

Knitting Department

THE MANUFACTURE OF KNIT GOODS.

By JOHN CHAMBERLAIN

STRAIGHT BAR MACHINE

As the fashioning course requires a totally different manipulation of the looping elements from that of the knitting course, two cams are attached to each circular boss on the main camshaft. The cams are detachable, and their removal does not affect the timing, which is made by the circular adjustment of the bosses on the shaft.

The path of the needle head during the knitting course is shown in Fig. 14 at A. At the commencement of the course the needle head occupies the position 1, and stays in this position during the loop formation. The loop-division position of the needle head is shown at 2, the pressing position at 3, the casting-off position at 4, from which the return movement is made to the original position.

The path of the needle head during the fashioning course is shown in Fig. 14 at B. At 1 an outward move is made in

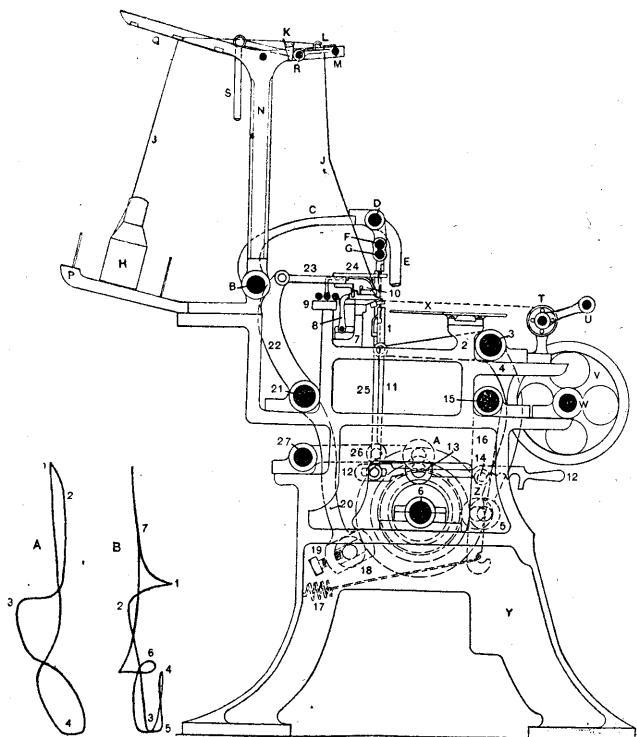


FIG. 14.

FIG. 15.—END VIEW OF MACHINE.

order to allow the narrowing points to descend on the beard side of the needles. At 2 the needles are covered by the points; at 3 the loops are transferred from the needles, and left suspended on the points. At 4 the racking of the points is effected; at 5 the needles are again covered by the points; while at 6, through the aid of the sinkers, the loops are transferred again to the needles. Afterwards the latter rise to position 7, the camshaft is moved endwise, and the needles are now controlled by the knitting-course cams, and rise to their original knitting position.

Fig. 15 shows an end view of the machine, the black circles denoting shafts and rods which extend the full length of the needle divisions. The needle-bar 1, the jacks 8, slur bar 9, sinkers and dividers 10, as well as the rest of the immediate looping elements, have been shown previously in Fig. 11, but are reproduced in Fig. 15 to show how their control is effected.

NEEDLE BAR CONTROL

The vertical movement of the needle bar is obtained through the agency of the arms 2, the rocking shaft 3, and levers 4, from the main camshaft 6. The cam levers 4 carry rollers 5 through the medium of which the motion is transmitted with a minimum of friction. Rocking shafts, an outstanding feature of the machine, are used so that the connections from the intermediate oscillating shafts to the main shaft and to the parts operated may be made in any convenient position.

The horizontal movement of the needle-bar is obtained through the agency of the connecting bars 11, cam levers 12, rollers 13, rocking shaft 15, and rocking-shaft levers 16. The levers 12 are connected to the levers 16 on the spindles 14, so that they can be released when any of the sectional needle bars are to be put out of action, as is necessary when a needle breaks or when certain operations are being performed. The rocking-shaft levers 16 are pulled towards the main camshaft by means of strong spiral springs 17, and the rollers of all the cam levers are caused to follow the contour of their cams by means of similar devices.

