Machinery and Appliances.

ANOTHER IMPROVED PATENT SECTION WARPING MACHINE.

MESSRS. ROBERT HALL AND SONS, BURY.

We have so recently written at length upon the subject of warping, and upon section warping as a particular branch of this process of manufacturing, that it will be quite unnecessary to go over the ground again in any detail. As before stated, warping is the process of arranging in parallel order the longitudinal threads that enter into the construction of woven fabrics. The varying conditions upon which manufacturing is carried on have led to a divergence in the methods used, the separation taking place about 40 years ago, when the invention of the tape-sizing machine, and subsequently the "slasher" type of the same, caused the old ball-warping system to be abandoned in the plain grey cloth trade. This system, however, was not adopted for the coloured goods branch, as it interfered too seriously with the dyes with which the yarns had been impregnated to permit of its use. The old ball system was therefore retained, until manufacturers grew thoroughly tired of its disadvantages. The demand for improvements existing, they were not long in forthcoming: hence the invention of the section warping machine. Though a comparatively new machine, this has, like all others, already engaged the inventive abilities of quite a number of persons. Amongst these it will be remembered that Mr. W. A. Booth, of Walkden, near Bolton, last year made his appearance as the patentee of a new anti-friction presser bowl, which was described and illustrated in these columns on Nov. 15th last. This gentleman is again to the front with several further improvements, which in their total entitle the improved machine to a careful examination on the part of those interested. We give two illustrations of the machine shewing it from opposite aspects.

In section warping machines it is usual to mount a section block on a shaft against a flange of larger diameter, afterwards placing another flange on the said shaft, until it is against the block, and then securing it in that position. The yarn is then fastened by suitable means to the block, and the shaft revolved, the yarn being thus drawn off the bobbins and warped on the block until the required length has been wound. The number of revolutions of the section-shaft whilst doing this is recorded by a counter, and the other sections which complete the set must, of course, be run to the same number of revolutions as the first. If these succeeding sections would come to the same size and length as the first section, it is obvious that nothing more than the simple arrangement previously mentioned would be required in cases where the same counts of yarn and number of ends are wound on each section. It is, however, impossible with so simple a machine to obtain uniform sections for the same number of revolutions, because, as the yarn on the bobbins becomes less, the power required to turn them is greater (owing to the yarn which pulls round the bobbin being nearer the centre). The tension on the yarn is therefore greater, and the result is that the second section will be more tightly wound and will be smaller in diameter and consequently shorter than the first. Although this difference is but slight (say a few yards each section), yet when the first and last sections of the warp are compared the difference is very considerable, and the waste becomes serious. It is also obvious that if less or more ends were warped on the second section than on the first, the result would be the production of a smaller or a larger section; or if the counts of yarn were altered to coarser or finer ones the result in such case would be similar. Another fault that would be developed would be that the surface of the yarn on the section would not be flat, but would shew ridges in accordance with the half-beer.

The method adopted to prevent these faults has been the application of a presser bowl to the face of the yarn on the section, such presser bowl being presumably drawn out by mechanism at a certain rate for each revolution of the section shaft corresponding to the counts of yarn or number of ends to be warped. It is obvious that if sufficient pressure is put upon the yarn of the first section to be warped by means of this presser bowl, then subsequent sections will be all of one size, although as before mentioned the tension on the yarn is greater, owing to the yarn on the bobbins being less.

The means hitherto used for positively drawing out the presser bowl have been the combination of two slotted levers, placed parallel to each other and connected by a bar, or placed opposite each other, with a stud to connect them through the slots, one lever receiving its motion from the section shaft and transferring the movement so obtained to the other lever, which is fixed on the same shaft as that on which the bracket holding the presser holder and bowls is fixed. These levers are so arranged that the bar or stud connecting the levers can be moved farther from the centre of one lever, and nearer the centre of the other, or *vice versâ*, thus increasing or diminishing the outward movement of the presser bowl.

