of oil and water — a solution to this particular difficulty was really a precondition of the manufacture of jute fabric on anything other than an experimental scale — and the problems of dyeing jute in certain colours were not overcome with the 1880's and '90's,¹² but it is instructive to examine at some length the solution to the hackling problem. We can do no better than quote the *Dundee Year Book* for 1890 : " The machinery suitable for flax was first used for the jute, but it was soon found that the new fibre put such a severe strain upon the carding cloth used that the expense involved through deterioration seemed likely to add greatly to the cost of production. The practice was to cover the cylinders with leather into which iron pins were inserted, and when these pins were broken there was no method of replacing them save by stripping the cylinders and working them apart — a work which entailed the delay of several days, besides much expense. In December 1852 a meeting of mill managers and card-cloth makers was held with the view of ascertaining whether a stronger card-cloth could not be introduced, as it was found that the leather filleting with iron pins could not withstand such a heavy fibre as jute. No reasonable escape from this difficulty was then suggested, but as Mr Worrall¹³ was then in business as a hackle-maker in Dundee, the subject was brought immediately under his notice. After much careful thought he came to the conclusion that hardwood logs or staves might be substituted for leather and that by putting straight tempered steel pins in the staves a much cheaper and stronger covering could be made ". After a dispute with his partner, Worrall introduced his new cylinders on 2 November 1853 and as the story confirms, " In a very short time the old system of carding was abandoned and the wood-covered cylinders were used with great success by all engaged in the jute trade . . . under the present arrangement the staves can be taken out, the worn-out pins removed, and the new one substituted within a couple of hours ... Mr Worrall did not patent his invention, but generously placed it at the services of the manufacturers ",¹⁴

In Worrall's cylinders we have an example *par excellence* of a technical improvement made to overcome a specific problem. We are not normally as fortunate as in the above example to be able to detect the precise circumstances surrounding particular innovations and are thus faced with a problem of causation — was the improvement designed to

broaden some particular bottle-neck in production, was it designed to save on some particular expensive input, or was it introduced to enable output to be increased against a probable expansion in demand ? Such indirect evidence that we have is mixed. For example, it looks as if labour difficulties lay behind Peter Carmichael's patent in 1846 of a flax hackling machine, because we are told that " in the beginning of 1847 . . . the hand-hacklers, who, from their erratic habits, had long been a dislocating element in the manufacture of linen, found their occupation gone ",¹⁵ But other inventions, like Laing's sack-sewing machine, patented and adapted by Robertson & Orchar in the 1880's,¹⁶ or George Cox's yarn-winding machine of 1855, displaced labour which was among the poorest paid in Dundee. One factor that should be remembered in trying to identify the main-springs of innovation is that many of the inventors prominent in the Dundee textile field, especially early in our period, seem to have been men who were interested in new ideas for their own sake. Peter Carmichael was occupied up to his death in investigation *inter alia* into the design of factory chimneys and into the causes of explosions in steam boilers.¹⁷ James Laing patented an air pump, for which, despite its lack of practical application, he was awarded the Royal Scottish Society of Arts silver medal in 1856, and an adaptation of the screw propeller,¹⁸ and William Cox turned his attention from the technical problems of processing jute fibre to devise an improved scheme for the combustion of smoke.¹⁹ Two more preliminary points should be borne in mind in any discussion of technical change. First, in many cases resistance to change comes from the purchaser of the product. Baxters had great difficulty in overcoming the Admiralty prejudice against power-woven sail canvas, and Carmichael thereupon invented a special machine for testing the strength of canvas to various specifications in order to prove that power-woven cloth was not inferior. Similarly, right up to the 1914/18 war power-looms were *not* used for the manufacture of hosepipes, because the potential buyers distrusted powerlooms. Second, it is easy to be misled if we use evidence of new invention to infer what processes were being typically used in any industry. There is a familiar gap between the performance of the most innovating and of the least adventurous firms in any industry.²⁰ This means that any single invention can take a long time to permeate through the whole of the industry. We can see this illustrated fairly dramatically in the case of the power loom : in 1836 Baxters started power-looms in Forfarshire; by 1850 there were 1,587 in the county; by 1861 the number was 5,514 and the Chamber of Commerce could report

that " hand-loom weaving is gradually being superseded by power-loom weaving "; and two years later, in 1863 there was some clear evidence that power-looms showed " grand results that have been accomplished by the ingenuity of men and by the beautiful adaptation of machinery to manufactures " that there were some 10,000 of them at work in Forfarshire.²¹ There was a gap of some 25 years between the pioneering use of power-looms in the Dundee district and their really widespread adoption. As a consequence of gaps like this, it can be misleading to think in terms of a single invention because there may well be a process of continued adaptations of the equipment so that the newest units are very different from their predecessors. We can see this influence of steady change at work at the end of our period in the history of Keay's sack printing machine—" originally only the one style was manufactured, this being known generally as the 1907 style, which was later developed into the ' H ' style machine. In 1914 the ' K ' style was introduced on to the market, the main difference in this machine being a much improved inking system giving firm control and thereby better printing results."²³

If we turn our attention to inventors, we must follow the *Jute and Flax Machinery Advertiser's* example in its "Men of Mark " series and give pride of place to Peter Carmichael. Carmichael was a Dundee man — his father ran Lower Dens Mill from 1819 — but went for training to Fairbairns at Leeds and to Manchester. By 1846 he had patented three inventions, the hackling machine we have mentioned already, a rubbing machine which helped in the weaving process by controlling the breadth of the cloth,²⁴ and a rotary gill which he had patented jointly with Peter Fairbairn.²⁵ In 1853 he produced a weft-winding machine, which involved (1) a variable spindle movement for securing the uniform velocity of the yarn, (2) the means for giving a variable movement to the guide for laying the thread evenly on the pirn, and (3) the application of a lever for relieving the hardness of the winding and for stopping the spindle when the pirn was full. In a series of experiments up to 1854, Carmichael produced a modification of the reeling machine devised by William Nairn (himself a Dundonian) in about 1845. In Carmichael's variant the machines were in two reels, eight bobbins to each reel, and could be attended by one girl. The machine stopped whenever a thread broke or a bobbin was empty, and also when the reels were full. " The reels are driven by the engine so that the girl has her hands at liberty and she thus attains a wonderful facility in knotting or tying, for in linen

every knot must be tied a good weaver's knot... a smart reeler can reel 520 spindles of flax yarn in a week of 60 hours ",²⁶ In 1858 Carmichael turned his attention to the finishing process, and worked out a method of using hydraulic pressure to hold cast-iron and paper cylinders for calendering to the correct pressure — a paper cylinder being used to prevent holes from being torn in the fabric as it passed through the rollers.²⁷

But Baxter's were not the only linen firm whose management showed a skill in devising new equipment. Just prior to Carmichael's reeling machine, G. A. Cox, of Cox Brothers, Lochee, Power-Loom Linen Works, devised in 1855 a patent self-acting yarn winding machine, with three claimed advantages — (a) that it stopped automatically when a cop or pirn was filled, (b) that there was a thumb catch to stop the action if the thread broke, and (c) there was a weight attached to an eccentric motive shaft for balancing the power required for driving the machine. The *Practical Mechanics Journal* concluded : " Superior work and a saving of time and waste, are points of gain completely realised in the example machine, which has afforded us the opportunity of remarking upon the scheme ",²⁸

Some years later, another member of the Cox family was bringing out improved equipment for the jute industry. William Cox was a recognised expert on the technicalities of power looms, but his major contributions were an improvement in hydraulics in jute baling, whereby the weight of a bale was raised from 300 to 400 lbs. with no increase in its size, and a new type of jute batching and softening machine.²⁹

The other major source of inventions seems to have been the specialist manufacturers of textile machinery and accessories. By far the most prolific of these seems to have been Joseph Lindsay who, after moving round various Dundee foundries and mills, was a co-founder of Urquhart, Lindsay & Co. In 1867, after only two years of activity, the firm patented two inventions, an improved power loom with an uptake motion which removed the need for change wheels,³⁰ and a spiral fluted roller for jute and flax softening machines. In conjunction with Thomas Bell of Belmont, Lindsay patented a power-loom for weaving 8-yard cloth (the basis of floorcloth) in 1871, and Lindsay on his own produced a series of inventions in the 1870's and 80's — a patent mangle, a cop-winding frame, a yarn-dressing machine, a double cropping machine and

a hydraulic calender and conoido-helical-bevel wheels.³¹ Lindsay's inventiveness was outstanding, but most of the major Dundee textile machine-makers developed their own specialities through the use of patents. Thus by the 1890's, Robertson Orchar at Wallace Foundry were specialists in winding, softening and dressing machines and in mangles; Lawside Foundry in bale-opening equipment and in calendars; Thomson Son & Co., Douglas Foundry, in crushing, softening and bleaching machinery; Keay's in shuttles, buffalo pickers and sack-printing equipment, and so on.

Not all the Dundee inventors were managers or employees of textile or textile accessories firms. In the natural course of events, the more successful of the " free-lance " inventors joined one or other of the relevant firms, but some of the important inventions were made by men working in space allowed them by owners of foundries or mills. Most notably, Laing invented his sack-sewing machine in space allowed to him by Carmichaels of Ward Foundry and it seems that he lacked the capital to use his patent and so sold it to D. R. Dawson for development.

When we try to place these various inventors in the context of technical change in the linen and jute industries as a whole, the pattern seems rather complicated. Throughout the whole of our period there were major specialist firms especially in Leeds and Belfast producing equipment for the linen trades. Some of this equipment required major adaptation to cope with jute fibre, and these adaptations seem mainly to have been made in Dundee. Similarly, but on a less dramatic scale, there had to be alterations in the flax-handling equipment to compensate for the decline in the quality of flax after 1860 (hence, for example, the new flax softening roller devised by Lindsay in 1867). Thus we have firms dominant in some of the specialised products — " One hundred of the new and powerful hydraulic mangles required (for calendering) were turned out in the Dundee foundries last year "³² •— whilst there was a persistent though never complete tendency for major equipment, especially engines, to be brought to Dundee from outside. Although the Dundee foundries could supply the size of steam engine required in the 1830's and 40's, by the 1880's the power equipment for most major mill extensions came from outside Dundee. When Grimonds built an extension to Bowbridge Works in 1885, the new (if rather old-fashioned) beam engine that they installed was made by Hicks, Hargreaves & Co. of Bolton.³³ In 1890, when new engine-houses were put up at Constable

Works, Ann Street Works and Edward Street Mill, the engines which were of the latest style — inverted, triple-expansion, surface-condensing — came from outside Dundee.³⁴ But a further extension at Bowbridge Works in 1891 was powered by what was then the largest engine in Dundee, a marine type triple-expansion engine of 12,000 h.p., and which was made in Dundee by Messrs W. D. Thomson & Co.³⁵

It is difficult to build up a clear impression early in our period of the extent to which individual items of machinery being used in Dundee mills were made in Dundee, as opposed to bought from elsewhere. But by the 1890's, the range of advertisers in the *Jute and Flax Machinery Advertiser* gives some guidance, and there is even more revealing information in the list of makers of second-hand machinery advertised as being for sale. The following firms advertised themselves as being makers of specific machinery for the textile industries: Fairbairn, Naylor, Macpherson & Co. of Leeds (preparing and spinning equipment only); Robertson & Orchar, Wallace Foundry, Dundee (most processes); Samuel Lawson & Sons, Leeds (most processes); Lee, Croll & Co., Lawside Foundry, Dundee (most processes); Thomas Fleming Sons & Co., Halifax (leather goods for all processes); Thomson Son & Co., Douglas Foundry, Dundee (most processes); Edward Lucas & Son, Sheffield (spindles); Combe, Barbour & Combe Ltd., Belfast (general machinery); Charles Parker Sons & Co., Victoria Foundry, Dundee (most processes); Kimball & Morton Ltd., Glasgow & Dundee (tubular sack-sewing machine); James F. Low, Monifieth Foundry (most processes); Frank Stewart Sandeman, Manhattan Works, Dundee (patent cotton belting); Halley Bros., South Ward Road, Dundee (hackles, gills, card pins, etc.); and Batchelor & Keay, Dundee (sack printing machines). Many other local firms were, of course, operating as general mill furnishers, or prepared to supply castings, etc. to order, but it is probably more significant that, of the firms offering specific machinery and equipment for textiles, eight were from Dundee and six from elsewhere — Dundee firms were the dominant, but by no means the only, advertisers in a Dundee-based trade journal.

The details of the second-hand machinery offered for sale are perhaps even more illuminating. The full information is summarised in the table of Appendix 4(a), but the most striking patterns are that the Leeds firms dominated the market for drawing and roving frames, Low's

of Moni-fieth were the chief makers of spinning frames, and Combe, Barbour & Combe of Belfast were very important in the long line winding frame manufacture. But generally the pattern of Appendix 4 (a) is mixed — in most types of equipment the Dundee firms were operating on a par with their competitors, notably from Leeds, with no very obvious dominance.³⁶

We can get a further indication of the importance of Dundee as a textile machinery centre by looking at the information we have about exports of Dundee machinery overseas. Regrettably, this is a rather suspect source of information, insofar as jute mills were financed by Dundee money, and staffed by Dundee technical experts. But the export of machinery from Dundee was not associated purely with the jute mills — in 1845 Baxters had shares in a flax mill at Ailly and sent some Dundee machinery to it, notably William Nairn's reeling machine. The first overseas jute mills were certainly typically equipped with Dundee machinery : the first Indian spinning mill, built in 1855 by George Ackland, was furnished with machinery sent out by John Kerr of Douglas Foundry, and the first jute factory in Europe outside Scotland, which was set up at Braunschweig in 1866, had Dundee machinery (and management).³⁷

In 1887, we are told, Dundee manufacturers built mills in Dunkirk because the labour there was cheaper and there were fewer trade disputes.³⁸

How far the Dundee influence on the ownerships and control of the Indian jute mills extended is a matter for some dispute,³⁹ but they seem to have drawn nearly all their equipment from either Dundee or Leeds.⁴⁰

We cannot tell the full story of technical change in the Dundee textile trades without some attention to the architecture of the mills, as opposed to the machinery in them, and we now turn to a brief examination of this topic.

The possibility of making technical changes was not, of course, confined to bringing in new machinery. The lighting and powering and indeed the very construction of mills were all fields in which technical change of considerable importance was taking place during our period.

Gas, supplemented as necessary by oil lamps, was the normal medium of lighting in the 1850's.⁴¹ But by the late 1860's, alternative lighting means were being examined. Inspired by a dispute over the

ownership of the Dundee Gas Works and by the possibility that the price of gas might therefore rise, Carmichael and a photographer from Perth experimented in the use of lime light in 1868, finding that the light was highly satisfactory in quality, but not an economic proposition.⁴² In the 1870's, the possibility of electric lighting was being actively examined, and George Lowdon of Dundee set up the first firm of electrical contractors in Scotland in 1876. Lowdon introduced to Scotland the French gramme dynamo with a service lamp, exhibiting the equipment in Dundee High Street, with the dynamo standing on the pavement and the lamp slung over two ladders.⁴³ The introduction of electric light in mills was not however free from troubles — " Our neighbour, Sandeman's (Manhattan Works) tried the electric light in his weaving factory. It was quite a failure ",⁴⁴ (1882)—and Lowdon could not convince some of the Dundee manufacturers that electric lighting was an economic proposition. Lowdon claimed that the cost of gas per burner per annum in Dundee factories varied from 4/9d to 9/4d. Carmichael questioned these calculations, claiming that in Dens the cost of gas per annum was 3/10³4d per burner, " and I believe we illuminate our works as well as or better than most. We do not grudge light, but we do hate waste ",⁴⁵ By 1890, however, Lowdon's could claim; " Electric lighting in jute and linen mills and factories a speciality ",⁴⁶ and the use of electric *power* had become general by the early years of the twentieth century. In 1905, for example, Hillbank Works was converted to electric power supplied by two steam turbine driven generators.⁴⁷

The stages of evolution that took place in mill-building⁴⁸ resulted partly from the availability of "new materials, like sawn stone slabs for mill flooring, or like reinforced concrete, but mainly from attempts to overcome the dangers of fire, ever-present in textile mills. In the 18th century mill designs considerable fire risk arose primarily from the wooden floors and joists. By the opening years of the 19th century, however, the first successful attempts to substitute cast iron for wood had been made and the first fireproof mill in Scotland had been started in Glasgow in 1804.⁴⁹ The Bell Mill, or West Ward Mill, of 1806 was Dundee's first fireproof mill,⁵⁰ and further fireproof mills followed in 1828 (" Coffin Mill ") and 1832 (Wallace Craigie). These early fireproof mills were, however, rather cramped for floor space because the columns were rather close together, and had inadequate attic flats. These problems had been overcome by 1850, when Upper Dens, designed by Randolph

Elliot of Glasgow and Peter Carmichael, was constructed to the latest pattern. The pattern established at Upper Dens was followed almost exactly at Lower Dens (Carmichael again, 1866) and at Ward Mills in 1867. In 1885 a very interesting extension was completed at Bowbridge.

The extension was designed to balance an existing building, and superficially it resembled the earlier part, but the roof of the older building had a tie-beam construction whereas in the extension the attic had " cast-iron couples, with moulded open panels . . . which have quite an elegant effect. These couples are supported upon two rows of columns and their graceful curves are in contrast to the squareness and angularity common to mill architecture ".⁵¹ In short, the extension at Bowbridge in 1885 was built to the same basic pattern as Upper Dens in 1850. The same type of construction was used even in 1891, when the North Tay Street mill was constructed. But although the perfected fireproof design with cast iron columns and spans was the latest pattern in 1850, by the time the Bowbridge and Tay Street buildings were being erected new and improved constructions — e.g. with flat arches of hollow tiles — were commonplace and allowed much more free floor space. It was not till about 1909, when the King Street mill designed by Robert Gibson was constructed, that reinforced concrete was used in Dundee.

Other special precautions against fire — necessary because jute smoulders with great heat, and when doused with water it expands and therefore threatens to destroy the walls by which it is contained — are mentioned with evident pride in the years around 1900, and we would therefore seem to have indirect evidence that they were not much observed before then. For example, in 1913 a description of Caird's Ashton works thinks it worth commenting on the fire precautions — that the warehouse walls were 3 feet thick, that bales of jute were never put less than 10 feet away from the walls, and that the spinning room was equipped with 4,000 Hoffman sprinkler heads, 10 feet apart.⁵² The idea of having a works fire brigade was introduced in Dundee about 1890 by Grimonds at Bowbridge and Maxwelltown Works. " The whole time occupied from the ringing of the alarm to the turning on of the water seldom exceeds two minutes. The warehouse and departments where spontaneous combustion is most likely to arise have had special care bestowed upon them. Thermometers are fixed to the ceiling and should the heat arrive at 105°F the alarm is given. The firemen's houses are

connected by electric bells to summon them during the night or meal hours. On a recent occasion Captain Young went into Maxwelltown Works at 1 a.m. and pressed a button which sounded the alarm at Bowbridge Lodge. The attendant called the firemen, who turned out and arrived at Maxwell-town Works — a distance of 400 to 500 yards — and turned the water on, only six minutes after the Captain pressed the button",⁵³ It is perhaps of interest to note in passing that the water the firemen turned on did not come from the public water supply; in a manner harking back to the problem of the water power days in Dundee, the basement floor at Bow-bridge was equipped with two small engines, one of 14 and the other of 10 h.p., one of which drove a centrifugal pump to circulate the cooling pond, and the other of which pumped water from a well, 240 feet in depth, below it. " This well supplies Bowbridge and Maxwelltown Works with water and saves the cost of the public water supply ",⁵⁴

If we were to try to read a single conclusion out of the variety of the evidence about technical innovation in the Dundee textile industries, it would at least on a first approximation run on these lines : in the first decade or two covered by this study, innovation was going on pretty rapidly, even if on a ' makeshift' basis, and tended to incorporate what were, in national as well as local terms, the latest ideas. The 1870's and 80's seem to have been relatively sterile : the ideas of the previous generation were followed without much critical examination, and indeed some of the great pioneers like Carmichael were still alive but had lost the vision to anticipate the future. In the 1890's onward, there was more of a conscious effort to innovate, but by then technical innovation alone was incapable of changing the fundamental economic position of the industry which was dictated by the continuing existence of relatively few but still buoyant markets for its main traditional product. Ingenuity was therefore spent on increasing the efficiency of a jute trade in which it was still possible, in the recurring boom, to make a lot of money. Only after a long period of depression and a complete change in its attitude to research and development did the Dundee textile trade turn to the man-made fibres in which its future in the second half of the 20th century may lie.

