Dec. 28, 1926. 1,612,684

L. N. D. WILLIAMS

MECHANISM FOR TRANSFERRING KNITTED WEBS TO THE NEEDLES OF KNITTING MACHINES

Filed Feb. 24, 1923 4 Sheets-Sheet 1

FIG. I.

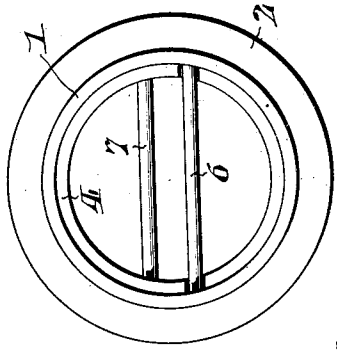


FIG. III.

WITNESSES:

John C. Bergner

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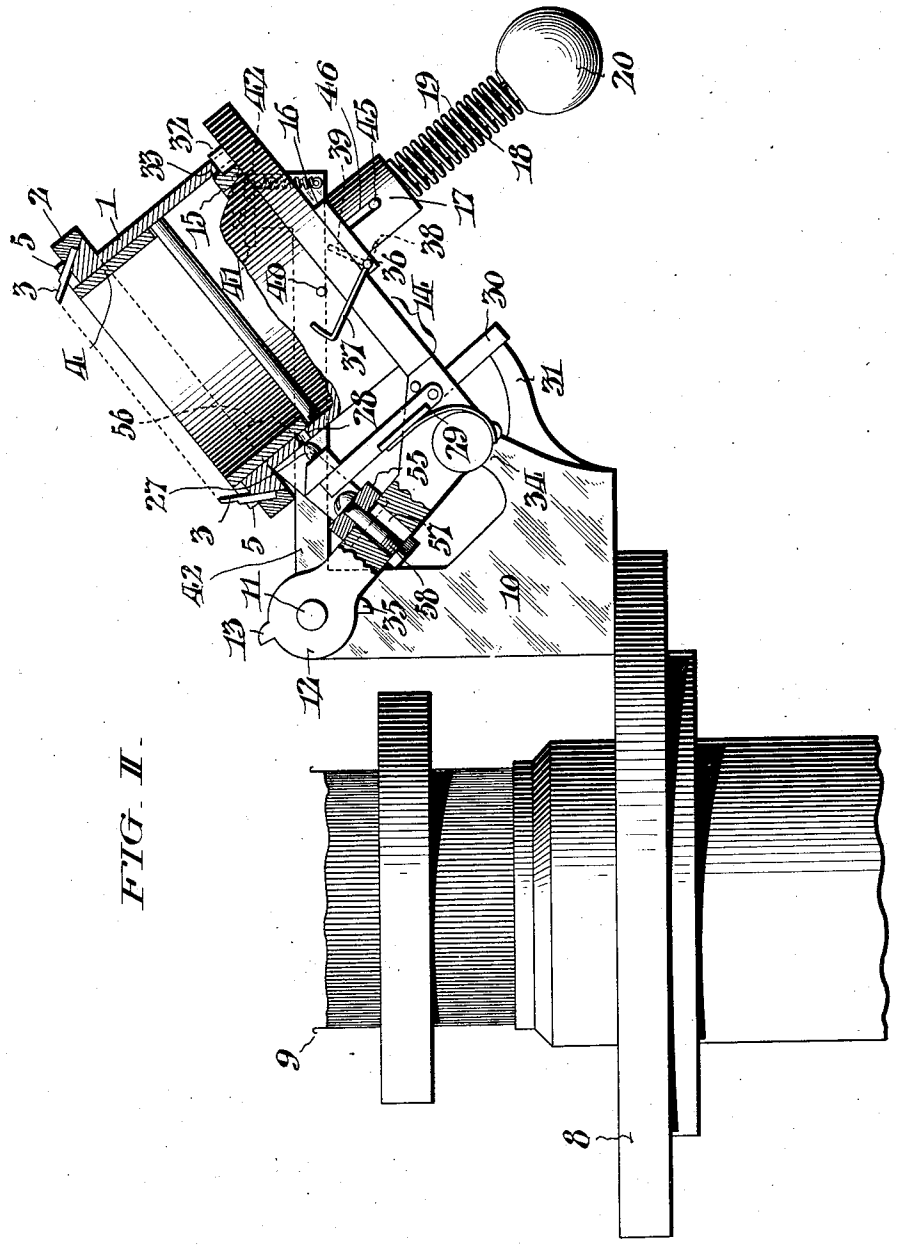


FIG. II.

