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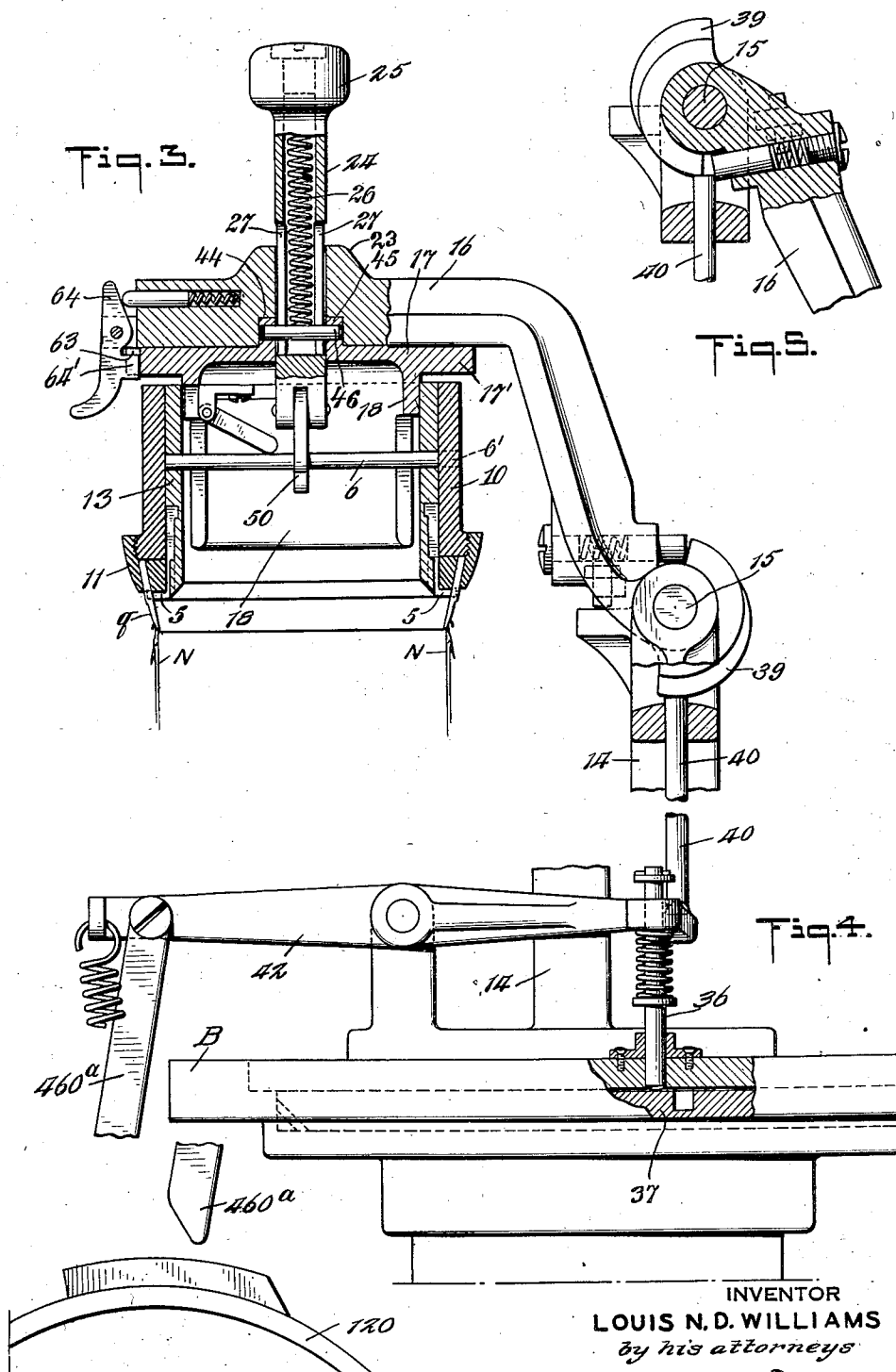
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TRANSFER MECHANISM FOR CIRCULAR KNITTING MACHINES

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## UNITED STATES PATENT OFFICE

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TRANSFER MECHANISM FOR CIRCULAR  
KNITTING MACHINES

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12 Claims. (Cl. 66—148)

In knitting seamless hosiery such as half hose in which the top of the stocking is knit of ribbed fabric and the remainder of the stocking of plain fabric, the ribbed top is frequently knit on a rib machine and then transferred to the needles of a plain machine to knit the remainder of the hose. In order to transfer the ribbed top to the needles of the second machine, it is placed on a point ring or transfer ring. This transfer ring contains a circle of quills on which the individual stitches are impaled, the ring being carried on a hinged arm or carrier fastened on the bedplate of the machine in such a manner that when the arm is swung over the needles the quills of the point ring will be inverted over the needles of the knitting machine. The quills are then brought down upon the needles and the transfer of the stitches is made.