NOTES

1. Boulton and Watt mss., Birmingham Public Library. This engine was sold to George Wilkie for £750 and was subsequently sold to J. and W. Brown on whose property the mill had been built.
2. Warden, p. 656.
3. Especially by the article, "Reminiscences of Dundee's Trade : The Cowgate 70 Years Ago", D.Y.B. 1892, pp. 90-99, and by Lamb Collection No. 196/119.
4. D.Y.B. 1890, p. 98.
5. D.Y.B. 1885, p. 78.
6. Warden, p. 614.
7. R. Sturrock, "Staple Trades of Forfarshire " — Paper read at the meeting of the Social Science Congress in Edinburgh, 10 October 1863.
8. D.Y.B. 1882, p. 101.
9. D.Y.B. 1892, p. 95,
10. Turnbull & Co., Ledger A, p. 23.
11. S. G. E. Lythe, "Dundee and Arbroath Railway ", Railway Magazine, August 1951, p. 546.
12. See, for example, D.Y.B. 1890, p. 95, or Warden.
13. Peter Worrall, of Worrall, Hallam & Co., hackle and sill makers, Willison Street and Barrack Street.
14. D.Y.B. 1890, pp. 101-2.
15. D.Y.B. 1891, p. 81. There is, however, an element of exaggeration in this claim. Some hand hackling continued into the late 1880's, but in 1889 it is stated that "preparing flax by hand is now almost an extinct trade" (D.Y.B. 1889, p. 67). The militancy of the flax-dressers seems to have survived their mechanization and was manifested most clearly in their strike in 1871.
16. D.Y.B. 1886, p. 68.
17. D.Y.B. 1891, pp. 81-3.
18. D.Y.B. 1886, p. 68.
19. D.Y.B. 1894, p. 95. Carmichael's own belief about invention was that it is foolish to set out to try to be an inventor: all good inventions surely evolved out of the need for them during the ordinary course of work. Invention was a long, slow series of small improvements, mostly, in his case, to improve the "beauty and precision of the machine as an end in itself". (Carmichael ms. letter, 13 October 1852.)
20. For an economist's analysis of this phenomenon, see K. Maywald, "The Best and Average in Productivity Studies and in Long-term Forecasting", Productivity Measurement Review, No. 9, 1957, pp. 37 ff.
21. Sturrock, op. cit. in note 7.
22. Thomas C. Keay Ltd., Commemorative Brochure 1879-1949, Dundee, 1949.
23. Unless otherwise specified, in what follows the dates quoted will be those of the patenting or first using of the equipment; and largely because of the paucity of material, there will be little attempt to trace minor adaptations, even though these may have been cumulatively very important.
24. This machine had right and left spiral rubbers, and tension rollers, to adjust the breadth of the cloth, thus eliminating "temples". At the same time, a "flattener" was introduced to improve the beaming of the warp on the dressing machine.
25. The rotary gill replaced the screw gill. The irregular action associated with the screw gill produced an irregular sliver of flax and thus made it impossible to produce an even yarn. Fairbairn's part in the patent seems to have resulted from a visit by Fairbairn to Baxters to see all the improvements Carmichael had been making.
26. Carmichael mss., vol. 2, p. 188.
27. Most of this information is in the obituary notice of Carmichael,

- D.Y.B. 7897, pp. 81-3.
28. Practical Mechanics Journal, vii, 1855.
 29. J.F.M.A., April 1891, D.Y.B. 7894.
 30. This machine won a bronze medal in a Paris exhibition, presumably in 1867.
 31. J.F.M.A., June 1891.
 32. D.Y.B. 7890, p. 101.
 33. " Compared with the simple horizontal steam engines now put together this style of engines looks cumbrous and complicated. But its very ponderousness is an attraction to spinners, its heavier weight ensures all the steadier running, and steadiness is the chief requirement for fine spinning. Each engine has two cylinders, high and low pressure, and will work at 700 indicated horsepower. The fly-wheel works directly upon a toothed wheel underneath which carries the power to the main upright shaft ..." D.Y.B. 7885, p. 57.
 34. D.Y.B. 7890, pp. 82-3.
 35. J.F.M.A. 7897 and D.Y.B. 7897, p. 10.
 36. The information in this and the preceding paragraph comes from J.F.M.A. December 1890-August 1891.
 37. T. Woodhouse and A. Brand, A Century's Progress in Jute Manufacture, 7833-7933, 1934.
 38. G. Phillips Bevan, " The Industrial Classes and Industrial Statistics "in British Manufacturing Industries, 1877.
 39. D.Y.B. 7884, discussion of ownership of Calcutta factories.
 40. D.Y.B. 7894, p. 113; "With coal and iron in abundance, the time cannot be far distant when the people here [sc. in Calcutta] will cease to send to Leeds and Dundee and Monifieth for their machinery and will make it on the spot ".
 41. Kirkland Mill, in Fife, was the first in Scotland to be lit by gas when the Boulton & Watt apparatus was installed in 1810. Warden, p. 537.
 42. Carmichael ms. letter, 6 May 1868.
 43. Scottish Electrical Engineer, March 1965.
 44. Carmichael mss., vol. 3, p. 197.
 45. Ibid, p. 177, 22 September 1881.
 46. J.F.M.A., December 1890.
 47. Records of James Scott and Sons.
 48. We are indebted for much information in this paragraph to Mr D. M. Walker.
 49. A. W. Skempton and H. R. Johnson, " The First Iron Frames ", The Architectural Review, vol. 131, January - June 1962, pp. 175-186.
 50. Lamb Collection, 196/119.
 51. D.Y.B. 7885, p. 58.
 52. Gentleman's Journal and Gentlewoman's Court Review, 15 March 1913; " Supplement on British Industries No. 10—Jute Manufacture ".
 53. J.F.M.A., June 1891, p. 46.
 54. Ibid.

Chapter IV

THE WORKING CONDITIONS OF THE PEOPLE OF DUNDEE

BEFORE 1850 numbers of workers had abandoned the mills and factories every summer for farm work.¹ Such opportunities became fewer in the second half of the century. Management and discipline in the mills became stricter and a pool of unemployed ready to slip into vacated jobs made temporary, unofficial holidays impossible. An unrelieved working year brought a need for organised recreational facilities. The most important of these was provided by cheap modes of transport. The transport revolution did not affect the means of getting to work until the end of the century. On half days and holidays, however, the situation was very different. Rival railway companies ran excursion trips to Arbroath, Perth, Newtyle, which attracted jostling crowds.² Steamers ran upriver to Newburgh and even out to sea as far as the Bell Rock.³ Charabancs took parties into the country. "We generally take the opportunity of visiting friends in the country . . . also during the summer the directors of the various conveyances both by sea and land arrange a number of cheap pleasure trips on the Saturday afternoons, which trips hundreds of our factory workers, after being confined all week find it their duty to indulge in".⁴

Many workers in mid-century Dundee were still hardly accustomed to being confined all day. In the fifties a very large proportion of the working population and an influential number of employers were country people born and bred, many of them Irish, some of them Highlanders, the greater part Angus folk drawn to the town by the failure of hand loom weaving.⁵

In 1847 the campaign for factory reform had culminated in the passing of Fielden's Ten Hours Bill, which limited the employment of women and young persons in mills and factories to ten hours per day and 58 per week. Passed during a severe depression in which unemployment was so widespread as to allow employers to engage labour on almost any terms, the Act was less effective than the factory reformers had hoped.⁶ It is clear that still, in the second half of the century, the protection given by law to the working population of a town like Dundee was inadequate. Not only were many workers not covered by existing laws but the

enforcement of such laws as there were was ineffective.

The restriction of the hours of labour applied only to those employed on the premises of mills and factories. Many women and children were employed by millowners as domestic outworkers on piece work rates so low as to enforce round-the-clock working. Sack-sewers, for instance, paid at the rate of 2½d per sack, sewed during all their waking hours and fell asleep upon the heaps of sacks. Laing's overhead sack-sewing machine, the introduction of which gradually put an end to the domestic work of thousands of sack-sewers in Dundee, was not introduced until 1884.⁷ Yarn-winders, open-air bleachers and calenderers were among those still not covered by the acts.

The circumstances of those outside the mills made it possible for men like James Stuart to claim that " the employment of young persons (in mills) would be the most desirable occupation within doors for the numerous class of young persons who must labour for their subsistence ".⁸ But conditions varied very much between the best and the worst mills. For instance wet-spinning, a flax process widely used in Dundee mills, was said to be " certainly the least healthful branch of manufactory. I witnessed a more painful sight again and again in beholding the miserable unhealthy looking beings in the wet-spinning and wet-dressing departments than in all the other parts of the many factories I have now visited ".⁹ Baxter Bros, had by 1846, introduced iron frames in front of the spindles which protected workers from the spray of hot-water. But in other places children were soaked all day, standing for twelve or thirteen hours in drenching hot spray which sometimes reached 110°. They suffered from very sore chapped hands and frequent ill-health caused by standing bare-footed on the wet stone floors. An Act of 1844 had provided that people so employed should have adequate protection but "mill-owners were very slow to comply ".

Enforcement of the law depended upon the making of reports by factory inspectors. Serious doubts must be cast upon evidence about Dundee in the Reports of the Factory Commissions for the mid 19th century because of the character of James Stuart. In 1840 a select committee on mills and factories expressed some surprise that while Horner, inspector for factories in the North of England, had made more than 600 prosecutions, Stuart had made none. The committee added "Can

you assign any reason why, when the law is universally observed in Scotland, it should be broken so regularly in England?"¹⁰ Stuart referred to the superior character of Scottish mill-owners. His claims were destroyed however by evidence from his two superintendents in Dundee who reported that Stuart never went inside factories, always accepted the owner's word that all was well within and that he insisted on Wood's and Beale's reports, when adverse, should be altered before being sent to head-office.¹¹ Wood kept the altered reports because " I thought that at some time or another a Committee would sit and enquire into the working of the Factory Act and I was sure that the alterations and omissions in that paper were altogether wrong ",¹²

The same series of reports showed how little assistance medical gentlemen had been in affording protection to the working people of Dundee. Paid 6d a time for issuing certificates of age and fitness to work to children seeking employment in factories (the 6d paid by the child, not the mill-owner) they seldom refused to issue one and it was suggested that " surgeons in the district are very lax and careless as to the mode of certifying ",¹³ and that " it is not always clear that the baptismal certificate in question has reference to the particular child". Although children were paid by the clerk to the works they were engaged by the overworker. It was perfectly possible and very common for the ownership and management of a mill to have little knowledge of the young persons working in their mills or the manner of their engagements, as was shown by Peter Carmichael's evidence to the Select Committee in 1840.¹⁴

Due to the legal requirement that children receive some education up to the age of thirteen after 1876, trafficking in birth certificates was still a common practice at the end of the century. In a town where jobs were relatively scarce, as they were between 1875 and 1900, a certificate allowing a child to leave school and take employment was a valuable commodity. To employers in a low profit industry the employment of young persons at low wage rates made sense even if it did mean that grown men remained unemployed. It was this factor which made the " half-time system " last longer in Dundee than in any other town. Half-timers were employed in the mills for either ten hours every alternate day, in which case the next day was spent in the mill school, or from 5 a.m. until 11 a.m. at work with the period after mid-day dinner until 6 o'clock in school.¹⁵ They were most usually employed as ' shifters', under the

direction of a mistress shifter with whistle and tawse hanging from her belt. Their occupation was thus described in 1881: "In an instant all the little hands are busy. The thread of half-spun yarn above the flyer was broken off, the flyer unscrewed, the bobbins slipped off the spindles, tossed into a skip, empty ones, which they took out of a bag hanging at their waist, set in their places, the flyers screwed on again, the broken ends drawn down and twisted through them and all again ready for action"¹⁶

Until 1891 the children thus employed and earning between two shillings and three shillings and seven pence a week, were aged from 10 to 14. The Chamber of Commerce minutes recorded 'the almost wonderful unanimity which prevailed in Dundee between the employers and the workers as to the keeping of the children's age at 10 years'.¹⁷ There seems in this instance and at this period to have been complete acceptance by the working people of values imposed upon them by the employers' view of the needs of the staple industry. In 1891 the age was raised, by a slim majority in the House of Commons, to 11. At first there was some diminution in the numbers of children employed but by 1897 the General Report of the committee of council on education in Scotland noted 'a considerable increase in the number of half-timers, owing to the great demand for labour in the jute mills and factories'. Dundee was now the only city in which the half-timers system was considered a problem by the school inspectors. Half-timers were common in some country areas where children were employed seasonally as game beaters or in harvest but their time out of school was at least healthfully occupied.

The certificate of age allowing a child to work half-time in the mill operated as some check on evasion of the shift system but the ease with which certificates were obtained in Dundee destroyed the efficacy of this check. The School Board in Dundee was so heavily influenced by the views of the important mill-owners that certificates exempting children from school were given to all who applied for them. The trade needed half-time children to keep wages down. The School Board therefore made children available for half-time employment. All other school boards in Scotland took parents' circumstances into account, putting forward only the names of those children whose homes they considered necessitous.¹⁸

The Education Act of 1901 raised the age of half-time children from

11 to 12. The School Board was now no longer left to its own discretion, the Education Department having powers to call for return to full-time school of children illegally exempted. The Chamber of Commerce remarked on the probability that when the Act had been some time in force very little of the half-time system would remain.¹⁹ In fact in 1903 Dundee employed more than 2,000 half-time children.

The half-time schools which had been attached to the various works were closed down one by one during the period 1890-1900. This meant that the public schools had to find room for large numbers of children so displaced. The Education Acts brought an increasingly large number of children into the net of compulsory education but left it to local school boards to find room for them. Secondary education was pressed on with in Dundee. Grove Academy, in Broughty Ferry, for instance, increased in size and importance, but primary schools in poor areas were neglected. In spite of warnings by school inspectors, no new school building took place in areas desperately in need of primary places, such as the top of Hilltown, where many children were turned away for want of room. The result was that children often did not enter school until too late. 'Infant' classes had children of 10, 11, even 13, in them. This made it impossible for them to reach the standard envisaged by the framers of the acts before they reached the permitted school leaving age.

Dundee had no teacher training college until the First World War, the last of four Scottish cities to have one. By the 1880's, Edinburgh had 3, Glasgow 3, Aberdeen 2. This made Dundee more dependent upon the pupil teacher system than the other cities and the ratio of pupil teacher to trained teacher was too high.

The buildings in which the children and their parents worked were, it was often pointed out, more comfortable than their homes. Dundee had suffered particularly badly in the typhus epidemic of the forties and in the cholera outbreak of 1849. Widespread belief that disease was air-borne had encouraged an interest in ventilation which the prosperous trading of the late 1850's allowed mill-builders to indulge. The jute and flax mills and warehouses built during and after the Crimean War were massively dignified in outward appearance, airy and well-lit within. Some thought was given, as it had not been in early flax and cotton mills, to adequate spacing between machines. Care for the fibre emphasised the need for control of humidity and temperature even had the workers' health not

been considered. Workers, in fact, often complained against the ventilation imposed upon them by employers who had accepted pure air as a health safeguard. For the workers the warmth of the mill had been one of its few advantages.

Middle class Dundonians found it remarkably easy to discount the disadvantages of mill-work, and descriptions of mills contain many statements like this : " owing to the large and airy nature of the room . . . the dust and fluff were not at all oppressive and everyone was comparatively clean . . . the particles given off by the flax were perfectly harmless although taken into the systems, because they were of vegetable origin ... it seems that every newcomer has a touch of what is called ' mill fever'; thereafter the system accommodates itself to its altered conditions and no more disagreeableness is experienced ".²⁰ That the " disagreeableness " had its effect in spite of the system's accommodation to it was shown in the diminished stature and lack of robustness of workers whose families had been employed for generations in Dundee. The annual report of the Chief Inspector of Factories and Workshops to the Home Secretary in 1901 remarked on the numbers of men not more than five feet tall and less than nine stone in weight. Dundee boys of 11-12 years were on average 4½ inches shorter than country boys of the same age and a stone lighter.

The sanitation of mills had received some attention throughout the 19th Century but there were few employers before 1850 who followed William Brown's example of reforming the whole waste disposal system of their works.²¹ The "water row" between the Joint Stock Water Company and the Dundee Town Council in 1831-7 had disclosed the alarmingly complete lack of sanitation in the town. In 1849 the cholera epidemic again drew public attention to the noisome ponds which attended every mill, acting not only as cooling ponds and reservoirs for the steam engines but as receptacles for the effluent of mill privies.²² But it was not until 1867 that the Public Health (Scotland) Act²³ gave powers to reform the sanitation of towns and not until after 1871 that water was brought into the town in quantity sufficient to make the implementing of those powers effective.

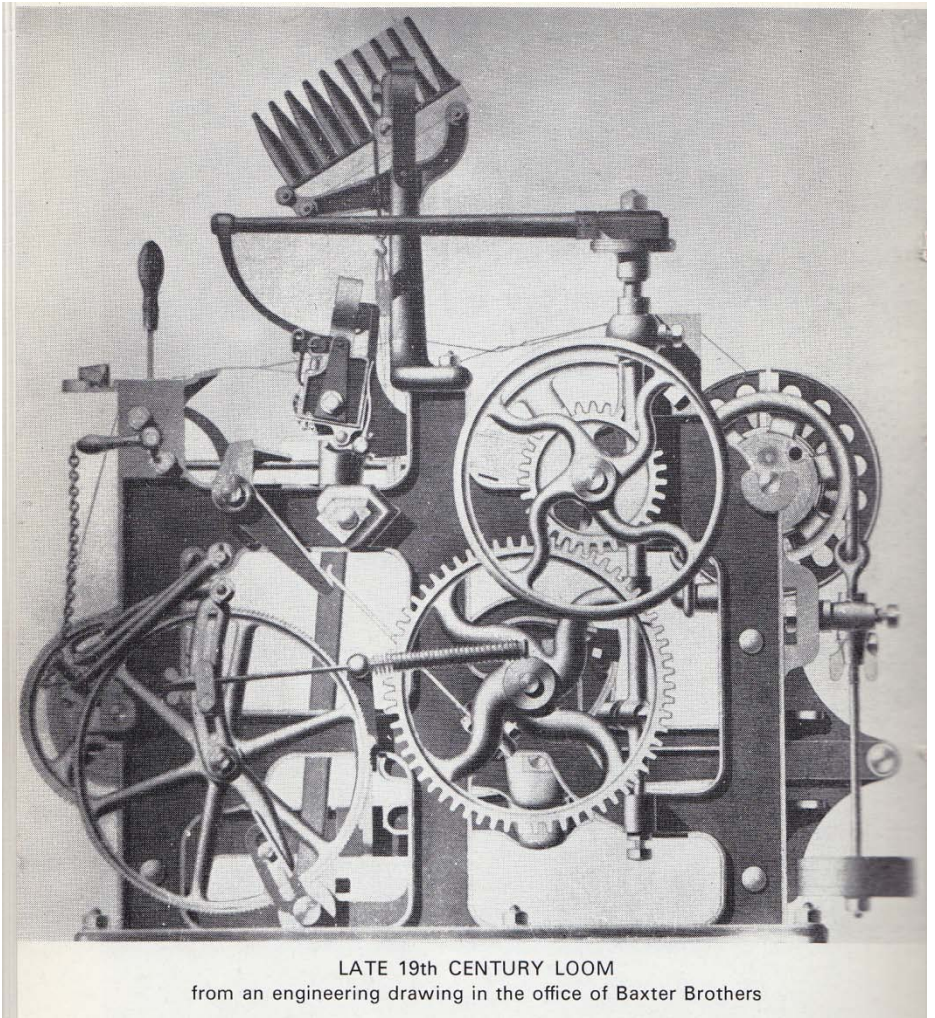
Until the introduction of piped water the risk of fire in mills and warehouses remained very high. Although that risk had been reduced by

(i)



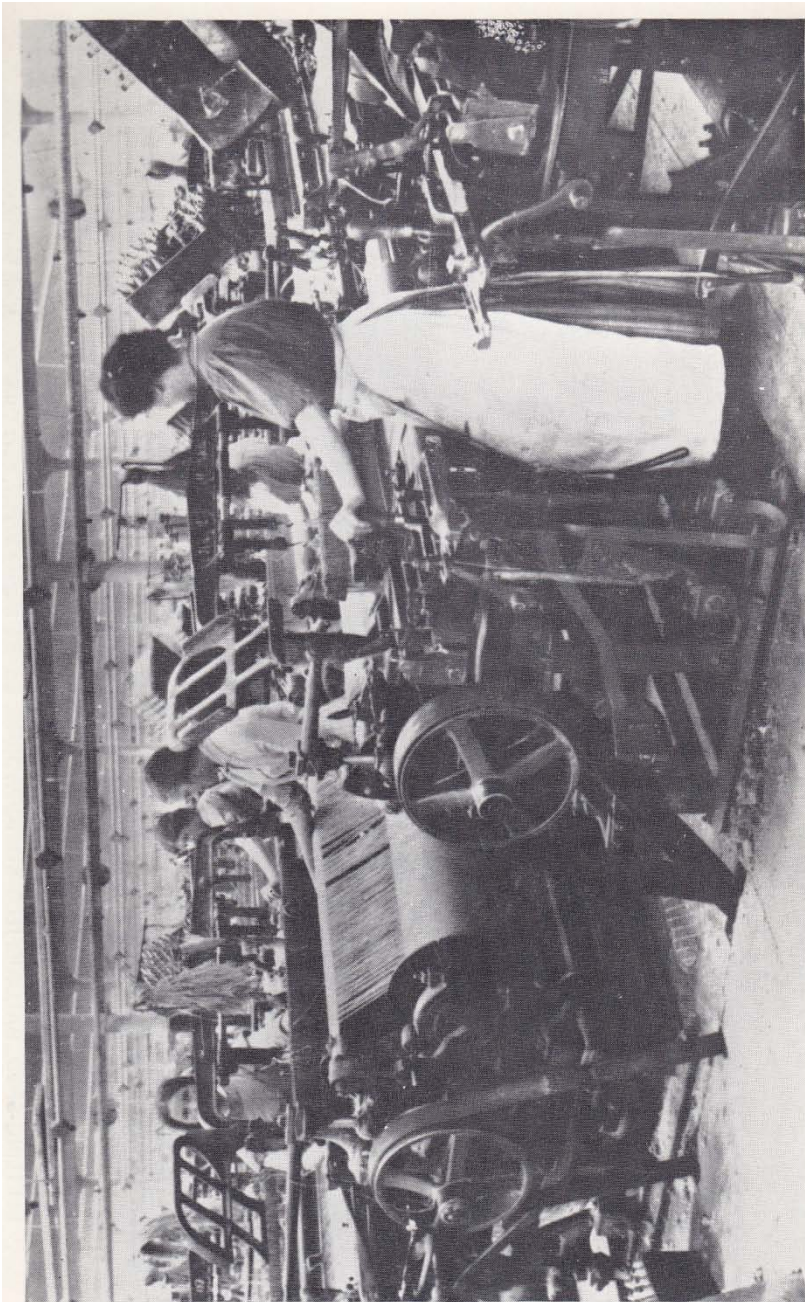
DUNDEE HANDLOOM

(ii)

