The Staple Trade of Dundee.

From the 19th Century History of Dundee

For an account of the textile manufactures of Dundee by steam-power, it is not necessary to go farther back than the beginning of the 19th century. At that time there was a considerable production of linens, chiefly OSNABURGS and sheeting ; but the yarn was wholly spun by hand, and of course the days of weaving by steam-power were yet distant. The yarn was chiefly supplied from the spinning-wheels of thrifty housewives in the country districts, who congregated in the High Street on market days for its sale. The manufacturers bought it as it came off the reel, in small parcels varying from one to a dozen spindles. The yarn thus obtained was necessarily unequal in quality and size, which rendered the production of uniform cloth a matter of difficulty, while the precariousness of the supply restricted the operations of large manufacturers. The greater proportion of cloth was produced by individual weavers, in their own dwellings, who supplied themselves with sufficient yarn for a web, which, on being passed at the Stamp Office, was offered from door to door until some cloth-merchant gave the price asked for it.

To obviate the inconvenience and loss of time involved in this primitive mode of conducting business, a class of dealers sprang up, who moved about the country districts, bought up yarn, distributed flax to be spun on hire, and collected and acted as agents for the production of cloth. By this means the larger merchants in the towns came to receive supplies of doth more regular in quantity and better assorted as to qualities, until the introduction of mill-spun yarns superseded the former system.

At the period referred to flax was not the only material used in this industry. The manufacture of cotton was tried, with some prospect of success, giving employment at one time to about 400 persons, and manufacturing to the value of about £20,000; but the companies engaged in it did not gain a permanent footing. In July 1802, the Advertiser mentions that "hundreds of families are now supported by the manufacture of coarse cottons, which still continue in great demand." The cloth produced was calicoes, handkerchiefs, and coarse waistcoats. A cotton-work stood on the north side of King Street, and the " Cotton Bead" marks the locality of another establishment of the same kind. About 1790, a woollen manufactory was tried, and Dudhope Castle, now occupied as the Military Barracks, was leased for the purpose; but this branch likewise proved unsuccessful. The manufacture of sewing threads took a firmer hold in the town, at one time giving employment to upwards of 1700 persons, and producing goods to the value of £33,696 per annum] but it too has long been extinct.

Reverting to the linen trade, we find that the first innovation upon the time-honoured system of hand-spinning was attempted in 1793, when a mill was erected in Chapelshade by Fairweather and Marr, in which steam was adopted as the motive power. Success did not, however, attend this venture; nor the next one, made in 1798 by David Birnie, in Guthrie Street, in premises formerly used as a tan-work, where the East Mill now stands. Other three mills were tried, in Chapelshade, North Tay Street, and the Dens, which continued to survive; but the limited nature of these concerns may be judged from the circumstance, that all the five above-mentioned were driven by 60 horse-power 0f steam, and only turned out about 5000 spindles per week of flax yarns, *5* to 6lbs. per spindle. In 1806, the Bell Mill was erected in Guthrie Street, by James Brown, which may be accepted as the prototype of the spinning-mills of Dundee, and was regarded at the time as a bold and costly speculation. It was built upon plans obtained from Leeds, where the machinery was also procured.

The building, which still exists unchanged in external appearance, was 97 feet long, 40 feet wide, and four storeys in height, containing 40 spinning frames for flax and tow yarns, besides twisting frames and preparing machinery, the whole being driven by an engine of 25 h.p. The cost of the building was £7000, and of the machinery £10,000. The weekly production of this mill was 2700 spindles, which cost 9½d. per spindle, about three times that now required, with greatly enhanced wages and outlay.

The unsettled condition of trade throughout the country until the close of the Peninsular war, was peculiarly unfavourable to enterprises hazarded as these were, in a new field of industry, and accordingly we find that one by one the mills came under the hammer, and no steady progress was achieved in spinning by machinery until after 1820, when a marked improvement began. In 1822, William Baxter & Son started the Dens Mill, the nucleus of the gigantic works now owned by the firm of Baxter Brothers & Co.; and at the close of the year, the town possessed 17 spinning-mills, driven by as many engines

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representing an aggregate of 178 h.p., and 7944 spindles. The new decade marked an increase to 43 engines, of 724 h.p,, employing 3000 persons, and producing yarns to the extent of about seven million spyndles. Since that period, the development of spinning, though checked at times by commercial depression, has been rapid. The introduction of the power-loom added another important branch to the trade, so that the combined appliances brought machinery and steam-power into a development which the most sanguine pioneers in the early years of the century would have pronounced visionary and incredible.

