

Lever machines, perhaps no one has shown a more intimate knowledge of its capability of adaptation than Mr. Birkin. He was the first to arrange it so as to produce several classes of ornamentation of great importance, both in what they were in themselves, and in what they further pointed to as practicable.

In 1828, Mr. Birkin accomplished making a pearl edge on Levers' breadth laces. Before this the pearl was stitched on.

In 1836, he patented No. 7090, a method for producing spots and honeycombs without stoppages on the Levers' machine. He also devised a way to make ribbons of cloth work sideways on it, but did not prosecute the plan. Having comprehended the powers of this machine and how they might be rendered most effective, he has closely imitated the most important classes of real laces upon it. Such are imitation Valenciennes and woven edgings, silk Saxony edgings, black, coloured, white silk blonde, and other edgings. Mr. Hooton Deverill's patent, No. 8955, was bought by him; and the plan of working Jacquard cards, not to the bottom set of carriages only as Draper's did, but most usually applied to bars at the end of the Levers' machine, was perfected, and soon became general. By this great improvement a new development of the trade took place.

His confidence in the principle of producing first-class articles in quality and pattern has been well repaid. In 1845, he put upon a machine a pattern produced by Dawson's wheels, brought it out at 3s. 6d., it has gradually been reduced to 9d., and still pays a fair profit. The machine has made no other pattern. An edging was brought out fourteen years ago at 3s. 9d. The machine has made it ever since; it has fallen to 9d., and is yet paying a good profit. Black silk laces with fining, thick threaded, scolloped, and to which Birkin added *perfect pearl edges*, only needed a thread to be drawn to separate each breadth in a state finished for the market. These were made of best twisted silk, and were calculated to wear well. Another manufacturer put in cotton warps, degraded the article, and ruined himself. From 1849 to 1851, R. Birkin altered

machines at a cost of £80 to £120 each, and was repaid the outlay in a few weeks, using mohair as a material for lace. He was the first to do so, either in England or France. "Lama" and "yak" are only other names for lace of somewhat similar materials.

John Woodhouse Bagley had one of the most singularly gifted mechanical minds that has ever been applied to the improvement of the bobbin net machine. By his adaptations of it, effecting the production of imitations of pillow lace of various and most intricate kinds, so close and perfect as almost to defy detection, and yet of chaste and elegant patterns, he proved his claim to stand in the first rank amongst those who have advanced the character and use of machine-wrought lace. (See Plate XV., Nos. 18, 19, 20, 21.)

Bagley's various productions were shewn in the Exhibition of 1851, and were highly praised both by jurors and visitors. Again, in that of 1855, at Paris, the articles he exhibited obtained for him a high eulogium, and the only silver medal awarded in the class to a *working* mechanic. Though from the ardour of his temperament—manifested in all that he did and said, whether in regard to mechanical, political, or any other subjects—he laid himself open to be misunderstood; yet those who are well informed as to the progress of this trade will accord to Mr. Bagley the meed of unqualified praise for the variety, ingenuity, and usefulness of his modifications of this machine. In his boyhood he received a very imperfect education, scarcely using a pen beyond occasionally appending a clumsy signature. But his mind and memory were clear and strong enough to dictate in nervous, though somewhat ungrammatical English, in the year 1856, a document filling thirty-two pages of folio manuscript. The substance only of this paper can of course be given, but so much must not be withheld from the reader, of a curious and interesting chapter in the history of lace inventors and their inventions. It is headed, "A few particulars of the various steps by which I progressed in machinery." The facts, so far as can be ascertained, seem to be truly given, being on the whole in accordance with notices of them gathered from the trade:—

“When I was about sixteen, I left shoe-making which I had been taught, it being then in a very distressed state; and, enquiring for work of Mr. Sansom a lace-maker, obtained it, he putting me into a straight bolt machine, in which I soon learnt to work. Having from a mere boy, helped my sister in all manner of platting and twisting, while she was engaged in making the first English Leghorn bonnets, I had gained complete mastery over the movements of threads, and readily saw how to get off the ‘wrong twists’ which was a frequent difficulty fallen into by the apprentice. I had very limited previous knowledge of the machine, or how to work it, and so had to get into the way of it as well as I could.

“After this, I worked for five years with Mr. James Smith, of Radford; and assisted him in getting the first circular machine put on with ‘Grecian net.’ Though receiving no wages for twenty weeks labour, it was not time ill spent, a large amount of information was gained, very valuable to me; nevertheless, I left him and went to shoe-making again; employed two journeymen, and was getting on very well. But I could not forget mechanical operations, so set to work and made a model of a ‘twist’ machine; and began to sell plans for making nets (meshes) to any one, feeling myself able to do anything of this kind that was wanted. Giving up shoe-making finally, I went to work for Mr. Morley; and offered to put him on with ‘honeycomb’ net, by putting into the machine ten or twelve bars. He laughed, and said ‘more than four could not be got in.’ The plan was submitted by me to Mr. William Crofts, at Mr. Fisher’s, who expressed satisfaction with it. I was employed there on other work; till, finding a circular was putting on with turn agains, and open work without them, I left there. As there were till then no ‘extra guide bars,’ I determined to keep my plan to myself, and employed a smith to make these bars for me. A person named Peach having a small Levers’ frame joined me; advancing £40, and giving me 25s. weekly, to receive half the profit of the plan, which at length was got to work. I advertised further plans of meshes for sale, and received a threat of an injunction from Fisher. Then some negotiations took place; but Peach sold the plan to the bobbin net mart for £100; of which, though I had a claim also for £23 for wages, no part was paid to me. The mart charged £2 a piece to any one using the extra guide bars. At that time ‘plain blondes’ were much used; and these extra guides greatly facilitated their ornamentation. The demand for some years was very great for both my classes of goods; much wealth was gained in Nottingham by them, while I was occasioned inexpressible trouble, and all I received was abuse and slander. I resolved now to act on my own account. My father lent me £10, and my wife’s father £10, with which an old ‘circular’ was bought; the smithing in it I got done on credit. During the time this machine was getting to work, my sufferings from hunger and those of my wife who was then suckling our first child, were intense; we were reduced to the deepest distress, so that for three months, we only ate meat once, and subsisted during several days upon water gruel without bread; my father-in-law on learning our state, assisted to keep us from starving, for which we were very thankful.

“The machine being completed and the first piece sold, Mr. Fisher

sent me a note, charging me with an infringement; but in conversation said 'we want you in our employ.' I engaged with him and continued there for several years; being employed in getting out new things, for which they obtained patents. My own machine above named, was worked by a man at my own house; and on shewing things made on it to my employers, was promised rewards, but did not receive them." (By an agreement, dated 13th November, 1838, made between Fisher and Bagley, all the inventions of the latter were to be paid for by Fisher giving him £100 for any one patented, and £100 more if Fisher put up four machines on the adopted plan).

"When I was specifying the traversed warp used on a circular machine, Mr. Carpmael's clerk gave me a bit (a quarter of an inch long and an inch wide) of Valenciennes lace, saying 'I think you can do it.' I took it home, shewed it my wife, and said 'I shall never go to sleep till I have made it.' Consequently, setting to work, I stuck to it till, to my surprise, my model and shirt were on fire; my wife then thought it was time I went to bed. I did not stay long there, for as I lay, I thought of the *double warp*; then said I, 'I have got it. I have got it!' I jumped out of bed, put up double warp threads, and before breakfast, had produced the mesh.

"On the holiday given upon the day of Queen Victoria's coronation, with the assistance of Mr. Cutts and my journeyman, I put my own machine on with this lace, shewed it to Mr. Fisher, and then to Mr. Crofts. Something handsome was promised me, and after some demur, I specified it. The patent was taken out in William Crofts' name, 1838, No. 7638. £100 was given me and one license, as 'two or three machines' it was said 'would stock the trade.' Soon after, I left Mr. Fisher's employ, contrary to his wish. My first piece of this plat lace, (*i.e.* from his own frame) was sold at £1. 15s. a rack; and was re-sold in small pieces, as samples, to 'twist masters.' The rest was disposed of to London shopkeepers chiefly. A large manufacturer handsomely gave me £20 for the mere remnants, for I could scarcely proceed for want of means.

"Mr. Pearson, of Calais, sought an interview with me at Derby, shewed me a bit of lace, asking 'if I knew anything of that.' I told him it was of my own making. He wished to buy the plan on fair terms, and paid me £150 down, to be made £500 when a frame was finished and patented; in six months an eight-qr. was at work and patented. From the bobbins being too tightly sprung it broke threads at first. I went over and remedied that, and the goods were then easily made. Pearson got £2 a rack for two years, without change of the pattern; the Paris buyer made a great sum—Mr. Keenan told me 'an independent fortune,' and the two journeymen to Pearson, each saved £700 out of his earnings. It was twelve months before a machine like it was got to work in Nottingham. The pattern was ticked round the cloth work, as it is now made in Nottingham. Mr. Fisher at one time had let sixty licenses at three guineas per week each; he himself at the same time having many machines at work on with the same, and putting others on as fast as he could. (This tribute would be £163. 16s. a-year, whatever the width of the machines. From other sources statements have been received that the tribute paid was £1. per inch per annum of the width of the machine, which is more probable.)

"I gave £300 for a *circular* machine, and put it with three others on with plat laces; but all were beaten by the superiority of *Lavers'* for this work. My own license I let to another. I then spent £150 uselessly in an effort to put a *pusher* on with plat fancies. But I produced several other articles, which though they were of no advantage to me, have since been profitably worked by the trade.

"Mr. Dunnicliff now sought me out. He wished to become connected with me. I had a seventeen-qr. machine not working for want of means. I sold him half of it for £100 cash, which being paid, the machine was sent to be worked at Wild's factory; I having previously produced upon it muslin cloth work and ornaments. Crofts, Dunnicliff, and myself went to take out a patent, in 1844, No. 10,390, for this invention; though, until a specimen made on it was shewn by me at Carpmael's office, Crofts would not believe this ornamented lace could be made. Dunnicliff then persuaded me to put on machines with a substitute for light warp blondes at Page's, Carrington; by which he afterwards stated to me, he and his partners gained £1000 the first year. I did not get 40s. for doing it. I then put my old frame on with traversed net and looped fining. It answered for a time in the pusher demand, but soon ceased. Mr. Dunnicliff retired, under painful personal circumstances, from business for a time; and my patent operations were stopped. On my machine, I afterwards made *the first* black silk figured shawls, so far as I know. They were sold to Mr. Ball, with whom Dunnicliff now was become connected. Other machines were better adapted by width and speed for production than mine, and my workmen became dissatisfied; so I was thrown aside in this article. I now bought two pusher machines for £40; sold one at once for £50; and then put on the other with fancies, and sold it for £300. The old frames were smashed, and sold for old iron. I resolved to go to America.

"Before starting on that voyage, I took my wife and son to Paris. While there, I was shewn by Mr. Keenan, for the first time, Honiton sprigs; and learnt the prices at which they were sold. This caused me much study; but while walking from one end of the Boulevards to the other, I accomplished the making of them in my mind; and saw that on the same plan, Valenciennes edgings could be produced. Returning to Nottingham, I put on machines to make these edgings; the plan becoming soon known to two or three others, they wished to become connected with me in working it under a patent; one was taken out in 1850, No. 13,122, in the names of Dunnicliff and Bagley. At this time there began many difficulties among all the parties who were making these edgings and other things, as to their respective interests and rights under the patents for my inventions. No regular agreements were signed, nor licenses issued, nor accounts kept. One party protested against the claims of another. At one time I made money fast by my Valenciennes edgings, and began to manufacture Honiton sprigs; but it required more capital than I could command. A partnership, from which there was just ground to expect large profit to myself, and to embark in which I had declined good offers elsewhere, was dissolved; and I had to leave the business without any capital coming to me at all. I had forgotten to mention that, having bought a round hosiery knitting-frame in Paris in 1851, I devised a method of making ribbed work

from it, and shewed it to a house who patented the plan without my permission; upon putting in a caveat against it, a settlement by arbitration was effected. Another patent, No. 13,880, in 1851, was obtained for a method of making round knitting cord, found out by my son; the interest in this specification we sold for £50. A large machine owner was using my Valenciennes patent, but without paying me for it, although I had put on for him a machine with Mechlin spots without any reward. 'A man of straw like you,' he said, 'can do nothing by going to law with me,' and laughed at me.

"This is a brief outline of my history (1856), and of the treatment I have received. Many are enjoying wealth from my labours. I am in difficulty to know how to pay my way."

In this dilemma he was advised to place himself in the hands of a competent and independent party, who by knowledge of the value of his inventions and of business in general, might so direct his efforts as to secure adequate profits to himself from them.

He had all along been the victim of his own restless versatility of invention; together with inability to make a safe bargain on a fair estimate of the value of his inventions; and an aversion to keep strict accounts himself or to require others to do so; in all which respects he shared the characteristics of the great majority of his class. The demand for the superior kinds of goods, of which he had originated the manufacture, continued; the profits of the half-share of his last patent and which he received, increased; and it is pleasant to have to state, that from the time at which his narrative concludes, his position became more stable and his circumstances comfortable. He died in the year 1859, aged about fifty. His son, also a clever mechanic, after exhibiting their productions in the Exhibition of 1862, died of consumption. Their business is carried on at present by a son-in-law.

## CHAPTER XXV.

THE BOBBIN NET MANUFACTURE. 1837 to 1866.

AFFAIRS in the local trades in the midland district were very adversely affected by the commercial panic of 1837; that of lace suffered in an especial manner. Half the hosiery and more than half the lace machinery ceased being worked. Prices of materials fell one-half and sales of wrought goods were almost impossible. Some houses did not make an entry during a whole month. A relief fund in Nottingham maintained 4,400 stocking and lace makers, representing 22,000 souls out of 50,000 inhabitants, for several months, and the poor rates rose from £11,628 in 1836, to £21,139 in 1837, although the aid from private benevolence was unusually great. 1,155 houses were shut up out of 11,000 in the borough.

This depression continued for several following years, with short occasional fluctuations. In 1843, the prices of plain bobbin net were reduced to the lowest figure at which they have been ever sold, viz. 8-qr.  $2\frac{1}{4}d.$ ,  $2\frac{1}{2}d.$ ,  $2\frac{3}{4}d.$  per rack for 10, 11, and 12 point, and 12-qr.  $4d.$ ,  $4\frac{1}{2}d.$  and  $5d.$  for the same qualities. Three-fifths only of the lace frames were at work for fifteen months. The following anecdote will strikingly exemplify the alternations to which this plain net business has been subjected. It was during the period of great prosperity, that upon the occurrence of a fire that consumed the machinery of Messrs. Wheatley and Co., the principal plain lace manufacturers at Chard in Somersetshire, that house determined to replace it by the construction of seventy-two new 12-qr. machines of the most improved description, under the superintendance of Mr. Riste, an able mechanic, formerly a workman, then become a partner in the firm. So satisfactorily was this

performed, that though the loss by the fire was estimated at £40,000, it proved a permanent advantage to the proprietors; the new machinery working by steam, more than covered that large sum by the profits realized from its operations during the first year after it was got to work. On relating this fact in 1838, Mr. Riste stated, "that he had himself received for making a yard of net £1. 6s., which at the time he spoke, would be paid for by the sum of one farthing"—a reduction to one-fifteen hundredth part of the original cost of the labour necessary for its production.

Between 1844-5, the market was so overloaded with platted laces, that though a beautiful and sound article, the prices fell to one-fourth of what they had been previously sold for, and still were only sold with difficulty.—The 'registration of designs act' had been lately passed, and much benefit had been expected to result from its operation. But a case was brought before the magistrates in Nottingham this year, for alleged piracy of a warp pattern, in which the complainant was unsuccessful, and it has since practically fallen into desuetude. There are often inseparable difficulties in the way of proving either originality or piracy of patterns.—In 1845, the lace trade was overdone in all departments. Fisher had only twenty-five machines of all kinds at work, and a number of licenses for his patent plats were given up. The prices for all fancy goods fell greatly. Levers' edgings and laces were sold at 1*d.* and  $\frac{3}{4}$ *d.* a yard—some at the prices which the yarn cost of which they were made. There were numerous instances of small machine holders, to whom more than one cotton-yarn dealer had been accustomed to give eighteen to thirty-six months credit for materials to work up in the two or three machines they owned, who had thus been enabled to accumulate large quantities of fancy lace goods, often of inferior patterns. These were at length pushed into the market, and sold at a terrible sacrifice, which inevitably issued in transforming the owner at once into a twist hand again. Many of these machines were purchased for exportation, at exceedingly low rates. For instance, an 11-qr. 11 $\frac{1}{2}$  point Levers' Jacquarded with 160 bars, and which latter with altera-



tions, cost £350 putting in, sold for £26. Yet during these trying years, many fancy Levers' machines of from 16-qr. to 20-qr. in width, were built for the manufacture of Jacquard laces. In 1846, a public meeting was held of 2,000 lace hands, half of whom were partially employed, the other altogether out of work. They prayed the House of Commons to restrict the working time to sixteen hours, and two shifts a-day. This petition was also signed by 430 small machine owners; 27 of the larger owners petitioned against it; and the bill was negatived by about 130 to 50. All parties agreed, that the working hours of women and children should be restricted. This was succeeded by the formation of the existing bobbin net workman's union. It was agreed to pay 2*d.* to the local and 4*d.* to the national fund weekly; to receive weekly, if the wages be 16*s.*, 10*s.*, and if £1, 12*s.* 6*d.* a-week from the union when sick or out of work. The depression continued in the trade. A lot consisting of fifteen 8-qr., ten 10-qr., and one 12-qr., with 200 lb. of fine yarn, was sold altogether for £230.

The government school of design had been established some time, and was working very successfully. Appropriate patterns were gradually multiplied, and the business of designing for the lace trade was introduced.—Early in 1846, a deputation was sent by the body of lace manufacturers and merchants, to request government to make a representation to the Spanish authorities of the reciprocal benefit to each nation that would result from moderate duties being levied by the one on English lace, and by the other on Spanish wines. The question was mooted at Madrid, but nothing came of it.

The commercial panic that supervened almost universally in 1848, produced severe losses in the Nottingham lace trade, as well as in the hosiery business of the midland districts. The American markets had been overstocked with goods, in realising upon which great sacrifices were made. No regular sales of either hosiery or lace were made in the home markets from October, 1847, to April, 1848, and much distress was produced by hands being very partially employed. The demand

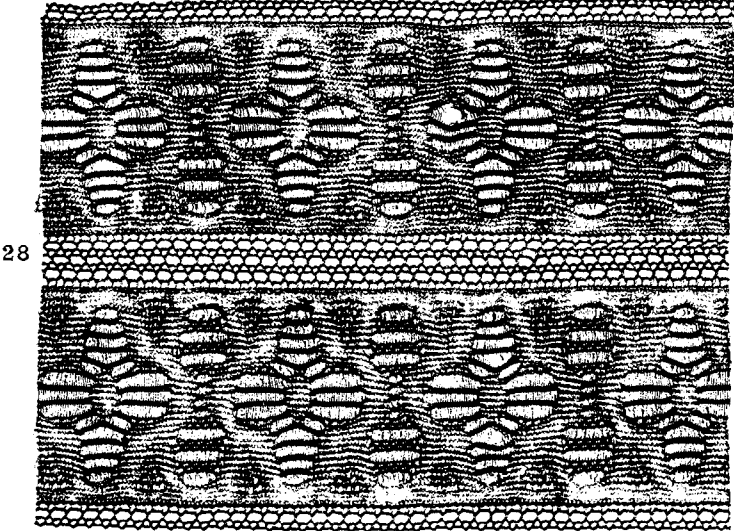
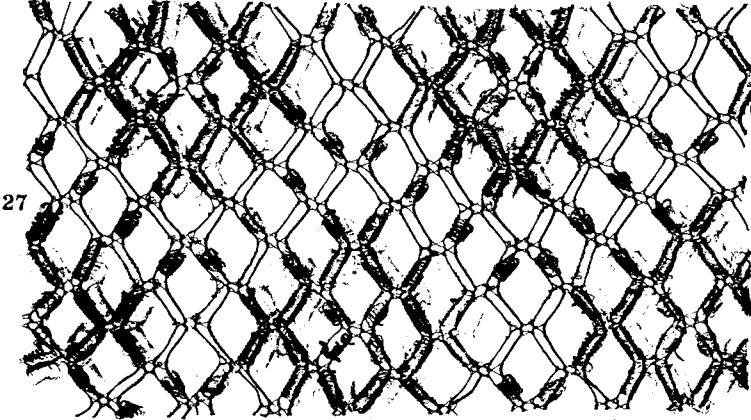
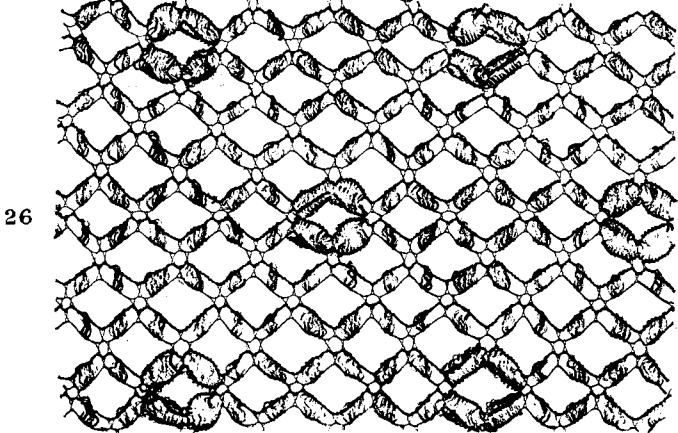
for lace gradually revived in 1849, when some articles began to be made on the Nottingham lace machinery, which had been imported till 1845 of the lower kinds from Saxony, and the more expensive ones from France. These were black silk ornamented shawls, scarfs, and flounces. Mechlin straight down plain cotton nets began to be much used after a time; the same article made of silk was very largely consumed, and has more or less continued in demand until 1866. This net was first made three twist, then double, and at last single twist only. By 1851, the principal Nottingham articles in machines fancies were cotton edgings, insertions, linen laces imitating white pillow goods, muslin edgings, and laces, platted, spotted, and other nets, imitating Valenciennes. Lace curtains, bed coverlids, and blinds, toilets, and d'oyleys, finished on the frame of excellent designs for superior furniture use, and at excessively low prices for the million, were after a time supplied in immense quantities. Some of those who have written disparagingly upon the subject of taste in lace, as seen in some classes of English goods, seem not to have taken into account, that we have to provide goods to suit the fixed unchanging taste of the Hindoo, the West Indian, or the South American markets. However it may differ from our own or that of the French, it cannot be forced. The same leaf or stripe or geometrical figure may be required year by year, to the great advantage of the manufacturer. For a similar reason, the window screen of lace for the cottage of the poor must have some design, some figure to enliven it, however imperfect the outline, or low the price.

After the Great Exhibition in 1851, there was a revival of demand for the three twist net of fine texture, suitable for the ground on which should be applied with the needle sprigs, braids, and flowers made at Brussels and Honiton on the pillow. Mr. Sewell had made this article for many years. Mr. William Gregory purchased the machinery of Mr. John Kendall, one of the former licensees, and, though not originally a mechanic, had by working at a lace machine become master of its construction and management, as proved by the excellence of these three twist fine nets, of which he has for some

years been a principal manufacturer, and thereby secured considerable pecuniary results. No doubt he gave strict attention to minute details in the management of his machinery and workpeople. What, however, he deemed of no small importance as aiding his progress, may be gathered from remarks made by him publicly after a dinner on his recent election into the municipal council :

“Mr. Gregory said he never denied his birth. He was not ashamed of having been a collier. He had also been a farm labourer for ten years ; he thought if he had not been a good servant he should not have remained in the same place ten years. He always contrived to save money however, and when he left farming he returned to the colliery. He had even been a beer-house keeper, and his wife had worked in a stocking-frame. If she had not been an industrious and economic wife, he could not have succeeded as he had. He felt proud of his family, with whom he had been very happy ; and he was glad to say he had a son sitting beside him who would make a much cleverer man than himself. He had his wife and family to thank for his success. Having striven hard to attain his present position,” he concluded by saying, “some might be there who, by following his example and taking care of their money, would possibly attain a much higher place than he had done.” (The business is now conducted by the son above referred to).

Amongst those who quitted the ranks of working men at lace machines, and who became employers of large bodies of workpeople, were the brothers Samuel and Jonathan Burton. They were originally frame-work-knitters and afterwards point net hands in Nottingham. We first saw them about 1828 employed in making bobbin net upon narrow frames in Broad Marsh. From thence they removed to the neighbourhood of Mount street. Afterwards, becoming connected with Mr. Sewell, they built and occupied large premises at Carrington, for the manufacture of plain net from circular machines of the best construction. The Messrs. Burtons accumulated capital rapidly ; and after a few years Mr. Samuel Burton established himself in a separate factory at Sherwood, where after a short interval he died, leaving considerable wealth to his family. Mr. Jonathan Burton remaining behind, increased his machinery to the number of about seventy 16-qr. to 20-qr. in width. Besides making this outlay in buildings and machinery, he purchased a valuable landed estate in the neighbourhood. He died suddenly a few years ago. The management of



his business was characterised by constant personal vigilance, and great decision upon emergencies; combined with such confidence in the accuracy of his calculations, and the soundness of his judgment of probable events, as led to the exercise of singular patience in waiting for results.—The Messrs. Burton, Mr. Gregory, and other similar instances of successful management which might have been adduced, shew that the inventive talent of this district, though it greatly preponderated, has been accompanied frequently by a large measure of administrative ability,—a fact probably not confined to our local artizans, and is of growing interest in connexion with the enquiry now occupying deservedly so large an amount of public attention as to the policy and practicability of conjoint interest of employers and employed in manufactures, and of the probable results of co-operation on the part of workmen amongst themselves.

In 1844, Mr. Alfred Butler made fancy open net and cloth work on circular machines—

By Jacquards operating on levers which pushed the carriages behind where required, traversing to make cloth, not traversing to make open work. The carriages were divided in the traverse, and the two tiers were kept apart, it is said, by using small carriages without tops but with nebs under them, by which both sets were driven by a peculiar kind of locker blade.

An invention appeared in 1846, produced upon circular machinery, by Mr. John Livesey, a draughtsman, of Lenton, called from the looped formation of the meshes and the threads not traversing, 'straight down' net; and it is upon this arrangement that curtain nets and curtains are principally made. The tissue is not solid or fast, and will not bear too much stress in wear; nevertheless cloth work of single, double, and three-fold texture can be introduced at pleasure; and intermixed with openworks, form elegant designs in the net work, by the application of Jacquard apparatus at the ends of the machine to one class of threads, and a separate one acting at the back upon another part of the threads, so as to produce the effects of light and shade in floral or geometric patterns. These are much admired for their beauty when hung up so as to intercept the light.

Livesey begun by using only one tier of carriages and bobbins. Where more warp threads were wanted in some parts for the pattern than in others, he supplied them from additional warp beams. Instead of the bobbin threads twisting with the separate warp threads, as in common bobbin net, one bobbin thread on this plan acts upon two warp threads, turn and turn about, which causes that the meshes united by one and the same bobbin thread, are produced in a vertical line. Hence its name.

This plan was not at first thoroughly successful; but by the consecutive assistance of Elsey, Sisling, and Cope, the proposed result was eventually more than realized.

They introduced the action of the Jacquard upon a second warp, serving for weft, placed behind the machine, wound on large bobbins as on the traverse warp plan. There are large carriages holding large bobbins, supplying the ordinary warp bobbin threads. These, by the action of a peculiarly formed spring, were kept at proper tension, and when slackened coiled back again aright. The ordinary bobbins and carriages serve for joining together the straight down ranks of meshes.

In 1851 there were 150, and in 1862, 300 of these machines at work in and near Nottingham.

They have chiefly been in the hands of Walker and Elsey, Robinson and Sisling, Wheatley and Co., and Cope and Ward. Each of these houses have made successive modifications in them, which have increased the power and excellence of the production, and at length seem to have firmly established the demand for these articles. The speed of the machines is such that a pair of curtains, each four yards long, may be produced on one machine in two hours. In the Exhibition of 1851, some 'store' curtains, each five yards long and two yards wide, consisting of one elaborate pattern only, were shewn, valued at £1. 10s. the pair. Each of these patterns required 12,000 to 15,000 cards to be used in the machine. The business in these goods is intermittent; during the season some tons weight of cotton curtains leave Nottingham weekly.

Of the latest improvements in curtain machines, one was patented by Messrs. Catford and Wheatley in 1861, No. 2507, for making the article with a traversed mesh, and consequently possessing greater durability than that formed of loops only. The greater cost of this ground must so enhance price as to affect the sale, it may be feared.

Another improvement was introduced by Messrs. Cope, Ward, and Cope, in 1860, No. 707, producing—

A new fabric in which the warp threads are united together, and pillars formed by looping them in substitution of bobbin threads. Needles are employed, each having an eye through which a looping thread passes. These needles are operated upon so as to take their threads between the warp threads, and to loop with them. The threads of these needles may be aided by hooks, and other instruments, in the movements given to the warp threads to effect the interlooping and tying together of the warp threads. Points and point bars, as well as bobbins and carriages with their combs, are dispensed with. Series of guides or interceptors, and traverse or extra threads, may be employed.

Mr. Cope being a clever mechanic, and having acquired a practically accurate knowledge of the bobbin net machine, had effected a modification of it, which he patented, No. 238, in 1858. Again, in 1860, his firm took out a further patent, No. 2855, with a view to simplify its action and increase its speed—

By means of taking from a crank pin on a rotary shaft, a lever to give a rocking motion thereto, and to connect with it another rocking shaft, whereby parallel motion is obtained; and thus there is imparted the required segmental motions and alternate rests to the back and front catch bars. Also, there is described an application of dividing instruments to act upon, and hold the warp threads between the guide bars or other selecting instruments for acting on these threads, and also on the under side of the carriages after each selection, and while they pass from back to front, or front to back, and thereby give time for a fresh selection of warp threads during their oscillation.

A further patent, No. 2098, was taken out in 1864, by Mr. Cope, for an improvement in bobbins and carriages.

John Livesey, the originator of the curtain net machinery, was so well acquainted with the various classes into which the lace manufacture had become subdivided, that he was enabled to take instruments from each for the purpose of effecting new combinations, and for these he obtained additional patents.

In 1851, No. 13,750, was for a mode of making articles resembling velvet and Brussels carpet ground; piled and cut, piled and embossed velvets, tapestry, or Berlin needle work; and lace with velvet figures, and internal pearls, spots, and ornaments. Also, having two or more piles to each carriage thread, and with a back and front ground, from between which the pile thread is drawn. Also, a mixed ground partly looped and partly woven, on which Berlin work stitches are

formed. Also, embroidered grounds with raised piled surfaces; and, finally, patterns in or on piled or cut piled, and in introducing more colours than were before practicable.

The productions here enumerated were of most diversified character and great beauty. The ingenuity displayed in the bobbin net machinery thus modified was highly creditable to the mind which devised and executed it.

The next year, 1852, S. Nicholls and E. Wroughton, mechanics, with J. Livesey, united in taking out a patent for several improvements in the circular hosiery knitting frame—

Into which they introduced warp and weft threads, and a break for stopping these machines. Also, for improved straight frames for plain and ribbed hosiery. Also, for an apparatus introducing weft threads in lace machinery, and making improved grounds thereby. Also, for improved instruments for making pile and other fabrics. And for making new fabrics, one part made at right angles to the other part; also fabrics made edgewise, and tied together at intervals. And, finally, improvements in making fringes and piled fabrics.

Some of the articles produced under this patent were ingeniously made and in good taste.

Livesey patented in 1852, No. 1139, for lace piled fabrics. In 1854, No. 1571 and No. 1748, the former for improvements in making laces, the latter in fringes from lace machinery. In 1855, No. 32 was for printing lace, and No. 182 for machinery. In 1857, No. 2997 was for further improvements in the machinery for making piled fabrics. His last patent was taken out in 1861, No. 2043, for methods of making lace embroidered articles, trimmings, &c.

This aptitude for and versatility of inventions evidence a great amount of mechanical power, but in Livesey it was more suggestive than practical; he indicated the way to important objects rather than pursued it so as to secure the beneficial results. Of these he obtained little beyond the needful supply of his daily wants. His mind seems to have been discursive, full of plans certain, as he averred, to bring large gains, but he lacked the energy and determination to work them fully out. Thus the greater part of life having passed without Livesey realising any pecuniary harvest from his inven-



tions, by a friendly contribution he was assisted to emigrate to Australia, where he is still living, it is hoped in comfortable circumstances.

Besides the modifications described more at large in connection with the names of other skilful inventors, the following were made during the epoch on which we have now entered, and are worthy of notice.

In 1841, Joseph Wragg, of Lenton, smith, assisted by Bertie—

Used the cylinder and cards, but instead of holes they put on knobs of wood of different heights to act on guide bars, forcing them to greater distances than by compound levers, and thus got gimp threads round the flowered patterns, which had before been put in by the needle.

This was a great discovery, operating however to displace the labour of many lace embroiderers, and to overturn some important arrangements of the trade. The goods being nearly finished for the market on the machines, much labour, time, and capital, previously employed in giving them out all over the midland counties to be run or tamboured, were saved; but the hands were gradually thrown out of employment. This was not an unmitigated evil, for the labour was unhealthy, and of late years ill-paid for long hours and close application. Moreover, the demand for female labour has increased so rapidly in Nottingham, as to have absorbed a constant supply of such country hands within the last twenty-five years—a process which is likely to increase rather than otherwise.

An able mechanic, Whittle, of Nottingham, lessened the cost of operating by guide bars, by placing a distinct bolt for each, which was acted on by the cards.

In 1842, Brooks put double cylinders on Levers' machines to propel the guide bars, moving them both ways. The plan became generally used.

Clarke and Kerrey used, instead of cards, plates on which were knobs to be changed at will.—W. Henson, Worcester, proposed to improve the bobbin net machine, by using a set of middle points as a guide bar.

In 1842-3, C. Nickells took out three patents for introducing elastic thread or India-rubber strands into the productions of lace machinery. They were Nos.

9472, 9629, and 9735 respectively. No. 9290 was a patent taken out by William Catford, of Chard, for a double cylinder Jacquard. This was purchased by James Fisher.

Charles and John Thornton constructed a machine in 1842-3, in which long levers were made to operate on other levers which were controlled by the Jacquard, and all were moved by power.

In 1843, Polak, of Brussels, caused the Jacquard to act on wires, through which warp threads passed, and when drawn by the Jacquard, enabled the carriages required to pass on the other side of the warp threads, only two guide bars being used.

This year, Tansley and Marsh made imitation plat laces, using three warp to one bobbin thread. The platting was done by the three warps, the bobbins merely passing to and fro to hold them together, and prevent their unravelling.

In 1844, a patent, No. 10,163, was taken out by William Clarke, for making traverse ground ornamented lace, forming scollops on breadths by accumulating a series of warp and bobbin threads. It was understood not to have been a successful, though a very expensive effort, costing it is said £3000.

The same year he obtained another patent, No. 10,350, for scolloping on a Levers' frame, causing warp threads to gradually accumulate to form the scollop, and leaving the points, by extra points to take up the twist, and making a sewing thread connect the net and the scollop. Several other methods were used to make this scollop, for one of which, said to be superior to the patent one, £100 was given to the inventor.

In 1844, *John Fisher*, with Gibbons and Roe, as machinists, took out a patent, No. 10,424, for manufacturing ornamented lace. In 1845, they obtained another for four distinct purposes, No. 10,716.

1st. For making lace with scolloped edges by the use of moveable combs or bolts, so as to cause the carriages that make the edge, and the carriages that make the body of the breadth to which the edge is applied, for a time to work away from or differently spaced from, those of the body of the breadth of lace. These are single-tier Levers' carriages. 2nd. To govern the make of bars and gaiting them, so as to secure their perfectly geometric exactitude in movement, reckoning the spaces by (say) eighths of gaits or spaces within the compass of the apparatus. 3rd. Apparatus for

making warp fabrics by using two hook bars, and dispensing with the presser bar to simplify the machine. The machinery arranged according to this improvement, we prefer should have the warp beam placed above, and the guides for lapping the threads in a vertical position; the sinkers in a horizontal position, and stems of the hooks which perform the parts of the stems in the needles ordinarily used, in a vertical instead of horizontal position. 4th. An improvement on the patent, No. 10,424, by which instead of one bar, any number of bars may be placed in a frame and used for each description of instruments employed in producing the patterns, so that several rows of pattern may be produced at the same time. This patent has fourteen sheets of drawing appended to it.

No. 11,644 was for improvements in the fabrication of lace or weavings.

In 1857, Mr. John Fisher took out No. 2279, for making spots and finings simultaneously.

About this time, Mr. Waterhouse, of Chesterfield, had constructed a fourteen-point machine, the carriages in which were moved by rolling lockers. The intention was to imitate the real Brussels ground, which is formed by two warp and two bobbin threads composing the upright pillar, and a warp and a bobbin thread being twisted to form each of four sides of the mesh.

This machine could only traverse over two meshes, and, in consequence, the lace had a shady appearance. The open and cloth works were good imitations of the foreign lace, but though from so fine a gauge, the ground looked rather coarse. Nevertheless, Her Majesty Queen Victoria, as well as the Dowager Queen Adelaide patronised its use, and it was commended in the *Times*.

Mechanics had not succeeded in traversing plat nets, made from fast warps, and it was suggested that the shaded appearance of this lace might have been prevented by lapping each thread alternately at the turn again of the mesh. The cost of this machine was understood to be upwards of £3000; and the price at which its produce could be sold, would not justify its continuance in work. It was bought for £300, and has been reconstructed for an ordinary purpose.—Mr. William Clark introduced a method of using iron plates instead of cards, having pins on the surface as well as holes. In 1866, this inventor took out a patent, No. 3108, for improvements in ornamental laces and other fabrics.

In 1844, Mr. Gravener Henson gave a plan and drawings to Crofts and Cox, of Lenton—

For putting one bobbin of the usual size at the bottom of a steeple-top carriage, and another of smaller size at the top of the same. The bobbins above the bars being of the same size as the bottom bobbins, a fixed thread passed round both bobbins to which the bobbin thread was attached, and was wound round both bobbins which were placed more than two inches above the others, holding double the quantity of thread, and the bobbins pulled nearly alike so that no yarn was wasted. Henson learned that this method had been applied with success by Ferguson, at Lisle.

Joseph Topham, in 1845, used a double Jacquard. A Manchester string Jacquard makes the net. The figuring is made by using stumps to every warp thread placed behind the machine, and operated on by a Jacquard the whole width of the machine.

Townsend and Revill placed at the side of a bobbin net machine, a large perpendicular wheel, having wooden knobs on its surface, from which levers were actuated, which moved guide bars. This was at that time a cheap method of making small patterns.

John Oldknow, of Lenton, made Lever machines this year, 24-qr. or 216 inches in width. It was intended to make muslin laces extensively from them, but as the bobbin threads did not traverse, the article fell into disuse.

Slater now applied sixty sheet-brass guide bars perforated for warp threads, and enabled Levers' machines to use them. 120 were put in, in 1844, and 200 such were afterwards used in one machine with wonderful results, until the introduction of Oldknow's perforated steel bars, which may be said to have indirectly revolutionized the Levers' fancy trade.

In 1846, Mr. Vickers, sen. and Mr. William Clarke, took out a patent, No. 11,042, for the manufacture of machine wrought velvet lace—one of the earliest efforts made to accomplish this.

Mr. William Vickers, jun., of Nottingham, assisted by Mr. Gamble, also a clever mechanic, constructed about the year 1850, a machine—

Having a central comb bar to receive a full set of carriages and bobbins; also, a front and a back comb bar to receive the carriages as they were selected and required for the purpose of forming the pattern. There were warp threads which traversed, but not a warp beam; and the bobbin threads performed only the

operation of twisting. This required but six motions, and those through half the usual distance only to form the mesh; so that it was an exceedingly quick machine, and it produced excellent net.

There was, however, a delicacy in its mode of operation, which though it might perhaps have been overcome, yet having already expended £1500 in its construction, and other more pressing things intervening, further proceedings were given up. This was one amongst several highly ingenious attempts to perform by mechanism, actuated by rotary motion and inanimate power, all the various processes used in the fabrication of pillow lace. These have been necessarily very costly in time and money; in this instance combining, after much simplification of their essential principles of action, those parts which are specially characteristic of the Levers', pusher, traverse warp, and double-tier machines.

About 1848, Mr. Peter Coxon, of Lenton, made embossed muslin laces from the Levers' machine. The article was too expensive, and did not sell in consequence. His method was to throw the wheels and tackle out of gear, and thus letting the warp accumulate where necessary for producing embossment.—Mr. Wilkinson made braid from the Levers' frame by extra guide bars and constantly interlapping; the exact method was not known to the trade. Similar goods were made by other modes.—Messrs. Ingoldby and Clark had brought out, in 1845, an ingenious but slow scolloping machine, for working which however licenses were bought freely for a time. It never became a really popular plan of making this kind of laces.

Mr. Barton, of New Basford, a worthy man and excellent mechanic, after years of intense study, devised and put together a compound machine of a very peculiar system, of which we are unfortunately in a position to give but a very slender account. The yarn of which it was made, was all put on bobbins, there being no warp. It had five comb bars and four sets of points, and required, we are informed, 240 motions to complete one series of meshes. But the result was as perfect an article as can be produced upon the pillow. In the report of M. Aubry on this department in the Exhibition of 1851, he affirms this to be "the most beautiful

imitation of pillow lace shewn there." It is very melancholy to have to record, that the strain upon his intellect and nerves cost Mr. Barton his life. He died by his own hand in December, 1845. The machine no longer exists, but a specimen of the work is given in Plate XVIII., No. 29, an undivided Valenciennes lace braid or edging.

Shetland woollen work begun to be made on the stocking-frame by Mr. Thomas Hill, of Nottingham, in the year 1854. He had made experiments with fine grey woollen yarn, with a view to produce falls similar to those knitted by hand in Shetland. No yarn of a suitable kind was obtainable for a time. Ultimately Walker and Co., of Bradford, were successful in producing it; and in the summer of that year the falls were introduced into London and Manchester with great favour, and have ever since continued in regular demand, both at home and abroad.

In the year 1862, T. Hill suggested to an intelligent workman at Hucknall, W. Farrands, that shawls might be made of these fine woollen yarns, by the introduction of the newly brought out bright colours, skilfully combined with the patterns in the borders. Samples in various styles found immediate sale in France. The manufacture has steadily increased, and now comprises other articles of utility and beauty for ladies' dress, and, if well made, are used in Spain, South America, and the United States.

These goods are made on stocking-looms, having a jack machine, in which is a set of points to remove the loops from the needles, placed in front of them. The spider-work formerly made on these jack frames had gone out of demand. Now about 100 of the wide ones are at work on these new fabrics. The yarns are become an important article in Bradford spinning, and fetch 4s. to 12s. per pound, according to quality, passing through the hands of several agents in Nottingham.

A far greater development would have been attained, had not the first productions been immediately copied of a depreciated quality, so as to be lowered in price.

The first order for shawls was for 1300, and were

intended for the London and Paris markets. While in course of preparation a sight of them was obtained, and they were met, when delivered, by an article offered at two-thirds the price. The Paris buyers seeing the inferiority of the latter, declined to risk the effort to make them fashionable—a result, which if attained, would have given them greater currency still in other countries.

This is a striking instance of the resuscitation of a body of old and, as was supposed, effete machinery for a valuable purpose, though in a somewhat different direction; and still more important, as shewing the folly of putting in jeopardy the demand for goods by infringing upon their quality.

In 1861, Edward Topham, formerly of Nottingham, now of Calais, took out two patents, Nos. 1778 and 2728, for certain appliances by which longitudinal meshes may be fabricated of lace, which meshes so formed may deviate from the usual course, inclining to or from, or be at right angles with the selvage of the tissue; and by which a fringe, or the appearance of one, may be imparted to these longitudinal holes, obtaining by machinery what had and could hitherto only be produced by hand.

This was effected by what were called 'fugitive' and 'drag' threads, because they were, while in operation on the machine, used as means of dragging or pulling the threads passed round them out of their usual course, and thereby altering and angularly distorting the meshes, thus producing a closer resemblance to pillow made lace; and also they had the name of 'fugitive,' being drawn out from the fabric to which they were superfluous, when the piece was made and in course of division into breadths of lace preparatory to sale.

There is no doubt a more complete resemblance to real lace obtained by this method, than by what was formerly adopted, viz. putting on additional or lessened weight or tightness in the action of such warp threads, or such bobbin threads as might be required to drag, or to be themselves drawn aside, more or less, in the work. By consequence, Topham's plan and goods, the latter in black and white silk laces, good in style and rich in finish, were in request. In 1862, he brought an action against James Hartshorn for infringement, when it was proved that the defendant had not been able to make

the lace until he had obtained a pattern of it, on which the drag threads remained as it came off the machine. The jury decided the plan to be new; that the defendant had infringed it, and that the specification was sufficient. The right to the use of this patent, having passed into other hands in 1866, the Master of the Rolls and a jury tried a cause for its infringement—*Barnett v. Maxton*, in which a verdict was entered for the plaintiff, whereby the sale of goods, wherever made according to the plan, except by license, is declared illegal. The defendant agreed to take licenses from the plaintiff.

In 1863, this house obtained No. 773, for further improvements in ornamenting lace.

Mr. Frederic Rainford Ensor, of Nottingham, has devised many methods whereby laces may be made more approximate in various particulars to Valenciennes produced on the pillow. He has taken out patents for some of those, though not all. One of these patents was No. 2344, in 1854; another in 1855, No. 2142; another, in conjunction with Mr. Jacoby, in 1858, No. 2216; another in 1865, No. 971. The last he describes as—

“Producing from a single complement of threads all the pillars of the ground of three threads; also perfect cloth work, the tabby weaving being clear; the carriages swing in the same grooves; that is, one thread up and one thread down, alternately. It is a perfect, simple, and economic mode of producing by machinery Valenciennes lace.”

The plan thus patented appears to be one of very great value. In an advertisement upon the subject of this invention, “Mr. Ensor reminds Mr. John S. Butler, Messrs. Dunnicliff and Smith, and Messrs. Jacoby and Co., that much lace is making under it.” On enquiry into the meaning of this, we were informed that there may be a question raised ere long, whether a patent No. 113, taken out in 1863, by Mr. J. S. Butler, may not be in some points infringed upon by Mr. Ensor. Mr. Butler states his invention to be—

For the manufacture of Valenciennes laces by the arrangement and combination of carriage threads and warp threads, or of these with gimp threads, so as to produce net of any guage less than the actual guage of the machines on which it is produced.

The rights under this patent were vested in Messrs. Dunnicliff and Smith, and Mr. Jacoby.



Mr. Jacoby had already taken out a patent in 1859, No. 2772, for an improvement in this class of laces. In 1860, No. 1406, another in connection with Redgate and Stones, and No. 2016 and No. 2348, all three for variations in methods and results in making the same valuable class of articles. One at least of them has four threads to the pillow. Besides the patentees, Dunicliff and Smith only are 'partially' licensed to make goods under them. The reader will readily excuse the absence of a more specific account being attempted of these very abstruse modifications and results, which would indeed require plates of machinery and patterns to make them even partially intelligible. The like must be said of patents obtained by another house, Messrs. Hartshorn and Redgate, for modifications of Levers' fancy machinery. These were in 1862, No. 1907 and No. 2472; in 1863, No. 2236; in 1864, No. 2066. Again, in 1864, No. 2676, in connection with Gadsby; and in 1865, No. 566, with Redgate, for making Maltese lace. The two last are advertised as the property of Mr. James Hartshorn and Mr. Jacoby. In the plan for making Maltese lace there is a peculiar mode of weighting the two warp and two bobbin threads respectively, producing, if wished, pearls either on one or both sides of the weaving edges.—A machine for making velvet spots was patented by Mr. J. Foster in 1855, No. 328. Also, in 1855, Messrs. Ball and Wilkins obtained a patent, No. 1618, for improved warp fabrics, and in 1862, No. 613, for further modifications.

Messrs. Hemsley patented, No. 2035, in 1855, for manufacturing chenille. In 1862, Mr. P. R. Couchoid took out No. 906 for chenille lace. The same year M. A. Fontaine Collette for "a new kind of lace," No. 3424; and M. l'Amadeè for an imitation guipure for veils, &c. A curiously constructed series of apparatus was patented in 1865, by John Wilkie, No. 801, effecting—

1st. Pearling edges from the warp, and from the warp and bobbin threads in nets. 2nd. Forming spots simultaneously with, but separately from the body of the fabric. 3rd. Producing fabrics in imitation of sewed brocade and fringed fabrics.