This invention relates particularly to means to facilitate the placing of the stitches of a ribbed top of men's half hose upon the quills of the transfer ring. The means devised consist of so mounting the transfer ring carrier arm that when the arm is fully retracted from stitch transfer position the quills of the transfer ring will point up and lie in a horizontal plane. The impaling of the stitches upon the quills is further facilitated by mounting the transfer ring revolvably upon the carrier arm so that the ring may be rotated as the stitches are placed upon the quills.

The invention will be shown and described embodied in the well-known Scott & Williams type of seamless hosiery machine with revolving needle cylinder, but it will be understood, of course, that the invention can be applied to other types of circular machines.

In the drawings—

Figure 1 is an elevation view of a circular knitting machine to which my transfer mechanism is applied, showing the transfer ring in retracted position.

Figure 2 is a detailed fragmentary section view of a portion of the transfer ring used in my invention. The section is taken on line 2—2 of Figure 1.

Figure 3 is an elevation view, partly in section of a portion of the transfer mechanism shown in Fig. 1, but showing the transfer ring in inverted or stitch transfer position.

Figure 4 is an elevation view of the lower part of my transfer mechanism, adapted to be used in connection with the apparatus shown in Fig. 3.

Figure 5 is a detail fragmentary elevation view partly in section, showing the transfer ring carrier arm mounting and locking means.

Figure 6 is a plan view of the locking means used in my transfer mechanism.

Figure 7 is a cross section view of the transfer ring taken at right angles to the carrier arm and showing it mounted on the carrier arm.

In mechanism for transferring fabric from a point ring to the needles of a circular knitting machine, such for instance as shown in the patent to Louis N. D. Williams, 1,558,136, dated October 20, 1925, there is a carrier arm 16 pivoted on an axle 15 on a bracket 14 mounted on the bedplate B of the knitting machine, the reference numerals referring to corresponding parts in the present application. This arm 16 carries the point ring 10 with its quills *q*.

Appropriate mechanism may be provided to lock the needle cylinder in proper position for stitch transfer and against movement when, in the sequence of knitting operations, the time arrives to transfer a "ribbed top" from the transfer ring points or quills *q* to the knitting needles N. This mechanism may also include means to lock the transfer ring in retracted position (see Figure 1) when the transfer of the ribbed top has been effected, and the carrier arm has been fully retracted in order that the application of another ribbed top to the quills may take place. Other means may be provided to release this locking means during stitch transfer.

Mechanism for carrying out the above functions is described and claimed in the copending application of A. E. Page, Serial Number 361,418, filed May 8, 1929 patented May 26, 1931, No. 1,807,000. Another suitable mechanism for the same purposes is described and claimed in my copending application, Serial No. 355,765, filed April 17, 1929 patented December 20, 1932, No. 1,891,857.

Generally stated, these mechanisms consist of a thrust rod 460a, by which the mechanism may be controlled from the pattern drum 120. This thrust rod is pivotally connected to one end of an arm 42 pivoted above the bedplate of the machine. The other end of the arm 42 holds a depending locking pin 36 which cooperates with the bevel gear 37 of the needle cylinder to lock it at the proper time prior to ribbed-top transfer. This same end of the arm 42 also holds an upwardly extending pin 40 which cooperates with a cam 39 on the carrier arm hub to prevent inversion of the carrier arm 16 except when the needle cylinder is locked.

According to the present invention, as shown clearly in Figure 1 of the drawings, the operation of applying a "ribbed top" to the quills of

the transfer ring may be facilitated by pivotally mounting the carrier arm 16 about the pivot 15 in such a way that the carrier arm can be rotated 180° from stitch transfer position, in order that the axis of the transfer ring 10 may be vertical and that the quill points may be upwardly directed and lie in a horizontal plane when the transfer ring is fully retracted from transfer position. With the quills in this position the stitches of a ribbed top may be impaled upon them much more easily and more quickly than was possible in the prior structures.

To further facilitate the impaling of the stitches on the quills, I mount the transfer ring 10 rotatably on the carrier arm 16 as will now be described, in connection with the transfer ring construction.

Near the outer end of the carrier arm 16 a cross bar 22 is cast integrally with the carrier arm. At the point of intersection of this cross bar with the carrier arm is formed a centrally bored bearing boss 23 which accommodates the slotted hollow shaft 24 of a transfer ring operating handle 25 hereinafter described. This construction is plainly shown in Figure 1.