In the earlier mills, the machinery was adapted only for heavy yarns suitable for the coarser fabrics, which then formed the staple production of the looms; and, although changes and improvements have been successively introduced to suit the varying requirements of trade, the bulk of our manufactures may still be classed as heavy goods. At the same time, machinery has now been perfected so that fine yarns and cloth are largely produced, while the raw material is subjected to such skilful manipulation that waste has been reduced to a minimum, and material, which at one time would have been regarded as incapable of useful application, is now fully utilised, The improvement in the habits and condition of the workers has been no less marked than in the extent and quality of the goods produced at these works,

"In the early days of mill-spinning," Mr Warden observes, "it was with difficulty that a sufficient number of hands could be got for prepares, spinners, or reelers, and it was then the practice in and around Dundee, for the owners of mills, or their managers, to attend the neighbouring country fairs to engage hands; and sometimes open tent had to be kept all day as an inducement to come to terms. Engagements were generally made for six or twelve months, as with farm and household servants at the present day, and "arles" given as earnest of the bargain. The system has been entirely changed tor many years ; then, work in mills was new and little understood, and the prejudice against it, and those who took employment In them, very strong. The hours of labour were long, ranging from fourteen to fifteen a-day In towns, and in some cases they were even longer in country mills. Indeed, in some mills the hours were altogether arbitrary, and depended upon the caprice or whim of the manager, and the cupidity of the owner. Holidays were rare, and when they were granted, the time was subsequently made up by working extra hours. Now, employment in public works is a regular and recognised species of labour, and the hours precisely defined by the Factory Acts. Wages are much higher for the shorter hours of the present day than they were for the long and weary hours of the early days of the trade. Sir complete holidays must be allowed yearly, as well as the weekly half-holidays ob Saturdays, and no making up of lost time is allowed.

The lofty and well-ventilated mills of the present age, where every appliance of modern skill is impressed for the comfort and convenience of the hands, tends to make them healthy and happy. Before the introduction of coal-gas, the mills were lighted by whale-oil lamps. As may be supposed, this mode of lighting was imperfect, troublesome, unhealthy, and dangerous. The substitution of gas did much to render employment in mills more attractive to the hands; and, by removing obstacles to the. prosecution of the trade, tended to make success more certain. Indeed, without gas, flax-spinning would not so soon have attained its present perfection."

Of employees connected with flax-spinning, the " hecklers," or flax-dressers, once formed a class of very considerable importance, both from their numbers, and the faculty of combination, which enabled them at times almost to control the whole trade, and dictate the rate of wages. Their policy, and the almost total extinction of their class which resulted from it, points a moral which has been exemplified in other quarters, where unreasonable dictation on the one side has provoked antagonism between labour and capital That the " hecklers" had grievances it might be unjust to deny; but the frequent and obstinate strikes, by which they sought to right themselves, showed by their ultimate failure, and the extinction of their trade, that they grievously miscalculated their strength. In the autumn of 1827, during a depression of trade, the spinners proposed a reduction of 3d., out of 2s. 6d. per cwt., for dressing flax, which the flaxdressers answered by a strike of thirteen weeks' duration, involving much privation to themselves, and other operatives dependent upon them. In the end, the diminished wages had to be accepted; but the struggle had the effect of stimulating mechanical ingenuity to produce a substitute for manual labour; and hackling machines were gradually introduced, and perfected, so that in a few years they almost wholly supplanted hand-labour in the preparation of the fibre.

For a long period prior to 1832, when the practice was finally discontinued, it was deemed necessary, for the encouragement of home manufactures, to pay a bounty on linen cloth exported from this country. Such a policy would not now be regarded as other than injurious to the true interests of commerce; yet, it was contended by able writers like Dr Small, that the practice was "the particular cause of the increase and prosperity of Dundee, by which the industry of the inhabitants was first set in motion and encouraged." The subsidy thus paid by Government was of large proportions for the extent of the manufacture at the time, amounting, in 1823, to upwards of £75,000. It might be inferred that traces of this liberality would appear in the wages of the operatives; but, on the contrary, the rates of wages demonstrate the opposite result, so far as they were concerned. The' miserable pittances earned by the workers are in fact the shady side of the picture of those times. In 1820, the Report of a Committee on the State of the Labouring Poor quoted the wages then paid in Dundee to weavers of sacking, 7s. 6d. per week; sailcloth and bagging, 8s. 6d.; osnaburgs, 9s. 6d.; and sheetings, 10s.— in all cases for the best class of workmen. Female labour was still more miserably paid: women in mills rarely made 5s. a-week; hand-spinners, when fully employed, 2s. 6d., but more generally 1s. 2d. per week. It was stated that women had to spin for 4s. as much yarn as would reach from Dundee to Aberdeen—65½ miles! Compared with the earnings of the present day, these figures lead us to rejoice in a change, which has