Mr. Henry Mallett took a patent, No. 1512, in 1866, for Valenciennes lace :

On this plan the pearled loops are closed at the stem of each, and are there intersected by a single thread, while the loops forming the pearls are each beyond the stem produced by a single thread, or two threads slightly twisted and worked as a single thread. The ground is produced by the employment of two warp threads to each bobbin thread, and where weavings are to be produced, the pairs of warp threads are wound on separate beams, so that the two warp threads of a carriage or bobbin thread may be worked up unequally; and then in place of the pairs of warp threads passing through the weaving side by side and as one warp thread, and also in place of employing extra warp threads as weft threads, one of each of such pairs of warp thread is used as weft threads or as a boundary thread to the weavings, and thus the corded effect heretofore resulting from the use of pairs of threads, as single threads in the weaving is avoided; and the cutting off of threads, as when extra wefting threads are used, is unnecessary. The weavings thus produced are like what have been produced when using one warp to each bobbin thread, and they are formed on a ground of net of two warps to a bobbin.

Provisional protection was granted in September, 1866, to Mr. William Selby, draughtsman, Nottingham—

For a method of making ornamental meshes or weavings in any part of bobbin net twist lace, by throwing out of work any of the regular warp threads and throwing in extra warp threads, by which the fabric is continued until the desired weaving or meshes be completed, the regular warp threads being carried over until again required to produce the fabric in the ordinary way. Messrs. James Hardy and Co. are alone authorised to make or sell the lace made under this patent.

Within the last fifteen years the attention of mechanicians, chiefly in France, has been turned afresh to the construction of machines for the fabrication of fishing nets.

The want of space forbids our giving more than the names of the inventors with the dates and numbers of the several patents which they took out, for facility of reference. In 1852, No. 841, Pierre Arnaud Comte Fontaine Moreau. In 1853, Nos. 145 and 2758, G. E. Gazanaine. In 1856, No. 2510, A. Bonnet. In 1858, No. 1234, F. J. Candy. In 1859, Nos. 1856 and 1872, J. and W. Stewart. And in 1860, No. 1546, Hervieux brothers; No 1843, L. Rome; No. 1174, B. Arnold; No. 2879, J. B. Payne. In 1861, No. 2340, Baudouin. In 1862, No. 2018, W. Clarke.

It is very probable, that amongst these machines there may be found, on careful examination, many examples of novel and ingenious plans and of clever constructions applicable it may be in other useful forms.

From the silence into which at least in this country they have fallen, we fear they have met with the neglect which befel their forerunners in this department, and it is not unlikely for the same reasons, the want of demand—the fisherman making his own nets during hours which would otherwise be wasted. But though not directly useful and profitable, past inventions, however apparently simple or trifling, if real, are invaluable as facts to be studied, not only on account of what they contain, but still more for what they suggest, and what they teach the inventor to avoid.

The statistics of the machines, wages, and returns in the lace trade, have continued to receive a large measure of attention from time to time. No account was taken of the bobbin net production between 1836 and 1843. In the latter year the business was much depressed, and, on an inquiry being instituted, it was found—

That wages in every department of plain and common fancy nets were reduced so that the younger machine hands did not get more than 10*s.* and the men 16*s.* to 18*s.* a-week; though a few making plat nets were paid £2. 10*s.* to £3. weekly; a square yard of plain net sold this year for 4*d.* but the like quantity of plat lace was sold from £5 to £10. There were in the whole 600 machines less than in 1836; 500 had been broken up and 100 sent abroad. Only 2600 were at work; 2300 of these making cotton and 300 silk goods; of these 1500 made plain and 1100 fancy work. The returns were only about £2,390,000, which sum passed at that time through about 100 houses in Nottingham, chiefly by way of London, and more than half consumed at home. 100 machines had been put on with Jacquard apparatus.

The warp lace business at this time employed about 800 machines, of which 500 produced cotton and 300 silk goods making a return of £350,000, being £200,000 cotton and £150,000 silk. This added in bobbin net, made the total returns £2,740,000.

At the request of the Board of Trade, the author drew up a fresh account in 1845—

From this it appeared that 3200 bobbin net machines were at work, of which 2800 made cotton and 400 silk net; 1650 of these being plain and 1550 fancies. The total returns were £2,995,000. The warp production had not materially varied, so that the entire lace trade returned £3,345,000.

The next account was computed from a census of machinery, making both bobbin and warp net, taken in 1851, by Mr. Birkin, and reported upon to Class 19, Exhibition, London. in 1851:—

He found then at work 3200 machines of total width in reckoned quarters 34,382, representing a capital of £1,329,445, to which there must be added further capital for buildings and machinery for working them; also for machinery in cotton spinning, silk throwing, dyeing, bleaching and dressing; and for smithing, bobbin and carriage, guide-comb and point making; besides capital in embroidering and finishing. These items were estimated at £1,616,500. The annual returns of production as sent from the machines were £2,300,000 to which embroidering, finishing and profits required to be added £816,000—total £3,116,000. The hands employed in making were computed to be about 20,000; in embroidering and finishing 113,000;—total 133,000.

The number of warp frames then employed was 150 making blonde and other silk laces, 150 cotton tattings, and 100 lace gloves and mitts; 400 in all, now become 90 to 100 inches in width, and making a return of £700,000 on a capital of £360,000. This makes the entire returns of 1851 in bobbin and warp lace £3,816,000. This branch employed about 10,000 hands altogether.

On the occasion of addressing the Society of Arts, in 1856, upon the history and then state of the machine-wrought lace trade, the author again made a careful enquiry, and found that—

The bobbin net machinery at work was 3,500 of full 40,000 quarters in width; a larger proportion was employed on silk materials; and the frames making fancies were 2158, mostly Levers'; the rest pushers, traverse warps, and a few circulars. The materials were all imported and cost £920,000; wages and profits amounted to £2,760,000—entire returns in bobbin net £3,680,000; 1350 rotary circulars were worked in power factories; and 1050 or more Levers' fancies were put on to power.

In warp goods made from 900 machines £60,000 was paid for materials and £300,000 wages and profits; returns £360,000 making £980,000 for the materials; £3,060,000 wages and profits; and £4,040,000 total returns of both branches. The number of hands employed was stated to be 135,000.

The returns shew to what an adverse extent the competition of bobbin net silk goods was now operating on the silk warp lace production.

So great was the impulse given about this time to the production of fancy lace goods in increasing variety and excellence, that within a single year, 1856, the number of machines to which the Jacquard apparatus was applied had increased about 400; almost all making the most expensive silk laces, Spanish shawls, and Maltese imitations. The materials increased in cost to £1,215,000, wages and profits to £3,565,000, and total returns to £4,780,000; about two-fifths of this production were exported.

In the enquiry caused by the proposed Treaty of Commerce betwixt France and England in 1860, Messrs. Boden, Bradbury, Barnett, and Vickers, representing the Nottingham lace trade, themselves owning 300

machines and employing 1200 workmen, stated to the commissioners—

That there were at that time 2000 English frames making silk lace goods, viz. bobbin net fancies 1030 all Levers except 44 pushers, 370 plain, making 250 to 350 racks a-week of Illusion, Mechlin, Chantilly, &c.; and 600 warp (out of 1000) making plain lace goods on 200 or so, and the rest fancy goods, instead of as formerly employed on Jacquarded shawls, mantillas, &c. These are now superseded by the cheaper goods produced at Lyons. The total demand for English silk net was described as not good, being met by superior and cheaper goods from France. The English machines produce an annual value varying from £480 to £1200 each, according to the kind of goods. The warp workmen gain from 16s. to £1. 10s. a-week; pushers £1. 5s. a-week, Levers' fancies £1. 16s. to £2, requiring the best hands.

Messrs. Heymann and Ward also stated that—

There were about 1540 English bobbin net frames making cotton lace; of these 750 made plain, and 700 fancy goods, and 90 curtains, and there were 300 warp machines making fancy goods. The machines cost on an average £230 each without Jacquard apparatus. They may work 15 to 20 years, but usually require repairs in 10 years. Each machine may produce £480 to £720 per annum, wages paid vary from 18s. to £1. 15s. sometimes however rising to £2. 10s. a-week. They averaged £1. 8s. The finishing adds according to stiffening 15s. to £1. 15s. to the rough cost. This rough cost consists of 70 per cent. yarn; 15 wages, and 15 for capital, expenses, &c. Stiff dressing may increase the weight of a cotton piece of net three-fold or more. Half the entire production was at that time exported leaving half to enter into home consumption.

The following is an account of the state of the machine-wrought lace trade in 1865. It is based on Mr. Birkin's census, presented to Class 24 in the London Exhibition of 1862; and upon an enumeration of the hands employed in and by a certain number of machines made by the author recently:—

At that time there were 1,797 circular machines making bobbin net; of these 200 were at Tiverton, 100 at Barnstaple, 360 at Chard, 500 in Derbyshire, and 700 in and near Nottingham. Also, 1,588 levers, 125 traverse warps, 42 pushers, all in Nottingham and its neighbourhood, making a total, with 353 standing, of 3,552 bobbin net, and 400 warp lace frames. Of these 2,149 were making silk lace, and 1,450 cotton lace. There were employed on plain net 1,442, and on fancy 2,157, the latter being closer imitations of cushion lace than ever before made. Although since 1862 there have occurred great fluctuations in demand, and the prices of both silk and cotton materials have advanced full 75 per cent., the amount of machinery and employment was in 1865 about the same as 1862. The entire production continues to be finished and sold in Nottingham, except that made at Tiverton, which is of silk, and sold in London.

The approximate number of hands employed in 1865 is calculated upon the account taken by the writer recently of the hands actually engaged in making and finishing the production of lace from a large body of bobbin net machines. These, for the whole body of the lace machinery, may be thus stated:—900 men employed in 180 shops for making machines, bobbins, carriages, points, guides, combs, needles, &c., at average wages of 33*s.* a-week; 10,300 men and youths at work in 130 larger factories and in lesser machine shops, 1,800 of whom may earn 16*s.*, 5,000 25*s.*, and 3,500 first-class Levers' hands 35*s.* a-week on an average. These all work alternate shifts of four and five hours each, in the entire day of eighteen hours during which the engine is going. 4,200 boys clearing, winding, threading bobbins, 5*s.* 500 women filling bobbins and overlooking, 12*s.* 15,000 brown net menders, who usually receive nets from factories, and free them from foul, broken, or uneven threads. It is generally supplementary labour to household work, by which 4*s.* to 8*s.* may be gained, averaging 5*s.* a-week. 300 men, warpers, 25*s.*; 300 men, moulders, founders, and superintendents of machinery, 35*s.*; 60 carpenters, 30*s.*; 360 porters, 17*s.*; 120 carters, 20*s.*; 90 watchmen, &c., 20*s.*; 260 steam engineers, 22*s.*; 150 bleachers, 30*s.*; 100 male dressers of lace, 8*s.* to 30*s.*; 900 female dressers, 10*s.*; 1000 female white menders, 12*s.*; 500 female lace folders, 10*s.*; 1,000 paper box makers of both sexes, 7*s.*; 450 warehouse women, 13*s.*; 250 female over lookers, 15*s.*; 100 draftsmen and designers, 40*s.*; 1,300 warehousemen and clerks taking salaries.

There are employed in each finishing lace warehouse from 6 to 600 females, as the size and nature of the business may require. The number cannot be known except by actual census. They are taken from out-door hands in brown mending and other employments on lace. The hours are 8 A.M. to 6 or 7 P.M., and the wages are about 9*s.* on an average; overtime is paid for. The kinds of work must be seen to be understood, but are in general more wearisome than heavy. In some of the factories and work rooms, in lace warehouses, and in dressing-rooms, the heat is sometimes oppressive. In general, ventilation is provided for, but hands do not always care to make use of it.

There is a far greater number of females employed, sometimes from a too early age, in the houses of "mistresses," often their own mothers, upon drawing, scolloping, carding, &c., processes light and simple enough, upon goods which have been obtained from finishing houses. These young people must exercise care and cleanliness on the articles, or they would be spoilt. When returned to the warehouse, the mistress receives a price, out of which she takes a portion for her labour, risk of damage, fire, light, house room, &c. Some of these persons employ as many as twenty young girls. The total number cannot be known accurately except by census. It being considered domestic employment, they are not under registration or visitation, except upon complaint made on sanitary grounds. A great improvement has been going on in regard to the age at which these children begin to do this kind of work, and the hours of their daily labour. The change dates from Mr. Grainger's report on this important subject in 1844.

The remaining department of female labour in connection with

the machine lace trade, is that of embroiderers with hook or needle, tambourers, or lace runners, once amounting to 150,000, now reduced to a sixth of that number. Their average weekly earnings in 1836 were 4s. ; now they are doubled, and more for the better kinds of work. As fast as the improved machinery produced figured work, nearly finished on the machines ready for sale, the lace embroiderers were cast aside. About 1840 an immigration set into Nottingham from all the districts within fifty miles, to supply the increasing warehouse and out-door female labour required in both the lace and hosiery trades. There has thus been added to the already preponderating female population of the place, 13,000 within the last twenty-five years. In these three classes it is computed there are from 90,000 to 100,000 females, which, added to the 38,000 above enumerated, make a total of about 135,000 employed in the lace trade of Nottingham in 1865. The materials worked up cost about £1,715,000; the wages and profits amounted to £3,415,000, or thereabouts; and the net returns may be stated at £5,130,000.

In Nottinghamshire there were, in 1864, 250 lace manufacturers, of whom 180 finished goods produced in 132 machine factories; 10 master machine builders; 20 bobbin and carriage makers; 35 machinists; 6 machine brokers; 11 guide, point, and steel bar makers; 18 engineers; 59 lace agents; 33 dressers; 14 starch makers; 18 cotton and silk doubling mills; 19 paper box makers; 6 Jacquard makers; 34 designers and draughtsmen; 40 bobbin net and cap makers; and 15 public warpers.

In Derbyshire there were 20 lace machine holders.

In the working of power lace machines, there is still the anomaly of eighteen hours' continued working of the engine in the midland factories. The women and children are now withdrawn from night labour. It is more than questionable whether the natural hours of adult male labour might not, if universally adopted, result in, at least, equal advantage to the owners of these machines, costly as they are, yet working to little profit, and conduce greatly to the comfort and morality of the workmen and their families.

In conclusion, the condition of the children, probably not much fewer than 40,000 employed by mistresses, and the circumstances attending such numbers being confined so many hours in rooms not intended for workshops, would seem to call for authorised inspection, and, we think, for registration also. The evidence taken by Mr. White, a sub-commissioner, in 1863, upon the subject of the employment of children in these trades, and his report thereon, are full of important matter; deserving of early practical notice, with a view not only to these young people working under circumstances

more favourable to their health and morals, but also to their obtaining a sound education ; which, under existing arrangements, is for the most part out of the question. It is announced that Her Majesty's government will introduce a bill into Parliament in this session, 1867, which, if carried into effect, will put under inspection and control this as well as some other branches of juvenile labour—a consummation earnestly to be desired.

Ireland has participated, though but to a small extent, in the lace manufacture. During the period when plain lace net was so extensively embroidered by the tambour hook, or needle, as to give employment to 150,000 females, a successful effort was made to introduce this department of labour into Ireland, by Charles Walker, Esq., a native of Oxford and student in the University, and who afterwards signalised himself as an engraver by his evident taste in design. Having married a lady, mistress of an extensive lace manufactory in Essex, and thus becoming interested in the style and finish of the articles produced, it occurred to him, on a visit to Limerick, that the labour of young females could be obtained there at a comparatively cheap rate, and with great local benefit. Being encouraged to make a serious experiment, he became tenant of a large building at Mount Kennett, which afforded the essential requisites of ample room, good light, and thorough ventilation. This he opened in 1829, and six girls became the first lace tambour workers in it. The first year was one of continuous outlay ; the children had to be *taught to work*. Twenty-two young women, skilled in the art of lace embroidery, and four in muslin work, were taken over from England, to instruct and lead on to that amount of proficiency, which would justify paying the children for their work. As they improved, their earnings increased. This addition to the family income made the new employment popular amongst labouring parents, and the public mind became interested in the success of the new enterprise. It had an excellent social and moral result, especially coming in aid when the provision trade was suspended. The wages averaged about 3s. 6d. a-week, though the more advanced hands obtained



from 5s. to 8s. a-week; equalling or exceeding the earnings of the head of the family. Twenty years after, the establishment had become a well-developed source of profit to the employer, and of benefit to those in his employment.

Several prosperous branches sprung from this parent institution. The most extensive is that of Mr. McClure, who had acted as Mr. Walker's manager; and who, in 1856, employed 550 girls and young women in embroidering Nottingham plain net, so as to be ready to be made up into articles suitable as veils, shawls, scarfs, jackets, or dresses, for the attire of ladies in the highest circles.

## CHAPTER XXVI.

## THE MACHINE-WROUGHT LACE MANUFACTURE OF FRANCE.

THE employment of females in making cushion lace had become general in several of the northern and central departments of France before the year 1600. Their labour was directed for the most part to making heavy articles used as ornaments for bishop's rochets, priest's robes, altar cloths, ladies' clothing, and bed furniture. Between 1600 and 1700, 'point d'Alençon' was fashionable, and its manufacture had greatly extended. The patronage of Mary de Medici, followed by the efforts of Colbert to introduce fine Flemish, Italian, and Spanish points, were crowned with success. French importation of these goods from abroad rapidly declined, while every kind of hand-wrought lace was more and more the object of attention and use, in both male and female dress. There was no part of the attire of either sex, from their heads to their feet, which was not ornamented by the addition of lace, often of the richest and most expensive kinds.

Fashion dictated from time to time variations in materials and colours, or grounds and styles; but there has scarcely been an epoch since the age of Louis XIV. in which lace of some kind has not been a favourite article, and used according to their means by all classes throughout France. An almost entire cessation took place during the time of the first revolution; but the consumption of lace was re-established by the ladies of the court of Napoleon I., and in one form or other it has continued to be fashionable ever since. The exception was a brief one, serving to sustain the general rule.

France took the lead of the other countries where lace was made by hand in amount, if not in quality,

an hundred and fifty years ago, and keeps that position still; so that according to M. Aubry (report in 1851), of the total number of hands employed in Europe, 535,000, producing a return of about £5,500,000 per annum, 240,000 were French workpeople, making nearly £3,000,000 of goods a-year; while Belgium, the first important home of the trade, employed only 95,000 and England 45,000; the remaining 155,000 were spread over Germany, Spain, Italy, and the rest of Europe. It was natural that France should be on the alert to put into operation any inventions that might by producing lace on machinery, so far lessen its cost, as to place it within reach of every class of society. Accordingly, the adaptation for this purpose of the stocking-frame in England, soon became known to French manufacturers of hosiery; amongst whom no modifications in that machine of any importance had occurred since its first introduction into Paris by John Hindret, in 1656.

Hearing of these lace making inventions, Louis XVI. when he sent the Duke de Liancourt to England in 1774, directed him to study the machine on which lace was made, and one Rhambolt was sent with him as a workman. The latter learnt at Nottingham to work Harvey and Else's 'pin' machine, and then took it to France. Tricot open-work silk net was made on it the same year by Bonnard at Lyons, and it was for a time the only machine used there for making lace. The Republican government are stated to have granted 110,000f. (£4,400) as a reward for its introduction. From France it was taken to Austria. The articles made from it are called "Tulle simple et double," and in both countries they are still made in large quantities.

From this time France became a close and powerful competitor with England in the manufacture of this and successively of all other kinds of machine-wrought lace. The produce from the 'pin' machine, by the French at the end of the last century, was greater than that of 'point net' (a similar article) by the English. There were 2,000 frames of the former class at Lyons and Nismes, and 1,200 only of the latter in England. In consequence of the better quality of the 'double

press' goods made in Nottingham, and the preference given to them in Paris over the Lyons 'single press,' the English article was prohibited entry into France. M. Aubry states—

“That the use of the English 'spoon tickler' apparatus was mainly instrumental in improving the silk net productions at Lyons; and that those who worked with it about the year 1800, often gained from 12s. to 20s. a-day, wages. The product had become so large in 1810, as to require a special representative for it in the 'Conseil des Prud' hommes' of that city.”

From the year when the 'pin' machine was introduced into France, the efforts of ingenious mechanics in that country were put forth to make advantageous alterations in it, and these were followed by much success. There is a mythical claim put forth, on behalf of an unknown workman of Nismes, to the invention of the warp machine. Warp net had been imported from England in 1775. The earliest notice of an improvement tending to making lace, was of one on the stocking-frame, for which Caillou, in 1778, received 1000 f. (£40) from the French Academy, and from government an honorary position in the frame-work-knitters guild at Paris. This was for making a web entirely of open work. No description, either of the machine or article, is given. In 1791, Jolivet and Cocher took out a patent for making improved silk net. Hayne, one of the proprietors of the English patent for making 'barley-corn' net, being at Paris in 1802, making arrangements for smuggling it into France, was detained when war broke out. Napoleon wished him to set up a machine, but he preferred his illicit business. In 1809, he was denounced by his own agent, and 1,500,000 f. (£60,000) worth of his goods are said to have been seized and burnt. Being completely ruined, he fled to England; but this event drew so much attention to mechanical lace manufacture, as to cause skill and capital to flow into it.

As regards the 'pin' and 'warp machines, various subsequent inventions, chiefly patented, must be briefly enumerated. In 1802, Jourdan and Son obtained a patent for further improvements in silk net. In 1806, Bonnard, who was an eminent manufacturer, made this article double knotted and of a fixed mesh. These

machines then employed 15,000 embroiderers, chiefly at Courdrieu (Rhone), and the goods were sold largely both in France and Spain.

In 1809, lace patents were taken out successively by Le Grand of Paris, Jarman of Lyons, and Devrieu and Pien of St. Etienne. One of these was for a crossed meshed net, 'tulle de glace.' In 1810, by De Passy, and Jolloet and Pochet of Lyons. In 1812, by Gillet and Jourdan of Brussels, and by Pinet of Lyons. In 1813, by Coutain of Lyons. In 1818 by Maynard of Nismes, for warp knotted silk net. In 1821, by Benoit Allais of Lyons, for warp fancies in symmetrical patterns; and other patents by Cochet of Lyons, and Galmo of Paris.

Warp machines were now largely employed at Lyons in making silk blondes and net for embroidered shawls, veils, mantillas, &c. It is stated, that the first applications of the organ barrel, the Vaucanson chains, and Jacquard cards, were now made to the Mechlin frame; and to the warp in 1824, by Colas and Delomprè, of Lyons, so as to produce silk lace patterns on it. In 1826, Gregoire and Hombard, of Nismes, patented the most perfect Jacquard application to make embroidered warp blonde nets, which were made up into shawls, veils, and scarfs of great beauty. All these were however looped fabrics, whether of point or warp net, and had neither the appearance nor durability of cushion lace. The frames on which they were made did not cost more than £10 to £20 each; whereas the bobbin twisting and traversing net machines, now brought into operation, cost £200 to £1000 each; and with their sounder productions looped nets could not for a time sustain competition. Like as knotted point laces gave place to warp fancy goods, so these gave way to the superior excellence of bobbin net.

Lace, the product of English machines, could not be smuggled into France under a premium of 30 to 35 per cent. This strict watchfulness of the French custom-house officers, caused every possible effort to be made to obtain and smuggle away from the other side of the Channel, one of these bobbin net machines. This was at length accomplished, at great risk of incurring the severe penalties inflicted by the English law then in existence against that proceeding, and which for twenty years after, the English trade sought at some expence

to put into active operation. When referring to this Act of Parliament, more than one French writer says its infraction rendered the infringer liable to be put to death. This was never the punishment in England for the export of machinery.

The following narration is drawn from the published statements of Messieurs Aubry and Ferguson, as well as from other authentic sources, and is intended to give an accurate idea of the steps by which the French bobbin net lace trade has so rapidly become one of the most important textile industries of that country.

Cutts, who had been a workman at Loughborough in the employment of Heathcoat, with the funds and other assistance of Hugo Young, got over to France an 'Old Loughborough' machine; and during the one hundred days in 1815, began to put it together at Valenciennes. Young, fearing the results of the political state of things in that part of the continent, went back to England. Cutts now met with Black and they went together to Valenciennes. But the siege of that city caused them to transport their machine to Douay, where it was finished and set to work at No. 22, Rue St. Albin. Cutts and Black there took into partnership M. Corbit, an aged currier of Cambray, and M. Thomassin, under the firm of Thomassin, Corbit, and Co. On the 14th of August, 1816, they deposited their claim to priority of importation at the Prefecture du Nord, and got a patent, November 15th, 1817. In 1816 they had caused a robe to be made on this machine, which was embroidered by Madame Ward, for the purpose of being presented to the Duchess d'Angoulême. Thus that princess wore the first machine-wrought bobbin net lace article made in France. Mr. Ferguson possesses a portion cut off from the same piece.

In 1818, Messieurs Corbit, Black, and Cutts were, after a judicial inquiry, declared to be the earliest makers of bobbin net in France.

The first machine set up at Calais was one 36 inches in width. It was constructed in England by James Clark, and partook of the pusher and traverse warp principles. It was smuggled in parts by French sailors into Calais at the latter end of 1816, and Clark got it to

work in the Faubourg St. Pierre, Rue de Commerce, Nos. 712 and 713, Bonser and McArthur, two Leicester twist hands, making net upon it. This frame led the way to a partnership between James Clark, Webster, and Bonnington. Mr. Bonnington was the father of the celebrated young painter, Parkes Bonnington, who studied that art in Paris, where his father went to dispose of the bobbin net which was made by the firm. Clark was described as being a clever mechanic, but this is doubtful: however, with the aid of West and Dobbs, father and son, several other machines for making net were put together at Calais. Their union did not last long. Clark set up another lace factory there. The following entry was made in the records of the chamber of commerce in that town:

“James Clark, Richard Polhill, Thomas Pain, Edward Pain, and Thomas Dawson, five Englishmen, appeared before us, the Mayor of Calais, to declare that from this day, 13th April, 1819, they form an establishment for manufacturing of nets, called warp and twist.”

Their first machine was a fifty-four inch eleven-point, and was secretly worked at the house of Polhill, in Rue de Clocher. The fabrication of bobbin net at Calais remained chiefly in the hands of Clark, Bonnington, and Webster until 1821; and of warp in those of the five partners above named. There were several ‘straight bolts’ got over to Calais between 1817 and 1824. In the latter year, M. Dubout Ainé (Dean of the Calais lace manufactures in 1862) joined Austin, who had several ‘point’ Mechlin machines. Then he bought a bobbin net machine of Mr. Cliff, sen., now of St. Quentin, and of whose establishment and career a separate notice will be given. This, when at work in the hands of a French house, alarmed Clark, Webster, and Bonnington, who offered him £80 for his purchase. This Dubout declined, saying, “he was young and wished to follow the course of this business, for it pleased him.” It is asserted that under his direction, the first really French bobbin net machine was built by a Calais workman, named Mechaut, who, in 1824, was a fellow workman with M. Lieven Delhaye, the mayor of Calais, in 1862. The intercourse which the author had with the latter gentleman, as jurors at the French Exhibition in 1855,

will ever be remembered by him with pleasure; and it causes him much regret, that in the instance of M. Delhayé, as well as of several others, both Frenchmen and Englishmen engaged for years in this arduous enterprise, it is not in his power to give particulars of the interesting incidents which must have occurred in the career of each. Clark went to reside at Lisle about 1822, and there joined M. Mechu.

Many English bobbin net workmen emigrated to Calais, Lisle, Cambrai, and other towns in France, so that St. Pierre, which in 1816 had but 4000 inhabitants, became in a few years a large suburb to Calais. Lace making was the only manufacture of the place. The machines already at work were transferred to St. Pierre from Calais; the noise made by their employment in the night having been complained of. At St. Pierre the hours of labour were unrestricted. The inhabitants numbered 11,000 in 1851. By this time the Calais authorities had found out their error, and the interference with night labour was discontinued. But it was too late; and the population of St. Pierre had increased to 14,779 in 1862. When it is considered that in 1810 Calais and St. Pierre had neither machines nor manufactures, the progress made by the energy and talent displayed there must excite the admiration of candid observers. St. Quentin, Douay, Rouen, Cambrai, and Caen have each taken part in the fabrication of bobbin net; but it is Calais only that can be said to have become the Nottingham of France.

In 1818, Mr. Heathcoat, the English patentee, established a factory in Rue de l'Oursine at Paris, which he filled with a large body of his machines constructed to make plain goods on the circular or 'old Loughborough' principle, though by simplified methods. These were continued in activity there until he removed them in 1827 to St. Quentin, where they were worked under the management of Messrs. Hallam and Cross. They are now unemployed.

In 1825 the French bobbin net manufacture may be said to have become established.

There had been only about thirty-five machines set up in Calais in 1823, and probably not more than one



hundred on the continent altogether; but extensive arrangements were being made for their increase in France. The influence of the expiration of the patent in England extended thither also, and symptoms of progress were seen on every hand.

M. Dognin, sen., a pupil of M. Bonard's, took the first bobbin net frame to Lyons. This machine had been thought by the French only suitable for making cotton nets, but Mr. Heathcoat had produced silk nets upon it to a considerable amount in the year 1824, and in 1825 his patent raw silk (reeled for him in the Cevennes) was used at the factory at Paris in making silk net. M. Dognin, in connection with M. Poidebard, that year began to make a net which he called 'Grenadine.' It was made on a circular machine—a heavy article in imitation of Spanish pillow ground; and the silk thread used was of highly twisted singles, doubled with a heavy twist the contrary way. These goods when embroidered had a great sale, and put aside point net ground for a long time. Dognin produced, in 1828, another article made from very light silk, and the net traversed only one mesh, which was called 'Mechlin,' 'zephyr,' 'tulle illusion,' and 'point chainette.' It was dressed with little stiffening for ladies' toilet use, and obtained an extensive sale. In 1824, Deurieu and Pien, of Lyons, patented an imitation of Dentelle ground. About the same time Messieurs Jenny and Sailby bought a circular machine at Nottingham, and it was got to work at St. Pierre by Mr. S. Ferguson, sen. A 'Levers' was put into operation there in that year also. Soon after, Bonsor, the former twist hand, began to construct warp and Levers' machines at Lisle, where his son employs them still in the manufacture of fancy lace goods of each kind.

The plain nets made on 'point' frames being less in demand from competition with warp and bobbin lace, the French invented articles which were called 'porcupine' scarfs. These were made on those frames by repeatedly placing adjoining threads upon the same needle, thus forming protuberances. With these they supplied the European and American markets so largely as to cause the English to imitate them. After some

time they went out of fashion; the last of the Nottingham point frames were transferred by Berthaud to Lyons, and the French remained masters in the fabrication of that description of lace.

The making of bobbins and carriages now became a special business at Calais in the hands of Cobb, Walker, Greasley, Britton, and West; S. Ferguson also entered into it, and after a time they were made at Lisle and Lyons. Widdowson having arrived at Douay with a traverse warp frame, was accompanied by Cantello, who also made bobbins and carriages. Widdowson forged the hammer with which he constructed his quilling machinery, and his grandson, Mr. William Bailey, has the frames now in operation. In 1825, Robinson and Morley patented an improved Levers' machine. In France, as in England, these modifications of machinery have usually been effected by mechanics each upon the separate class in which he has himself laboured; and in which, knowing their component parts perfectly, they could adjust suitable alterations of the wheels, bars, and other parts.

Wasse and Duprè took to Amiens, in 1827, six circular frames, to which six more were slowly added. These were at first employed in making plain net, then quillings and fancies, and now curtains. A patent was also granted to widow Choel, of Lyons, for an improved circular. M. Aubry calculated there were in 1830, 1000 bobbin net machines in France, producing from £400,000 to £600,000 worth of cotton net. Capitalists had for some years entered more and more extensively into the business.

Messrs. Kirk and Poole built a machine in 1821, the produce of which Kirk sold, much to his advantage, at a house he established in Paris. Though he suffered considerably by the revolution in 1830, he was enabled to buy two circular and two Levers' machines. He took out four patents for improvements in them, between 1836 and 1840. He was a mechanician of great skill; aided by Keenan and Louard, he constructed nearly the first French marine steam-engine. But the vessel in which it was placed was too heavy, and it proved a failure. Keenan brought out a modified warp frame in

1830. John Bailey took the method of working bars in lace machinery by Dawson's wheels to Douay this year. Levers' and circular machines were also set up by Guilmené, Mingot, and Meats.

In 1831-2 there were said to be 3000 frames in France, on which point net was made. Their speed, with the quality and finish of the article, issued in its increased export to England. The amount of silk net sent out of France in the seven years, 1825 to 1831, was only £36,000 worth, and of silk laces, £32,000. Mr. William Morley, of Derby, reported to a committee of the English trade sitting in 1833, that he had reason to suppose, from personal enquiries in France and Belgium, that there were then 1,650 bobbin net machines in France, and 200 more elsewhere on the continent, producing altogether (at English prices) to the value of £570,000 annually. In an address to the French Government presented this year, asking for a free admission of English yarns, the writer of it, who states himself to be an original French bobbin net manufacturer, says, that their 1,500 good machines had fallen from a value of £600 each to an average of £120, and others were worth no more than old iron. He estimated that the French consumed bobbin net to the amount of £1,000,000 annually, half of which was of English, and half of their own manufacture. In 1834, M. Abiet, delegate from the bobbin net trade at Douay, stated to the Council General of Commerce, that there were in that city 22 shops, 96 machines, and 800 workpeople at wages of 9s. a-week for the best hands, the women and children averaging 3s. weekly. Widdowson, the owner of 23 machines, stated his fixed capital to be £8,000, and his returns of £2000 every three months carried on the concern. He used the profits in building new machinery. The general evidence contained the following statistical summary:—There were 1,500 bobbin net machines in France, of which 900 were at Calais, 400 at Lisle, and 200 at St. Quentin, and elsewhere. The fixed capital was £300,000, reckoning each frame at £200, and floating capital was £300,000; this machinery giving employment to 500,000 (?) workpeople, including embroiderers. According to the evidence, the prime cost of bobbin net was 60 per cent. higher in France than in England at that time. In a report made by M. Argout, in 1835, it is stated that there were then 1,585 bobbin net frames in France, and 6,850 in Europe.

In 1835, M. Dognin, jun. brought out his 'tulle Brussels,' which became fashionable, and about this time, Wootton set up his plain net and tatting machinery, which is still at work. M. Jourdan produced at Cambray plain silk nets from wide machines, so regular in mesh and superior in finish, as to be exported largely to England and the United States. This eminent manufacturer afterwards took out patents in 1838, 1839, and 1849 for the application of Jacquard apparatus to circular machines.

On these he at first made fancy white silk laces, with a Brussels ground. The experiment was very costly; and in 1842, he changed to the production of black silk laces, the cloth work in which was made by the machine, the thick thread was put in by hand. These sold well. In 1834, Champollion and Pearson patented the spotting apparatus in France, and the articles made from its use had a great sale. This patent was the forerunner of the Jacquard application to Levers' frames in Calais, and to the other machinery at work elsewhere in France. Since that time, there have been more than forty patents taken out in France for inventions in these machines, native or imported, having for their object more perfect imitations of pillow lace.

On arriving at this point in his analysis of the course of the French bobbin net manufacture, M. Aubry remarks—

“That this application of the Jacquard gave new life to the production of silk nets. The merit of this M. Isaac, of Calais, claimed to share with M. Jourdan, the first French patentee. . . . Rotary circulars were now so increased in width, and variously modified as that warp nets could not compete with them. And as the frames were gradually put on fancies first by the use of wheels and then the Jacquard, they attained still greater superiority in the estimation of French lace manufacturers. . . . If England has the honour of the invention of the bobbin net frame, France justly claims the application to it of the Jacquard, which was indispensable to its continued existence, and is the basis of all novelty of production by it; and to the Jacquard is due the power of imitating real lace upon it. Together they constitute the most marvellous weaving instrument in existence.”

With all due respect to M. Aubry, and an earnest desire to avoid writing under the influence of national or individual prejudice throughout this volume, we are constrained in the interests of truth to withhold assent to this claim. The principle of selecting at pleasure individual instruments, lies at the bottom of the arrangement and use of the organ barrel, the notched, nobbed, and eccentric wheels, as well as of the endless chain of perforated Jacquard cards. The last is without doubt the most useful in its application. The dates in this chapter, given entirely on French authority, if compared with those in the account of patent bobbin net inventions

by Draper, in 1835, and the discussions upon them as related in the chapters on the English lace trade, will, it is apprehended, show sufficient grounds for dissenting from M. Aubry's positive view of the matter. The proceedings on the one side of the Channel, however, followed so closely upon those on the other, and the rivalry has been on the whole so amicably pursued, that we do not care to discuss the question further. Each body of manufacturers has derived and may still derive so much benefit from the skill of the other, that they may well agree to divide the merit of almost simultaneously applying the Jacquard and gradually perfecting it equally between them.

Mr. Ferguson, referring to the memorial presented by the English bobbin net and warp makers to the Board of Trade in 1836, expressing their desire for free intercourse between the two nations, especially in the articles they dealt in, and which has never yet been fully accomplished, says—

“That neither the moment nor the man was yet come thus to benefit France.” He further expresses the decided opinion, “that the principal reason which indisposed the French manufacturers to accede to such a withdrawal of protection, and entrance upon free competition, was the difference in cost, quality, and price of English plain nets, as contrasted with their own; and ascribes the adverse position of the French makers of nets to the fact, that the English keep their machines up to the highest point of excellence, throwing them when inferior to the scrap heap without hesitation, to be replaced by more perfect ones in system and construction.”

This is an accurate statement of the English practice, which has been however carried to excess. Had the latter depended less on width and speed in their machinery, and looked more decidedly to quality of materials and perfection of finish in their goods; the loss by their destruction of narrow frames still capable of making good net, and outlay upon new ones of extravagant widths and cost, might have been to a large extent avoided, or extended over a long course of years. Besides which, from 1826 to 1838, more bobbin net was produced in both France and England than the national demand required; wages fell with prices, and for some time English workmen returned from Calais, where still the hands were more than half English.

The number of machines in France making single press point silk net had increased, in 1840, to 3,500. The returns of goods made by them amounted to £400,000 a-year. The dress put upon this net at Lyons was so superior as to cause the export to England to be doubled. In 1850, France exported £288,750 worth of silk nets. In 1851, England exported £160,000 worth of silk nets. There were many machines also at work in Spain, and some in Italy, besides the large body in Austria. From 1842 to 1846 there were 1800 bobbin net machines at work in France. The straight bolts had been superseded by circulars; and though costing originally £600, were sold for £10 each as old iron. 908 machines were still employed at Calais. These consumed materials which cost £320,000, and paid wages and expenses £160,000, making a return of £480,000 a-year. Of the materials £120,000 was English cotton yarn.

The 'pusher' machines in England, by using extra bars, guides, and stumps to act independently, had been in 1831 put upon imitations of fancy blondes, and narrow tatting breadths. In 1842, A. Isaac of Calais and C. Dognin of Lyons, applied to this and the other systems of bobbin net, the 'brodeur Isaac' and patented it. Its manner of operating was soon after improved.

H. Black, who was an equally good mechanic and manufacturer, brought out in 1844, a very good imitation of Valenciennes and Chantilly black silk cushion laces, and patented the process. The machine was half circular, half pusher. The mesh was a good one, and the effect superior to that in any other lace at that time; but the fining betrayed its mechanical origin. The produce of Black's machines was sold by M. Monard at Paris, and bore his name. Besides the above-named patent, and one for the Grecian net in 1830, Black took out others for improved processes by lace machinery in 1834, 1837, and 1847.

While, as might be expected from the difficulty of the subject, some of Mr. Ferguson's historical facts may be open to question, the author cordially agrees with the just and sympathising spirit which dictated the following (abbreviated) paragraph in his recent work:—

“By their importation of the bobbin net machine, Messrs. Black and Cutts endowed several localities with an industry, until then not known in France, and gave them fortune. We may add that one of these men who thus brought the country prosperity, is at this moment vegetating in it in the most precarious position. The son of Mr. Black came, in 1815, with his father, energetically assisted, and succeeded him in constructing these machines in several of our

cities. But a reverse of fortune has not left him with a single machine whereby to provide for his necessities. How many other pioneers of labour have been repaid by poverty for their services, and fallen into ruin by creating industries which have given riches to their more happy successors? Could there not be apportioned out of a patent fund modest pensions to these men, who have opened up the way along the field of industrial discoveries? It is objected they seek for profit, 'if successful, *they* gain it, not society; is it the duty of society to meet the results of their ill success?' We reply, 'soldiers and civil servants of the state receive the recompence of bread in old age.' We claim the like reward for these soldiers of commerce and founders of industrial wealth."

This will be an appropriate opportunity to mention the services to both the English and French bobbin net trade, rendered by Mr. S. Ferguson, sen., then residing at Sneinton, near Nottingham. He began his useful career by arranging the circular machine, so as to produce bullet-hole and Grecian nets, in 1823. This was effected by cutting notches in the back driving bar, so as to retain carriages stationary when needful. This plan was extensively used here. He afterwards produced both square net and wire ground. One of his workmen took the bullet-hole plan to Calais.

Mr. S. Ferguson, jun., his son—in his "*Histoire du Tulle et des Dentelles Mecaniques en Angleterre et en France*," from which valuable information in this account of the French manufacture has been derived—with excusable filial regard, "claims for his father the honour of having most contributed of any one, towards bringing the circular system of machines to perfection." Without attempting to decide that point, it is certain, that by his mechanical efforts the usefulness and value of that class of machines were considerably enhanced. In 1838, at the time of the American commercial crisis, he went to France, "to be certain of enjoying the fruits of his invention, which he had found impossible at Nottingham." After other adaptations, he invented a plan for using Jacquard cards, so as to produce on this machine an imitation of black Chantilly lace, scarcely to be known from its original, the Cambray pillow lace. For this he took out a French patent. He was now fixed at Cambray, in partnership with Jourdan and Co., already makers of silk net there.

In 1852, Mr. Ferguson made lama lace, of which

the bobbin yarn is made of mohair. Like the Cambray, this mohair has had many imitators at Lyons and elsewhere. Leaving in his plan the special system of the circular machine untouched, he acted on the bobbin threads by Jacquard cards, employing two extraordinary guides only. He was afterwards established at Amiens.

Mr. William Cliff, now of St. Quentin, was originally a workman in the lace trade at Nottingham. Messrs. Paget and Wallis, of Loughborough, having bought some lace machinery at the former place of a Mr. Ward, employed Cliff to set it up, and afterwards to work it. In 1818 or 1819, a straight bolt was bought at Nottingham by Bonington, Clark, and Webster, and taken to Calais; but the net made on it being inferior, could not be sold, and it ceased to be worked. In 1821, Webster had become its sole proprietor, and looking out for some one to put it into a profitable working state, Cliff was engaged; who, settling his affairs amicably with Paget and Wallis, removed with his wife and family to Calais. Having set smiths to work and taken other proper steps, in three months the straight bolt produced more in a day than it had done in a week, whereby this mechanician got such reputation at Calais, that he was soon offered orders for new machines. He began business as a machine builder in 1822, taking premises and setting up a forge. There he constructed amongst others, one machine for Dubout and Austin, two for Hopkins, of Lisle, and one for Storer. He then built a hand circular on a plan of his own, and sold it to Hopkins for double the price of the straight bolts, and he forthwith filled a shop with these circulars, straight bolts having fallen into disrepute. In 1825, the lease of his Calais premises being out, Mr. Cliff removed his business to St. Quentin, where he continued to build circular bobbin net frames, for which he obtained large prices. Some of these were worked at St. Quentin, others at Lyons, Courdray, and three at Vienna in Austria, where a respectable establishment was set up, and still continues in operation. The profits obtained from the circulars which Cliff had constructed for his own use, became unsatisfactory; and he therefore, as the French lace business generally



and that of St. Quentin in particular was become very important, decided to erect works for bleaching and dressing, not only his own goods, but those of others also. Both these processes had hitherto been carried on in a most defective way.

The town of St. Quentin was famed for the production of cotton articles called 'pignes' (quiltings), these with goods from Calais, Douay, Lisle, &c., he bleached and finished to such an extent, as in 1837, to require him to erect larger premises, in which steam-engine, pure water from an Artesian well, and attention to the minutiae of details, enabled him to carry on the business to satisfaction. In 1847 his factory was burnt down, by which a loss of a-year's time was incurred, to be followed in 1848, by a change of dynasty in the government of France. These events, important in themselves, were not without use. As a practical man, Mr. Cliff took advantage of the opportunity thus afforded for replacing the old circular machinery with a body of thirty Levers' frames of greater width, and with the latest improvements, including the application of Jacquard apparatus to them all. Mr. Cliff's sons had now been added to the management, the firm becoming Cliff, Sons, Biddle, and Birkin—the two latter joining them with machinery from Nottingham. Since that time they have manufactured, under the management of Mr. Edwin Cliff, silk net, silk guipures, cotton guipures, blondes, Cluny, and other fashionable laces. This house obtained first-class medals at the Exhibition in 1851 and 1862. In 1865, the firm became Cliff Brothers, and Son. This important business, employing 300 men on the premises, is become of the first magnitude in France for the production of lace, and challenges comparison with any other home-made or foreign goods, in quality, finish, and price. Mr. William Cliff devotes his scientific attainments, which are considerable, especially in chemistry, to the bleaching and finishing of goods. The house took out, in 1861, an English patent, No. 2892, for improvements in the manufacture of lace.

In 1848, Dognin and Jourdan made an imitation of woollen lace on the bobbin net machine, like those

made at Puy on the pillow. In 1849, Kirk bought from Keenan two more circulars for plain net, besides two Levers' making fancies without, and two with Jacquards. He transferred through his son, two Levers and one warp machine to Barcelona at once; but the Spanish tariff on this kind of lace being lowered, the operation was only partially successful. Kirk, sen., continues his business at Caen. Levers' machines, to which the new brodeur apparatus of Isaac was applied, were now worked at Calais, producing imitations of blonde and Valenciennes.

In 1850, it was estimated that there were 300 to 400 warp machines at Lyons, together with 150 to 200 rotary circulars, and 12 to 15 Lever and circular Jacquard making bobbin net. The spoon tickler was disused in making point net. In 1851 there were at Calais 14 warp, 3 pusher, 124 circulars making plain goods, 141 circular and 321 Levers' Jacquarded for fancies; in all 603 machines. "The fancies produced there," M. Aubry in his report says, "were now preferred to those made at Nottingham, not only at Paris but also in London. Nevertheless many of the patterns made at Calais were still imitations of the English. Calais exported £70,000 worth of these goods in 1851. Though the number of frames was reduced one-third, their speed and the quantity and value of their production was increased considerably. Some of these Levers' with Jacquards cost each £1000."

Under the name of 'Dentelle de France,' M. Dognin had exhibited an article in 1844, and gained a silver medal for it. Similar goods were sold in Paris by M. Malaprè in 1851, under the name of 'Dentelle de Paris,' since 'de Creteil,' made by M. Gallope. They are of very fine silk.

The French estimate of the actual position of their machine-wrought lace manufacture as well as its relative progress in competition with that of England, will be best gathered from the report of M. Aubry on the Exhibition of 1851. The following are notes taken from it:—

"Forty years ago there was only one centre of this trade, Nottingham; now there are two, Calais having taken its position. The Jacquard system now operates alike on the greater part of the machinery employed in both places. All difficulties have disappeared, though formerly thought insurmountable, in the way of producing imitations of real lace. Whether from circulars, pushers, or Levers, admirably correct copies of pillow Chantilly goods are obtained. Cambrai produces laces, shawls, berthas, scarfs, &c. Successful imitations of Caen blondes are made on French machinery. Every change of

fashion and taste may be met now by mechanical arrangements. It is true that there are 1000 machines (of which they say 300 are Heathcoat's) making silk blondes in England; selling the produce at lower prices than the French; and their plain cotton nets which were at one time 40f. the square yard, are in 1851 3d." (4d. was their lowest figure.) "And their larger articles" (shawls &c.) "lower than the French in price; yet except those shewn by Vickers and one or two others, they are inferior in design. Their curtains require French taste ere the articles will replace the excellent embroidery of Tarrare and St. Gall, as they are probably destined to do. England is distinguished by the production of enormous masses of common goods; in these she need not fear any competition with the 3000 machines in Nottingham and its neighbourhood. Calais from its 700 machines exhibits products artistic, varied, and rich in design and fineness of tissue. Instead of servilely copying step by step the products of Nottingham as formerly, Calais is now developing its own ideas, which are more and more reproduced by English machinery. This is becoming a French industry, destined to take the first rank, if not in amount, in variety of design and facility of adaptation."

The report of the International Exhibition of 1855, says—

"That there were at St. Pierre les Calais, 610 frames of different systems, and 40 more building, employing 5000 men and women, and furnishing labour to 50,000 more. To these were to be added some hundred more machines at St. Quentin, Caudry, Lisle, Indry Cambray, and Paris, of the value of £200,000, returning yearly £800,000; to which adding embroidering and finishing, the entire returns would be at least a million sterling."

In this document the following paragraph occurs:—

"Machine wrought lace exactly fulfils every condition often repeated by H. I. Highness Prince Napoleon as to claims for prizes. The prices of the articles are such as to render them accessible to all classes. They are in perfect taste, and the improvements in their manufacture are such in some kinds as Mechlin, Chantilly, silk blondes and above all Valenciennes, that it is with difficulty even when examined closely, they can be distinguished from the same classes made by hand. And there is this happy circumstance, that far from damaging the business of making cushion lace, the progressive development of machine wrought lace, appears rather to have excited in regard to the former, which is essentially a luxury, a double activity beyond that of any former epoch; so that hand wrought lace was never before so much sought for by the richer classes, and the returns in it being never so great as they are to day. In the bobbin net business, incessant efforts are put forth and immense sacrifices are made, in the constant improvement and renewal of its machinery. By these means, without injury to the interests of the hand-wrought lace business, its machinery places the luxury of lace of great beauty and at low price, at the command of all the world."

