SOME NOTES ON TEXTILE MACHINERY DISPLAYED AT GHENT EXHIBITION.

By FRANK NASMITH (Manchester).

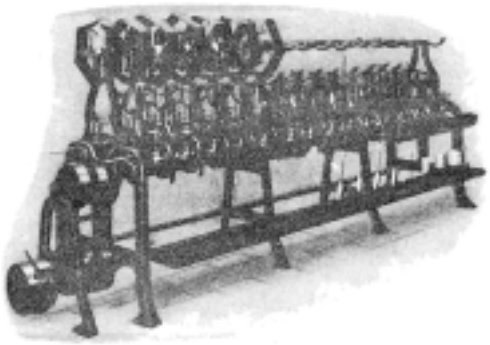
Two broad methods of participating in International Exhibitions, such as the present one at Ghent, apparently offer themselves to textile machinists. One is to arrange a comprehensive exhibit showing the machines necessary to prepare, spin and weave one of the textile fibres, the other to display a miscellaneous collection of individual machines which embody entirely new features of construction. The first is permissible only to large firms who make a great variety of machines, the second can be followed by large or small firms as desired. These two methods are demonstrated at Ghent, for in the British section we find not only the really fine comprehensive displays of Platt Bros., of Oldham, and Fairbairn Lawson Combe Barbour, of Leeds and Belfast, but also exhibits of a few special machines. In the German section the second method predominates. Wherever possible a general examination of the whole of the machinery shown is to be commended, as well as a more searching examination of that particular class or type in which the visitor is most interested. The progress made by other countries besides one's own should be noted and appreciated; the trend of invention should be recorded and the general efforts made to increase production or quality carefully considered. Much can be learnt from one's competitor, although the mere copyist is to be strongly deprecated. At the Ghent Exhibition there is a great deal of textile machinery which, although of excellent design, construction, and productive capacity, is old in principle, and is generally well-known to those connected with the textile industries. The application of minor improvements which are purely constructional are matters which the visitor, although interested in the use of such machines, passes over, as in many cases he only spares a few hours to examine the whole of the exhibits. On the other hand, he appreciates and pays particular attention to a new type of machine, and at the present exhibition there are many such machines, which will be seen for the first time by members of this Institute. It is to such machines that it is desired to direct your attention, and at the same time to voice some thoughts which have occurred to me in connection with the extremely important question of the decrease in the amount of available efficient labour for the weaving shed. That certain machines exhibited, comprising a new type, will have an important bearing on this question in the future cannot be denied, and it is gratifying that details of the working of such machines are available.

I refer particularly to those machines that make possible increases in loom production, minimise the labour necessary and increase the quality of the fabric. In two words, pirn winding machinery. But besides such machines one must remember in this connection the improved creels, cop spindling apparatus, and automatic weft replenishing mechanism, examples of which are to be found in the Exhibition. Pirn winding machinery has been improved almost out of recognition during recent years, due probably in a large measure to the introduction of American machines into Great Britain and Europe. Such machinery is in a sense antagonistic to automatic weft replenishing mechanism, although it can be made a most useful auxiliary. The question that arises, however, is whether the manufacturer when offered a partial remedy to his labour difficulty will not accept it at a much less first cost to himself and with much less change of conditions than would be occasioned were he to instal automatic looms. The modern system of pirn winding increases the holding capacity of the shuttle from 1½ to 3 times. Recent tests I had to make on a new type loom demonstrated the very considerable increases in production gained by the adoption of this system, and other figures placed at my disposal confirm those obtained by myself. Moreover, a weaver with a helper is enabled to attend to six looms in place of four hitherto tended. Of course, six looms per weaver is considerably less than the 16 to 24 of the Northrop or the 33 of the Steinen, but in a 500-loom shed it reduces the number from 125 to 84 efficient weavers, which is a considerable reduction, and spread throughout Lancashire, for example, would go a long way to mitigate the scarcity.

At Ghent there are three different makes of pirn winding machines to be seen in the German section—none in the British. Every credit must be given to the German makers for the ingenious well-constructed examples shown.