WITNESSES:
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FIG. IV.

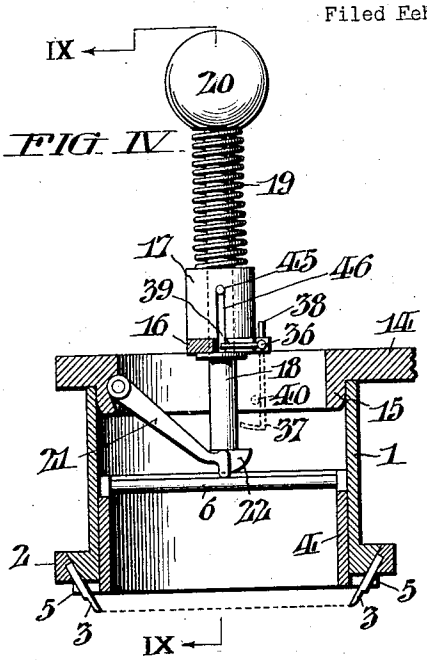


FIG. V.

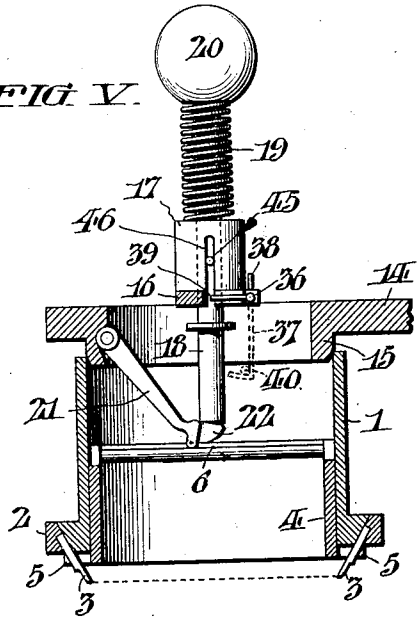


FIG. VI

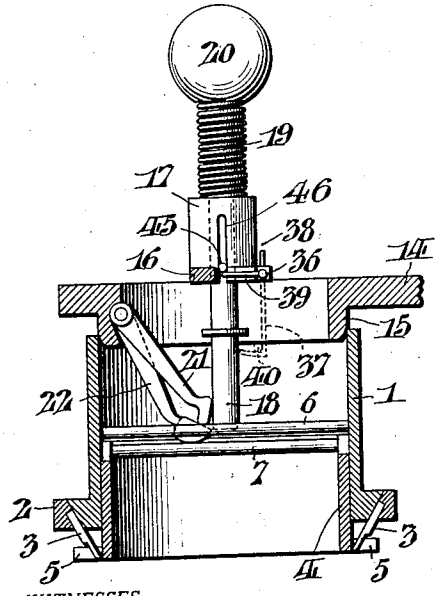
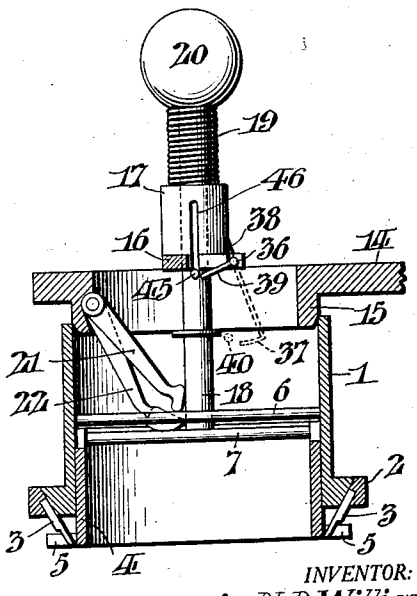


FIG. VII.



WITNESSES:

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Alfred E. Tschinger.

INVENTOR:

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MECHANISM FOR TRANSFERRING KNITTED WEBS TO THE NEEDLES OF KNITTING MACHINES

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FIG. VIII.

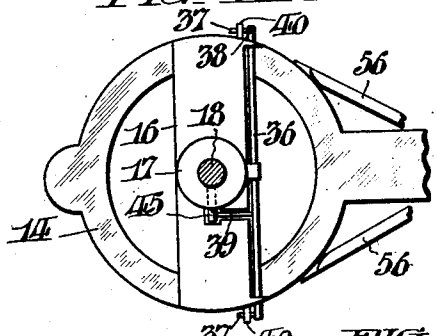


FIG. IX.