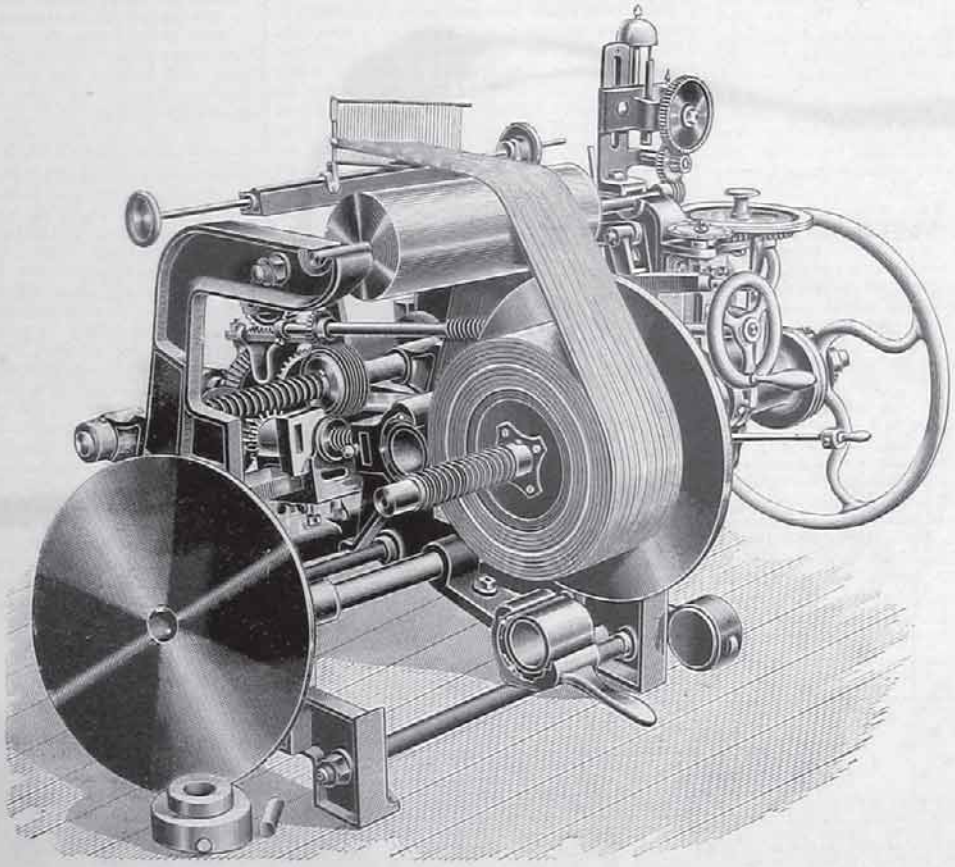


FIG. 1. SHEWING PRESSER AND CONNECTIONS.

Some arrangement of this kind is necessary in order that the presser bowl may move at a quick speed for coarse yarns or a considerable number of ends, or at a slow rate for fine yarns or a small number of ends. It will, however, be apparent that as these arrangements of levers move in a curvilinear direction and describe arcs of circles, their effect upon the presser bowl gradually decreases, with the result that as the winding of the section proceeds the outward movement of the presser bowl diminishes, so that by the time the section is filled the yarn is unduly pressed, the friction in some cases being so great that considerable power is required to work the machine. The number of joints, etc., is also a drawback to its efficiency. It is also impossible with this arrangement to put a dozen ends more in one section than another, without the production of a slightly larger and consequently longer section (because the additional ends spring the presser and levers actuating it to their utmost limit) and *vice versâ*; if a dozen ends are taken out the result is just the reverse of the previous one.

A practical as well as theoretical knowledge of these defects prompted Mr. Booth to invent some method of drawing out the presser other than the arrangement of levers before described, and he claims that in the machine which we illustrate all the defects before dementioned are remedied. It will be seen from Fig. 1 that the presser is mounted upon a screwed spindle working in a brass nut. A worm wheel is fastened on the end of the brass nut, which gears in the worm shaft at the back of the machine parallel to the section shaft. A friction disc is keyed on to one end of this worm shaft, and a circular motion is given to it by means of the friction pulley, cross shaft, and bevel wheels (as is shewn in Fig. 2). From these the action of the machine will be apparent. Immediately the section shaft rotates the bevel wheels turn the cross shaft, and the friction pulley being keyed on this shaft and working against the face of the friction disc, the disc, worm shaft, and brass nut are revolved, and the screwed spindle and presser being fixed, are drawn out laterally away from the section an equal distance for each revolution of the section shaft.