brought, with material progress, a juster recognition of industry, and its more adequate reward (*A discreditable practice long prevailed among the manufacturers of giving out webs ostensibly of uniform length, which were paid for by the piece. Hessian sheetings were presumed to be 115 yards ; but, when a public meeting was held in 1833, on the Magdalen Green, where webs given out by various manufacturers were produced and measured, the hessians were found to vary from 123 to 150 yards! The employers were thus shamed into the adoption of a uniform standard of length)*. The following table furnishes a comparison of the wages paid to mill and factory hands at different periods:—

	1853						**1863**						**1873**				
	60 hours per week						60 hours per week						60 hours per week				
Spinning Mills	**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**
Preparers	**4**	**3**	**To**	**5**	**9**		**7**	**3**	**To**	**8**	**3**		**10**	**0**	**To**	**12**	**6**
Spinners	**5**	**6**	**To**				**8**	**3**	**To**	**8**	**9**		**10**	**7**	**To**	**11**	**7**
	1853						**1863**						**1873**				
	60 hours per week						60 hours per week						60 hours per week				
Spinning Mills	**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**
Shifters	**2**	**9**	**To**	**3**	**3**		**5**	**9**	**To**	**6**	**0**		**7**	**0**	**To**	**-**	**-**
Boys	**4**	**10**	**To**	**-**	**-**		**4**	**6**	**To**	**9**	**0**		**6**	**9**	**To**	**8**	**3**
Reelers	**6**	**6**	**To**	**7**	**6**		**9**	**0**	**To**	**14**	**0**		**10**	**6**	**to**	**16**	**6**
Overseers	**17**	**0**	**To**	**24**	**0**		**21**	**0**	**To**	**24**	**0**		**28**	**0**	**To**	**40**	**0**
Factories	**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**
Winders	**6**	**0**	**To**	**9**	**0**		**7**	**0**	**To**	**9**	**0**		**10**	**0**	**To**	**13**	**0**
Weavers	**8**	**0**	**To**	**11**	**0**		**9**	**0**	**To**	**11**	**0**		**13**	**0**	**To**	**16**	**6**
Tenters	**17**	**0**	**To**	**20**	**0**		**22**	**0**	**To**	**26**	**0**		**23**	**0**	**To**	**26**	**0**
Warpers	**12**	**0**	**To**	**16**	**0**		**15**	**0**	**To**	**16**	**0**		**15**	**0**	**To**	**20**	**0**
			1853					**1863**							**1873**		
	60 hours per Week						**58½ Hours per week**						**58 Hours per Week**				
	s.	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**		**s.**	**d.**
Mechanics	**21**	**0**	**To**	**-**	**-**		**17**	**0**	**To**	**25**	**0**		**27**	**0**	**To**	**30**	**0**
Calenderers	**11**	**0**	**To**	**14**	**6**		**15**	**0**	**To**	**16**	**0**		**15**	**0**	**To**	**21**	**0**
Lappers	**11**	**0**	**To**	**15**	**0**		**15**	**0**	**To**	**17**	**0**		**15**	**0**	**To**	**21**	**0**
Flaxdressers	**2**	**6**	**Per Cwt**										**2**	**10½**	**Per cwt**		

The introduction of weaving by machinery formed an important epoch in our local trade. About 1821, the subject engaged the attention of manufacturers; but it was not till many years after that practical steps were taken to test its capabilities. The honour of doing so is due to Messrs Baxter, who, in 1836, erected the first power-loom factory at their works in the Dens, following in the wake of similar undertakings in England, and also at Aberdeen. Messrs Baxter's factory was 150 feet long, 75 feet wide, and, on one floor, lighted from the roof—a plan which conduces greatly to comfort and safety, and has since been almost invariably followed in such works. The Dens Factory was speedily followed up by Alexander Rowan at Dudhope, John Laing at Dens Road, and Messrs Edward at Logie—these four works being for some years the only powerloom factories in Dundee. It is needless to say, they have since been rapidly multiplied, so that very few spinning works of any magnitude now exist without a weaving department of corresponding extent. The handloom has thus been to a great extent superseded, but is still employed for certain fabrics, and has therefore not experienced that complete extinction which has befallen hand-spinning.