Although the price of machine lace is not more than one-eighth of that of cushion lace, there never need be any fear of the lessened use of cushion lace, however close the imitations by machinery may become.

The touch and finish of lace made by hand must excel them. The rich are seeking therefore more eagerly than ever the exquisite work of Brussels or Alençon. M. Auguste Lefebvre, manufacturer of pillow lace at Bayeaux and Caen, reported in 1860, "that since the exhibitions at London and Paris, the demand for real lace had increased 30 to 40 per cent."

The French were found in 1855 to have doubled their bobbin net production since 1835. Jourdan had begun to make lama lace. In 1856, Dognin had removed his machines to Lyons. Maillet and Oldknow, Bonsor, Keenan, and others were making curtains on Livesey's system. That plan improved is now being used extensively. R. and T. Birkin having taken out an English patent, No. 945, January, 1857, for making embroidered breadths straight across the Levers' machine, on taking steps to patent it in France, discovered that Topham, of Calais, had obtained, September 23rd, 1856, a patent for the same process. More than half the French lace patents are found to be taken out by Lyons people.

Mr. Ferguson, jun. states as follows:

"French bobbin net frames in 1831 were 1000 producing an annual return of £400,000; in 1833, 1200 producing £440,000; 1835, 1585 producing £400,000; 1836, 1600 producing £400,000; 1844, 1800 producing £400,000; 1851, 1200 producing £440,000; and 1856, 1400 producing £800,000."

His remarks upon these figures, explanatory of the different results of the trade in regard to the greater or less amount of the machinery, are valuable. The concluding observations are also deserving of the serious consideration of the English makers of bobbin net at the present moment.

For we are arrived at the close of a year, which, after nearly fifty years connection with the trade, the author does not hesitate to characterize, as one of the most portentous of evil that the English bobbin net business has ever passed through. Without accepting the defects in English management of the lace business stated or implied by this writer, in all the extent to which they might be adversely pressed, yet it would be unwise not to ascertain and grapple with any real evils in order to effect a remedy. The explanatory statement runs thus—

“The comparison of machines and production shews some discrepancies arising from various causes. At first all the machines were narrow, complicated, and slow. They became doubled in width and much quicker, especially when put on to steam power. A difference in quantity sold has sometimes altered the quantities made. The annual value has been greatly augmented by the amount of fancy production. These discrepancies are seen most remarkably in the English trade; where in 1844, there were 512 machines less than in 1836, and those remaining gave £400,000 more returns than in 1835. In 1856 there were 1342 more machines than in 1835 and the returns were doubled. In 1851 the number of machines was more than in 1844, and the production the same. A commercial crisis had surcharged the warehouses with lace merchandise.”

The contrast between the condition of the business in France in 1851, when the machinery had been lowered since 1844 from 1800 to 1200, and the returns were £40,000 increased, and that of England, where there were 400 more machines and the returns were the same, though not noticed by Mr. Ferguson, is a very remarkable one. Then follows the depreciatory paragraph to which special reference has been made by us:

“In England they work for quantity and to keep down price. They do not keep up quality nor cultivate taste. Cheapness is a fatal rock; and cheating one another of designs and lowering their quality will ruin any manufacture. Job lots and immense discounts destroy confidence, not in specific articles only but in a trade. Immense production for stock induces crises in the trade, and great vacillations in prices.”

A further observation made by this writer we quote, because it concerns an important part of the operations of the lace trade, that of the preparation of patterns, and for the purpose of expressing entire dissent from it:

“We do not agree with those who think English designs are equal to those of France. If an English maker has not a French designer, then he purchases patterns in Paris or Calais. If he have one who remains without refreshing his ideas at the fountain of taste, he loses his first merit in a few years.”

The English lace manufacture owes much, but not everything, in regard to design, to Belgium and France. These countries have had three centuries of experience. In much less than one, the progress made in England towards excellence in original designs for every class of machine-wrought lace, has been such, as to render her as independent of foreign supplies of taste as her French neighbours themselves.

Notwithstanding the tone of confident superiority present and prospective in everything but quantity expressed hitherto in the extracts given from French authorities, a manifest difference in this respect occurred in the statements made on the occasion of the Treaty discussed in 1860, which was strongly, yet as it would now seem needlessly deprecated. The following statistical details, drawn from the report of evidence then given, will be read with some allowance on that account:

There were stated to be between 1600 and 2000 bobbin net frames in France, of which 650 were at Calais and 400 in the Cambresis. The number had been lessened, but the Calais ones were wider than formerly, and consequently made an increased quantity. Early in 1860, the price of a 20-qr. was £20 a-quarter or £400; later in the year, from the expectations raised by the treaty, the price became £24 or £480 the machine. The frame-work or carcasses of the Calais machines were now made there, but still many of the insides were obtained from Nottingham. Occasionally the entire machine, if on an improved plan, was got from thence as a model by which to construct others. They were worked entirely by men, who earned from 14s. to 16s. a-week, by two shifts of six hours each daily, women winders gained 7s. 3d. to 9s. 6d. and children 2s. 4d. to 6s. 4d. weekly. Each machine gave employment to 12 persons in all. The Levers' circulars and pushers were moved by mechanical powers.

A machine making 8 motion net would produce 150 racks a-week. Mr. Bailey informed the commission that the 900 machines at work in the departments du Nord and de l'Aisne produced £370,000 value of goods in the year or about £400 each, of which £212,000 were materials and £158,000 wages and profits. His machines had been put on half work for some time. The average of the weekly production per machine in France was stated to be from 150 to 175 racks a-week, while in England some classes of machines were producing twice that quantity. In 1860, there were no longer any plain nets being made at Calais, these machines (circulars) having been transferred to Lyons and were employed in making silk net. M. Dognin said that he had still in a factory at Calais, but about to be removed, 5 frames making chiefly spotted mohair (goat's hair) net; 9, on with silk spots; 8, mohair laces; 20, silk laces. And at Lyons 7 circulars and 6 pusher mohair or silk laces; and 30 warp machines making silk or spun silk laces. The machines were worth £80 to £480 each. Those of the latter value are equal to any. The wages paid are 3s. 6d. to 4s. a-day to men working in 4 to 6 hour shifts twice daily. Including embroiderers, these 85 machines give employment to 3000 people. The cost of materials in plain or spotted goods is two-thirds the value, in laces from one-fourth to one-third only. He exported nine-tenths of his production to European States and America. M. Dognin said he was "careless as to competition with England, Belgium, Germany, or any where else. They had not been imitated because by the excellence of their patterns, they were beforehand with imitators. They had given up taking out patents, because these only afforded knowledge of

what they were doing and led to infringements." After referring to the introduction by his father of the first bobbin net machines into Lyons, (by which workmen gained £12 to £16 a-week (?) of three or four days labour) and by making Grenadine silk net upon them, founding the bobbin net manufacture at Lyons; he went on to state, "that by the 'tulle illusion' which his father had devised (crea) made the fortunes of plain silk manufacturers at Lyons, and was copied by the English at a much later period." M. Dognin was pressed to say how many plain net machines were then at work at Lyons, and whether they could compete with the English; he did not give a direct answer to this question. "He did not know the entire number of machines, but was able so to work his as to meet the English with success."

The chamber of commerce at Lyons stated there were 400 plain net frames producing £280,000 a-year, of which one-thirteenth part only was exported. They found it necessary to fetch both machines and persons to set them up from England; and that in order to compete, this machinery must be put on to work by steam power. They had 30 machines making imitations of Chantilly and Cambray pillow laces, producing £80,000 a-year returns. There were also 250 warp frames making fancies 'dentelle de Lyon' or 'damassees' returning about £160,000 a-year. M. Baboin of Lyons, a maker of plain silk bobbin net, stated the actual number of machines was 382 in that city, of which 300 were owned by 170 masters of workshops and 82 by manufacturers, but not worked conjointly with the former in workshops. He described the bulk of the 382 as old and so defective as not to be in condition to be worked by rotary power. Wide nets, quillings, and Mechlin nets, were made from these frames; the demand for these articles being suddenly much increased. He complained that the workmen could not set anything right which might be wrong, and stated the production working as they did 24 hours a-day was 220 instead of 350 racks a-week as in England, the machines being narrower also. M. Dolfus-Moussy, manufacturer of fancy silk net at Lyons, stated that 350 warp frames were then making fancy goods in that city. These machines were newly made there and constructed on the best principles. They cost £60 to £120 each. They are entirely employed on silk articles for exportation. The workmen labour ten to eleven hours a-day; and earn now 3s. 2d. to 3s. 6d. a-day wages, the rate having fallen within the past year 25 to 30 per cent. The bobbin net hands were gaining 2s. 6d. to 4s. a-day. Ferguson states that in 1862 there were 500 warp circular and other Jacquard lace frames at Lyons.

The Treaty, modifying commercial relations between England and France, still gives a protective duty to the makers of French lace, of from 15 to 20 per cent. In 1861-2, sixty superior wide Levers' machines were exported to France. Having cost from £400 to £800, they were sold at an average of £300 each. The production from them copes with that of England in their markets, and in London also.

Embroidery on white lace net gives a considerable amount of employment in France to needle and crochet workers, "au passe" or "au plume." Thus in Paris rich robes and elegant shawls and scarfs are produced. Furniture embroidery is done largely at Tarrare in window curtains, &c. At Luneville bobbin net is embroidered in every class of articles chiefly by the needle. Fine satin stitch formerly carried on at Nancy, is now prosecuted in the Departments of Le Meurthe, La Moselle, La Meuse, and Les Vosges. In the latter, the taste and intelligence of the workpeople are combined with chasteness and elegance of design. French embroiderers excel in open works to give variety and effect. The business was until recently rapidly increasing in France, and being domestic employment added to house duties, has introduced much comfort and ease into the circumstances of the majority of those engaged in it. There is usually either a pattern figure worked into the article or piece to be embroidered, or one stamped in outline all over it for the embroidress to follow. This she does either by the tambour hook, or running thick thread by the needle around and through the figure for the outlines and filling it up with fine thread cloth work. In doing this, the piece being stretched on a frame, she sits besides it, placing her left hand under the web at the spot where with her right hand she passes her needle around or across the interstices. The posture is sitting and leaning sideways, and therefore not a natural one. If it were continued through long hours daily, and that for years, as was often the case formerly, it is very unfavourable to health. The witnesses examined by the French Commission in 1860, stated the embroidery work done in France amounted to £64,000 a-year; in Switzerland, £48,000 a-year; and in the Vosges to £160,000 a-year. It was piece work, at which the earnings were about a franc ( $9\frac{1}{2}d.$ ) a-day.

No great impulse had been given to the spinning of fine numbers of cotton yarn in France, until they had been to some extent substituted for linen thread in the finer fabrics of Cambray and Tarrare. A still further demand for them resulted from their having been suc-



cessfully used when doubled, in 1805, by the cushion lace makers of Buckinghamshire; on learning which, the pillow lace makers of France and Belgium slowly overcame the great prejudice with which the change was met, and at length began to consume them extensively. But to spin them of the requisite fineness, and by careful doubling to secure the requisite clearness and strength, was a very difficult task performed in England, and not without great labour and skill, in which process the French followed at considerable intervals of time.

According to the best information upon the subject, the dates and numbers at which the spinning of fine numbers was accomplished there, were as follows: In 1819, No. 40; 1823, No. 60; 1828, No. 90; 1832, No. 110; 1836, No. 170; 1840, No. 210; and 1850, No. 250. While English fine yarns were entirely prohibited entry into France, they were smuggled in at an expense of 4 per cent., the French spinners putting their own marks upon them, and sending them out openly to their customers. English numbers above 170 were permitted entry in 1834, at a duty of 35 per cent., upon which change the spinners in France rapidly pushed on their improvements. In 1842, at Calais 77,151 killos. of yarn were used, of which 29,048 killos. were French spun, and 47,503 were English. The balance was so far turned, that in 1858, 116,130 killos. were used, of which 97,783 killos. were French and only 18,347 killos. were English. In the Report on Treaty, 1860, it is stated that Calais lace makers then consumed 150,000 killos. of yarn yearly; of which 60,000 killos. were spun at Lisle, under No. 170 and upwards; 60,000 killos. under No. 170 smuggled, and 30,000 killos. of No. 170 and upwards were imported from England. M. Loyer, a manufacturer of Lisle, stated that there were the following spindles for spinning fine yarns:

In 1849 at Lisle	313,551,	and in 1859	695,430
“ at Roubaix	128,000,	“	217,640
“ at Tourcoing	60,186,	“	157,634
“ at Douay (since gone)	50,400,	“	none
	<hr/>		<hr/>
	Total 552,137	Total	1,070,704
	add spindles in course of preparation		200,000
			<hr/>
			1,270,704

The 1,070,704 are said to represent a capital of £2,000,000.

The finishing of lace goods adds 20 to 25 per cent. to the cost in the rough state. The report also adds, that France exported at that time 20 per cent. of her bobbin net production.

In 1817 the first eight bobbin net machines set up in Belgium, were introduced by Verbeck Moese, at Termonde. In 1828, there were twenty at Ghent, but they could not compete with the English. In 1834, Mr. F. Washer caused eight to be constructed, and they

have been worked at Brussels until now, making almost entirely three twist net of very fine numbers of cotton yarn, and on which hand-made Brussels sprigs were applied by the needle. In this special article he has succeeded in excelling the English make. He exhibited in London, 1851, this net made from Nos. 400 to 530 yarn. This firm has now sixteen machines. At Malines there are eight. At St. Josse-ten-Voode four, making the same ground. It is not produced in France. One Read took the first twenty bobbin net frames into Switzerland, the heavy standard parts of which were made at Calais by Holmes—Hilton, of Nottingham, supplying the insides. There were eighty of these machines in the Swiss cantons in 1856. In Spain it is said there were 500 'pin' machines at work in 1831, and eighty bobbin net machines in 1856. In Austria there were sixty in 1814, and it was said 500 in 1856. At that time in Prussia and Russia, thirty. Russian black silk Jacquard laces were much admired. In Saxony, fifty or seventy bobbin net machines were at work.

In order to bring this chapter to a close, there only remains the necessary duty of describing, so far as the intricacy and novelty of some of them will allow, various improvements effected of late years in France upon lace machinery, all of them well deserving the notice of the trade at large. They furnish unmistakable proofs, were that necessary, that mechanical genius and its unwearied development, are by no means confined to the English. These inventions are the more remarkable, as having for their object to produce the very highest qualities and kinds of lace by mechanical means.

Messrs. Maillot and Oldknow are established at Lisle, and also at Nottingham, as fancy lace manufacturers. They were amongst the first to introduce the manufacture of lace looped curtains into France, upon Livesey's system.

James Oldknow had the distinguished merit of devising and carrying into successful operation the plan now universally adopted, of substituting for the guide bars, in use until 1849, steel perforated bars. Having patented this invention in France, it was in 1849 patented in England, and under that protection 1171 licenses were granted by Mr. Edward P. Cox, (the representative of the patentees for that purpose here), to English machine owners for the use of these improved instruments. But when the idea was first introduced to the notice of a large meeting of the Nottingham fancy machine owners, convened for that

purpose, it was very generally thought to be impracticable. Mr. Oldknow having taken the precaution of bringing with him workmen from France, who had practical knowledge with himself of its feasibility, they shut themselves up in a room with darkened windows and locked doors, and put the steel drilled bars into a Levers' machine which was ready there for the purpose. When seen really at work, it was with some difficulty those present could understand, how the bars were so accurately drilled as to work exactly with the corresponding parts of a Levers' machine, wherein the bars must act with entire exactitude in the minute space allotted to them. They had to be so drilled, as to operate with the combs, each to the exact guage. It was necessary therefore to place the holes not absolutely equidistant, but with allowed shades of increased space, according as the holes were more or less distant from the sides of the machine. The heat generated by the operation of drilling and consequent expansion of the metal, had to be got rid of by cooling the bars repeatedly during the process. The only drawback to their use is said to be that they are liable to be affected by expansion and contraction through changes of weather. It is believed that in the whole, nearly 3000 machines have been or are working with this useful invention, resulting in an entire modification of the use of Levers' machinery, lowering its relative cost as compared with its increased range and rapidity of production. The Levers' fancy goods produced by this house in silk laces, Greek insertions, trimmings, and ornaments, are very varied and of first quality. Plate XVI., Nos. 22 and 23.

The following singular origin of the machine about to be described, has been related to us: M. Planchè had a son-in-law, a civil engineer in France, who, accidentally looking at pillow lace makers at work, was interested in their operations, and thought, after reflecting upon what he had seen, that the like result might be obtained by machinery. Without suggestions from any one, he constructed a machine which he put into operation, and obtained a French patent for it. One Laforte with another workman, having been engaged in

its construction at their overtime, made a similar one for themselves, for which they have taken out a patent in England. It is stated, that a reclamation for infringement of rights, has been successfully prosecuted before a French court, by the original inventor. A factory has been erected at Roubaix, in which M. Planchè is now working these machines.

In 1861, the produce of the first of them was sold in London for some time as *real* lace. F. Mennon took out an English patent, No. 2267, for an invention by J. F. Regis Laforte, of Paris, and previously patented in France: "It is for an improved combination of machinery adapted to produce netted fabrics identical in texture and appearance with hand-made Valenciennes, Chantilly, Brussels, and other ornamented hand-made laces. Most of the elements of this combination are borrowed from machines known in textile manufactures, especially from looms used for the production of *tulles* and imitation laces."

"The essential objects to be obtained in the mechanical production of real lace, are: 1st, the means of rendering each thread independently capable of passing from right to left, of changing with one of its neighbours, or of remaining stationary if required, so as to form the twists of which the fabric is composed. 2nd, the means of causing one or several threads to cross a given number of others for the production of certain ornamental effects, in passing alternately above and below each corresponding thread by a single motion either right or left."

These operations are so effectually arranged and provided for by this machine, as fully to justify the report upon it, made by the commissioners in the International Exhibition of 1862, where it was shewn—

"As a machine the most remarkable of its kind, producing an article that the most expert judges cannot distinguish from that made by hand. Having seen it at work in Paris we can attest the fact, that in point of difficulty of execution it presents one of the greatest conquests of machinery, and proves incontestably the possibility of substituting automatic for every kind of hand labour."

M. Aubry had said, in 1851, when pointing out the surprising results then achieved in lace machinery—

“Who knows if some day the lace machine may not become the true cushion lace maker, and its bobbins the real spools worked by mechanical hands and fingers.”

If this idea, which was the view entertained by Heathcoat in regard to his *first* patented machine in 1808, be not realized absolutely by the machine now under notice, it needs but little to fully accomplish it. Iron instruments are not human sinews and nerves and joints; nor are machines endowed with the wondrous adaptations and powers of animated beings; yet, to describe the various parts, adjustments, and operations of a machine, even remotely imitating a clever lace maker's manipulation of her threads, as she curiously and almost imperceptibly forms them into those floral and arabesque forms we so much admire, would be quite impossible. Especially is it so in respect to this machine, for it would be absolutely a specification of parts and combination of the most intricate kind without the plates and letters of reference. For a full account, comprehensible by the mechanic and him who would study it for practical purposes, the actual patent specification is commended. A few of the most salient points must here suffice to explain special peculiarities in it.

All the threads are wound upon bobbins, and these are placed in carriages having close resemblance to those in common use. All these carriages and threads are operated upon from the back of the machine by a Jacquard apparatus, selecting carriages either in the back or front comb bars. There are guide bars leading to three comb bars. The latter will do all, as it should seem, that Masson's *later* machine does with five or seven. The middle comb bar may be described as the home of the carriages, and does not move. The back and front comb bars move or shog laterally, and the carriages pass to and fro twisting the threads around each other, or remain at rest, as may be necessary for the pattern. The great peculiarity of the machine is as follows: The bobbins are much coarser than the actual gauge of the work when it comes to the work roller. It may be that they vary as 3 to 1. But the proportion may be varied at the pleasure of the constructor of the machine. The work is made in a radiated form and at such a distance as to allow its contraction by concentration of the points themselves, as they approach the breadths of work already made. The lower back and front comb bars are of the actual gauge of the machine. They enter the threads at the top of the carriages, and by their concentrated or fan shape, they bring the threads into the contracted space of the intended quality of the work. When brought

into this space, the upper sets of points come into operation, taking the twist and crossing from the lower point bars, and convey them to the work bar. Plate XVIII., Nos. 32, 33, 34, 35.

Each breadth of lace as it is made is not attached to those breadths made on each side of it, but is an independent finished article as if made on the pillow. The breadths go on to the work beam side by side, but at a distance equal to the diminution of the space occupied by the threads at the outer circumference of the fan-shaped arrangement of the lower points. Thus the actual gauge may be as 3 to 1 of the space occupied by the work produced.

The space thus apparently sacrificed in the non-occupation of (say) two-thirds of the width of a machine, is compensated, so far as it goes, by enabling the carriages to be larger in that proportion, and thus to receive bobbins holding so much more thread.

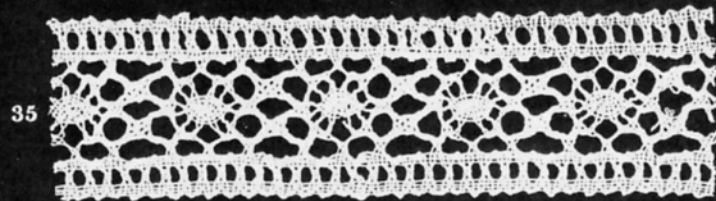
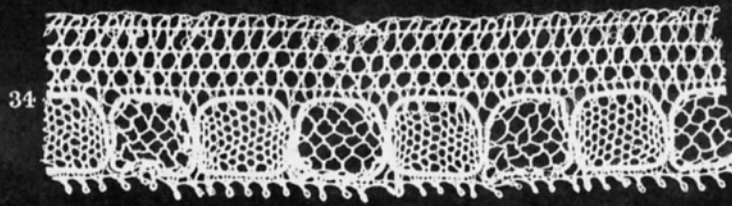
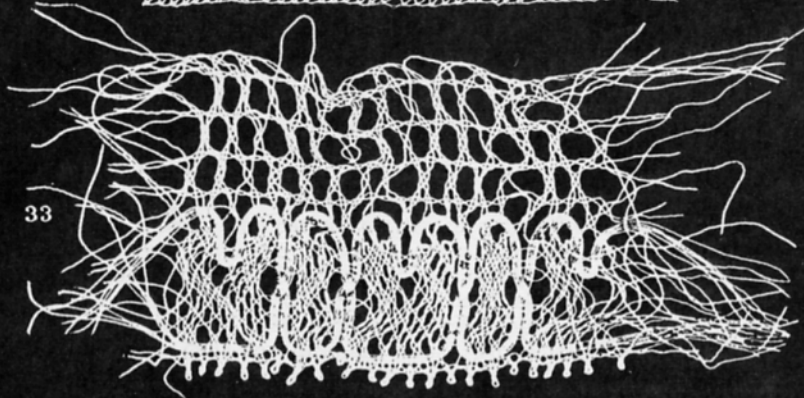
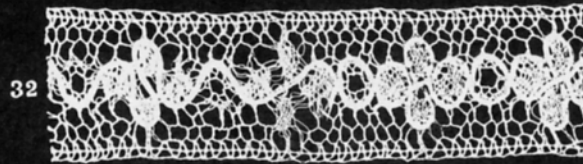
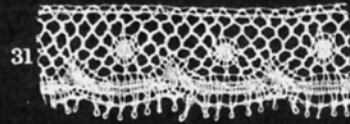
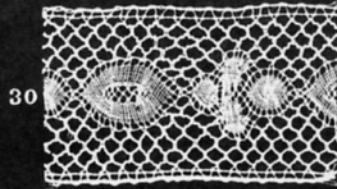
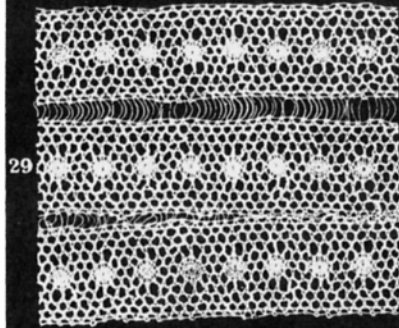
This machine works more safely than that of Barton's, in proportion as it is far less delicate in the instruments used; though the principle is nearly allied: of course it is of a better and swifter construction on that account.

One of the latest inventions approaching to a mechanical performance of the operations which take place in making lace upon the pillow, is that devised by Alfred Masson, at St. Pierre les Calais, and patented here by Mr. Newton in connection with Mr. Shepherd of London. The specification is not yet published. The following particulars may suffice to give an idea, though an imperfect one, of its principal features:

There is no separation of warp threads; all are wound upon peculiarly constructed spools; long, tapering, thin, and, when covered with yarn, resemble a flattened cop. From these the threads are each passed once round a bobbin, and from that carried through an opening at the top of the case to the operations of twisting, &c. This case is eight inches in height, and is an elongated or steeple-topped carriage, inclosing next above the parts necessary for driving and passing through the comb bars the spool with its thread; and above the spool the bobbin is placed with its spring, to regulate, so far as it can, the quantity of thread given off.

The bobbin case has a V groove on one side to fit on V projection on the inside of the carriage frame. The opposite side of the case is bevelled off and held in its place by a spring catch.

The bobbins and carriages work to and fro in combs fixed in



leads attached to the bars. The carriages are moved to and fro by reciprocating catch bars, acting by notches on their under sides by means of springs. The sides of notches in the carriages are at an angle of  $45^\circ$  to the bottom edge of carriages, so that if carriages are held back by any means, the spring catches of the bars will yield, and be withdrawn from the notches without moving the carriages. These are held back by tumbling levers working on centre pins, and are kept to the under side of the carriages by springs. The ends of these bars have projecting catches, which fit into rectangular notches made on the under side of the carriages; when thus placed they prevent the carriages being moved by the bars when the latter advance; but if the tumbling levers are pulled down so as to release the carriages, the latter may be drawn back in the combs by the reciprocating bars.

By attaching the strings of an ordinary Jacquard apparatus to the tumbling levers, the particular levers to be withdrawn for the release of the carriages required to form the pattern may be selected and moved to and fro in the combs, and manoeuvred by the catch bars as required for that purpose.

This Jacquard is best placed beneath the working part of the machine. The combs may be divided into five or more sets, according to the kind of article required to be made. Seven sets are shewn in the drawings, four fixed and three moveable; they are mounted on separate bars; the three are capable of lateral movement in either direction, for the distance of one carriage. Any number of comb bars may be used, provided they are alternately placed. If, therefore, selected carriages be drawn by reciprocating catch bars into the combs, they may either be moved laterally in one or the other direction, or left stationary, as the pattern may require their forming any knot or tie or variety of pattern. The catch bars working the carriages are fixed in leads secured to longitudinal bars on each side of the machine. Other bars are secured to the lower ends of curved vibrating levers actuated by pendant rods jointed at their upper ends to bars, and at their lower ends to vibrating bars. These latter rock in their bearings, and are connected at their lower ends by a rod to a crank, or eccentric on the main driving shaft of the machine. These movements of rods and levers impart a simultaneous curvilinear and vibrating motion to the longitudinal bars and catch bars, consequently the carriages and threads may be moved to and fro as required. There are also two rocking bars, each having a series of teeth on which the work is formed. These are lifted and moved forwards as the operations of the machine proceed. These point bars rock on centres secured to the sliding rods, vibrating in unison with the levers; the latter bearing on the edges of a rotating cam shaft, and are actuated by it. A compound movement vibrating to and fro, added to a lifting one, is thus imparted to the point bars. To insure a proper to and fro motion, the levers are forked at their upper ends, and each part of the fork carries a bowl which works against cams within the fork. The shogging motions in opposite directions of the moveable comb-bars are effected by means of a vibrating cam-plate forming part of the vibrating lever, whose elevated and depressed parts actuate the movements each way of these comb bars.



Without pretending to offer any specific and practical opinion as to the successful employment of this ingenious machine, the question presents itself, whether it can be safely driven at such speed as may make it profitable; considering the extraordinary height of the carriage and case, its inevitable vibration with the weight of case and bobbin, and unsteady or irregular giving off of thread from a flattened instrument, which can hardly be prevented by the bobbin spring from affecting the size or shape of the mesh, especially if driven at speed. The height and other peculiar arrangements of this part of the machine, are the result of desire to get as much available yarn as possible, seeing that the supply must all come from the bobbins.

It is designed to produce from this machine shawls or other articles eighty inches in width, not to be distinguished from those made by hand either as to the ground, cloth work, or ornamentation. The selection of individual threads is completely secured by perfect control in their active or quiescent state. The result is an accurate imitation of hand-wrought lace.

A machine for producing simultaneously a back and front fabric for mittens, gloves, &c. from lace and net frames, was devised and patented in England, by J. and J. A. Keenan, of Paris, in 1865, No. 1129.

One half the warp threads, and one half the bobbin threads work in each fabric. Thus, if the machine works a single tier of bobbins every alternate bobbin, (say) the even numbers work to produce the front fabric, and the odd numbers produce the back fabric. The two fabrics are united together at intervals to form tubes by warp threads working into both the fabrics. Thus tubes of desired diameters may be formed of the upper part of the mitten or glove, and these tubes are connected together into a sheet from side to side of the machine. If mittens or gloves are to be produced, it is necessary, after making a sufficient length, to divide at the upper part this tube into smaller ones for thumb and fingers by other warp threads working with both fabrics. The widths may be contracted by greater tension on warp threads, or diminishing the number of meshes. The finishing off of the ends of fingers is given by the hand by knotting or ornamentation. Greater strength may be given to the article by using additional warp threads.

At the moment this sheet is going to press we hear of a patent, just taken out for France and England, for

a machine combining in a very ingenious, and it is believed effective manner, the powers and instruments, including the shuttle, of the weaver's loom, with those of the Levers' lace machine. We have not as yet seen and therefore cannot describe the process or its products. The patentees are Messieurs Rebiere, Pouilly, and Destonbe, of St. Pierre les Calais.

## CHAPTER XXVII.

THE MACHINE HOSIERY MANUFACTURE. 1810 to 1835.

DURING the latter half of the eighteenth century, the productions of the stocking-frame in hosiery had increased in variety, until about the year 1800, when they seem to have attained their highest point, and from that date, by the changes of fashion added to some other causes, fancy hosiery began to decline, and continued to do so for the next forty years. In 1750, hose embroidered by the insertion of threads forming a pattern by hand, while the stocking was in process of manufacture, had ceased to be made. The art of chevening, *i.e.* embroidering by needle hose and gloves already made, had been long practised in France and Spain, and silk goods thus ornamented were brought to England in considerable quantities from about 1700. It was only in 1783 that Mrs. Elizabeth Drake began to cheven hosiery at Nottingham. Plain stockings and those with open work insteps were ornamented with varied and appropriate patterns; on cotton hose glazed linen thread was used; silk goods were embroidered with white silk or dyed in varied colours. Embroidery afforded employment to many workpeople in the English trade for the next fifty years, and then almost ceased. It still prevails extensively abroad. About the year 1780 turned shapes in silk hose went out of use. In 1785, silk velvet pieces and silk brocade pieces figured by employing a boy to draw back the needles, and silk twilled hose, ceased to be made. These extinctions were followed by those of plain and tucked fancy silk vest and silk shag webs in 1790; silk and cotton twilled and brocade vest pieces in 1795. About 1800, there were still seventeen or eighteen different kinds of hose worn as to fashion,

colour, &c. Then the following kinds began to decline and to fall into disuse, viz. silk and cotton non-elastic plated twilled, and silk and cotton plated plain hose; silk narrowed clocks embroidered hose; and warp-vandyked hose in making which 500 frames had been formerly employed. By 1810 silk tickler mitts and silk elastic mitts and gloves, which had required 600 or 700 frames, had gone out of use; as also cotton spider net for ladies' habit shirts, which had employed about 1500 frames, 400 of them working in Nottingham.

These important changes threw a large number of machines back upon the plain hose branch, into which also a great influx of new frames took place. These were the property chiefly of persons not in the trade, who invested spare capital in them, generally in small amounts, and clubs were formed whereby the workmen's savings could be thus invested—all for the sake of obtaining the large rent that was charged so long as work could be found on which to employ them. The trade in all the three branches of woollen, silk, and cotton, soon began to shew signs of distress. The ordinary demand for goods suitable for the country trade fell off, and then the London trade declined, so that by 1810 the situation of things had become gloomy indeed in the midland district. Manufacturers restricted their own frames and stopped those belonging to other people. The workmen, whose condition was now a very trying one, cast about to ascertain the causes of and remedies for such a serious reverse in their employment. They found that a vast increase had taken place in the number of apprentices taught by the masters in the more prosperous times, when hands were wanted to work the greatly enlarged body of machinery. For instance, a father and son in Nottingham had twenty-four; at Hinckley two frame-work-knitters had one hundred between them. In their distress the workmen turned their attention to the powers entrusted to the chartered London company, and sought their intervention for relief. The legally appointed deputies of that corporation were all dead in 1804: others were now appointed, two for Nottingham, and one each for Mansfield, Sutton, and Leake, two for Leicester, and one each for Lough-

borough and Hinckley. Many workmen were made free by paying £1. 13s. 4d. each, "there being more spirit then amongst the men than since." On their petitioning Parliament for an act to regulate the trade, Alderman Sawbridge recommended them to apply to the company, saying that "if the company were unsuccessful, a Bill should be brought in to protect them, notwithstanding the hosiers' combined opposition." So an action was brought against Mr. Payne, of Burbage, Leicestershire, and tried before Lord Mansfield, for 'colting,' *i. e.* taking apprentices contrary to the company's bye-laws under the charter. Payne, encouraged by the combined hosiers, defended it. The Chief Justice expressed strong opinions against the company's supposed rights, and regretted the claim. The jury however found for the plaintiff, giving one shilling damages. The charter was so far sustained; and Payne, having expended £300, which was all he possessed, was lodged in Leicester gaol, a ruined man. The surplus of labourers complained of was absorbed in some degree by the large demand made by the army during the war, but the relief was trifling, and the excess continued to be an incubus on the trade for many disastrous years afterwards. The men also complained that the long established custom of payment by agreed lists was now laid aside.

In 1802, Dawson's wheels having been invented and employed at Leicester, about 1807 braces and cravats were made by their use in warp frames. The wages gained by making them was one-third higher than by making hose. The demand for these goods went on increasing, so that in 1844 wages still were 20 per cent. above the average; many fancy articles continue to be made of this class, and the trade in them seems likely to be a permanent one. In 1808 German worsted pieces began to be made at Leicester, giving 50 per cent. higher wages than hose. And in 1809, two and one raised cords came into great demand at Leicester, also affording to skilled workmen 50 per cent. higher wages than ordinary goods. In 1810 the hosiery sock trade was begun at Leicester, using woollen and cotton

yarn in the manufacture of these useful articles of constant and increasing consumption. The rate of wages has always been about 10 per cent. above that for hose, as they require a somewhat higher class of workpeople. From these sources some aid was afforded under the general depression.

Several Leicestershire makers of hosiery having shops of frames, removed them to Nottingham, and entered into the finer cotton branch. Two of these, being brothers, established a business long known for excellence of quality produced under the superintendance of one, while the other performed the part of salesman. The latter made his journeys on foot to the London market, and might be seen in town with his samples strapped under his belt and cloak, visiting his customers. This hosier, the last example of the old school, died in 1808, leaving £20,000 to a relative, his successor in the business.

A census of hosiery and lace machinery in 1812, is given by Blackner in his *History*. Some of the numbers are evidently approximative only. At that time there were said to be—

Stocking-frames in Nottingham	.	.	2600
"    "    in 74 places in Nottinghamshire	.	.	6685
"    "    in Leicester	.	.	1650
"    "    in 100 places in Leicestershire	.	.	9583
"    "    in Derby	.	.	400
"    "    in 83 places in Derbyshire	.	.	4300
"    "    in 16 " Gloucestershire	.	.	970
"    "    in 3 " Devonshire	.	.	38
"    "    in 7 " Wilts., Surrey, Berks.	.	.	130
"    "    in 7 " London, Essex, Kent	.	.	137
"    "    in 12 " Oxford, Northampton	.	.	214
"    "    in 2 " Norfolk	.	.	22
"    "    in 21 " Yorkshire	.	.	172
"    "    in 7 " Lancashire	.	.	75
"    "    in 6 " Worcestershire	.	.	43
"    "    in 4 " Cheshire, Wales	.	.	17
"    "    in 7 " Staffordshire, Shropshire	.	.	46
"    "    in 8 " Cumberland, Northumberland	.	.	50
"    "    in 7 " Lincoln	.	.	27
"    "    in 5 " Warwick	.	.	50
"    "    in 38 " Scotland	.	.	1449
"    "    in 35 " Ireland	.	.	974
Total in the three kingdoms			29582

				<i>Brought forward</i>	29582
Stocking-frames at 24 towns in France					6859
" "	4	"	Netherlands		520
" "	11	"	Spain and Portugal		1955
" "	10	"	Italy		985
" "	6	"	Germany		2340
" "		"	St. Petersburg		206
" "		"	Stockholm		30
" "		"	Copenhagen		34
" "	5	"	Armenia		260
					<u>13189</u>
			Total number of stocking-frames		<u>42771</u>

The frames in England were employed, in regard to production at that time, about as follows:

Plain cotton hose					7589
" gauze					350
" pieces					250
" gloves					350
" drawers and shirts					530
" sandals and socks					550
" angola and merino					350
Plain worsted hose					5650
" gauze					250
Ribbed worsted hose					2750
Plain lambs' wool hose					900
Plain worsted pieces					1500
" caps					120
" petticoats, shirts, &c.					300
" fleecy "					110
Ribbed worsted pieces					600
Ribbed thread hose					350
" cotton hose					750
Plain " caps					200
Plain silk hose					1400
" gloves					320
" purses					20
Ribbed silk hose					56
British ribbed pieces					1800
Silk spider hose					70
Cotton "					340
Silk knotted hose					260
Silk elastic hose					30
Jack warp pieces					30
Double lap pieces					320
Warp-sash and brace					60
					<u>28155</u>
Square lace net					3
Warp "					240
Point single net					840
Point double net					200
Twist bobbin net					140
					<u>1423</u>
			Total number		<u>29578</u>

A patriarchal frame-work-knitter, James Hutchinson, died in 1813, at the age of ninety-three years; having laboured in the same frame seventy-six years. He was employed by the long-established house of Rawson and Co. fifty-six years. His habits were peculiar; for fourteen years he drank no ale, and never tasted tea; but lived for thirty years on coagulated sour milk, and during the same length of time might be seen working at the same window of the house in Narrow Marsh, where at length he died. He never travelled beyond seven miles from Nottingham.

The rate of wages, which had been raised 2s. per dozen by the Luddite commotions and excesses in the trade during the previous twelve months, relapsed in 1812; and produced an application to Parliament to prevent cut-ups being made; or single yarns, whether cotton or worsted, used; or wages to be paid in goods; and to enforce paying by statement lists for the fashioned work, giving fourteen days' notice of any proposed reduction. A bill embodying such clauses passed the Commons, but the appeal was unsuccessful in the Lords, several leading peers opposing it as tending to disunion in the trade. In 1814 the workmen in all the branches entered into a union. The masters offered 2s. per dozen advance, and it was given for a time. But the Leicester hands were not hearty in the affair, being met by a combination of masters. Moreover the workmen's deputies discontinued their meetings, being threatened with prosecution under the combination laws. Six hundred Arnold hands contributed nothing to the expences, for many of their families were already reduced to beggary. Three hundred and fifty silk hands at Derby turned out for 8s. a dozen advance, but without obtaining any permanent increase.

Public attention was drawn at this period, as in some subsequent occasions, to the reductions in the selling price of goods made in each branch of the trade by manufacturers who purchased goods the produce of materials fraudulently kept back by workmen from their employers, and bought by them at low rates, whereby they were enabled to undersell the honest makers. The evil is one very difficult to cure, because this is



chiefly a domestic business, in which there is a peculiar practice carried on of using soap and other things in the preparation of the materials for work, which may add weight to them that cannot be ascertained. The yarns thus surreptitiously obtained are bought by dealers who dispose of them to the agents of those manufacturers who thus encourage the practice, while they risk their own respectability by the use of these materials. There were more than an hundred and twenty such 'Turkey' merchants, dealers in stolen yarns, in Leicestershire, Derbyshire, and Nottinghamshire; the bagmen, who were numerous in the villages, too often furnishing facilities for these transactions.

The articles of warp plain and ribbed Berlin cotton pieces had been used in very large quantities for pantaloons since 1800. Wages for making them, gave the workmen 25 to 30 per cent. advantage over plain work. But as the fashion changed, they were gradually depreciated in quality, and by 1816 had almost ceased to be used. The price of making fell from 2*s.* 6*d.* to 8*d.* a-yard, and about 1500 machines were put on worsted pieces. The addition of so large a body of machinery to that already employed during the war in supplying the army and navy with worsted webbing, now that the demand was reduced, at once greatly over-loaded the business. Soon the common ribbed trowser pieces, and then the double German ribbed demand failed. This was endeavoured to be met by a reduction in materials and quality, together with lower prices of workmanship. The latter fell from 2*s.* 7*d.* in 1809, to 4*d.* per yard in 1819, by which time this fabrication had nearly ceased.

A small quantity only of 1 and 1, 2 and 1, 3 and 2, as well as broad and royal ribbed cotton continued to be made in 1815. A Guernsey worsted frock for sailors' use, sent as a sample to Coleman and Co. of Leicester, though a difficult article to produce on a machine, was successfully attempted by them, and became a settled article in the trade, by making which about 15 per cent. better than ordinary wages were obtained. The general woollen shirt manufacture has been superadded, assuming at times great importance

and prosperity; but at other times prices and workmanship have fallen very low, as in 1844-5; since then, however, it has become larger than ever. In 1817, the knotted hose trade was taken to Leicester, employing many frames at one-third more than common wages. A change in fashion in 1825, brought earnings in them down from 16s. to 6s. a dozen. At this time wages had fallen in Nottinghamshire, both for hose and gloves made of sound fashioned work, below the rate of 1812. This induced a turn-out, to which the gentry subscribed, and a large fund was administered in Nottingham to the most needy. The rate of wages was raised to the statement of 1812. At this time the prices of cut-up hose in sale were less than the wages alone, small as they were, of fashioned work.

The year 1819 was a very memorable year in the history of the frame-work-knitters in Nottinghamshire, for the extraordinary severity of the sufferings of the workmen and their families. In their extremity they frequently paraded the town, women and children heading processions, one of which consisted of more than five thousand people. They said that by sixteen to eighteen hours labour they could only gain 4s. to 7s. a-week; and that for the previous eighteen months they had not been free from the pangs of hunger. These statements created great compassion in the public mind; while the proceeding of the workmen to load carts with frames, and draw them by their own hands from all parts of the county into Nottingham, and deposit them at the warehouse doors of the hosiers, alarmed the authorities. In consequence, six companies of foot and two troops of yeomanry, with ammunition and stores, were brought into the town, and occupied Bromley house. Out of a fund of £3000, three thousand families of stocking-makers were relieved; and by a further sum of £4000 subscribed for the purpose, three hundred families were enabled to emigrate to the Cape of Good Hope. Employment was given, in levelling ground, to those who were willing to do that kind of work.

From the year 1815 wages continued to fall in the hosiery trade of Leicestershire also, till in 1819 the stocking-makers were not receiving enough to sustain

nature, and it was impossible to look upon such a mass of wretchedness without deep commiseration for the sufferers, and a desire to help them if possible. The competition for employment was excessive, and the rate of wages in consequence greatly reduced. The first attempt at relief was to fix a 'statement' list of prices to be paid for work. The agreement to this was far from unanimous on the part of the masters, and the buyers had little confidence that it would be adhered to. Then a turn-out was threatened, to avoid which, the idea of an union of the whole body of workmen throughout the country, for the purpose of affording relief to the unemployed out of their own contributions, with such aid as the public might afford, was largely countenanced by many not engaged in the trade, and by some of the masters, though opposed strongly by others. William Cobbett employed his powerful mind and pen in opposition to the scheme; which gave occasion to the Rev. Robert Hall's celebrated "Reply to Cobbett"—greatly admired for its eloquence and pathos.

"He defended such an union as a means for obtaining a just and natural remuneration for industry; the workman thus obtaining the necessaries of life for himself and his family by foresight and self-denial. He would no longer lie entirely at the mercy of his employer; yet it was not to be confounded with a combination to raise wages arbitrarily: but was a provision for securing practically the terms mutually agreed upon between masters and men. The depression of wages and profits would thus be shared in fair proportion between the two classes."

This distress of the frame-work-knitters, in 1819, was further eloquently referred to by the Rev. Robert Hall, when writing in aid of the fund raising to mitigate it, in the county of Leicester.

"Were the state of suffering, with which we have long been familiar, removed from immediate observation, we could scarcely hear of it without agitation; how much more afflicting to be placed in the midst of it, to feel it pressing on our senses in all directions, without the power of contributing any thing to its mitigation and relief beyond a barren and impotent commiseration! Is there no hazard of contracting a fatal induration by a daily familiarity with indigence which we cannot alleviate, with scenes of woe we can neither remove nor diminish? To go into the house of mourning

is good, since it is adapted to impress salutary lessons; but to dwell in a situation where every house becomes such, is a state to which nothing but utter insensibility can be reconciled."

The proposed union was constituted, and its funds were managed by trustees and a committee of gentlemen who took an interest in the movement. The male stocking-makers in work were asked to pay 6*d.* weekly, or 3*d.* if women and youths. The former when unemployed to receive 6*s.*, the latter 3*s.* a-week. £1,800 was received before anything was paid out. There were about 3000 frames in Leicester, and about 10,000 more in the county. The committee reported at the end of a year, that £6000 had been paid to the framework-knitters out of work, of which the hands had themselves contributed £4,400, and that wages had risen 4*s.* a-week for the men, and employment was increasing throughout the country. The effect upon the poor-rates was remarkable. The officers of the principal parish in Leicester stated, "the scheme to be of most decided and unprecedented advantage to all parties." The poor-assessment of the town, which in 1819 was £23,599, fell in 1823 to £11,050, but rose afterwards in 1829, the plan being no longer in operation to £19,512, and was in 1842, the year when Mr. Cort drew up the statement from which these figures are taken, £22,824. In Sileby, the rates in 1819 were £2,205; in 1824, £650; in 1829, £1,092. In the year 1842 the frames in Leicester had become 4000. The distress amongst the stocking-makers of the whole midland district had again become intolerable.

To return to 1821, £6,182 was paid out in relief to the unemployed from the fund in the first three months of that year to 2,172 hands, of whom 1,559 were men, and 613 women and boys. This rapid absorption of the fund, indicating the severity of the crisis, was met by an extraordinary measure. £1,550 was borrowed on notes of hand, to be repaid out of the weekly contributions. Some revival in demand, partly arising from increased confidence of buyers that wages would be kept up to 'statement' prices, gradually set the machinery to work, and permanently relieved the fund. The £1,550 was liquidated out of the workmen's con-

tributions. The fund had amounted to £16,182. Of this the public subscribed £3000, the parishes £2,500, the remainder was contributed by the men themselves.

Some of the Leicester hosiers had joined with the great body of the workmen, in stating to a select committee of the House of Commons, that cut-up work was usurping the place of properly fashioned hose, and that being greatly inferior in real value and use, its effects were injurious to the character of English hosiery, and productive of distress and pauperism to the many hands not employed, whose spirit of independence was destroyed. The committee reported in favour of an experimental bill, prohibiting cut-up work for three years. Such a bill passed the Commons, but was thrown out by the Lords on going into committee after the second reading. A general turn-out was partially commenced, when the principal hosiers of the three counties met at Nottingham, and resolved—

“That they deplored the distresses and privations of their workmen arising from want of demand pressing on their wages so that they cannot by incessant labour obtain the necessaries of life, thus forcing them to the degradation of parish relief. That prices of goods and of labour depend on demand. That the market being overstocked, advanced prices and wages cannot be obtained, to their great loss; and that the workmen themselves lower their price of their own labour. But the hosiers present, resolve that if stocking-makers do not manufacture for themselves and sell their goods so as to lower prices; or parishes turn hosiers, doing the same; or other undersellers pay by truck or otherwise irregularly affect prices, they will adhere to the raised statements then agreed upon.”

The statement for Nottingham was issued August 23rd, that for Leicester, September 13th, 1819. Upon raising the fund in Leicestershire designed to help in this emergency, it was ascertained that the number out of employment, included one-third of all the frame-work-knitters in that county.

About this time London became more decidedly the chief depôt for the sale of English hosiery, the capital necessary for holding large stocks in these frequently recurring bad times, being more readily furnished there by wholesale houses, trading more or less independently of the country manufacturers. Nevertheless, as capital accumulated amongst the latter, in a few

years they became merchants also, supplying the home and foreign markets on their own account.