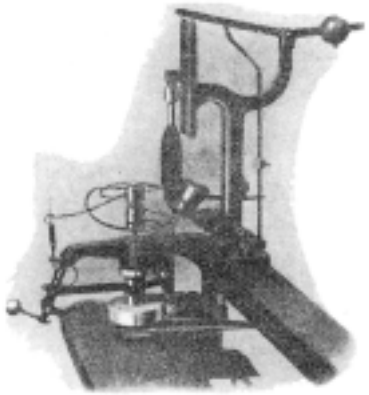
The Schlafhorst machine employs a spindle arranged vertically. The pirn is built up and formed by means of a self-adjusting cone which is peculiar, inasmuch as it always contacts immediately when brought into position for the whole of its depth with the spindle or yarn, and not as is often found only when a layer of yarn has been wound on the spindle. The spindle drives the shaft of the thread guide, which consists of semi-circular wings carried in collars mounted on the shaft. The thread is alternately guided by the radial edges and by the peripheral edges of the wings. Should it be found necessary to alter the length of traverse or the distance through which the thread is guided it is sufficient to free one or both collars and to fix them the desired distance apart. The springy wire wings allow the feed distance of the thread to be altered within the limits required by the spools. One rather important point—and one, by the way, that is stressed by the German machinists—is that the thread in passing from the feed package or hank to the pirn follows what is practically a straight line and does not pass through any acute

angles. The advantages of this method when winding fine or tender yarns will be appreciated. The transmission of movement between the various winding spindles and their thread guides is effected by cut gears, so that a gradual starting up of the spindles is accurately and exactly reproduced in the starting up



RAPID PIRN WINDER, SCHLAFHORST TYPE.

of the thread guide. A friction slipping device is also introduced to effect a slow starting of the spindle and thus avoid broken threads. No threading of the end of yarn into the guide is necessary as the thread passes into position automatically. As regards winding speed this is high, no less than 275 yards per

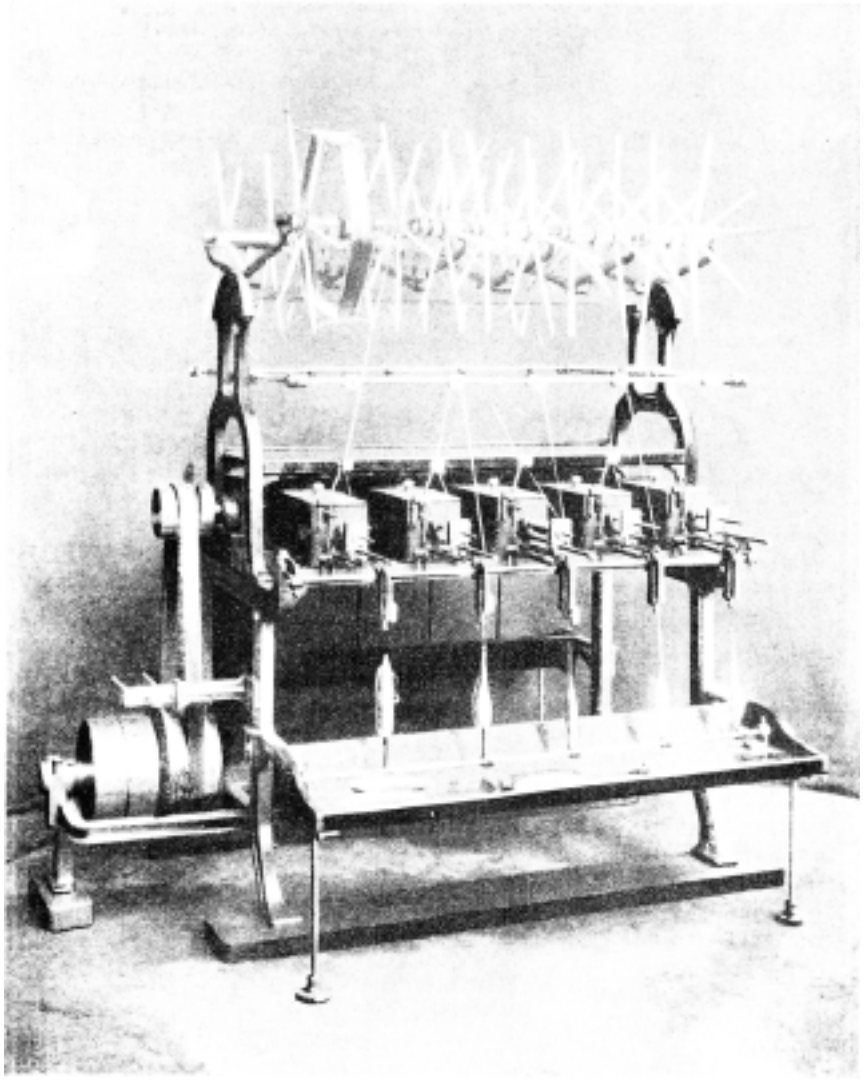


TRAVERSE GUIDE, SCHLAFHORST PIRN WINDER.

minute being claimed by the makers. Broken thread and full pirn stop motions are applied as is usual with all such types of machine.