It will be seen that with this arrangement the presser is drawn out at a uniform rate, and the yarn is pressed equally until the required length is wound. It will also be noticed that there are no links, levers, nor bell cranks in this arrangement, but that the presser is fixed direct on the screwed spindle, which draws it out. This being so, the machine will admit of 100 ends being warped on one section more than another and yet bring them both out exactly the same size and length for an equal number of revolutions.

A glance at the arrangement will shew that it is impossible for the section on which more ends are warped to come out larger, unless the pressure of the yarn were to bend out the back of the machine—a contingency utterly impossible. This good feature will be greatly appreciated by warpers of coloured goods, as it will save them the trouble of calculating a method whereby the number of ends in each section shall be the same and yet have the pattern complete.

It might at first sight be thought that the result of warping 400 ends in one section and compressing them into the same space that had been allowed for only 300 ends, the previous section, would be that the yarn would be impoverished by the friction of the presser bowl, and that if dyed a glaze would be put upon it. With the old style of presser this would no doubt occur. This machine, however, is fitted up with Mr. Booth's patent Anti-friction Presser Holder (illustrated and described in our issue of November 15th, 1890), which allows the presser bowl to rotate at the same speed as the yarn being warped, thus obviating the rubbing action, etc., before mentioned.

The machine with the revolving presser bowl only requires half the power to drive, and is consequently much easier to handle than machines in which the bowl does not revolve.

The method of varying the outward movement of the presser for coarser or finer yarns relatively to the section shaft is very simple. Looking at Fig. 2, it will be seen that if the friction pulley on the cross shaft be fixed near the centre of the friction disc, then the disc and worm shaft will be rotated at a quick rate, and by means of the worm shaft and brass nut the screwed spindle and presser will be drawn out at a quick rate, suitable for an exceedingly coarse yarn or a considerable number of ends. If, however, the friction pulley be fixed opposite the edge of the disc, the disc and worm shaft will only revolve at one-sixth the previous rate, suitable for an exceedingly fine yarn or a small number of ends. The method of running a trial section for the purpose of ascertaining in what position to place the friction pulley opposite the disc is also simple. For this purpose the bell-crank arrangement with the presser under the section is used (Fig. 1), the positive arrangement being put out of gear. The presser bowl with this auxiliary arrangement is free to move downwards, with the exception of a weight on the bell crank for the purpose of holding the presser bowl against the yarn on the section at a moderate pressure. The section is then filled with yarn until a mark turned on the flanges (3 in. from block) is reached. The machine is then stopped, and, according to the registered number of revolutions it has taken to reach this mark, the position in which to place the friction pulley on the cross shaft is known.