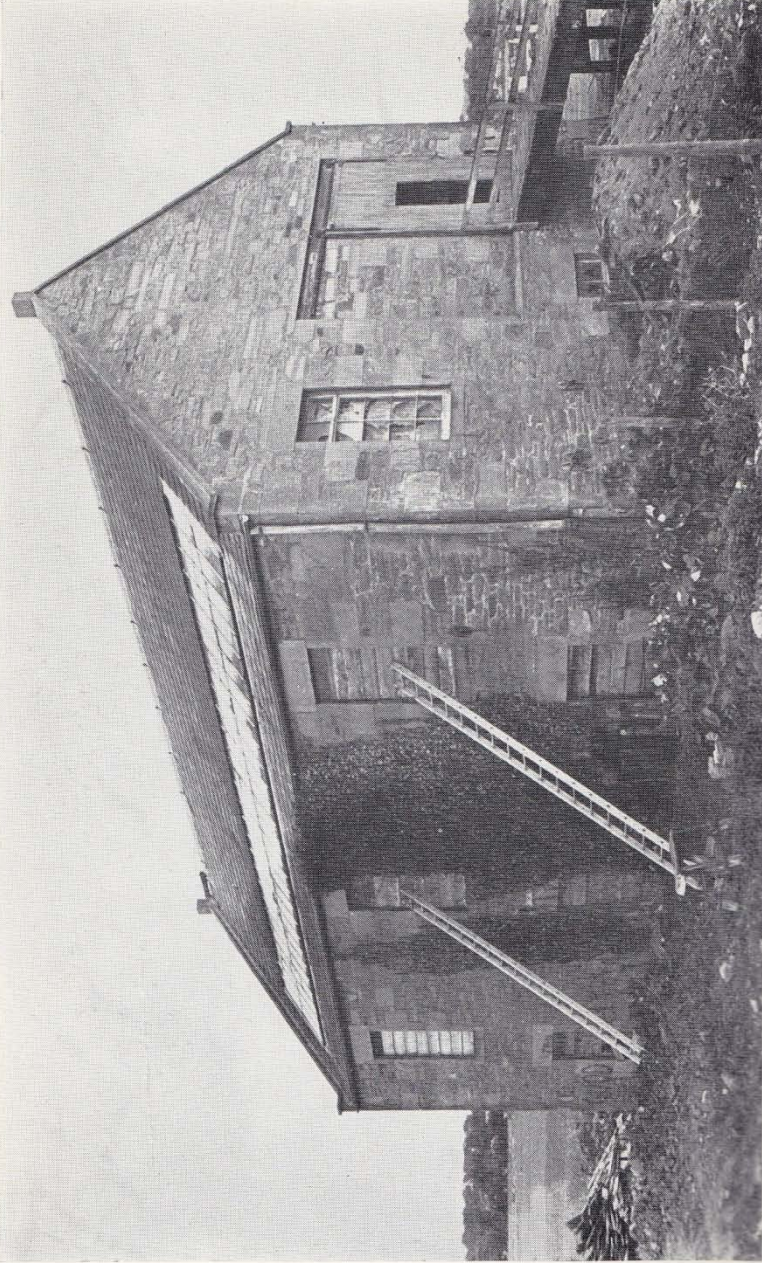


LATE 19th CENTURY LOOM
from an engineering drawing in the office of Baxter Brothers

(iii)

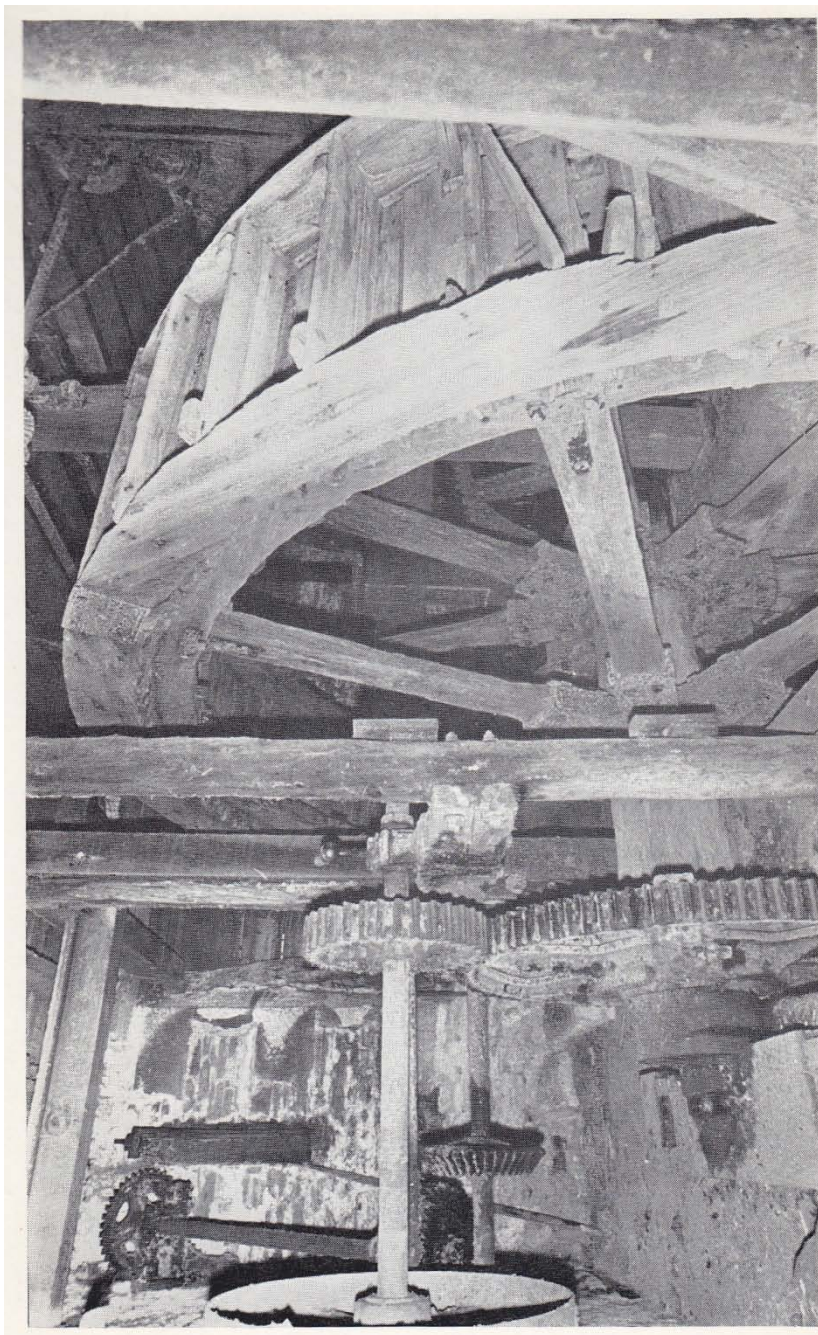


WEAVING FLAT — MESSRS BAXTER BROTHERS DENS WORKS, c. 1908



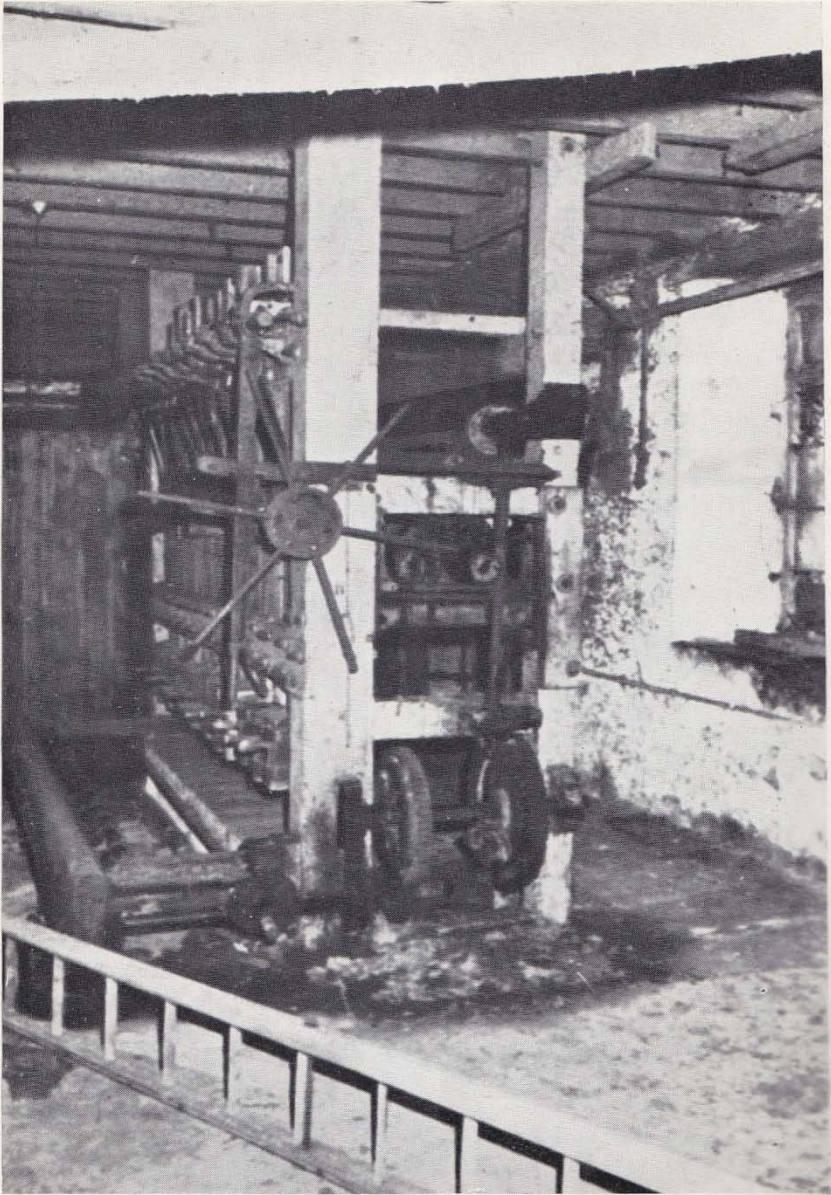
BEETLING-SHED, BALUNIEFIELD BLEACHWORKS, on the Dighty Water, near Dundee, during dismantling 1968

(v)

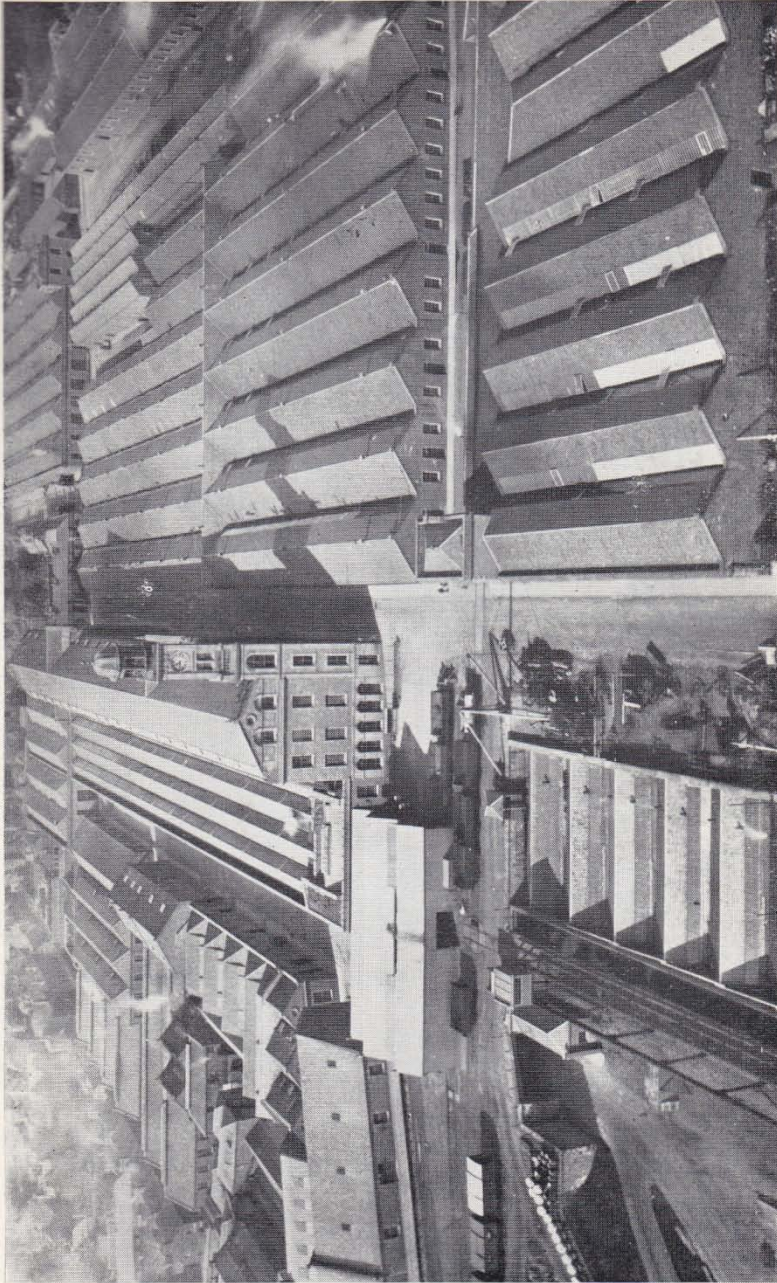


WATER-WHEEL FOR BEETLING MACHINE, BALUNIEFIELD

(vi)



BEETLING MACHINE IN BALUNIEFIELD



MESSRS COX, CAMPERDOWN WORKS, LOCHEE, DUNDEE — 1908

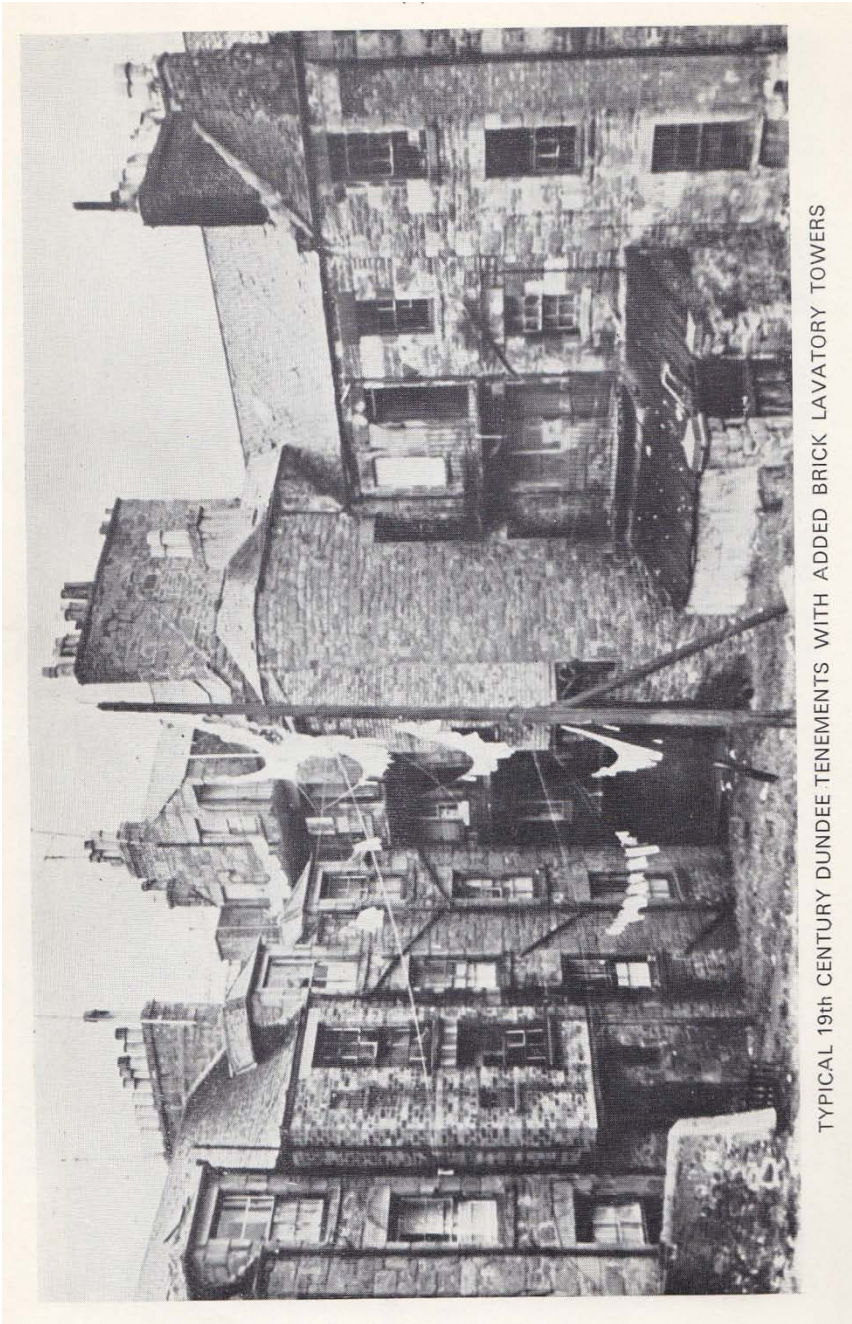


"BACK-SHIFT" LEAVING DENS WORKS, c. 1908 (Note the bare feet of some of the boys)

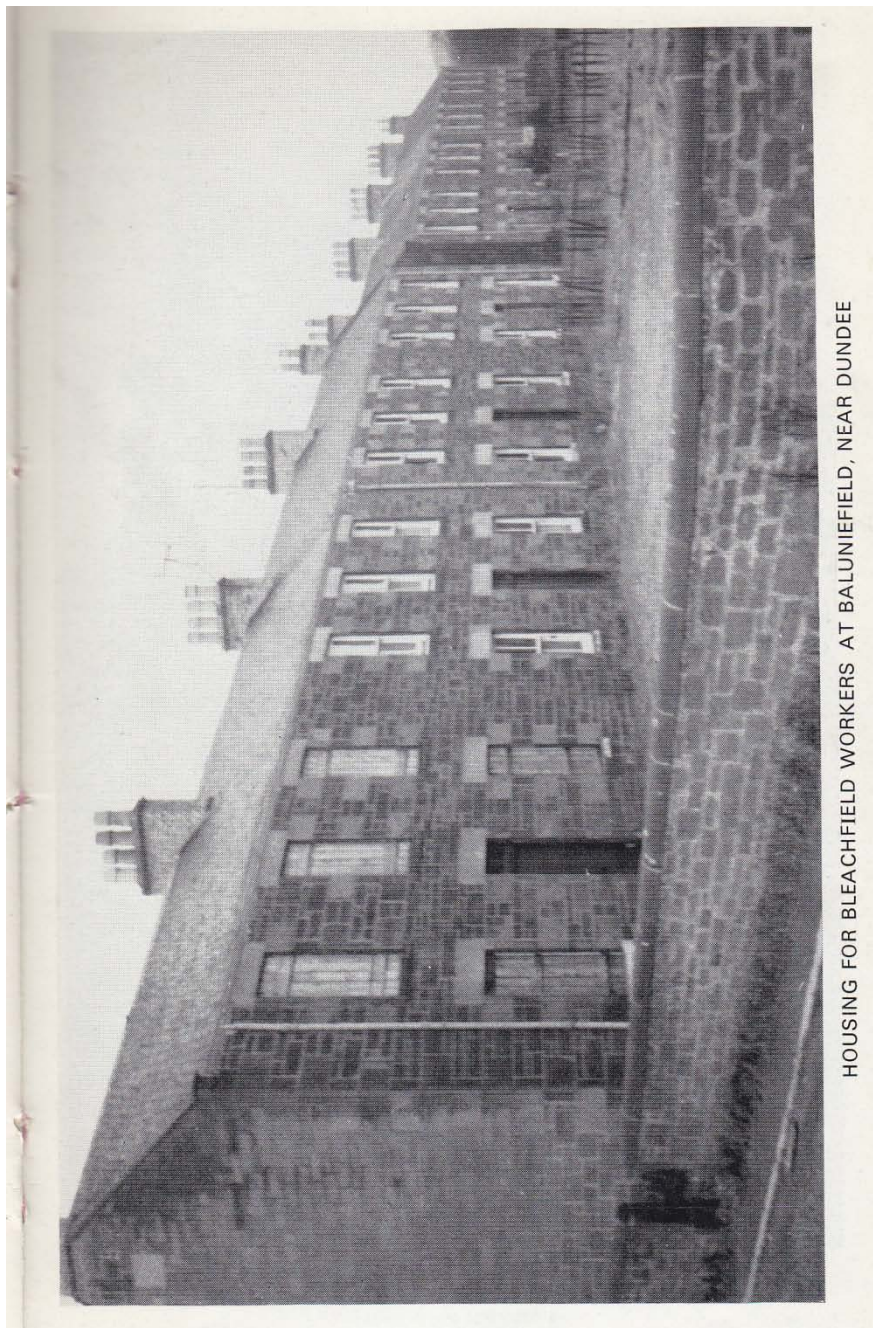


BAXTER'S OLD HALF-TIME SCHOOL AND SCHOOLMASTER, Mr. ANDREW STRACHAN

(x)



TYPICAL 19th CENTURY DUNDEE TENEMENTS WITH ADDED BRICK LAVATORY TOWERS



HOUSING FOR BLEACHFIELD WORKERS AT BALUNIEFIELD, NEAR DUNDEE



THE HIGH LAND — DUNDEE'S HIGHEST TENEMENT
(The top storeys were not used for many years because of
structural weakness)

the construction of mills on fire-proofing principles, of which Dundee has some early and outstanding examples,²⁴ there were still many mills in Dundee which were hazards to the lives of those within them. The boom conditions of the fifties and sixties caused not only the building of those lofty well-planned works which still grace the city but also the putting back into use of many derelict old mills which had lain empty for long periods. In these neither the safety nor the comfort of the workers was a consideration. Too often restarted without sufficient floating capital they were intended to take advantage of the chance of quick profit-making in a sellers' market. Fire in such places was too frequent. Peter Carmichael of Baxter Bros, made a series of interesting experiments on the causes of fire in mills and the possibility of its prevention.²⁵ The readiness with which spontaneous combustion takes place in heaps of jute waste is, of course, still a frequent cause of fire in Dundee.

Discussion of wage rates in Dundee in any useful way is made difficult by the scarcity of facts. The material from which information about 19th century wages in Dundee can be culled is of the following kinds : (a) wages books of some jute and flax firms, (b) lists produced by various firms at odd times for comparison with other towns, (c) lists collected by other authors from sources now destroyed, (d) references to wages in local newspapers. Taking these categories in turn we may say :

(a) The wage book of a bleaching firm in 1836 shows over time frequently worked in season and paid for at a penny an hour. This might add a shilling a week to a wage of 9/- a week. Later information about bleachers' wages includes no information about overtime. Such wage books of flax and jute mills as survive refer to total wages paid, and as this includes piece-work and weekly wages in one item, gives no guidance about take-home pay of individual workers, or of the numbers employed. Baxters have one book showing wages of individuals for 1842 which shows no overtime pay but many deductions.

(b) On occasions mill-owners drew up lists of wages paid to different trades within their works. There is, for instance, one comparing wages in Dundee with wages paid in Montrose in 1895. This can only be taken to refer to "take-home" pay, but we have no

evidence about whether that includes or does not include overtime, or indeed whether it allows for deductions for various reasons. As in the 18th and early 19th centuries "putters-out" fined hand-loom weavers for faulty work so later mill-owners deducted from wages for flawed power-woven webs. We know this happened but have no figures to show to what extent it affected pay.

(c) A most important source is Dr Lennox's unpublished thesis in the University Library, Dundee, entitled "Working class life in Dundee 1878-1903 ", which gives a great deal of information about wages, most of it taken from his own study of local firms. Unfortunately the sources he used do not now exist and he makes no reference to the various factors which might have affected basic pay. Similarly G. Phillips Bevan in his *Industrial Classes and Industrial Statistic*²⁶ gives many items about wages in textile industries, and A. J. Warden gives some figures for wages in Dundee in his classic work, *The Linen Trade*. Neither differentiates between take-home pay and wage or, in fact, gives any evidence that such a difference existed.

(c) Reference to wages in local newspapers²⁷ can safely be taken to refer to money in the hand at the end of the week because their point of interest is the purchasing power of that wage.