It is indeed gratifying that the three pirn winding machines shown should be so dissimilar in their methods of obtaining the

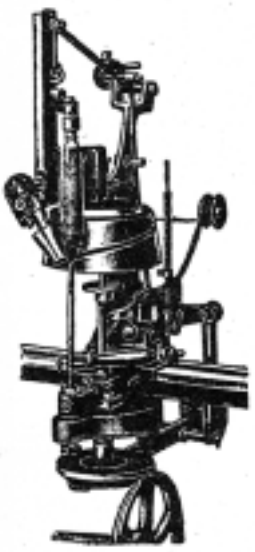
same object. The machine just described is a vertical rotary spindle machine with a rotary traverse device; that made by Franz Müller, of M/Gladbach, has a spindle arranged horizontally, such spindle receiving in addition to its ordinary rotary



MÜLLER PIRN WINDER.

motion for winding, a reciprocating motion to effect the traverse. Cam gearing is employed to impart a reciprocating motion to the spindle, and this gearing, combined with that which secures the rotary motion, is carried in a special gear-box and runs constantly

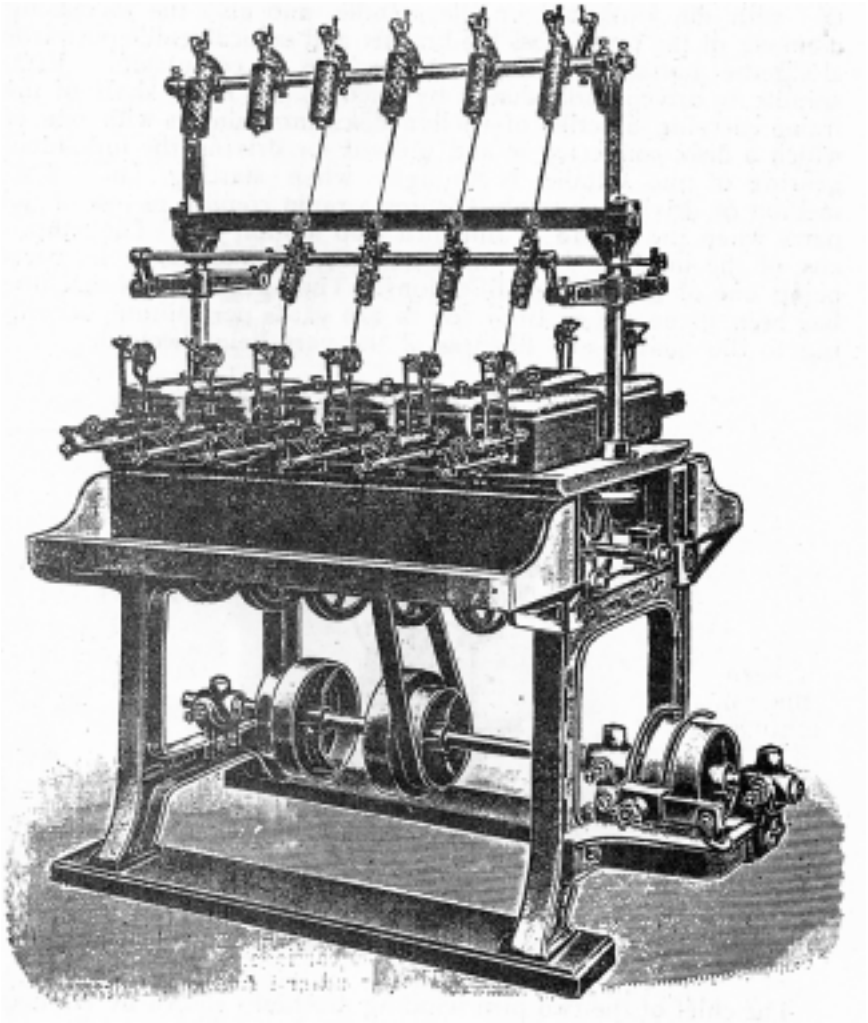
in oil. The construction of the gearing and the fact that it is continually running in lubricant renders it almost noiseless. The spindle passes through a conical guide carried in a small bracket supported on two horizontal rods. The conical guide which acts as the pirn-forming device is rotated by frictional contact with the yarn laid on the spindle, and also the increasing diameter of the pirn forces the bracket and conical guide outwards along the horizontal rods until the pirn is completed. Each spindle is driven individually by friction, the main shaft of the frame carrying a series of friction discs into contact with one of which a disc, connected to and utilised for driving the individual gearing of one spindle, is brought when starting up. This method of driving certainly ensures a rapid coming to rest of the parts when the thread or full pirn stop motion act. The simplicity of the machine is to be remarked, the fewness of its parts being one of its chief qualifications. The speed of this machine has been given me as from 165 to 220 yards per minute, according to the quality and fineness of the yarn being wound.