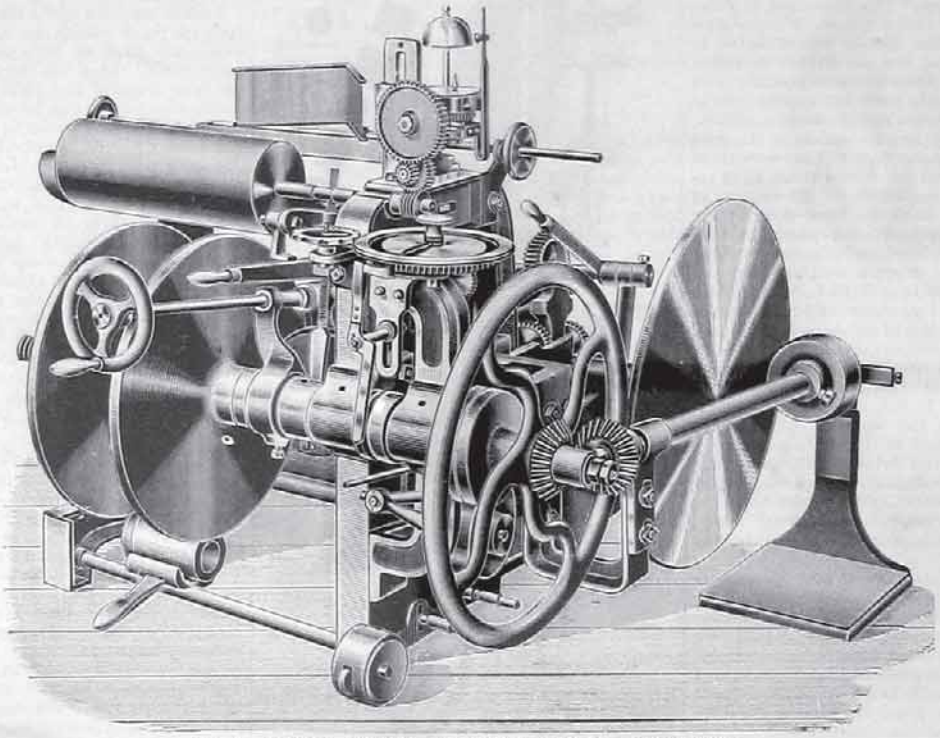


FIG. 2. SHEWING FRICTION DISC AND ITS DRIVING ARRANGEMENT.

For instance, if the yarn is very coarse it may take say only 150 revolutions to fill the yarn up to the mark; if, however, the yarn is very fine it may have taken 900 revolutions to fill the yarn up to it. If the latter be the case, the friction pulley is set at number 900 (opposite the edge of the friction disc), and the positive arrangement is used to finish the section, as well as for the succeeding sections. If the former be the case, the friction pulley would be set at 150 (near the centre of the friction disc), thus ensuring that in either case the presser shall be positively drawn out at exactly the same rate as the presser on the auxiliary arrangement was moved.

One of the machines, worked by a girl 16 years of age, is in daily use at Bridgwater Mill, Walkden, near Bolton, and Mr. Booth will be pleased to shew the machine at work to any

manufacturers or their representatives, if they will send him a few hours' notice of their intended visit.

Messrs. Robert Hall and Sons, of Bury, are the sole makers. The improvement described may be applied to machines of their make by simply bolting it on. The arrangement can also be adapted to most other machines. Messrs. Hall and Sons will be pleased to afford any other information that may be desired.

THE SQUARE HOLE OR UNIVERSAL DRILLING MACHINE.

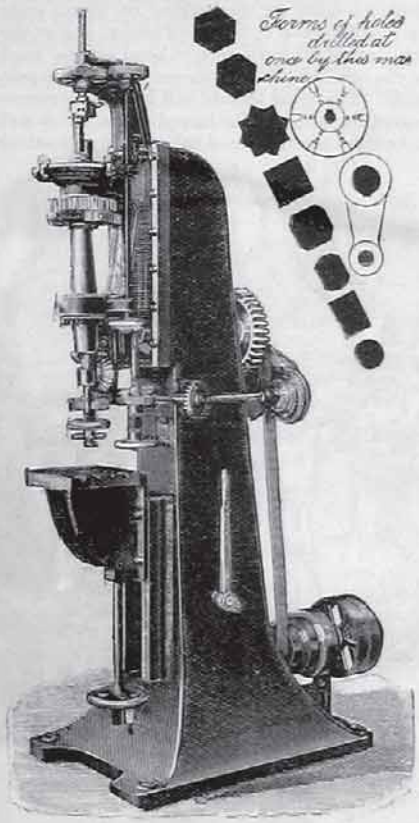
Every well-apportioned textile mill has its mechanics' shops, and though, with the growth of our engineering works, it is generally found more advantageous to avail one's self of the latter when heavy repairs of machinery are required, still the time lost in sending small jobs away from the mill renders the mechanics' shop an almost indispensable adjunct to every textile establishment situated at any great distance from a machine shop. The limitation of room available for such shops makes it imperative that their equipment should be conducted in such a manner that the machinery installed should take up as little room as possible, and should simultaneously perform as many jobs as can be combined in one and the same machine. Drilling or slotting holes are two of the jobs which are of the most frequent recurrence in such mill-shops, and up to now these have required at least *two* machines, or the slotting of square or hexagon holes has been done by the far more laborious and time-taking manual labour of hammer, chisel, and file after machine drilling. For these reasons we think the machine here illustrated will find its place in every well-equipped machine and mill-shop of the kingdom, since it will not only drill a round hole, but a square, and, in fact, any shaped hole, with equal facility in little additional time, with a precision that must really be seen to be believed possible. In this manner, this universal drill combines the work of the ordinary drilling machine and of the slotting machine, and as regards hand labour the square drill bores a square hole at about 1-20th the cost of doing it by the drilling machine and hammer, chisel, and file, in addition to boring round holes to the usual depths of the ordinary drilling machine.