There is, therefore, no clear set of statistics from which hard facts about wages can be drawn. However such facts as we have point to the likelihood that the payment of overtime was never a major factor affecting wage bills in 19th century Dundee. At no time, except perhaps for a few boom years in the 1860's, was there the kind of shortage of labour which made it necessary to pay for extra hours worked. During the fifties the influx of Irish workers willing to work for low wages ensured a pool of labour to draw on if local men showed objection to extended hours. After the sixties there was always a large enough number of unemployed ready to take work on any terms. Even during the sixties it is doubtful whether overtime pay was common. It was the habit of the trade to extend the works, install more machinery, and to take on more workers during periods of heavy demand rather than to attempt to raise production in existing departments. Thus, while an episode such as the American

Civil War greatly increased the wage bill of the city as a whole it made only a small difference to the pockets of individuals.²⁸

Add to this the evidence in the Report of the Royal Commission on Labour, 1893, from female workers in Dundee jute, about the ingenious methods used by mill-owners to avoid the necessity of paying extra wages : "the bounty", for instance, which it was impossible to earn, the speeded-up machinery which increased production by straining the physical resources of workers without extending the hours worked.

The conclusion would seem to be that where our sources mention a wage without discussion about additions to or subtractions from it they do so because there were no fluctuations. The wage mentioned is the actual sum earned and taken home. Such complications as tax, pension fund, and insurance did not yet affect mill-workers and the majority did not have to pay the penny or tuppence a week into union funds. In the case of women workers payment for child-minding would be a regular deductible expense where there were children under working age. This commonly amounted to sixpence a week per child. But for many the extended family system, the non-working grandmother or aunt at home, made this deduction unnecessary.

With these qualifications it becomes possible to say a little about wages paid in Dundee during our period. It must always be borne in mind that the bulk of textile workers were throughout most of this period the least unionised, as well as the poorest-paid part of the local working class. Skilled males organised in craft unions in the relatively prosperous building trades in Dundee had a hard uphill struggle for improved wages and shorter hours, even in the prosperous early 1860's, when a masons' strike for shorter hours failed.²⁹ It would have been astonishing if the jute and flax workers had done better.

Such records as exist and have been studied point to a rise,³⁰ but not a meteoric one, perhaps 33% on a wage of less than 10/-, in the earnings of textile workers between mid century and about 1872, drastic and frequent reductions in earnings during the 1870's and 1880's, and a steadying between 1900 and 1912 at rates which, for some workers at least, were in actual figures the same as before 1850 and in real money considerably lower.³¹ Booth and Rowntree's gauge of the poverty line at

between 18/- and 21/- in the last decade of the 19th century would have left nearly all Dundee working people in poverty.³² Taking an average man's earnings at 16/-,³³ a family could keep just out of poverty if his wife also worked to bring in an average of 9/-. In these circumstances the 3/- or 3/3d brought in by a child working half-time could mean the difference between rent-paying and debt.

Without a local price index it is difficult to know how far the relation between earnings and cost of living in Dundee differed from the national pattern; but there is no reason to suppose a locally lower cost of living and medical evidence of 1900 found Dundonians poorly nourished even compared with Lancashire textile workers.³⁴ The ratio between earnings and cost of living was certainly no more favourable than in other industrial towns. There are instances of comment before 1850 on the deterioration of the diet of workers in the town.³⁵ Figures for beef cattle killed at the slaughter house for consumption in Dundee had fallen so far by 1847³⁶ that the conclusion could only be that the average Dundonian did not eat meat at all. The lowest paid workers, of course, never had troubled the butcher except for a piece of suet to mash into their potatoes. Social workers at the beginning of the 20th century commented on the fact that tea, bread and sugar had become more common items of expenditure but these, in fact, represented not an addition to the diet, which might have supposed the existence of an increasingly useful pay packet, but a substitution of these articles for more traditional fare. Imported goods like tea, sugar, white bread and margarine were used instead of oatmeal, bone broth, potatoes and suet because they were more quickly and easily prepared. Throughout the period the number of women at work increased, making quick meals important; and the constant subdivision of houses resulted in many families living in rooms without cooking facilities of any kind. In these circumstances the fact that Dundee was one of the best markets for Dutch margarine in the late 19th century illustrates not increase in spending on food in Dundee but deterioration of diet.³⁷

Suppose Dundee's price index to correspond with the national figures and to show a drop in prices between 1890 and 1910. We know, for instance, that rents in Dundee dropped during this period. The fact that, in spite of this, thousands of houses remained unoccupied in a town experiencing severe overcrowding³⁸ must mean that the cost of living did not

fall enough to help the working class in Dundee. The drop could benefit only those workers in the higher wage brackets and in steady employment. That the rent of an apartment in a good tenement building had been lowered from 10/- to 7/6d a week was quite irrelevant to a household maintained by a woman earning nine shillings a week, and of only marginal interest to the family maintained by a man at sixteen shillings. Consumers for whom the reduced price was still out of range were not affected by a drop of a penny or two in the cost of butter, bacon or eggs. In Dundee, because the staple industry was a coarse cheap one dependent upon unskilled labour, with very few places for the labour aristocrat with a skilled worker's wage, and with long and frequent periods when the mills shut down for want of work, the town carried a high proportion of very low wage workers as well as a constant pool of unemployed and unemployable. For them the fluctuations of the national price index were almost an irrelevance. Still, after 1853 and until 1872 the quick and easy profits enjoyed by mill owners could not have failed to have some effect upon the standard of living of part of the working population of the town because of the steadier, if hardly better paid, employment. The wages of the small top class of skilled worker increased, widening the difference between the highest and lowest ranks of workers. The vast number of unskilled workers available was constantly diluted by immigrants from Ireland and from the rural districts of Angus who were prepared to accept very low wages, thus keeping the minimum wage at its pre-boom level while prices were rising. For the majority of workers in Dundee the improvement in their condition was brought about, not by the raising of their basic wage but by the greater regularity with which they received it. The tiny surplus above the cost of existence provided by a week's wages became large enough to allow for improvement in diet and clothing, though not in housing.³⁹

Overtime, for instance, was not necessarily paid for at all. The high proportion of women and children, forbidden by law to be employed over twelve hours, made the working of overtime by men difficult if their work-shifts were to be synchronised with the rest of the labour force. Where extra hours were worked, the pool of unemployed was, during most periods, sufficiently large to make the payment of overtime to attract or keep labour unnecessary. When it was paid it was at rates so low as to make little difference either to a firm's wage bill or to an individual's budget. The need for overtime to step up production was

ingeniously dispensed with by a system which put alternate processes in jute works on piece work rates. Thus piece workers, fighting to make a wage, set a pace which workers on weekly wages were forced to maintain at no benefit to themselves but at the risk of stoppage of the machinery. Stoppages were deducted from the weekly wage payments. There was no alternative but to maintain the hard pace set by the piece workers, an arrangement which must have helped greatly to keep down the wage bills of large works in boom periods. Similarly the system whereby a bounty was awarded to workers for 'overspin', to encourage productivity, rebounded to the workers' disadvantage. Witnesses to the Royal Commission on Labour, 1893, reported that advantage was taken of the bounty system, which they called 'blood money', to speed up the machinery and pay at a lower rate, so they had to work harder to earn the same.

After 1906, against the rise in wages that had taken place as a result of well organised strikes, has to be measured an increase in the new 'necessities' which were entering the budgets of working people, such as tram fares to work, often further from their homes, insurance contributions, school clothes for children now finding it less easy to dodge school attendance. Wages did not rise again until 1915 when war bonuses began to be paid, especially to women doing men's work. In February 1915 wages advanced one shilling a week per worker, two shillings in March, another shilling in July. Two shillings extra were awarded to all trades in 1916, more increases throughout 1917 and 1918. Baxters' wage bill rose from £124,934 in 1913/14 to £228,609 in 1919.⁴⁰ But the war bonus stopped in March 1919 and short time was worked thereafter. The wages bill fell back almost to its pre-war level.

Employers had had a complete and early success in introducing labour to the mills and factories and in imposing acceptance of advanced stages of mechanisation. The Dundee based flax industry did not develop, as the Lancashire cotton industry succeeded in doing, a strong trade union system led by skilled male spinners who could organise the unskilled majority. In Dundee the skilled spinners were women and gave no lead.

In the period before effective trade organisation a number of attempts at self-help in spheres not directly related to working conditions had been attempted by working people or by those representing them. The old, pre-

1851, Police Commission, elected as it was by a very low franchise and actively representing working people's interest, had visited slum areas and reported their desperate need for public measures. Men like "Dominie Hunter", working in the crowded closes even during the height of the fever epidemic, called attention to the mountains of night soil, euphemistically called "ash-pits", the muddy streets running with filth, the dark, fetid passages between houses, which had allowed cholera to rampage. They had no real powers to make improvements but they made the problem public and they gave slum-dwellers confidence that their plight was known.⁴¹

Adoption of the new local Police Act eliminated working class representation from the commission. Energy had therefore to be channelled away from direct political action and showed itself, as it did generally in Britain at this period, in the formation of such self-help organisations as the 'Dundee Co-operative Meal and Provision Society',⁴² founded before 1857, at least two years before the Edinburgh St. Cuthbert's Society, and the very interesting 'Working Men's Coffee-Houses' which had premises in Princes Street, Wellgate, Crichton Street and the West Port.⁴³ Co-operative societies are more relevant to the bettering of living conditions than might at first appear. It was customary for 'co-op' members to use their dividend to pay the rent, thus making them, as regular payers, desirable tenants.⁴⁴ Organisation on a regular union basis was made difficult by the absolute lack of cooperation on the part of employers. Their fear of losing any small advantage over rivals caused cut-throat competition at the expense of workers, unwillingness to reduce working hours even in the face of over-production and equal unwillingness to be the first to raise wages for fear of being bettered in markets where one fifty-sixth of a penny on a selling price could lose a customer. The lack of a combination of employers made action by the workers on their own behalf more difficult. Employers insisted on making individual arrangements with their own employees making the work of unions and strike committees almost impossible. Thus, while other trades became effectively organised during the last quarter of the century, Dundee's main trade, in spite of courageous attempts at union organisation, failed to develop a successful combination for bargaining over conditions of work.

It was an article of faith to industrialists in Dundee that the trade

could not bear any substantial increase in wages and that serious or long-term recessions in trade could only be met by wage cuts. After 1872 discussions took place very frequently on the comparative merits of cutting unit costs by wage reduction or reducing output by working short time. The *Advertiser* pointed out that over-production, which had flooded markets with cheap jute goods, making Dundee's products unsaleable, v/as the cause of the trouble. Wage reductions, far from reducing production, actually increased it because piece workers tended to step up their output in an attempt to reach their previous level of earning. Employers, however, preferred the immediate reduction of costs gained by wage cuts.⁴⁵

The prosperous trading of the sixties, with its resultant demand for labour, had produced some increase in wages at the same time as the pressure on accommodation caused deterioration in workers' living conditions. Increases, however, were never large in proportion to the increase in production and, moreover, did not march in step with other large cities. For example, rope makers in February and calenderers in June 1872 pointed out that while within living memory their wages had been the same as those of their fellow tradesmen in Glasgow and while they had received some increases, Glasgow workers were now earning 20% more than they.⁴⁶ In smaller towns near Dundee, such as Montrose, wages in jute and flax mills lagged slightly behind Dundee's but reductions after 1872 were less drastic.⁴⁷

Protests by or on behalf of the workers were almost unknown during the sixties. The Open Air Bleachfields Act of 1862 which brought bleachers under the same protection as other textile workers was accomplished with little agitation from bleachers in the Dundee region.⁴⁸ Even at the height of the Fenian scare in 1868 when the Home Secretary had alerted cities with large Irish communities to the danger of major uprisings Dundee found no need to appoint special constables and occasion was taken to remark on the peaceable character of the town and its workers.⁴⁹

But after the Report of the Royal Commission on Trade Unions in 1869 and the Criminal Law Amendment Act of 1871 agitation for shorter hours and more pay became active. The Dundee Factory Act Association and the Arbroath Nine Hours League were formed in 1872 in support of

Mundella's 54 Hours Bill. Employers were said by Provost Yeaman, who chaired a meeting on 15 July 1872, not to be opposed to the nine hours' movement but to feel "it to be the factory workers', not their, movement".⁵⁰ In fact employers were privately agitating for the Bill's failure.⁵¹

Other trades rapidly followed the factory workers in forming associations pledged to demand shorter hours and more pay. The Calender Employees Association was formed on 15 May 1872 and was moderately successful in forcing an advance of wages for most of their members.⁵² By October the Lappers' Society had 800 members and "a considerable fund in the bank",⁵³ Rope-workers, of whom about 70 were present at a meeting reported in February 1872, failed to gain a reduction in hours worked but gained in 1874 an increase in wages and congratulated themselves on "the tradesmanlike social status they had recently assumed",⁵⁴

But the unemployment resulting from adverse trading conditions after 1873 split the movement into three camps. Those still determined to press for higher wages and shorter hours as a right, in spite of the unlikelihood of gaining their demands, were a diminishing group. Many more supported the claim for shorter hours without wage reductions, a reasonable demand which was partly met by the passing of Mundella's Act in 1874; but the fact that the bill had been amended to allow 56 hours rather than the 54 for which they had been agitating caused active demonstrations and a long strike by thousands of millworkers in November and December 1874. The fact that the third group, in which "among the women especially there is a considerable amount of apathy and possibly in some cases of positive opposition to the proposed changes"⁵⁵ was much the largest, explains the fact that the Dundee Factory Act Association was dissolved on 3 August 1874.⁵⁶

But for a number of workers the benefits of a combination had been proved. The success of the Iron Trades Reform League in demanding a 51 hour week meant that many men in Dundee worked a shorter day than their wives and children, a situation which helped to attract sympathy for the cause of millworkers still working 56 hours and subject to frequent reductions in pay. Throughout the early part of 1875 the possibility of forming a millworkers' union was discussed. Employers were sufficiently alarmed to arrange for a series of talks against the principles of Trade

Unionism to the Working Men's Club, talks which were politely received but emphatically rejected in debates which followed.⁵⁷

The end of 1874 and the spring and summer of 1875 saw a series of strikes from which millworkers emerged not triumphant but with some recognition of the need for combination and the East of Scotland Mill and Factory Workers' Protective Association was formed on 20 October 1875.⁵⁸ The *Journal* wrote : " We are convinced that an association for defending and promoting the interests of the Dundee factory workers would, if well managed, prove advantageous to all concerned ",⁵⁹ Subscriptions towards the support of strikers had shown that, in general, public opinion in Dundee backed their claim for better conditions, shorter hours and a steadier rate of pay.

But the Union was not a strong one. It easily won an increase in wages in November 1875 when spinners were temporarily in short supply,⁶⁰ but during 1878 wages were reduced and strikers in February 1879 found their places filled by unemployed. In May 1879 Camperdown Works increased the number of hours worked for the same pay. A large number of workers, but by no means the whole work force, came out on strike in September when their claim for increased wages for the longer hours was refused. The Union agreed to support the strikers from union funds but advised those still at work not to strike. Such a vacillating position could lead only to defeat. In March 1881 at a special meeting the East of Scotland Mill and Factory Workers' Protective Association was dissolved. After discharging all liabilities £1216 6s 8d remained for distribution among 882 members.⁶¹ The lesson learned from this attempt was that jute and flax workers were powerless to defend themselves against exploitation except during periods when labour was scarce. 1881-5 saw frequent reductions of wages, a mounting number of unemployed and increasing distress in the town.⁶² From 1879 the Town Council provided some work for unemployed men on road improvements but the scale of help given was not enough to diminish the distress. Relief committees gave employment only to men, while in a town worked predominantly by female labour it was the lack of work for women which was causing destitution. In 1884 the number of 1,201 registered as unemployed at the town's unemployment office consisted entirely of men and represented, therefore, a very small fraction of those in need.⁶³ 1885, however, brought an improvement in trade caused by expansion of

American markets, a very marked increase in flax imports, the biggest since 1877,⁶⁴ and a resultant demand for labour. In these circumstances millworkers felt strong enough to strike against a further 5% reduction in wages. The employers' viewpoint was expressed by James Cox : " Several of our mills are . . . speaking about taking down the wages of those retained . . . We are still busy and not over-stocked with hands, but if our neighbours come down we must also for safety's sake ",⁶⁵

During the strike of 1885 there emerged an intermediary at least tolerably acceptable to all parties. That he was not warmly regarded by employers is demonstrated by the long delay in electing him to the School Board, a position he coveted and in fact deserved.⁶⁶ And the wary acceptance by working men was explained by his old-fashioned rejection of such schemes as free meals for mill children which he thought likely to weaken the moral fibre of the labouring classes.⁶⁷ The Reverend Henry Williamson succeeded both in persuading the women on strike to return to work if he would negotiate on their behalf and in persuading the employers to yield to their claim for restoration of the lost 5%. He became the President of the Dundee and District Mill and Factory Operatives' Union, founded 1885.⁶⁸ By 1891 the union had a membership of 5,945 women and 600 men, and considerable funds invested in local government securities.⁶⁹ Williamson had great success in gaining the loyalty and affection of his female union members and, because his avowed principle was wherever possible to avoid strikes, he was accepted to a limited extent by employers. His Union was not, however, an effective weapon in the struggle to improve working conditions and acted more to control and subdue discontent than to remove its causes. The Dundee Trades Council, formed 1867, disapproved of the manner in which the women's union was run but seemed unable to produce an alternative. It is doubtful whether at this stage the fact that Williamson's Union was not affiliated to the Trades Council played any real part in its development but this fact allowed and encouraged the formation of a later and more effective union. Real help for and by working people did not come until the organisation of the Jute and Flax Workers' Union in 1906.⁷⁰

Without efficient campaigning by strong unions there was little chance of workers' conditions being improved during the period 1850 – 1900. In fact it is possible to show that conditions deteriorated.

Employers, for the most part, confined their attempts to remedy this situation to the giving of park-land to the town.⁷¹ That notable reformer George Gilfillan commented : "Multiply Baxter Parks and Balgay Hills as you please, and annex the Law to them also if you like and what good will ever all this do if the people have no time to walk on these beautiful and breezy localities ".⁷² Wages did not rise to meet the 19th century rise in the cost of living. Hours, although after the 1874 Act they had been cut to 51 or 54, increased again in 1879 to 56. Housing, which in 1850 had begun to seem inadequate was, by 1900, grossly inadequate.

NOTES

1. Letter Book of James Cox, 29 August 1840; see also Sidney Pollard, " Factory Discipline in the Industrial Revolution ", *Economic History Review*, vol. 16, 1966; and William Brown, *Essays on Flax-spinning*, manuscript in Dundee University Library.
2. Carmichael mss. II, p. 40.
3. D.A., advertisements each July.
4. Report on Select Committee on Mills and Factories, 5 May 1845—petition by Baxters' workers.
5. The 1861 census reported 61.57% of the population to have been born within the county, 20.95% to have come from other countries, 15.67% from Ireland.
6. For a full account of the Factory Acts and the campaign leading to their achievement, see John Ward, *The Factory Movement, 1830-1855*, London, 1962. Hours were restricted to nine per day in 1874.
7. See above, p. 49.
8. Report of Select Committee on Mills and Factories, January 1839. Stuart was Inspector of Factories for Scotland of the Select Committee on Mills and Factories.
9. *Ibid.* April 1846, p. 38.
10. *Ibid.* 1840, p. 113.
11. *Ibid.* April 1840, p. 64.
12. *Ibid.* May 1840, p. 77.
13. *Ibid.* April 1840, p. 27 and p. 106.
14. *Ibid.* May 1840, p. 76.
15. Report of the Committee of Council on Education in Scotland, 1901-2.
16. "Sketches of Life in a Jute Mill," *Peoples Journal*, 14 May 1881.
17. Chamber of Commerce minutes, 25 June 1891.
18. Report of the Committee of Council on Education in Scotland, 1901-2.
19. Chamber of Commerce minutes and D.A., 27 December 1901.
20. D.Y.B. 7884, pp. 54-66.
21. William Brown ms., op. cit. in note 1.
22. John Fulton, town surveyor, Report on the Sanitary Improvement of the Burgh

- of Dundee, [1832], p. 4.
23. England's Act was passed in 1848. Local authorities opposed the application of the 1848 Act to Scotland, resenting the interference of central government in their affairs.
 24. A. & E. Edward's Logie Mill, 1828, and Baxter's Princes Street Mill, 1837.
 25. An envelope of interesting news cuttings of reports of fires is preserved at Arthurstone House, Meigle, the property of Major P. O. Carmichael.
 26. London, 1877.
 27. e.g. Peoples Journal, 13 April 1874.
 28. D. C. Carrie, Dundee and the American Civil War, 1861-65, Dundee, Abertay Historical Society Publication No. 1, 1953, p. 6.
 29. 1. MacDougall (editor), The Minutes of Edinburgh Trades Council 1859-1873, Edinburgh, Scottish History Society, 1968, p. 98, meeting of 15 July 1862.
 30. See Appendix III.
 31. The wages bill at Lower Dens Mill rose from £1,018 in 1852 to only £1,134 in 1857, although in that period the Crimean War had swollen profits. After combination with Upper Dens in 1857 the wages bill rose from £4,695 rather more quickly to £5,158 in May 1859. Managers' monthly salaries remained at £10 between 1891 and 1912, mechanical overseers' at £8 10/- for the same period. Mill overseers' rose from 20/- in 1842 only as far as 23/- in 1914. Half-timers' rose by 3d a week between 1866 and 1893. (Baxter Brothers' Wages Books.)
 32. The national figure was 40% in poverty.
 33. Peoples Journal, 13 April 1874.
 34. John Lennox, Working Class Life in Dundee, 1895-1903, unpublished thesis in the University Library, Dundee.
 35. Letters Lord Kinnaird to Lord Howick, 8 and 9 February 1843; Grey Papers, Department of Palaeography and Diplomatic, University of Durham.
 36. Carmichael mss.
 37. C. Wilson, The History of Unilever, London, 1954, vol. 2, pp. 23 and 40. Dundee had provided a growing market for Dutch butter during the period up to 1870. Thereafter, as in other textile towns, margarine replaced butter, even when, in the 90's, the price of butter fell drastically.
 38. Lamb Collection, 227 (21).
 39. See next chapter. In this period new housing to accommodate the increasing population had not been built.
 40. This represents not so much the taking on of greater numbers as the payment of boys at women's wages and women at men's wages.
 41. D.A., 1851, passim.
 42. D.A., 9 January 1857.
 43. Ibid., and biographical note on Robert Nicoll in catalogue, "Old Dundee." A Pictorial and Historical Exhibition, illustrative of the past life, social, political, municipal and industrial, of the Ancient Burgh of Dundee, 1892-93, [Dundee, 1893], p. 107.
 44. R. Chalmers, Autobiography, Dundee, 1872.
 45. D.A., 6 December 1874; and Peoples Journal, 1 November 1874.
 46. Courier, 10 February 1872 and 10 June 1872.
 47. Montrose workers suffered a 5% drop in wages between 1873 and 1892. Dundee workers employed by a branch of the same firm suffered a 15% drop.