About 1820, several articles in hosiery went out of use. Amongst them plain and knotted silk breeches-pieces, in making which 220 frames had been employed. Also shamoy shaped hand and tickler made cotton hose. This article was still being made in France thirty years afterwards. Next year it was ascertained that there were 1,928 frames at Sutton-in-Ashfield. Each wide one employed two or more narrow ones in finishing straight down hose. 400 machines making twilled, were turned upon spider work. Worsted imperial hose made on Berlin piece frames, now went out of use almost entirely, and wages fell from 8s. to 3s. per dozen.

A general meeting was held, in 1821, at Alfreton. The distress was again great, and a public subscription for the unemployed was made, upon which a more general strike than any before or since took place; scarcely a dozen of hose was made in the three counties for two months. It resulted in a return to the statement of 1819, for both worsted and cotton goods. The accumulated stocks were cleared off, and a large demand arose for coarse goods. Upon this, at a meeting held at Loughborough, a general further advance was proposed of 2s. per dozen; but the decision being postponed, at another meeting held at Nottingham, in 1822, it was resolved to strike, two Leicester deputies only objecting. It was partially carried into effect, and for a time the prices advanced somewhat, but in the main, 1819 rates only were obtained.

The 5th George IV. chap. 96, known as the arbitration act, was passed to enable disputes to be more equitably and summarily settled between masters and workmen than heretofore. By it, tickets of prices mutually agreed upon were made legally binding. It has however been of little use, the men declining to avail themselves of it. There was only one case in the hosiery trade within three years, and the act became obsolete.

Prices had gone down again for stocking-weaving so much, in 1824, that after unsatisfactory discussion with the hosiers, who offered 2s. per dozen advance, a great

turn-out took place. This lasted thirteen to eighteen weeks, and caused much suffering. There were great differences of opinion amongst the men, as to the policy of this strike, some of them declaring the majority to be blind to the teachings of experience as to their real interests. The prices given by hosiers were very irregular.

No effort was made to keep up the contributions of the workpeople to the funds of their union in 1824-5, so that although in 1825 new statements of advanced wages were put forth, both in Leicester and Nottingham, they were only paid for a few months. The masters had entered into a combination to resist further demands, when the panic of 1826 came and gave an accelerated force to the declension of prices which had already set in. The following articles had now almost disappeared from the market, viz. tuck ribbed silk stockings, formerly made upon 300 to 400 frames; shamoy shaped embroidered silk hose; silk square net mitts knotted and tuck pressed, made in Nottingham and London from about 150 frames, the men working in them earning £2 to £3 weekly; and plain and fancy tucked silk purses. In 1825 the frame-knit trade appeared in Leicester. Though at first the wages were in favour of the workmen, they were brought down by 1837 to the ordinary level.

The fall in wages throughout 1827 produced such loud complaints, as to induce the masters to agree to an advanced list. Some of them soon began to give reduced rates, which resulted in strikes at various places. But the sufferings from the strike of 1824, caused such a dread of their repetition, that the movement was a very partial one. A new statement of prices was agreed upon in 1830 at Leicester for making woollen goods. The same year cotton Berlin web for gloves, &c. was introduced there, for working which at first the wages were two or threefold those paid for ordinary goods. Warp lace looms were altered to make it. The wages fell from 1s. a-yard to 6d. in 1845, when half the looms were idle. The average value in Derbyshire for silk frames was, in 1832, £12, and of cotton frames £7 to £8 in Nottinghamshire. The hands in 1833 again

urged complaints upon the House of Commons, in a petition from Basford. The pressure was so severe on the trade as to threaten serious consequences. Their state, and the views they thought necessary for their relief, were clearly and forcibly stated.

“They describe themselves as a large body of industrious and peaceable men, and ask to be protected from starvation in their poor, but to them endeared homes, and from death in workhouses, amidst insult and reproach. They pray for the enactment of a minimum of wages, the abolition of wide frames, and cut-up work, also for an allotment of crown or waste lands to which they might transfer their families, and the repeal of taxes on the necessaries of life.” They stated further by their delegates that there were 4000 wide frames making two to four hose at once shaped by scissors, and producing six-fold the quantity of those made by the fashioning frames. These were called ‘lamb tails.’ And they asked for marks on hose, shewing their size and quality. It was further alleged by them that a United States Boston firm was buying English frames to supply *sound* work. A Leicester petition of the same date states wages to have fallen to one-half the rate of 1814. This it ascribes to the cut-up goods; and says that labour ought to be protected in the spirit of the charter of Charles II. A Leicester deputy proposed “that the trade should be put under the factory act, so that apprentices might get less work and more food, and that goods not fashioned on the frame should be by law sold under the title of ‘leg-bags.’”

“The standard size of women’s hose is twenty-five inches in length; in 1833 they were often made from two to four inches longer, and of stout yarn, so as to fit men,—other sizes made in proportion.” A writer, conversant with the trade, wrote to a local newspaper of that day, making the broad assertion—

“That there is no four-legged animal which could exist a twelvemonth if worked as closely the long hours and fed as poorly as the frame-work-knitter. It would quickly kill off a whole race of horses to keep and work them thus. Yet these people are growing grey under an infliction which only because they are men, and possessing the faculties of reason and hope, they are enabled to endure.”

The only part of the trade that obtained an increase was the Hinckley coarse cotton branch. A higher statement was agreed upon this year for their goods only. The three counties union was revived—

“With the view of raising labour to a fair price by peaceable and legal means and when raised to preserve it at that rate, each frame-work-knitter to pay 1*d.* a fortnight or 2*s.* a-year.”



As prices for workmanship were as low at this period as at any time between 1812 and 1866, the following table will assist in understanding what the proportions were:—

Taking 'womens dump bound in' hose in several qualities as the standard; the wages per dozen were, in—

	24 gauge.			30 gauge.			36 gauge.			40 gauge.			46 gauge.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
1814:—	0	10	0	0	18	0	1	5	0	1	11	6	2	2	6
1833:—	0	7	0	0	10	6	0	13	9	0	18	0	1	4	0
1842:—	0	7	6	0	10	6	0	14	6	0	19	0	1	5	6

In 1833, there were only twelve frames at work in London, and these were for theatrical uses. Half the frames at Godalming were stopped, as were those at Cork and Belfast, and thirty only left in Dublin.—The fact was well-known to the workpeople, that the writer of these pages had been collecting statistics, shewing the extent of the trade and its prospects, and the numbers and earnings of those employed in it. Their leaders were afraid that their cause might suffer with Government and Parliament by their union, and even that it would be put down. They ascertained that the statistics of both trades, hosiery and lace, were intended for the use of the Board of Trade. A deputation in consequence placed many statements in his hands, which were communicated as desired to Government. The following portions are not without interest, even now:

“From that time the oath on admission was given up, though the form of initiation was still very solemn and affecting. They have no bond but the law of the land, and the moral law of the Bible. They meet at public-houses because most convenient. They expect every man to hold persons and property sacred, and do not use fear as a means of coercion to work or not to work for any master or on any terms. They wish their members to live a conscientious and sober life, and to get instruction for themselves and their families, and to do their neighbours good. They think God made man to inherit the earth. Persons having property and capital should use them for the benefit of their fellow citizens as well as themselves. A workman's property is his labour. They desired such wages only as were consistent with fair profits to their employers. But they ought to lay by funds sufficient to prevent needless reductions in wages, and other safe and proper purposes. They were good subjects; and hoped by reforming themselves, their trades and wages, to make this England a paradise in regard to the state and morals

of the labouring class, and by rendering bad government and general misery impossible. They stated Lord Melbourne would not interfere, and Lord Althorp advised them to shorten their hours of labour and production."

The following is a condensed account of the statistics of the English machine-wrought hosiery trade in 1833:

	costs of materials. £	wages and profits. £	total returns. £
10300 frames making fashioned cotton goods, used . . . . .	73000	252000	325000
6000 cut-up cotton . . . . .	172000	383000	555000
9500 fashioned worsted . . . . .	284000	256000	540000
1000 cut-up worsted . . . . .	40000	40000	80000
1300 angola . . . . .	45000	59000	104000
1900 lambs' wool . . . . .	80000	66000	146000
3000 silk . . . . .	120000	121000	241000
<hr/>	<hr/>	<hr/>	<hr/>
33000 frames <i>at work</i> 1833.	£814,000	£1,177,000	£1,991,000

This annual return was composed of cotton hosiery, £880,000, in which wages were 4s. to 7s.; and cut-ups, 10s. to 24s.; worsted, &c., £870,000, wages 3s. to 6s.; silk, £241,000, wages 6s. to 12s. a-week. Hands employed 73,000; capital employed, £1,050,000.

At this period about one-fourth of the full wrought work and three-fourths of the cut-up production passed through the hands of bag hosiers to those of the wholesale manufacturing hosiers.

By purchases of raw materials and providing money for workmanship, parishes had occasionally endeavoured to mitigate the sufferings of the people and eventually to lighten their own rates. In a few cases it answered by their holding until good times carried off the stock at fair prices. In general however they grew frightened, and sold at a loss—the usual result of interference with the regular course of trade.

This report closes with describing the stocking-makers as steeped in poverty; ill fed, ill clothed, ill lodged; as physically deteriorated, mentally depressed, and often morally debased. They were easily distinguished by their care worn anxious faces from other handicrafts men.

Mr. Biggs furnished a valuable report to the Board of Trade the same year, upon the Leicester hosiery business.

He stated there were 14,000 frames employed, of which 11,500 were narrow, the earnings on which, at 7s. a-week, were £201,250; 2,000 wide at 12s., £60,000; 500 looms at £1, £25,000; giving further indirect earnings to 10,667 at 2s. 6d., £66,670 and 2000 at 3s., £15,000 which together with 1,333 employed in finishing at 10s., £33,325; amounted to £401,245 paid in wages to 14,000 hands; added to which materials &c., £600,000 made up a return of £1,001,245, of which £159,400 was exported.

The union committee, seeing no signs of legislation on their behalf, or of further inquiry by government into their state, became impatient, and announced an intended general strike in 1833-4. From this they were earnestly dissuaded, because of the increasing probability of a better demand, which then appeared to us almost a certainty. The hope was realized, for within six months a moderate advance took place in the general rate of wages.

## CHAPTER XXVIII.

THE MACHINE HOSIERY MANUFACTURE. 1836 to 1846.

IN the year 1838, the then oldest Nottinghamshire stocking-maker, died in his ninety-fourth year. This fine example of what one could wish every workman should be, was born in 1745, and bound an orphan apprentice in 1755. At that time the charge on journeymen frame-work-knitters, for board, lodging, and washing, was 5s. a-week; meat was  $1\frac{1}{2}d.$  per pound, butter and cheese  $3d.$  per pound, and wheat 3s. to 4s. a bushel. Being a swift and steady hand, he was always amongst the last to be stinted or thrown out of work in a slack time, and the foremost to be put into employment on a change for the better. He not only married and maintained his small family comfortably, but saved sufficient money out of his earnings to enable him to build, in 1783, a good brick cottage of four rooms, the land for which and a fair garden by its side, was publicly presented to him and set out for the purpose by the lord of the manor. He lived in it fifty-five years. About the same time that he obtained this quiet home, he was enabled out of the produce of his own labour and that of his only son, then a frame-work-knitter also, to purchase a new frame in which he made hose for the following thirty-five years. It cost him £25 at first, and £3 only during that time for repairs. When he ceased to work, it was disposed of for £10. He attributed this trifling wear and tear to timely repairs, and careful handling of the machine. When he began life, the usual hours of labour were ten, five days a-week, and one Saturday was allowed for taking in work and marketing, the alternate one for gardening and domestic matters. In middle life twelve hours' work was necessary. At its close,

fourteen to sixteen hours a-day scarcely sufficed for obtaining a bare maintenance by those who depended on this kind of labour.

This modest and intelligent workman was much respected for his truthful and upright conduct, and equally beloved, because of the cheerful amenity of his disposition. So much confidence was placed in the accuracy of his testimony, that it was frequently required in matters of boundaries, roads, water-courses, and other legal enquiries, until he had attained extreme old age. Many passers by were wont to stop and admire the venerable man's prolific garden, ornamented with choice flowers, and its trimly cut hedge of many years' growth; and not a few in superior stations of life gave him their friendship, and liked to visit him in his pleasant abode. There the author was taught by him nearly sixty years ago to labour diligently in the art of stocking-weaving, as the source of his livelihood; and there, after an interval of thirty years, he had the satisfaction of hearing him say, with unfaltering voice, when dying, "I have lived in comfort by the Divine blessing all these years under this roof, and am now going to dwell in the house of the Lord for ever." This is an instance of practical effort to perform his duty, shewn by one in the common walks of life, through the exercise of those powers with which most men are endowed, and by habits which all may certainly acquire. These were—diligence, thriftiness, sobriety, handicraft-skill, love of wife and children, kindness to others, and contentment with his own lot. The consciousness of having endeavoured honestly to fulfil duty, is the only source of real satisfaction in any station of life, and there is no place more fraught with happiness, than the home of such a mechanic as the one we have now described.

The hosiery business was fast approaching the darkest period in its eventful course. Having when describing events in the lace trade mentioned facts, shewing the intensity of the revulsion consequent on the panic in 1837, it is only necessary to say here, that the great distress in the hosiery business was faithfully reported upon after personal enquiry on the spot in that

year, by Mr. Gulson, the assistant poor-law commissioner. Again, in 1840, Mr. Fletcher when reporting upon the condition of hand-loom weavers, gave an account of the stocking-makers, in which their low wages, poverty, and sufferings were related in terms of strong sympathy. An association had been set on foot in Nottingham for ameliorating the condition of the working classes, in consequence of their depressed and partially employed state. The objects proposed were—

“To advocate due protection and encouragement for home manufactures—to collect and diffuse general information upon the trades of the district—to discuss and report upon the rates of wages paid in them—and by holding friendly communications between manufacturers and workmen, to promote mutual confidence and good will, and thereby the interests of both classes, and especially to secure a just and uniform as well as an adequate rate of wages.”

At the same time, a new chamber of commerce was organized, with the view of assisting to revive trade. But neither body could agree on remedial measures, and gradually ceased their operations.

We have stated, that all the enumerations of stocking-frames previous to that in 1844, had been confined to those found to be actually at work. The hosiers had an indistinct idea, that the so-called independent frames were numerous, but they were too much engaged in their own business, and had so great a dislike to any inquiry or marked interference, that each was content with endeavouring to deal with the course of events and circumstances affecting his own interests as they arose. There never was a case, nevertheless, in any branch of manufactures, which shewed when the facts were ascertained, more than the hosiery trade, the importance and necessity of enquiries from time to time by competent and authorized persons into its state, the amount of machinery and returns, number of hands, rates of wages, and classes of production.

It should be one of the principal functions of our chambers of commerce, to obtain authentic annual returns, which would serve for the guidance of manufacturers and their workpeople; and being transmitted to the Board of Trade, would show whether the public

interests were being promoted as they ought by the operations of the business. There is no position or species of trade in which accurate statistics can be otherwise than useful, or indeed safely dispensed with. If such had been obtained and fairly dealt with by the hosiers between 1800 and 1810, they most likely would have saved their machinery and capital, with the wages of their workpeople, from the fearful depreciation of the next half century.

High frame rents had then placed two-fifths of all the frames, *i.e.* about 18,000, in the hands of people who had really nothing to do with the trade in any direct form, beyond obtaining rent for them. While the demand was good, the supply of work from these machines not being to be depended upon by hosiers, their influence was injurious to the manufacturers; when the trade fell off, they by their competition for employment, brought down the workmen's wages throughout the whole production, from more than 45,000 frames. As an instance, a supervisor of excise laid out £1000 in the purchase of 200 frames, which in the first instance he endeavoured to let to hosiers; not succeeding, he tried certain bag hosiers, and what these would not hire, were offered to smaller master stockings. There not being employment for all, what work could be obtained, was in this and such like cases spread out in lessened amounts weekly to the hands, who in many instances were charged full weekly rent for a partial week's supply of labour. It is doubtful if this injustice is not inseparable in a greater or less degree from the system of frame-rents. High frame-rents and excessive charges of other kinds, seem to us not only wrong in principle, but destructive in practice, and the abolition of them would be followed by a real benefit to both employers and their workmen. In this opinion, we are aware, the owners of frames do not generally acquiesce. Possibly the events transpiring of late years may solve the vexed question in a safe and satisfactory manner to all parties.

As regards the diminution in the value of frames, it may be noted, as an example, that nearly forty years ago, in consequence of the bankruptcy of Clark, Mitchell,

and Co., 400 stocking-frames were brought to the hammer and sold for £1,350, or £3. 7s. 6d. each; 1,170 were sold by auction at Nottingham, in the year 1824-6, for £7 to £8 on an average, and from 1827 to 1832, 2,746 at about £4 each. These 4,316 frames were bought therefore for somewhat less than £5 each on an average, or less than two years' rent charged for their use. It is probable that not less than 15,000 frames changed hands at this rate. That the rent is greatly out of proportion to the second-hand value and cost in repairs of the great body of the machines is plain. The annual outlay by the hosier, including the recruit, does not average more than £1, and, with proper care on the part of hands, it ought not to be so much by one-half. The rent of narrow hand-frames is £2 a-year at least, if at work. An income of £1000 per annum clear therefore, was stated by one eminent hosier, to be derived by him from each 1000 of his frames when employed. This gentleman gave evidence in favour of charging frame-rent, because, by its causing hosiers to give out work in bad times, at the risk of holding large stocks to a loss, the men would be continued in employment, when otherwise they would be set adrift. Notwithstanding the commercial unsoundness of the principle thus enunciated, he was supported in this view by most of the hosiers at Nottingham and Leicester, some of whom employed from 1000 to 5000 frames each, chiefly their own property.

But few new English frames had been constructed between 1810 and 1840. The framesmiths were so reduced in number, and pressed down by dearth of employment, as to induce a part of those who remained to attempt the revival of demand for frames by constructing them for lower prices. The Derbyshire framesmiths published in 1838 the following list of prices:—16 inch 30 gauge, £19; 20 inch, £22 4s.; 24 inch, £25 8s.; 28 inch, £29 4s.; and 32 inch, £34. 16 inch 3 needle 30 gauge silk-frames, £24.

The act 1 and 2, William IV., cap. 37, called the Truck Act, was passed in 1831. Under this statute a question arose, which was most important to the hosiers and their workmen. Frame-rent had been charged by the one and paid by the other for a century preceding, varying in amount from 9d. to 3s. weekly,



according to the width and gauge of the machine. This had been a growing source of complaint and ill feeling. The amount of rent charged continued the same for the frame, though the price paid for the work made upon it had been gradually reduced, and sometimes full rent was levied when the frame was only partially employed. By custom, the rent was deducted in the settlement of wages. The question naturally arose as to whether this deduction was consistent with the provision in the 'trunk act,' which required that the entire amount of wages must be actually paid to the artificer. A person, named Chawner, sued his employers for £3. 13s. 6*d.*, thus as he alleged illegally withheld. The case was tried at the Leicestershire autumn assizes, 1844-5, when the defendants pleaded, that the charge for frame-rent was in principle sanctioned by statute. A verdict was taken by consent for the plaintiff, with a view to a special case being argued in the Court of Queen's Bench: accordingly this took place, and under the direction of Lord Denman, the judgment was reversed, "the rent and charges being according to invariable usage of the trade, which was known to the plaintiff, and he was dealt with accordingly."

The pressure upon the authorities, by whom relief to the necessitous was administered, became so great, that in many unions, as at Sutton-in-Ashfield, amongst others, families were assisted by making up wages out of the rates. In this, the guardians were countenanced by the neighbouring gentry.

In 1844, an important instruction was issued by the Poor-Law Board to the clerks of the Board of Guardians and to the overseers of the poor, to take proceedings against any one paying wages by truck to persons seeking relief. It was high time that the degrading system of furnishing workmen with food on account of wages was put an end to; for so common was the practice of under-masters and bagmen paying by truck before the year 1845, that in eight of the villages in one district, which were visited in taking the hosiery census of 1844, it was found that of eighteen bagmen, only two paid wholly in wages. In Nottinghamshire, more

than two hundred and fifty of these truck masters (as they were called) were enumerated. The numbers were equally great in proportion in the counties of Derby and Leicester. A man grown rich by the practice, hunted with the Quorndon hounds for several years. Subsequent improvement in the trade, public opinion, and the influence of the hosiers who are the ultimate employers, have brought about an entire abolition of the system, so far as can be ascertained.

Other charges besides that of frame-rent have been mentioned. These, which are made by under-masters, are usually for fire, light, standing, winding, needles, and getting out and taking in work from and to warehouses; and have amounted in bad times to an important part of the gross wages to the workman. For instance, a list, published by the Leicester Board of Guardians in 1847, of the nominal earnings of 500 frame-work-knitters, shewed they were in one week £194, from which the deductions were £77, leaving £117, or 4s. 8d. for the average weekly wages of each workman. The total poor's rates in 1844 for the county of Leicester amounted to £95,315; the shop charges upon the frame-work-knitters to £129,906. An under-master working thirty frames cleared by rent and charges £250; another by sixty glove frames, after paying £75 for repairs, gained £500 in a year—the whole having cost him only £500 for the purchase. These charges for frame-rent and other things were highest in Leicestershire, where the cost of the frames was the lowest, and the reverse in Derbyshire in both respects. The clear earnings for an average week's work, of from sixty to seventy-two hours, on cotton hose, was from 5s. for 30-gauge and below, to 6s. for 32-gauge and above; cotton gloves, 6s. 6d. fashioned, and cut-up 7s. 6d.; cotton drawers and shirts, 7s. 6d. For silk plain hose 7s. 3d., knots 8s., gloves 7s. 9d. a-week. These figures represent the weekly income of the employed part only of those who worked in about 20,000 frames; the number at work half their time, or wholly unemployed, amounted to several thousands.

Under these circumstances, as to which they could exercise neither foresight nor control, and in which each

year added to their hopelessness and misery, it is surprising that no further demonstrations of general suffering and popular anger than the one in 1842 should have taken place. In that year the working classes of the country proposed a general cessation from labour, until the political charter could be obtained from the three estates of the realm. This caused much excitement amongst them in all manufacturing districts; and, as might naturally be expected, the stocking-makers of the midland district were induced to join in this movement. Any change it appeared to them, must be for the better. Some thousands from the county collected in Nottingham, and great commotion ensued. Several hundreds were arrested for riotous behaviour, who, on quiet being restored, were liberated, and returned to their usual occupation so far as labour could be obtained.

We do not hesitate to affirm that the actual sufferings and privation experienced during the so-called Lancashire famine of 1863-6, were far less than the distress in the midland hosiery district during the interval between 1810 and 1845; where it became a long and widely spread practice to still the cravings of hunger in the adult by opium taken in a solid form, and by children in that of Godfrey's cordial.

These people had been for years at the lowest point of existence, feeding on bread and potatoes sometimes for weeks together. Their furniture gradually disappeared; their clothing could scarcely be held together; and nothing new had been obtained by many families for so long that they could not remember the time. Their dwellings were for the most part filthy and the abodes of discontent and misery. The children had no scholastic education at all.

A framesmith making his usual inspection of hosiers' frames at workmens' dwellings in Nottingham, to ascertain their state, after thus spending a fortnight, found his health had begun to suffer from the squalid wretchedness of their abodes. Thinking to improve it, he went on the same errand into the country, but found the frame-work-knitters there in a still more deplorable state. From the bad air and other distressing influences in

their condition and that of their dwellings, in another fortnight he returned, too ill to attend to his business for some weeks afterwards. This occurred in 1843.

One of the most illustrative cases of the wretched depression of the frame-work-knitters, and its effects upon their habits of thought and manifest hopelessness of improving their condition, and helplessness if they attempted it, came under the eye of the author in one of his visits amongst the workpeople in one of the lower parts of Leicester in 1844. He found a female at work between nine and ten at night; her husband and two journeymen at work above her head up the step-ladder over the kitchen place she was occupying. Her age she stated to be fifty-three; she had the appearance of being seventy; there were bones, sinews, and skin, but no appearance of flesh. She had been the mother of fifteen children, ten of whom, male and female, her husband and herself had bred up to be stockingers. From sickness in a morning she could not work before her breakfast of tea, but laboured at night till ten o'clock, and her clear earnings were about 2*s.* 6*d.* weekly. She had worked the same frame nineteen years, and was making three feet at once to worsted hose. The frame had been "patched up" twice in that time. The rent of it was 1*s.* 6*d.* a-week. The house rent was 2*s.* 6*d.* a-week. It was ill drained, damp, and unhealthy, as were all around it. She was however cheerful, uncomplaining, thankful, and even pious in her manner and speech.

Here was the female frame-work-knitter; the mother of other female stocking-makers, and of sons too—ten in all—added to the numbers of a trade grievously overloaded with labourers ever since they had belonged to it, and without prospect of relief. Her husband was a man of some character and standing, or he would not have been entrusted with four frames. He was one who made charges on his journeymen, as well as paid them to the hosier; yet neither his labour, and the sum he received as a per centage on theirs, nor his poor wife's long hours and trifling earnings, nor, it seems, any other available means or motives, operated to send his children one after another into better paid and more promising occupations. They seem to have had the idea that having

come of a frame-work-knitting stock they must for ever remain in that occupation.

Leicester, Loughborough, and Hinckley suffered equally with Nottingham, Sutton-in-Ashfield, and Derby. At Leicester sixteen firms had become insolvent, and others were closed, the heads of them having lost their capital. Of 2650 frames belonging to eight firms, 955 were idle. Wages for plain hose did not exceed 6s. 6d. a-week. By making ribbed hose at Loughborough 8s. might be gained. At Hinckley half the men only were fully employed at 7s. 6d. a-week, the rest gained 4s. with difficulty. "The wretchedness was too severe to be portrayed, and too extensive to be relieved; there never was any previous distress like it." A subscription of £5000 had been raised at Leicester to relieve the work-people; one-third of all the 18,500 frames in that county not being employed. There had been a large body of warp hosiery frames engaged in making upon worsted piece goods; but that branch suffered equally with the rest; the number of frames unemployed was so great as to bring down their price, so that warp looms sixty inches in width were sold for £5 each.

At this epoch of declining home demand for hosiery, the small foreign consumption suffered a severe blow, from the cessation of export of all kinds of elastic and plated hose made with cotton insides and silk outsides. These articles had been sent largely to the West Indian and South American markets for many years. But latterly the competition in the supply had become so urgent as in order to undersell each other, to induce the manufacturers to reduce the size from the standard in length and width. This, added to their slighter quality, entirely discredited their character and destroyed their use. On the other hand, there sprung up a demand for eyelet-hole fancy hose of fine quality, employing about one hundred frames at Hucknall, and about one hundred for coarser quality at Sutton.

A number of frames were put on having ticklers placed on bars; when at work the ticklers all moved at once, and by three or four such motions of the bars in a course, various patterns were made. By using a Jacquard apparatus twenty-eight motions have been put into the work of such machines in France and Spain.

The progressive steps in the history of frame-work-knitting prove that the miseries so long endured by the workpeople in it, were not consequent upon a lack of either energy or skill in modifying, adapting, and improving their machinery. In no trades have efforts been more unremitting, better directed, or, on the whole, more successful. The entire machine-wrought lace trade has, as we have shown, sprung from the stocking-loom. This notion of inertness has arisen from an imperfect knowledge of the peculiar circumstances under which the business of this manufacture has been carried on. From these peculiarities has issued a rate of wages averaging for so long a time a less figure than that realized in any other department of skilled or unskilled labour, though it had not been pressed down by competition with inanimate power, but remained a domestic hand employment; and notwithstanding the success of inventors who had raised up from it and placed beside it the lace manufacture, drawing from it many of the best hands, giving them wages equal to the highest paid trades in England, and from whose ranks have been derived most successful manufacturers. The special causes of low wages weighing on the trade from 1810 to 1840 were chiefly these; the parish apprentice system in earlier years, construction of needless frames merely for rent, middle men, making full charges for partial work, and payment of wages by truck.

The decline in the employment for frame-work-knitters and their consequent distress, drew the serious attention of kind-hearted landowners in various parts of the three midland counties to the consideration of local means for their relief. This was furnished to an important extent by adopting the system of cottage allotments for gardening purposes, thereby giving some employment and useful aid.

The Duke of Portland let land on his estate at Sutton-in-Ashfield for about 600 gardens at 3s. per 400 yards, or £1. 16s. an acre clear of further charge. John Dodsley, Esq., of Skegby, let about 300 acres in plots of from 400 yards to 3 acres at about £2 clear per acre. Mr. Frearson, of Arnold, let 100 allotments of a quarter

of an acre each. At Loughborough, and in some neighbouring parishes, the workmen themselves by annual subscriptions previously made, hired land in large plots and subdivided them to suit various occupants. Many landowners were encouraged to continue this during the time of distress, by witnessing the marked good effects which it produced, physically, socially, and morally.

When inquiring in 1844 throughout the stocking-making districts, as to their numbers and condition, special attention was paid to their dwellings and gardens. It was found that some cottages which had been built on waste ground by the wayside, and which usually had gardens attached to them, had been taken down, and in several instances the sites added to the neighbouring private estates. But where the workman or labourer had preserved his separate dwelling and plot of garden ground, his means of living had been much increased by it, and the cleanliness and orderly bringing up of his children were of a superior character. This is almost a paradisaical state for the artizan, when compared with that of the 8000 families cooped up in the back-to-back houses of Nottingham; and when once enjoyed, it is to be regretted he should be deprived of it, either by the will of another, or his own lack of self-denying energy.

The changes which were now made apparent in the places where stocking-frames were found, and their numbers compared with those of former times, are remarkable, shewing the almost entire absorption of the trade in the midland counties.

Tewksbury had been an important seat of the manufacture of hose ever since the stocking-frame was set to work extensively in London and its neighbourhood. The number of machines at work there in 1844 was only 380, while 550 were standing still; and wages were so exceedingly depressed, that the scenes of wretchedness witnessed there were such as our correspondent said "he had never seen before, and hoped never to see the like again." The most valuable part of this machinery has, we believe, been since transferred to Nottingham.

The entire stocking machinery in Ireland had now

become limited to 265 frames, nearly half of which were employed in the special manufacture of Balbriggan hose, which still retained their celebrity, and a few in Dublin dependent on the aristocracy and the theatres.

The actual manufacture of hosiery in London had declined so far in 1844 as to employ only 74 machines; 10 of which made hose stout and widened as well as narrowed, which were chiefly for theatrical uses, as were also 4 making the fleecy outside imitations of wild beast skins; 4 made drawers; 22, purses and sashes; 11, foundations for wigs and woollen Welsh-wigs; 2, surgical bandages. A few were worked at retail hosiery shop doorways as decoys to customers, like that of the long established and well known Robert Romanis in Cheapside, and the rest worked to orders in Spitalfields, where there was an ancient colony of frame-work-knitters, which had emigrated from the original locality, Bunhill row, in which Lee first placed his machine, and its neighbourhood.

The long continued depression and sufferings of the greater part of the hosiery trade, added to his early connection with it, induced the author to undertake, in 1844, a general census of its machinery, numbers of persons employed, wages earned, and the amount of returns made at that time. The following figures were thus ascertained, and have been generally adopted since as a close approximation to the truth. The errors in the former estimates of machines were at once manifest, and were of the utmost importance, having been confined to those actually at work, and thus excluding the one-third (chiefly of independent frames), for which there was often no work to be had. There proved to be making silk goods in Derbyshire, hose frames 756, gloves 698, total 1,454. In Nottinghamshire, hose 687, gloves 1,409, total 2,096. Elsewhere 223. Thus there were 3,773 frames, using £141,800 raw silk, and paying wages and profits £191,883, making a return of £333,763.—Cotton goods were being made in Derbyshire of fashioned hose on 3,900 frames, cut-ups 255, drawers, &c. 225—total 4,380. In Nottinghamshire, fashioned hose 5,544, cut-ups, &c. 4,547, gloves 849, drawers, &c. 1,500—total 12,440. In Leicestershire, fashioned hose 6,446, gloves 487—total 6,933. Elsewhere, hose 1,070. There were in all 24,823 frames making cotton goods, using £163,000 raw material, and paying £835,700 wages and profits, making a return of £998,700.—Worsted, lambs'-wool, and merino goods, employed in Derbyshire 2; in Notting-



hamshire 61. In Leicestershire, on fashioned hose 7,061, cut-ups 1,798, gloves 923, drawers, shirts, &c. 1,361, fancies 314, making a total of 11,457. In Scotland, upon woollen house 2,365; elsewhere 198. The total frames making woollen goods were 14,083, using £400,000 worth of raw materials and paying wages, frames and profits £823,750, making up a return of £1,223,750.—There were also 86 frames, using £900 worth of flax materials, paying £5,600 wages, &c., and making £6,500 worth of returns. The sum paid altogether for *imported* raw materials was £304,800. For *home-grown* materials £400,900, altogether the cost was £705,780. The sum paid for wages, expences, and profits, was £1,856,933, and the total returns were estimated at £2,562,713. The number of frames employed were 5,836 in Derbyshire; 14,595 in Nottinghamshire; 18,494 in Leicestershire; 968 in other English counties; 267 in Ireland; 2,605 in Scotland—being 42,765 at work, and there were 5,830 standing; so that the entire number in the three kingdoms was 48,595, giving employment to upwards of 100,000 workpeople.

At the time this census was taken, the hosiery machinery had scarcely begun to be gathered into large factories. The number of frames under one roof averaged then rather more than three only, and even now the absorption of narrow hand-machines into large masses can scarcely be said to have more than commenced. In 1844, there were about 15,000 masters and 33,000 journeymen. But the introduction of steam power, with its more regular and easily applied rules and management, is evidently leading the way to a great and very important change; which will be the more easily brought about, by the powerful impelling motive to the working class, of the higher wages gained for lessened manual labour and shorter hours, which always accompany steam factory employment. What an amount of change of local residence, and over how extended a surface such an emigration may operate; to how large an extent it may help to depopulate villages and increase the over-crowding of towns, already too densely peopled for health or comfort or morals; in a word, how much for good or evil, the face of society

in the midland district may be changed by this possible, and, as some think, rapidly approaching exodus of stocking-makers, must be problematical. The question is however not without interest in several respects. That part of it which relates to where the present homes of these workpeople are (the only remaining body of hand loom weaving cottagers), and what was the number of their frames in 1844, will be found in the following tables abstracted from our census. The reader will notice the fact, that the removal of each frame should it take place must necessitate, if not an entire change of place, the alteration of employment and means of living of three persons on an average.

The details as to width, gauge, kinds of work then making, and of what materials, will be found in the original report; to which also the inquirer is referred for information upon a variety of details, which the changed circumstances of the trade now render it unnecessary to recapitulate.

The following is a list of the numbers and localities of stocking-frames in Leicestershire, 1844; viz. at—

Ashby-de-la-Zouch . . . . .	14	Castle Donington . . . . .	110
Anstey . . . . .	215	Desford . . . . .	163
Arnsby . . . . .	100	Diseworth . . . . .	62
Asfordby . . . . .	6	Dunton . . . . .	120
Aylestone . . . . .	76	Dadlington . . . . .	34
Belgrave . . . . .	200	Enderby . . . . .	350
Barleston . . . . .	114	East Shilton . . . . .	650
Barkby . . . . .	35	Fleckney . . . . .	126
Bagworth . . . . .	34	Foston . . . . .	10
Belton . . . . .	93	Glenfield . . . . .	50
Burton Overy . . . . .	20	Great Glen . . . . .	100
Barrow . . . . .	210	Gilmorten . . . . .	200
Blaby . . . . .	322	Hathern . . . . .	367
Bruntingthorpe . . . . .	70	Humberston . . . . .	22
Broughton, Upper and Nether	20	Heather . . . . .	23
Barwell . . . . .	400	Huncote . . . . .	92
Barsby . . . . .	29	Hinckley . . . . .	1750
Burbage . . . . .	450	Leicester . . . . .	4140
Cossington . . . . .	7	Leir . . . . .	40
Countesthorpe . . . . .	214	Loughborough . . . . .	906
Calton . . . . .	5	Little Ashby . . . . .	20
Cosby . . . . .	250	Little Thorpe . . . . .	107
Croxton, South . . . . .	35	Lutterworth . . . . .	90
Coleorton and Griffy-dam	56	Market Bosworth . . . . .	80
Claybrook . . . . .	44	Mount Sorrell . . . . .	258
Croft . . . . .	54	Markfield . . . . .	153

Narborough . . . . .	144	Stoney Stanton . . . . .	200
Newton Nethercote . . . . .	10	Stanton under Bardon . . . . .	49
Newton Harcourt . . . . .	37	Smeeton . . . . .	140
Newbold Verdor . . . . .	60	Sapcote . . . . .	220
Osgathorpe . . . . .	24	Thurleston . . . . .	85
Oadby . . . . .	350	Thorpe Acre . . . . .	47
Peatling, Great . . . . .	30	Thringston . . . . .	160
Quornndon . . . . .	188	Thurcaston . . . . .	11
Queenborough . . . . .	110	Thornton . . . . .	22
Ratby . . . . .	120	Whitwick . . . . .	423
Rearsby . . . . .	70	Wykin . . . . .	10
Rothley . . . . .	159	Wimeswold . . . . .	10
Sheepshead . . . . .	1209	Wolvey . . . . .	150
Sileby . . . . .	500	Whetstone . . . . .	297
Syston . . . . .	280	Walcote . . . . .	70
Saddington . . . . .	34	Wigston, Great . . . . .	550
Sutton Cheney . . . . .	15	Willoughby Waterless . . . . .	80
Sheresby . . . . .	60	Woodhouse and Eaves . . . . .	158
Stapleton . . . . .	23	21 villages amongst them . . . . .	72
Stoke Golding . . . . .	206		
Shornford . . . . .	56		
		Total	20311

In Derbyshire 6447 frames were enumerated in 1844,  
at—

Alfreton, Swanwick, &c. . . . .	501	Holbrook . . . . .	152
Ashover . . . . .	80	Ilkiston . . . . .	594
Ashford . . . . .	100	Kirk Ireton . . . . .	10
Breaston . . . . .	50	Kilburn . . . . .	50
Bolsover . . . . .	5	Loscoe . . . . .	57
Breckenfield . . . . .	30	Litton . . . . .	80
Bakewell . . . . .	10	Long Eaton . . . . .	24
Bonsall . . . . .	143	Morley . . . . .	15
Belper . . . . .	421	Milford . . . . .	37
Breadsall . . . . .	10	Matlock . . . . .	50
Borrowash . . . . .	28	Melbourn . . . . .	111
Coxbench . . . . .	56	Normanton, South . . . . .	147
Codnor . . . . .	137	Ockbrook . . . . .	147
Crich and Fritchley . . . . .	245	Pentridge . . . . .	6
Cromford . . . . .	20	Spondon . . . . .	117
Clay Cross . . . . .	20	Smalley . . . . .	150
Chesterfield and Brampton . . . . .	60	Sandiacre . . . . .	16
Draycott . . . . .	26	Sawley . . . . .	29
Darleydale . . . . .	20	Taddington . . . . .	8
Denby . . . . .	20	Tibshelf and Blackwell . . . . .	223
Duffield . . . . .	151	Wingfield, South . . . . .	250
Derby and Little Chester . . . . .	700	Wessington . . . . .	100
Eaton, Little . . . . .	24	Wirksworth Dale . . . . .	10
Higham and Shirland . . . . .	110	5 villages amongst them . . . . .	16
Heage . . . . .	29		
Heanor . . . . .	722		
Horsley-Woodhouse . . . . .	330	Total	6447

And 16,382 frames in Nottinghamshire in 1844, at—

Awsworth . . . . .	10	Hoveringham . . . . .	45
Annesley . . . . .	5	Kirkby Woodhouse . . . . .	501
Attenborough . . . . .	27	Keyworth . . . . .	78
Arnold . . . . .	1397	Lenton . . . . .	23
Beeston . . . . .	275	Lowdham . . . . .	94
Bingham . . . . .	58	Leake, Great . . . . .	119
Bramcote . . . . .	33	Lambley . . . . .	381
Brinsley, Kimberly, &c. . . . .	553	Mansfield . . . . .	821
Bradmore . . . . .	34	Mansfield Woodhouse . . . . .	194
Basford . . . . .	518	Nottingham and Sneinton . . . . .	3490
Bulwell . . . . .	606	Newark . . . . .	6
Barton . . . . .	10	Normanton-on-Soar . . . . .	10
Blidworth . . . . .	93	Oxton . . . . .	56
Bridgeford . . . . .	52	Orston . . . . .	5
Burton Joyce . . . . .	106	Radford, Old and New, and Ison Green . . . . .	775
Calverton . . . . .	409	Ruddington . . . . .	343
Costock . . . . .	30	Rempstone . . . . .	12
Cossall . . . . .	9	Sutton-in-Ashfield . . . . .	1968
Claythorpe . . . . .	67	Skigby . . . . .	143
Carlton . . . . .	589	Shelford . . . . .	10
Collingham . . . . .	6	Screveton . . . . .	12
Cotgrave . . . . .	20	Selston and Bagthorpe . . . . .	191
Chilwell . . . . .	77	Stapleford . . . . .	33
Eastwood . . . . .	166	Southwell . . . . .	120
Epperstone . . . . .	30	Sutton Bonington . . . . .	110
Farnsfield . . . . .	10	Willoughby . . . . .	15
Gedling . . . . .	12	Woodborough . . . . .	191
Gotham . . . . .	87	13 villages amongst them . . . . .	25
Gunthorpe . . . . .	59		
Hucknall Torkard . . . . .	973		
Hucknall Hustwayte . . . . .	290		
		Total	16382

It was estimated that there were in addition the following frames in England:—

London . . . . .	74	Northstoke . . . . .	12
Canterbury . . . . .	6	Twining . . . . .	30
Chacomb . . . . .	25	Winchcombe . . . . .	10
Middleton Cheney . . . . .	24	Exeter . . . . .	8
Dobcross . . . . .	12	Godalming . . . . .	102
Huddersfield . . . . .	6	Feversham . . . . .	10
Leadgate . . . . .	10	Flewer . . . . .	6
Wakefield . . . . .	40	Barnsley . . . . .	6
Manchester . . . . .	10	Halifax . . . . .	6
Stafford . . . . .	6	Leeds . . . . .	6
Kendal . . . . .	6	Saddleworth . . . . .	15
Alnwick . . . . .	6	Liverpool . . . . .	6
Loseby . . . . .	7	Birmingham . . . . .	10
Deerhurst . . . . .	10	Berwick . . . . .	6
Tewksbury . . . . .	380	Wooler . . . . .	12
Ditto standing . . . . .	550	Lincoln . . . . .	6

Nuneaton . . . . .	10	Woodchester . . . . .	12
Gloucester . . . . .	6	Various other towns in which	
Leigh . . . . .	35	are 4 or less . . . . .	48
Northleach . . . . .	20		
Pemerton . . . . .	12		
Thurley . . . . .	20		
		Total	1572

## In Ireland—

Belfast . . . . .	35	Cork . . . . .	10
Coleraine . . . . .	12	Drogheda . . . . .	6
Dublin . . . . .	44	Inneskillen . . . . .	12
Dungannon . . . . .	6	Lisburn . . . . .	22
Lurgan . . . . .	8		
Limerick . . . . .	10		
Balbriggan . . . . .	100		
		Total	265

## In Scotland—

Hawick and vicinity . . . . .	1200	Selkirk and vicinity . . . . .	128
Dumfries ditto . . . . .	500	Jedburgh ditto . . . . .	60
Edinburgh ditto . . . . .	150	Of these not at work in vari-	
Glasgow, Kilmarnock . . . . .	280	ous places there are 620	
Perth . . . . .	108		
Langholm . . . . .	92		
Denholm and vicinity . . . . .	87		
		Total	2605

The influence of the publication of this census was considerable: but the appointment in 1845, of a commissioner, Mr. Muggeridge, to make an enquiry, was in consequence of the following petition, signed by upwards of 25,000 frame-work-knitters and presented to the House of Commons in 1843, which, on behalf of the workers of frames in all parts of these realms, humbly sheweth—

“That your petitioners are suffering severe privations from the low rate of wages to which they have been reduced when employed; and the frequent periods in which your petitioners are out of employ, are greater in extent than any other body of workmen similarly situated with regard to steam power; which sufferings your petitioners attribute to the want of protection for labour, by which we are left at the mercy of the unprincipled and competing employers, which system has extended itself through all the branches of this trade.

“That your petitioners have fully considered all those evils and from which your petitioners without legislative interference can never be relieved. That your petitioners are aware of the great increase of the people, while at the same time the machinery in our trade has but slightly, if at all increased; from which circumstance we beg to remind your honourable House, from the reduced price of labour a vast number so reduced are deprived of the means of consumption; while at the same time a spurious mode of manufacture has been introduced, by which means the productions in many articles have been increased twenty-fold, thereby throwing out of employ a great

number of workmen. We your petitioners pray your honourable house to grant a committee to inquire into the allegations set forth in this petition. 1st. As to the present low rate of wages given for making hosiery, and the causes of such depression, and to provide a remedy. 2nd. As to the consequences of the fraudulent making of hosiery by the want of fashion and other frauds; and such hose being made three, four, or five at once, and to restrain such practices. 3rd. To inquire into the enormous exactions of frame rent and other excessive charges, especially full rent when full employment is not given, and to limit the rate of frame rent upon the same principle as usury is restricted. 4th. And we further pray that foreign hosiery may be prohibited importation into these realms, until foreign states will allow the importation of English hosiery. 5th. We also pray for an increase of punishment for paying by truck, by imprisonment, and for a better method of enforcing the law by putting it on the same footing with other misdemeanors as a felony. 6th. And that hosiers and manufacturers, be required to deliver out tickets with their work as to the price given, and the quantity of work required, and making it penal for master stockingers or bagmen taking out hosiery to manufacture, not shewing their journeymen such tickets when they deliver the material to them to work. 7th. And whereas a charter was granted for the protection of the frame-work-knitters of these realms in the year 1663, but as of late years no notice has been taken thereof, we pray your honourable house to revive those protections, and if found insufficient for our protection, we further pray, 8th. And humbly implore your Honourable House, to enact a law empowering the crown to appoint a commission in case of dispute between employers and the employed in the manufacturing districts; to fix and regulate wages; and to make general regulations for the guidance of masters and workpeople, subject to the revision of the Privy Council. And your petitioners will ever pray.

(Signed,) BENJAMIN HUMPHREYS, &c. &c."

Both prior and subsequent to this petition, communications were made to the Board of Trade by representatives in Parliament for the counties of Leicester and Nottingham, and other influential individuals, strongly pressing for an inquiry into the premises. The commissioner being appointed, fixed on twenty-two towns easy of access to every place in the three counties, as centres for his inquiry.

Having taken a large body of evidence throughout the trade upon the petition, Mr. Muggeridge thus in brief concluded his report upon it:—

The evidence established the following points, viz.:

1st. That though the system of paying by truck had been greatly checked, it was still carried on indirectly to a great extent by employers who combine provision shops with their operations in manufacture, but whom the then present law (1845) had not been able to reach.

2nd. That although there was considerable diversity in the condition of frame-work-knitters, at different seasons, and in different branches, yet they were, as a body, in a very depressed and distressed state, from the very low amount of their ordinary earnings.

3rd. That this arose from the disproportion existing between the supply of their labour and the demand for it; the latter having been usually deficient, and at all times very irregular, while there was a constant tendency in the former to increase and none to adapt itself to the irregularities or the amount of demand.

4th. That this excess of supply arises primarily from the accessibility of this trade to the unemployed of other classes and from the facility with which a knowledge of the trade may be gained especially in the common branches.

5th. That these facilities admit of competition of women and children of which they largely avail themselves; and the natural consequence is to reduce wages generally by an undue augmentation of numbers, especially the wages of adult male knitters, by lowering them to the standard rate of such competitors.

6th. That this excess of supply is much encouraged by the system of frame rents and the long recognized custom of heavy deductions from wages; which make it the interest of employers to spread work among a larger number of workmen than is necessary to its performance—a practice greatly facilitated by superabundant machinery created and brought into the trade, by other than the legitimate employers in it as profitable investments of capital induced by the customary exorbitant rent of frames.

7th. That no permanent or general improvement in the condition of the frame-work-knitter can be looked for but by a diminution of their numbers proportionate to the existing demand for labour, or such an extension of the manufacture as would largely augment the amount of employment. The first of these means is in the exclusive control of the workmen themselves; and can only be produced by abstinence from early or improvident marriages, or by bringing up their families to other occupations—results only to be expected from the slow operation of improved moral cultivation.

8th. That an extension of the manufacture is most likely to be attained by the improvement of which it appears susceptible in the manner of conducting it; by a more judicious appropriation and division of labour, and whereby the cost of production would be diminished; and by an increased application of taste and skill, in the designs and patterns of the articles manufactured, especially in the fancy branches of the trade.

9th. That an improvement in the quality of most of the goods manufactured is apparently as essential to an increase in the permanent demand, as it will probably be to the maintenance of the manufacture even at its present extent; the evidence tending to establish, that the spurious qualities of a large proportion of the goods made, are calculated to lower the character of the manufacture both at home and abroad.