The loop-forming position of the needles would ordinarily be decided by the setting of the foregoing levers, but in common practice additional cams and levers are provided, so that the rollers Z of the levers 16 are not in contact with their cams during the stitch formation, it being possible to adjust the stitch length by means of set-screws with milled heads to exceedingly fine limits without altering the horizontal component of the needle bar movement.

SINKER CONTROL

The sinker action is controlled through the agency of the catch-bar, catch-bar arms 22, 23, rocking shaft 21, catch-bar levers 20, and rollers 18, from cams on the main camshaft 6. The rollers 18 have a set-screw adjustment, so that any regular wearing of the cams may be compensated by roller adjustment. In a like manner the other rollers have also set-screw adjustment.

In order to release the catch-bar from the slots in the sinkers and dividers during the loop formation a vertical movement is given to the catch-bar at the completion of each course. For this purpose the catch-bar arms 23 have extensions 24, which are lifted through the agency of the vertical rods 25, rocking shaft 27, lever 26, and rollers A, from cams on the main shaft 6. At the completion of the loop formation and division the catch-bar is allowed to fall so that the sinkers and dividers make a collective movement during the rest of the course.

The narrowing mechanism is carried from the rocking shaft B by means of arms C. Brackets are attached to the front ends of these arms, which carry the shaft D. At intervals on the latter other brackets are placed in which slide the narrowing rods F, G, which carry the narrowing fingers. The movement of the narrowing mechanism is a simple oscillating one about the rocking shaft B, and is obtained from the main camshaft through the agency of the vertical levers E attached to the shaft D. During the knitting course the rollers of the levers E rotate idly on a circular flange so that no movement is given to the narrowing mechanism.

The bobbin stand P and snapping mechanism are arranged around the vertical brackets N. The yarn J is drawn from the bobbins H, and passes through guide holes in the bars Q, over wicks in the lubricators K, under the snapping springs L, which are attached to brackets carried on the snapping rod R. This rod is oscillated through the agency of the connect-

ing rod S from a cam on the main shaft. During the loop formation the snappers L are held away from the yarn by the front rod M so that the yarn may pass freely through the thread guides to the sinkers, but when the draw has been completed the rod R is oscillated in an upward direction so that the yarn is trapped and lightly held between the snappers and the brackets. In this manner the yarn is held taut so that it will pass correctly between the needles and sinkers when they are returned to their position after casting-off or narrowing. This ensures good selvaging, an important point in the making of wrought goods.

MANAGEMENT, CARE, AND ADJUSTMENT

Advantages will be gained by keeping a machine knitting from similar yarns as far as is consistent with the orders obtainable. Changing from one yarn size to another often necessitates overhauling and adjusting the machine, as also does changing the character of the yarn used. Different classes of yarns require different adjustments of carrier-rod stops and snappers if good selvages are to be ensured. These machines are noted for their longevity of wear if kept in good condition by careful attention to details. A good operator will keep the needles, sinkers, and points as straight as if the frame were new.

The alignment of the needle bars, catch-bar, and jack-bars is of the utmost importance. Sometimes, in case of a mishap, the sectional needle bars may become disturbed, and before restarting, the machine should be turned by hand until the needle heads are just disappearing between the sinkers. If the needle bar is level, the needle heads will become invisible as a whole; if not level one side will disappear first.

In keeping the sinkers, knocking-over bits, needles, and points in good order, the knocking-over bits should be lined up to the sinkers and the points adjusted so that they pass between both sinkers and knocking-over bits without any sideways deflection.

Finally, the needles may be pliered to the points. It is useless pliering needles to wrongly set points, as both needles and points must work between the sinkers and knocking-over bits without visible contact.

It is better to avoid the use of too much drawing-off weight, as this has a tendency to pull the selvage loops and needles inwards so that the points do not cover properly in the fashioning operations.

Tucking and throwing-off at the selvages may be due to incorrect vertical setting of the needle bar, as well as to incorrect horizontal positioning. If the complete loop is not below the beard when the latter is closed, a tuck stitch will result, as the loop cannot be cast off. If the new loop is below the beard, the stitch will be cast off at the same time as the finished loop. These imperfections may not necessarily appear all across the fabric, as it is evident that the new loops are only directly connected to the finished loops at the selvages from which the carrier guides are drawn, and it is here that the results of imperfect adjustment will be made manifest.