YARN TRAVERSE GUIDE AND SPINDLE, SCHROER'S PIRN WINDER.

The chief of the two pirn winding machines shown by Herman Schroers, of Krefeld, embodies some novel features in its construction. It is strongly claimed for this machine that its construction is such as to enable fine yarns to be wound at high speeds. Essentially the mechanism comprises a vertical spindle shaft, driven from the traverse guide shaft, which in turn is driven frictionally through a disc from the main shaft of the machine, the usual forming cone and a conical split drum, somewhat on the Hill and Brown type. The yarn passes in an almost direct line from the hank, bobbin, or cop to the slit in the conical

drum. The effect on the yarn by this method of traverse is not so severe as that of a reciprocating guide in the employment of which there is a continual change of tension. The Schroers machine will, it is stated, wind yarns from 175 to 235 yards per minute. Good quality can be wound at higher rates of speed.



UNIVERSAL RAPID PIRN WINDER.

A later machine introduced by Schroers is termed the "Universal Rapid." It approximates in principle to the "Müller" machine already described, that is each spindle is individual, is reciprocated and employs a cone as a forming device. The thread guide of the machine is stationary. A frictional drive is employed. One distinctive feature is the direct method

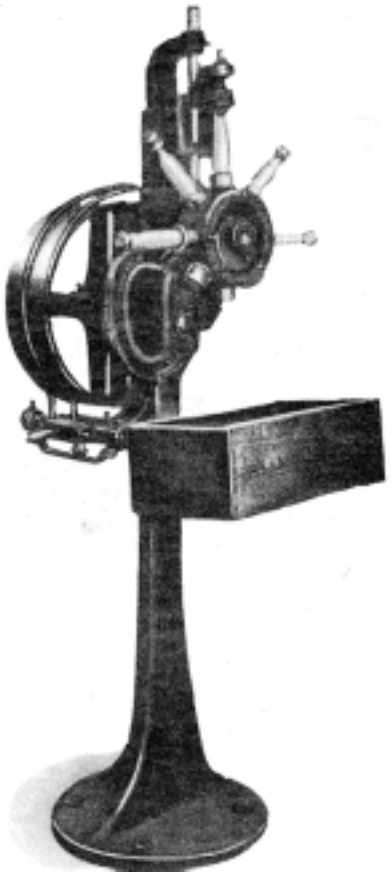
of yarn feeding employed. The thread from the cop, cheese or hank passes in a straight line to the thread guide and practically to the pirn itself. The cone of the pirn is from $1\frac{1}{4}$ in. to $1\frac{5}{8}$ in. in length. One traverse up and down of this length being completed in 16 revolutions of the spindle. A gradual acceleration of the spindle at starting up is secured by the arrangement of gearing which runs in oil.

Considerable attention has been paid to the invention of mechanism which can be applied to existing looms for the purpose of rendering them automatic in the replenishment of weft. The manufacturer who decides to adopt automatic weft replenishing looms is required to determine whether he will adopt what may be termed full automatic looms, or whether he will endeavour to apply to his existing loom auxiliary mechanism to effect the purpose. In the first case he is assured that the whole of the parts of the loom, including the additional mechanism have been considered as a whole, and as a special combination designed to facilitate the change. The timing and general action of the parts are those of a well-ordered machine. The greatest deterrents are, however, the first cost entailed, and the fact that looms which are capable of much further good production have to be cleared out to make way for the new types. Auxiliary mechanism on the other hand, only presents a patchwork kind of job, and a great many of the failures of looms fitted with such mechanism has been due to the lack of sympathy—if I may use such a term—between the ordinary mechanisms and those added.

At Ghent two looms will be found on the stand of the firm of Rich. Hartmann, of Chemnitz, to which has been applied weft replenishing mechanism. The mechanism employed does not differ in its essential principle very materially from numerous examples that have been introduced prior to this Exhibition. The loom in both cases could operate as an ordinary plain loom, and the weft replenishing mechanism is purely auxiliary. Either the weft fork or a feeler can be utilised to bring the change mechanism into operation. The magazine is of simple construction and is adapted to take any form of spool and either ring, pirns, or mule cops may be employed. Cutting devices are applied to keep the selvedge edges free from loops and loose ends due to the changes.