Though the commissioner was decidedly unfavourable to the continued manufacture of cut-up hosiery, yet much evidence was given by some important wit-

nesses in its favour ; founded on its low price and great usefulness in newly settled countries, acting as a pioneer to the use of the better fashioned stockings themselves. And it is remarkable, that though not visibly connected as cause and effect, yet this was the time at which the round frame began to be extensively brought into operation, and the trade in cotton and worsted goods in every department exhibited a new and vigorous activity, with advances in wages and prices. The trade has been improved contrary to the expectations of the petitioners, without any direct legislative interference. But no doubt the commissioner was right in his conclusion, that the trade could only be permanently and securely based on the production of sound articles in materials and workmanship.

Mr. Muggeridge having reported that the interests of all engaged in the trade required the change, since the year 1846 the question of gathering the hand-machines into large factories has been much discussed. We did not at that time see reason for deciding that in order to their working efficiently, so as to secure good work, adequate wages, and reasonable profits, the machines and hands must be subjected to the automatic system which governs the arrangements and operations of a factory. Since then, however, an entire change has been brought about in the relative position of the employers and employed. The demand for goods has for some years been beyond the power to supply them. This has partly arisen from increased consumption. But it has been a consequence also, of the well-known fact in manufactures, that as wages increase, less work is done ; especially, when the time devoted to labour is simply controlled by the will of the workman. This consideration may at an early period become one of such importance, as to bear strongly on factory, as contrasted with domestic employment of machinery. Then there is the further fact, of a marked yearly increase in foreign competition. How far this may be carried is dependent on a diversity of circumstances, some of them of a kind that may be in some degree anticipated and measured ; others contingent on home and foreign political events.



The small proportionate quantity hitherto consumed and produced, shews there was room for a very large increase of the home consumption of hosiery. The same may be said of our foreign exports. Novelty in design and beauty of execution, was not attempted by more than four or five houses during the first half of this century. But about 1845, successful efforts begun again to be put forth by many Leicester hosiers, to introduce greater variety of colours, styles, and materials, into a multitude of articles so devised as almost to command a sale. Thus, hosiery has been made increasingly fashionable. It is worn so as to be more seen, and contributes its share to an elegant costume, furnishing various attractive articles of female attire. In 1845, Mr. Biggs stated, that 1,300 frames were already employed at Leicester in making new and tasteful articles. The number is much larger now, and is increasing both there and at Nottingham. This for a variety of reasons, is causing the accumulation in factories of machinery to be worked by power. Mr. Collins, of Leicester, shewed at that time, that steam could be applied to round frames. Charges for rent, standing, winding, and other things, were made amounting sometimes in a week's work on these frames, from 7*s.* to 9*s.* 6*d.* a-week; and the net earnings at that time by youths of sixteen or eighteen, were 10*s.* to 16*s.* a-week. At Messrs. Harris's factory, where fancy goods were made, the earnings were about £1 a-week. This house secured secrecy as to their production by this inclosure of the machinery.

A meeting was convened at Nottingham, in 1845, at which it was decided, by a majority consisting chiefly of the hands working on cotton and silk in Nottinghamshire and Derbyshire—the Leicestershire delegates dissenting on the ground that, “the resolutions were behind the age, and were moreover impossible of execution”)

“That parliament should be applied to for an act to establish a minimum of wages; to authorize the seizure and destruction of ‘cut’ goods, *i.e.* those fashioned by the scissors and sewn up; the prohibition of importation of foreign hosiery except on terms of perfect reciprocity; and finally, the re-establishment of the authority of the London frame-work-knitters company throughout the stocking manufactures of the three kingdoms.”

The Leicester part of the trade, at a meeting held in March, agreed upon a petition, which was well drawn up, asking—

“That sound and cut work might be stamped before sale so as to distinguish them to the eye of purchasers. That all charges for frame rents and expenses in diminution of their earnings might be entirely abolished. That all work should be given out accompanied by tickets descriptive of kind, quality, and price of the labour, and should be paid for accordingly. That local boards or courts of conciliation composed of masters and men should be established on application to government made from time to time, having for their object the conciliation of differences, the adjudication of small sums in dispute, and vindicating the law in local matters of trade with such other powers and functions as may be attributed to them.”

This meeting also decided on the raising of a fund to enable the men to resist further reduction of wages.

In 1846, Sir H. Halford introduced a bill in conformity with one of these requests—

“To require manufacturers to deliver tickets on giving work out to the men specifying the particulars as to the kind of goods to be made and the prices contracted to be given for the work, of which these tickets were to be evidence.”

Sir Henry succeeded in getting this act passed. It was soon found that it would be impossible to carry out its provisions; and that if practicable, it would be of no real advantage to any of the parties interested in its execution.

In 1847, Sir H. Halford brought into the House of Commons another bill, entitled “A bill to repeal an act for making further regulations respecting the tickets of work to be delivered to persons employed in the manufacture of hosiery in certain cases, and to make other provisions instead thereof, and to make further provisions to secure the wages of persons employed in the manufacture of hosiery.”

“1. Its preamble states it to be expedient to abolish the Ticket Act, and to give more efficient protection to workmen in every department of the trade. 2. The old act to expire on 1st September, on which day the new one to come into force. 3. The interpretation clause limits the term ‘manufacturer’ to any person furnishing material to be wrought into hosiery goods, to be sold or disposed of on his account; ‘agent’ or ‘servant,’ any one acting for and in the name of the manufacturer; ‘workman,’ any one by whom the materials furnished are to be actually wrought into hosiery. 4. Declares the practice of receiving materials by intermediate parties, and em-

ploying workmen under them to convert the same into hosiers' goods, to be objectionable and ought to be abolished; and enacts that no one, except the manufacturer, being the real and absolute owner of the materials and interested in the sale when wrought up, shall give out work, employ workmen, or enter into any contract for that purpose. 5. A partner may act for a firm, make a contract, and give out materials. 6. An owner may act by an agent or servant whose acts shall bind the principal. 7. Every manufacturer of hosiery shall, on delivering out any materials to be wrought up, whether on his own premises or elsewhere, enter in a book or books to be kept by him for that purpose a statement of the particulars of agreement between him and the workmen, by whom such materials are to be wrought into hosiery goods; such entry to specify names and places of abode of workmen, and be in form in every respect and particular of schedule annexed, and be signed by the manufacturer or his agent. (The schedule for stockings requires twenty-three columns of particulars besides signatures; for socks, sixteen columns; for gloves, seventeen columns; for shirts, sixteen columns; for caps, ten columns; and eight columns for any other description of hosiery). 8. Inflicts penalty of £5 to £20 for contravention of any thing provided in the act on proof before two justices, whether as to contracts between manufacturers or smaller masters, or non-inserting, altering, or obliterating particulars of contracts with workmen as ordered. 9. Books of particulars of these agreements to be kept at the manufacturer's usual place of business; and any workman being or having been within fourteen days in his employ, may apply for and obtain inspection of them, and may copy any entry therein at suitable times. Hindering or refusing such inspection or copies, incurs a penalty of £5 to £20. 10. In case of dispute this book to be produced, and the entry shall be evidence respecting the particulars contained in it. 11. Except where the dispute arises from alleged imperfection of work, when the piece of work in question shall itself be produced; or if not, taken to have been well made. 12. Makes the wages contracted for, a debt to be paid without any deduction whatever. 13. Declares that frame-rents are unjust to workmen, and have given rise to many evils—therefore, ought to be abolished; and goes on to enact that, no person shall let on hire any frame to any workman, or take from him any money, rent, gain or profit, or deduct from his wages on account of his renting, hiring, or using any such loom, frame, or apparatus for making hosiery. 14. Enacts penalties for breach of the preceding clause (sum left blank); states fifteen to eighteen forms for legal procedure, and gives penalties to the crown. 15. Declares no removal by *certiorari* allowable, nor any conviction to be invalid for want of form; nor any but special damage recoverable in case of any irregularity in proceedings.

This proposed Act was of so extraordinary and sweeping a character, as to cause much discussion at the time, and though the state of things as to wages is widely different now to what it was then amongst the body of frame-work-knitters, yet independent frames,

frame rents, charges, and intermediate agents remain; so that these grounds of difference, and, in the event of adverse circumstances in the trade, of discontent, present subjects still for unprejudiced consideration.

At the time, the following objections were made to the proposed enactment:—

“It abolishes frame-rent, but does not provide for securing the owner’s right of property in and use of frames, as is done by weekly frame-rent, and his payment for the larger repairs.

“It does not state who in future is to pay these larger expenses, nor deal with the question, Who is to compensate the owners of independent frames for this legal destruction of the value of their property?

“It makes every workman or workwoman independent of any one but the hosier. All journeymen and even apprentices are to become their own masters. A hosier could not give out work to a husband for his wife, or to a parent for his child. No exceptions are contemplated; the object being to get rid of unjust charges and every kind of intermediate agency at any cost. No one is to make a bargain for a working stocking-maker but him or herself. The hosier may employ a paid agent, but the workman must appear in person, and be dealt with individually by a separate agreement, both as to money and materials—a thing impossible.

“Will the hosier thus increase the number of his accounts, or entrust a frame and materials to every stocking-maker on his own account? The chief places where materials are given out, and stockings taken in from the workpeople or their agents, are Nottingham, Sutton-in-Ashfield, Belper, Derby, Loughborough, Leicester, and Hinckley. By the bill all the 40,000 men, women, and youths must waste their time, strength, and money in going to these places, instead of three-fourths of them staying at home to work in the frame, clean the house, work in the garden, or otherwise profitably and healthfully employ themselves. At that time there were 16,280 frames in Nottinghamshire placed in 5,200 shops. The shopmaster only attends the hosier’s warehouse. Besides these, the bill would oblige the remaining 11,000 workpeople to travel every year, chiefly on foot, each 400 miles on an average, to visit warehouses already overcrowded, incurring the temptations of the town as well as the expense.

“The book containing particulars of agreements is to be open for inspection, and may be copied and published for aught that appears in the bill. This cannot be fair dealing with an employer’s business.

“It is remarkable that, *under this bill no workman could incur any penalty.*

“The direct and necessary result of this bill must have been to entirely break down the domestic character of this manufacture, spread as it is over nearly every open parish throughout the three midland counties; to bring twenty to thirty thousand families into the larger towns, and place the frames in factories. This may, in time, be found necessary; but as it must involve the removal of at least 100,000 persons, would require much caution in the process.”

To these adverse remarks, the supporters of the measure replied—

“That the clause allowing the masters to employ local agents, who could enter into binding contracts on their behalf direct with any workman, was sufficient for all necessary purposes of trade; and that a workman has an inherent right and direct interest in making engagements with principals or their servants. Many workmen were already thus directly engaged and employed; and it would be greatly for their advantage if all were so. The men are employed under the prevailing system in ill-ventilated shops, serving in many cases as sleeping rooms, workshops, sculleries, kitchens, dining rooms, and even rabbit houses: where the children are compelled to inhale impure air, and to witness every kind of indecency. The present is a system that encourages vice, robbery, and immorality. The men are unjustly dealt with, and in return retaliate by disposing of the materials, and even sending mere babes to the accursed bagmen to sell the yarn belonging to other people. Under the new system the men are not only better in their social position, but their mental and moral qualities are higher. They get more steady employment, and are not subject to many inconveniences of the existing system. If there are to be middle men, they ought to be made by law responsible to the hosiers as to their masters, in carrying out engagements made on their behalf with the workmen.

“Frame rents impoverish the workpeople by bringing down wages to an unnatural level. Besides, if we are to believe the evidence given by the manufacturers on Mr. Muggeridge's enquiry, the prosperity of the trade does not depend on the profit received for the making of goods, but from exactions made from workmen's wages after being agreed to be paid for at a certain rate per dozen. In every trade where direct deductions are made from wages, the people are in poverty living on the charity of ratepayers, and dragging out a miserable existence, while their employers are growing rich. In factories, more expensive machinery is employed, yet none of these charges on the workpeople are made. Besides, in many factories 1,000 to 3,000 persons are employed, yet the whole of these deal directly with the manufacturer through his servants. Surely no one can assert that the employer of 100 cannot do the like. We conclude in the words of Mr. Muggeridge, ‘that frame-rents tend to create surplus supplies of goods, acting together with the long recognized system of heavy deductions on one pretext, and another from wages making it the interest of employers to spread work among more workmen than are necessary to its performance—a practice greatly facilitated by superabundant machinery, brought into the trade by others than the legitimate employers as profitable investments of capital through the exorbitant rent of frames.’ This bill does not confiscate property: it is protected by 6th and 7th Vic. And are the masses and rate-payers to be ruined, that a few speculating men may receive exorbitant rents; and the trade be injured, that they may live at the expense of the community?”

There were those who for years had seen and deeply deplored the difficulties and sufferings of frame-work-

knitters, and had expressed their sympathy by devoting time and money to the advocacy of a public and general effort to raise them in position and increase the rate of earnings: first, by creating a fund for the purchase of independent frames; second, the consentaneous abandonment of frame-rents; third, abolishing all shop and middle men's charges, except as allowed by a recognized and reasonable tariff; and fourth, by making it illegal for the bagman to pay less wages for the work than he received it out at and was paid for it from the warehouse, of which, in all points, he must be considered the responsible agent when giving out and taking in their work.

Men of business, having prognosticated, as the event proved rightly, that the 'ticket' bill would fall into disuse of itself, could only see in this effort at trade legislation, another instance of the danger of important and difficult legislative matters falling into over-sanguine and inexperienced management.

A minimum of wages to be legally established and enforced, is still thought by the great majority of workmen to be not only right and desirable but feasible, and if withheld, that it would not be by the force of reason and experience brought against it, but by the strong hand of power.

There are many in other classes, however, who are true friends of the working people, yet agree with most political economists in denying the right or policy of interfering with wages further than to enforce legally the performance of any contract, by requiring the stipulated labour on the one hand, and the due payment for it in the current coin of the realm on the other, and that such contracts should be freely made on both sides. Besides, if a minimum could be established, it must include day and piece work; that of the young, the full grown, and the old; the agricultural, domestic, mechanical, and distributive. The idle, stubborn, inexperienced, and awkward, must in fact be paid out of the funds resulting from the labour of the acute, diligent, well-trained, highly skilled operatives.

On the other hand, discussions with a view to arrangements between even bodies of employers and workpeople,

as the basis for fair and equitable rates of wages, stand on very different ground, and might prove beneficial in facilitating satisfactory individual contracts; especially if sanctioned and ratified, after due enquiry, by boards of arbitration and conciliation. The publicity thereby given to these matters would operate generally to establish and sustain just and adequate scales of wages, and prevent attempts at extravagant and dangerous advances, more than any Act of Parliament that could be devised, and which it would be possible to enforce.

## CHAPTER XXIX.

THE HOSIERY MANUFACTURE, 1847 to 1867.

COURTS of conciliation, arbitration, and regulation of differences arising out of manufactures and trade, have been often proposed and discussed, and sometimes brought into operation. These should be local, cheap, frequent, and final; and so constituted as not to impede the free and profitable employment of labour, skill, and capital in trade. Such courts were established by law in France in 1806, and have been, with some modifications, effectively continued to the present time throughout the empire, under the name of "Conseils des prud'hommes." Their functions extend to every question that can arise in manufactures and trade, except that of fixing a rate of wages; which however, when agreed upon between employer and employed, they can enforce; and in the fulfilment of their duties they have exercised a most beneficial influence. In the ten years from 1830 to 1840 they had 135,730 cases brought before them; of which 128,319 were conciliated, 3513 were withdrawn by consent, the councils pronounced 3881 judgments, against which only 155 appeals were made. Later statistics exhibit a constantly increasing area of operations with equally satisfactory results.

It is not pretended that such courts would be in every particular suitable for England. Yet the principles and modes of operation embodied in their constitution, are deserving of the greatest publicity with a view to serious consideration, especially as the subject has been under inquiry by committees of the House of Commons, and is now one of several cognate topics referred to a commission for full enquiry. An abstract is therefore given of the French laws, as translated by



the present author, in 1835, and since circulated by frequent republications, parliamentary and otherwise:—

“These local trade councils are established in order to hear, conciliate, arbitrate and settle all disputes arising in manufactories and workshops between merchants, manufacturers, masters, clerks, overlookers, journeymen, or apprentices, or each other, as to any employment whatever; thus any agreements and contracts which relate to manufactures or handicraft labour may be submitted to the judgment and decision of persons of competent knowledge, to hear and decide upon them; but they shall have no other jurisdiction whatever, except where statements of facts are required by ordinary tribunals. They are to repress insubordination in manufactories and all serious misconduct of apprentices. They are also to ascertain and state where necessary for the guidance of the superior courts, the amount of loss by neglects, breach of agreements, unfaithfulness, and thefts committed in workshops by those employed in them.

“To guard property in patents, marks, patterns, &c., and to punish those who counterfeit or usurp the same; an appeal is however open to the tribunals of commerce in these cases.

“To give information to government from time to time, of the prosperity or decay of each branch of industry and commerce.

“They shall be composed of merchants, manufacturers, masters, overlookers, and privileged licensed workmen only.

“No wholesale or retail dealer, if not a manufacturer, or if under thirty years of age, or who has failed in business, can be a member.

“The number of members varies with the size of the town; and are elected from the manufacturers in proportion to the amount of the trade; and from the masters, overlookers and licensed workmen. The latter electing one fewer than the former. Each member to be elected by a simple majority of votes present.

“The election to be by convocation of each class, held eight days after public notice, called and presided over by the prefect. Each voter shews his patent of privilege, and inscribes his name. Persons who have failed; those who have not exercised the trade for six years; who cannot read and write; or who have not returned materials given to them to make up, are excluded. The prefect decides upon any contested vote.

“One manufacturer, or one from all the other classes, shall be chosen to fill up a vacancy from death, retirement, &c., during the year.

“The members take an oath before the prefect or mayor, to fulfil their duties with zeal and integrity.

“The president to be elected by a simple majority who shall take their votes, express their will, and sign all documents.

“And a vice-president to act in his absence; both of whom shall be from the class of manufacturers. The judgments of the council to be executed by an officer to be appointed by the magistrates for that purpose.

“If the council be composed of 5 to 7 members, one member shall go out each year for two years; if of 9, two shall go out; if 10 to 15, three of each; but the third and each succeeding year those go out who were first elected; all are eligible for re-election. Expenses to

be verified by the mayor. These include pens, ink, paper, salary of secretary, carriage, postage, and expence in visiting workshops, &c.

“Every workman labouring in his own dwelling is amenable to the council before which his employer may be citable.

“In 1811 there were 156 trades named as under the authority of these councils.

“Their first duty is to reconcile; the second to arbitrate. Whatever the nature of the dispute if connected with manufacturing operations, and whatever the sum at issue, they are subjected to their decision. If of above £4 amount their decision is liable to appeal to the higher court. Their cognizance extends to the application of general laws, and new or revived regulations affecting masters or workpeople throughout the manufactories of the empire, particularly as to deficiencies in lengths, widths, quantities, size, weight, preparation, quality, or solidity of any work performed, or goods made of any materials whatever, animal, vegetable or mineral, prepared in shops, factories, forges, or laboratories. The councils decide upon all defects in work done in any trade whatever. They hear all complaints of want of solidity or quality in bleaching, dyeing, or printing, arising out of not using necessary ingredients for producing good colour or fine impression; or from injuries arising from employing corrosive or other destructive matters.

“All questions of responsibility of clerks, under-masters, over-lookers, &c. as to making goods, buying, distributing, and using materials to workpeople; preparing and making up goods; their expedition to market; payments to workpeople; keeping of accounts; disputes as to wages, salaries, &c., between manufacturers, masters, under-masters, over-lookers, and clerks, come under their cognizance. Also, all questions as to bad materials, defective work, delay or refusal to work, or deliver up work finished, advances of materials or on wages; and as to all engagements entered into between employers and employed.

“These courts estimate all work begun, abandoned, or finished, whether disputed by masters, or men, and whether there may or may not have been an agreement as to the price to be paid for the labour to be put into them.

“And also as to work destroyed or injured while in the hands of workpeople, whether by accident, violence, or any other cause, where no fault is attributable to the workman.

“Also, as to the quantity and quality of raw materials, looms, harness fittings, tools, or instruments delivered to workmen, whether used at home or in the employers' factory. And as to refusal by masters to pay wages or to receive work from the workmen, whether by masters, clerks, or agents.

“As to the fulfilment or otherwise of indentures of apprenticeship.

“And finally, as to all damages and loss resulting from disobeying the laws or contravening the trade regulations, or not executing agreements amongst the above named parties; or from inferiority, defects, delays, or loss of goods, on the part of any of these classes from the neglect or misconduct of another. Upon insubordination or disobedience, on the part of workmen or apprentices towards masters, in their business, punishable under the old law by fine of 10s. or less, or 5 days imprisonment or less; the council may

inflict three days' imprisonment or less. If more serious they may send the offender to the ordinary criminal court, in custody if necessary.

"The court may not interfere with any matter of ordinary general police, affecting workpeople in factories, this being the duty of the mayor exclusively.

"The judgment of the council is without appeal as to imprisonment, and shall be executed by the ordinary police.

"These councils cannot take cognizance of the following matters with a view to deciding upon them; but they may do so in order to stating the facts, and preserving the things from abstraction, destruction, or alteration, necessary for evidence upon them before the superior courts, viz:

"Any combination of masters tending unjustly to lower wages; upon which crime the law inflicts imprisonment of from six days to a month and a fine of from £8 to £120.

"Any combination to hold stocks of goods with the intent of not selling below a fixed price; or any fraudulent practices, intended to raise or lower prices above or below the rates fixed by natural and free competition of commerce; against which there is the legal penalty of from one month to a year's imprisonment and a fine of from £20 to £400.

"Any fraud or deceit in the title under which merchandise may be sold, whether false weight, measure, or quantity; against which there is a penalty of three months to a year's imprisonment and a fine not exceeding a quarter of the sum restored nor less than £2.

"Any combination of workpeople to stop work altogether, or hinder it from going on, or for continuing it certain hours, or to raise its price; which subjects the offender to imprisonment for a month to a year.

"Any outrage, violence, menaces, or injuries by masters or workmen towards each other; for which the law inflicts imprisonment proportioned to the offence.

"The communication by masters, workmen, over-lookers, clerks, or apprentices, of any secrets in the manufacture in which they may be employed to any foreigner or Frenchman residing abroad, against which the penalty is solitary confinement and a fine of from £200 to £800, or to any Frenchman living in France, for which there is the legal penalty of three months to two years' imprisonment and a fine of 10s. to £8.

"The pillaging or injuring goods in shops, factories, &c., by combinations or riotous workpeople; the penalty for which is hard labour and a fine of from £8 to £200.

"Voluntary injury to materials or merchandize; or their abstraction from factory, or workshop, by persons employed; the first incurring imprisonment from two to five years and a fine not exceeding a quarter of the damage nor less than 10s. the second two months to two years and a fine not exceeding a fourth of the value, nor less than £20.

"And finally, thefts in workshops, factories, forges, and laboratories, &c., by those employed; involving the penalty of solitary confinement.

"Two of the council, one a manufacturer, the other a workman, shall be sent when necessary to search the premises of manufacturers

or workpeople; and on emergency, take such measures as may be necessary for securing things necessary for evidence, assist the course of justice and the conviction of offenders in all manufacturing cases.

“The council shall appoint a private committee composed of two members, one a master manufacturer, the other a master workman, over-looker or privileged workman. These shall hold a sitting every other day, where the council is of 5 to 7, and every day where it is of 9 to 15 members, from 11 till 1 o'clock. Their function is to reconcile applicants. If unsuccessful, they shall send them to the general sitting held at least once a week, and composed of at least two-thirds of the council. There, cognizance of the cases not reconciled shall be taken, and if not involving more than £4, their decision shall be final. If beyond, it may be carried by appeal to the chamber of commerce. These decisions shall be by the votes of a simple majority of the members present.

“The councils are charged with the duty of visiting once or twice a-year workshops and factories to inspect them, and take an exact account of all the machines and people at work in them. To obtain information useful in manufactures and commerce; to register it, and send it through the chambers of commerce to the government.

“No lawyers are permitted to plead in these courts, and the expenses are limited to a few shillings in any case.”

The general establishment of trade boards of arbitration has frequently been requested by bodies of workmen at the hands of the legislature, and successive committees of the House of Commons have taken much and varied evidence on the subject. It presents confessedly great difficulties, but the necessity for a satisfactory solution of them is of equally great, nay paramount importance. Had the commission, at whose head has been placed one of the greatest of our revered judges, not been appointed, and through whose labours these questions will no doubt have great light thrown upon them, we should have ventured to express the view, which after long consideration, we take of them. But instead thereof, it will be of more practical utility to give an opportunity for contrasting with the French system, the particulars of a mode of conciliating differences between employers and employed, brought into operation a few years ago in the hosiery trade, the narration of the progress and present position of which we are about bringing to a close. The following public document has just been drawn up, and has been handed to us for this purpose.

“AN ACCOUNT of the origin and progress of the Board of Arbitration and Conciliation of the Hosiery and Glove trades, of which Nottingham is the centre:—

“The hosiery trade for a period of two centuries has been spread over the counties of Nottingham, Derby, and Leicester. Leicester has long been the centre of the woollen branch, as Nottingham is of the cotton, silk, and merino branches, which form by far the largest portion of the trade. These last employ, according to Mr. Felkin’s estimate, from 20,000 to 25,000 workmen in hand-frames (not reckoning the frames worked by steam power) spread over the counties of Derby, Nottingham, and the northern part of Leicestershire. The wages of these hand frame-work-knitters are regulated by the board of arbitration and conciliation, and all questions arising from wages are referred to it for settlement.

“There are few trades in the united kingdom in which there has existed so much agitation and irritation as in this. For a century past strikes have been frequent and protracted, and in some instances have led to disastrous and even fatal consequences. Luddism was an out-growth of the opposition to improved machinery, which the frame-work-knitters believed tended to reduce wages, and was not suppressed until several of its unhappy leaders suffered the punishment of death. Throughout the present century down to the year 1860, strikes and lock-outs continued; and in times of brisk demand the trade was constantly subjected to loss and embarrassment consequent thereon. Trades unions have existed in every branch from about 1780 to the present day. The trade has always had to maintain a sharp competition with the foreigner, and especially against the cheap labour of Saxony. The system of employing middle-masters, which is a necessity of the trade, is liable to great abuse; and the cupidity of individual employers has at times given rise to great oppression; hence there has always been cause for irritation and disunion, and however unreasonable the demands of the workmen may occasionally have been, their grievances have been many, and often calculated to embitter their minds against employers and their agents. From these dissensions both the capitalist and the workmen have been frequent sufferers. Strikes have heretofore been usually resorted to by the workmen as their only means of redress. Frame breaking and burning in effigy were amongst their worst consequences in the first quarter of this century; and in modern times they have been embittered by gross personalities and inflammatory placards.

“It was after a struggle of many weeks in the wide branch in the autumn of 1860, that the board of arbitration and conciliation originated. This was the third or fourth strike in the same branch during that year. The workmen struck for an advance of wages which their employers believed it would be impolitic to grant. The manufacturers met together to consider what steps should be taken to terminate the strike, and as the branches which were at work contributed to the support of the branch which refused to work, a lock-out was proposed. Before resorting to such an extreme course, some manufacturers wished to try conciliatory measures, and it was resolved to invite the workmen to a conference. This invitation was cheerfully responded to, and a deputation of employers met the workmen in the committee room of the chamber of commerce; and after a protracted discussion extending over several days, all difficulties were adjusted upon the express condition that a board

of arbitration and conciliation should be formed to prevent such calamitous disputes in the future. The board was immediately constituted, and met for the first time on the 3rd December, 1860, at the committee room of the chamber of commerce, where it continues to hold its meetings. At the outset it consisted of nine manufacturers chosen by a public meeting of their own body, and nine operatives selected by their respective trades unions. Recently the number has been reduced to seven of each, but in all other respects the rules appended thereto continue to govern the board in its constitution and proceedings.

“Questions of wages, the manner in which certain classes of work should be performed, and the rate at which new classes should be paid, constantly employ the attention of the board: but in addition other matters have arisen which have an important bearing on the material and moral interests of the workmen. One of the first subjects which demanded its attention was the abominable practice of the ‘truck’ system. Some of the middle-masters, whilst paying the regulation prices to their workmen, continued to keep them in a state of subjection by supplying them in advance with various articles of consumption, such as groceries, flour, cheese, bacon, &c. This, although in contravention of law, is sometimes very difficult of suppression, as it is not always done in a direct manner, but through some relative keeping a shop or store in which the employer possesses a secret interest. The goods supplied in this way are invariably charged much above the market value, besides being of inferior quality; and this is tantamount to a large reduction of wages, besides depriving the workman of his independence. The board advertised in the public newspapers their determination to stop the system by prosecuting the offenders, and by removing the machinery from any middle-master having recourse to such practices. A prosecution was instituted in one instance, and these measures had the effect of entirely stopping this oppressive system; if it is at all practised at present, it is in such a secret and mitigated manner as not to be known by the board. Another evil which reduced the purchasing value of the workmen’s earnings was the custom of paying them in the villages at late hours on Saturday night, or early on Sunday morning, when no markets were available. This was also advertised in the newspapers as contrary to the wishes of the board; and individual employers guilty of the practice were written to in terms of remonstrance, and the evil thereby greatly checked, although, perhaps, not entirely eradicated. Deductions from earnings in excess of the customary charges of the trade have been steadily discountenanced and suppressed.

“When the board was first founded it was generally considered a doubtful experiment. Several manufacturers were openly or covertly hostile to it. Some regarded it as Utopian and impracticable; others, as likely to pry into the secrets of their business, and some as derogatory to their position and independence. These objections, however, have been steadily disappearing, until at the present time there are only two or three who refuse to acknowledge its decisions: but these are as effectually governed by its regulations as its warmest supporters; and the resolutions of the board have been generally loyally responded to by both masters and workmen. The decisions

at the board have always been conducted in the most friendly spirit and orderly manner. There has never been the slightest contention as to who should fill the offices of president or vice-president. The workmen propose a manufacturer as president, and the manufacturers a workman as vice-president. Whenever any breach of economic laws has been suggested by workmen outside the board, the operative delegates have always been the first to denounce it. The voices of reason and humanity have invariably had due weight with the delegates of both sections. And although both masters and workmen are accustomed to express their opinion of each other's individual and collective acts without the slightest reserve, no manufacturer or workman has ever been known to suffer from the free and honest expression of his views. One of the most evident results of this interchange of thought and opinion is, that the workman becomes better acquainted with the laws which govern trade and commerce, and with the influence of foreign competition; and the master learns how to appreciate the difficulties of the workman and to sympathise more with his trials and struggles to maintain and improve his position. It is important to notice that the success of this system is more attributable to its preventive than its curative character. Nine-tenths of the matters arising in the trade that would, if allowed to go on, produce dissension and irritation, are never brought before the board, but are arranged by the interposition of the committee of enquiry, who by taking prompt action, and by exercising a spirit of justice and conciliation, succeed generally in arriving at a satisfactory result: if unable to do so, a reference is then made to the board.

“During the disastrous years of 1863-4 the trade suffered terribly from the American war; manufacturers sustaining great losses and workmen suffering severely from want of employment. For the greater part of that period the board did not meet, owing mainly to the fact that there was no occasion for its services; but the committee of enquiry continued its duties; and immediately revived meetings of the board were alike called for by manufacturers and workmen, and the prices of labour were raised to a level corresponding to the demand.

“The strikes of former periods not only entailed great sacrifice and suffering on the workmen while they lasted, but necessitated large contributions before and after to sustain them. The trades unions sometimes levied as much as 1s. or 1s. 6d. per week from the scanty earnings of the stocking-maker for many weeks in succession, and the clothing and furniture of scores of families disappeared during a long strike. At present the contribution to the trades unions during some years does not exceed that of a single week under the old system. And the manufacturers have ceased to regard them as their natural enemies.

“The facts which the board points to as the best proofs of its success are—that during the six years of its existence no strike or lock-out has taken place, no personal attacks have been made, and no inflammatory handbills circulated. Never in the history of the trade has there existed so much good feeling betwixt employers and employed as at the present moment. And during the past two years, wherein labour has been scarce and agitation on the question of wages prevalent throughout England, the manufacturers in this branch of

industry, have been able to accept contracts without apprehension, and execute them without delay.

“(Signed)

<i>Manufacturers.</i>	<i>Workmen.</i>
H. J. MUNDELLA, <i>President.</i>	J. SAXTON, <i>Vice-President.</i>
T. HILL (Messrs. J. & R. Morley).	H. FARRANDS.
R. W. SMITH.	T. WILSON.
T. ASHWELL.	W. FOSTER.
J. H. LEE.	— STRAW.
T. BLACK (Messrs. Rogers & Co.).	G. KENDALL.
H. T. COX.	JOHN LAMB, <i>Secretary.</i> ”

(January, 1867.)

The rules of this arbitration committee are these—

“The board to consist of seven manufacturers and seven operatives, The latter are elected one each by the Sutton, rotary, drawer and shirt, circular, rib top and wide half hose, wrought, and glove branches. The manufacturers are elected at a public meeting of their own body. All the deputies serve for one year, and are eligible for re-election in January of each year. Each delegate is to be entrusted by his branch with full powers to vote, and the decision of a majority present at meetings (the chairman having a casting vote) is to be binding on each branch. An annually appointed committee of enquiry, consisting of four members and the president *ex officio*, shall inquire into cases referred to it by the secretaries. Such committee to use its influence towards the settlement of disputes. If not able to adjust the business referred to it, such business shall be remitted to the board for its decision. In no case is the committee to make any award. A president, vice-president, and two secretaries shall be appointed at the annual meeting, and are eligible for re-election. The board shall meet quarterly; but on a requisition signed by three members to the president, he shall within seven days convene a meeting by circular, stating the nature of the business to be transacted, provided such business has been first submitted to the committee of enquiry and not decided upon by them. All complaints for the decision of the board shall be clearly stated and in writing one week at least before the meeting of the board. All expences incurred to be borne equally by the operatives and employers. Notice of any proposed alterations or additions to the rules must be given in writing one month before a quarterly meeting, or a special meeting to be convened for the purpose.”

The annual report of the board for 1866-7, states—

“That the past year has been on the whole a prosperous one, employment in nearly all the branches of the trade having been abundant. The board has met eight times during the year for general and special business. The committee of enquiry has also met on several occasions, and all matters in dispute which have been submitted to it, have been speedily arranged. Six years experience of the practical working of the system of arbitration in place of strikes and lock-outs, has thoroughly convinced the board, that in a free country where workmen and capitalists have a perfect right to enter



into combination, the simplest, most humane, and rational method, is arbitration and conciliation. The demand for hosiery has been for two years exceptionally large, and workmen unusually scarce: and, though the workmen have preserved their trade unions, having now a central authority to appeal to, composed equally of employers and employed, all irritative questions and disputes and inequalities in wages have been adjusted, and the masters could accept contracts without fear, and the workmen's rights have been strictly preserved. At no former period in the trade has there been a more cordial understanding between them. This they trust may long continue, and so advance the interests of the trade and improve the condition of the workmen."

This committee of masters and men for arbitrating and settling disputes, is an arrangement which seems likely to be followed by one of equal or even greater importance, considering the extent of its proposed operations, and the very altered position of the work-people, from the demand for their labour and consequent advance in the prices it commands. 'Three county meetings,' as they have been termed, have been frequently held in times of general difficulty and distress; but from the diversified position of the respective trades in cotton, woollen and silk goods, as to the extent of demand experienced at any one time for their respective classes of labour, united action has always been found a matter of difficulty amongst the hands. Improved circumstances, whether internal from the effect of better wages, or external from the example and influence of other trades, seem to be operating to bring the whole fifty or sixty thousand frame-work-knitters into a closer union. Meetings have been held of delegates for some years in the several districts, into which the trade naturally divides itself. Within the past few months, meetings of a more general kind have taken place. These have issued in a "delegate meeting of frame-work-knitters, representing the three counties of Nottingham, Derby, and Leicester." This was held in Nottingham, June 11, 1866, Mr. H. Farrands in the chair. Reporters were present. The resolutions agreed to, were to the following effect:—

"That we form a general amalgamated and consolidated union, to be called the United Frame-Work-Knitters Society, to protect our wages and to render assistance to all the members who subscribe to our funds and conform to our laws. That the legislative power shall

be invested in an annual conference of delegates from the several local unions of frame-work-knitters in this association. Special meetings may be called, if necessary. That the executive committee consist of a president, secretary, and treasurer, and one committee man from each branch of frame-work-knitters. *That we recognise the power and assistance of the present board of arbitration in all its decisions according to the rules laid down by that body for the guidance of manufacturers and workmen.* The president shall preside over all general and committee meetings. The duties of secretary and treasurer are defined. That in case the general secretary cannot, when all other means have failed, bring any dispute to an amicable settlement between the meetings of the board of arbitration, then he shall have the power of calling the central committee together. That each member pay one penny per month for general expences; that each branch manage its own funds locally; and that if one penny monthly be insufficient to meet all general expences, the committee have power to lay on an extra levy to meet the same. General expences defined to be—board members expences, printing for general society, central committees expences. That when the services of the general secretary are required in any locality, that locality shall send a deputation with him and pay the expences; and the local secretary shall give him an account of the time occupied therein."

Mr. Farrands was elected president, Mr. G. Kendall, secretary, at a salary to be fixed after consulting the 'body at large,' and representative delegates were chosen from the 'three-frame,' shirt and drawer, wrought hose, glove, rib, fancy hose, and half-hose branches. There were thirty-five delegates present, only one of whom was from Leicestershire. Whether it will subsist and operate as a real and efficient general frame-work-knitters union, is yet to be ascertained.

Many and important modifications and improvements have taken place since 1836, in hosiery machinery of all kinds. The number of frames making two or more stocking legs at once, which were without narrowing, but straight down to the feet, was so large, and the price of labour so low, that, joined to the difficulty and expence of constructing new, speedy, and safe frames to work by rotary power, it was not earlier than about 1845, that the latter were got into extensive operation. But far more difficult problems than this had yet to be solved; especially the important one of putting fashion into the work by automatic action, and that without stoppage of the machine.

This had been partly accomplished by a plan of Luke Barton, hosier, of Arnold, who patented it

in 1838, No. 7545. Perhaps this may be justly said to be the first wide rotary frame in which the stitches were shifted automatically, along with performing all the other operations of the frame. It included a novel construction of sinkers, and a peculiar adaptation of bars for carrying into effect the operation of narrowing by ticklers and other essential movements, which were effected in a very ingenious manner.

Ever since that time, extraordinary efforts have been put forth to attain, by the simplest methods of adaptation, a good and perfect self-acting substitute, suitable for factory labour and management, in place of the narrow-hand fashioning frame of Lee, for so many ages domestically employed. Nevertheless, in regard to nearly all of those hitherto constructed, Lee's principal instruments are retained and used in one form or another.

The house of Paget, of Loughborough, is one of very old standing in the hosiery manufacture. During three-quarters of a century, they have been the largest producers of fashioned Derby rib goods, having maintained the quality to a high degree.

Being always alive to the importance of securing new inventions, added to improvements in machinery that might be devised by themselves, they noiselessly, about the year 1844, alighted upon the circular machine, the 'tricoteur' of Brunel, constructed many on that principle, and worked them to great profit. An early modification of these circulars was introduced. An upright cylinder was used, around which needles were placed, which were moved by an upward ascent in succession, and the beards were subjected to a pressing movement, as the needles were replaced in position below. From the peculiar form and application of the sinkers in forming the loops, these were called 'platine machines.'

Messrs. Paget's circular machines have just passed by sale into other hands; they continue to produce work of excellent quality, and can only be superseded by machinery possessing the additional recommendation of increased speed.

In 1857, Mr. Arthur Paget took out a patent, No.

930, for improvements in hosiery machinery, whereby it was made self-acting, narrowing without loss of time, and which might be put to inanimate power. The following are some of the principal changes made in it :

“Using levers without joints, hinges or pins actuating the sinkers or their equivalents. Holding needles by their hooked or cramped ends, in a cut bar or comb. A presser bar working behind the sinkers, pressing and relieving the needles at proper times. Knocking over the work by wiping the loops over the needle heads by a bar. By a double grooved pulley arranged to draw across once during a part of each revolution, and in opposite directions during each alternate revolution. Producing a selvage in any part of the width of the frame by throwing out of action one or more sinkers for a time. Making combs or bars with cut brass or iron backs on which gauge depends, and casting divisions on the backs in soft metal, so that the gauge of the bar may not be affected by the casting of divisions.”

In 1859, a patent, No. 830, by the same gentleman, was obtained, modifying the former in the following important particulars :

By using a sinker to each needle actuated directly by an ‘incline’ and supported on each side by a grooved bar, kept in position by a spring. Using a presser bar with gaits or grooves for the sinkers to slide through, the walls of such grooves pressing the needle beards. Producing a selvage on any needle in the frame by means of the arrangement of a thread layer working exactly to and stopped at the required needle. Knocking the work over the bar by pieces of steel plate and securing them in gaits or grooves in a bar of metal.

Again, Mr. A. Paget patented in 1860, No. 624, improvements on both the above plans—

In thread carriers acting by an incline made to descend and pass between the needles at the end of each course. By alternately knitting web, and narrowing and widening it, or making changes in the web by moving levers or cams endwise in the directions of their axes, and another set of levers to be employed in narrowing, widening, or changing the knitting processes. Doing this by self-acting motion, by hand or pulley without arresting revolving cams. By stopping the catch block. By changing or suspending the speed of the rotary motion.

These machines with due attention work with safety, speed, and accuracy; producing excellent work. One of the largest employers of hosiery machinery of every kind, also one of the cleverest mechanics known in

the trade, after a recent examination of several, asserted "that in construction, working quietly and efficiently, and in the character of work produced, they were the *beau ideal* of what Lee's machine with the application of automatic power throughout all its various movements in making fashioned work ought to be."

A modification of that important instrument, the thread carrier, spoken of at p. 108, is here described; and from this time, in power frames, its use has been constant, though diversified and improved. It has increased the speed of the stocking-frame to a surprising extent. To it has been attributed the origin of the fly shuttle and other important inventions. Two workmen laid claim to the thread carrier; the one, Sadler, who died in Mansfield workhouse at the age of ninety; the other, John Roe, who died in the House of Correction in Nottingham.

In 1828-9, Messrs. Warners, of Loughborough, assisted, it was said, by Hood in perfecting the movements, brought out a power stocking-frame acting by thread carriers without hand with suitably adapted pressing and slur motions.

In 1830-1, Mr. Mather, of Nottingham and Paris, with Messrs. Wakefield, introduced a frame having two tiers of needles and an independent instrument acting upon each needle.

Messrs. Foote and Moore's rotary stocking-frame and thread layer was arranged so as to make fashioned hose by widening them. This was completed in 1834-5, by the assistance of Mr. Donnington, of Nottingham.

In 1836, Mr. Cope, of Radford, is said to have constructed an eyelet-hole stocking-frame, the movements on the needles governed by perforated paper instead of cards, but on the principle of the Jacquard.

Mr. Coltman, of Leicester, produced a rotary stocking-frame in 1837. The jacks in this were without tails; small springs working in catches at the head of the jacks, and there was a snail wheel to stop the thread carrier in narrowing.

In 1839, Mr. Henson, of London, constructed a warp rotary frame having an extra lapping movement.

The same year Messrs. Barton and Fisher devised

a frame having a receding needle bar and thread carriers worked by rotary movements.

In 1841, Mr. Lupton, of Radford, put together a tickler stocking-frame, the motions in which were governed by a Jacquard apparatus.

The Lisle thread for the glove manufacture was first used at Leicester in 1834. In 1845 its use had increased tenfold over 1835. Messrs. Biggs and Bedell's introduction in 1845 of patent elastic twist bands had greatly aided this result.

Mr. J. Thorburn patented in 1841, No. 9075, a stocking-machine, the principal feature in which was the placing a row of the ordinary needles on a moveable slide, and after the loops had been made and the presser applied, the loops were forced, the needles were drawn backwards, the loops forced over the needle heads, and then the needles were brought forwards again.

The plan appeared at the time to be the swiftest then known, and was spoken a good deal of, but has passed out of notice.

In 1842, Mr. Stubbins, of Nottingham, introduced inlaying india rubber thread into hosiery.

A stocking-frame working by the use of levers was constructed in 1843 by Mr. Bedford, of Hinckley. The process is not known.

A person named Goddard is said to have exhibited some years since in Angel row, Nottingham, a curious but complicated hosiery machine intended to produce straight down (not narrowed) stockings. This frame comprised three straight lines or tiers of needles, and worked by rotary power. It was unsuccessful.

In the *Society of Arts Transactions*, vol. xxix., p. 84, a stocking-frame is described upon which tartan plaid Scotch hose were woven by Mr. John Robinson, by making some additions to the common stocking-frame.

Mr. William Ward, hosier, of Leicester, and Mr. D. W. Groucock, a framesmith, took out a patent in 1844, No. 10,216, for looped, knitted, or netted comforters, neckties, &c. made in a tubular form. In 1855, Ward took out another, No. 2708, for improvements in weaving.

Mr. Charles Nickells brought out a machine in 1847

which proposed the following novelties for arrangements in the machinery :

Making a compound fabric of three or more webs combined together in the act of weaving by shooting the various webs with the same or separate wefts. Weaving tubular or circular fabrics by making them duplicate instead of single as heretofore. Making duplicate fabrics with separated selvages; the two, three, or more fabrics being combined longitudinally in the act of weaving.

This plan was patented in 1847, No. 11,729.

In 1848 he patented, No. 12,364, a fabric for gloves, dress, and furniture.

In 1851 he patented, in connection with Ball and Bagley, No. 13,880, an improvement in machine for making loop knotted elastic fabrics.

Fabrics knitted with a cut pile, one set of needles in circulars to remove the work from another set of needles. Improvements in warp fabrics by causing weft or traverse threads to be laid in on either side of inlaid longitudinal threads. Improvements in looms for making narrow fabrics. The like in looped terry, fleeced terry, or cut pile surfaces, by applying india rubber for water-proofing, gloves, &c. For covering longitudinal india rubber threads.

This specification is an instance of a practice too often adopted of grouping together in one patent, heterogeneous and it may be important claims, where they might never be looked for or expected.

Nickells and Thornton took out a patent in 1852, No. 247, for weaving.

And, in conjunction with Hobson, in 1854, No. 2124, for using wires in making piled fabrics.

Messrs. Thornton Brothers, of Nottingham, took out a patent, No. 72, in 1853, for making looped mitts and gloves. Another in 1855, No. 2267, for looped work. Also, in 1863, No. 1962, for a coarse knitting machine to make the fabric for children's hoods, gaiters, and shawls. The knitted stitches are varied in size and form, or made by the action of bars and wheels or Jacquard apparatus. The product is an almost perfect imitation of hand-knitted or netted articles. This method is not confined to Thornton's, but is used by Harris and Sons, of Leicester, who have become interested in the patent. It is highly spoken of as an excellent and useful invention.

We learn from the interesting article 'Brunel,' *Encyclopædia Britannica*, 8th edition, that—

"Sir Marc Isambert Brunel" (the patentee of the round hosiery frame, and for aught that is known to the contrary its inventor) "was born in 1769 of an ancient family at Hagueville in Normandy. He early shewed a strong predilection to the physical sciences and genius for mathematics. He entered into the French naval service and made several voyages to the West Indies. In his fifteenth year he constructed for his captain a sextant with which to make his observations. Being a royalist he emigrated during the Revolution to the United States of North America, where he became an architect and civil engineer, and supplied several new and ingenious machines, while prosecuting national works—such as cutting canals, and erecting an arsenal and cannon foundry at New York.

"In 1799 Brunel came to England, where by 1816 he had completed his beautiful and effective block cutting machinery, which after fifty years remains at work without any improvement. These machines have more than most others tended to the substitution of machinery generally for manual labour. For this invention he was rewarded by Government with £16,000, and was further employed to put up extensive saw-mills at Woolwich and Chatham. He had already invented the ingenious little machine for winding thread into cotton balls, which has been one means of increasing greatly the use of cotton yarn; and found time to invent an instrument to multiply copies of manuscripts, by the use of several pens at once—a simple portable copying machine. Also a contrivance for making small druggists' boxes, previously imported from Holland. He gave some effective attention to nail making machinery; and discovered means to give the appearance of efflorescence to tinfoil, fitting it to ornamental use. He improved the cutting of veneers, by using circular saws of large diameter, to which is mainly due their extended application to articles of furniture of various kinds. A little before the conclusion of the war in 1815, he devised a method for making strong durable and cheap shoes by machinery, which were used by the army. Brunel was one of the first to take an interest in the use of steam for marine purposes, especially in towing vessels to sea, and introduced during several years various improvements in steam-engines. He especially devoted time, money, and mental effort, in the endeavour to use liquified gases as a source of motive power, but in this he was not successful.