The sole agent for this machine for Lancashire and Cheshire, and the greater part of the Continent of Europe, is Mr. Alfred Wenner, of Greenwood-street, Manchester, where we not only inspected the machine, but saw samples of work drilled in all conceivable shapes in cast and wrought iron and in brass with a remarkable precision, rendering hand-finishing of the work done by the machine unnecessary. The machine is being made in the following sizes and working capacities:—

Size of Machine.	Drilling Square Holes.	Drill square holes deep.	Table will take in diameter.	Diameter of drill spindle.
0	$\frac{3}{32}$ sq. in. to $\frac{1}{2}$ sq. in.	$\frac{1}{16}$ in.	16 in.	$\frac{3}{4}$ in.
1	$\frac{1}{8}$ " " $\frac{5}{8}$ "	$1\frac{5}{8}$ "	20 "	$1\frac{1}{4}$ "
1a	$\frac{1}{4}$ " " $\frac{7}{8}$ "	$1\frac{5}{8}$ "	20 "	$1\frac{1}{2}$ "
2	$\frac{5}{16}$ " " $\frac{1}{4}$ "	$2\frac{1}{16}$ "	23 "	$1\frac{3}{4}$ "
2a	$\frac{5}{16}$ " " $1\frac{1}{4}$ "	$2\frac{5}{16}$ "	23 "	2 "
3	$\frac{1}{2}$ " " 2 "	$3\frac{7}{8}$ "	84 "	$2\frac{1}{2}$ "
4	$\frac{5}{16}$ " " $1\frac{1}{4}$ "	$2\frac{5}{16}$ "	13 "	$1\frac{3}{4}$ "

The sizes of other shaped holes correspond to the above. The prices of the machine are, comparatively speaking, low.

Its construction differs from the ordinary drilling machine, inasmuch as the spindle, instead of being kept vertical, can be swivelled around its lower bearing, which is ball-fashioned. The top of the spindle, on the other hand, is made to follow the inner course of the template, which curve corresponds to the form of hole desired to be drilled. This template can be changed according to requirements, by simply unscrewing four screws and replacing it by another template. The boring tool, instead of cutting along its sides, is of a triangular form, and simply cuts or scrapes on its bottom edge while it revolves, as in the ordinary drilling machine, with the additional motion given to it, however, of the fore-mentioned template. By bringing down the saddle or raising the table bodily it will be evident that holes with parallel sides or rectangular to the table surface will be drilled, but the machine also permits of tapered holes being drilled by the following additional mechanism:—The spindle proper is carried in a sleeve and can be fed downwards, either by hand or by automatic feed, whilst the sleeve itself with its bearings remains stationary. Consequently, the further the bottom edge of the cutting-tool descends from the template position, the more tapered will the hole become, which is an additional advantage not secured by any other drill. The patentees of



SQUARE HOLE, ETC., DRILLING MACHINE.

the machine claim, moreover, that it will drill a key-way at the same time as it is drilling the bush of a pulley. With such advantages as we have here enumerated, there can be little doubt that the machine is destined to have important effects on the machining trades, and as there can be no doubt that square holes possess many advantages, which would bring about their more extended adoption were it not for their costliness, and as many as over 100 drills of different kinds are constantly employed in drilling round holes (a large number of which are afterwards formed into square holes or holes of other shapes by the expensive and tedious process of filing the corners by hand) we think that this machine will soon be universally adopted. In conclusion, we may add that Mr. Wenner will be glad to shew it to all interested.