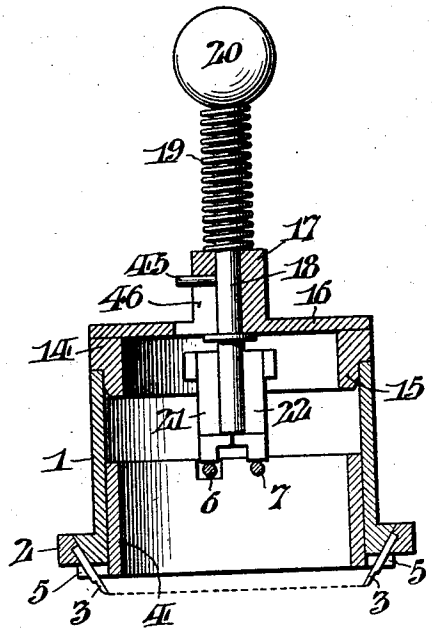


FIG. X.

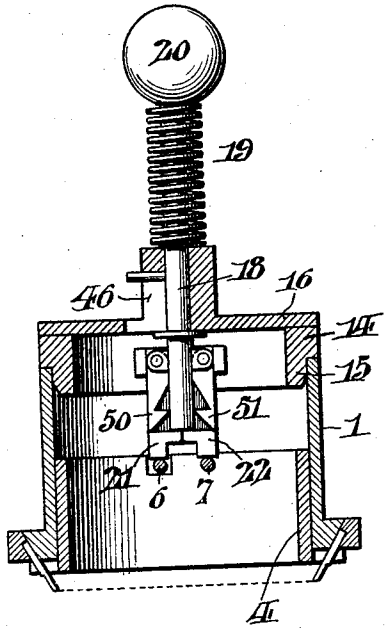
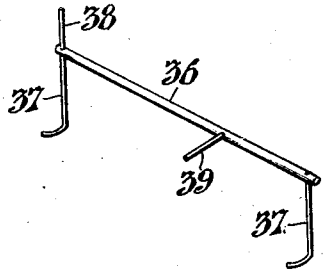


FIG. XI.



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Patented Dec. 28, 1926. 1,612,684

UNITED STATES PATENT OFFICE.

LOUIS N. D. WILLIAMS, OF OGONTZ, PENNSYLVANIA.

MECHANISM FOR TRANSFERRING KNITTED WEBS TO THE NEEDLES OF KNITTING MACHINES.

Application filed February 24, 1923. Serial No. 620,902.

This invention relates to mechanism for transferring the loops or stitches of a knitted web and is generally of the same nature as the invention set forth in my application for United States Letters Patent filed October 18, 1920, Serial No. 417,754, relating particularly to that type of transferring mechanism in which the loops or stitches are transferred from the points or quills of a transfer ring onto the needles of a knitting machine, as for example, in "running on" a ribbed top of a half hose preparatory to the knitting of the plain web of the leg and foot in continuation.

The purpose of my invention is to enable such transferring to be effected with absolute precision,—that is to say, without the possibility of stitch dropping, and without necessitating employment of skilled labor in its performance; and more specifically speaking, to provide a reliable means whereby all the manipulations necessary to perfect transfer of knitted fabric to the needles of a knitting machine may be automatically effected in a quick efficient manner by a simple movement on the part of the operator.

With this end in view, I provide a movable frame or carrier upon which a transfer device, with the knitted web upon it, is placed. This carrier is then moved so that the points or quills of the transfer device are directed toward the needles of the knitting machine and respectively brought into alignment therewith. Mechanism is provided by means of which the transfer device can thereafter be projected to a certain predetermined degree in order that the individual points or quills are brought into engagement with corresponding needles, after which the stitches are stripped or displaced from the points or quills and incidentally impaled upon the needles thus permitting the bare transfer device to be removed for re-use.