Each slur-cock should be carefully adjusted to push the sinker through the agency of the jack precisely up to the bar on the sinker plate, the catch-bar then adjusted to take the dividers up to the same bar, and the cam timed so that the catch-bar immediately drops into the sinker slot. Wrongly set catch-bars will cause the sinker loop to be greater than the divider loop or vice versa, and if badly set, will not fall into the slots at all.

It is necessary to avoid the use of needles which vary slightly in length of beard, thickness of the wire, or needles possessing opened-out eyes. All needles should be cast out exactly the same length, and the beards set so that the yarn can pass safely under them. Partially closed beards will split the yarn and cause pin-holes, or throw stitches off completely.

Raised beards will mispress and cause tuck stitches. Beards not parallel with the needle stem will be pressed outside the needle, and also cause tuck stitches as well as bent sinkers, while in time the beard will be sheared off.

To produce good selvages the carrier guides must be set to suit the character of the yarn used. The snapping springs must be examined, and their relative strength tested by the feel. All guide holes through which the yarn passes should be clear of lint and be perfectly smooth. The bobbin should occupy an exactly central position with reference to the first guide hole, so that no drag caused by the yarn pulling off hard on one side of the bobbin occurs, for if the yarn does not run freely, cuts will result. On the other hand, tensionless yarn may cause drop stitches through the necessary long lead of the thread guide. There should be no end play in the screw-box connection to the narrowing fingers. Hard yarns should be lubricated during winding as well as during knitting, but yarns lubricated in the winding process should be worked immediately, or drag is bound to ensue.—*The Textile Manufacturer, Manchester, England.*

POINTS ON SILK HOSIERY.

* PURE DYE.

The almost invariable method of manufacturing seamless silk hosiery is to knit the raw silk. The goods are then finished by first boiling to remove the gum from the silk, then bleached or dyed. A little sizing is generally used to harden the silk, this disappearing on subsequent washings. As no loading or weighting is used in this grade, it is termed "pure dye." The method of knitting is very simple, it being almost as easy to make "pure silk" hosiery as to make mercerized cotton goods. Were it not for the tendency for pure dye hosiery to rough up when subjected to the slightest chafing or to catch on almost everything it touches, it would outwear the higher grades of silk stockings.

Pure dye hosiery can be readily distinguished by burning a strand of the silk. It will burn away instantly like a human hair unless it has been subjected to mineral weighting, in which case the strand will remain intact in the form of ash which crumbles when handled. The heavier the weighting the slower will be the burning and the greater the amount of ash. When weighted silk is applied to a flame, the ash becomes red hot and blackens again without crumbling when removed.

Seamless hosiery machines knit pure silk in the gum without special preparation, but on full fashioned machines the silk must first be moistened. Knitting dry silk on fashioned machines invariably results in a poor fabric because of the wirey nature of the thread. The loops run together and cause uneven knitting. There is little difference in the results obtained by applying the moisture by rewinding over a leather roller and by drawing the silk thread directly through clear water as it is being knit.

"Pure dye hosiery" sounds good, but in reality it is, of the three distinct grades, decidedly the inferior. Pure dye goods would not be made in such quantity if it were possible to weight the silk in the stockings easily without affecting materially the cotton in the goods.

"DIPPED" SILK.

This grade of silk hosiery comes next in respect to quality and the difficulty in handling during the processes of manufacture. It is made from silk that before being knit has been boiled off and weighted, but not dyed. The operations on silk treated in this manner are more difficult than on gum silk. The moistening must be more carefully carried out and the handling of the fabric in all operations up to the dyeing requires more care. When the gum has been removed from silk the tendency for running stitches and the

ability of seriously damaging the goods increases materially.

Moistening makes gum silk slippery and causes the loops to knock over more easily. This advantage is lost when the gum is removed before knitting. The weighting of the silk adds to the difficulty in making the needles pull the new loops through the old ones. An excessive amount of moisture makes the silk stick to the needles. Even the moisture in the air at times settles on the needles of a full fashioned frame, causing difficulty in clearing the loops when working weighted silk and making a "cloudy" fabric.