"M. Brunel offered his plans for constructing roads under rivers to the Emperor Alexander in 1814, with a view to one under the Neva at St. Petersburg. These being applied to the Thames, under his superintendance, issued in the existing tunnel, which was opened in 1843. This great work exhibits so much professional skill and energy, combined with facility of invention and resources adequately to overcome apparently insurmountable difficulties, as to secure a high position for the successful engineer amongst his brethren. Crowned with scientific and national honours, both English and foreign, he lived to the advanced age of eighty, dying in 1849.

"Sir M. I. Brunel was unaffected and simple in his habits; was possessed of indomitable courage, perseverance, and industry; while



his benevolent disposition prompted him to the kindest acts, and to the forgiveness of injuries or slights offered to him."

The amusements in mechanism or any other science of such a man, are often fraught with deep meaning, and may lead to important consequences. Brunel's attention had been so far drawn, according to his own evidence given in the bobbin net trial in 1816, to the manufacture of hosiery and lace, as to have made him acquainted with the whole range of machinery employed in it from Lee to Heathcoat. This fact, no doubt, originated the *round* stocking-frame, which was so devised by him, as not to employ any one of Lee's instruments, except the hook or needle, and though embodying Lee's principle, it was altogether different in its form and use. This apparatus, small and compact enough to be screwed to a lady's work-table, is capable of making loops of stockings faster than the eye can follow it, and though too slight a thing to induce even its inventor to push it into notice, was destined to become one of the cheapest and most effective looms the world has ever seen.

M. Brunel invented this round frame, which was patented by him in 1816, No. 3993. He called it the "tricoteur," the frame-work-knitter. It is a circular machine, as contradistinguished from the straight frame invented by Lee. A seamless sack is produced by its operations. The needles are of the same bearded shape as in Lee's, and similar loops are made on them by instruments acting as sinkers. These loops, when the beards of the needles are pressed into their grooves, are passed over the needle heads consecutively as fast as they are individually formed, and at once form part of the web already made.

The needles are firmly fixed on the external rim of a wheel or frame suspended from and fixed to a rotating spindle. They are placed in concentric direction, and at distances according to the desired quality and quantity of work to be produced. Another wheel moves on the spindle, carrying arms and knitting machinery, besides the bobbins of yarn to feed the machine. This thread as it is delivered is pressed down between the needles by 'pallets,' and is carried under the hooks. By an oblique movement the thread is pushed to the extremity of the needles by the first arm. The second arm carries a small wheel with long teeth like radii. The solid part of this wheel presses the needle beards into their grooves, and taking the web

already formed, slides each stitch over the beards of the needles, upon which the third arm carrying a wheel, throws the stitches over the needle heads. A fourth arm carrying a wheel like the second, places the stitches clear of the needle beards or hooks. Several sets of these wheels may be fixed round the spindle-wheel.

The diameter of the wheel or machine round which the needles are placed and work, may be equal to knit a circular web of any size, even that of a carpet. They are in fact worked of diameters, varying from two to one hundred inches. The work is continuous, only interrupted by the breaking of a needle or the thread, and therefore expeditious. The first row of stitches is made like that in the ordinary stocking-frame. As bearing upon the interesting question, by whom this ingenious machine was invented, Mr. Ferguson, in describing the introduction into France of the "point net" frame, has the following paragraph:—

"In 1801 George Armitage took the point net frame to Antwerp and constructed many more there. He then came to Paris; but finding that Hayne by his contraband proceedings prevented profit being obtained in making this lace, he effected many alterations there in the stocking-frame; and at length invented the circular hose frame, either there or in Prussia, to which country he took the lace frames. He brought the circular stocking-frames which he had made and worked in Prussia, to Cambray. I saw him working in one myself, and it was a very ingenious machine. Certainly he was one of the first men who made a circular stocking-frame."

Mr. Ferguson, from his personal knowledge, goes on to describe Armitage as "a singular and irritable old man; lame in body, but possessed of a lucid mind. About the year 1850, and at the age of 82, he announced his intention to make a voyage to Australia;" going, as he said, "to make himself acquainted with the country." This voyage he made, and died there in 1857.

Lace machines were sent or taken to Moscow by the same G. Armitage, who seems to have had a thorough knowledge of the modifications made in the stocking-loom up to the beginning of this century, as is attested by several competent persons, independently of each other. He might therefore have invented as well as constructed the round frame. But proof that he actually did so, is not forthcoming; and from the last sentence in Mr. Ferguson's statement, it may be

gathered, that *he* was not quite sure of Armitage being the real originator of this ingenious machine.

A circular or round frame, constructed like Brunel's, was placed and worked in the exhibition of art and machinery at Nottingham in 1840. It obtained, however, but little notice, the judgment passed upon it being unfavourable. There was an almost intuitive dislike to the idea of making stockings in the form of bags, both on the part of hosiers and frame-work-knitters. The former thought the character of the articles throughout the whole trade would be depreciated by the more general introduction of cut-up and stitched work; the latter believed it would inevitably reduce their wages, and prove the last addition to that cup of bitterness, of which for nearly forty years they had been compelled to drink. How mistaken both were will be afterwards seen.

In the year 1845, M. Peter Claussen, of Brussels, took out an English patent, No. 10,724, for an improvement on circular machines making looped fabrics. This was essentially Brunel's frame with certain altered combinations of parts.

He described a new kind of feeding wheels; employed pressure wheels varied in circumference so as to produce different patterns; applied comb pieces to this weaving of looped fabrics; and used steel needles.

One of these machines was placed in Nottingham for inspection by the hosiery trade; Claussen seeking their sale and use upon paying him a royalty. His agent offered to construct 26-gauge women's size at 15s. an inch. Amongst others the author carefully examined it, and was so convinced that this "grinding of hosiery webs" would not be said 'nay,' but must produce vast results, that after much difficulty he persuaded one of the most practical manufacturers of stockings in the trade to see it also. On leaving the loom, the latter fully acquiesced in opinion as to its immense power of production, but expressed the sorrow he felt in contemplating the evils it might, and most probably would, entail on the wrought and fashioned business forming the principal part of the manufacture. Many like him resolved not to use this new and most unwelcome class of machinery.

Claussen took out another patent, No. 11,658, in 1847, for further improvements—

By employing hooks to revolve with the needles; and attaching a winding up apparatus, not one of the least curious and useful appendages to this circular frame. For such is the rapidity and quantity of production, that to roll up the web as it is made, is absolutely necessary for many purposes.

The use of machinery constructed on Brunel's principle now increased, and that, before long, very rapidly. Some of the hosiers were required by Claussen to pay him tribute, he claiming originality of the principle, as well as of his modifications. This was resisted, and evidence got up for defence against an action; but he did not go to trial. To M. Claussen, however, is owing in good measure the practical resuscitation of Brunel's invention after it had slept so long, and the wonderful results of improvements upon it. There is little doubt that the first idea of thus simplifying and giving speed to the knitting-frame was conceived by foreigners, and to them belongs the great merit of introducing it here.

The next important change in circular machinery was produced by the advent of the 'wheel-frame,' so called from the operations of supplying the yarn, dividing the loops and of pressing them, and carrying them over the heads of the needles, being accomplished entirely by means of wheels. This mode of constructing and manipulating round machines is still more prevalent than any other for making plain circular stocking web. The cylinders are of every diameter.

In those round frames where the tumbler needles are used, the construction is such as to do away with wheels altogether, except that for driving the machine round.

Grooved cylinders are used in which the needles work and are raised up successively to the apex of a blunt cone and lowered again, carrying the threads from each feeder to each such cone. The raising the needles, feeding, looping, pressing, and passing the loops over the needle heads, are all performed by the operation of these cylinders upon the needles themselves. Mechanical art never devised a more simple yet effective plan for attaining very difficult results.

Another great advance made in the use of circular frames was in adapting them to the production of

Derby ribbed stockings, for which they are pre-eminently suited, because the lack of fashion in ribbed hose is of little consequence; the rib giving them tenacity to the surface, and an easy adjustment to the shape of the leg. The use of articles made from this frame has become very large; and in cotton and merino self colours from one or two feeders, they can be produced of such quality and of so respectable an appearance as to bring in sale very advantageous prices. This adaptation was the invention of Thomas Thompson, a frame-work-knitter of Nottingham, who, when visited at his own home on one occasion, was found busily engaged with the model, placed on a chair, of this circular ribbing frame, then in process of completion. We regret to be able to relate so little of the course of this clever inventor.

Mr. M. Townsend, who describes himself in his first patent as a frame-work-knitter, and afterwards as a hosier of Leicester, in 1847 took out a patent, No. 11,899 for the application of a 'machine like that of a point net frame to an ordinary stocking-frame.'

In this plan there are needles and hooks, of peculiar and ingenious shapes both in the loom, and on the machine attached to it. The mode of using them is too intricate to be understood without drawings. The invention is intended however, to take off the work by the machine from and return it to the frame instruments, in such manner that the direction of the loops may be reversed on the surface of the fabric, from time to time, as it is effected by hand knitting, and by workmen, on frames reversing them hitherto by hand.

In 1854, he took out No. 1,523 for making round hose, &c. with heels and toes fashioned on other machines. In 1856, in No. 1,157, he describes a method of raising looped pile on knotted fabrics for 'terry'—

Employing a row of needles or points, or their equivalents acting in combination by a Jacquard apparatus. Using a bell crank and lever guides similarly actuated, for throwing different colours into the work. Using 'hinge covering needles' in knitting double pile fabrics, and a notched sinker arranged as directed.

The same year, No. 1858, Townsend patented—

The application of jointed guides to the machinery of double barred knitted goods, so making figured patterns on both sides; throwing threads on one row of needles or hooks to form the pattern, and carrying surplus threads round the other row of needles to form

the pattern on the contrary side; the appearance of the pattern being made to look alike on both sides; sliding needles or hooks may be used, moved by the Jacquard in any direction. Using rows or circles of double ended needles having hooks or beards at both ends, and forming loops by a peculiar method. By placing double rows or circles of needles in an inclined position in lines crossing each other, each needle when depressed draws a thread to make a new course, without the use of loop wheels or sinkers. To make a broad rib it requires points to be used in combination. Making circular knitted warp fabrics, by using a row of 'tumbler' needles having '*hinged*' beards, circularly placed with lever guides to carry the threads forming the fabric.

The 'tumbler' needle was so called from the peculiar action of the small moving pin, devised and affixed just so far below the hook as that its point may reach the hook, or when reversed may lie in a groove. This invention of Townsend's is a very ingenious one, and has proved in the hands of others, a most useful and profitable one. The reader will form some idea of its shape and operation from the following explanation:—

The principal part of the instrument consists of a smooth thin iron stem, into which the lower end of a knitting hook has been soldered. The gauge of the circular frame in which these are to work, will determine the size of the hook, its length, thickness of its bed, and size and thickness of a bevelled square brass nog, fastened nearly at the bottom end of the stem into which the hook is fastened. This nog is put on that edge of the stem, toward which the hook at the other end is turned. The stem and hook are raised by the action of the rotating mechanism upon the nog; each consecutively falling into its place again by its own weight. While raised, the thread is taken along the stems of the hooks, and as fast as this is done, sinkers pass between them and form the loops. These being taken under the hooks, the previously formed ones will have to be got to pass over them and the hooks. With bearded needles this is done by the presser forcing the beards into their grooves, and allowing the former loops to slip over them and the needle heads. When hooks are used in hand knitting they are turned half round to allow the stitch to avoid the hook. Here comes in the curious device of Mr. Townsend. Immediately under the hook in the machine needle his stem is bellied out, a groove is made along it, in the centre of which a tongue half the length of the groove is *hinged* so as to work freely and which when raised to the point of the hook shall receive it into a spoon-like indent at the free end of the tongue. This will form in fact a smooth loop of steel, or when the loop of work rises from the stem, and seeks to pass the tongue now hanging with its point towards the stem, the work loop carries the tongue with it and at once reverses the position of the tongue, leaving it on the point of the hook, the work loop passes over both to the web, and the tongue falls into the lower half of the groove to repeat the operation in passing the next loop up and over the needle head.

Mr. Townsend was in the first rank of skilful manufacturers of fancy Leicester hosiery; and had a good practical knowledge of the machinery used in this trade. Having patented the needle, he seems not to have succeeded in getting it into very profitable or extensive use. Probably he fixed the royalty he required at too high a figure.

For various reasons he discontinued his business at Leicester, and took up his residence in the United States; where, after some of the vicissitudes to which inventive talent is peculiarly exposed, it is pleasant to hear that his undoubted skill has met with its reward.

These needles are now used in England to a very great extent; in France and Saxony also; and are exported largely to the United States, one house here paying nearly £1,000 a-year for this article to be sent thither.

Messrs. Hine, Mundella, and Thomas Thompson took a patent out in 1853, No 1967, for the improvements of the latter in looped fabrics made upon the *circular* ribbing machine.

In this the thread from the cop is carried under the *frame* needle beards by a looping wheel. As these needles are carried round, they are depressed by the lower part of the collar, thereby bringing their beards to the frame presser; and after pressing, the work is knocked over by the top of the collar. The work is then drawn back ready for the *machine* presser to operate upon it, at which point a plate draws the machine needles back, and the work is knocked over; the *frame* needles rise, and the *machine* needles are thrown out. The course is then repeated.

Messrs. Haddens patented in 1855, No. 2872, an improvement by Scattergood upon this patent machine of Thompson's.

A patent was taken out in 1854, No. 325, by Hine, Mundella, and Luke Barton of Hyson Green, for an application to the original stocking-frame of a *narrowing* apparatus; both frame and apparatus to be actuated by rotary motion. Hitherto only one or two hose of best (or fashioned) quality have been made in the widest parts on one machine; by this invention from two to ten hose can be made at once with less labour to the workman, at less cost, and with increased production.

Other articles, as shirts, drawers, half hose, &c. may be made.

The thread carrier is lifted up through the needles, and the jacks follow, passing over them; when arrived at the other side, the thread carrier descends through the needles, being stopped and secured up to the stop by a clutch cam. The frame is then sunk down and the loops are divided in the usual way. The loops are brought forwards, pressed over, the work is put back, and a treadle being depressed pushes in the ticklers and is held in the bolt in a catch-box. The action of the frame is then reversed; and a cam acting on a bar depresses the tickler points in the needle eyes, and the loops are brought on ticklers, which then rise and are shogged aside the space of so many needles as are required for the narrowing. The ticklers are depressed into the needles; the frame is brought forwards, descends, and carries back the work. The ticklers next rise off the needles, the pin in the cam drives back the bolt liberating the spindle bar, which is again brought into position by the spring. Thus the course is finished ready for repetition.

The same year, 1854, Hine, Mundella, and William Onion took out a patent, No. 365, for another rotary hosiery frame—

In which instead of using a fixed frame and machine needles, a moveable frame and machine needles are employed, working in fixed combs. The sinkers are also moveable, and work in the same combs by curved plates. A small sliding presser and thread guides are used. The machine is a rotary one. In the old rotary frames the threads are laid on the needles, the jacks are drawn, and the sinking, locking, pressing, and knocking over cams form the remainder of the course. All these movements are made in the present machine by means of curved plates; the course being completed in the same time as the jacks are drawn in on the old frame, thus producing two courses in the same time as one from the old frame.

The same house took out a further patent, No. 1448, in 1857, for improvements in looped machinery employed in making ribbed fabrics, with faces alike on both sides, exhibiting simplicity in combination and adaptation, resulting in superiority of the articles produced.

There are employed two sets of needles, each affixed to a moveable needle bar, with a stationary presser bar—but these are not new. The machine part which carries the sinker bar, hand bar, and spring bar, is stationary in place of having motion given to it; the knocking over bar being affected by the motions given to the needle bars. The parts are operated upon by a rotary motion. When lead sinkers are used as well as jack sinkers, the lead sinker bar will have a rising and falling motion given to it, to cause those sinkers as well as the jack sinkers to form the loops.



By this adaptation of parts facility is given for both sets of needles to pull uniformly at the machine course upon their respective loops, by which more perfect work will be obtained.

Another patent was obtained by the same parties in 1861, No. 2899, for further improvements in the stocking-frame. By this plan of constructing it, nearly every part, as needles, jacks, sinkers, and trucks are altered either in shape, position, action, or result, according as plain and ribbed work may be desired. The entire specification explained by the drawings must be carefully studied to give even a competent frame-work-knitter any adequate idea of the construction, working, and importance of the machine here patented.

One of the first attempts at arranging a stocking-frame so as to be capable of widening or narrowing at pleasure by the application of a Jacquard apparatus, issued in an invention devised by Mr. F. W. Mowbray, of Leicester, after seeing the Jacquard applied to the warp machine. This principle and method was made the subject of a patent by Messrs. Harris and Sons of that place in 1855, No. 327. It has been used extensively and with success not only by the patentees, but also generally by the manufacturers of goods produced on the lower gauges, which are mostly employed in the woollen hosiery trade, and to which the improvement is better adapted than to the finer gauges.

Mr. Edwin Stanley Brookes constructed a rotary Derby ribbing machine at Loughborough and patented it in 1857, No. 659. This proved an excellent plan, and was worked very successfully. Brookes emigrated to New Zealand, and the right to its use has been acquired by Mr. Shipley, in whose hands it is stated to be working to considerable profit.

Another rotary Derby ribbing frame was built by Mr. Bailey for Messrs. Mitchell, of Leicester. It was constructed so as to combine more plans than one, but in what way, not being able to obtain a specification, we cannot tell.

Mr. William Coltman, of Leicester, also built a wide rotary, but it was not capable of putting in any fashion.

In 1857, Monsieur Luce-Viellard, of Dijon, France, took out two patents in England, Nos. 1887 and 2884, for improved methods of making articles suitable for petticoats, curtains, and gimps upon the hosiery frame.

William Cotton, of Loughborough, took out a patent in 1851, No. 1660, for the manufacture of hosiery, widening the fabric by the action of the machine working upon rotary power.

In 1860 he took out another patent, No. 70, for a similar machine with the additional arrangement of its parts, so as to narrow as well as widen by the rotary action of the machine.

In 1863 he obtained a third patent, No. 1901, for a machine on the same principle of action with the former two in widening and narrowing the fabric by self-acting rotary apparatus, but on a horizontal instead of, as in the others, the perpendicular plan.

The needles in this machine are of the ordinary shape, are placed perpendicularly, the beards and heads uppermost. The presser bar is stationary, and acts by the pressure of the needles upon its edge, they being placed in front of it. The jacks are placed behind the needles and in an upright position on a jack wire, and have a round head working backwards and forwards, acting upon the jack sinkers, with which they are not connected by pushing them forwards; they themselves being forced up by a slur cock, and follow the thread forming the loops in the usual way. The lead sinkers divide the loops with the jack sinkers by the operation of a locking bar; the needles fall lower, and passing the divided loops the beards are pressed in the act of being carried down, and the loops are carried over the needle heads by means of fixed instruments devised for the purpose. A new and perfect course is thus formed and added to the former work. The jacks, sinkers, and other movements of the interior parts of this machine are affected and controlled by cams, locker bars, slide, &c.

The widening and narrowing are brought about by the action of ticklers having one or more points in each, and which are placed on a moveable rod so ingeniously and accurately adjusted as to obey a side movement either way, to the extent of the distance of one needle only, whatever may be the gauge; and to take off, remove, and put on to the next needles any number of stitches required. The narrowed selvage is perfect; the widened one sufficiently so.

The essential knitting parts of the machine are compactly placed so as to work together safely and smoothly in the compass of six inches square, in the interior length of the machine, which is eight feet long and four feet in width and height. There is no

perceptible vibration, though it is not fastened in any way whatever.

The work on the 21-gauge frame under inspection, was making 26 courses when widening and narrowing, and 30 courses when making straight selvages per minute, which might be considerably increased with safety. The work is sound without tuck stitches or lines, and the machine is described as not breaking many needles. It is evidently a first class piece of mechanism both in conception and execution. The right to the use of this machine is now vested in the Nottingham Hosiery Company (limited), and Messrs. J. and R. Morley. The *Times*, in describing the establishment of Messrs. Hine, Mundella, and Co., in 1857, "as a model one for making hosiery goods from first class hand and power machinery," states "the number of hands employed by it in making goods to be 4000." The firm has been changed into a (limited) Company, and having absorbed the old established business of J. J. and J. Wilson, has greatly extended its operation. The Messrs. Morley employ in all about 5,000 frames. Other houses at Nottingham, Leicester, Loughborough, and Belper are very large employers of labour.

Samuel Hancock, of Nottingham, patented an improvement in machinery for looped fabrics. This was in 1854, No. 2166. It consisted of a great variety of substitutionary instruments.

In lieu of the old jacks and sinkers and presser, these newly devised means brought the work forwards on the needles; pressed down the beards of the needles; regulated the loops; knocked the work over the needle heads, and drew it back again.

Another arrangement dispensed with ticklers, by using instruments and methods for either narrowing or figuring the web whilst it was being made, so losing no time. It also included a method for working thread carriers on the working bars in widening or narrowing, and of using inclined planes.

In this machine the parts essential to forming the looped web, are comprised and worked in the space of three inches square, leaving room for parts required for narrowing, widening, and figuring. It cost in the construction much time and money; and though not brought into general use, it was at the time it was devised a considerable step in advance, and creditable to the mechanical talent of the inventor.

In 1858, Mr. Wm. Clark Gist, a citizen of the United States, took out an English patent, No. 1826, for a circular machine to be supplied by any number of feeders up to eight, where only one had been worked before. By this means striped work including sixteen colors may be made at once, and produce on a head of 4 inches diameter, or 12 inches round, 350 courses a minute. These courses formed by such a number of threads following each other, will be slightly spiral lengthwise of the web, but even in colors this is scarcely perceptible and not injurious in sale. Each such head would produce a yard in a minute, equal to a web long enough to be formed into 150 dozens of women's hose in a week. Several of these heads are managed by one person, usually a female.

Messrs. Hine, Mundella, and Co. purchased this English patent right. Immediately on its being worked in this country, a modification was introduced, by which Gist's valuable invention was simplified and the cost of the product lessened.

Thomas Thompson, who, as against Pepper, an American inventor, and Appleton, an Englishman, claims the honour of being the first to adapt the circular frame to produce Derby rib work, being at that time in Hibbs Brothers' employ, upon examination of Gist's machine, saw at once the way to improve it, by laying aside the ordinary stocking-needle, and using in lieu of it the *tumbler-needle*, invented by Townsend. This he accomplished; and the improvement was so great as to have been adopted extensively by firms at Leicester, for making striped goods; one house there having produced 5000 dozens weekly, on this plan. This modification was not patented, the *tumbler-needle* patent having then three more years to run.

After Townsend had patented his needle, other attempts were made to improve the shape and quality of this instrument.

In 1860, Mr. Greenough, of New York, took out an English patent, No. 1411, for barbed and other needles for knitting or sewing, by cutting, grinding, polishing, flattening, and bending, without removing or handling them until finished.

And in the same year, M. Quinquarlet, of Paris, took out a patent here, No. 1542, for an improvement in needles used in stocking fabrication, circular or otherwise, by which

To make them of tempered steel and of such length as to give them spring to dispense with oscillating movements of two needle bars in ribbed stocking-frames. From their fixed positions in circular frames to do without gearing for working the rib needle bar, and by these spring needles to render the construction of an interior ribbed stocking-frame practicable. Finally, there is economy in construction of the frames which are light and easy to work, these needles acting with simple and regular movements.

Mr. J. S. Wells, of Nottingham, devised and patented a needle in 1861, No. 1787, which had—

A short beard or hook in the groove; under the beard a slot is used, passing quite through the substance of the needle. In this slot is inserted a small piece of metal having a groove in its upper surface, which receives the end of the beard or hook. The metal piece passes through the slot and is rivetted to the bottom side of it so as not to be displaced. The piece is capable of sliding from one end of the slot to the other end, and the grooved portion is inclined downwards both ways.

The patentee also proposes needles, each end of which should have such beard or hook, and slot with a sliding piece, as above described.

In 1863, Mr. J. S. Wells took out a patent, No. 585, for a mode of strengthening the selvages of looped hosiery fabrics by using an additional thread carrier, so as to lay in an additional thread or threads on the needle or needles, on which the selvage is formed, whether in the leg or feet selvages of hose, and on the selvages or any other parts of other articles, where the addition of one or more threads may improve the seam and render it more secure.

A small domestic knitting-frame was contributed by a mechanician, named Bakenheim, to the Cologne exhibition a few years ago. It was highly spoken of. It had eighty-four needles, and the machine was said to weigh not more than 14 or 15 lbs., and might be adapted to any table for ladies' work. It is said to produce from 10,000 to 35,000 loops per hour, and to be worked with great facility. Whether it is a mere modification of the old stocking-frame, or of the circular

knitting-machine, or an entirely new arrangement, was not stated.

There need not be much surprise excited that frame-smiths have so often been eminent inventors themselves; for who so likely to understand the principles of construction of the classes of machinery to which they have devoted their lives, or to find out defects and remedy them, and throw aside round-about ways for obtaining desired results by eliminating the superfluous, and simplifying the intricate? From the higher rewards offered by the rapid and profitable development of the lace trade, the course of mechanical improvement was more marked for a time in that than in the parent hosiery machinery. But both were destined to witness similar triumphs of genius. The remarks made by one of the oldest of these practical mechanics, Mr. Attenborough, in regard to the construction of hosiery frames (wherein the firm of which he is the elder partner has attained a leading position) have long been felt to hold good by the best makers of both hosiery and lace machinery: "Their experience has shewn for the last fifteen years that the course of invention demands that the tools required to make all those kinds of machinery, should be of the most scientific character. For instance, the machines for dividing the bars of longitudinal, and the rims of circular frames must be, to do the work justice, mathematically perfect in their operation. Therefore no expense is spared to attain steady, accurate, and rapid movement in these intricate constructions. To get perfect models, a staff of model makers for this work alone is often employed at the founders. As the tendency is to employ power machinery upon the working of later kinds of hosiery machinery in increasingly finer gauges, the accuracy of machines and workmen engaged in constructing machinery is rendered the more necessary." The three principals of this establishment were foremen of mechanics in the employment of a Manchester firm, and adventured to come and direct their practical knowledge to building hosiery frames in Nottingham; by which they now give constant and well remunerated labour to about seventy hands.

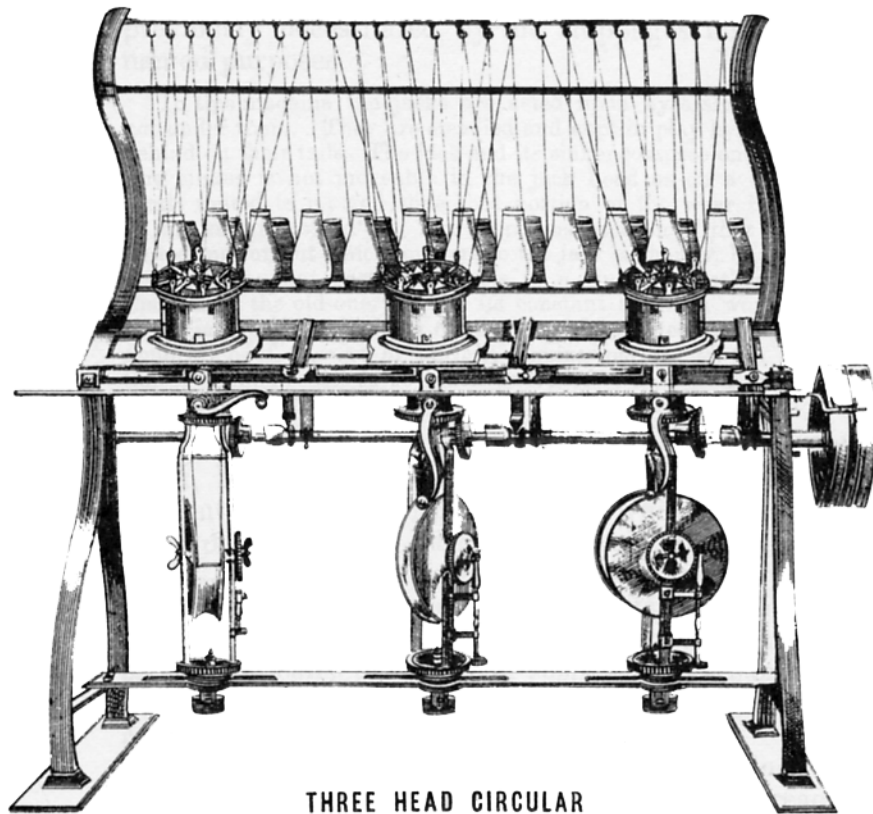
This house has lately constructed a rotary Derby rib machine, in which the operations for making ten or twelve webs of ribbed tops, six or seven inches wide, at once are performed by the self-acting adjustment of the mechanism, without loss of time or interference of the workman, either in forming the welt, the slack course to join on by putting in splicing to divide the tops, or striping to any extent desired—and this at the rate of thirty courses per minute. One machine will produce 300 dozens of medium sized ribbed tops in a week, and one man can work two machines. The quality of the work is excellent; and the cost is, of course, reduced in proportion to the saving of time, previously necessitated by the stoppages for the above named purposes.

In this machine the jacks are acted upon by a slur passing over not under them. They are steadied and kept in play by springs from behind on their tails. The jack and its sinker compose one instrument. The sinker is not moveable in the jack head as on a hinge, but is firmly united to it; and thus that portion of the wear from friction in this joint is got rid of. The shape and position of that part of this united instrument which answers to the jack is shorter, but still works horizontally; that part which acts as a sinker is rather altered in shape from the old one, and by its constant angle in work relatively to the jack part the division of the loops is effected accurately. The application of the set of upright ribbing needles to the horizontal tier of frame needles is so quick and perfect as almost to elude the observation of a bystander.

A variety of other deviations from the plain ribbed work, besides those above referred to, may be obtained without difficulty; inasmuch as the whole of the operations of the various parts of the machine are brought about by the action upon them of a wheel working at one end, the surface of which, being eccentric and uneven, can be so altered and its eccentricities arranged, as automatically to change or suspend and resume work, and thus vary the production in many important respects.

The following plain round hosiery machines, constructed by this house, may be described as reaching as high a point of production in quality and quantity as has hitherto been attained—

First. A tumbler needle round head, say of 26-gauge with *ten* feeders, producing a beautiful shaded web suitable when footed for



THREE HEAD CIRCULAR  
TEN FEEDER STRIPING FRAME.



any use. This head, as the machine is termed, revolves once every second, being four inches in diameter, and produces 10 rounds or courses of loops in the second, equal to 30 inches in length of the round sack which is thus formed each minute. As there are 160 needles in the circumference, and by consequence as many loops, this head forms 96,000 loops in the minute. If worked ten hours a day, and five and a half days in the week, it will turn off 2,750 yards in length or 600 square yards of webbing weekly. One man was superintending two of these heads, turning off together 1200 square yards a week.

Second. A circular plain tumbler needle shirt machine, 18 inches diameter with 32 feeders, constructed on their own plan, making 26-gauge coloured stripes. This frame or head made 10 revolutions a minute; that is, it adds a band composed of 32 loops in breadth each revolution to the web in process of formation. As there are 928 needles in the circle and as many loops, this single frame makes 296,960 loops every minute. It requires 100 lbs. weight of yarn to feed it daily, or 12 tons a year. Its weekly production would cover 1000 to 1200 square yards. Machines of this capacity are being sent to all parts of the trade at home and abroad. One house employing them sends out a waggon load daily of their produce.

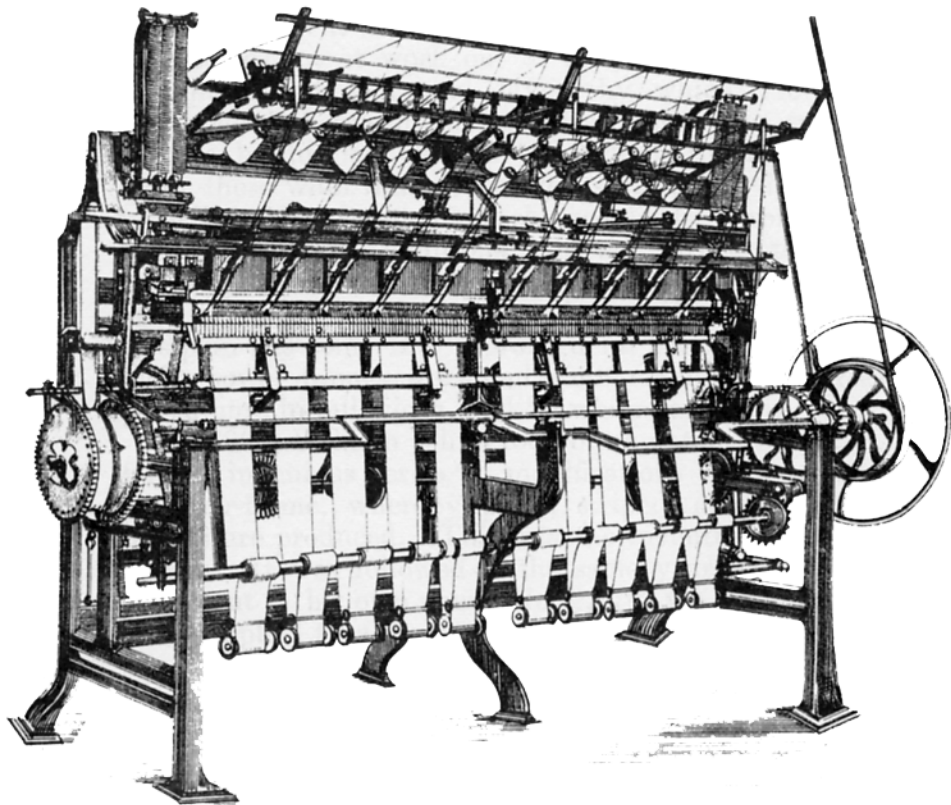
Third. In place of making very coarse heavy worsted hose on the lowest gauges of wide straight down frames, to be footed on other frames, and which required entire seaming afterwards, Attenborough and Co., have, by the use of a very coarse gauge tumbler needle on the circular frame, introduced a speedy and cheap imitation of the legs of Aberdeen knit goods, requiring only to be footed in the usual way. Being made round, half the seaming only is required. Almost any quality of yarn can be used. The demand for these machines is becoming very large.

Mr. Moses Mellor came from a village near Belper, to Nottingham, where after 21 years spent as an apprentice and journeyman in the business of frame-smith, he commenced it in 1844, on his own account, and has now 130 hands at work. He has confined himself to the construction of hosiery machinery, and latterly to the classes worked by steam power, upon improved mechanical arrangements.

In 1843, the machine devised and patented, No. 9883, by J. B. Wykes, of Leicester, in which there was a Levers' lace machine movement, and on which six hose could be made at once, was built by Mellor. On seeing Brunel's round stocking-frame which had been placed in the Nottingham Exhibition, Mellor improved it by placing the needles perpendicularly instead of radiating in a horizontal circle, and operated on them outside by an indented loop-wheel roller; and still further to secure the perfectly equal division of the loops, in 1849, he caused

another similar wheel to follow it. Both being bevilled, brought up the loops under the needle heads; a wheel acting as a presser, then placed the beards of the needles in the grooves, when an inside bevill wheel brings the work already made from the stems of the needles, and takes it over the beards, whence a fourth bevill wheel passes it over the needle heads, and an instrument follows to take down the web to the stems of the needles for a new course. The round frame thus arranged formed the loops more equally, independently, and safely, and consequently with increased speed, so as to thoroughly establish its use. In 1849, Mellor improved the wide power stocking-frame, which by the arrangement until then used for narrowing, raised the needles not at work out of the way of the thread; he introduced a thread layer, by which the yarn was placed between the needles where the selvage had to be formed, without disturbing them. About 1850, these wide frames received still further improvement by the formation of selvaged heels, through the operation of an additional thread carrier to each stocking, to be used while the two sides of the heel are in process of formation. It is only of late that this plan has come into more general use. These wide plain power frames we found were making 27 courses per minute in full width, and 20 while narrowing.

In 1863, William White took out a patent, No. 1236, for an ingenious series of modifications in the round stocking-frame, whereby plain, striped, and fashioned fabrics are produced. This was the invention of Moses Mellor. It was followed in the same year by a patent taken out in his own name, No. 2,778, for an invention to be applied to a reciprocating straight frame, making one or more breadths of work at once; or to a reciprocating circular frame, making one or more breadths at once; each machine producing a fashioned selvage, broad, ribbed, plain, or patterned looped fabric; or to be applied to a continuous circular frame. This is effected by the arrangement here patented, added to the use of the fashioning and striping apparatus in White's patent; and by altering alternately the position of the inclines after one or more courses, and working



**ROTARY RIB TOP FRAME.**

other way for one or more courses. A fabric results either plain or ribbed in one part, and having loose loops on the other part; the patterns varying according to the setting of the machine. This combination is described as a circular and selvaged three-press broad ribbed knitting-frame; and is considered to be constructed upon a plan highly creditable to the inventor, and calculated to prove very useful and profitable to the trade. Mr. Mellor has earned the character of a first class mechanic, and an unobtrusive, yet talented man.

In this year Mr. Mellor constructed his first wide or longitudinal fashioning Derby ribbed frame. This increased the production by one workman, ten or twelve-fold over the original Derby rib frames. This he threw open to the trade, and it was first used by Messrs. Corah, of Leicester, the cost being £120 per machine.

The circular patent frame costs £18 per head or £108 for six heads. A man superintending six heads, each two feeders would produce 100 to 120 dozens a-week of women's or men's hose. The ribbed wide rotary making twelve six-inch tops at once, will produce about 320 dozens a-week.

The beautiful and varied productions from ribbing machinery, whether circular or longitudinal, are such that at the present time more are made in a week than formerly in a year. The demand is still rapidly increasing, and likely to continue to do so.

Returning from this important series of mechanical modifications to the general course of the trade, when the proposed treaty of commerce between England and France was under consideration in 1860, the chamber of commerce in Nottingham drew up a statement, of which the following is the substance:

“English hosiery is chiefly made in the counties of Nottingham, Derby, and Leicester, of which the delegates represent all except the woollen hosiery manufactures of Leicester.

“The materials used are cotton, silk, spun silk, and a mixture of cotton and wool called merino. There are four classes of machinery, hand, rotary, circular and warp frames.

“There are about 5000 kinds of articles made upon them: stockings, shirts, pantaloons, caps, gloves, and mitts, in all sizes, and also piece goods for gloves, &c.

“The oldest branch is work made by hand ; it is a domestic manufacture chiefly, and consists of two branches narrow and wide ; the greater part are narrow frames, numbering 40,000 to 50,000. These are from 12 to 16 inches wide, and in the lower gauges require less skill and strength, therefore are worked chiefly by old men, women, and young persons of both sexes. The finer gauges require a good sight and more skill. The average earnings are lower than in the other branches, and run from 6s. to £1. 4s. a week.

“The wide frames are from 25 to 30 inches in width, and the earnings are from 16s. to £1. 10s. weekly.

“The rotaries average 40 inches wide, though some are of much greater width. These are worked in factories by steam power, regulated by the Act of Parliament, and worked 56 hours a week. The earnings are from £1 to £1. 10s. weekly. There are about 1,200 of these machines, and all are worked by men.

“The circulars are similarly placed in factories and employed like hours, but are attended by both men and women. The men earn £1 to £1. 15s., and the women 12s. to £1 weekly. There are estimated to be 1,500 sets of heads, employing at the frames from 2,000 to 2,500 hands.

“The warp machinery at work upon hosiery is not extensive ; there are about 300 frames, averaging 90 inches wide, worked in factories by men and youths, earning from 16s. to £1. 15s. weekly. The manufacture of warp pieces to be cut up and made into gloves has been considerably developed of late years, and more so it is believed in England than in France, for French glove makers have desired to import these pieces, but have been prevented by a prohibitory tariff.

“The working of rotary, circular, and warp frames by steam power cannot be avoided. There is required therefore the cost of factories, engines, and other appliances absorbing large capitals ; the interest on which, coupled with the expense of working, has to be added to the wages of workmen. The rates of wages are higher, and hours of labour are shorter than in France and Germany, necessitating economy of human labour. The owners of such costly machines must have strict control over the working hours, to secure an adequate amount of production ; keeping them in proper condition requires supervision by skilled mechanics. It is thus evident that in steam factories there must be added to the wages of the framework-knitters the interest on building engines, gearing, &c. ; cost of repairs ; the wages of engineer, smiths, and overlookers ; cost of coal and gas ; depreciation by wear and tear ; and loss by the introduction of improvements, which in some classes of machinery has been very great.

“The hosiery business employs a large number of auxiliaries in finishing goods for the market, as cutters, stitchers, menders, folders, &c., the women earning from 8s. to 16s., the men £1. 5s. to £1. 10s. weekly.

“The English home consumption far exceeds that by export. The duties for years past on hosiery imported into England have been only 6*d.* on hose and 3*d.* on half-hose and gloves per dozen.

“The manufacturers of France have free access to all English machinery, every class of which is increasingly in use in France.

Many articles of the largest consumption are made and finished there at a lower cost than in England; this is an advantage so great, that if the duties on these were entirely abolished, the English could not compete with them. Where the English cost is below that of France, it is believed to chiefly arise in the classes where there is the absence of modern machinery in the French hosiery manufacture.

"It is confidently hoped that the French tariff may be so arranged as to permit of an interchange of some branches of our manufactures, producing extended commerce and increased good will between the two nations.

“(Signed) A. J. MUNDELLA.  
T. ASHWELL.

"P. S. The delegates find on comparison that where labour enters largely into the cost of production, the French manufacturer enjoys an advantage; but where machinery performs the most important part, English goods are cheapest. They suggest that if English goods were permitted introduction in the state they leave the loom, on very low duties, their lower priced labour in finishing would be to the advantage of France, and they would also obtain the advantages of English machinery.

"The number and variety of articles in hosiery precludes satisfactory classification; but judging from the experience of the United States, duties levied *ad valorem* would work sufficiently well for both revenue and commerce."

The French treaty has hitherto disappointed the expectations of the English makers of cotton hosiery, for which the demand has been but little increased. It had been supposed to be specially adapted for that market.

One of the most marked, not to say discouraging features in the present aspect of the English hosiery manufacture, is the decay and almost extinction of the silk branch of the business.

It was said that there were 7000 silk frames in the trade when waistcoats, small clothes, gloves, and stockings were worn made of silk hosiery. In 1812 it was computed there were 2156; in 1833, 3000. In 1835-6 the silk hands in Derbyshire obtained an agreed statement of prices; their wages averaged 18s. a week, and in this agreement it was specified that it should be a rule of the silk trade throughout Nottinghamshire and Derbyshire, that no repairs of frames except for needles and pewter, and no damages except by his fault, should be charged upon a workman; or any other charges made but for firing or ill made work; also that journeymen should be paid the whole price given by the hosier for extra labour. An allowance for waste according to weight of materials used was also agreed upon. But the number of machines in Derbyshire had fallen to 1,500 in 1840, of which it was ascertained that 790 were idle. The men at work earned 8s. on an average weekly. In 1844 there were 756 hose and 698 glove frames using silk in Derbyshire; 687 hose and 1407

gloves using silk in Nottinghamshire, and 223 elsewhere, together 3,773 silk frames. We have not been able to ascertain the number of silk frames at work making stockings and gloves during the past year in Nottinghamshire; it has not fallen quite so low as to be in proportion to the present number in Derbyshire, but the trade has been rapidly declining the last ten years. In Derby there are about 35 making hose, and 40 making elastic silk bandages for surgical purposes; and in the county 60 making hose; total 135; not a tenth of the number in 1844. There was only one apprentice in this branch at Derby. The hands averaged sixty years of age, and earned about 13s. a week. Their defective sight renders it somewhat difficult now to find workmen able to make the finest gauges necessary to furnish hose suitable for a royal *trousseau*. The wages earned on the elastic bandage frames run from £1 to £1. 10s. a week.

It is natural to ask for the causes of declension, and almost cessation of demand for silk goods. Change of fashion has no doubt much to do with it. People will not purchase silk hose to be worn under long petticoats, or trowsers, or boots. But it may be that inferior quality has also had an influence. Slight materials produce lower cost, but at a much greater expense in the wear of goods. And if, in order to lead a buyer to suppose he gets a heavy article, the silk is weighted with dye stuff, the cheat will be discovered at the first washing, and the article itself will fall into disuse.

In 1864 there were in Nottingham and the county, 69 wholesale hosiers, and 12 glove manufacturers; and of trades connected with them, 24 master framesmiths, 8 master sinker makers, 29 master needle makers, 12 bleachers, 39 dyers, 6 trimmers, and 55 hosiery agents, 10 cotton and silk spinning factories.

In Leicestershire 144 hosiers, and 23 glove manufacturers, 20 master needle and 13 master sinker makers, 45 master framesmiths and machinists, 19 elastic web-makers, 35 dyers and trimmers, 26 worsted and lambs wool spinning mills, 26 wool staplers, 7 waste dealers, 15 woollen and cotton yarn agents, and 7 fancy box-makers.

In Derbyshire 30 hosiers and 20 silk and cotton spinning mills.

In the hosiery business of Nottingham, there were at work in 1865, 11,000 narrow hand machines, employing domestically 7,500 men and 3,500 women and youths, at wages from 6s. to £1. 6s., averaging, by the statements of the hands themselves, 10s. 6d. weekly; also 4,250 wide hand machines, likewise domestically employing 4,250 men, from 10s. to £1. 10s., averaging, according to the workmen's statement, 15s. weekly wages. These 15,250 hand frames were placed in 4,620 shops, in eighty parishes spread over the county of Nottingham. The entire average wages of 42,000 frames at work throughout the whole of the hosiery trade in 1844 was about 6s. a-week only. These two classes of Nottinghamshire hand machines,

it is computed, give employment to about 20,000 women and girls as winders and seamers, earning 4*s.* each on an average. There are about 1,000 wide power rotary frames, employing 700 men, at from £1 to £1. 12*s.*; and about 1,600 girls and women, seamers and winders, on an average of 5*s.* weekly. There are about 1,200 sets of circular round power frames improved, employing 500 men and 500 youths, at from 12*s.* to £1. 5*s.* weekly; and 1,000 women, getting 12*s.* to £1. weekly wages. The winders, cutters, menders, and others attached to these are about 11,000 women and girls, averaging 7*s.* to 12*s.* a-week. And there are about 400 warp machines making hosiery by power, employing 400 men, at 14*s.* to £1. 15*s.*; and 200 youths, at 12*s.* to £1; besides 400 warpers, &c. (men), gaining about £1. 5*s.*; and also 2,000 women and girls, stitching, &c., at 8*s.* a-week on an average. It is probable that there are 2,000 men employed in bleaching, dyeing, &c., and as porters, &c., at £1. to £1. 15*s.* weekly; besides 5,000 menders, folders, &c., working in warehouses, at from 8*s.* to 12*s.* weekly. To these must be added the warehousemen and clerks in eighty establishments for finishing and sale of goods in Nottingham. The Nottingham hosiery business is now believed to be giving employment to about 17,000 males and 44,000 females—together 61,000 workpeople. The estimated returns amounted in 1865 to about £3,000,000.

The two staple trades of Nottingham, hosiery and lace, distributed in returns an amount of somewhat more than £8,000,000 sterling last year, and furnished, in the aggregate, employment to nearly 200,000 workpeople.

The returns of the entire English hosiery manufacture, in 1851, were computed to amount to about £3,600,000. In 1862 the returns were calculated to have risen to £6,480,000 of which materials were £2,630,000, and wages and profits £3,850,000. This great increase was chiefly due to the increase in power goods. The advance in the price of all the raw materials used averaging 50 per cent. raised the returns in 1865 to £7,795,000. Cotton wool has fallen very seriously since then, and animal wool is of lessened value; therefore the returns of 1866 have probably been in some measure reduced in amount. This is not however certain. For every effort was put forth in 1865-6, for the construction of new and reparation of old machinery throughout the English hosiery trade. The cessation of civil war in the United States of America, and consequent revived demands from thence, gave a fresh impulse to this business.

The number of hands employed in the entire English hosiery trade of 1866, is computed to be as follows; 42,000 working narrow frames, 8,000 at wide ones, and about 100,000 menders, seamers, winders, cutters, finishers and makers up, chiefly women and children, total 150,000. So that these two English trades of machine wrought hosiery and lace combined, gave employment to about 285,000 persons; and produced a return of £13,000,000 last year.

It is difficult to say, with any approach to accuracy, what proportion of the hosiery production of England is consumed at home, and what is exported. The Custom-house returns, whether as to export and imports



of hosiery and lace, are exceedingly defective; and steps ought to be taken to reform them, so that they may shew the approximative amounts. The quantity exported is very small. It is, however, certain that the exports of hosiery are increasing to India, Australia, Canada, and the Cape. It is doubtful whether English hosiery has not been, during the internal war in the United States, replaced by goods of their own manufacture; and also, whether the extraordinary tariff is not causing such an amount of home machinery to be employed by them, as may have the effect of permanently lessening the proportion of our supply to their consumption.