Referring particularly to Figures 1, 3 and 7, it will be noted that the transfer ring comprises an outer cylindrical transfer ring base 10 having a quill ring 11 on one end which holds the quills accurately in evenly spaced relation around the circumference of a circle concentric with the transfer ring base. Within and concentric with the transfer ring 10 is a stripper sleeve 13 having stripper elements 5, which are held in one end of the sleeve 13 and inserted between the quills *q* of the transfer ring. The stripper sleeve 13 forms a sliding fit within the transfer ring 10 so that when the sleeve is slid outwardly of the transfer ring the stripper elements 5 move with the sleeve to push the stitches off of the quills *q* and on to the knitting needles *N*. The transfer ring and the stripper sleeve are held assembled, the one within the other, by cross rods 6, 6', the ends of rod 6' being seated in the transfer ring 10 while the ends of rod 6 are seated in the stripper sleeve 13. In order that a limited amount of relative motion between the stripper sleeve 13 and transfer ring 10 may take place during the stitch stripping operation, slots 7 are provided in the sleeve adjacent the ends of the rod 6'.

To support the transfer ring a flanged, cylindrical cup-shaped pilot 17 is mounted at the intersection of the cross bar 22 with the carrier arm 16 and to accurately locate the pilot 17 on the carrier arm a hub 45 is formed on the outside and in the center of the bottom of the pilot 17. This hub fits in a recess 44 located in the carrier arm 16 at the intersection of the cross bar and provides an axis about which the pilot 17 may rotate. The pilot is held upon the carrier arm by two diametrically opposed lugs 59 located at the ends of the cross bar 22 each lug having a foot which is bent to overlie a bottom flange 17' laterally extending from the pilot. These feet hold the flange 17' loosely enough to allow the flange to slide beneath them as the pilot 17 is rotated together with the transfer ring 10.

The cylindrical cup portion 18 of the pilot 17 is adapted to fit snugly within the stripper sleeve 13 as the transfer ring is slid on the pilot in mounting the transfer ring on the carrier arm.

In order that the cross rods 6, 6' will not interfere with the placing of the transfer ring on the

pilot the cylindrical walls 18 of the pilot are slotted to accommodate the rods 6, 6'.

In order that the quills *q* will be in proper circumferential position to register with the needles when the transfer ring is inverted over the needles to effect the "ribbed top" transfer, I make in the flange 17' of the pilot a tapering nick 63 with which cooperates a spring pressed latch member 64 pivotally mounted on the end of the carrier arm and having a tapering tooth 64' which rides upon the periphery of the flange 17', as the pilot is rotated. At the proper moment the nick 63 will arrive under the latch member 64 and the tooth 64' will snap into the nick thereby fixedly locating the pilot in the desired circumferential position.

In order that the proper circumferential relation of the pilot 17 and the transfer ring 10 may be established and maintained, I provide a rectangular key 21 and keyway 20 on the pilot 17 and transfer ring 10 respectively. The keyway 20 is in the periphery of the transfer ring at the end opposite to the quills and cooperates with the key 21 screwed to the outside of the pilot at the flange 17'.

It should be noted that the hollow operating-handle shaft 24 contains a coil compression spring 26, one end of which bears against the inside of the handle 25 at the end of the shaft while the other end bears against a bearing pin 46 whose ends are retained in the pilot hub 45 and which extends through the diametrically opposed longitudinal slots 27 in the handle shaft.

From the drawings and foregoing description it is apparent that the rotation of the handle 25 will, through the agency of the bearing pin 46, rotate the pilot 17 when the latch member 64 is disengaged from the nick 63. Since the pilot 17 and the transfer ring 10 rotate as one on account of the key and keyway construction previously described, the machine operator as she impales the ribbed top stitches on the quills, can readily rotate the transfer ring by means of the handle 25.

In order to hold the transfer ring 10 on the carrier arm 16 as the carrier arm is rotated to invert the transfer ring over the needle cylinder preparatory to stitch transfer, a spring pressed hook 50 is pivoted on the end of the handle shaft 24. This hook grasps the cross rod 6 of the sleeve 13 and thereby holds on the carrier arm both the stripper sleeve and the transfer ring (which it will be recalled, is held to the stripper sleeve by the cross rod 6').

When the transfer ring has been inverted and the operation of transferring the stitches is to take place, the handle is depressed allowing the transfer ring to slide down over the needles. To hold the transfer ring at this time, at its proper height over the needles, hooks 33, pivoted to the end of the cross bar 22 of the carrier arm, catch stud pins 35 laterally projecting from the transfer ring and suspend the transfer ring at the proper height. The handle may now be further depressed so that the end shaft 24 engages the cross bar 6 of the stripper sleeve pushing the sleeve down while the transfer ring is held stationary in the hooks. Thus the stripper elements push the stitches off the quills and on to the needles. Upon release of the handle the force of the spring 26 returns the stripper element and transfer ring to their original positions. The carrier arm may then be retracted to the position of Figure 1 so that the transfer ring faces upwardly ready to have another ribbed top applied to its quills.