In the finishing and packing of cloth, improvements, by the aid of machinery, have steadily followed the increased production. The primitive expedients of beetling the cloth upon a large stone, by wooden mallets plied by manual labour, and then tying up the cloth by cords, was supplanted by the processes of calendering and press-packing, which greatly improves the appearance of the cloth, without injury to its quality, and gives the desired compactness and solidity to the hales required for shipment. The larger establishments contain a department for these operations ; but there are seven independent calendering works throughout the town specially engaged in this branch, and employing a large number of hands—one peculiarity of these works being, that no women or children are employed. The process of finishing is thus described :—

"The calenders employed are of four, five, or six bowls or rollers, two of which are made of paper, and the others of iron. The hydraulic packing presses are powerful machines, capable of exerting a pressure on the bales of from one to two thousand tons and upwards. The goods are beetled, sarceneted, cylindered, chested, or mangled, &c., as may be desired—the different styles of finish to the goods being the effect of putting them through between the rollers in particular ways. The goods are cropped, then slightly damped, preparatory to the calendering process. Afterwards they are measured, lapped, or made up to suit the special taste of the market for which they are intended, then packed and shipped. In most processes of calendering, the goods are slightly contracted in width and extended in length. Few coarse

linens, excepting those specially finished for padding, receive any starch or other extraneous substance, preparatory to calendering, to give them an appearance of having more body than they really possess. The firmness and consistency of linen is chiefly owing to the quantity of fibrous material in the cloth, and this adds value to linen goods."

In its monetary aspects, the staple trade of Dundee has passed through a series of crises which retarded its progress, and at times even threatened its destruction; but it has survived them all, and, by adapting itself to the changing exigencies of the markets, and promptly adopting new materials and improved processes of manufacture, has now reached a position which justifies strong faith in its stability and permanence. It is well to remember, however, that its prospects were not always so hopeful, and instructive to recall some of the vicissitudes over which it has triumphed. As has already been mentioned, the trade underwent a serious depression at the close of the first decade of this century, when the price of flax suddenly fell from £150 to £80 a ton. The effect in mercantile circles was most disastrous; and for some time a series of violent fluctuations occurred, in which but few of the merchants, who withstood the first convulsions, escaped bankruptcy. In 1812, William Sandeman failed for £120,000, offering 4s. 4d. of dividend; and numerous failures of less magnitude followed. Within five years, 240 banks throughout the country succumbed, and wide-spread distress prevailed among the working classes.

Had this state of things continued, the ruin of trade seemed imminent; but, fortunately, a brighter day dawned, and for some years prior to 1825, manufacturers enjoyed a return of prosperity, which sustained their hopes for the future. In that year, however, the commercial panic, which broke out in London, rapidly spread over the kingdom, and Dundee was paralysed by its effects. In 1826, between twenty and thirty bankruptcies occurred, and, but for the unusual yet kindly help of the Government, in granting Exchequer Bills to merchants for goods deposited, which was followed by the local banks giving similar advances, the consequences would have been utterly disastrous. In 1827, a revival of the American trade gave considerable relief, by a demand for bagging, which continued until 1835, when an extensive fire in New York consumed large stocks, and induced our manufacturers to glut the market. The goods thus imported lay in the store for years, only to be sold at enormous loss, and, with a panic in America, insolvency again became epidemic amongst Dundee merchants. Rallying again, the trade enjoyed a fair measure of prosperity until 1847, when the Railway Mania having culminated in the investment of nearly £200,000,000 in these undertakings, a monetary crisis followed, which operated most injuriously on every branch of industry. In 1857, the year of the Western Bank stoppage, several failures, for a considerable amount, took place in Dundee, the liabilities of one firm being £70,000 (*House's Century of Banking.*)

Since that period, the town has enjoyed a gratifying immunity from insolvencies connected with its staple trade, considering the magnitude of its transactions. Nor can we deny ourselves the gratification of stating that, within the last few years, numerous instances have occurred of firms and individuals voluntarily paying, in full, the debts standing against them, when in former years the pressure of adverse fortune had compelled them to suspend payment. In thus employing their resources, a moral rectitude has been evinced, in the highest degree honourable to those who have displayed it, and an example given of commercial integrity which cannot fail to raise the credit of the town, and the character of its merchant princes.