Interesting apparatus which may be termed auxiliary to automatic weft replenishing mechanism is shown by the firm of Richard Hartmann, of Chemnitz. It is to be employed in mills having automatic weft replenishing looms, and briefly comprises a spool putting on machine and tube drawing off machine. With the increasing employment of weft replenishing mechanism after the Northrop. principle the employment of specially spun and wound bobbins has been dispensed with in many instances, and weft cops direct from the mule are put direct on to spindles having a Northrop butt, or weft cops, or wound paper tubes are utilised in the same way. The work of spindling these cops

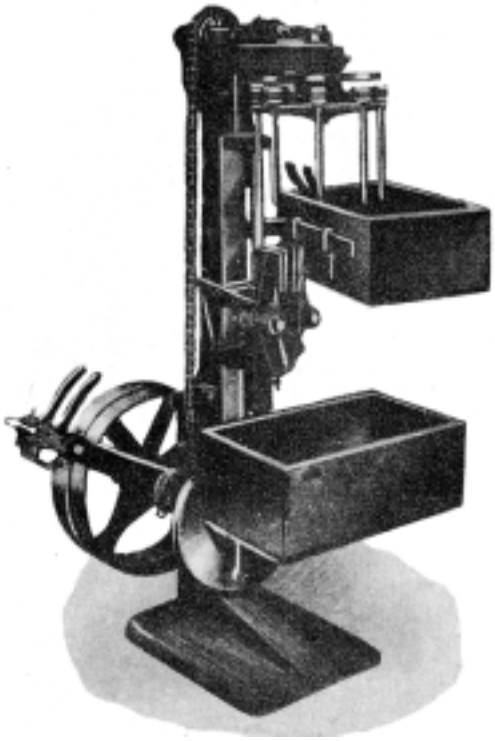
and of withdrawing the tube or end of the cop after the spindle's ejectment from the shuttle involves the employment of special labour. The first appliance of the pair referred to is a spool or cop pressing device, and consists of a drum carrying on its circumference eight renewable cones. In these cones are placed cops lightly fitting on their spindles. The drum is moved forward by one division for every revolution of the driving pulley, and the spindle with its cop is brought under a presser



COP OR PIRN SPINDLING DEVICE

which forces the cop into its correct position and at the same time compresses it. A further movement drops the spindle with its cop into a receiving box. The tube drawing-off machine consists essentially of a disc turning horizontally and provided with eight slots. The spindles are hung in the slots and by the revolution of the disc they are brought into reach of rubber-covered forked catches, which draw off the tubes or the butt ends of the cops and deliver them to one box and the spindle to another.

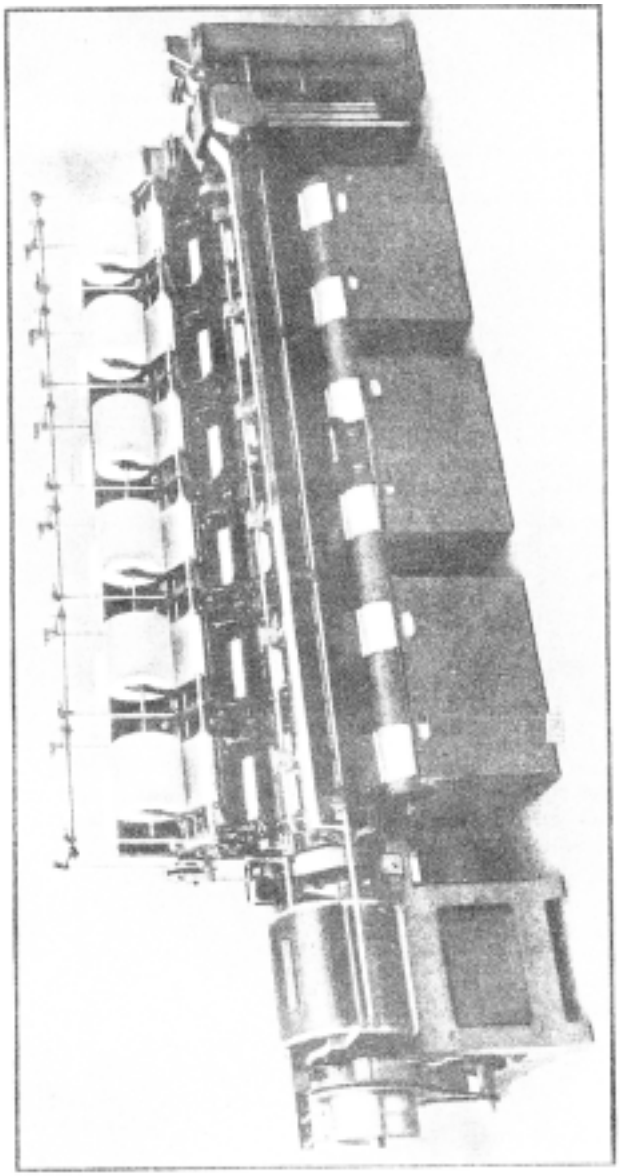
Preparation and spinning machinery has been somewhat ignored in this paper, although there are many interesting machines in these classes to be seen. There are three cotton combers; an improved construction of Platt's with five rows of drawing rollers in the draw-box, the Nasmith comber on John Hetherington and Sons' stand, and the entirely new type—at any rate, I believe, it has never been shown at an exhibition before—to be seen on the stand of the firm of Richard Hartmann, of Chemnitz. The Alisy-Trübenach comber is double-sided, with a single combing cylinder, two sets of top combs,