Many modifications and changes within the scope of my invention will occur to those skilled in the art, therefore I do not limit myself to the specific embodiment shown.

I claim:

1. Stitch transfer mechanism for a circular knitting machine, comprising a transfer ring adapted to cooperate with the needle cylinder of the knitting machine, a movable arm upon which said ring is rotatably mounted while in retracted position, and releasable means locking said ring against rotation about its own axis during the transfer of the stitches to the needles.

2. Stitch transfer mechanism for a circular knitting machine, comprising a movable arm, a transfer ring rotatably mounted thereon and movable by said arm from a retracted position into position for stitch transfer to the knitting needles, releasable means locking said ring against rotation on said arm during the transfer of the stitches to the needles, said locking means acting automatically to lock said ring in a certain circumferential position upon its rotation to such position.

3. Stitch transfer mechanism for a circular knitting machine, comprising an arm, a revoluble pilot mounted thereon, a transfer ring adapted to be removably mounted on said pilot in a certain circumferential position.

4. Stitch transfer mechanism for a circular knitting machine, comprising an arm, a revoluble pilot mounted thereon, a transfer ring adapted to be removably mounted on said pilot in a certain circumferential position, and a handle cooperating with said pilot whereby said pilot and transfer ring may be revolved.

5. Stitch transfer mechanism for a circular knitting machine, comprising an arm, a revoluble pilot mounted thereon, a transfer ring adapted to be removably mounted on said pilot in a certain circumferential position, and a handle cooperating with said pilot whereby said pilot and transfer ring may be revolved, said handle being depressible to effect stitch transfer from said transfer ring on to the knitting needles.

6. Stitch transfer mechanism for a circular knitting machine, an arm, a revoluble pilot mounted thereon, means to hold said pilot in a predetermined circumferential position upon said arm, a transfer ring removably mounted upon said pilot, means to hold said transfer ring in a predetermined circumferential position upon said pilot.

7. Mechanism for transferring stitches to the needles of a circular knitting machine, comprising a quilled transfer ring, supporting means upon which said ring is revolubly mounted while in retracted position, said supporting means being capable of moving the ring from a position in which the quills of the ring are inverted over the needle cylinder, to a retracted position in which

the axis of the transfer ring is vertical, and mechanism for transferring the stitches to the needles.

8. Mechanism for transferring stitches to the needles of a circular knitting machine, comprising a quilled transfer ring, supporting means upon which said ring is rotatably mounted, said supporting means carrying said ring from stitch transfer position to a retracted position in which stitches can be readily impaled upon the quills, said ring being capable of uninterrupted rotation through 360° in clockwise or counterclockwise direction while in retracted position, for the purpose of impaling stitches on the quills.

9. Mechanism for transferring stitches to the needles of a circular knitting machine, comprising a quilled transfer ring, supporting means upon which said ring is revolubly mounted, said supporting means being capable of moving said ring from a position in which the quills are inverted over the needle cylinder to a retracted position in which stitches may be impaled on the quills, and releasable means to lock said ring in a predetermined position against rotation about its own axis while the stitches are being transferred on to the needles.

10. Mechanism for transferring stitches to the needles of a circular knitting machine, comprising a quilled transfer ring, supporting means upon which said ring is revolubly mounted, said supporting means being capable of moving said ring from a position in which the quills are inverted over the needle cylinder to a retracted position in which the axis of the ring is vertical, and releasable means to automatically lock said ring in a predetermined position against rotation about its own axis, while the stitches are being transferred, and mechanism for transferring the stitches to the needles.

11. Mechanism for transferring stitches to the needles of a circular knitting machine, comprising a support, a quilled transfer ring mounted on said support, said support being movable from position for stitch transfer to the needle to a retracted position in which the stitches may be readily impaled on the quills, said ring being revoluble on said support while in retracted position, and mechanism for moving the terminal stitches of the fabric from the quills to the knitting needles.

12. Mechanism for transferring stitches to needles of a circular knitting machine, comprising a support, a quilled transfer ring mounted on said support, said support being movable from transfer position to a retracted position in which stitches may be readily impaled on said quills, said ring being revoluble while in retracted position, locking means holding said ring against rotation on said arm during the transfer of the stitches, and mechanism for moving the terminal stitches of the fabric from the quills to the needles.

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