In the drawings, Fig. I is a top plan view of a transfer device of the type employed in connection with my invention;

Figure II is an illustration showing only those parts of a knitting machine essential to the present purpose, together with transferring mechanism constructed in accordance with my invention, said transfer device being represented partly in side view and partly in section, and the parts of the carrier mechanism in the positions occupied by them when the transfer device is applied thereto;

Figure III is a view similar to Figure II but showing the parts of the carrier mechanism in the positions occupied by them after the carrier has been moved into position to bring the points or quills of the transfer device into alignment with the needles of the knitting machine preparatory to the transfer of stitches from said points or quills onto the needles;

Figure IV is a vertical sectional view through the transfer device and its carrier with the various parts in the same positions as shown in Figure III;

Figure V is a view similar to Figure IV but illustrating the next step in the transferring operation, wherein the transfer device has been properly projected from its carrier to bring its points or quills into engagement with the needles;

Figure VI is a similar view illustrating the next step in the transferring process, wherein the stripping element of the transfer device is projected to displace the stitches from the points or quills and impale them upon the needles of the machine;

Figure VII illustrates the next step of operation, wherein the transfer device is released from its carrier;

Figure VIII is a sectional plan view of the mechanism shown in Figure IV;

Figure IX is a transverse vertical sectional view on the line IX—IX, Figure IV;

Figure X is a view similar to Figure IX but illustrating a certain modified type of construction, and

Figure XI is a perspective view of one of the elements of the mechanism best shown in Figure VIII.

Referring first to Figures I, II and III of the drawings, it will be noted that the transfer device which I use in connection with manipulating mechanism constructed in accordance with my invention comprises an annular or cylindrical tubular shell 1 provided with a circumferential head 2, from which project a series of stitch-receiving quills or points 3. Within the frame 1 is slidably mounted a stripper sleeve 4 from which extend radially series of strippers 5, each of the latter being disposed between a pair of adjoining quills 3. Ex-

tending transversely across the annular shell 1 from side to side is a rod or bar 6, and parallel thereto and normally in the same plane therewith, is a similar bar 7 which extends across the base of the stripper sleeve 4. The purpose of these bars 6 and 7 will be later described.

The knitting machine chosen for illustration herein, comprises a bed plate 8, and a cylinder with a circular series of needles 9. Projecting upwardly from the bed plate 8 is a bracket 10, which affords a bearing for the fulcrum shaft 11 and of a swingable carrier 14 that is of annular formation and affords a circular opening 14ª adapted to receive the transfer device. This opening 14ª is surrounded by an annular boss 15 which assists in the guidance of the transfer device when the latter is manipulated in the carrier as hereinafter explained. The opening 14ª of the carrier is spanned diametrically by a bridge member 16 with a central boss 17 that serves as a guide and bearing for a plunger rod 18. This plunger rod 18 is normally maintained in the retracted position, shown in Figs. II and III, by means of a coiled spring 19 which is interposed between the outer face of the boss 17 and a spherical hand knob 20 at the upper end of the rod 18.

Pivotally mounted within the annulus of the carrier 14 are a pair of swingable fingers 21 and 22, the free ends of which, when the transfer device is applied, bear respectively upon the transverse bars 6 and 7 and are in turn engaged by the inner end of the plunger rod 18, as shown in Figures IV and IX.

For the purpose of normally holding the transfer device to the carrier 14, I provide a locking means in the form of a yoke 25 pivoted at 26 to the carrier and having a pin 27 adapted to engage an aperture 28 in the shell of the transfer device. A spring 29 tends to urge the yoke 25 toward the transfer device, as shown in Figure III, so that the rounded end of the pin 27 is yieldingly maintained within the aperture 28. One side of the yoke 25 is extended as at 30 to engage a projection 31 of the bracket 10 when the carrier 14 is moved to the position shown in Figure II. As a result, the yoke 25 is automatically swung back to retract the pin 27 so that the transfer device may be readily applied to or removed from the carrier 14. Proper positioning of the transfer device upon the carrier 14 is facilitated by a lug 32 on said carrier adapted to engage a notch 33 in the upper edge of the shell 1.

When the carrier 14 is placed in the position shown in Figure II it bears against a stop 34 projecting from the bracket 10, so as to be held at an angle for convenient access in applying and removing the transfer device after the transfer device is applied, as shown in Figure II, the carrier 14 is swung by hand to the position shown in Figures III and IV, whereby said transfer device is brought down over the cylinder of the knitting machine and the points or quills individually aligned with the needles 9. The inward swing of the carrier 14 is limited by engagement of a lug 13 on its hub 12 with a projecting stop on the bracket 10.