We now come to speak of the third phase in the history of Dundee manufactures, which has had an influence not less beneficial and important than the introduction of machinery for spinning and weaving purposes—the introduction of Jute. This material is the fibre which constitutes the inner hark of an Indian plant, of the *Corchorue* genus (natural order Tiliaceae)—the variety *C. Capsularis* of botanists being the one from which the fibre is chiefly obtained. Its introduction to Europe for textile purposes is of comparatively recent date, is being almost unknown previous to 1830, except in the form of "gunny-bags," in which sugar, rice, pepper, and other Indian produce had long been largely imported, without attracting attention to the material of which they were made. When first introduced, the great length of the raw fibre, sometimes exceeding twelve feet, suggested its employment for cordage; but, after repeated trials, it was found less suitable than hemp for that purpose.

Some of the earliest parcels of jute-fibre sent to this country fell into the hands of manufacturers at Abingdon, in Oxfordshire—a place famous for its sacking, twines, &c. —by whom it was spun, dyed, and made into carpeting. About 1824, a few bales of the new fibre reached Dundee; it was experimented upon by William Anderson, whose experience of East India hemps led him to regard it with favour, but without much practical result. A small consignment was received about the same time by Thomas Neish; but such was the hostility and indifference of spinners to the new material, that it lay in his warehouse for some years; and when at length some were induced to give it a trial, the difficulties encountered in manipulating it according to the prevalent treatment of flax, and with the machinery then available, discouraged its adoption at that time. In 1832, Mr Neish received another consignment, which was again tried by Balfour & Meldrum, whose experiments this time produced more favourable results. James Watt, another merchant, also tried a few bales with a like degree of success, and took up the introduction of the new material with such spirit that, in the following year, the reluctance of spinners was so far over-come that several used it in considerable quantities. For some time after the possibility of spinning jute had been demonstrated, it was not spun by itself, but mixed with tow and flax. The mixed yarn was not regarded with favour, many declaring the process to be little else than a fraud; still, considerable quantities were used unwittingly, or under mental reservation. Towards the end of 1833, James Taws first began to spin pure jute; Balfour and Meldrum followed, and were the first to spin 4 to 6 lb. line-yarn, and

make jute-twist; and to this circumstance the introduction of the jute carpeting trade in Dundee may be attributed. In 1835, pure jute-yarn was regularly sold in the market, 11 lb. fetching 4⅛d. a-pound—the price of the law material being then £22 to £23 per ton.

The manufacture of jute-carpeting was first taken up by Mr James Neish; but, notwithstanding a favourable return from the first consignment to the New York market, this branch of manufacture did not make steady progress for a considerable time. In the end, however, Mr Neish achieved marked success, and others followed in the same channel. Jute fabrics of every class long retained a doubtful reputation, partly arising from ignorance of the nature of the material, the want of proper machinery, the uncertainty as to the extent of the supply, and the prejudice which existed against them as substitutes for linen fabrics. One by one, however, all obstacles to its employment were overcome by patience and skill: its advantages became fully recognised, and Dundee now stands confessedly the head-quarters ot the jute trade in Great Britain.

For a long time, the dyeing of jute for fine colours was not understood; so that the yarns were sent to Glasgow for that purpose, and brought back to Dundee to be woven. That expedient, it is needless to say, has long ceased to be necessary, as this process has now been brought to a high state of perfection in this neighbourhood. Mr Warden remarks:—

"it is one of the most easily dyed fabrics known, and the colours it takes on are bright and beautiful. The common dyes are quickly applied; but they are very fugitive, and, when exposed to the sun's rays, soon become faint and dull. By the common process, the colouring matter strikes little more than the outside of the fibre, and, as it were, paints it; and this mode of dyeing requires little material, and is done at small cost. The fibres of jute do not subdivide so minutely as those of flax, and they are of a hard dry nature, and to a considerable extent impervious to moisture. It therefore requires a more complex process to make the colouring materials thoroughly penetrate the fibres, So as to make the dye lasting. This can, however, be accomplished, and the better class of goods made of dyed jute undergo this process, which makes the colours much brighter and faster. It is hardly possible to make every colour perfectly fast, although some of them are as durable as those upon other materials. Jute is very readily brought to a rich cream colour, either in the fibre, in yarn, or in cloth. It is, however, very difficult to bring it to a full white without injuring the strength of the fibre."