PIRN DRAWING-OFF DEVICE.

nippers and piecing rollers. In a space very little greater than an ordinary six-head comber twelve heads are compressed. The combing action is secured by equipping the oscillating comb drum with comb segments, having teeth pointing towards each other. The comber it is stated can work on long or short stapled cotton equally well, and gives a production at 90 double nips or beats a minute of 26 to 33 lbs. of sliver per hour with 17 to 20 per cent. waste. The production is thus considerably more than that of an ordinary comber occupying the same floor space. The great number of parts compressed into a small amount of space gives one

the impression that adjustments or renewals would be difficult. The comb drum, which has a reciprocating rotary movement, is fitted with two sets of needles, each in 17 strips. Each needle is



THE ALLSY-TRUBENACH COMBING MACHINE.

renewable without necessitating the removal of the comb drum or without interfering with the other needle strips.

The combing cylinder has a two-thirds rotation, first in one

direction and then in the other, the whole machine working continuously, so that at each beat combing takes place at one side and drawing off at the other.

One can hardly estimate the number of attempts that have been made to produce mechanism which will permit cotton spinning on the bare spindles of ring frames, and even to-day after 40 years the commercial accomplishment of the object sought has not been attained. It is gratifying therefore to note the progress made in this direction by makers of machinery for flax and jute spinning. On the stand of Fairbairn Lawson Combe Barbour Limited will be found a patent centrifugal flyer dry spinning frame, which possesses two broad features. First, the yarn is spun direct on to the bare spindle; second, the cops are all automatically doffed and are ready to be placed in the shuttle of the loom at once. In carrying out the first feature the yarn is wound direct on the spindle by means of a swivelling centrifugal presser flyer leg. This presser is pivoted loosely close to the periphery of a revolving carrier ring. The presser leg is provided at its lower extremity with a fish-tail guide eye, and at its upper extremity with a crank guide eye which swivels with the presser leg. The presser leg is made of such a shape and weight that when the carrier ring is revolving the fish-tail end is always lightly pressed against the spindle, thus ensuring that there is no length of yarn exposed between the fish-tail eye and the bobbin. The spindle is made tubular and is dragged round against a friction cord similar to that now used against an ordinary bobbin. The guide eye at the top of the presser leg is at the commencement of the cop approximately in a radial line with the centre of the ring, but as the cop increases in size and the fish-tail end of the presser swivels outwards, this guide eye changes its position horizontally until at the finish of the cop it is approximately at right angles to a radial line. This has the effect of gradually increasing the pressure of the fish-tail end on the cop and ensures that as the cop increases in size and weight the presser exerts more control over the dragged spindle, and in consequence the drag is regulated automatically, requiring very little attention and regulation during the building of the cops. The machine is provided with a patent double-acting quick-traverse motion, and is at present constructed for the production of weft cops of 8 in. traverse and $1\frac{3}{4}$ in. diameter, built on the cross wind principle. The centrifugal flyer and carrier ring are supported at a fixed height, and the whole of the spindle rails and spindles are traversed up and down some 14 times per minute, the top portion of the spindle and cop passing through the carrier ring at the top of the 8 in. lift.

The entire side of cops are doffed by withdrawing the spindles. The footstep rail and the collar rail are made so that each may be controlled separately and during the doffing the collar rail is arrested by means of special stops, and by release of a special controlling and driving pin in the traverse motion mechanism

the footstep rail is dropped and with it the spindles until the latter have been completely withdrawn from the cops. The position at this stage is that all the cops are standing in the collars withdrawn. At this moment a rod comes into operation and pushes all the cops over into a box placed in a suitable position. The spinner then winds the rails into the original position, cuts the ends, and commences spinning, the whole operation of doffing one side occupying less than half a minute.

The foregoing descriptions do not exhaust all the interesting textile machinery exhibits to be found at Ghent. My endeavour has been to draw your attention to what I consider the more novel displays and towards machines and appliances which are on exhibition for the first time.

DISCUSSION.