In order to effect transfer of stitches from the quills 3 of the transfer device, to the needles 9 of the knitting machine after the various elements have been brought to the position shown in Figures III and IV, the transfer device is first bodily moved from the position shown in Figure IV to that shown in Figure V to engage the quills with the needles 9. The stripping element of the transfer ring is thereupon projected relative to the quills 3 to the position shown in Figure VI to displace the stitches from said quills and impale them upon the needles 9. These operations are effected simply by depressing the knob 20 on the outer end of the plunger rod 18. In the course of downward movement of the plunger rod 18 the swinging fingers 21 and 22 are simultaneously actuated to depress the bars 6 and 7, thus lowering the transfer device bodily to the position shown in Figure V. The transfer device is now dislodged from the carrier 14, but further downward movement thereof is temporarily prevented by retaining means which will be later described. During the last described action, the locking pin 27, by virtue of its rounded end, yields to being forced out of the aperture 28 in the shell 1 of the transfer device. When, as shown in Figure V, the shorter finger 21, by reason of its swing, has passed from the path of the plunger rod 18 there will be no further movement of the transverse bar 6 so that the shell 1 of the transfer device will remain stationary. Continued downward movement of the plunger 18, however, causes further depression of the longer finger 22 with consequent further depression of the transverse bar 7, and this serves to move the stripper sleeve 4 independently of the shell 1 to the position shown in Figure VI and results in stripping the stitches from the quills 3 and their transfer to the needles 9. Still further downward movement of the plunger rod 18 from the position shown in Figure VI to that shown in Figure VII serves to release the hereinbefore referred to means for temporarily retaining the transfer device, which means will now be described in detail.

Mounted in bearings (Figures VIII and XI) afforded by the bridge 16 of the carrier frame 14, is a transverse rock shaft 36 which is provided at each end with a hook 37, at one end only with a projecting finger 38, and

at a point intermediate its length with a finger 39. When the parts are in the position shown in Figure II, the hooks 37 are out of line with projections 40 which extend laterally from the opposite sides of the shell 1 of the transfer device. As the carrier 14 is swung inward to the position shown in Figure III, the projecting pin 38 on the rock shaft 36 encounters a spring-influenced trigger 41 pivotally mounted at the outer end of an arm 42 projecting from the bracket 10. Contact of the pin 38 with the trigger 41 so rocks the shaft 36 as to move the hooks 37 into active position relative to the projections 40 as shown in Figure III. When the transfer device is shifted by actuation of the plunger rod 18 from the position shown in Figure IV to that shown in Figure V, the projections 40 are arrested by the hooks 37, and further movement of the shell 1 of the transfer device toward the needles 9 is thereby temporarily prevented. This limitation of movement insures proper engagement between the points or quills 3 of the transfer device and the needles 9 so that the possibility of breakage or distortion either of said quills or the needles is greatly minimized.

In practice after the stitches have been transferred from the points or quills 3 of the transfer device to the needles 9 of the knitting machine, it is sometimes desirable that the carrier 14 be swung back empty to the position shown in Figure II so as to leave the transfer device upon the needle bed from which it may be afterwards removed by hand. In order that this may be effected, it is necessary that the hooks 37 be removed from beneath the projections 40 to release the device from the carrier 14. I accordingly provide the plunger rod 18 with a laterally projecting pin 45 which passes through a slot 46 in the boss 17 and is so positioned relative to the finger 39 on the rock shaft 36, that it will contact therewith when the plunger rod 18 reaches the position shown in Figure VI, at the completion of the stitch transferring operation, therefore, when the plunger is finally shifted to the position of Fig. VII, the hooks 37 will be swung entirely clear of the projections 40 to free the transfer device for the purpose explained.

Under certain conditions of practice, it might be desirable to maintain the transfer ring under the control of its carrier 14 so that when said carrier is swung back from the position shown in Figure III to that shown in Figure II after the completion of the stitch transferring operation, the empty transfer ring will be carried back. This may be accomplished by use of a construction such as illustrated in Figure X. This modified form of my invention is identical with the first described embodiment with the exception that the plunger rod 18 has freely pivoted to it a pair of notched gravity latches or hooks 50 and 51, the hook 50 cooperating with the transverse bar 6 of the annular shell 1 of the transfer ring, and the hook 51 with the transverse bar 7 of the stripper sleeve 4. With this construction, depression of the plunger rod 18 beyond the point necessary to actuate the parts for the stitch-transferring results in engagement of the hook 50 with the transverse bar 6, and the hook 51 with the transverse bar 7. Automatic return movement of the plunger rod 18 under action of the spring 19 results in withdrawal of the transfer device bodily from the position wherein its points or quills 3 are in engagement with the stitches and reseats it within the annular boss 15 of the carrier 14, the locking pin 27 slipping back automatically into the aperture 28 in the transfer device under urgence of the spring 29. Then when the carrier is swung back to the position shown in Figure III the empty transfer device may be removed from it by hand, and replaced by another with web upon it in readiness for a succeeding transfer operation.