Many experiments have, from time to time, been made to bleach jute ; but at best they have been only partially successful, and it may be said that a perfect white 1ms never yet been attained without impairing strength. Fresh sound jute, of fine quality, can, without danger, be brought to a moderate degree of whiteness; but, ob the fibre gets older, exposure to the atmosphere changes it to a brownish tinge, and it then becomes more difficult to bleach. The nature of jute, the regular even thread which, by the improved machinery, is formed of it, and the smooth, tidy, and clean appearance of jute cloth, are all-pleasing to the eye, and therefore attractive. These qualities, combined with its cheapness, have served to recommend it to consumers, and bring it into general use. Now, instead of being used stealthily by spinners as of old, it is the only material spun by most of the leading firms in Dundee.

Down to 1840, our manufacturers obtained their supplies of jute from the London and Liverpool markets; but, on the 26th of April in that year, the barque "Selma" entered the harbour direct from Calcutta, with 860 bales as part of her cargo. Upwards of twenty years elapsed, however, before the direct importation was regularly established, on a scale equal to the requirements of the trade. A fleet of between 70 and 80 large full-rigged vessels is now employed in this traffic, to the great advantage alike of the manufacturers and the town generally. The following table, whilst showing the quantities of Jute, Flax, &c., imported into Dundee, exhibiting the growth of the staple trade, brings out very forcibly the rapid expansion of the new fibre, and, as it were, the stationary state of the pure Flax trade:—

		Jute	**Flax, Tow and Hemp**
Year		Tons	Tons
1838		1136	30850
1843		4858	26268
1848		8905	30585
1853	Jute Direct from Calcutta	15400	47113
1858	Tons	30086	25842
1863	6772	46983	28898
1868	5437	58474	36712
1869	27844	82379	29935
1870	30537	81740	49592
1871	61534	102844	50935
1872	91276	123139	40636
1873	102133	143150	38900

The introduction of jute has brought about great changes in the staple trade of Dundee, and rendered possible those adaptations of supply to demand, which the extended commercial relations of British enterprise so rapidly develop in distant countries. The paramount element of cheapness, combined with suitability of purpose and facility of production, are all found in jute fabrics, and to this much of its

success is doubtless attributable. The extended use of it has at the same time set free the more limited stocks of flax and other fibres for purposes to which they are better suited, so that the one branch of manufactures has not been extinguished to make way for the other— the changes involved being rather in the direction of a general expansion of trade.

"In place of sackcloth, Lagging, and other coarse fabrics being made from hemp, hemp cedilla, and coarse tows, these are all now entirely made from jute, and some of these raw materials are not now known in the trade. While much the same quantity of flax and taw is now imported as many years ago, the real linen is in this way supplemented, the quantity formerly used in the coarser branches being now available for other purposes. The more common descriptions of osnaburgs, sheetings, and many other fabrics are now manufactured solely from jute ; or these goods, instead of being made of flax or tow as formerly, are now composed partly of tow and partly of jute. Fine goods are also manufactured from a combination of jute and cotton. In this manner has the linen trade again been most largely supplemented. The jute trade has increased so rapidly, and the goods made from the fibre are now so highly appreciated over the whole world, that, looking to the future, one is entitled to say that, in extent, it will probably only be rivalled by the cotton manufacture. The pack-sheet, bagging, sackings, and woolpacks of Dundee, are used in almost every quarter of the glebe. There is another fabric worthy of particular notice, which owes its existence solely to jute—the carpeting, which have nearly the appearance of carpets made from wool; and though they are neither so durable, nor retain their colour so well, when it is mentioned that their cost ranges from 6d. to 1s. 4d. a yard, it is not remarkable that they should be greatly used."