Mr. BLEAKLEY said he would like to know from Mr. Nasmith whether there was to be seen in the Exhibition any arrangment for stripping the tube of the yarn. On the looms at the stand of Messrs. Richard Hartmann, which had been mentioned, there was an arrangement for squeezing the shuttle cop on to the spindle. It was so tightly wound on that it had to be pulled off mechanically, because the weaver's fingers were not strong enough to get it off. There was a stripping machine, but that machine pulled away not only the empty tube, which was a through tube, but also the yarn which was left on the tube. The manufacturer wanted the yarn, and, if possible, to have the yarn separated from the tube. He desired to know whether or not there was any arrangement that would do that. Improvements in detail had been touched upon in the paper. He remembered that at a meeting of mill managers Professor Fox told them of the importance of detail excellence in the preparation of yarns for the loom. At the Ghent Exhibition, and in England as well, they found a wonderful concentration upon improvements in detail in winding and so forth. The view of one prominent gentleman upon the winding machines exhibited at the Ghent Exhibition was that there was none to beat those Lancashire and Yorkshire users were accustomed to. Improvements in preparation and in winding were being very largely adopted at present in Lancashire, and with considerable advantage. He did not know why automatic looms had not been more widely adopted; perhaps the Chairman could tell them. It was a puzzle to him. Mr. Frank Warner, the Chairman of the Council, had remarked that morning that he paid as much as £2 per yard to the weaver of a certain cloth. A weaver in the cotton industry got more like £2 for weaving five or six thousand yards of calico. Reverting to improvements in preparation and in winding, he might mention that he knew of places in Lancashire where the four-loom weaver had had her capacity doubled simply by the adoption of the International winding arrangement. He believed the cost of winding was about ⅜d. per lb., but the arrangement rendered it possible for

a weaver who formerly tended four looms to tend eight looms. Moreover, he had seen cloth with a perfect edge, and they all knew the importance of having perfect edges. That indicated the improvement secured by attention to detail. Of course, there was a great saving in waste also. He believed this improvement in winding was first applied in Yorkshire, and he had heard managers of Yorkshire woollen factories speak of the great advantage they gained by its adoption. They in Lancashire were now copying their friends in Yorkshire.

Mr. W. O. O'BRIEN (Manchester) said that they had not had much opportunity of examining the machines exhibited. One found textile machinery in different places throughout the Exhibition, and one came across machinery by accident rather than by design. In walking round the Textile Section, he had seen most of the machines that had been referred to by Mr. Nasmith, but unfortunately they were not always running. He noticed an automatic machine on the stand of Messrs. Fairbairn Lawson Combe Barbour, of Leeds and Belfast, for flax hackling. For some years flax machinery makers had made a machine by which two hackling machines had been made to automatically transfer the flax from one to the other by mechanically unscrewing and rescrewing the flax holders and turning the pieces of flax at each end. In addition they were now exhibiting a machine to take the pieces of flax away from the hackling machine and deliver the same to the spread board. That meant doing away with the work of four boys and a man. A German firm were also exhibiting a machine for flax hackling which had a good arrangement for automatically operating the flax holders.

Mr. GEORGE WHITE (Bradford) said he would like to add his experience in the worsted trade in regard to winding. In his works he had twenty machines that cost £60 each, or £1,200 in total, and he spent £2,000 in pirns, but the advantage gained was such that they had thrown out all the old winding and introduced the new system, not only for the ordinary 5 in. spool, but up to an 8 in. pirn. Speaking of coatings and sergings, they got every satisfaction, and considerably more production than formerly. The extra cost of winding over the use of spools direct from the frame was about ⅛d. per lb., but the extra production in weaving of 12½ per cent easily met this extra cost.—Mr. BLEAKLEY: What counts?—Mr. WHITE: From 2-fold 12's to 2-fold 28's, and in singles from 12's up to 28's.

Mr. BLEAKLEY remarked that Mr. White's observations formed a very practical contribution to the discussion.

Mr. HALL said he had taken the opportunity of examining the German winding machinery, and those in charge of the stand, although competitors of his, had drawn attention to its features and put the machinery in motion for his inspection. He would like to make a few remarks respecting winding, which might be of