## CHAPTER XXX.

## SAXON HOSIERY MANUFACTURE.

ALTHOUGH Beckmann quotes the statement that the consort of the Duke of Pomerania, when at an advanced age, in 1417, she could no longer sew nor embroider, amused herself with knitting continually, yet he does not give it credence; and there are no authentic records of the time and circumstance or by whom the introduction of hand-knitting took place into Germany. It is first spoken of there in the middle of the sixteenth century. The art was known at Berlin in 1590. It is equally unknown when and by whom the first stocking-loom was taken to Germany. But it was chiefly spread through that empire by refugees from France, after the revocation of the Edict of Nantes. These carried to Hesse the first stocking-loom known there. French names were given to all parts of the machine; and by these names they are called at Pausa, in Saxony, at the present time; where iron frames are at work, which were constructed at, or at least brought from Hanau, near Frankfort, shortly after that time. The first stocking-frame which was seen in Vienna was taken thither by one Becker, who constructed others of wood. They are made of that material now, at Olbernhau, in the Erzebürge, a district surrounding Chemnitz. In Beckmann's time "these sold for 28 thalers (£4. 4s.); though," he goes on to say, "iron ones, of a most inferior kind, sell in Voigtland for 60 or 70 thalers (£9 to £10. 10s.)."

Eventually the stocking-hand-knitters and stocking-loom-weavers (of each of which there were many in Wurtemberg) were arranged in separate guilds. The members of one class of these societies were not permitted to wear the productions of the other. "Save that the

laborious poor men, women, and children, with those who watch" (their sheep and goats, or the sick), "and at the same time knit, may wear the work of their own hands."

These hand-knitters in Wurtemberg wrought a carpet three ells long, and two and a-half ells wide, when it was milled, in which were flowers and figures. This elaborate piece of workmanship was thought to have shewed the hand-knitting art brought to an astonishing point of perfection.

After the establishment of the French hosiery manufacture at Rouen, in Paris, and the city and district of Troyes, it is said that a silk hose frame was taken from France to Chemnitz; but it is probable that this machinery was taken southward to Nismes, and eastward through Frankfort and Hanau into Bavaria; then gradually proceeded northward to Ash, Brambach, and the whole surrounding district; thence on to Zeulenroda, where the manufacture of hose from iron frames has been carried on for about two hundred years; and thence to Chemnitz, seventy miles off. There, from the neighbouring Erz mountains where wood is plentiful, and a great deal used for making into toys, &c., the stocking-frame came to be made half of iron and half of wood in some of its important parts—as wooden jacks moved by a wooden drum with nicks cut in it. They were made at the relative low cost of £4 to £8 each. Some of them are now neatly ornamented with inlaid wood-work.

The growth of the stocking manufacture has been very rapid in Saxony, since the beginning of the present century, with frequently recurring periods of depression. Chemnitz, in 1840, contained about 20,000 inhabitants only, and the whole country was estimated to employ about 20,000 frames, making 2,500,000 dozens of hosiery goods, and exporting them to the amount of £750,000 a year. At that time employment was scarce and wages miserably low. A man could not earn more than 3s., and a woman 2s. a-week. In 1851, the Saxon report to the exhibition in London, stated the number of looms to be 30,000, employing 45,000 hands. The workpeople are frugal by necessity and

habit, and in most of the larger towns, seem to be fairly educated.

The following are facts derived from reports to the Saxon Government upon the latter interesting subject:— In Chemnitz, public school instruction is carried out systematically, under the authority and careful inspection of the Government or its municipal representatives. Every child from six to fourteen years of age must attend a school at least four hours a day. In this city where there are about 55,000 inhabitants, amongst other scholastic institutions there are four “peoples schools,” in the two lower of which 4,580 boys and girls, and in the two higher 2,970 boys and girls are taught; the fees in the former being 7*s.* 3*d.* a year, in the latter £1. 10*s.* a year, each pupil. There are in these four schools 7,550 youths taught at a total expence of £8,513, for which fees are received amounting to £5,200, leaving £2,870, to be charged on the town funds, and £443 on other sources of income. They are under the management of a superintendent, four directors, and one hundred and six teachers. The buildings cost the municipality £30,387, interest on which raises the cost of each pupil from £1. 2*s.* 6*d.* to £1. 6*s.* 3*d.* per annum. The public grammar school with 378 scholars, and 346 more in the Polytechnic, (the fees in both which are about £4 a year), and other schools, including those where weaving and the construction and use of machinery are taught, afford supplementary education of a higher order preparatory to that of the Universities.

The municipal council of Chemnitz have paid £42,500 for school buildings and furniture. In 1865, the town funds were taxed to the extent of £3,000, and the state funds £4,000, for educational purposes in that city alone, beyond the large sum paid by the parents themselves. But so successful is the result, that it is in contemplation to erect district schools; and thus bring an excellent though compulsory education almost to the door of every dwelling, whether its occupants be rich or poor.

The Saxon hosiery manufacture has two principal centres, Chemnitz, and Stollberg, for the employment

of wooden frames. The account about to be given of these, chiefly from official sources, may be fitly introduced by the following particulars, extracted from *The Guide through Chemnitz*, by Julius Pinther, printed in 1865, under the head of 'Stocking Weaving.' The compiler says :

"This is a branch of industry founded in 1728 by three persons, Roeder, Braun, and Saur; who transplanted the manufacture of cotton hose, caps, and gloves to Chemnitz, in 1765 when stocking weaving by hand was constituted a guild. Already in 1802, this guild produced more than 50,000 dozens of hosiery." (This would require about 1000 frames,) "In 1820, it numbered 1538 master workmen, 630 journeymen, and 346 apprentices. There were two presidents or head masters, and 85 district masters for the villages in the neighbourhood."

The firm now trading under the names of Gottlieb, Hecker, and Soehne, has been established in Chemnitz, 103 years.

There are now in Chemnitz 45 hosiery firms, of whom 20 make hose, 11 gloves, and 14 both. There are 10 in Limbach, 3 in Hohenstein, 3 in Lichtenstein, 4 in other places, making a total of 65 firms in the 'wooden' frame district.

The surprising extension in the short period before mentioned of the Saxon stocking manufacture, is a subject of such deep interest to the English, French, and American trades, as to justify the insertion of that authentic information, in its entirety which has been collected upon it.

The following is part of the "report of the chamber of commerce and trade for the district of Chemnitz, Saxony, for 1863" presented to the Home Minister, relating to *stocking-making*. It was drawn up by Mr. Hahmann the President, a partner in the firm of Hecker and Coventil, 1865, when he retired. He is an exceedingly well informed and impartial man. (The italics are ours throughout.)

"The manufacture of handwoven stockings &c., in Saxony, which according to the last statistics, gave employment to about 45,000 hands, of whom there were about 30,000 males and 15,000 females, has reached its present importance within the last 40 years; although in the last half of the last century, the hand loom hosiery weaving in the Erz mountains, was a regular branch of industry. The merchants who traded at that time in woven fabrics, such as 'Pignees,' 'Canevas,' &c., took also the products of the stocking-frame, and

so brought them into the wholesale trade. They gave out to the stocking weaver the material; the raw cotton, principally 'Macedonian,' being spun by hand; and he had to make it up into stockings, caps, &c., according to the wants of the trade.

"Saxony soon won for itself a name in these articles, and increased its returns in Germany, and through the various fairs to Poland, Russia, Italy, and the Levant. But the political revolutions at the end of the last and commencement of the present centuries, together with the heavy and varying import duties of the different countries, hindered its uniform progress and development, and after longer or shorter favourable periods, caused times of very disadvantageous stagnation.

"Soon after 1820, several manufacturers turned their attention to the Trans-Atlantic export trade; which had become developed in Germany, but in which as yet, the Saxon hosiery trade had not taken any part. German importers from the United States, stimulated the manufacture of stockings in imitation of English samples, which led to decided improvements in style, fashion, seaming, bleaching and trimming; whilst the yarn now spun by machinery, enabled finer qualities to be made than hitherto. Thus an export business was founded; which though it has had its crises, has powerfully assisted in the growth of this branch of industry. Saxony has competed with success in all ultra-marine markets, where the cheaper though commoner Saxon goods are preferred to the English. The workmen earned their daily bread in abundance; and it was *still better for them, when between 1830 and 1840, the manufacture of 'cut' goods from wide frames began; and the article 'cotton woven gloves' first came into general use.* Unfortunately, the endeavour after improvement, did not go hand in hand with the improved condition of the work people. The better the earnings, the more careless were they in their work. They were deaf to every remonstrance to hold to good quality, or to make use of new and better methods. Every thing to which they were unaccustomed met with opposition, which was only subdued by necessity. This came in the form of a stagnation in trade, once in about every four or five years. For instance, wide hand frames *with carriers*, making several 'cleared,' *i.e.* fashioned hose at once, were in full employment in England in 1850-1; and through the division of labour, legs, heels, and feet, each made on separate frames, were produced at a cheaper rate; while with us, the same means have only been introduced on an extended scale for three or four years.

"The patent of J. G. Heynig, of Neustadt, near Chemnitz, which has simplified the making of heels and toes, and without doubt given many advantages to the workmen, found from the same obstructive feeling, but very slow introduction.

"In 1851, the first round frame was put up in Saxony. This was the English frame, as well as the French one of rather earlier invention. These were followed by other improvements, which were used with greater or less results. With the introduction of these frames, this branch of industry has entered a new phase; inasmuch as the manufacture is partly changed from hand weaving, to working by machines moved by steam power.

"Respecting the course of the trade, especially during the past year, 1863, the hosiery business has certainly suffered the most from

the cotton crisis, of all the various branches of the great cotton industry. Not only has the raw material risen to a price hitherto unknown, but also the principal market for wrought goods has been in great part closed, or rendered difficult of access, through the American civil war. The nature of the article, as one not subject to the change of fashion, brings with itself, that larger stocks accumulate in the hands of manufacturers as well as dealers, than is the case with 'sampled' and fancy articles, such as dress goods, laces, &c. These stocks, with the increasing dearness of the material, pressed so much on the home and export markets, as to make it quite impossible to raise the prices of manufactured goods in proportion to the rise in raw materials; so that as the few stocks of yarn came to be worked up, more and more frames entirely ceased to be employed. And although manufacturers and 'factors' (bagmen) exerted themselves to the utmost to find employment for the workmen in 1862 and early in 1863, it became a question of self-existence; because it was not possible to make new goods to come under old selling prices; a fact which must exert its due influence.

"The tables at the close of the report, giving the number of frames with and without employment, shews the extent of this stagnation of trade in a sorrowful manner. The demand for special articles, such as all kinds of gloves, fancy striped hose, &c., which from their very nature cannot be put largely into stock, has somewhat improved this state of things; and work has been given out for a pretty good number of frames. The prospect of the continuance of this is only exceptional and the most hardly pinched districts, Chemnitz, Schopau, Stollberg, &c., have had but a small share in this improvement, as in these districts staple articles are principally made, with which the market is completely glutted.

"The building of the Chemnitz Annaberger Railway, has helped to mitigate a great deal of distress in these districts. Those who were strong enough found employment till December; and *were enabled to earn 1s. 3d. to 1s. 6d. daily; which is three times as much as could be got by working in the stocking-frame; upon which, by many hands, not more than 2s. 6d. to 3s. a-week could be earned, including the assistance of wife and children in seaming and spooling the yarn. Even on wide frames and better paying articles, a diligent workman could scarcely earn more than 5s. to 6s. a-week.* Under such circumstances, the fair earnings of a Saxon stockinger, being under the average of other employments even of day labourers, it was only natural, that more and more hands left the trade, and sought after other work, returning no more. This falling off is not in the least reduced or covered by younger hands being bred up to the trade; for the 'Guildbooks' shew, that very few learners have entered it. In times of good trade, the scarcity of workmen will make itself felt powerfully; and points to the necessity of altering the present deficient mode of manufacturing and carrying on the trade.

"If we seek into the causes which have kept down the wages of stocking-makers during the last ten years, in opposition to the general continued rise in the necessaries of life and in the wages of other hand labour, we shall find them to be as follows: In the successful efforts of England through the adaptation of power machinery, and improvements of hand frames to increase the power of production, and

thereby to paralyze the effect of the cheapness of Saxon labour, and in the slowness with which our trade has followed these improvements. In England also, they who continue to work on the old small hand frames (now to be designated imperfect) earn less than day labourers; but the new improvements and system of division of labour, supported by larger capital, found quicker entrance there.

“A number of iron (probably unremunerative) frames were introduced from England in 1862, in order to make use of our cheap labour. What profit this will produce to those introducing them, it is not necessary to investigate here. But it has so far an interest for the Saxon trade, in that it teaches the workmen how to work on English frames, and in English styles. In times of brisk trade, this undertaking, which has previously been tried on other sides, would have been unsuccessful, owing to the unpliability of the workmen, but the present scarcity of work makes it possible without any great sacrifice. [This refers to the undertaking of Lowe and Co. to introduce English frames.—TRANS.]

“Further, this low rate of wages is consequent upon our system of domestic labour; according to which, almost every workman is his own master, and owner of the frame he works in, and sticking to that which is old, will sooner make work he is accustomed to at a cheaper rate, than learn new methods of manufacture. The means are wanting to most of these people, for they do not reckon anything for repairs or amortization [wear and tear], and become ultimately poor, pressing upon the market their cheap, and certainly often very inferior goods; so that it is difficult, even with improved machines but paying better wages, to compete against them in the market of the world.

“This is the last struggle between purely hand labour and power machinery, whether it be self-acting or requiring the guiding assistance of the hand. This state of things may last a number of years, till the old small frames are used up, and the number of hands working such frames is reduced. These last will, through improved machines, be enabled to produce a greater quantity of goods than the present larger number of workmen; but they will also earn better average wages than now; and in periods of depression, to which every branch of trade is subject, there will be fewer breadless workpeople than we see at present. Already those hands who work at power frames, or on the improved [Heynig] patent ones, earn more than on the small hand frames, and have had during the present crisis more constant employment.

“The more the manufacture is transferred into closed establishments [factories], which through the superiority of power frames must undoubtedly take place, the better will be the condition of the workpeople; and, as a rule, the earnings will be higher than now. The owner of a factory has much more interest in keeping his machinery fully going, than the present manufacturer has to keep employed a number of frames *not his own property*, and upon which he cannot rely when he wants goods, and consequently leaves them to take care of themselves when he is not in want of their production.

“It is true that on many other sides, besides that of the workmen, this decay of home industry, from the increasing development of power frames, is to be regretted. Especially from the moral stand point, it is really to be deplored. These power frames, however,



having been once invented, are without doubt the only means whereby this branch of industry can be retained in the country. We do not wish to see a repetition of the experience which has fallen upon the ribbon trade, and partly also on the cotton printing branch. That the perception of this is making way amongst manufacturers, is proved by the increase of power frames during the last few years. There existed according to the *Journal of the Statistical Bureau*, Dresden, Nos. 3 and 4, in one district of the Saxon stocking trade:—

	In 1861.	End of 1863.
Of English round frame heads . . . . .	3798	4258
Of French       "       " . . . . .	137	303
Of wide power frames . . . . .	30	49
Of stitching machines . . . . .	395	1325

The number of the previous, as well as present existing [wide] walzen [the general term for ordinary wooden hand frames], with patent narrowing machines for making cleared [fashioned] goods, we have not been able to ascertain; but, according to all enquiries, they have considerably increased in number, as many have had the narrowing machine added to them. Of hand looms, a total of 85 has been notified to us as being new made, and they all belong to this category. When we take into account that all this increase has taken place in 1862-3 only (the two worst known for many years in this branch) it shews doubly how the necessity is recognised, not to remain behind the times.

“Experience has also taught us, that Saxony can compete in this field with success against her rival England. For on the one part our spinners have made sufficient progress not to leave us behind in our yarn materials; and on the other, the wages and various expences in bleaching, trimming, &c. (excepting coal, where steam power is employed) are lower than in England. Although the ‘round’ frames till now introduced, have only been used to make the cheaper sorts of hose and half-hose, shirts and pants, *i.e.* cut goods, there is a prospect that a new frame brought from England and patented for Saxony, will be able to make ‘cleared’ [fashioned] goods at a cheap rate [viz. Paget’s patent, bought by Wex for Saxony]. There are, it is true, already frames at work, that make faultless narrowed stockings by power [wide fashioning frames of Mark Mellor], but they are so expensive, as only to compete with difficulty against hand labour the interest and other expences bringing up to too high a price, the otherwise cheap product. Their introduction has, therefore, not been continued. On the other hand, there has been a considerable increase in the wide power *rib* frames, which make elastic ribs for half-hose, socks, pants, and shirt sleeves, &c. [chiefly Hine and Mundella’s construction]. The quality of Saxony hand made ribs, is far behind those of England and France. Some villages, specially employed in making such ribs by hand, from wooden ribbed frames, have suffered severely in consequence, and have, by alterations of frames, betaken themselves to other kinds of [hosiery] work.

“An essential impediment to the quick and general adoption of power machines, will be found in the low development of machine building in this direction. Only a few smiths’ shops, and with insufficient means, are employed in the building of such frames; and

the want of such an establishment, has led several manufacturers to use their own shops for building and repairing their own machinery.

“From the importance of the whole of this branch of industry for our smaller ‘Fatherland’ [Saxony], may the attention of his Excellency the Home Minister be directed to the question—*should not schools be founded, such as already exist in the spinning and weaving trades, for the technical education of young people who propose to follow the profession of stocking-making?* The want of a ‘stockinger school’ of the same kind as the school for teaching weaving (webschule), will be felt in a most lively manner, when the manufacture is carried on in factories where overlookers will be required, and frames of various constructions must be in use. The following tables give a bird’s eye view of the frames employed in the whole Chemnitz branch [being the district represented by this chamber of commerce].

“These tables were compiled in the autumn of 1863, with the assistance of the Behörden (government authorities), and they shew what means of manufacturing are at the disposal of the trade, when business is good; and also the great extent of the present shortness of work; and in which districts the suffering is the greatest. About 18,000 hand-frames were standing; consequently so many workmen were compelled to seek other than their usual employment, besides the seamers and winders dependent upon them, losing the means of earning their daily bread.

“It must, however, be stated that in times of good trade, a considerable number of frames, particularly in the higher mountainous districts, are always unemployed in the summer months; their owners being also joiners, builders, field-labourers, &c., and during fine weather follow their other employments. The number of these only half-employed frames is about 2,000 to 3,000 in the whole district. The tables also shew that the manufacture by power looms, in the present abnormal state of things, is better able to struggle against unfavourable circumstances, than hand-labour; inasmuch, as a greater per centage of power frames were kept employed, than of hand-frames, though the most miserable wages were paid on the latter.

“The ‘ketten frames’ (at first 60 inches, now built 120 inches wide, and which are constructed on the plan of English warps, and used for making webbing for gloves) have been, in spite of all calamities, the best employed, and at good wages; producing cotton and woollen pieces, from which cut gloves are made, in the same style as kid gloves. The sewing of them has given considerable employment; and women have been able, on this work, to earn more money than the men; as is also the case in the ‘gorl embroidering, carried on in the higher mountains.’ (These frames are well constructed; built at Limbach, and are rotaries).

“We reckon that the mere wages of the hands employed on and through the ‘ketten’ frames in winding, working frames, cutting, stitching, dyeing, trimming, and embroidering amounted fully, in 1863, to 500,000 thalers (£75,000), of which two thirds was earned by females. No other kind of frames can shew such a result. Limbach is the centre of this kind of work. For a long time the products of the ‘ketten’ frames were sold exclusively for European use, and principally at the fairs; but for some years past they have

forced their way into the export trade to America, and into consequently increased extension."

Abstract of the Table of Hosiery Machinery in the whole Chemnitz or "wood-frame" district, as given with Report of Chamber of Commerce, 1863:—

"In Rochlitz country—wood plain frames:

	Total.	Going.
Bingstadt . . . . .	1678	454
Mittwerda . . . . .	342	118
Penig . . . . .	434	151
Rochlitz . . . . .	58	17
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	2512	740

"In Chemnitz country—

Augustenburg . . . . .	418	139
Chemnitz . . . . .	6227	3776
Frankenberg . . . . .	118	42
Limbach . . . . .	2473	1311
Oederau . . . . .	13	8
Stollberg . . . . .	4992	1516
Zschopau . . . . .	1822	642
	<hr/>	<hr/>
	16063	7434

"In Zwickau country—

Johangeorgerstadt . . . . .	10	5
Remse . . . . .	202	60
Schellenberg . . . . .	4	1
Schwarzenberg . . . . .	16	4
Wildenfels . . . . .	256	126
Zwickau . . . . .	17	7
Crimitzschau . . . . .	8	5
	<hr/>	<hr/>
	513	208

"In Annaberg country—

Annaberg . . . . .	127	41
Ehrenfreidersdorf . . . . .	1560	258
Geyer . . . . .	54	19
Grunhain . . . . .	86	11
Johstadt . . . . .	7	1
Langenfeldt . . . . .	122	20
Marienberg . . . . .	104	41
Oberwiesenthal . . . . .	40	12
Wolkenstein . . . . .	781	95
Zoblitz . . . . .	75	31
	<hr/>	<hr/>
	2956	529

"In Schönberg . . . . . 4834 2300

"Total of wood hand-frames, 26,378; of which were employed and making *plain*, 11,211; besides which, there were wood *rib* frames,

424, of which were at work, 218; and iron hand-frames, 99, of which were at work, 79.

" Of 'ketten' frames	495,	of which, at work,	413
Of French round frames	303	" "	131
Of English round heads			
worked by hand	1774	" "	1066
Ditto ,, by power	2484	" "	1037
Of wide hand power	21	" "	10
Of wide steam power	28	" "	20
Of stitching and em- broidering	1325	" "	881

"The whole population of the above district, at the last census, was 650,445.

"The total value of the before-enumerated frames *under present circumstances*, and not reckoned according to what they cost making, would come about as follows:

<i>Hand frames, cost, wide and narrow, £7. 10s. to £12; 26,878 at £4. 10s.</i>	£	£
	120,951	
Iron hand frames, £27 to £30; 99 at £19. 10s.	1,930	
Ketten, £30 to £37. 10s.; 495 at £27	13,365	
Rib frames, £11. 10s. to £12; 424 at £7. 10s.	3,180	
		139,426
<i>Power frames:—French round frames, cost £60 to £75; 303 at £37. 10s.</i>	11,362	
English round head, £6 to £7. 10s.; 4,258 at £4. 10s.	19,161	
Wide power frames, 49 at £150	7,350	
Stitching and embroidering, £4. 10s. to £6; 1,325 at £3	3,975	
		41,849
		£181,275

To which must be added the value of gearing, driving tackle, winding machines, and utensils used in trimming, pressing, &c.

"In a good state of trade, with all frames fully employed, the following quantities of yarn would be required:

26,977 wood and iron hand frames, 5 lbs. weekly	lbs.	134,885
495 ketten frames, 30 lbs. weekly		14,850
424 ribbed frames, 5 lbs. weekly		2,120
Total hand frames		151,855
303 French, 50 lbs. weekly	lbs.	15,150
4,258 English heads, 10 lbs. weekly		42,580
49 wide power, 15 lbs. weekly		735
		58,465
Total weekly consumption		210,320

Say 200,000 lbs. a week, or 10,000,000 lbs. per annum, of which Saxony furnishes a full half, the Zollverein and Switzerland a quarter,

and England a quarter. In the past year not more than a third of this quantity has been required, owing to the number of frames standing, and the reduced hours of labour.

“Turning to the kinds of material employed, about nine-tenths has been cotton yarn. During the last few years, the working of woollen yarn has been more general, being used for gloves, and also partly for stockings and shirts. In finer qualities of woollen under shirts, hose, and half-hose, the Saxons have been in competition with Thuringian [Apolda] manufacturers for some time; and lately stout heavy articles have found entrance into German and general consumption. This has employed many frames that, in bad times in the cotton branch, would have remained unemployed. We much want the important ‘carded wools’ from long stapled common wools, which are spun nowhere in Germany, but which have hitherto given the predominance to England in common woollen hosiery. A material much used in England, merino yarn, a mixture of wool and cotton, has been but little used in Saxony, for hose, half-hose, pants, shirts, &c.; the spinners of such yarns being wanting, or only accustomed to spin for weaving purposes; and the finishing of the merino wrought goods is attended with difficulties. Besides, the English manufactures are so extended in which this article is used, and are so firmly founded, that it makes it doubly difficult to struggle against them, and make a position in the markets of the world. Linen yarn occurs only exceptionally, being partly replaced by ‘Scotch twist’ [Lisle thread], which is gaining the upper hand, and furnishes a more even web. Organzine silk is used only in gloves, and then almost always in mixtures with other materials. *Floret* silk, which was formerly much used for gloves and stockings, has found latterly but little use; it has died out.

“With respect to the returns of the trade for the year 1863, it may with safety be assumed, that they have been greater than the amount of goods made, for the stocks on hand are smaller than at the beginning of the year. But the selling price not being anything like in proportion to the cost of newly made goods, the manufacture of the latter, beyond the demand, has been kept down as much as possible. The cost of goods at this time was no criterion of the selling price. Holders calculated averages between the cost of old and new made goods, and offered them at prices, which they modified according to their engagements, and opportunities of lightening stocks by sales. The depreciation of the American currency pressed more on sales and on all business to America, than the prices asked on this side; and stopped all sales of better goods to that country. With diminished stocks, any return of brisk demand, will, it is hoped, raise the present extremely low rate of wages. It will find considerable disorganization. Many frames will have become useless; many, especially of the younger hands, gone into other employments: so that the pecuniary loss to workmen of wages, and to the manufacturer of his profits in trade, will not be the only evil befalling this branch, through the cotton crisis.

“In conclusion: It is a proof of the care, prudence, and solidity, with which the members of the Saxon hosiery trade have conducted their business, that in spite of two years so pregnant with events, only one or two small failures have occurred; the causes of even these,

are not to be attributable to the unfavourable circumstances of the times. The capital employed in the trade has rather diminished, we believe, than increased, in the years 1862 and 1863."

In order to bring the official account to the latest possible time, extracts from the report of 1864, also drawn up by Mr. Hahmann, President, and presented as before, are appended:—

"There is no improvement of the hosiery trade in this district of Saxony; the returns are somewhat larger, but the number of unemployed frames is much increased, and is now beyond 18,000. In the district of Annaberg, the brisk trade in embroidery of muslin and lace, has enabled the women to earn good wages, and the men have done the household work. Webs for gloves have been in request; as also goods of coarse gauges in fashioned work. Stockingers wages have not increased, 4s. 6d. to 6s. is considered good pay. Hands are still rapidly leaving, and that finally, sales are making of wood frames at 10s., £1. 15s. to £3. 15s. a-piece. Some from mere necessity; others from despair of any improvement. There has been no symptom of a disposition to riot, either here, or amongst weavers in Silesia. Round frames are fully replacing the cut goods made by hand; and coming lower in price, press on the demand for narrowed goods also.

"Power frames are building to meet the expected deficiency of hands for making narrowed hose and hoped for improved demand;" (these are constructing partly on Paget's, and partly on Woller's plans; of the latter little is as yet known) "but the want of suitable framesmiths will prevent their quick extension. Smiths accustomed to other kinds of machinery, are not equal to the construction of these hosiery frames; at least not until they have had experience amongst stocking weavers. And again, reference must be made to the necessity for setting up 'trade or technical' schools, to teach how to construct frames, and how to work them.

"About two-thirds of the English and French round frames have been continued at work, mainly with the view of keeping them from injury, to which they are so liable. The capacity of all classes to produce, has been much lessened by the very inferior yarn now used in making hosiery. To keep down price has been the main object, both in yarns and goods. So to work all Surats has been common; except for retail home trade, which would pay the value of the good old quality. These remarks apply to hose, socks, pants, and shirts; but of gloves, the produce of the 'ketten' (warp) frames, a more favourable report can be made. In these there has been a lively trade, old machines have been improved, and better new ones built, to make hay while the sun shines. Limbach is the chief seat of this branch. There, 22 ketten frames have been greatly improved; and 38 new ones, 60 Saxon inches wide, to be worked by hand, and 80 iron 120 inches wide for power, have been constructed. They would all be made of the latter kind, were the expence not so great. For with old narrow frames it is not possible to meet foreign competition. On these frames, workmen earn from 15s. to 18s. a-week; on the old ones only 6s. to 9s. can be obtained.

"Steam power is now also applied to do all the work in cutting out gloves; indeed to make and finish them entirely from 'tricot' machines; and by the use of stitching machines to seam up, even the fingers neatly; and then by the 'stepp' machine, to embroider them in the present styles.

"All these three kinds of machines, are made now in the increasing and fully employed machine building business, at Limbach.

"By these arrangements, glove seamers in the villages are dispensed with, and orders for goods are executed with a regularity, formerly unattainable. The glove trade from the regular hand frames is small; but it certainly offers better work, than that in stocking making. These gloves are worn chiefly by the poorer classes.

"Although for German and foreign trade, great caution was used by purchasers; and American currency still fell in value; yet the Saxon hosiery business was on the whole improved in the early part of 1864. In the latter months, buyers expected to see every fluctuation in the Liverpool market for cotton, reflected in the prices of the goods here; although wool had risen 300 to 400 per cent. and goods not more than 100 per cent. Great confusion in prices and offers has been the result. The German retail trade, hitherto supplied from France, is yearly more cultivated. Thread hose and half hose; and, favoured by fashion, fancy striped goods of all kinds in cotton, merino, and worsted, are in fair demand. This branch should be cultivated, for it pays better wages, and trains accurate workmen. A factory has been set going, in which fancy work is made, on hand frames; these better paying articles it is likely may be thus profitably produced. For making unbleached staple goods, it has hitherto not been found, that the production by domestic industry, can be thus replaced to profit.

"The effect which the French treaty of commerce may have is doubtful. It is a curious fact, that of cotton hosiery, which constitutes the bulk of the manufacture and consumption of both countries, not one word is spoken. It must therefore be looked for under unnamed articles from cotton, with a 15 per cent. duty."

Appended is a table added to the report of 1864, by the chamber of commerce:

"Weekly earnings in stocking making:

	1860.			1864.		
	£.	s.	d.	£.	s.	d.
Chemnitz, males, hand frames	0	3	9	0	3	9
"    "    power frames	9s. to 12s.			1	4	0*
Zwickau, males, hand frames	0	6	0	0	7	6
"    females, hand frames	0	4	6	0	5	3
Annaberg, males, hand frames	0	4	0	0	6	0
Mittwerda, males, hand frames, with lodgings	0	4	0	0	4	6
Zschoppau, males, " "	0	3	0	0	2	6
Loessnitz, males, " "	0	3	0	0	2	6
Limbach, males, hand frames	0	6	0	0	12	0
"    "    power frames	0	4	6	0	5	0

\* (Probably on patent rotary frames with ribbing or narrowing tackle.)

	1860.			1864.		
	£.	s.	d.	£.	s.	d.
Stollberg, males, hand frames . . . . .	0	6	0	0	4	0
„ males, power frames . . . . .	0	6	0	0	7	6
„ females, power frames . . . . .	0	3	6	0	4	0

“And in smaller towns and villages :

Men earned in hand frames . . . . .	0	5	3	0	5	9
Women „ . . . . .	0	2	0	0	2	0
Men „, power frames . . . . .	0	6	0	0	9	0

The following remarks explanatory of the above table are from a private hand :—

“From 1860 to 1864 was a time of greatest depression ever known to the hosiery trade in Saxony.

In Chemnitz itself there is now very little work made by hand. Only made in factories, as Hecker's, Wex's, Starker's, and one or two more.

“In Zwickau, very little hand work; it is the great coal field; and more is made in mining than stocking making.

“Annaberg gives embroiderers better wages, than stocking makers can gain.

“In Mittwerda there are not many frames.

“The wages are most depressed in Zschoppau, Loessnitz and Stollberg; which are in the principal district where fashioned hose, half hose, &c., staple articles, are made from narrow and wide hand frames.

“Limbach is the district for fancy striped and fine thread goods, and gloves.

“At Stollberg, Mr. Woller makes round hose very largely indeed.”

A machine for making looped hosiery articles, constructed on a novel and ingenious plan, was devised by Mr. Jacob Albert Eisenstück, of Chemnitz, and patented in England in 1860, No. 1132. This gentleman's father was an eminent hosier at Chemnitz, where, having retired, he is succeeded by his very clever son, this patentee. It is for machinery operating on a new arrangement of needles, whereby widened or narrowed cylindrical hosiery is made without seam, in cylindrical or narrowed parts. Without plates a very limited idea of its operation can be furnished.

In the specification it is stated that two sets of needles are arranged on parallel bars. The needles are placed inwards; and these four sets of needles form a four-sided figure or parallelogram. The fashioning is effected by causing the fashioning needles to move to and fro and between the two first-named rows of needles, by suitable means. The patentee prefers to produce the narrowest part of the fabric first. The fashioning is caused by the action of the same



power, as that at work producing the knitting fabric. So long as the parallelogram remains undisturbed, a perfectly cylindrical web will be produced. When the fashioned part of the fabric is to be made, then the fashioning guiding apparatus comes into play. The precise pattern of the stocking or other article to be made, is first set out on a pattern wheel. Then the wheel with the knitting machinery is caused to rotate. The pegs and projections operate on a ratchet wheel, which by cranks and other mechanism, acts on both sets of fashioning needles, causing them to recede from each other, to produce fashioning according to pattern. The to and fro action of the fashioning needles may be produced in other ways.

This machine has been as costly as it is ingenious, and has been the result of many years of laborious effort. It is perhaps too complicated at present for practical purposes; but if the principle of construction is sound, it may receive such simplification as shall render it effective.

In addition to the concluding remark in the explanatory statements above given, we are informed that Mr. Woller, of Stollberg, has just got out an invention for working a ribbing frame by power. It is a very clever one. It makes the welt, the slack course, and the fine course all by its own action, and without stopping or assistance from the workman. At present, they make four ribs at once; and one man can manage three frames. He is building them, and selling them to manufacturers.

Each needle has its sinker, and divides well, and the machine works well. At present Mr. Woller works them slowly; but intends to put them to the higher speed of which he believes them to be capable; and by which he calculates one man would be able to turn off 300 dozens of ribs,  $4\frac{1}{2}$  inches wide, weekly.

Mr. Woller's hosiery concern is one of the largest in the world. He makes often 20,000 dozens of round hose in a week, and can do more. He does not bleach his own goods, but trims and boards them. The town of Stollberg, as well as his own works, he lights with gas. The goods produced by this house find their way into all parts.

The goods made in Saxony upon iron frames have obtained a place in most markets of the world. They are principally sold through four or five manufacturers, whose business is carried on at Zeulenroda. They are made on the same system as that practised in the

Chemnitz district; fine yarn is used on stouter gauges, made extra wide and short; and then boarded up to the requisite length by the stockinger. The hose are consequently hard and non-elastic, but still firm and clothly.

In this district the workmen generally are very industrious, but poor; and, as a rule, work direct to the manufacturers. Each master has one or two apprentices, and sometimes journeymen; but since the abolition of legalized guilds, the latter work mostly on their own account. The quantity of work turned off by them in a week is, about four-fifths that produced by English frame-work-knitters; but they do not knock the frame about so much. They are not so easily changed from making one size to another as the English workmen, but they are docile and contented. They often make up for absence from work at one time, by long hours of labour at other times. In this respect they are quite the counterpart of their brethren in England.

In this iron frame district there are but few factors; the masters working to the manufacturers in Zeulenroda and Pausa. Journeymen and apprentices lodge with the masters; and the former pay weekly in Pausa 1s. 5d. for lodging and coffee in the morning, and a dinner of broth, potatoes, and a little meat, and of coarse black bread. The evening meal, washing, &c. they have to find themselves. Good black or brown rye bread, possessing more real nourishment than the best wheaten white bread, costs 1d. per lb. Meat has risen 1d. per lb. within the last ten years, and is now for veal, 4d. to 5d.; beef and mutton, 5d. to 7d. Potatoes are 3s. 3d. to 4s. for 100 lbs.; coals, 1s. 8d. to 2s. for 100 lbs. Most of the master frame-work-knitters cultivate potatoes, cabbages, &c. on a piece of land of their own. An apprentice gets no wages until he makes a dozen pairs of hose in a week, and has to pay nothing. When he makes over a dozen he receives 1d. or 1¼d. a pair, according to quality, &c., and has free board and lodging.

For making 30-gauge stockings 21 inches long and 9 inches round feet, round heels and full narrowed,

made of No. 40, three thread yarn, the master receives 5*s.*, the journeyman 3*s.* 4*d.* per dozen, and may produce 18 to 20 pairs in a week. The master pays seaming 4*d.*, frame rent 6*d.*, and for fire, light, needles, winding. The rest is for himself for lodging, &c. The above price is the highest ever paid for this article; the lowest was paid in 1864, viz., 3*s.* 6*d.* per dozen to the master.

A report of the chamber of commerce in 1864, for the Plauen district contains the following table of stocking-frames (then at work most probably), viz.:—

	Masters.	Journey-men.	Apprentices.
Plauen . . . . .	12	—	—
Pausa . . . . .	227	82	19
Mühltroff . . . . .	71	36	17
Brambach . . . . .	97	30	20
Adorf . . . . .	26	5	—
Oelmitz . . . . .	3	1	—
Barenwalde . . . . .	106	—	—
	542	154	56

Making a total of 752 frames.

The result of careful inquiry in this district, in 1866, upon this subject, compared with the amounts of goods believed to have been produced and delivered into the hands of manufacturers and bleachers at Pausa and Zeulenroda, is, that the number of *iron* frames are, at least, in Zeulenroda, 1000; Pausa, 400; Aurna, 150; Schleitz, 120; Gefell, 100; Herschberg, 100; Leichtenberg, 30; Tanna, 15; Triptes, 15; Hohenleube, 50; Mühltroff, 120; Brambach, 100; and various small villages, 100; making a total of 2,300 narrow frames; which, together with 40 wide frames at Pausa, and some scattered wooden frames, comprise the actual hosiery-machinery in the Voigtland district.

The entire numbers of Saxon frames stated in this paper, are 27,300 narrow of wood; 2,400 of iron narrow, and 100 wide; 500 'ketten' wide; 300 French round, and 4,260 round heads—a total of 34,860 frames; and 1,325 stitching machines are known to be employed by them.

The Chemnitz hosiers, as a rule, do not own hand-frames; only round or power ones. The factors, and the men themselves, are the owners of the hand frames. These factors are a very respectable and fairly educated class of men. Most of them, before the cotton crisis, bought their own yarns, and then sold the goods to the Chemnitz hosiers. During that crisis, many of the weaker and smaller were obliged to work for wages, taking the yarn from the manufacturer. But now they are returning to the old system. There are factors who

have held 10,000 to 20,000 dozens of unfinished goods in stock; and one or two have held even larger stocks than those for a time. This system places the Chemnitz hosier in a very favourable position. He need not hold an unwieldy body of machinery, nor a risky stock of yarn, nor any great stock of goods; therefore less capital is required in his business. Still, the larger and older houses, having considerable capitals at their disposal, make their own ranges of numbers and prices of all kinds of goods; which being in stock, are ready for finishing and sale.

The great object too much kept in view by Saxon hosiery manufactures, has been cheapness. Everything else seems to have been subordinated to this. The goods are made shorter than in Nottingham; finer numbers of yarn being worked on coarse gauges, and consequently the work is harsh, with little elasticity. In England, the governing principle of payment is by *width*, in Saxony by *length*. On the Saxon principle the difficulty of getting goods made regular in quality is increased. For instance, a stocking intended to be 25 inches long,  $5\frac{1}{4}$  inches wide, and with a 9-inch foot, is made about 22 inches in length, 6 inches wide, and  $8\frac{1}{2}$  inches in length of foot. By manipulation in boarding and trimming, it is brought to somewhat like the required size. On this system the goods will vary, and the wale is liable to be injured, and the qualities after all must be assorted from each other of goods made under the same name.

In Saxony, the bleacher uses less soap than is used in England; his charge is proportionably less, no doubt; the goods, however, lose fulness in hand by it. More time is allowed by him for the operation. He does not dress and finish them. Most of the large manufacturers dress and trim their own goods.

Mr. Wilhelm Vogel, a native of Apolda, now a merchant of Chemnitz, favours us with the following notes on the hosiery trade of Apolda:

“This manufacture was planted there about 300 years ago by Netherlanders, driven from their own country by religious persecution. During this interval it has prospered, produced knitted and machine-wrought

striped woollen stockings, caps, shirts, pantaloons, gloves, &c. These found an outlet principally at the fairs of Leipsic, Frankfort, and Brunswick. A few houses have had connexions in Holland, Switzerland, and Italy. In 1830, Mr. Vogel was the first to travel in this business through North Germany and Holland. This he did on account of the house of August Zuimmermann. The more important advance in the hosiery trade at Apolda dates from 1834, when the Zollverein was established, and is principally owing to the activity of the brothers who constitute the firm of Christian Zuimmermann and Sohn, whose production included, besides the before named articles, fancy woollen goods of the most varied kinds, which gained a market in every part of the world. Their returns probably equal those of all the other hosiers at Apolda together. Apolda had about 4000 inhabitants in 1830; now there are about 9000; it contains a large number of manufacturing houses, shewing the prosperity of its trade."

The following is extracted from the *Weimer Times* of 18th March, 1866. The article is headed "Thuringian Industry, 1864":—

"One of the most important branches of the industry of Thuringia is the woollen trade and branches connected with it. As the Thuringian spinning mills had full employment in 1864, so was the manufacture of woollen stuffs and hosiery fully carried on. At the end of that year a reduction in prices took place, which was particularly felt at Goesnitz and Greitz, and in consequence many stocking-frames were thrown out of employment in Goesnitz. At Apolda manufacturers of woollen hosiery have been fully employed. During the previous four years an average of 15,300 cwt. of raw materials were used in making 13,000 cwt. of finished goods." [Hildebrand's *Annual for Political Economy and Statistics*, gives the yarn required at 25,000 cwt., on an average of the value of 3,750,000 thalers, £562,500.] "Of these 13,000 cwt. of woollen hosiery the Zollverein takes 5000; fairs and markets, 1850; free cities, 500; Mecklenburg, 200; Schleswig Holstein, 150; Norway and Sweden, 300; Denmark, 200; Switzerland, 600; Italy, 900; Russia, 300; England, 50; North Spain, 25; Turkey and Danubian principalities, 350; Holland, 950; Belgium, 25; South and West America, 1,200; other non-European states, 400. This 13,000 cwt. of hosiery represents a value of £412,750. The yarn employed is 6,600 cwt. from England, the remaining 6,400 cwt. is German spinning chiefly from the Thuringian mills of Jena, Stadslin, Muhlhausen, Gotha. Also from Saxon spinning mills. The manufacture of this hosiery employs 900 to 1000 frames, and in Apolda about 150 machines. There are 2000 to 3000 females employed by Apolda

firms, who are spread over all the large towns and villages through the neighbouring district."

According to other information, these statements seem to be taken too low.

The prophecy in the report of 1863, that a deficiency of hands would make itself felt so soon as the demand for the United States returned, has not only been fulfilled, but to a much greater extent than any one seems to have anticipated. Wages have risen since March, 1865, 50 to 100, and in some articles, 120 per cent. They are now higher than ever known, by the oldest manufacturers. This, with the high price of yarns, brings goods to an enormous cost; and makes it in the judgment of the most experienced hosiers, not a little dangerous to manufacture.

In a former chapter prominence has been given to the important and difficult subject of trade regulations, whether by a chartered company, trade combinations of masters and men, or courts of conciliation; we therefore close this account with a description of the system of management instituted in the German guilds or trade companies, under which this business has noiselessly advanced to its present dimensions and that have been but recently laid aside as to the exercise of any authority from the state.

The guilds which were constituted in Saxony, do not now settle trade differences between masters and men, nor do they amongst the men themselves. Their legal power to do this was withdrawn in 1861. Formerly, the workpeople were obliged to belong to them; since that year they only exist in Saxony as private societies, and not as guilds. To the English frame-work-knitter, the history of one of these authorised societies may be interesting; that of Pausa is given as an example. It was founded in 1750, by 20 stocking-makers who were masters, having 22 journeymen, and 14 apprentices. Its highest numbers were attained in 1850-60, just previously to its cessation as a legalized body; there being then in it 81 masters, employing 129 journeymen, and 174 apprentices. It was originally established in order that being confirmed by authority, journeymen and apprentices taught their business at

Pausa, might have recognition and consequently find employment, when on their appointed journeyings through other German districts and States; and thus not be compelled to return back again, from not having been acknowledged as members of a guild. The term of apprenticeship was four years; on finishing which, the youth remained a journeyman, till of age at twenty-one. He then was obliged (according to the ancient and universal trade custom in Germany,) to travel ("wander") for two years; after which, on returning home, he could, if he desired it, become a master, after giving six months notice, and proof of capacity, by making a "master piece of work, consisting of one night cap, one pair of gloves, and one pair of men's hose with shapes." These had to be made in the presence of the president (*obermeister*) of the guild, his assistant, and two deputies as well as a deputy from the Town Council. During the operation, these five functionaries ate and drank at the candidate's expence. As each article required was begun, it was sealed with the guild seal by the president, to prevent deception. A fee of 13*s.* 3*d.* was paid on the entering of apprentices, and another of 19*s.* on becoming a journeyman. At first a feast was given by a newly made master; but as the number became large, this was commuted into a payment of 34 thalers, or £5. 2*s.* by each new master to the fund.

These fees, including a payment of 6*s.* a year by each master, constituted the fund of the guild. This body had the power to cross out the name from their register, of any member convicted of stealing. In cases of quarrel or dispute between masters and journeymen, the president decided the case.

Each guild had a large chest called the "*Lade*"; usually a handsome carved piece of furniture, with drawers for money, guild-book, and other documents. The president held the key, and kept the books, register, &c. This '*lade*' was an object of great respect; all meetings were held before '*open lade*'; when the president had opened it, the members took off their caps, ceased smoking, and were obliged to behave in all other respects, decently and respectfully.

It was before '*open lade*', that new masters were admitted, after solemn examination of their 'master piece of work.'

Each journeyman on setting out upon his wanderings, received a '*wander-buch*' (a travelling pass-book) from his guild. It is now issued from the police office in larger towns, and by the ordinary authorities, in lesser places; and every workman must have his pass-book. The police write in it "left this town such a day." The owner on reaching another place, must present himself to the police authorities, and be registered. Foreigners who settle for some time any where in '*Father land*' (Germany,) but do not become naturalized, must obtain a 'permission ticket' to live there; by which plan every one is under the observant eye of authority.

On the death of a husband or wife, belonging to the guild, 18s. was paid out of the fee fund; and so much for a deceased child; in case of sickness, assistance was given; and occasionally money was lent to a master for special purposes. Any balance in hand was from time to time either divided or expended, on a general feast of the members.

This account, with minor differences in customs of various trades, is applicable to other German guilds, besides those for hosiery.

Since it ceased to be compulsory for Saxon stocking-makers to become members of guilds, complete statistics cannot easily be obtained, as will appear from the tables with which the account of the iron branch of the manufacture is closed.



## CHAPTER XXXI.

## MACHINE-WROUGHT HOSIERY.

It is difficult to say when or by whom the stocking-frame was first taken to the *United States of America*. Before 1775 there were 150 of these machines at German-town, and near the Brandywine. They had increased to 200 in 1815, and so remained as far as was known in England up to 1835. Since then there has been an interchange of mechanical inventions, beneficial to both countries. Several clever hosiery frames of American construction are at work both there and here. Our brace, warp, and bobbin net machines, have been sent over thither.

We have received the following statements, which if not over-estimated, indicate such an extraordinary progress as may well command the serious attention of the English trade. They have been compiled by a gentleman conversant with the United States hosiery manufacture:—

“The amount of hosiery annually produced at German-town, is from eight to ten millions of dollars, (£1,600,000 to £2,000,000). These are nearly all woollen, similar to those made by Harris of Leicester. They comprise hose and half-hose chiefly made on *circular* looms; also shawls, hoods, scarfs, nubias, comforters, gaiters, &c. Fashioned hose are made here to a limited extent; a few circular cotton hose and half-hose complete the list.

“New York state takes the lead in the production of shirts and drawers; and manufactures from ten to fifteen million dollars yearly, (£2,000,000 to £3,000,000), of these goods, principally at Cohoes, near Albany, where are the Falls of the Mohawk, affording splendid water power. Ribbed hose and half-hose are made at New Amsterdam, thirty miles north of Albany.

“The New England states have made rapid strides in this manufacture, especially during the war. Massachusetts takes the lead, followed by New Hampshire, both being largely engaged in the Derby ribbed hose trade. These goods are made on Aiken’s and Pepper’s patent speedy circular frames, producing handsome goods.

In Massachusetts many ribbed goods are made on *hand* frames by Englishmen. Rhode Island, Vermont, Connecticut and Maine, all make hosiery, and the New England states may probably become the centre of the manufacture. It is not possible to estimate the amount now produced there, but it is very large. New Jersey produces from one to two million dollars (£200,000 to £400,000) yearly. The aggregate United States production, exclusive of New England, is from nineteen to twenty-seven million dollars (£3,800,000 to £5,400,000)."

Mr. Joseph Whitworth, the celebrated mechanician and engineer of Manchester, introduced in 1834, an American knitting machine, which had not any of the parts of Lee's stocking-frame in its construction. This frame may make ten or twelve hose at once; but the fashioning by narrowing can only be given by the superintendant to one hose in succession to another. The machine loops stitch by stitch one loop at a time in each stocking, making 400 loops of 18-gauge to 24-gauge per minute, per stocking.