For the purpose of sustaining the transfer device against lateral thrust tending to dislodge the same from the embossment 15 during the swinging of the carrier 14, I provide a bifurcated element such as indicated at 55 in the drawings. The extremities 56 of this element are, as best shown in Figure VIII, angularly directed, and their ends are appropriately configured for tangential contact with the outer surface of the tubular cylindrical shell 1 of the transfer device. In order that the element 55 may be adjusted to properly position the ends of its extremities to engage directly behind the flange head 2 of the transfer device, a slot 57 is provided in the carrier 14 for traverse of the securing clamp screw 58. By virtue of the support thus afforded, the transfer device cannot possibly become displaced from the embossment 15 during the swinging of the carrier 14 and the element 55 therefore assists in ensuring maintenance of the proper alignment of the quills 3 as they approach the needles 9. Moreover, by provision of the element 55, the transfer device cannot possibly drop from the carrier 14 if accidentally released by the operative before being properly engaged on the embossment 15 during mounting.

Having thus described my invention, I claim:

1. In mechanism of the character described, the combination of a transfer device, a carrier for supporting the device in transfer position relative to the needles of a knitting machine, and movable stops functional to limit independent motion of the transfer device in the carrier during stitch transfer.

2. In mechanism of the character described, the combination of a transfer de-

vice, a carrier for supporting the device in transfer position relative to the needles of a knitting machine, stops for limiting independent motion of the transfer device in the carrier during stitch transfer, and means for shifting the stops into and out of active position.

3. In mechanism of the character described, the combination of a transfer device, a carrier for the transfer device movable toward and away from the needles of a knitting machine, stops for limiting independent movement of the transfer device in the carrier during stitch transfer, and means for automatically retracting the limiting means to inactive position when the carrier is moved away from the needles.

4. In mechanism of the character described, the combination of a transfer device, a carrier for the transfer device movable toward and away from the needles of a knitting machine, stops for limiting independent movement of the transfer device in the carrier during stitch transfer, means for automatically shifting the limiting means to active position when the carrier is moved toward the needles and for retracting the limiting means when the carrier is moved away from the needles.

5. In mechanism of the character described, the combination of a transfer device, a carrier for the transfer device movable toward and away from the needles of a knitting machine, a pivoted stop for limiting independent movement of the transfer device in the carrier during stitch transfer and means for automatically swinging the stop to active position when the carrier is moved toward the needles, and for swinging the stop to inactive position when the carrier is moved away from the needles.

6. In mechanism of the character described, the combination of an annular transfer device, a carrier swingable to move the transfer device into and out of transfer relation with the cylinder of a knitting machine, a rock shaft journalled on the carrier, stops on the shaft adapted to engage projections at opposite sides of the transfer device to limit independent motion of the latter in the carrier during stitch transfer, and a trigger for engaging a finger on the rock shaft to automatically swing the hooks into active position as the carrier is moved toward the needle cylinder, and again to shift the hooks to inactive position when the carrier is withdrawn from the cylinder.

7. In mechanism of the character described the combination of a transfer device, a carrier therefor movable toward and away from the needles of a knitting machine, stops for limiting independent motion of the transfer device in the carrier during stitch transfer, and means whereby the stops are subsequently disengaged from the transfer device to permit the device to remain on the needles when the carrier is retracted.

8. In mechanism of the character described, the combination of a transfer device including a quill member and a relatively movable stripper member, a carrier for supporting the device in transfer position relative to the needles of a knitting machine, and a stop for limiting motion of the quill member in the carrier during alignment of the quills with the needles and for subsequently restraining movement of the quill member when the stripper member is independently shifted to transfer the fabric stitches to the needles.

9. In mechanism of the character described, the combination of a transfer device including a quill member and a relatively movable stripper member, a carrier for supporting the device in transfer position relative to the needles of a knitting machine, and means whereby the quill member is first projected relative to the carrier to align its quills with the needles, and the stripper member thereafter to transfer the fabric stitches to the needles.