If the silk becomes a little dry, partial tucks form, the frictional electricity drawing and splitting the silk when passing over the heads of the needles. Movable, knocking-over bars are a great help in overcoming these difficulties, as they provide a constant and not too rigid tension on the yarn during the moving of the new loops over the needle heads. Machines require closer adjustments on this kind of silk knitting. Under favorable conditions the production can be as large as on gum silk. As all operations are performed with undyed materials, the highest skill is not essential. When completed, this grade of hosiery is dyed in the same manner as gum silk except that it does not have to be boiled off. Weighted silk differs from pure silk in its affinity for coloring matter, and does not blend as well with the cotton parts. This hosiery is generally termed "dipped."

Because of the weighting there is less tendency to rough up when worn than is the case with pure dye hosiery. The finished product has a heavier and more solid body than pure dye hosiery, and does not become fluffy and sleazy on laundering as is the case with pure dye goods.

INGRAIN HOSIERY.

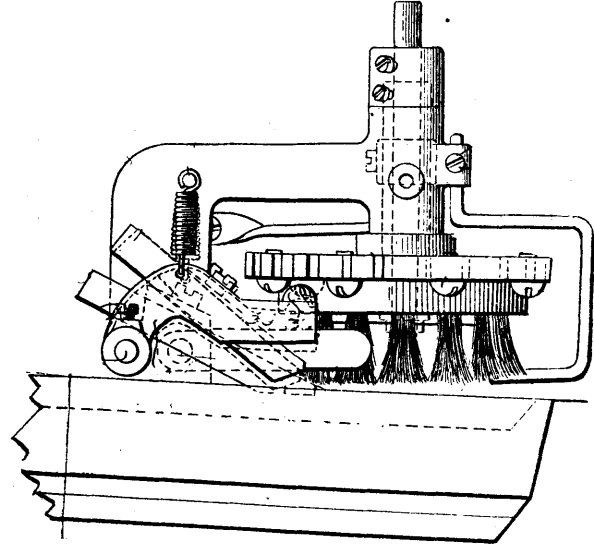
The best grade of silk hosiery is called ingrain. This is knit from silk that has been boiled off, weighted and dyed in the yarn. Only knitters of great skill and long experience are successful in operating full fashioned machinery on ingrain work. The difficulties in making dipped hosiery are several times multiplied in producing ingrain goods. Besides having the mineral weighting in the silk, there is also the color or dye to contend with together with the scroop which is always acid and adds to the difficulty of obtaining good knitting. On light colors, scrupulous cleanliness must be observed. The winding preparation of silk, correct moistening methods and constant attention required in order to keep the silk and cotton in the right condition for good work call for men of long experience who have grown up in the business.

Ingrain silk hosiery is generally looped with white thread or silk, this being one of the best means of distinguishing ingrain from dipped hosiery if the colors are solid. There are, however, all silk goods which are knit in the gum and afterwards boiled off, weighted and dyed in the piece. Such goods have even been relooped with white silk, but these goods do not stand out as a specific grade.

MONACO.

ATTACHMENT FOR LOOPING MACHINES.

The illustration shows an attachment for a looping machine, recently patented, and designed for closing the gap in the toe portion of a seamless stocking. The object of the device is to cut the chain thread made by a looping machine at the vacant intervals where no fabric is attached to the looper points for the needle to sew. Much time is lost by the operator in breaking this chain by hand, and frequently there is a long length of chain left inside of the stocking.



LOOPING ATTACHMENT.

A rotary brush is attached to the lower end of vertical shaft, and secured to the top of brush is a ratchet plate, which is provided with teeth, secured to the under face of the ratchet plate, and evenly spaced around the same, is a plurality of round-headed screws, as shown.

A single round-headed screw is carried near the inner end and upon the top of the cutter-carrying bracket. This screw is adapted to be engaged by the heads of the screws carried by the ratchet plate, as the screws come in engagement, they will ride over each other, but by reason of the cutter-carrying bracket being able to swing downward, the bracket will be forced downward, as the heads of screws pass over the head of screw 38, causing the cutter blade to move down for cutting a thread that is moved by the bristles of the brush in between the blades of the cutter.

A coil-spring is secured, at its lower end, to the bracket, and at its upper end to the outer end of a horizontal fixed pin. This spring exerts an upward pull upon the cutter-carrying bracket for holding the head or extension of the screw in the path of the heads of screws, so that at certain intervals, by reason of the heads of screws coming into engagement, the movable blade of the cutter is operated for causing the cutting action for severing the strand.