The web is made by a long bar traversing from side to side and back again; on this bar are placed a number of upright hooks at the end of which is a slight beard or kind of 'tumbler.' A description of fixed carrier needle acts for making each stocking, which remaining stationary, laps round each hook in succession as it traverses, and a sort of point enters an eye on the hook, and rising up lifts from behind the loop and passes it over the end of the tumbler upon the loop already made. Thus stitch by stitch making a new series or course of loops.

The hose are seamed in the usual manner. Very hard twisted durable materials can be used on these frames. They were of coarse gauges and produced excellent imitations of the best hand knit work, only to be distinguished indeed from it by their more perfect regularity of texture.

In 1845, there were six frames at work. But from the cost being so much higher than that of ordinary frame-knitted hose, they are no longer employed. The name of Wild has been associated in this country with this invention. Possibly it is that of the American inventor at New York.

In the *Scientific American*, July 2nd, 1860, the following statement appeared:—

"It has long been a desirable object to knit a stocking from top to toe without a seam by a machine, and which would fit the foot as neatly and sit as easily as one knit by hand. This has at last been

accomplished. We have examined four unique knitting-machines of Raymond and Co. at Williamsburg, which knit at the rate of two pairs of entire stockings in nine minutes. One girl can attend four machines, and produce over ten dozen pairs of stockings per diem. Three threads are fed simultaneously on one machine, the needles of which are placed around a circular 'former' or 'cylinder,' that is so actuated as to execute the difficult operations of forming the legs and feet alternately. The devices for accomplishing these results are ingenious and peculiar. The stockings are knit in a continuous web; the toe of one is finished when the top of the other begins; and by drawing out a thread the one is separated from the other. Nominally there is no waste of yarn; the mechanism is strong and durable; and the needles having no catches are not liable to break. The American and European patents for these machines belong to the McNary knitting machine company of this city."

This company took out patents, Nos. 452 and 2421, in England for improvements, in 1860. The second is a new arrangement of the former.

Both are described as being on a circular machine, not having flexible or closing beards, and having their work taken off by stitch hooks. The plans and instruments are very ingeniously devised, and the invention is described as specially applicable to machines which have rotary or lateral motion of needles, controlled for the purpose of giving form to stockings, &c., by means of a rotary studded cylinder or drum (patented in No. 452) to which automatic motion is given, continuous, longitudinal, reciprocating, and rotatory. A switch lever is so constructed and applied as to be thrown out of and restored to position by the action of the studded cylinder. The pressers are so arranged and operative as to admit knitting on immediately adjacent needles. The switch wheel is geared with the needle ring. 'Loopers' are employed and needles are constructed and secured as described.

This company patented improvements on the above in 1861, No. 831, intended to make better fashion and with greater economy.

In the present plan the requisite fulness in the leg of a stocking is obtained from accumulated loops got by knitting backwards and forwards in courses of various lengths, making short or long zig-zag courses as in a gore without seam. By doing this over more or fewer needles, the forms may be varied in breadth as well as length. Modes of lessening breadth in circular work are described. Lock or chain stitches to finish off round work are proposed. The accumulated courses are effected by the cylinder being suitably studded.

An English patent was taken out in 1863, on behalf of Mr. J. G. Wilson, of New York, for an improvement in knitting machines.

This is described as consisting in an apparatus to be used on machines in which several needles are knitted upon at once. Ordinary pressers have a complicated movement. In this invention the same

results follow by using a pad of india rubber to press the work against the upper part of the inside at the back part of the needle bar. The pad is also made to rise from contact with the work just before the rotation of the needle ring in a circular frame, or longitudinal movement of the needle bar in a straight machine, takes place; and remains out of contact during the movement of the bar. As the needles start on their upward movement, the pad descends still further, so that it draws the work and yarn back over the heads of the needles to prepare for the next course. A second pad can also be applied to press upon the work just before the first pad leaves, to hold the needle bar while the first pad is raised. By this means the work is drawn away from the needles as fast as it is done. A divided presser with a series of conductors in two or more sections can also be employed in a circular frame, for closing the beards of the needles when a large number of threads is used to knit at once on several of the adjacent needles. Each piece of the presser and the corresponding part of the series of conductors is so applied and operated upon, that one point in each piece of the presser and one conductor in each part of the series moves radially towards the centre of the ring. An improved stop motion, composed of slides, is also applied, so that in case the yarn breaks a suspended slide drops and brings its tongue into notches, which are arranged so as to produce a longitudinal movement to throw the machine out of gear. Grooves of the depth of the screw head are cut to prevent the shaft from being moved longitudinally further than is necessary.

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The production of hosiery holds a high rank in *France*, as indicated by the amount of transactions of which it forms the basis, as well as the great number of workpeople directly and indirectly employed in weaving, seaming, embroidering, and finishing this class of articles. The district around Troyes is nearly assimilated to that of Nottingham, as being the principal seat of the cotton hosiery fabrication. Around Nismes and in the 'Department du Gard' generally, has long been the home of the silk hosiery production. Paris and its environs are celebrated for fancy goods. Frames are, however, employed in upwards of 600 communes of France. The entire number we are not able to state. The chamber of commerce at Troyes was presided over in 1846 by M. Grèau, long one of the most eminent manufacturers of hosiery in that city. This body joined in strenuous efforts to oppose the introduction of free trade into France, to which measure its president also was decidedly adverse. This caused him to draw up a copious and able statement containing, amongst other matters, an account of the extent, employment, and

returns of the hosiery business in that district. The document was compiled from information furnished by official sources added to the personal knowledge of the compiler. This paper received the public approval of the Prefect du Department de l'Aube, and of the Ministers of the Interior and of Agriculture, and may be received as entirely authentic. Though, as we think, greatly in error on the exciting subject of "Freedom of Exchange," yet M. Grèau was a man of great public spirit, and indefatigable in carrying out whatever he deemed to be practical ameliorations in society around him. On referring to this report the prefect remarked, "if such an one had been drawn up each fifty years since the time when the hosiery manufacture was first established there, how much of interest would now be known of its adverse and prosperous times, calculated to instruct the present and guide the future?"

In describing the progress of the business, M. Grèau mentions M. Delarothiere, of Troyes, as one who, if he had been placed in a favourable position, would have been accounted, from the improvements he effected in the hosiery manufacture, as a man of great mechanical genius. Forgetful of himself, he sought only to endow his country with valuable inventions. While prosecuting them he vegetated in obscurity, until his very name was ignored amongst those who had been enriched by his discoveries. In 1828, he produced a machine supplying web equal to that from the English warp-frame; and soon after, a machine for making gloves, replacing those smuggled from England. In 1834, he constructed one for narrowing stocking feet without seams. Twelve French patents for improvements were obtained by him in fifteen years. His system of narrowing frames is spread over France.—To Messrs. Poron frères, of Troyes, is due the introduction of English rotary ribbed frames.

There were in 1846, in the Arondissement of Troyes, 18 cotton spinning mills, with 65,000 spindles, employing 1690 spinners, males and females, and producing 862,500 killos. (1,832,800 lbs.) of yarn worth 2,242,500 f. (£89,660). M. Grèau, gives the prices of coal from *sixty-three* French coal fields. In the district of *Troyes* there are 1495 narrow cotton hose frames, 715 wide pantaloons frames, and 400 circulars, all using cotton; 500 Scotch thread for hose and gloves,

100 cashmere, 200 spun silk, and 100 woollen mittens; 3510 frames in all, 22 to 30 gauge; using 840,660 killos. (1,786,400 lbs.) of materials, and producing goods worth 6,391,000 f. (£265,640). In the district of *Nogent sur Seine* all that were at work were on with cotton, except 100 using wool; 2,000 were making cut-up goods, 800 were wide making shirts, 400 made fashioned hose, and 100 circulars,—total, 3,400 frames, 22 to 27 gauges; using 992,000 killos. (2,198,000 lbs.) of materials; and producing goods worth 6,409,000 f. (£256,360). At *Arcis sur Aube* and its environs there were 1946 making cotton hose, 900 using Scotch thread, 200 cashmere, and 400 spun silk hose and gloves. These were all 30 gauge, and with 240 at *Eperney*, 16 at *Bar sur Aube*, and 29 at *Bar sur Seine*, made up 3,491 frames; using 192,818 killos. (409,738 lbs.); and which produced 4,472,600 f. (£178,900) in value. The entire number of machines using cotton 7,901, consuming 1,880,550 killos. (3,996,170 lbs.), and producing 13,548,100 f. (£541,924); Scotch thread, 1404 machines, using 56,000 killos. (119,000 lbs.), making goods worth 1,482,000 f. (£59,280); wool, cashmere, and spun silk, 1,100 machines, using 58,100 killos. (123,462 lbs.), producing 2,262,000 f. (£90,480) in value. The hosiery manufacture in the *Département de l'Aube* in 1846 therefore employed 10,401 frames, using 1,994,650 killos. (4,238,630 lbs.) of materials, which cost 7,380,271 f. (£295,211), giving 7,270,000 f. wages (£290,800), and producing an ultimate return of 17,292,600 f. (£691,700). There were employed 11,721 men and women, who gained 1.25 f. (1s.) a-day, and 21,402 women and children at 0.45 f. (4½d.) a-day. The capital laid out in 10,401 frames and buildings requisite, was calculated to amount to 7,779,860 f. (£311,190).

After comparing the quality and cost of the hosiery articles from Saxony in the Berlin exhibition, in 1844, and English hosiery of the same date with those of France, M. Grèau declares his opinion to be that, to meet on equal ground, the price of the labour of the French frame-work-knitter must be reduced 50 per cent., or the price of French cotton yarn, 30 per cent. The weekly wages of the Saxon stocking-maker were stated by him to be 4s. to 4s. 6d. a-week.

We regret not to be able to give an equally extended statement of the production of silk hosiery in the south, or of fancy and other articles of luxury made at Paris. The report of M. Edouard Tailbuis, of Paris and St. Just, upon the production of French hosiery made on the occasion of the Great Exhibition in 1862, gives the following information, of which he enables us to avail ourselves. No one has been more prominent in employing effort and money to introduce English machinery into the hosiery manufacture of France than this gentleman; and he has added to them

modifications which adapt them for the production of articles specially suited to French demand. He has patented one of these in England in 1862, No. 1499, under the title of "a rectilinear knitting-frame." At St. Just, M. Tailbuis constructs hosiery machines of each class, worked by power; equal, probably, to any either in France or England. Of these, each capable of making eight fashioned hose or four drawers at once with great speed, he has upwards of thirty at work on his own premises, besides having constructed similar ones for others in France and Spain. M. Tailbuis is not only highly esteemed by his workpeople and neighbours as a public benefactor, but his services have obtained the marked approval of his sovereign, who has given him the Cross of the Legion of Honour.

"While England and France are the chief producers of hosiery, Saxony is known more particularly for the lower articles of bleached and unbleached cotton sold at advantageous prices to the consumers. They have machines equally good and cheaper labour, so that France cannot compete with her. England makes fancy articles which were once special to France on a large scale. The circular machine has been so improved by the English, as to reduce the cost of the production below competition. Their manufactures are on a colossal scale; their returns in 1862 being 160,000,000*l.* (£2,400,000). Their materials are of admirable regularity, and their bleaching and finishing excel in softness and brilliancy those of France, while these processes are cheaper by one-third. Their wages are it is true higher, but not so as to equalise the cost. Extra fine English hose are without rivals; but with the protection of the tariff and their excellent quality, French goods made stout and fully fashioned, will keep the home market.

The greater part of the French narrow machines continue inferior to the English. Some improvements have been introduced which have favourably effected the price of production, but much remains to be done. There is no country that may remain stationary or safely count on long acquired superiority in manufactures.

"The *rectilinear* machine with selvages and narrowings, has remained with some modifications as it was when first introduced into France, by John Hindret, in 1656. On these the narrowed and widened hosiery are chiefly made. The *straight rotary* appeared in 1844, and on this a few years after narrowed goods were made mechanically, and now are produced automatically. The *circular* machine appeared in France in 1827, and is now employed in nearly all the manufactories. The goods are shaped by scissors and sold at low prices. Some of these frames can make thirty ranges of loops every revolution. The use of the stitching frame lowers the cost of these goods, and is not sufficiently employed in our stocking trade.

"The production of hosiery has rapidly increased in France since 1855. It had become in 1860, seventy million francs, (£2,800,000)

and in 1866, ninety million francs, (3,600,000) of which, cotton was 55, woollen 35, silk 9, and linen 1 per cent. Troyes and Romilly had made great progress. At Falaise, Guibray, Rouen, Le Vigan, St. Jean du Gard, Moreuil and St. Just, *cotton* hosiery is made of good quality, but higher in price than English or Saxon. The French prefer their own Scotch thread hose of a transparent texture and made of bleached yarn, to the finest English hose which are, though of surpassing beauty, in little demand there as articles of luxury. In cotton hose of medium quality the English are unrivalled in price; as also in the qualities of all goods from the circular frame. Plain *woollen* hosiery of common kinds is made extensively in Picardy. Several thousand frames around Orleans make woollen goods. Circular woollen shirts &c., made in Picardy and at Paris, are consumed abroad as well as at home; woollen gloves, plain and ornamented, are produced of superior quality.

“Hosiery made of cotton mingled with animal wool, an important and varied branch in England, is still almost entirely ignored by French manufacturers. Yet this is destined to be the material for a large part of our goods. The price to be paid for this success will be found in our spinners placing the quality of their production on a level with that of England. Goods made from these yarns do not run up with washing, an attribute which ensures their use. The English mixed (merino) articles are of soft materials and agreeable colours.

“The silk hosiery of France is manufactured chiefly at Ganges St. Hyppolyte, le Vigan, St. Jean du Gard, Paris, and St. Just. *The production is lessened sensibly since England has entered on this manufacture, and disputes foreign markets with France.* Their hosiery silk goods are remarkable for their originality of patterns, harmonious combination of colours, and excellent fabrication. The quality of the silk articles from England and France seems in the main equal. The plain and open work embroidered white silk hose made in France are unrivalled in brilliancy and taste. They vary from 4 f. (3s. 3d.) to 120 f. (£4. 16s.) a pair. The French satin skin silk gloves made chiefly for exportation equally deserve praise.

“In 1865 France exported of cotton hosiery 4,152,164 f. (£166,087); woollen, 7,175,379 f. (£287,015); silk and spun silk, 4,674,600 f. (£186,984)—total, 16,002,143 f. (£640,086). The same year she imported hosiery 600,288 f. (£24,015).

“In 1855 wages for making French hosiery were on narrow hand frames 1½ f. to 2 f. (1s. to 1s. 7d.) a day, and on circulars 2½ f. (1s. 10d.) a day. The women in the silk and spun silk departments gained 75 centimes to one franc (7d. to 9½d.) a day. The manufacturers stated that they must have a protective duty of 30 per cent.”

The facts stated in this valuable report are in the main no doubt correct. The sentence italicised by us contains however an error. By a reference to p. 515, it will be seen that an hundred years ago there were many thousands of frames making English silk goods; but that during the last thirty years this trade has been threatened with extinction. Any diminution in French



exports of silk hosiery must arise from some other cause than successful English competition.

We have not any accurate knowledge of the number of machines, or amount of hosiery produced in other countries on the continent, besides Saxony and France. It has been stated, on doubtful authority, that there were, in 1835, 2000 frames employed in Italy. At Turin, where flowered silk hose were made in colours; and at Genoa, Mantua, Leghorn, Rome, and Palermo, where the ordinary kinds of silk hose and gloves were produced. Also that, at the same time, there were 7000 frames in Spain, spread over the districts round Barcelona, Chinchona, Madrid, Talavera de la Reyna, and Valencia, chiefly producing silk hose and gloves, for which articles Spain had been noted as the best in Europe for quality, though not for shape. Flowered silk hose in colours were said to be making at Valencia, having embroidered clocks put in by hand.

Although the hosiery exhibited from other countries in 1862, shewed nothing striking in kind or price, there were evident tokens of progress made since 1855.

## CHAPTER XXXII.

## CONCLUSION.

DEMAND for the long staple animal wool used for spinning worsted yarn, has been much increased from the great addition made to the power machinery now employed in the Leicester hosiery business. The production of shirts, drawers, and all other kinds of goods made upon rotary and round frames, is become surprisingly large: the quality and fashion being such as was until lately thought unattainable from steam machinery. The prices have been lowered and the consumption has been increased accordingly. The rate of wages to the workpeople has been advanced to an amount long unknown in the hosiery manufacture; while the cost of labour per dozen on power goods has been much reduced. The materials in the latter classes of goods now constitute from five-eighths to three-fourths of the entire cost of the articles. The colours of fancy hosiery goods should be of bright and fast dyes. In these respects they are much improved, and constant attention to this point is of essential importance. French practical chemistry enables their manufacturers to take a high position in regard to this process.

The far larger part of the cotton yarn used in the manufacture of English hosiery, and a considerable proportion of that consumed in Saxony, is spun at Stalybridge, Ashton-under-Lyne, and Bolton. The amount is become very much larger than it was twenty years since, in consequence of the wide and round frames, worked by power, introduced since that time. The consumption of materials in these classes of frames is enormous. Some of them require a supply of three hundred weight a week. The mills for spinning hosiery yarn in these districts have increased greatly in number

and power of production. Bourbon and Mauritius wools deserve from their colour greater use here. Since the cotton famine, the spinners have not confined themselves as formerly to the use of South American wool; but have been consuming a large amount of the best East India kinds, for spinning which into hosiery yarn a good deal of the machinery has been adapted. Should the quality of the wool used for hosiery received from thence remain inferior to South American, it might in time prove very injurious to the interests of the trade, by deteriorating the quality and wear of the articles made from it. The custom-house registered value of exports of cotton hosiery in 1864, £461,046, had become in 1866, £793,705. The imports in 1864 of cotton hose were 606,566 dozens, and in 1866, 971,247 dozens. The registered value of lace exported in 1864 was £367,239; in 1866, £547,657. This increase in the export of hosiery and lace was exceptional, and due to the cessation of the American civil war, with an expectation of an increased tariff there.

Forty years ago the machinery of the bobbin net trade was to a large extent in the hands of more than a thousand small owners, chiefly handicraftsmen, most of whom were unused to business, and of course practically unacquainted with the principles on which it should be conducted. These employed some hundreds of agents in the disposal of the produce of their machines. Many of these were not much in advance of their employers; they carried their goods in large packs daily for sale at the warehouses, and in the main were paid weekly. This plan had its disadvantages both to maker and buyer; so with the disappearance of the small owners it has for the most part passed away. The owners of most of the fancy machines now finish and sell their own goods; the sale of the remainder and of plain nets is in few hands. The trade seems to be approaching a further important concentration in the ownership and employment of machines; unless, indeed, as is prognosticated by some, they should be largely exported abroad. The financial crisis through which the nation is passing has materially injured this branch of business and caused much loss. In the last three months of the year 1866

more than half the plain and fancy machines were standing; the remainder were at work during such restricted hours as reduced the production to one-third its usual amount. There are it is thought symptoms of improvement in the demand for Nottingham lace. If realized, it may be hoped they will not be followed by the hitherto usual speculative construction of wide and speedy machinery. After the rapid decline experienced during several past years, the advent of that better state of things so ardently desired will be hailed with much satisfaction.

The early mode of supplying the retail demand for bobbin net in the metropolis and in the larger cities and towns in the country, was at first based upon the practice of the Buckinghamshire hand lace manufacturers, who waited upon the London trade taking the goods they wished to dispose of with them in assorted boxes, and then and there effected the transactions without further delay. For years after bobbin net was introduced packages were similarly made up, two of which being slung over a porter's shoulders, who accompanied the town traveller, their contents were offered to buyers throughout the appointed district. At length the quantity and weight increased so much that horses and vehicles laden with stock were substituted in London by the principal houses. The like mode was adopted for the country journeys by Messrs. Fishers and Co., Messrs. Copestake and Co., and others. Each of the houses just named might have during that period thirty to forty such vehicles, transporting as many tons weight of lace goods for the daily service of town and country customers. Railways and other means of saving time and facilitating business have rendered these laborious and expensive processes for the most part unnecessary. For instance, the house of Copestake and Co. transact now so much of their immense operations in Cheapside, as to require the attention of two hundred or more counter-men, twenty-five managers of departments, and ninety clerks. Their country and foreign trade employs thirty agents, and is carried on at seventeen centres, as Nottingham, Glasgow, Manchester, Paris, New York, Philadelphia, and elsewhere. The returns are of an

almost incredible amount, and is an instance of extraordinary success; it is cited here because founded (about 1826) primarily in connection with the lace trade. The partners are highly esteemed as men of business, and Mr. Moore is well known for his ardent devotion to the interests of various benevolent institutions with which the metropolis abounds.

The plates representing lace in this volume, furnish an example of one mode of facilitating the sale of light tissues. Instead of pattern books containing bits of the designs cut off and fixed, one of which books was furnished with prices and numbers to each customer, Mr. William Taylor, a stationer at Nottingham, about 1844, devised the plan of taking re-impressions on paper, of impressions obtained on a suitable material from the pattern itself. Such were produced by him in that year; shewn in the exhibition of 1851; and have been ever since used in the lace and muslin trades, as also for producing illustrations by this so called "nature printing." Of the accuracy and delicacy of such impressions, our readers will judge. We embrace the opportunity of claiming for Mr. Taylor the credit which is his due for so important a discovery, as to which, others have hitherto received almost the entire praise.

While the population of Nottingham and Leicester, has advanced equally with the manufactures carried on in those towns, there has been a marked extension and improvement of the buildings used for trade purposes in each place; lace and hosiery warehouses now cover fourfold the area of ground thus occupied a quarter of a century ago, and many of them are of noble architectural proportions. In these, over-crowding may be avoided and sufficient ventilation secured. Factories also are now constructed in a superior manner and correspond more and more in their management with the spirit of the legislative enactments affecting them. The health and morals of those engaged in warehouses, in which the female sex so greatly predominates, are subjects of increasing attention on the part of employers. The establishment of Messrs. Thomas Adams and Co. in Nottingham, and those of Messrs. Copestake, Moore, Crampton, and Co. in

London and Nottingham, are not only well known for the magnitude of their transactions, but for an arrangement which gives evidence of special solicitude on these points. From four hundred to six hundred persons are employed in each of these warehouses; and for their instruction and guidance in religious duties, a clergyman conducts in a room set apart for the purpose, a short and interesting service, before entering upon the secular duties of the day. These devotional exercises, to which are added visits of sympathy and comfort by the minister to those who may be sick or otherwise afflicted, have proved both useful and acceptable. Other houses are using various means having the same end in view. These are steps in the right direction; tending as they do to identify more closely and plainly the true interests of the employers and employed. The practicability and permanence of these plans were for a time doubted. In this age of excessive competition, to exemplify the undeviating consistency and high Christian principle necessary on the part of those who institute them, must be attended with corresponding difficulties, yet the excellency of the design and its success thus far, calls for this record of a very praiseworthy effort.

The important advance which has taken place in the frame-work-knitters' wages has enabled them to obtain larger supplies of wholesome food than was possible for many years. Their physical appearance is proportionably improved, and they are far better clothed. So that instead of being as formerly, easily distinguished from other workmen by their anxious countenances and slender limbs, they are now generally well favoured, stout, and of respectable appearance. There has been a large addition made to the former scanty furniture of their dwellings. When however excessive and long continued depression has once lowered the feeling of responsibility and self-respect by withholding the means necessary to sustain them, it may require more than one generation to pass away before this wholesome influence shall be re-established. This is especially the case in regard to the self-denial of parents necessary to secure for their children a sufficient education.

The larger proportion of the children of parents employed in both hosiery and lace are growing up, from this and various other causes, without a sound practical training in knowledge and habits. There is no real or unavoidable reason why this should be the case, and it ought therefore to be remedied. Suitable training cannot be long withheld except to the degradation and loss of the young, dishonour to their parents, and danger to society. We submit that the education of the children of working men, as well as of all others, should include in addition to elementary science, information more or less extended upon household economy—the mutual duties of parents and children—husbands and wives—masters and servants—governments and their subjects: also on wages, profits, savings, and their reciprocal influence—combinations and strikes—utility of machinery—capital and labour—alternate prosperity and depression incident to manufactures, agriculture, and commerce—relation between population and subsistence—scarcity or redundancy of labour and its price—over-production, over-trading, and speculation.

All doubt as to whether such a course of instruction is within the power and means of the community in these midland districts (and probably in any other) is removed by the current rates of wages of English artizan labour and by such facts as are given at page 521, of the extent and cost of Saxon schools. In these, we are assured, every topic of inquiry above indicated is efficiently treated at some period or other of the six years, while moral principles are explained and enforced during the whole course. The effect upon the face of society is easily discernible. The English as well as the Saxon hosiery business has been limited, during the past year, not by want of demand, but of hands. This will, if continued as we hope, secure ample wages and profits. It will be a noble result, should employers and employed in this country combine to improve these advantages, by taking the best measures for imparting an excellent education to those that now depend upon them for it—whether it should be national and compulsory, denominational, or individual, it is not necessary to attempt here to decide.

A remark, shewing the need of caution, is suggested by the extraordinary advance in the Saxon and, it would seem, still more rapid increase in the United States hosiery trades, and in the present amount and position of the French lace business. It is certain that we possess exclusively no one important element of manufacturing prosperity. The working classes in these, as in most other English trades, are now freed from misery and wrong, so far as wages are in question, and ought wisely and carefully to observe the signs of the times abroad. Capital in manufactures and trade may be more easily transferred than ever before, to avoid excessively advanced rates of wages; or vexatious interference with the management of business; or such high prices of commodities as must eventually reduce consumption, and so, in due time, seriously limit the amount of employment.

The principle of 'limited liability' has been introduced into the businesses of hosiery and lace. The firm of Thomas Adams and Co. in lace, Hine, Mundella and Co. in lace and hosiery, both of Nottingham; Noon and Co., hosiers at Leicester; and Morrison, Dillon, and Co., the very extensive dealers in hosiery, lace, silks, and haberdashery in London, with some others, have made this change. There has not been any co-operative manufactory established, we believe, in the staple trades of the midland district. Lace being an article immediately subject to the caprices of fashion, would probably be too dangerous, and the extent over which hosiery machinery is spread too difficult, to be made the subjects of co-operative management by the hands employed in these trades. Stores for the supply of food and clothing are established by them in increasing numbers.

A considerable part of the manufacture of hosiery from hand frames is still carried on through the intermediate agency of those who receive materials from hosiers, distribute them to the master workmen, then collect and return the goods when made. But there is now full knowledge amongst all the parties, the journeymen included, that upon the work being properly done, the workmen must be dealt with fairly in price and charges; or the ultimate employer would not obtain his supply of wrought goods.



This is gradually bringing about more satisfactory relations the one with the other. Fewer women labour in the stocking frame than formerly; and the number of apprentices taken is less every year. There is danger of embarking too large a portion of available capital hastily, in the swift and effective machinery now within reach of the manufacturer. The temptation to this is great; but if the requisite caution be employed, there seems every reason to anticipate the further profitable extension of this business, by supplying the legitimate demand for both home and export consumption of hosiery.

A report on the rates of wages now paid in a considerable number of trades, including those current in the hosiery and lace manufactures, has just issued from the Board of Trade. To the statement from Leicester at p. 8, there is appended the following note upon narrow hosiery frames: "These are old-fashioned frames now but little used; being superseded in great measure by the wider frames. More employment would be found for these machines, but hands cannot be obtained; better paid labour being more plentiful." The rates of wages are no doubt correctly estimated; the difficulty as to finding hands to work *all* the narrow machines exists, and may probably increase with the greater use of wide and round power machinery. And narrow hand frames may be much less used in "Leicester and its neighbourhood," where it is possible to gather them into factories, than formerly. In 1833, Mr. Biggs found 11,500 narrows were at work in the whole county; and in 1844 there were upwards of 15,000; we would therefore suggest that (without actual enumeration, which we understand has not taken place) it may be reasonably doubted, whether this great body of frames is now really but little used and is largely superseded. It is believed by persons possessing considerable knowledge on this subject, that the reduction in the number of narrow frames actually employed in Leicestershire, is not greater in proportion to the entire number, than in Nottinghamshire. If so, there would remain 10,000 or 11,000 at work. Besides such a serious change supervening in the employment of the labouring

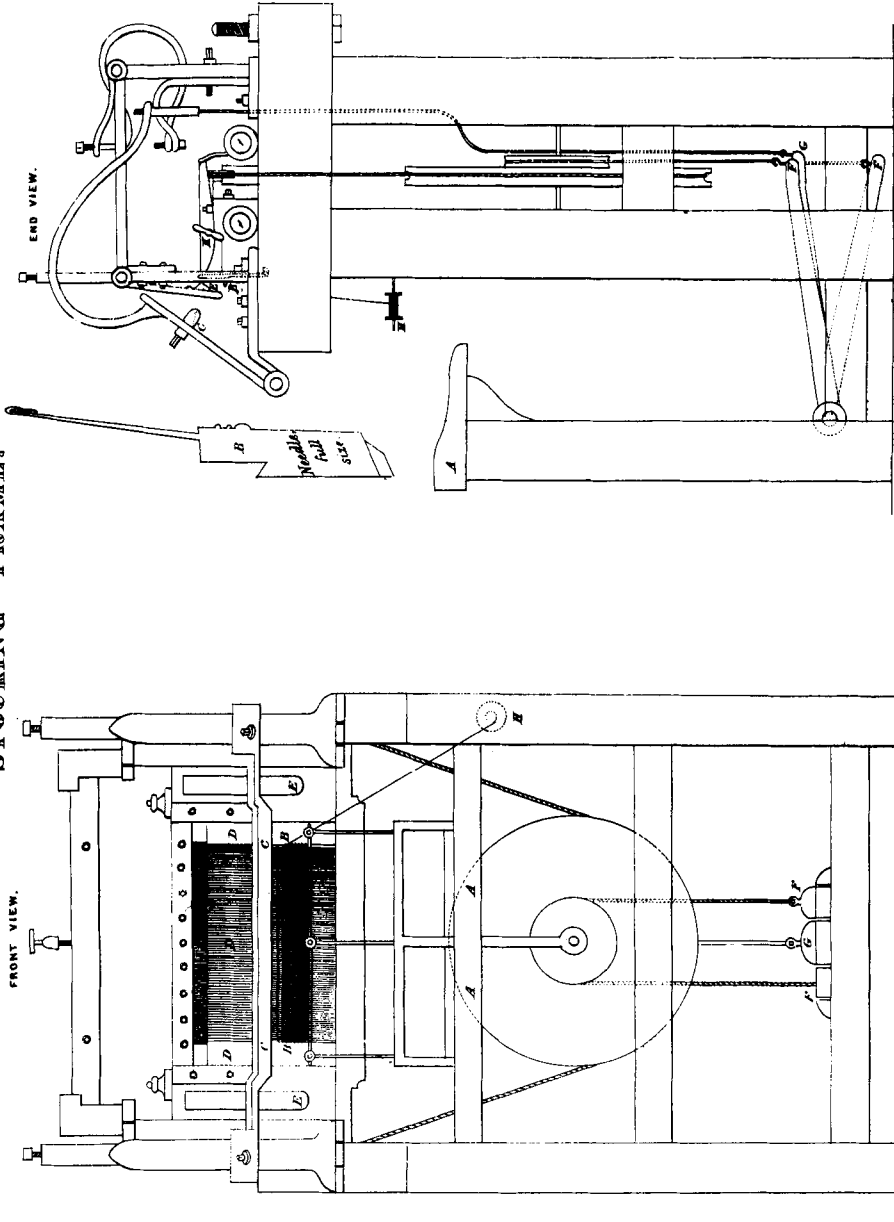
population of the county of Leicester as this note seems to indicate, could not take place without unmistakeable signs in the stocking making localities spread over two-thirds of its surface. Of these there is no sufficient evidence, either in the number of newly constructed power frames, or the removal and absorption into factories of the labour previously employed in the narrow hand ones.

This is one of the cases seeming to justify the remarks offered at p. 453, upon the importance to the real interest of all parties engaged in making and selling goods, of statistics, collected and published by competent authority. The error, if it be one, just pointed out, is no doubt an involuntary one, but may mislead in future, if not rectified.

With foreign manufacturers of hosiery and lace we trust our rivalry will be always carried on in an amicable spirit. It may, without doubt, be made mutually advantageous. For we have been from time to time indebted to them, as they have often been to us, for improvements in machinery, and still more in the arts—the result of well applied ingenuity and skill. The diversity of wants arising from an ever increasing civilization and refinement, and consequent expansion of the markets of the world, may be reasonably expected to give profitable employment to the talents and energies of skilled workmen, as well as to the capital and mercantile knowledge of employers in all manufacturing countries. Higher wages will reward the labour of the one, and an increase of income and capital resulting from the responsible exercise of sound judgment the other. These will have the effect, if anything can produce so happy a result, of uprooting national trade jealousies, and rendering strifes between employers and employed infrequent if not impossible.

ILLUSTRATIONS.

STOCKING FRAME.



FRONT VIEW.

END VIEW.

- A. Workman's Seat.
- B. Needles or hooks.
- C. Presser.
- D. Sockets.
- E. Frame handles.
- F. Treadles for drawing Socks.
- G. Treadle to force down the Presser.
- H. Bobbin supplying yarn.
- K. Socks from the cards of which sockets D are suspended.

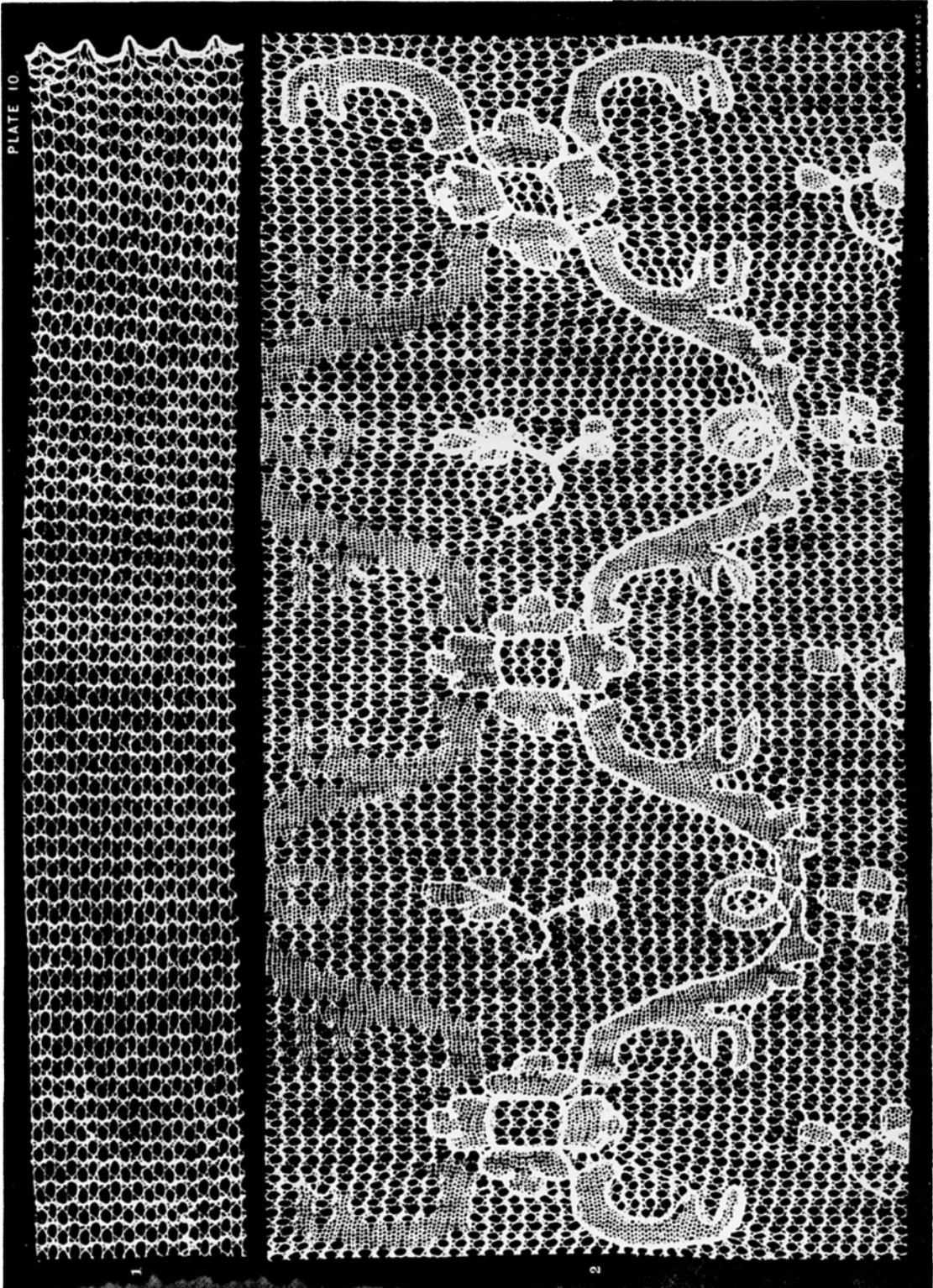
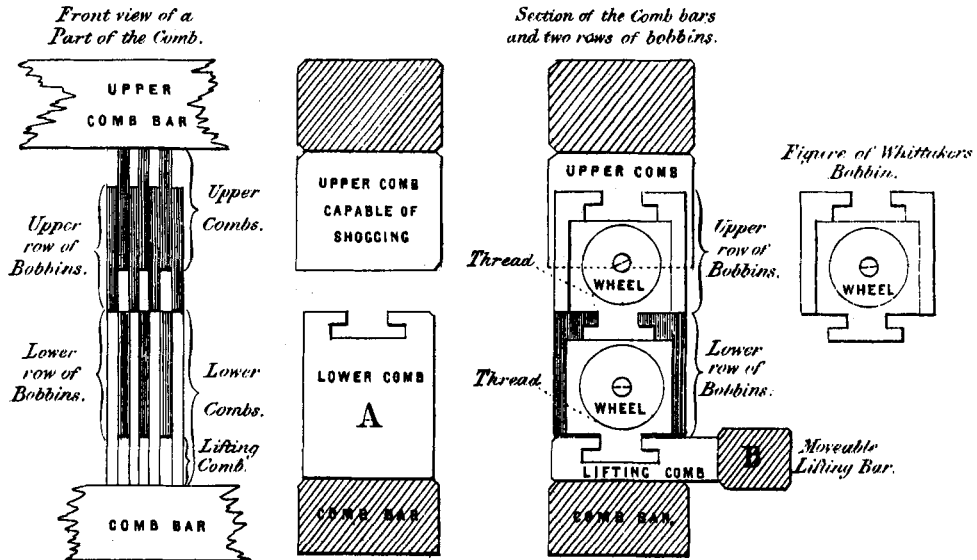


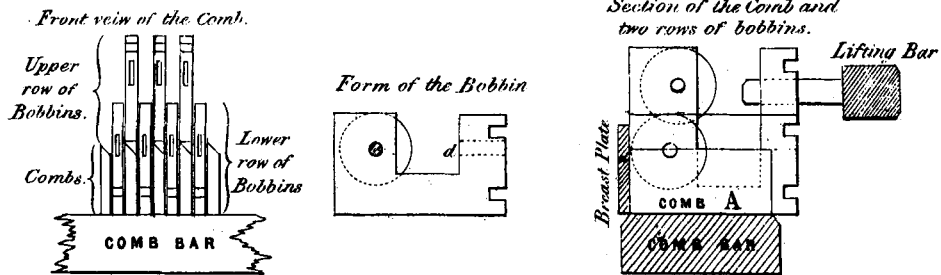
PLATE 10

SPATIA 12

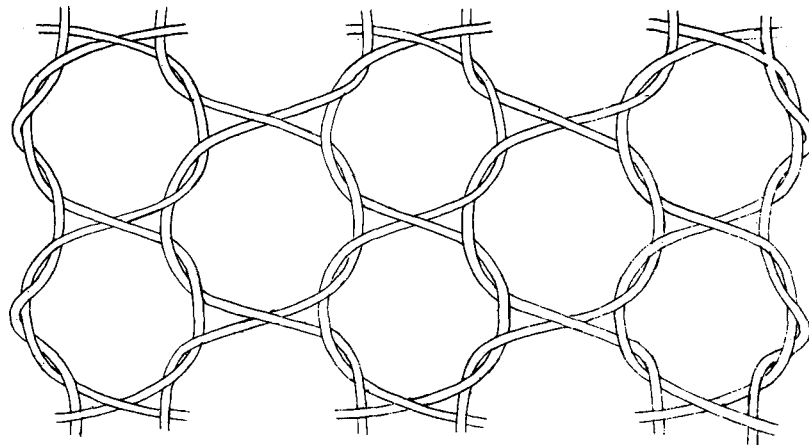
SKETCH OF WHITTAKER'S ATTEMPT TO MAKE A LACE MACHINE.



CHARLES HOOD'S IMPROVEMENT OF WHITTAKER'S MACHINE.



A FIGURE OF THE LACE MADE BY CHARLES HOOD WHICH HAD NO DIAGONAL THREADS.



FRONT VIEW OF HEATHCOAT'S 1<sup>ST</sup> PATENT BOBBIN NET MACHINE, 1808.

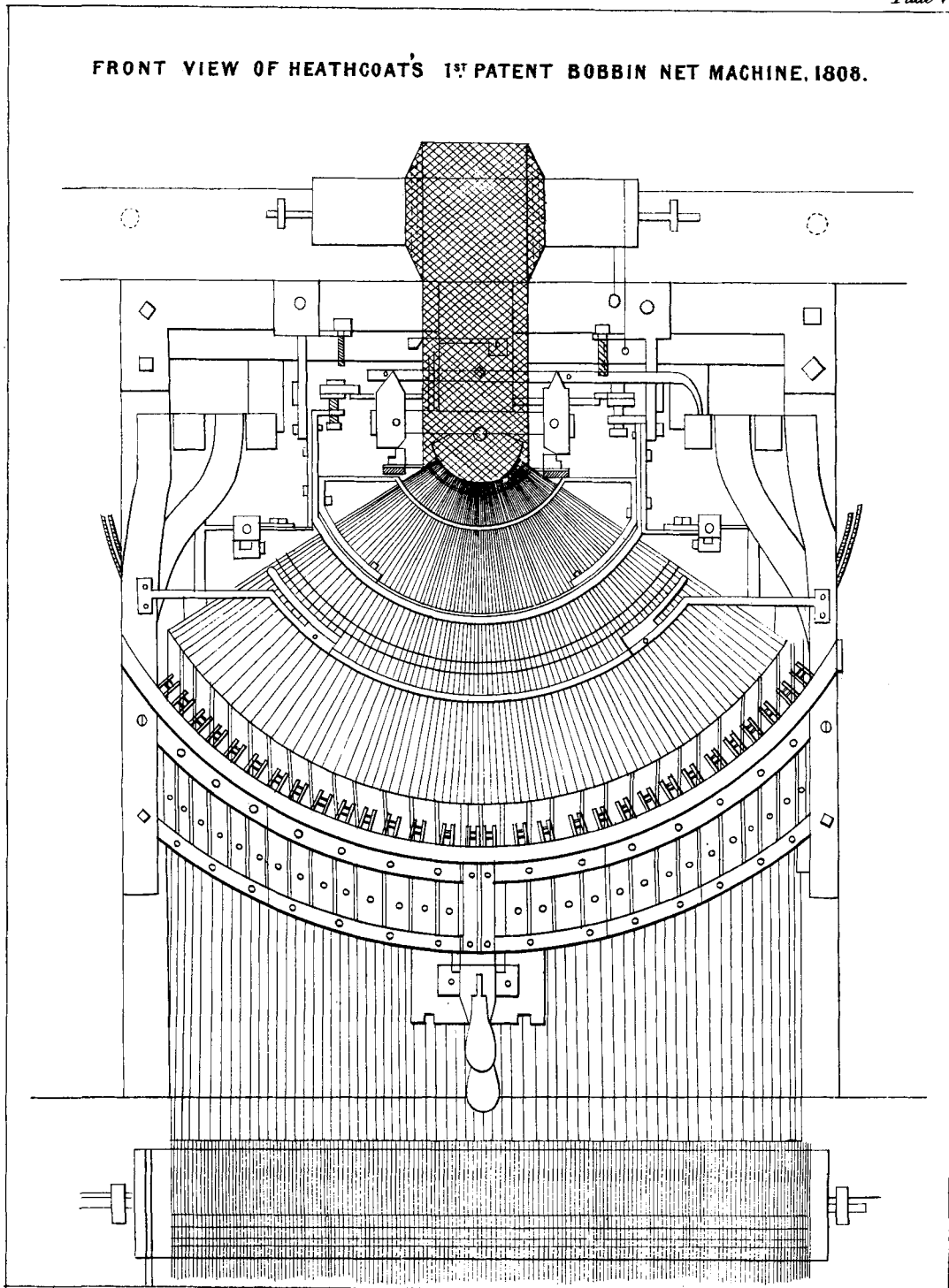
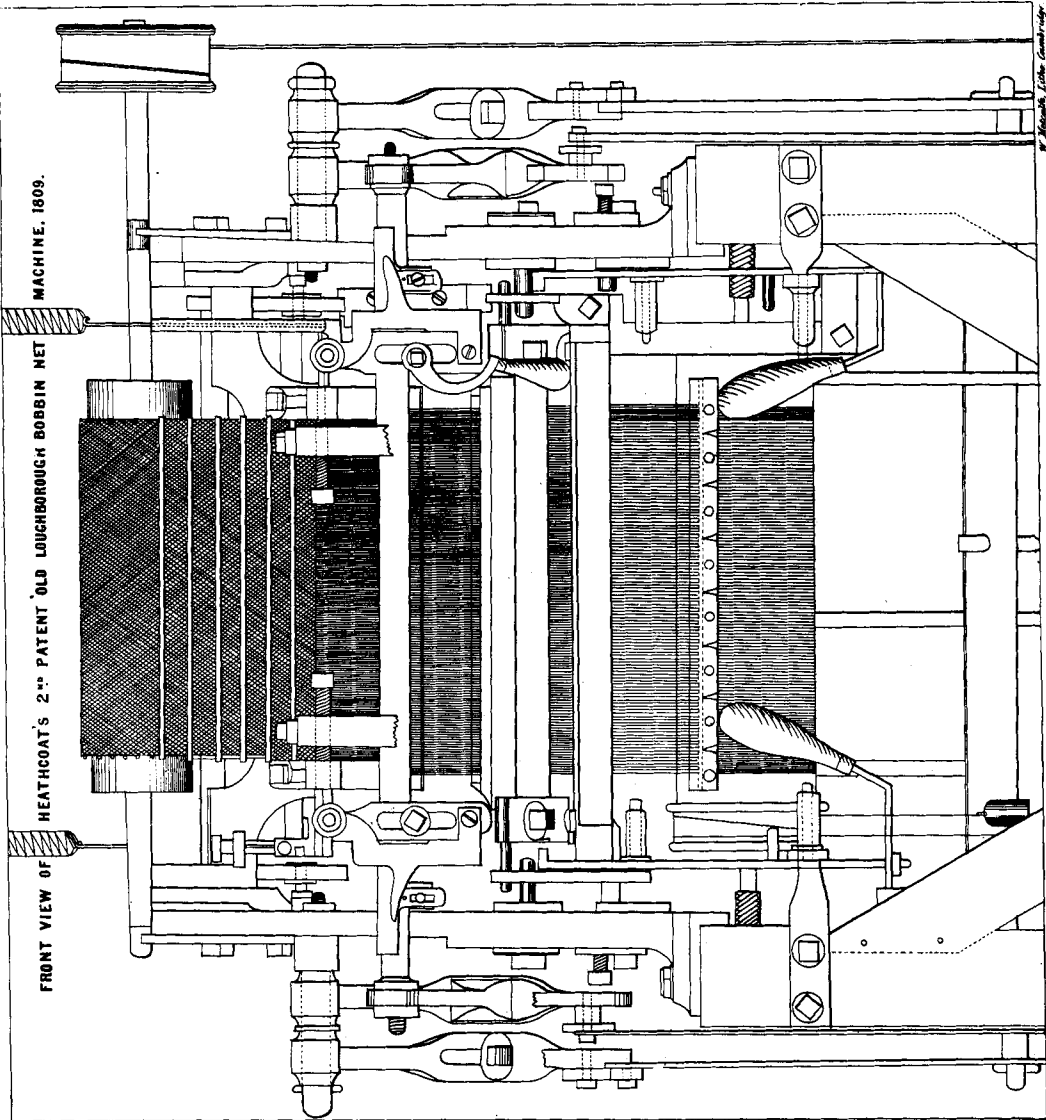


Plate 11



MACHINE. 1809.

HEATHCOAT'S 2'' PATENT OLD LOUGHBOROUGH BOBBIN NET

FRONT VIEW OF

W. Heathcoat & Co. Ltd. Cambridge



END VIEW OF THE OLD LOUGHBOROUGH MACHINE.