48. The Dundee bleachers did not join the Scottish Bleachfield Workers' Union until 1888.
49. D.A.
50. D.A., 15 August 1872.
51. Cox's Letter Book, 24 May 1873.
52. D.A., 17 May 1872.
53. D.A., 14 October 1872.
54. D.A., 13 March 1874.
55. D.A., 20 May 1873.
56. Courier, 5 August 1874.
57. D.A., 8 March 1875; and Peoples Journal, 13 March 1875.
58. Courier, 23 October 1875; and undated papers in Lamb Collection 196 E.
59. Peoples Journal, 11 September 1875.
60. D.A., 18 November 1875; Lamb Collection 196 E. This rise only restored wages to their level before the last reduction, that is between 10/- and 13/- a week.
61. D.A., 2 March 1881; Lamb Collection 196 E.
62. Wages were reduced between January 1875 and September 1884 by 50%, with short-lived increases in 1879 amounting to 15%. See Appendix III.
63. Council Minute Book, vol. 31, p. 413. The Burgh Engineer's office acted as a register of unemployed and attempted to place some in work.
64. D.Y.B., 1871-188. Flax imports 1884 : 21,402 tons; 1885 : 28,474 tons.
65. Cox's Letter Book, 21 January 1885.
66. L. Baker Short, *Pioneers of Scottish Unitarianism*, Narberth, 1965.
67. Ibid. See also, The Rev. Henry Williamson, *Dundee: Recognition of public services*, Dundee, 1924.
68. Williamson's report to Labour Commission, printed in D.Y.8. 7897; also Lamb Collection 197 (25).
69. Lamb Collection 196 E.
70. The history of this union is the subject of research in the History Department of the University of Dundee. The Trades Council's rejection of Williamson was officially because their rules forbade leadership by anyone but a worker.
71. There were, of course, notable exceptions such as Sir James Caird's hospitals. Cox's libraries and swimming baths, and the Baxter foundation of University College,
72. D.A., 15 July 1872.

Chapter V

" DENS OF DARKNESS AND FILTH " — THE LIVING CONDITIONS OF THE PEOPLE OF DUNDEE

THE MIDDLE of the 19th century brought widespread discussion of the need for improving the condition of Britain's towns. Decades of immigration from the countryside into the towns plus Irish immigration speeded in the immediately preceding years by famine, had produced slum conditions in all manufacturing cities. Dundee's case was in no way better than that of comparable towns, in some ways worse. Glasgow's population had grown by 37% between 1831 and 1841, Dundee's by 38%.¹ The water supply to the town was more inadequate than that of any other Scottish town.

Two serious waves of endemic fever had accented the need for improved sanitation everywhere. Typhus in 1847, cholera in 1849, were both particularly severe in Dundee. Throughout Britain the ' sanitary idea ' was at length, slowly, becoming accepted although the provisions it required were still unacceptable to those who would be assessed for higher rates to meet them. The Public Health Act for England and Wales, passed in 1848, was successfully opposed by both local authorities and the medical profession in Scotland. Scotland's own Public Health Act was not passed until 1867.

In Dundee the local Police Act of 1837, considered by neighbouring burghs a model worth imitation,² came up for renewal in 1851. Moves by the police commissioners, in Dundee elected on an unusually low franchise, to provide for drainage, street paving and the removal of accumulated filth, aroused strong opposition from ratepayers. Especially hostile were the mill-owners who were threatened not only with re-assessment of mills and factories on a new basis which would greatly increase their share of the rate burden but also with very inconvenient restrictions on their rights to foul the town's streams and maintain filthy ponds.

In these circumstances discussion of the need for low-cost building to rehouse the slum dwellers could never become more than discussion. Mid 19th century opinion accepted that comfortable living conditions were the reward of sobriety and self-help. Penury, miserable lodgings, even fever were self-evidently visited upon the improvident. Housing for those most in need of it, those crowded into the cellars, back-court sheds

and nameless alleys where the lowest paid workers lived, would not be provided until a completely new way of thinking about poverty could be imposed upon the ratepaying middle class. Between 1850 and 1900 then, although the housing of the poor was often talked about, the housing actually built was used by the 'respectable' artisan class, those whose regular payment allowed them to pay regular rents. At no time within our period and for at least a decade before it was housing adequate to the needs of the workers of Dundee. There is no evidence that trends in demand and supply of houses were at any time clearly correlated. There was no possibility of the lowest paid workers acquiring living space adequate for the most basic human needs. Houses vacated by middle class Dundonians in the late forties and early fifties, when cholera and typhus had frightened them away from the crowded town centre and the new railway system had made commuting possible even for those who did not keep a carriage, were divided to accommodate larger and more numerous families of the higher paid workers. Their homes in turn were even more intensively used by lower grade workers; while into the attics, cellars and sheds there flowed the remnant, the unemployed and those lowest paid workers whose wage rates and whose standard of living, whatever may be said of the conditions of the 'average worker', had not improved since the 18th century. The resultant overcrowding emphasised the complete inadequacy of towns planned to rural patterns for the pressures of rapid industrialisation.

Mid 19th century Dundee has been distinguished from the countryside around it not so much by its being a centre of industry but because it was a focal point for distribution of the products of industry, and was, therefore, suited to become the commercial and business capital of the region. Industrial units existed in a state as advanced as those of Dundee in Montrose, Brechin, Blairgowrie, Forfar and a number of Fife towns. Dundee was, in fact, a loosely associated collection of small individual communities grouped round the mediaeval town, each unit, Dens, Scouringburn, or Chapelshade or Lochee, a separate village with the mill as the centre of its life. The housing existing in the 1850's and, for the most part, that built during the '60's, reflected the rural character of the community. Not until the '80's did Dundee become a truly urban community, when the population was steady, the influx from the countryside slower, and most workers had been town dwellers for a generation.

The increase in population per decade reached its peak in 1871. Thereafter, although the population continued to grow, its rate of increase was slowed. In the decade 1861-1871 the increase was 29,060, up to 1881 7,599, up to 1891 it was 13,831 and up to 1901 only 5,161.³

The usually accepted picture of the mid 19th century Scottish city as one of looming, crowded tenements is a false one for Dundee.⁴ The problem as it existed in 1850 was that the tenements had not been built. In the centre of the town mediaeval housing was so dense, especially in areas like the Vault,⁵ that no ground could be made available for rehousing until after extensive demolition, for which the town was not politically ready until the 20th century. In other districts, Lochee and Blackscroft, for instance, village housing had been stretched to accept a very rapidly growing population of townsmen. Many Lochee streets were not even named, making identification and inspection almost impossible.⁶

The two storey cottage, with an outside stair serving an upstairs flat, was the most typical Dundee house, but many rows of one storey thatched cottages remained within the town until the extensive improvements of the late seventies.⁷ The need to accommodate a loom had accustomed people to crowded living conditions and the two roomed house with loom shop at one end and kitchen with box bed in it was very common.⁸ As hand loom weaving died out lodgers took the place of the loom because the drop in income made such a step necessary if the rent were to be paid.⁹

When William Brown was asked what would be the rent of a three roomed house in Dundee, he answered : " For houses such as you mention, with three beds and grate in each, I can say nothing as none of that description are to be had here ".¹⁰

The census for 1861 showed that 72% of all Scottish families occupied no more than two rooms, a situation which did not change until after the First World War. 37% of all Dundee families lived in one room, Glasgow and Edinburgh both housed 34% of families in one-roomed houses, Aberdeen 35%. Only Paisley, with 42%, was worse than Dundee. The average number of persons per house in Scotland was higher than that for England and Wales. Dundee's was worse than the average for Scotland.¹¹

According to the Registrar General: "That then from which our town population suffer is not so much insufficient house accommodation as the over-crowding of masses of people in a limited space".¹² This statement

has to be qualified for Dundee. Up to about 1870 there was indeed insufficient housing accommodation, because very little housing other than middle class villas had been built at all. After 1870 there was insufficient accommodation at rents suitable for working people. The population grew from 45,355 in 1831 to 78,981 in 1851. There were 30,000 more people in Dundee in 1861 than in 1841, but only 568 extra houses were built in that period.¹³ In 1857 a letter in the *Advertiser* spoke of the need for even more labour to be attracted to the city : " The town, however, appears to be already more than full and additional houses cannot be got ",¹⁴

The severe cholera outbreak of 1848/9 drew attention to the problem of overcrowding. Strong condemnation of the mill-owners began to appear in the local papers and in the speeches of country land-owners. The reaction of the wealthy manufacturer to the fever epidemic had been to move out of the crowded areas: "Our building operations progress very slowly on account of so many new houses going on at present, it is impossible to get a sufficient quantity of stones from the quarries presently opened. Most of the new houses are villas for the comfortable classes ",¹⁵ The *Advertiser* carried a leader on the subject: " We have no wish to censure individuals for what is a common neglect but we do think that the employers of large numbers of work people who have brought to the town for the carrying on of their mills and establishments thousands of Irish and others of a lower class than ever lived in it before owe it to the whole community to provide or see provided, proper shelter for those whom they employ . . . The owners of large mills who have amassed fortunes and live in princely houses cannot permit their work people to live in wretchedness without having a heavy reckoning to pay in the long run ",¹⁶

In fact the presence of the Irish in Dundee, while it accelerated the deterioration of the existing semi-rural housing into which they crowded during the forties, was also responsible for some of the earliest attempts to right the situation. In 1843 the Roman Catholic Holy Guild of St. Joseph, which awarded prizes for the cleanest and best kept houses, held a ' festival' in Edinburgh to which speakers from Dundee, irrespective of denomination, were invited to attend for discussion of the housing problems of the poor. The Reverend G. Lewis, Protestant Minister of St. David's parish, Dundee, spoke of the desperate need to improve living conditions : " The fever bills of Scottish cities, contrasted with those of

the English commercial towns, declare too plainly that man has not yet done his part in Dundee to avert this scourge of society ",¹⁷

The fever bill grew higher in the next decade, and in the fifties, certain steps were taken to meet it. The Lodging Houses (Scotland) Act, passed in 1853, contained provisions to control the letting of rooms and allowed for eviction from over-crowded premises. In Dundee 3,153 people were evicted during 1853, 498 from houses too small for the size of the family, 256 from cellars, now classed as unfit for human habitation,¹⁸ and 2,408 from over-crowded lodgings. But as no provision was made for their re-housing this only increased the pressure of need for accommodation in the town.¹⁹ The surplus, unhoused section of the poor simply shifted, from one part of the town to another.

The Dwelling Houses (Scotland) Act 1855, intended to foster associations for the erection of working class housing, captured during its passage through the Lords the attention of George Fox, ninth Lord Kinnaird. It was largely through his influence that three model lodging houses were built, one, to accommodate 90 men, in the Overgate, one for 220 women in the Scouringburn, and another for a smaller number of women in Blackscroft.²⁰ Intended as a refuge for the unfortunate and a model of ideal housekeeping for the neighbouring inhabitants, these houses could, of course, only touch the problem. Lord Kinnaird, however, was ahead of his time in seeing the need for appealing to the profit motive if housing for the poor were to be provided on an adequate scale.

He wrote to the editor of the *Advertiser* in 1857: "There is no doubt that a heavy responsibility rests on the owners of property and employers of labour, who are morally bound, whether in town or country districts, to see that those by whom their wealth is created have the means of providing themselves with dwellings where health and decency can be maintained ".²¹ But he armed himself for this appeal to conscience with figures drawn from his association with a London builder²² which showed that a return of 6 to 7½ per cent on capital could be expected from outlay on the building of working class housing.²³

In 1865 Baxter Brothers involved themselves in a scheme for housing their workers. It was by them that a definite feeling by Dundee mill-owners against owning tied houses was first put into words : " Although *it is against our principle as employers to build houses* yet necessity and humanity compel us to do something .. . The double relationship of master and landlord was at times awkward and it was not

always possible to limit the letting of houses to workers ",²⁴

In the early industrial period there had been clear advantages for employers in building houses for their employees. Labour was sufficiently short to make it necessary to offer accommodation for families as an attraction. While there was no regulation of factory hours it was an advantage to have workers close at hand so that they could be got out of bed at any hour to meet an extra call for work, and tenancy of a tied house gave the employer an extra hold over his workers in the event of labour disputes.²⁵ But after the passing of the Factory Acts of 1833-47 the advantages were very much reduced and were outweighed by the chief disadvantage, the disincentive which operated powerfully to prevent house-building by mill-owners in Dundee. That was the extreme difficulty of raising economic rents from workers in low wage employment. Wages, even in boom periods, were too low to allow for more than a very low rent. When wages fell rents could not be paid and the ownership of workers' housing became unprofitable. Jute and flax employers in the 19th century did not willingly indulge in unprofitable activity.

The extremely low rent which it was possible to raise was, as it still is in Scottish cities today, the chief cause delaying solution of the house building problem in mid 19th century Dundee. In 1819 William Brown spoke of £2 to £3 a year as a usual rent.²⁶ Chapman showed that in 1827 a flax dresser earning 13/6d a week and paying 1/6d a week rent for his house could not fail to be a few pennies in debt each week, even if his employment were steady.²⁷ In 1851, during the dispute about the raising of the franchise for the Police Commission it was made very clear that while the 40/- franchise admitted the greatest part of the town's householders a £5 franchise would eliminate almost the whole working population.²⁸ In 1865, when the housing shortage was very severe, new two-roomed houses, built of brick²⁹ were to let at six guineas per annum. There were, of course, many houses in the town at lower rents. Examination of the valuation rolls³⁰ for the 1870's shows that working people in Lochee paid rents varying from £2 to £7 a year. This gives no guide to the number of people occupying a house and combining to pay that rent. Census reports showed, as we have seen, that where working class families had the opportunity of living in houses of more than two rooms at a correspondingly higher rent they found the extra money by

sub-letting : " Nearly a third of the families living in houses of three and four rooms let their spare apartments to strangers ... in order to spare money for better food and drink they never hesitate to crowd their families into as confined a space as possible that they may sub-let one or two rooms ",³¹

The wage paid to textile workers, then, would not allow the bettering of their condition through increased rentals. This situation did not change at all during the 19th century as it has been very slow to change in the 20th. As late as 1924 the rents paid in the infamous "Blue Mountains", where the population density was 555 persons to the acre, varied between 2/5d and 4/6d a week.³² A jute preparer there paid 3/6d for two rooms, a spinner 3/- for one room, a street singer 3/2d for one room.

Chapman³³ concluded that, in the early part of the century, workers were accustomed to pay one-ninth of their income in rent. It is harder to arrive at a similar figure for the later period. Leaving aside discussion of any rise in the cost of living the actual wage paid had risen very little and was, in any case, subject, especially after 1870, to sudden reductions. The average working man in Dundee in the 70's earned 16/-³⁴ but the dependence of textiles on female and juvenile labour meant that most households drew in about 25/-. Such information as exists points to rents being rather less than 3/- a week. So that the proportion of one-ninth had hardly changed. Nor was it possible for a larger proportion for rent to be squeezed out of the average wage.³⁵

Building costs in the 60's and 70's could not be kept below £80 for a two roomed house if it were to have the most basic amenity value.³⁶ This meant that a house owner must wait six or seven years before his original outlay began to show any returns, an unattractive proposition for the speculator. The solution produced was to build higher and more densely, thus reducing land costs. Even then house factors found it necessary to insist on a deposit on letting to secure their rents.³⁷ Rents were, in fact, lowered during the last quarter of the century because of the difficulty of finding tenants able to pay them and the town was full of unoccupied houses, in spite of the severe overcrowding in some areas. There were 3,852 unlet houses in Dundee in 1880.³⁸

Nothing, then, happened within our period to raise any expectation of the possibility of making the building of good quality workers' housing an attractive proposition for the investor. Those employers who, like

Baxter Brothers, attempted it, motivated by an honest desire to better the conditions of their workers at least as much as by a fear of epidemic, soon gave it up as hopeless : " The intention of doing so was therefore given up and the houses, though con-veninently situated for the workers, were let to any who were likely to prove good tenants ",³⁹

The situation was made worse by the difficulty of obtaining land for building within the city. Pressure on existing housing was, of course, felt most in the old industrial centres, originally formed around the water sources, the Scouring-burn, Lochee, the Dens. As the ground owned by the petty lairds of the district gradually became available from the late 18th century onwards it was snapped up by the manufacturers, then the only holders of reliable capital. Hunter of Blackness began to feu portions of his estate in 1829 for use as a rope walk and continued to offload acres as it suited the family throughout the century.⁴⁰ The lands of Wallace Craigie began to be feued from the Guthries of Craigie from about 1830 and were bought up by Baxters and, later, by Halleys.⁴¹ Baxters had already bought some Craigie ground earlier in the century. Ownership of land in the Hilltown and Maxwelltown areas was sufficiently complicated to involve the Town Council in lengthy litigation.⁴² Logie began to be feued from about 1830. Clepington was feued to "an enterprising manufacturing firm" from 1857 onwards.⁴³ The point is that where land became available it fell very often into the hands of manufacturers who were, as we have seen, seldom inclined to build houses on it.

An important step was taken when the Police Commission, in 1868, with the support of the proprietor's son, succeeded in having Balgay estate laid out to a feu plan " upon approved sanitary principles " although speculators fought for their right " to build houses on any plan they chose, to become in a short time dens of darkness and filth ".⁴⁴

With a population doubling itself every 30 years and an increasing awareness of public health considerations, housing for workers had to be built, and built on a scale which, if it was not large enough to solve the problem, was certainly large enough to change the whole appearance of the city.

The plans kept by Dundee Corporation from 1867 of all building carried out can show what kind of housing was built, in what areas it was built, and by whom it was built.

Among those taking steps to provide housing were the trustees of the

R.C. congregation of St. Mary's, Lochee, who let houses in St. Mary's Lane and Burnside to their co-religionists, almost all textile workers of Irish origin. Those houses were administered by a grocer living in a house and shop within the block. It was common for the ground floor to be taken up by shops as a means of raising the rental.⁴⁵

The Cox family also owned some house property in Lochee, both as individuals and as a firm, but because it was scattered in very small holdings it seems unlikely that it was built by them. More likely it represented the remains of long established Cox family holdings in the area. It was not confined to their own workers but let to tenants in miscellaneous employment. The contrast between the Cox family's own home and those of their workers is betrayed by the difference in their annual rentals, the difference between £250 and £2 per year.⁴⁶

These two, a church and a textile firm, are only two among a very wide range of proprietors. Almost every class of person speculated in house property. By far the biggest number of houses built between 1850 and 1914 was built by private persons looking for a small return on their money. Such persons built three times as many houses as did large speculative building contractors, for instance, and seven times as many as manufacturers building for their workers. This would tend to support the theory that working class housing could provide only a very small profit. It was attractive to a spinster, widow or small tradesman looking for a small income over a long period, but of little interest to the man of property looking for a quick return on capital. That this situation changed to some extent over the period is shown by the fact that while houses built by large contractors and small building tradesmen were approximately equal in numbers up to 1880 the small firms built only a quarter of the number erected by the large firms between 1880 and 1914. This could be interpreted in more than one way.

Dundee's chief industry had entered by 1875 a period of unprofitable trading from which it did not emerge for 25 years. There were many unemployed in the city. Rents and therefore profitable returns on house building were even less easily raised. Although there was still a need for houses there was more risk in their building, a risk which the small man could not afford but which the larger firm, looking ahead, over-optimistically as it turned out, to a future of better trade and better rents, was prepared to take. Also the other investment opportunities for the larger firms were then doubtful bets, since profit margins were depressed.

The other interpretation, and the more likely one, is the change in the character of house building after 1875. After the supply of water from Lintrathen had been brought into the town⁴⁷ it became incumbent upon the builder to provide wash houses, W.C.s and sinks, amenities with which it had been formerly possible to dispense. This, together with the increasing difficulty in acquiring land, made the building of small houses uneconomic. It was possible to make a profit only by building high, by putting one roof over a very large number of houses. This was an exercise beyond the resources of most small builders. Twice as many two storey houses were built between 1860 and 1880 as between 1880 and 1900. The number of four storey houses rose five times between 1869/70 and 1879/80, and it was in the later period that almost all the five storey houses in the town were built. The public health campaign had, in fact, the result of crowding more people into an area than had been there before the Improvement Act.⁴⁸ The number of houses built entirely without sanitation fell from 2,328 for the period between 1867 and 1875 to 259 for the period between 1875 and 1914, but the number of families sharing an outside W.C. or privy did not fall to a marked extent. 'The object of architects in preparing plans for that description of houses is not so much the sanitary advantage of the tenant as what will yield the best return to the proprietor.'⁴⁹

During this latter period falls the only clear example of large scale building by a textile firm for workers. Malcolm Ogilvie built during the 90's a very large number of houses in the area around Brown Constable Street and Dundonald Street. If they found this worthwhile it can only be said that none of their competitors made any attempt to emulate them.