Everyone is familiar with the appearance of the raw material, when landed in compact oblong bales, of about 300 lbs. each. The first operation to which the fibre is subjected on reaching the works is termed "batching." Naturally of a hard and dry nature, it was long before the obstacles presented by this peculiarity of the fibre were successfully overcome, so as to bring it into a condition to spin and weave satisfactorily. Saturation with oil (the animal oils being found most suitable) was resorted to, and found to be successful; and accordingly the material, spread in layers in the batching-house, is allowed to lie a certain time, sprinkled with oil and water. The long fibres are then torn asunder, by being fastened to the ends of iron bars placed on either side of a wheel, having stout spikes in its rim. From this stage the fibre goes through the processes of spreading and drawing, roving, winding, spinning, and reeling, until the yarn isturned out into spyndles, containing 14,400 yards. The yarn then either passes directly to the loom, or is sent to be bleached, according to the description of cloth for which it is destined to be used. Of the bleaching and weaving processes it is unnecessary to speak, and the final processes of finishing, calendering, and packing have been already adverted to. We may therefore proceed to notice some of the larger manufacturing establishments.

The rise of Lochee, which, though now part of the municipality of Dundee, was a century ago an inconsiderable village, deserves more than a passing notice. It belonged in old times to the barony of Bal-gay, which, in 1601, was held by John Lindsay, a member of the ancestral family of Balcarres. The barony comprehended the loch of Balgay, which covered a portion of the valley on which the thriving suburb of Lochee is now built. The modern name is believed to be derived from Loch E'e—the eye or opening of the loch. A small stream, which doubtless formed the feeder of the ancient loch, still rises towards the east of the place, and, flowing westward, joins the burn of Benvie, forming with it the burn of Invergowrie, a short distance above its confluence with the Tay. The Lochee burn furnished the water supply required for bleaching the yarn and cloth of the old hand-loom weavers, and the neighbourhood of Dundee provided a ready market for their goods, which were chiefly coarse linens. In 1792, there were 276 looms in the Lochee district, producing 4860 pieces, of the value of £12,520. About half a century ago, there was a large flourishing manufactory in Lochee, carried on by the late Mr James Paterson, which gave employment to a great many hands, and was considered one of the largest establishments of its kind in the vicinity. Unfortunately, the greater part of it was destroyed by fire, along with a fine dwelling-house occupied by the proprietor, and was not again renewed. The Established and Free Churches have been built on the site which the work covered. A small part of the original factory, which formed a square, alone remains. The ground belonging to this establishment extended to about twenty acres, on part of which the fine buildings now forming a portion of the High Street are built.

About the beginning of the last century, a Mr Cox was engaged as a merchant manufacturer, on a small scale, in Lochee, who, at his death, in 1741, was succeeded by his son, David. In his hands the business remained until 1793, when it devolved on his son, James, the third in succession. He was a man of considerable enterprise and capacity, and, along with other leading men of his day, founded the Dundee Banking Company in 1777. In 1810, the fourth generation entered upon possession of the works at Lochee, which at that time had become greatly extended, the bleaching greens covering not less than twenty-five acres. Three years afterwards, the occurrence of a destructive fire led to these works being abandoned, and the site of them has long been absorbed into the home farm of Camperdown. Mr Cox having moved into the village, then turned his attention to weaving, and was succeeded in that line by his eldest son, Mr James Cox, the present respected Provost of Dundee, and head of the firm of Cox Brothers, which was formed in 1841, and now ranks foremost in the staple trade of Dundee for the extent and enterprise with which its operations are conducted. About 1845, the firm commenced weaving by steam-power, and since then have established the Camperdown Linen Works upon a systematic plan, and on a scale which may truly be described as colossal. The works extend over an area of twenty-five acres, the greater part of which is covered with buildings of the most substantial kind, and which command admiration alike for their ornamental character, and the complete arrangements by which the various processes of preparing, spinning, bleaching, dyeing, weaving, and finishing, are carried on

without waste of time, labour, or material. The firm have an establishment on the Hooghly, at Calcutta, for the storage and shipment of jute; and from the moment the raw material passes, by their branch railway, into the Camperdown Works, every process it undergoes is completed within the gates, until the finished fabric is sent for export to all the markets of the world.