10. In mechanism of the character described, the combination of a transfer device including a quill member and a relatively movable stripper member, a carrier for supporting the device in transfer position relative to the needles of a knitting machine, the pair of fingers pivoted upon the carrier and coordinated respectively with the quill holder and the stripper, and means capable of selecting between the fingers to cause the quill member of the transfer device to be first projected relative to the carrier to align its quills with the needles of the knitting machine, and the stripper thereafter to transfer the stitches to said needles.

11. In mechanism of the character described, the combination of a transfer device comprising quill member and a relatively movable stripper member, a carrier for supporting the device in transfer position relative to the needles of a knitting machine, a pair of fingers one shorter than the other coordinated respectively with the quill member and the stripper member, and a plunger operative upon said fingers whereby both are at first simultaneously engaged to project the holder and the stripper together to align the quills when continued motion of the plunger effects only the longer finger to shift the stripper to transfer the fabric stitches to the needles.

12. In mechanism of the character described the combination of a transfer device, a swingable carrier for supporting said device in transfer position relative to the needles of a knitting machine, means whereby said transfer device is normally latched on—and may be bodily moved relative to—the

carrier in effecting stitch transfer, and means for automatically restoring the transfer device to its normal position on the carrier after completion of the transfer operation.

13. In mechanism of the character described the combination of a transfer device, a carrier for supporting the device in transfer position relative to the needles of a knitting machine, a plunger adapted to move the transfer device in the carrier in effecting stitch transfer; gravity hooks mounted to the plunger and adapted upon full movement of the plunger, to engage the transfer device, and a spring operative upon the plunger to restore the transfer device to its original position in the carrier upon completion of the transfer operation.

14. In mechanism of the character described the combination of a transfer device comprising a quill member, and a relatively movable stripper member, a carrier for supporting the device in transfer position relative to the needles of a knitting machine, actuating means supported by the carrier successively operative upon the quill member and the stripper member to project the quills first into alignment with the needles, and the stripper, thereafter, to transfer the fabric stitches to said needles, instrumentalities carried by the actuating means aforesaid for engaging the quill member and the stripper member to automatically restore them to their original positions in the carrier after the completion of the transfer operation.

15. In mechanism of the character described, the combination of a transfer device, a carrier for the transfer device movable toward and away from the needles of a knitting machine, and means for locking the device to its carrier, said lock automatically engaging the device when the carrier is moved toward the needles, and automatically disengaging the device when the carrier is moved away from the needles.

16. In mechanism of the character described, the combination of a transfer device, a carrier for the transfer device movable toward and away from the needles of a knitting machine, and means for locking the device to its carrier, said locking means yielding to enforce dislodgement when the transfer device is moved independently relative to the carrier during stitch transfer.

17. In mechanism of the character described, the combination of a transfer device having a tubular shell, a carrier for the transfer device swingable toward and away from the needles of a knitting machine, said carrier having an embossment over which the tubular shell is adapted to engage, and means for sustaining the transfer device against lateral thrust tending to dislodge the same from the embossment aforesaid during the swinging of the carrier.

18. In mechanism of the character described, the combination of a transfer device having a tubular shell, a carrier for the transfer device swingable toward and away from the needles of a knitting machine, said carrier having an embossment over which one end of the tubular shell is adapted to engage, and means for engaging the opposite end of the shell to sustain the transfer device against lateral thrust tending to dislodge the same from the embossment aforesaid during swinging of the carrier.

19. In mechanism of the character described, the combination of a transfer device having a tubular cylindrical shell, a carrier for the transfer device swingable toward and away from the needles of a knitting machine, said carrier having an embossment over which one end of the tubular shell is adapted to engage, and a bifurcated element with its extremities adapted for tangential contact with the tubular shell at its opposite end to sustain the transfer device against lateral thrust tending to dislodge the same from the embossment aforesaid during swinging of the carrier.

20. In mechanism of the character described, the combination of a transfer device including a tubular cylindrical shell having a flange head serving as a holder for stitch quills, a carrier for the transfer device swingable toward and away from the needles of a knitting machine, said carrier having an embossment over which the base of the tubular shell is adapted to engage, and a bifurcated element with its extremities adapted for tangential contact with the tubular shell and at the same time engaging behind the flange head of the same to sustain the transfer device against lateral thrust tending to dislodge it from the embossment aforesaid during the swinging of the carrier.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 14th day of February, 1923.

LOUIS N. D. WILLIAMS.