At first sight the extent of investment in America by Dundonians might suggest that Professor Phelps-Brown's thesis "Whether a house is built in Oldham depends on and is decided by whether a house goes up in Oklahoma" might hold good for Dundee. Perhaps it should read: "Whether a tenement is built in Dundee depended on whether a cattle-ranch was built in Texas".⁵⁰

There are, however, certain facts which make it less accurate for Dundee than Phelps-Brown supposed it to be for the U.K. It is true that the majority of those Dundonians who were the founders of the 1st, 2nd

and 3rd Scottish American Trusts and the Matador Land and Cattle Company were mill-spinners of jute and flax, that most mill-spinners in the first half of the century invested in house building and that they had almost all given up the practice in the second half of the century. This however cannot be interpreted as meaning that American land companies absorbed funds which would otherwise have been spent on house building. In the first place, although there are no figures to describe the exact extent of house building by mill-owners before 1867, it is clear that such houses as they built were put up to attract labour to individual mills and not as speculative investments. Secondly, there is clear evidence that the mill-owners had ceased to build houses long before the period of extensive American investment, that not only had they gradually given up the habit but that they had consciously turned their backs upon it. The appearance of the town before the recent extensive redevelopment showed only very rare signs of buildings consistent in style with erection in the period 1840-50. Very much older housing existed until after World War I but the non-existence of building of the mid-century period was very apparent. Visual evidence, of course, could not exclude the possibility of demolition of a whole class of housing. But after 1867 plans for the demolition of older housing and its replacement had to be lodged with the Police Commissioners. The study of these plans which led to the production of the figures in Appendix I showed frequent instances of the building of new houses on sites carrying pre-1840 type cottages and low terraces, almost none for the subsequent period. The columns of houses to let advertised in the *Dundee, Perth and Cupar Advertiser* in the early forties prove the existence of a supply of house accommodation more than adequate for the needs of the population. Very large numbers of mechanics and skilled artisans left Dundee in the late thirties and early forties to emigrate to America and Australia. A large number of bankruptcies helped to empty houses of the better sort. The population continued to grow during the period but the large scale invasion of immigrant Irish crowded at first into the oldest and cheapest housing and then brought about the deterioration of the kind of housing built in the twenties and thirties for fairly high wage artisans by insinuating large numbers of big families into houses built to accommodate one or at the most two small families. By 1850 the town was overcrowded but house building as an investment did not begin for almost twenty years more and then, for the most part, was undertaken by a type of investor not likely to have risked overseas investment. There is here, of course, some support

for the theory that periods of development in America, by attracting migrants, bore a relation to periods of non-development at home where the exodus of the emigrants removed an incentive to house building. It would be more convincing except that it would seem that emigrants were affected more by the definite lack of work here than by the possible existence of work in America. Periods of heavy migration and fluctuations in house building here seem not to bear too close a relationship to the American trade cycle, but to have been much more affected by factors of purely regional significance; although of course trade and industry in Dundee was in some sectors heavily dependent upon the American market. For the later period when figures for exports from Dundee to America can be laid alongside figures showing the extent of house building in Dundee there would appear to be no very close relationship between them.⁵¹

What then are the special regional features with influence on investment in house building for this area, and who were the investors?

In any town the two chief influences on the extent of house building are the existence of demand and the availability of funds for building.⁵² The builders' habit of buying materials on long term credit from suppliers must establish that in periods of extensive building the suppliers were themselves able to risk lying out of their capital for longish periods and at the same time had reason to trust the credit of the builders to whom they supplied materials. From about 1850 there was certainly a shortage of building materials allied to a demand for houses, conditions which might lead suppliers to expect a fairly rapid return on their money. Mylne of Mylnefield, owner of the Kingoodie quarries, had been forced by his losses in Hamburg, to give up his local interests.⁵³ Leoch, the big late 19th century quarry, had not yet been opened. The Lindsay Street quarry in the heart of the town was strained to capacity. Small quarries were opened up wherever there was suitable stone, some mills standing riskily on the edge of holes quarried to build extensions.⁵⁴ No large scale brick firm existed in the neighbourhood until the capture of a contract to supply ten million bricks for the Tay Railway Bridge in 1867 encouraged Robert Taylor and Son, coal, lime and brick merchants, to take over and expand a small brick and drain tile field in the Carse of Gowrie.⁵⁵ It would seem that the difficulty of obtaining materials must have been more pressing than the difficulty of obtaining credit to pay for them.⁵⁶ One local firm which did build large numbers of tenements in the later 19th century was

Bell and Sime, whose business was the importing of timber from Scandinavia.

Investment in the American market had more effect on middle class housing development. This is chiefly a study of house building for workers in textiles but it cannot escape notice that the first decades of the 20th century, when the building of low cost housing had virtually ceased, saw a great increase in the numbers of high quality, high cost villas in suburban areas. It is at least likely that many of these were the result of high returns on small investments in the various Scottish-American trusts which had attracted large numbers of small shareholders in the 70's.

That housing for workers had to wait for a shortage of outlets for other types of investment is usually considered axiomatic. Yet the figures for tenement building in Dundee hardly bear that out. The highest figures are reached in the 70's when the possibility of investment overseas was well recognised in Dundee. This must point to the idea that the very large profits accumulated and spent in the town in the 60's made credit stand high for another decade. The availability of credit then made it possible to yield to the undoubted need for more housing created by the influx of workers to satisfy the demand for labour in the mills during the boom of the sixties.

Need of course is not the same thing as demand. Need not backed by the existence of strong credit had little effect. Three times during our period pressure to alleviate the undoubted wretchedness of workers' living conditions mounted high. That there was a real need was accepted without much reservation, but whether there was a demand for houses by people who could pay rents for them was more uncertain. Public opinion on the need for action to fill that need was organised at times which coincided with the growth of labour movements in the town, but which have no close relation to the actual building of houses. The first organisation of opinion on the need for industrial housing occurred in 1850 coincidental with strong feeling about the limiting of the local electorate. No building followed until the 60's. In the mid-70's the very tentative growth of a weak labour movement again coincided with the drawing of public attention to the need for housing, but the period from the late 70's until the 90's in fact saw a severe decline in numbers of houses built. The upward swing was from about 1867 to about 1878 with

a downward turn until about 1893 and a slight swing upwards again towards the end of the century. In the 80's a moribund labour movement allied to low profit making in the local industry produced not only less building but even less publicly expressed certainty about the need for it.

After 1900 working class house building in the city ceased almost altogether, although, now that piped water was available and public transport linked the suburbs with the commercial centre, the middle class areas were developing fast. It was not because the need for it had passed that low cost building ceased. The chief sanitary inspector's report for 1901 showed that there were 10,000 houses inhabited by 49,000 persons, in an unsanitary condition.⁵⁷ But now the lack of profit incentive was allied to a growing feeling that public action rather than private enterprise was needed to solve the problem.

A series of acts and reports during the second half of the 19th century had been aimed at a solution. The Dwelling Houses Act (Scotland) of 1855 had aroused considerable discussion in the Dundee press but no action except the building of the three lodging houses. The Nuisances Removal Act of 1856, in which the phrase 'unfit for human habitation' was first used, defined nuisance and gave powers to prosecute house owners who allowed filth to accumulate. It was extended by the Public Health (Scotland) Act in 1867. This however proved little to Dundee's advantage. Manure was a valuable property belonging to the Police Commissioners who, therefore, did not allow its removal by private persons. They, unfortunately, because they would not risk non-election by raising the rates which would have been necessary for the payment of scavengers, allowed it to accumulate in closes and back greens.⁵⁸ In April 1867 the Town Council petitioned the Commons in favour of the Small Dwelling Houses Bill, which passed in 1868 as the Artisans and Labourers Dwellings Act and gave power to levy a special local rate not exceeding 2d for building and maintenance of workers' houses. The low ceiling limited effectiveness everywhere, but in Dundee it was still more than ratepayers were prepared to spend. In 1867 the Town Council provided for the submission of new building plans to a committee and from that date all new houses and alterations to old property had to conform to a standard, albeit a very low one. The only plans rejected were those showing rooms below street level or with unscreened 'ashpits'. Dundee's street improvement act was passed in 1871

and the Artisans and Labourers Dwellings Improvement (Scotland) Act, giving further powers to raise rates for improvements, in 1875. In 1885 the Royal Commission on the Housing of the Working Classes reported and produced the Housing of the Working Classes Act, 1885 which gave local authorities powers to acquire land and erect houses thereon.

Dr Begg's⁵⁹ mid-century campaign for housing reform had gained little support from working people in Dundee. This was partly because, in his own words : " In Scotland the working man cannot reasonably hope to reach the possession of a house worth £10 a year ".⁶⁰ In England the freehold land movement was supported by claimants for a wider franchise because a forty shilling freehold gave a vote. The situation in Scotland was different. There the spur of electoral representation was not enough to make a slum dwelling jute weaver into a house owner. It is also possible that Dr Begg was shunned by the workers simply because he was strongly supported by their employers for whom the philosophy of self-help for the poor was both convenient and the pivot of their own mental attitudes.

Dr Begg had the support of influential people, among them Lord Kinnaird. In 1864 a talk Begg gave in the Thistle Hall⁶¹ on ' Working Men's Houses and the advantage of building societies' was followed by the founding of the Dundee Working Men's Houses Association Ltd. Its aim was the ' providing of houses . . . suited for the occupation of the working classes, the acquisition of land, the purchase of houses already built . . . and the letting, sale or disposal of said houses '.⁶²

1,403 one pound shares were subscribed. Of the subscribers 53 were working men who subscribed 113 shares. 930 subscribers were ' merchants and others '.⁶³

As the chief aim of the society had been to attract working class subscribers it had failed at the start. Ground was feued at very favourable rates, legal costs were minimal and loans were arranged at attractively low rates. Ten two storey tenements were built in Blyth Street, containing four houses, some two and some three-roomed. The first houses to be built sold briskly, the last hung unoccupied on the market for two years and had to be sold at greatly reduced prices.⁶⁴ The Association's only profit was made by sub-f euing the remaining ground at more than three times its original cost, and the town's housing problem was hardly touched.

Conditions had been made as favourable for this scheme as was possible and yet it failed in its aims because it did not recognise that house ownership on any terms was quite beyond the resources of the population of a town with such a low average wage. That the position was not the same in other Scottish cities and that, therefore, the history of housing in Scotland cannot be treated as a whole is shown by the success of similar companies in Edinburgh. ' In these circumstances that the Company did not succeed to anything like the same extent those in Edinburgh have done is remarkable '.⁶⁵

The hope of house-owning by workers was not allowed to die. Lord Kinnaird conducted a one-man campaign for better housing in the correspondence columns of the *Advertiser*, not unmindful, when he taxed textile employers with neglect, of the earlier hostility towards the landed gentry shown by the industrialists' Anti-Corn Law League.

In May 1874 the Dundee Independent Liberal Association held a meeting, presided over by John Robertson,⁶⁶ on the question of providing houses for the working classes. In the same year James Cox presented the Working Men's Club with a dozen copies of Begg's pamphlet *Happy Homes*⁶⁷ and Lord Kinnaird was asked to speak to the club on ' Ventilation and concrete building'.

Three separate associations⁶⁸ resulted from this revival of interest in the problem. The Concrete Building Company built a number of two storey cottages at Clepington during 1874/75 in an endeavour ' to give cheap and substantial cottages to working men '.⁶⁹ They apparently went bankrupt in the attempt. This was a very early example of the use of concrete for housing. Beachtower (1874) by John Murray Robertson in Broughty Ferry has been, to date, known as the first domestic building in concrete in the east of Scotland.⁷⁰ Hitherto, all housing, except the brick tenements mentioned by Carmichael in 1865,⁷¹ an experiment attempted because of the extreme shortage of stone in that year, had been of local stone.

In 1874, also, the Dundee Land and Building Association built a five-storey block with shops on the ground floor and eighteen houses on each storey, seven of them two-roomed, ten of them three-roomed and one four-roomed.⁷² The same year saw the formation of the Working Men's Building Co. Ltd., Dundee, which built two three-storey blocks of two and three-roomed houses, each with a parlour, a W.C. and a scullery

with bed-closet.⁷³ In 1875 they built another block, in Court Street, this time of three storeys. It contained one two-roomed flat on the 1st and 2nd floors, a shop on the ground floor, with one W.C. serving the whole building. This lowering of standards points the very real difficulty experienced in making the proposition pay.⁷⁴

In any case, such operations, because they provided houses only for their own members, who, if they were working class people at all were bound to be of the most prosperous section of workers, were not on a scale to affect the sheer size of the housing problem. Similarly the later building societies⁷⁵ which operated in Dundee, the first of which was the Caledonian Property Investment Company in 1879, hardly touched the need.

In Dundee the powers given by the 1890 Housing Act to acquire land and build houses were not taken up. A depressed town with high unemployment, its industry working without profit, and its Town Council split by political squabbles and unable to do more than form distress committees, Dundee was not, in 1890, ready to lead the field in housing reform. It was no time to raise the heavy rate which would have been necessary for corporation building, and the number of unlet houses in the city strengthened the hand of those who liked to think all well with the workers without looking too closely at their problem.

But pressure began, slowly, to force the council into discussion if not action. In 1901 a Housing Reform Conference was attended by ninety delegates of Trades Councils, Trade Unions, Co-operative Societies and Friendly Societies from Angus and Perthshire. Afterwards they submitted a letter to the corporation urging them to use vigorously the powers they already possessed to borrow money for the purpose of buying land and erecting comfortable cottages and tenements thereon.⁷⁶ In the same week Julius Weinberg, an important and respected public figure, petitioned the corporation, putting before them " the appalling state of things actually existing in the one-roomed houses in this city. Some facts of such a disgusting nature have lately come to my knowledge that it is impossible to describe them ",⁷⁷

In November the chief sanitary inspector, Thomas Kin-near,⁷⁸ produced a report which so exposed the miserable living conditions of a great part of the town's population as to shock even the hitherto

complacent. The Secretary of the 5th Ward Municipal Association wrote to the Town Council : ' We earnestly request that immediate action be taken by the Council to warn all defaulting landlords that they must provide suitable sanitary convenience for their tenants ' .⁷⁹

Very slowly the Council began to answer criticism by purchasing pieces of ground for slum clearance. In 1905 the Works Committee was requested to consider the advisability of utilising the vacant ground belonging to the council in Blackscroft and Seagate and erecting thereon model dwelling houses for working people.⁸⁰

By now the theory that public action for solving the housing problem should be taken was more or less accepted in the city. A Housing and Town Planning Committee, with the enlightened Dr Walsh as its convener, was appointed in 1907. But action was delayed by a long wrangle in which good, idealistic men like Edward *Scrymgeour played no more helpful or creditable a part than councillors with motives less worthy.⁸¹ Outside the confines of Dundee the ' garden city' movement was at its height. Vaguely socialist, inspired by nostalgia for a vanished rural Britain, romantic and middle-class, its power to appeal to the imagination contributed to the delay in rebuilding slum-ridden cities like Dundee.

The situation was now desperate, as the reports of James Thomson, the city engineer and architect appointed in 1906, showed and the Dundee Social Union report reiterated in 1911, but the Council settled to a bitter quarrel which lasted for ten years about the comparative virtues of cottage type and tenement type houses.⁸² The dream of a country cottage and an old world garden for every working man died hard, although it was already obvious that the only possible way to meet the need was by intensive development. Speculative tenement building in the 60's and 70's was blamed for the creation of the slums, although in fact that had come in answer to an older, even more serious slum problem; and tenements were, therefore, regarded with horror by idealists like Scrymgeour. In spite of excellent work by Dr Walsh, Dundee had not got as far as action when the 1914 war broke out, delaying solution and increasing the size of the problem for another three years.

The delay however gave time for the maturing of a city engineer with

the vision to attack the problem realistically. It was James Thomson's *Report on the Development of the City, 1917-18*⁸³ which earned the town its reputation in the 20's as a pioneer of housing reform, making it, at the end of the long battle, 'a paragon of civic excellence whose example other municipalities are asked to emulate'.⁸⁴

By 1914 many Dundonians were aware that the spectacular expansion of the regional textile economy which had been the precondition for the growth of Dundee between 1850 and 1914 had left two great problems unanswered. One was the problem of future economic security for the large percentage of the population working in a low-wage textile industry heavily dependent on overseas markets and exposed to severe foreign competition. The other was the problem of an urban milieu which failed to provide tolerable living conditions for the majority of the inhabitants. It was claimed that the death rate in Dundee had halved between the Dundee Improvement Act of 1871 and 1917, but in the latter year there were still 231 deaths from tuberculosis in the city, and it was said that the illness and mortality from this disease alone cost the city not less than £400,000 annually.⁸⁵

Neither the economic problem nor the problem of urban renewal was easy, but by 1914 a small group of people in Dundee were pioneering a new approach to town planning and development. Of these Patrick Geddes was the most important. A Scot educated in London and Paris, he was in 1888 appointed Professor of Botany at University College Dundee, an institution founded in 1881 largely because of generous support by two members of the Baxter textile family. Geddes is recognised by modern authorities like Lewis Mumford, a close friend of his, as the father of modern town planning.⁸⁶ He had been turned down for the Edinburgh Chair of Botany as too unorthodox, and he was unpopular with his senior colleagues in Dundee because he spent little time in the city. Academic teaching at University College Dundee was done in two sessions : a winter session from October to March, and a summer session from April to July. Geddes was obliged to teach and examine only in the summer session, when he would live in Newport and travel daily across the Tay to Dundee. For the rest of the year he lived in Edinburgh or travelled all over the world. In his own farewell lecture to Dundee in 1919 he said : ' Beyond this little garden I have practically failed to make any real impression upon this great industrial city '.⁸⁷ He

was top pessimistic. His influence was not spectacular but he contributed to a gradual change of outlook in significant circles in Dundee. So compulsive was he in preaching his gospel of the need for awareness of urban problems and of conscious planning to surmount them that one serious student of botany in his classes reported him to the university authorities for teaching very little botany even when exams loomed near.⁸⁸

The academic community in University College Dundee was far from isolated from the problems of the community around it. Indeed the holder of the chair of Mathematics and Natural Philosophy, Professor J. E. A. Steggall, was active not only on the Dundee School Board but also in the Dundee Social Union, a voluntary body interested in the social problems of the city. In the summer of 1904 a committee of the Dundee Social Union, including Steggall, began to prepare a report on housing, industrial conditions, and public health in Dundee. Its publication in 1905 was epoch-making. It documented the problem of overcrowded working-class tenements in the centre of the city where population density ranged from 380 to 882 persons per acre.⁸⁹ It also pointed out that there was a great shortage of land suitable for working-class housing within the burgh and the authorities had failed in an attempt to extend the boundaries in 1899.⁹

Yet it is clear that active interest in problems of urban redevelopment in Dundee, even after 1905, was characteristic of a very small minority of people. Apart from the odd 'human interest' story on subjects like the District Nurses, which indirectly touched on the pattern of life in the tiny 'houses' of two rooms or so in the great tenement blocks,⁹¹ the local press displayed no sustained interest in social problems, devoting more space to church affairs and sport. It is typical of the mental attitude of the time that there was an active campaign afoot to change the name of one of the worst congested districts — the Scouringburn. Appalling living conditions had bred numerous court cases and instead of thinking in terms of social reconstruction a strong pressure group was by 1907 lobbying the Town Council to hasten the 'moral regeneration' of the area by calling it something else.⁹²

Dundee was fortunate that James Thomson, one of its greatest local government officers, and for a critical period Burgh Engineer, was deeply

affected by some of the most advanced thought of the day on town planning and urban renewal. He had as Assistant Burgh Engineer both testified before the House of Lords in 1899 on the state of Dundee's congested districts and provided a great deal of material for the Social Union Report of 1905.⁹³ In 1906 he became Burgh Engineer. In this post he found more immediate scope for his enlightened views on street planning and future traffic problems than for his interest in working class housing. There was a barrier compounded of complacency and real financial difficulty which stood in the way of renewal of Dundee's congested areas. Upper class opinion favoured development in working class areas most when it rendered the population a more efficient work force and when the development could pay for itself. Thus in 1877 a group of local capitalists had formed the Dundee and District Tramway Company Limited. This company created the first really effective public transport network in Dundee and extended regular services to Lochee. Between 1893 and 1898 the company's annual dividend ranged from 6% to 12J%. In 1899 the system was taken over by Dundee Corporation which electrified it and made it one of the most efficient systems in the country. An extensive system of early morning workers' cars was run on all routes and special cars were run for some large works like Baxter Brothers for whose workers a service ran from Crescent Street to Stobswell.⁹⁴

But improved working class housing just did not pay. Even in London in the late 19th century when philanthropically-inclined groups built working class tenements like Peabody Buildings and Katherine Buildings, they found that the poorest class of worker could not be relied upon to pay even a very low rent regularly.⁹⁵ In Dundee the very low level of general wages outwith shipbuilding and engineering, which employed less than a quarter of the labour force, reinforced the strong Dundee working class tradition of very low rents. Indeed when there was vigorous slum clearance and redevelopment in the 1920's the authorities often faced bitter opposition from the tenants of insanitary, overcrowded tenements who were much attached both to their friendly neighbourhood and to their low rents.

The solution to this impasse had to come from outside. It came in the shape of state intervention. Patrick Geddes was friendly with John Burns, President of the Local Government Board in 1908. In that year,

influenced by Geddes, Burns introduced a Town and Country Planning Bill which became law in 1910. It gave local authorities the necessary powers of compulsory purchase and co-ordination needed to plan large new developments. Despite the fact that in 1910 Geddes, with the help of Burns,⁹⁶ mounted a great Town Planning Exhibition at the Royal Academy in London, Dundee showed no signs of positive enthusiasm for the scope offered by the new Act. Indeed, James Thomson in his annual reports on behalf of the Corporation Works Department to the *Dundee Year Book* had to admit that the building of working-class housing was at a standstill in 1911, 1912 and 1913.⁹⁷

By 1914 town planning had become an acceptable phrase in corporation circles, but Thomson had to justify it on the grounds that foresight in such matters as street planning and the purchase of open space would ultimately save ratepayers' money.⁹⁸ Tenement building could scarcely be defended on these grounds. By 1915 the war was exercising a paralytic effect on all non-essential building. The Housing and Town Planning Committee of the Town Council were said to be conducting a 'crusade' against slum housing in congested areas, but they do not appear to have been offering any alternatives.⁹⁹ Fortunately, the end of the war saw dramatic changes. In 1918 Dundee Town Council published a report on the development of the city 1917-18, which was written by Thomson and which put the case for drastic action to deal with congested working class housing. Then in 1919 Lloyd George's government, which had wooed ex-servicemen's votes with talk of 'homes fit for heroes' passed the Housing and Town Planning Act which envisaged a large programme of local authority housing and asked local authorities to consolidate their housing and town planning work into one integrated policy. Perhaps most important of all was the fact that under the 1919 act the Treasury undertook to relieve local ratepayers from any burden over a very small figure of less than a penny per pound added to the rates by a housing programme. Dundee seized the opportunity with commendable alacrity. When Logie housing scheme was opened in 1920, Dundee was leading Scotland in this field, and in the mid-1920's was recognised by a big London newspaper as a pioneer of modern town-planning.¹⁰⁰

There were, of course, problems associated with the 1919 Act. The building supply industry was inadequate for a large new building

programme and much of the subsidy disappeared into the increased cost of building materials. Subsequent subsidies placed a heavier burden on the rates and therefore opened the way for bitter conflict over local authority housing in the field of local government. So low were wages in Dundee that no jute worker could afford to live in Logie. When some members of Dundee Corporation wanted to build very cheap working class housing, they found that their proposals fell below the minimum standards laid down by the government.¹⁰¹

For all that, it would be fair to say that from 1919 Dundee adopted a positive and constructive approach to its heritage of poor and congested Victorian working class housing. The depression necessarily gave a severe setback to the process of urban renewal, but it had begun, and its roots can be traced back to before 1914. The inefficient handling of the financing of housing schemes which followed in the 20's and destroyed the pioneer hopes of 1919 is material for another study.¹⁰²

NOTES

1. T. Ferguson, *The Dawn of Scottish Social Welfare*, Edinburgh, 1948, pp. 42-3.
2. "Hints may most advantageously be taken from the police bill of the neighbouring town of Dundee"; *N.S.A.*, Perth, Vol. 10, p. 135.
3. "Statistics of Dundee" in each D.Y.B.
4. Useful as the pamphlet on *Scotland's Older Houses* by the Scottish Housing Advisory Committee is, its conclusions are largely based on evidence from Glasgow and Edinburgh.
5. *Report on the sanitary improvement of the burgh of Dundee*, by John Fulton, town surveyor; bound in *miscellaneous Pamphlets*, Dundee Public Library, D5073 I.
6. *Ibid.*
7. Plans for improvement often show existing cottages on the site; Dundee Corporation Duplicate Plans.
8. See *Prize Essays*, Highland Society, 1803, Vol. 2.
9. For the extent of the drop in income, see R. Chalmers, *Autobiography*, Dundee, 1872.
10. Brown, ms. *op. cit.* in Chapter IV note 1.
11. Ferguson, *op. cit.* in note 1.
12. Report of Registrar General for Scotland, 1861 Census.
13. Census reports, and *D.Y.B.* for the respective years. "House" here must be taken to mean "block of houses", a point of difference between English and Scottish usage left undefined in census reports.