Of the external features of these works, perhaps the most striking is the magnificent chimney shaft, erected in 1865, which forms a prominent landmark in the country for many miles around. It is built after the style of the Italian campaniles, but far exceeds in dimensions the largest of these examples of art. It is square in form for about three-fourths of its height, the upper portion being octagonal, and is built of particoloured bricks, with the exception of the basement and cornices, where stone is employed. An inner circular casing, 12 feet in diameter, is carried up throughout, and so connected with the exterior walls as to give strength and rigidity to the whole. The height of the shaft from the ground is 282 feet, or almost twice that of the Old Steeple; and upwards of a million of bricks were used in its construction. The weight of materials employed exceeded 5000 tons, and the Cost was understood to be about £6000. That, even with this large outlay, the forethought of the firm has been amply justified, by the immunity from the smoke-nuisance, which half a dozen ordinary chimneys would have created, may be inferred from the fact, that the smoke from 58 furnaces, and also all the smoke from the forges, is efficiently disposed of by means of underground tunnels, communicating with the one shaft.
In the Camperdown Works, the motive power is supplied by 22 engines, of an aggregate power of 2750 horses; the largest engine being a giant of 100 h.p., which has worked up to 500. The raw material worked up exceeds 15,000 tons per annum, and upwards of 5000 persons are employed in the various departments of the works. It is worthy of note, as forming an exception to the rule, that the partners reside in the immediate vicinity of their works, and thus are in a position to identify themselves more closely with the well-being of Lochee, which has become thriving and populous through the successful enterprise displayed in the Camperdown Linen "Works.

In the town of Dundee, the Dens Works, belonging to Baxter Brothers & Go., have long held the foremost place for the magnitude and completeness of their arrangements, and the high standard of excellence which marks their manufactures. The situation is not naturally advantageous or well adapted for extension; but its difficulties have been successfully overcome, and, of the twenty-one acres of ground embraced within the boundaries, fully one-half are covered by the buildings and accessories of the works; while the superficial floorage exceeds twelve acres in extent—the greater part of which is occupied by valuable machinery, of the most improved construction, and which is chiefly made on the premises. In the spinning department there are upwards of 22,600 spindles, with all the requisite preparing machinery; while the weaving includes upwards of 1200 looms. The motive power of this vast concern is derived from 28 boilers, consuming about 300 tons of coal weekly, and supplying steam to 22 engines, of the aggregate indicated force of 2850 h.p. The hands employed number about 4500, of whom a large proportion are females.

The firm has long been famed for the immense production, and fine quality of navy sail-cloth, manufactured at these works; but other classes of goods are now turned out in large quantities, the aggregate production exceeding twenty-five million yards in the course of a year, and comprising bleached and brown sheeting, ducks, paddings, towellings, Osnaburg, Hessians, &c. The early history of these splendid works is referred to in the memoir of the late Sir David Baxter, Bart., long the head of the firm, and to whose sagacity and enterprise, and those associated with him, they will ever remain a noble and, let us hope, an enduring monument. The principal building has a frontage of 250 feet to Princes Street, and is five storeys in height, the centre of which is surmounted by a figure of James Watt, while at the east end a lofty bell-tower rises above the roof.

But a few years ago it might have been easy to describe all the manufacturing concerns of any note in the town; but, at the present day, any such attempt would require a volume of itself. It must suffice to enumerate, in addition to the two concerns just described, a few of the most remarkable, which come next to them in point of scale and equipment. The Tay Works, belonging to Gilroy Brothers & Co., present a most imposing appearance, having a frontage of 1000 feet to the Lochee Road, and rising to a height of five stories in the centre, and four along the wings—the former possessing considerable architectural character, and surmounted by a figure of Minerva over the pediment These works are devoted almost exclusively to jute manufactures—the raw material being imported direct from Calcutta in Teasels belonging to the firm. The Logie Works, of A. & D. Edward & Co., situated in the Scouringburn, among the first established in the town, have in late years been extended to colossal proportions, and now comprise a mill of 300 feet in length, and five storeys in height, besides extensive weaving factories, and other accessories on a corresponding scale. Bowbridge Works, erected by J. & A. D. Grimond in 1867, on the northern outskirts of the town, are justly regarded as among the best arranged works of their class, and, with recent extensions, are now of great magnitude. Carpets, matting, rugs, &c., form an important section of the goods produced at these works.

At Seafield Works (Thomson, Shepherd, & Co.), these goods also form the leading articles, Of works solely devoted to spinning, those of O. G. Miller & Co. are the largest, embracing five mills, which produce a large quantity of yarns, chiefly flax and tow, the quality of which has long held a high position in the markets. Of other works, our space only permits us to name Wallace Factory (R. W. Morrison & Co.); Constable Works (Malcolm, Ogilvie, & Co.); Ward Mills (Don Brothers, Buist, & Co.); Pleasance Mills (Kinmond, Luke, & Co.); and Dudhope Works (Alex. Henderson); the number of smaller works being legion.

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