MR. JAMES MAWDSLEY, general secretary of the Amalgamated Association of Operative Cotton Spinners, has accepted an invitation from the Government to a seat on the Labour Commission.

THE balance-sheets of the Austro-Hungarian jute spinning companies do not indicate that 1890 was a very prosperous year with them. It was lately announced that the First Hungarian Jute Spinning Company had closed its financial year with a loss of 79,358fl (say £6,613), and we now learn from Vienna that the Austrian Jute Spinning and Weaving Company has declared a dividend of 7½ per cent. for last year, against 14½ per cent. for 1889, and 14½ per cent. also for 1888.

Bleaching, Dyeing, Printing, etc.

PAPERS ON BLEACHING.—XI.

(*Continued from page 244.*)

YARN AND THREAD BLEACHING.

In this paper it is proposed to deal with the bleaching of yarns and thread. In principle there is no difference between the bleaching of a piece of cloth and a hank of yarn, whatever modifications are adopted in practice being due to the difference in the mechanical condition of the two kinds of goods. It is obvious that a piece of cotton cloth can be handled much more easily than, and in a different manner from, a hank of yarn; consequently while from a chemical point of view the main operations of yarn bleaching are the same as those of piece bleaching, yet the machinery has to be modified to suit the different way in which yarn must be handled.

Yarn is supplied to the bleacher in two forms: (1st) warps, in which the length of the threads may vary from as little as 50 to as much as 5,000 yards; these can be dealt with in much the same manner as a piece of cloth, that is, a continuous system can be adopted; (2nd) hanks, which are too well known to require description. Sometimes yarn is bleached in the form of cops, but as the results of cop bleaching are not very satisfactory, it is done as little as possible.

Warp bleaching.—The warp, if very long, is doubled two, three, or four times upon itself, so as to reduce its length; care should be taken that the ends of the warp are tied together to prevent any chance of entangling, which would very likely happen if the ends were left loose to float about. As a rule warps are not lined, but the adoption of this lining would assist the bleaching. In outline, warp bleaching consists of the following operations:—

1st. Ley boil. Using 30 lb. caustic soda, 70 per cent., and 50 lb. soda ash, 58 per cent.; giving 6 hours' boil, and washing.

2nd. Sweeting boil with 30 lb. soda ash, 58 per cent., for 2 hours.

3rd. Washing.

4th. Chemicing. Bleaching powder liquor at 1° Tw.; washing.

5th. Sour. Sulphuric acid at 2° Tw.; washing well.

6th. Hydro extracting and drying.

About 2,000 to 3,000 lb. of warps are usually treated at one time.

The machinery used may be the same as that used in the cloth bleach, and each operation may be conducted in the same manner. In some warp bleach-works, while the kiers are made in the same way, some of the other machines are made differently. The chemicing and souring is done in stone cisterns, provided with a false bottom, in which the warps are allowed to remain for about two hours. A more complicated form of chemicing cistern is also in use; this is made of stone, and is provided with a false bottom; above is a tank or 'sieve,' as it is called, having a perforated bottom, through which the liquor flows on the warps in the cistern below. Under the chemicing cistern is a tank into which the liquor flows, and from which it is pumped up into the sieve above; a circulation of liquor is thus kept up during the whole of the operation. Owing to the action of the chemic or acid on the metal work of the pump there is great wear and tear of the latter, necessitating frequent repairs; this is a defect in this form of chemicing machine. For drying the warps, a hydro-extractor is first used to get the surplus liquor from the goods. This machine is now well known, and is in use in every bleach-works, where it is familiarly known as the 'whiz,' and the operation itself is generally called whizzing. Hydro-extractors are made in many forms and sizes, but the principle on which they work is the same in all—a revolving basket with perforated sides holds the goods; this is caused to revolve at a high speed, and by centrifugal action the liquor is forced outwards from the goods and through the perforations in the sides of the basket and then away from the