14. D.A., 23 January 1857.
15. Carmichael mss. vol. 2, p. 1000, letter dated 9 April 1850.
16. D.A., 17 January 1854.
17. *Report of the annual festival of the Holy Guild of St. Joseph . . . with an account of the speeches delivered . . .* ed. Bishop Gillis, Edinburgh, 1843.
18. Yet as late as 1914 there were still underground cellars and vaults inhabited in Dundee; Council Minute Book, 1 December 1914.
19. D.A., 17 January 1854.
20. D.A., 2 February 1855.
21. D.A., 30 January 1857.
22. Lord Kinnaird was involved in one of the earliest associations for improving workers' housing in London; in 1874 he recommended to Dundonians, in his pamphlet *Working Men's Houses*, printed at the *Advertiser* office, that they should seek advice from the Peabody Trust, whose architect was a friend of his.
23. This estimate was, of course, over optimistic, being based on rents which could be extracted in London.
24. Carmichael mss., vol. 3, p. 314.
25. Provision of housing continued to be usual for country mills and bleachfields where there was still difficulty in attracting labour. The long strike of Dighty bleachers in 1906 was broken by the threat of eviction from tied houses which had been occupied by the same families for generations.
26. W. Brown, *Essays on Flax Spinning*, *op. cit.* in Chapter IV, note 1.
27. D. Chapman, "Combination of hecklers", *S.H.R.*, vol. 127 1948.
28. D.A., 11 March 1851.
29. Carmichael mss., vol. 3, p. 314.
30. Valuation rolls, Forfarshire, 1871-2 (in Dundee Public Library).
31. Census Report 1871.
32. D.A., 23 December 1924.
33. "Combination of hecklers", *op. cit.* in note 27.
34. *People's Journal*, 16 May 1874.
35. See *Report on the sanitary conditions of the labouring population of Great Britain*, by Edwin Chadwick, 1842 ed., with an introduction by M. W. Flinn, Edinburgh, 1965; introduction p. 7 : "In terms of life itself it really mattered little how a labourer's wage varied . . . if a dwelling house with water supply . . . could not be afforded at any income under, say, 30s. a week."
36. *People's Journal*, 16 May 1874.
37. *People's Journal*, 13 April 1874.
38. D.A., 27 February 1877.
39. Carmichael mss., vol. 3, p. 311.
40. Records held by Lawson's Tay Rope Works, Dundee.
41. A. J. Warden, *Angus or Forfarshire*, Dundee, 1880-5; and firms' title deeds.
42. Memorandum by the Town Clerk regarding Barony of Hilltown 1883. Lamb Collection 228 (31).
43. D.A., 6 January 1857.
44. D.A., 3 January 1868.

45. We do not know that this property was built by the church or if it was older property bought by them, but we do know that the last quarter of the century a considerable amount of housing was built by the Very Rev. Canon Holder in working-class areas. See Dundee Town Council, Police Commission, Duplicate Plans, in custody of Dundee Corporation.
46. Valuation Rolls, Lift and Benvie.
47. Only as far as stair heads, Piped water inside houses did not come until 1901.
48. The relevant act for Dundee was passed in 1871.
49. Lord Kinnaird, *Working men's houses*, 1874.
50. See for instance J. C. Gilbert, *Scottish investment trusts*, London, 1939.
51. See Appendices I and V.
52. H. Habbakuk, "Fluctuations in house building", *Journ. EC. Hist.*, 22, 198.
53. *D.A.*, 28 January 1851.
54. *People's Journal*, 14 May 1881.
55. *D.A.*, 3 September 1871.
56. Difficulty of obtaining land was even greater; see p. 84.
57. Council Minute Book Vol. 36., p. 336.
58. Kinnaird, *op. cit.* in note 49.
59. James Begg, D.D. (1808-1883), Free Church minister, supporter of Dr Chalmers, keenly interested in social questions, especially working class housing.
60. *D.A.*, 20 January 1854.
61. This hall is still in existence as the dining room of the Royal Hotel.
62. *People's Journal*, 16 May 1874.
63. Donations amounting to £130 18/- were given by Lord Kinnaird, Mr Armitstead, Edward Baxter, A. & D. Edward.
64. Small houses, sold at first at £105, later at £85; larger houses cost at first £146, then £125. Loans were arranged at a total cost of £1 10/- on £75 and £2 on £110. *People's Journal*, 16 May 1874.
65. *People's Journal*, 16 May 1874. For an account of an Edinburgh Society see James Begg, "Happy Homes".
66. *Ibid.*
67. James Cox's Letterbook; to Begg, 21 May 1874.
68. David Walker thinks that the Concrete Building Company were operating on behalf of one of the others, making two, not three associations. This may be the case, but their houses are described as two storey cottages while the others have three and/or five storeys.
69. Lamb 227 (2).
70. P. Collins, *Concrete, the vision of a new architecture*, London 1958. See also, "The progress of concrete as a building material", *People's Journal*, 14 November and 28 November 1874.
71. Carmichael Memoirs, vol. 3, p. 314.
72. Duplicate Plans 1874.
73. *Ibid.*
74. The foregoing descriptions of houses were taken from duplicate plans in city offices. The cost of the 1874 houses was reckoned at £80 for a two-roomed house, the cost of borrowing 5%, but many thought both estimates optimistic; *People's*

Journal, 16 May 1874.

75. The Dundee Joint Stock Co. had built some houses in Charles Street in 1824. We are indebted to Mr David Walker for this information.

76. Corporation Minute Book, vol. 36, p. 125, 7 March 1901.

77. *Ibid.*

78. See also Kinnear's contribution to the *British Association Handbook 1912*: "Sanitation and pure air in Dundee, fifty years ago and now".

79. Corporation Minute Book, vol. 36, p. 336, 5 December 1901.

80. *Ibid.*, vol. 37, p. 397, 5 December 1905.

81. Meetings of the housing committee throughout 1908 and 1909, especially, were interspersed with continual changes of policy with allegations of conspiracy.

82. See, for instance, Council Minute Book, vol. 39, p. 290, 19 November, 1908.

83. His 1912 report revised and published after the war.

84. *Courier*, 6 May 1925. See also *Spectator*, 9 May 1925.

85. Dundee Town Council, *Report on the development of the city 1917-18*.

86. See Acknowledgements in L. Mumford, *The Culture of Cities*, London, 1940.

87. "Geddes' Final Dundee Lecture", reprinted as Appendix II in Patrick Geddes, *Cities in Evolution*, edited by the Outlook Tower Association, London 1949.

88. G. Wilson, *The Making of a Lord Provost*, Dundee, 1967, p. 19.

89. Dundee Social Union, *Report on Housing and Industrial Conditions and Medical Inspection of School Children*, Dundee, 1905.

90. *Ibid.*

91. *D.A.*, 13 May 1907.

92. *D.A.*, 5 June 1907.

93. Dundee Social Union, *Report*, 1905.

94. A. W. Brothie, *Tramways of the Tay Valley*, Dundee Museum, 1965, p. 51.

95. B. Webb, *My Apprenticeship*, Vol. 2, Ch. 6, pp. 314-315, Penguin ed.

96. P. Mairer, *Pioneer of Sociology*, p. 140.

97. Works Department reports in D.Y.B., 1911, 1912 and 1913.

98. Works Department report in D.Y.6., 1914.

99. Works Department report in D.Y.8., 1915.

100. Review of Report on Development of Dundee, in *The Spectator*, 9 May 1925.

101. *D.A.*, 5 February 1924.

102. At present being carried out under Mr Lenman's supervision by an American Rotary scholar.

Appendix 1

WORKING CLASS HOUSING STATISTICS

(a) Houses built for working people

1867/1870	1,725 houses in 125 blocks
1871/80	9,303 houses in 434 blocks
1881/90	1,783 houses in 141 blocks
1891/1900	5,520 houses in 269 blocks
1901/1914	2,236 houses in 158 blocks
TOTAL	20,567 houses in 1,100 blocks

(b) Description of houses built, various periods

	1867/70	1871/80	1881/90	1891/1900	1901/14	Total
One Story	4	4	1	-	1	10
Two Story	16	20	5	10	4	55
Three Story	52	84	27	41	23	227
Four Story	45	271	79	208	126	729
Five Story	8	53	2	10	4	77
Six Story	-	2	-	-	-	2

(c) Sanitation

	Up to 1875	After 1875
How many houses were built entirely without?	2,328	258
How many houses shared more than 2 to a W.C.?	3,547	2,699
How many had W.C.'s on stair or plat? (i.e. one between two)?	1,362	2,944
How many had W.C.'s (i.e. one each)?	570	6,918*
How many had bathrooms?	9	496

* becoming common around 1888

(d) Number of rooms of average hous at different periods

	1867/70	1871/80	1881/90	1891/1900	1901/1914	Total
One Room	168	704	5	52	91	1,020
Two rooms	1,490	6,820	1,066	3,796	1,496	14,658
One + bed-closet	6	80	2	15	-	103
Two + bed-closet	4	113	-	24	64	205
Three Rooms	43	1,442	667	1,544	575	4,271
Four rooms	14	139	33	81	20	287
Five rooms	-	5	10	8	-	23

(e) Type of investor at different periods

	Up to 1880	After 1880	Total
Building tradesmen in small businesses	111	24	135
Large speculative contracting firms	112	81	193
Private persons as investment (spinsters etc)	265	349	614
Churches	2	5	7
Societies formed for the purpose	4	14	18
Architects	11	39	50
Firms building for their workers	54*	29†	83
	559	541	1100

* Greatest number by McGrady of Bell & Sime

† Greatest number by Malcolm Ogilvie

(f) Districts of the Town (or neighbourhood) in which working class houses were built at different periods.

	1867/75	1875/90	1890/1914	Total
Hilltown	90	89	60	239
Lochee	49	56	50	155
Hawkhill	37	48	14	99
Perth Road	13	7	20	40
Dens	36	52	58	146
Cleington	10	11	48	69
Maryfield	-	12	52	64
Dudhope	40	20	59	119
Blackscroft	11	28	26	65
Logie	12	16	15	43
Blackness	16	16	29	61
	314	355	431	1100

Appendix II

DUNDEE: POPULATION AND JUTE IMPORTS 1851 - 1914

Year	Population	Jute Imports Tons	Year	Population	Jute Imports Tons
1851	79,931	16,928	1883		233,883
1852		16,983	1884		130,150
1853		15,400	1885		175,672
1854		16,590	1886		153,453
1855		24,086	1887		195,885
1856		26,964	1888		188,568
1857		36,554	1889		
1858		32,309	1890		369,958
1859		37,812	1891	155,985	344,720
1860		36,965	1892		255,560
1861	91,664	35,716	1893		278,634
1862		38,277	1894		338,884
1863		46,983	1895		392,025
1864		56,404	1896		340,649
1865		71,000	1897		336,919
1866		52,179	1898		362,138
1867		47,777	1899		
1868		58,474	1900		280,919
1869		64,191	1901	160,836	321,331
1870		73,878	1902		414,550
1871	120,724	94,608	1903		240,090
1872		123,666	1904		306,432
1873		139,923	1905		336,855
1874		114,935	1906		369,789
1875		112,911	1907		363,840
1876		117,540	1908		354,028
1877		107,499	1909		
1878		128,423	1910		296,720
1879		150,619	1911		300,959
1880		139,847	1912		384,991
1881		160,089	1913		350,196
1882		168,786	1914		207,681

Appendix III

(a) Some Dundee Wage Rates 1851 - 1914

Year	Spinner's Wage	Weaver's Wage	Calenderer's	Half- Timer's	Rovers	Source
1851	6/3				4/6	
1852	5/9				4/4	
1853	6/-				4/6	
1854	6/-				5/9	
1855	6/6				6/6	Dundee Advertiser 26/12/95
1856	7/6					
1857						
1858						
1859						
1860						
1861						
1862						
1863						
1864						
1865						
1866	8/6 Flax 10/- Jute	12/6		3/-	6/-	Warden Supplement
1867						
1868						
1869						
1870						
1871	8/6 Jute 7/- Flax	9/3 Jute 8/- Flax		21/- jute	8/6 jute	Bevan
1872						
1873						
1874						
1875						
1876	12/- Jute 10/- Flax	10/- Jute 8/-	18/- flax	3/-	13/- jute	Bevan
1877						
1878						
1879						
1880						
1881						
1882						
1883						
1884						
1885						
Year	Spinner's Wage	Weaver's Wage	Calenderer's	Half- Timer's	Rovers	Source
1886	8/3	11/1	17/1	2/6	8/6 females	Lennox
1887						
1888						
1889						
1891	11/6	13/-		3/-		D.Y.B.

1892				3/3	11/6	
1893	9/-	11/-				
1894						
1895						
1896						
1897						
1898						
1899						
1900						
1901						
1902						
1903						
1904	11/4	13/3	22/6	3/3	11/6 males	Lennox
1905	10/4	12/-	18/- 21/-	3/7	11/11 Girls	Dundee Social Union Report
1906	12/3 average	13/11 average		4/1 average		Ladywell Calender Co..
1907						Report on earnings & hours textile trade 1906 (CD)
1908						
1909						
1910						
1911						
1912						
1913						
1914						

(b) Wages - 1856**Advertiser, 26th Dec. 1856**

Year	Feeders	Rovers & Enders	Spinners
1850	5/-	4/8	6/6
1851	-	4/6	6/3
1852	4/9	4/4	5/9
1853	4/7	4/6	6/-
1854	4/9	4/6	6/-
1855	4/9	5/9	6/6
1856	5/9	6/6	7/6
1857	6/9	-	-

(c) Wages - 1876**(Lamb 196 E)**

Spinners	10/- to 13/-
Calenderers	18/- to 22/-
Shifters (Half Time)	3/- to 4/-
Sack Sewers	5/- to 10/-
Weavers	8/- to 13/- (single loom)
Weavers	12/- to 17/- (double loom)

(d) Average Rates of Wages. Jute Manufacturer Lennox

Return of wages 1890

Wages bills in various works throughout the City of Dundee in 1904

Note: There is no general standard of rates of wages.

	1886			1904		
	Males	Females	Half-time	Males	Females	Half-time
Preparing						
Overseers	27/-			29/4		
Softners	11/11			17/-		
Batchers	14/6			17/8	10/-	
Preparers	13/1			11/9	10/6	
Carders	7/9	7/9		10/1	10/1	
Cutters	12/6			13/-		
Drawers		7/8			10/3	
Rovers	8/3	8/6		11/6		
Feeders		7/9		17/-		
Shifters	6/5		2/8	10/-		3/11
Spinning						
Overseers	27/2			34/7		
Spinners		8/3		15/3	11/4	
Twisters		9/-			10/10	
Shifters	5/11	5/9	2/6		10/1	3/3
Carriers	10/11			14/-		
Reeling						
Overseers	27/-			30/10		
Reelers		9/6			13/4	
Winders		10/6			14/10	
Weaving						
Overseers	36/5			40/-		
Warpers		12/2			16/6	
Beamers	18/8					
Dressers	22/2					
Tenters	23/3			30/-		
Weavers	24/-	11/1			13/3	
Finishing						
Overseers	29/5			22/6		
Calenderers	17/1			22/6		
Lappers	17/8			22/6		
Packers	19/2			17/-		
Lumpers	14/10					

(e) Wages of Jute Operatives**Lennox**

Return of the rates of wages in the minor textile trades, 1890

Limits of average rates	Men	Lads	Women	Girls
Of 35/1 and under 40/-	52			
Of 30/- and under 35/1	53			
Of 25/- and under 30/-	127			
Of 15/- and under 20/-	964			
Of 10/- and under 15/-	1038	117	2886	
Under 10/-	565	1757	1332	
Half-timers		621		957
Totals	2799	2555	10,909	2289

(F) Dundee Year Book 1891**Report to Labour Commission**

Wages : J. H. Walker's evidence

Unskilled men	15/- to 17/-
Lads	9/6 to 12/6
Half-timers	3/6
Women	10/- to 12/6
Spinners	11/6 to 12/-
Women overseers	15/-
Winders	14/-
Female weavers (about 90% are women)	13/- to 17/- (single)
Female Weavers	17/- to 20/- (double)
Average over whole factory - 16/9 weekly	

Dundee Year Book 1893

Wages : Various Works

Weavers	11/- to 15/9
Spinners	9/- to 11/-
Feeders	9/- to 11/6
Half-timers	3/3
Another Firm	
Spinners	12/-
Carders	10/6
Warpers	14/- to 16/-
Winders	13/-
Another Firm	
Spinners	10/6
Shifters	9/3
Drawers	10/- to 10/3
Winders	13/- to 16/-
Weavers	7/7, 10/6 and 17/8
Another Firm	
Spinners	10/- to 12/6
Batchers	13/- to 16/-

Carders	10/6
Preparers	9/6 to 10/6
Reelers	9/6 to 16/-
Rovers	11/- to 11/6
Winders	10/- to 14/-
Weavers	12/- to 20/-
Warpers	16/- to 18/-
Shifters	14/- to 14/6

(g) Calender Worker's wages in 1905

Ladywell Calender Works Co.

Packers, Lappers, Calenderers	21/- to 24/- per week
Lumpers	17/- per week

Sack Sewing Machinists wages in 1905

Ladywell Calender Works Co.

Machinists	(18 to 35 years old)	14/- to 22/- per week
Bundlers, Twiners	(20 to 40 years old)	12/6 to 21/- per week
Learners, Tyers, Spreaders	(14 to 18 years old)	8/- per week

(h) Dundee Social Union Report, 1905

Wages

Half-timers (boys)	3/9	Shifters (girls)	9/-
Shifters	9/4	Spinners	10/4
Rove Carters	10/-	Girls	3/7
Rovers	11/-	Rovers (girls)	11/11
Preparers	10/6		10/-
Batching-house	5/-		12/2
Beamers	15/-	Piecers	9/10
Dressers	15/-	Spinners	10/4
Weavers (Power)	19/-	Twisters	10/-
Weavers (hand)	7/7½	Shift Mistress	14/-
Carpet	12/-	Reelers	12/-
Hosepipe	24/-	Winders	12/-
Oilers & Weighers	14/6	Warp winders	12/-
Assistant tenters	11/6	Drawers	10/4
Calenderers	18/-	Weavers	12/-
Lappers	20/-	Carpet	15/-
Dyers	18/-	Calender, Tyers, Bundlers	9/-
Mechanics	29/-		
Assistant overseers	17/-	Sack machines	12/-
Tenters	22/-	Sweepers	10/-
Overseers	23/-		

Appendix IV

MILL INVENTORIES AND SPINNING ESTABLISHMENTS

(a) Contents of Mill in Ward Road belonging to Trustees of James Hynd (deceased) in 1835.

This machinery was offered for sale, on behalf of the Trustees, by William Halley on 13th February 1835: -

One steam engine of 4 h.p.

One Teaser

One Breaker Card

One Finisher Card

Two Heads of Drawings

One Spreading Gill Machine

One Tow Roving Frame of 10 Spindles

One Flax Roving Frame of 6 Spindles with drawing carriage

Six Spinning Frames of 36 spindles each - 216 spindles

Another lot of machinery was advertised on 23rd January 1835 - Apply William Halley, 18 Wellgate.

(b) Contents of Wallace Craigie Mill in 1836

Two Boilers 30lbs. pressure thereby

One Steam Engine 28 h.p. 35 r.p.m. by Carmichael of Dundee

One Tow Shaker

One Devil (Bale Opener)

Ten Cards with card cloth

One Flax Preparing Machine

Six Tow Drawings of Two Slivers each

Sixteen spindles of Roving for lint with two driving machine (for peddle operation by a blind man)

Seventy Spindles of Roving for Tow

Lint Frames - Two of sixty spindles each 120

Two of fifty-six spindles each 112

Tow Frames - Six of fifty-four spindles each 324

Four of fifty spindles each 200

Six of forty-two spindles each 252

1008 spindles

The necessary supply of Roving Bobbins Mill Lists

Probable weekly out-put about 12 tons.

1836 - A sum of £2,800 was borrowed, on the security of the Mill and contents, from Hugh Lyon Playfair, Esq., St Andrews. The building and contents were transferred by Robert Brough to William Halley & Co. In 1837 and became the property of William Halley after settlement with his creditors in 1842. The loan was taken over by the Dundee Banking Co. in 1849 and finally liquidated in 1856.

(c) Contents of a Handloom Factory in Crescent Street owned in 1836 by Robert Brough, and by William Halley from 1838 to 1856, or later.

Twenty-four looms

Thirty-----*

Thirty-six starching Berths, with full set of rods and

One Boiler with six starch tubs

One Warping Mill with about one gross of -----*

One Lapping Table

Cams and Reeds, say about four pounds worth.

£1,500 was borrowed on the building and contents from William Fairweather, Farmer, at 4½%. Bond transferred to the Dundee Banking Co in 1849, and finally liquidated in 1856.

The building and contents were made over to William Halley & Co. in 1837 by Robert Brough, and acquired by William Halley after settlement with his creditors in 1842.

The Factory was let at this time to Peter Kinmond, and was possibly the one referred to as being in the Sailors Acres in 1840 and occupied by William Halley though it could hardly have been sold until the bond on it had been repaid. The Factory in Sailors Acres is stated to be "almost new", and may have been a different establishment altogether.

* indicates illegible word in the original.

(d) Contents of Wallace Craigie Works in 1921

Four Lancashire Boilers of 120 lbs. pressure (installed 1891).