interest to the members, and which would in some measure back up Mr. Nasmith's statements upon the effect of getting a greater quantity of yarn into the shuttle. The two main principles involved, were getting a larger quantity of yarn into the shuttle, and winding that quantity at a high speed. There was a great danger of winding too quickly. Although many people differed from him, he thought it was far better to run the yarn at a slower speed and give the operative many more spindles, and so wind yarn at the lowest possible cost. He knew of a spinning mill in which the speed was very high, but the firm put fewer operatives on to the machines, lengthened the machines and gave each operative more spindles, and the net result was better work, a lower price paid for winding per pound, and a larger aggregate wage to the operative each week. In regard to getting a larger quantity of yarn into the shuttle, he was not quite sure whether the practice emanated in Scotland or Yorkshire, but he knew it was in one of those places. That system had really been available for everybody for at least thirty or forty years, but people would not take it up. More than twenty years ago he himself in a circular gave advice about such machines, and in that circular the phrase occurred: "A step forward towards an automatic loom." One of the German machines described in Mr. Nasmith's paper had been at work for some time in Germany, and he had it from experts there that the repairs were becoming so numerous that one firm was beginning to question the wisdom of taking it up, and were considering whether they would not revert to a slower speed of winding. With regard to the difference made in the production of the loom; some twenty-four years ago a machine was introduced into the Bolton trade which enabled the shuttle to hold from two to five times as much yarn as before. That machine gradually made its way in the district, notwithstanding the apathy of those who were slow to recognise improvements. A day arrived, howevr, when there was only one firm who had not adopted the machine. The secretary of the operatives' association interviewed the heads of the firm in question, and told them that unless they were prepared to put that particular machine into their winding department they must add so much per cent to the lists of their weavers. That showed that the weavers at other mills were earning more on the same class of work. The result was that the firm placed an order for 700 spindles. He took it that Mr. Nasmith had intended to suggest the advantage of the system as a step forward, the ultimate idea being to combine it with the automatic loom, and that was being done. He might, perhaps, add another word to show what our Government was doing in the direction of giving work to prisoners. In the British Section of the Exhibition he noticed a hand-loom which was used by prisoners who were employed in weaving.

Mr. G. WHITE remarked that makers of winding machinery were asking too much for their machines. Ten thousand more machines would be put into use if they did not cost so much.

Mr. J. H. QUILTER (Leicester) said he would like to know if those in the weaving branch had the same difficulty as those in the knitting trade in getting British makers of machinery to compete with foreign makers. Our hosiery factories were being filled with German and American machines. It would be interesting to know why British machine makers could not progress in the same way as foreign makers did.

Mr. HALL said the people who wanted winding machinery in Mr. Quilter's district evidently did not read the textile papers, or they would see English makers could fulfil their requirements in every respect.

Mr. QUILTER said the trouble was that British machinery makers would not adapt themselves to the requirements of the hosiery manufacturers. In the hosiery trade they could not use the small bobbins commonly used in other trades, but had to have bobbins upon which they could get 3 lbs. or 4 lbs. of yarn.

Mr. NASMITH, replying to the discussion, said the only stripping device he had seen in the Exhibition was that illustrated by the second drawing accompanying his paper, called a pirn drawing off device. But that did not strip the yarn off the tube and put the yarn into one box and the tube into another; it put the whole into an exhaust receiving box. As regarded Continental winding machines, he thought the fault with the British makers was in not showing. He agreed that they had machines in Great Britain which were quite equal to, and better in many constructional features than the machines shown in the German textile section; but the British exhibitor did not make displays to the same extent as foreign makers. It had been acknowledged that foreign makers were going ahead, and certainly they got trade not only abroad but in our own country as well. A few days ago he visited what he considered to be one of the best winding places in Lancashire, and was much struck by the preponderance of machines of American origin. British makers *could* beat the Germans in the constructional features of the machine, and he had hopes that they ***would*** beat them. As to the speed of winding, he had seen a new machine not yet on the market which was a rapid pirn winding machine. It was made by a firm who prided themselves on the quality of their machines. He thought that machine would compete very favourably with the German machines. He did not wish Mr. Bleakley to minimise the advantages of this winding because, although he (Mr. Nasmith) had only mentioned the main phase of the matter—increased production of the looms—there were other advantages such as improved quality of material, smaller amount of attention required to be paid by the weaver, better selvedges, and so on. He agreed with Mr. O'Brien as to the difficulty of finding all the textile machinery on view at the Exhibition. It would have been very much more convenient and advantageous if all the textile machinery could have been placed in the big machinery hall and placed in sections

representing the makes of various countries. Touching upon Mr. Hall's comments, he himself contended that a high speed would become universal. The constructional details of the machine, to his mind, would be improved so as to permit of high speeds. Any disadvantages which existed at present would be overcome, but they could only be overcome by improving the quality of the work that was put into some of the machines. In the German section there were machines which he considered were too flimsy to work at high speeds, and to maintain high speeds. He thought the British manufacturer would come along and improve all that. The pirn winding machines, as Mr. Hall said, were the first step to the automatic loom. They had to face the question whether the manufacurer who did not want to throw out looms that were doing good service would not adopt rewinding in preference to throwing out such looms. If he went in for rewinding, he would get an added advantage. In reply to Mr. Quilter, he did not know any machines that suited the Leicester trade, with the exception of the ordinary hosiery winding machines, such as the Foster Camless Winders, but he thought Mr. Hall's reply was right; if Mr. Quilter would look up the advertisements and write to the makers he might get something to interest him.