One Steam Engine 500 h.p. (installed 1891, scrapped in 1950).

1890 -

One Bale Opener

One Jute Softener

Four Breaker Cards

Eight Finisher Cards

Seven First Drawings

Seven Second Drawings

Nine Rovings

Sixty-four Spinning Frames - 3312 Spindles (3000 Spindles in 1890)

Eight Cop Machines (Four double-sided)

Ten Spool Machines (Five double-sided)

Three Dressing Machines

Weekly output 45 tons yarn and 40 tons cloth

Added 1916/1928

One Teaser Card

One Finisher Card

One First Drawing

One Second Drawing

Two Spinning Rovings

Spool Machine

Cop Machine

One Warping Mill

One Dust Shaker

} Heavy System Weekly Output
10 tons yarn (scrapped in 1952)

(e) Contents of Ward Mills in 1844, with current values

The property of John Halley from 1929 to 1840

Card Room, 1st Floor -

1	Tow Shaker	£8	0	0
1	Teaser	£28	10	0
5	First Breaking Cards at £60	£300	0	0
5	Finishing Cards	£300	0	0
2	Old Finishing Cards (taken down)	£40	0	0
11	Heads of Common Tow Drawing, Two slivers each	£80	0	0
6	Heads of Spiral Tow Drawing, Four slivers each	£124	0	0
4	Heads of Spiral Tow Drawing, Two slivers each (8in broad)	£80	0	0
48	Spindles of Spiral Tow Roving	£260	0	0
20	Spindles Common Tow Roving, 4 spindles per system	£44	0	0
42	Spindles Common Tow Roving, 2 spindles per system	£52	0	0
450	Sliver Cans	£45	4	0
8	Tow Baskets	£0	12	0
12	Fire Buckets	£0	12	0
	Ladders, Oil Cans, Screw Keys etc	£0	10	0
1	Sliver Machine	£12	0	0

1st Spinning Room, 2nd Floor

16	Spinning Frames containing 672 spindles, mostly out of use	£201	2	0
8	Racks and 4 Warping Mills	£20	0	0
2	Bundling stools and 4 Reeling Boxes	£2	10	0
12	Bobbing Baskets	£0	14	0
	Side Beam with Weights	£1	2	0

2nd Spinning Room, 3rd Floor

32	Spinning Frames containing 1824 spindles	£1094	8	0
3	Dozen of Baskets, oil can, screw keys, brushes and ladder	£2	5	0

Flax Preparing, 4th Floor

2	Common Spreading Machines	£30	0	0
2	Spiral Spreading Machines	£100	0	0
10	Heads Spiral Drawing, 2 slivers each	£260	0	0
32	Spindles Spiral Roving	£190	0	0
28	Spindles Common Roving, 2 spindles per system	£80	0	0
403	Sliver Cans	£20	0	0
1½	gross Roving Bobbins, small, with beam and weights	£6	5	6
3	Rove Carts at 15/-	£2	5	0
	Oil Cans, ladders and screw keys	£0	10	6
21	Reels	£21	0	0
11	Reeling Boxes	£2	6	0
1	Bundling Stool	£0	8	0
1	Bundling Press	£10	10	0
1	Desk Beam with weights	£1	10	0
	Small Desk with tow sets of steps	£0	7	6

Turning Shop

1	Double Power Turning Lathe with slide rest	£40	0	0
1	Second Power Turning Lathe with side rest	£5	10	0
1	Pair Power Turning Lathe with side rest single	£3	10	0
	Shear Beams for Lathes	£3	0	0

1	Vertical Drill	£14	0	0
	Grindstone with frame and pulley	£1	5	0
4	Vices	£5	0	0
	Wrights Bench	£1	10	0
1	Circular Saw	£4	0	0
	Watchman's Clock	£1	0	0
1	Die Frame with 3 sets of bits, 26 Screw taps and 4 plates	£4	0	0
22	Turning Tools and swarfs	£1	10	0
34	Flat Drills	£1	2	0
4	Hammers, 1 Punch and 4 Nut keys	£0	10	0
	Clamps Brace	£0	14	0
	Fore Hammer	£0	2	0
	Machine for covering rollers	£1	2	0
	Long Slide for Cards	£14	10	0
4	Top Shafts for Turning Lathe and Vertical Drill	£7	5	0
7	Tressels and 1 ladder	£0	10	0
1	Two-wheeled Barrow	£8	6	0

Warehouses

	Standard with Scale, Beam and Scale	£8	10	0
5	cwt. adjusted weights	£1	12	0
1	Standard with Beam Scale	£5	10	0
8	cwt. adjusted weights	£2	17	0
1	Scale Beam with Scales	£4	10	0
2	cwt. adjusted weights	£0	15	0

Heckling Shop

113	Heckles of various sizes, much work	£45	16	0
-----	-------------------------------------	-----	----	---

Counting Room

1	Fir Table with drawers	£2	10	0
1	Desk	£2	8	0
1	Small Desk	£2	0	0
4	Desk Stools and Chair	£0	14	0
1	Crate with Fire Irons	£0	12	6

		£8	4	6
Total	£3714	2	0

From the Testament Testamontor and Inventory of the Goods, Gear and Debts of Umquhile James Buist, Merchant and Flax Spinner, Dundee at the time of his death which was on 28 March, 1844.

(f) Spinning Establishments in 1908

		Estimated Bales per week
	Anderson & Glass, Mid Street	150
1822	Baxter Bros. & Co. Ltd., Dens Works	500
	Thomas Bell & Sons Ltd., Belmont Works	350
	Henry Boase & Co. Ltd., Wellfield Works	500
1836	A. J. Brough & Co., Taybank Works	300
	Buist Spinning Co. Ltd., Stobswell Works	600

	J. K. Caird, Ashton Works and Craigie Works	1150
	William Cleghorn, Park Mill	350
	Clelington Spinning Co., Clelington Works	700
	Cox Brothers Ltd., Camperdown Works	2300
	Don & Duncan, King's Cross Works	200
1820	Don Brothers, Buist & Co. Ltd., Ward Mills	250
1806	W.A. Douglas & Co., Bell Mill, Guthrie Street	150
	D.H. Fleming, Sons & Co., Lochee	450
	Gilroy, Sons & Co. Ltd., Tay Works	1250
	E.G. Gibb	130
	Grand Baxter, Dundee Linen Works	250
1857	J. & A.D. Grimmond Ltd., Bowbridge Works	1500
1835	J. & A. Guthrie, Seabraes Mill	160
1835	William Halley & Sons, Wallace Craigie Works	350
	Hardie & Smith, Baltic Works	120
1818	Alexander Henderson & Sons, South Dudhope Works	420
	John Henderson & Sons, Lindsay Street Works	350
	M. & C. Hill Ltd., West Dudhope Works	400
	J. H. Kyd & Co	850
	David Low & Co., Ann Street Works	300
	D. McMaster & Co., South Anchor Works	250
	Malcolm Ogilvie & Co. Ltd., Constable Works	1100
	A. P. Mathewson & Co., Grove Mill	600
	P. Spence, Mudie Mills near Edward Street	220
	William Nairn, Balgay Works	230
	James Paterson & Co., Lawside Works	320
	James Prain & Sons, Larchfield Works	350
	James Robertson & Co. Ltd., Scouringburn	400
	F. S. Sandeman & Sons, Manhattan Works	700
	Spalding & Valentine, Caledonian Works	230
	James Scott & sons, Dura Works & Mid Wynd Works	1400
	Scott, Sons & Co., Dudhope Mill	600
	John Sharp & Sons Ltd., Miln Street Works	1200
	D. Smith & Sons, Garden Works	600
	Harry Smith & Co., Polepark Works	800
	Thomson Brothers Ltd., Angus Works	450
1857	Thomson Shepherd & Co. Ltd., Seafield Works	800
	Victoria Spinning Co. Ltd, Queen Victoria Works	600
	Harry Walker & Sons Ltd., Caldram Works	1100

24,980

54 Mills	1,225,000 bales per year
Under 250 Bales per week	9
250 - 500 Bales per week	16
500 - 1000 Bales per week	12
Over 1000 Bales per week	8

These estimates are probably on the high side.

Appendix V

Details of makers of Second-hand Machinery advertised in "Jute and Flax Machinery Advertiser", Dec. 1890 - Aug. 1891

(Note : This table lists only equipment in the more specific categories or opposed to "Miscellaneous Equipment". Equipment listed in more than one issue has been counted only once.)

Type of Machine	No.	Maker/Patentee	Place of M/fr
Softners	1	Urquhart Lindsay & Co	Dundee
Open Teazers	4	n.a.	n.a.
	1	n.a.	n.a.
	1	J. F. Low	Monifieth
	1	Lawson	Leeds
	3	Fairbairn etc.	Leeds
	3	Pearce Bros.	
Drawing Frames	25	Fairbairn	Leeds
	2	Lawson	Leeds
	4	McGlashan's Patent	
Roving Frames	15	Fairbairn	Leeds
	2	Lawson	Leeds
Spinning Frames	1	n.a.	n.a.
	29	Low	Monifieth
	5	Fairbairn	Leeds
	1	Maclean & Marsh	
Twisting Frames	4	n.a.	n.a.
Long Line Spreading Table	2	n.a.	n.a.
	1	Fairbairn	Leeds
Long Line Drawing Frames	1	n.a.	n.a.
Long Line Roving Frames	1	n.a.	n.a.
Long Line Winding Frames	7	Coombe etc.	Belfast
	1	Crayson & Hardisty	
	1	Urquhart Lindsay	Dundee
	1	Anderson Foundry Co.	
	1	Thomson	Dundee
Beaming Machines	1	n.a.	n.a.
Dressing Machines	1	Robertson & Orchar	Dundee
Cropping Machines	2	n.a.	n.a.
	3	Thomson	Dundee
	1	Porteous	
	1	Urquhart Lindsay	Dundee
Calenders	1	n.a.	n.a.
	1	Robertson & Orchar	Dundee
	1	Thomson	Dundee
Measuring & Folding Machines	3	J.H. Riley & Co.	

Type of Machine	No.	Maker/Patentee	Place of M/fr
Sack Cutting Machines	1	Blyth's Patent	n.a.
Sack Sewing Machines	4	Kmbale & Morton	Glasgow
	2	Laing's 'B'	n.a.
	1	Laing's Patent Hessian	n.a.
Sack Printing Machines	1	n.a.	n.a.
Packing Presses	3	n.a.	n.a.
	1	Carmichael	Dundee
	1	Pearce Bros.	
Hydraulic Pumps	2	n.a.	n.a.
	1	Tangye Ltd	Birmingham
	1	H. Tyler & Co.	
Weighing Machines	2	n.a.	n.a.
	4	Salter	London
	1	Pooley	Liverpool
	1	Whyte & Sons	
	1	Davidson	Edinburgh
Engines, Engines & Boilers	18	n.a.	n.a.
Boilers	1	Rigg's Patent (10 h.p.)	
Machine Tools	7	n.a.	n.a.
	1	T. Berry & Son	
	1	MacLean	
Fans	2	Donald's Patent	
	1	Lloyd's Patent	
	1	Tangye's Patent	Birmingham
	1	Allday's Improved	
Pulleys	7	n.a.	n.a.
Looms	4	Robertson & Orchar	Dundee
	1	Charles Parker	Dundee
	1	Anderson Foundry	

Bibliography

This is not meant to be an exhaustive bibliography. It does not include, for example, many parliamentary papers studied in the preparation of the pamphlet. It is hoped, however, that it will serve as a guide to further reading on the subject.

- | | | |
|---|---|-----------------|
| Aronsfield, C.C. | "German Jews in Dundee"; in
<i>Jewish Chronicle</i> , November 1953. | |
| Atkinson, Ronald R. | <i>Jute, fibre to yarn</i> | Heywood, 1966. |
| Beckles, N. I. | "Textiles and Port Growth", in
<i>Scottish Geographical Magazine</i> ,
Vol. 94, No. 2, September 1968,
p.90. | |
| Boase, C.W., G. C.
and F. | <i>An Account of the families of Boase</i> | Truro, 1893 |
| Boase, Charles W. | <i>A Century of Banking in Dundee.</i> | Edinburgh, 1867 |
| Bremner, David | <i>Industries of Scotland</i> | 1869 |
| Brown, William | <i>Essays on flax-spinning and
remarks on the management of East
Mill, Dundee</i> ; m.s. (typescript copy
in Dundee University Library). | 1819 |
| Brown, William | <i>Reminiscences of flax-spinning.</i> | Dundee, 1861 |
| Chapman, Dennis | "William Brown of Dundee, 1791-
1864; management in a Scottish
Flax Mill", in <i>Explorations</i> , vol. IV,
1952. (Publications of Research
Centre in Entrepreneurial History,
Harvard University). | |
| Chapman, Dennis | "Combination of hecklers in the
East of Scotland", in <i>Scottish
Historical Review</i> , Vol. 27, 2, 1948 | |
| Cox, James | <i>Journal of James Cox, 1808-1885</i> ,
ms. lent by Jute Industries Ltd. | |
| Duncan, W.M. | "Early co-operative ship building in
Dundee" in <i>Scots Co-operator</i> ,
1942. | |
| Dundee Art Exhibition
Com.
Dundee | <i>Catalogue of "Old Dundee"
Exhibition</i>
<i>The Trade of Dundee: an outline of
trade functions from the beginning
of the century.</i> November 1857
(Lamb 196[20]). | Dundee, 1893 |
| Dundee | <i>Historical Survey of jute and linen
trade</i> , 1973 (Lamb 196 B). | |
| Dundee Social Union | <i>Report</i> | Dundee, 1911 |

- | | | |
|-------------------------------------|---|------------------------------------|
| Dundee Town Council | <i>Report on the development of the city, 1917-18.</i> | |
| Dundee Trade Report Assoc. | <i>Statistics of the Linen trade.</i> | Dundee, 1855. |
| Elliot, Alexander | <i>Lochee as it was and is</i> | Dundee, 1911. |
| Fleming, John | <i>The warping overseer's assistant</i> | Dundee, 1868. |
| <i>Gentlemen's Journal</i> | British Industries Series: "Jute". | March 15, 1913 |
| Gilbert, J.C. | <i>A history of investment trusts in Dundee, 1873-1938</i> | London, 1939 |
| Graham, Oliver | <i>Dundee Jute industry</i> (unpublished thesis in Dundee University Library) | |
| Gray, John | "Old Dundee, the town and its folk", in <i>Dundee Advertiser</i> 2 Jan 1906. | |
| Hartley, Henry | <i>Research report on the jute industry. 1890-91</i> | Dundee, 1931 |
| Kidd, William (Bookseller) | <i>Memoranda of the Chartist Agitation in Dundee</i> | Dundee, 1889 |
| Kidd, William (Bookseller) | <i>Dundee Past and Present</i> | Dundee, 1909 |
| Kinnear, Thomas | <i>Sanitation and pure air in Dundee fifty years ago and now</i> | British Association Handbook, 1912 |
| Leggatt, W. | <i>The theory and the practice of the art of weaving linen and jute manufacture by power looms. 2 Vols.</i> | London, 1893 |
| Lenman, B. and Gauldie, E. | "The industrial History of the Dundee Region" in <i>Dundee and District</i> , ed. S. Jones, Dundee, 1968 | |
| Lennox, Dr John | <i>Working class life in Dundee, 1895-1903</i> (unpublished thesis in Dundee University Library) | |
| Lewis, Rev. George | Lectures given at the Watt Institution, Dundee | 1841 |
| Lythe, S. G. E. | "The Dundee Whale Fishery", <i>Scottish Journal of Political Economy</i> , June, 1964, p. 158 | |
| Macdonald, John A.R. | <i>History of Blairgowrie</i> | Blairgowrie, 1899 |
| Menzies, Isabel and Chapman, Dennis | "The Jute Industry" in <i>Studies in industrial organisation</i> , ed. H. A. Silverman, London, 1946 | |
| Miller, A. H., ed | <i>First History of Dundee, 1776</i> , (edited from original manuscripts). | Dundee, 1923 |
| Miller, A. H. | <i>Roll of eminent burgesses of Dundee 1513-1866</i> | Dundee, 1887 |

- | | | |
|--|--|---|
| Moore, Alfred S. | <i>Linen, from the raw material to the finished product</i> | London, n.d. |
| Myles, James | <i>Rambles in Forfarshire</i> | Edinburgh, 1850 |
| Myles, James | <i>Chapters in the life of a Dundee factory boy, 1851-57</i> | Dundee, 1887;
Republished Dundee, 1951 |
| Norrie, William | <i>Dundee celebrities of the nineteenth century.</i> | Dundee, 1873 |
| Orchar, J.G. | "The Engineering Manufacture of Dundee" in <i>The Engineer</i> , Sept, 13, 1867, p. 234 | |
| Pike, E. Royston | <i>Human documents of the industrial revolution in Britain</i> | London, 1961 |
| Ritchie, David | "Textiles" in <i>British Association Handbook</i> , Dundee, 1912, p. 266 | |
| Sandeman, John Glas. | <i>The Sandeman Genealogy</i> | Edinburgh, 1950 |
| Scott, J. | <i>History of Tayport</i> | Cupar, 1927 |
| Sharp, Peter | <i>Flax, Tow, and Jute Spinning.</i> | Dundee, 1907 |
| Sime, John (Secretary of Jute and Flax Workers Union) | <i>Report on Accidents</i> | Dundee, 1911 |
| Skinner, William C. | <i>Baronnie of Hiltowne, Dundee.</i> | Dundee, 1927 |
| Small, Robert | <i>Statistical Account of Dundee</i> | Edinburgh, 1792 |
| Sturrock, Robert (Secretary of Dundee Chamber of Commerce) | <i>The staple trade of Forfarshire</i> ; a paper read at the meeting of the Social Science Congress in Edinburgh, 10th October, 1863 | |
| Thom, William | <i>Rhymes and recollections of a hand-loom weaver</i> | Dundee, 1845 |
| Thomson, James | <i>The History of Dundee</i> | Dundee, 1847 |
| Turner, W. H. K. | "The growth of Dundee" in <i>Scottish Geographical Magazine</i> , Vol. 84, 1968 | |
| Turner, W. H. K. | "Some 18th century developments in the textile region of East Central Scotland" in <i>Scottish Geographical Magazine</i> , Vol. 69, 1953 | |
| Turner, W. H. K. | <i>The Textile industry of Arbroath since the early 18th Century</i> (Abertay Historical Society, Publication No. 2) | Dundee, 1954 |
| Turner, W. H. K. | "The evolution of the pattern of the textile industry within Dundee" in <i>Transactions of the Institute of British Geographers</i> , 1952 | |
| Walker, M.L. | "Work among women" in <i>British Association Handbook</i> | 1911 |

- | | | |
|-------------------------------|---|----------------------------|
| Wallace, D. R. | <i>The romance of jute: a short history of the Calcutta jute mill industry, 1855-1927</i> | London, 1927 |
| Warden, Alex. J. | <i>The burgh laws of Dundee</i> | London 1872 |
| Warden, Alex. J. | <i>Angus or Forfarshire</i> | 5 Vols.
Dundee, 1883-85 |
| Warden, Alex. J. | <i>The linen trade, ancient and modern</i> | London, 1864 |
| Webster, William | "Seats of industry No.2: Dundee" in the <i>Technical Educator</i> , XII, 1886 | |
| Watt | <i>The finishing of Jute and Linen Fabrics</i> | London, 1916 |
| Woodhouse, T. | <i>A century's progress in Jute manufacture, 1833-1933</i> | London, 1933 |
| Woodhouse, T. and Brand A. | <i>Jute and jute spinning</i> | London, 1920 |
| Woodhouse, T. and Kilgour, P. | <i>The Jute industry</i> | London, 1921 |

Other Publications of the Abertay Historical Society

1. DUNDEE AND THE AMERICAN CIVIL WAR, by D. C. *Carrie*, M.A.
[Out of print]
2. THE TEXTILE INDUSTRY OF ARBROATH SINCE THE EARLY EIGHTEENTH CENTURY, by W. H. K. *Turner*, M.A.
3. ARCHITECTS AND ARCHITECTURE IN DUNDEE, 1770-1914, by D. M. *Walker*, D.A.
4. CASTLE HUNTLY : ITS DEVELOPMENT AND HISTORY, by E. A. *Urquhart*, F.S.A.Scot.
5. LIFE AND LABOUR IN DUNDEE FROM THE REFORMATION TO THE CIVIL WAR, by S. G. E. *Lythe*, M.A.
6. PUBLISHING IN PERTH BEFORE 1807, by R. H. *Carnie*, M.A., Ph.D.
7. DUNDEE AND THE REFORMATION, by J. H. *Baxter*, D.Litt., D.D.
8. MONTROSE BEFORE 1700, by W. A. *McNeill*, M.A.
9. MAINS CASTLE AND THE GRAHAMS OF FINTRY, by Sir Francis *Mudie*, K.C.S.I., M.A., and D. M. *Walker*, D.A.
10. GOURLAYS OF DUNDEE : THE RISE AND FALL OF A SCOTTISH SHIPBUILDING FIRM, by S. G. E. *Lythe*, M.A.
11. ASPECTS OF ANTIQUITY : A MISCELLANY BY MEMBERS OF THE ARCHAEOLOGICAL SECTION OF THE ABERTAY HISTORICAL SOCIETY, collected by Elise M. *Wilson*, B.A.
12. THE TULLIS PRESS, CUPAR, 1803-1849, by D. W. *Doughty*, M.A., F.L.A.
13. THREE DUNDONIANS : JAMES CARMICHAEL, by S. G. E. *Lythe*, M.A.; CHARLES WILLIAM BOASE, by J. T. *Ward*, M.A., Ph.D.; EDWIN SCRYMGEOUR, by D. G. *Southgate*, B.A., D.Phil.

All the Society's publications, except No. 1 which is out of print, are available either through booksellers or by post from the Honorary Publications Secretary, Mr L. Williams, Department of History, The University, Dundee DD1 4HN.



Abertay Historical Society



Book Scanned by Iain D. McIntosh - January 2011.

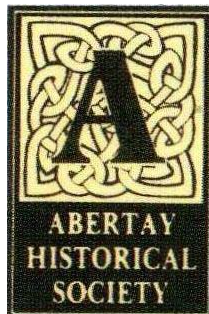
Scanning on A4 CanoScanLiDE 200 - 400 dpi. Software - Abby Finereader 6 OCR.

No changes whatever have been made to the original book after scanning and converting to pdf format.

All text and images from the original book, including details of the Abertay Council members and the list of books currently in print at that time, are as they were at the date of the original publication.

Up to date information of all current books and prices for sale can be found on the Abertay Historical Society Website -

<http://www.abertay.org.uk/>



January 2011