

May 20, 1969

E. R. ZIEMBA

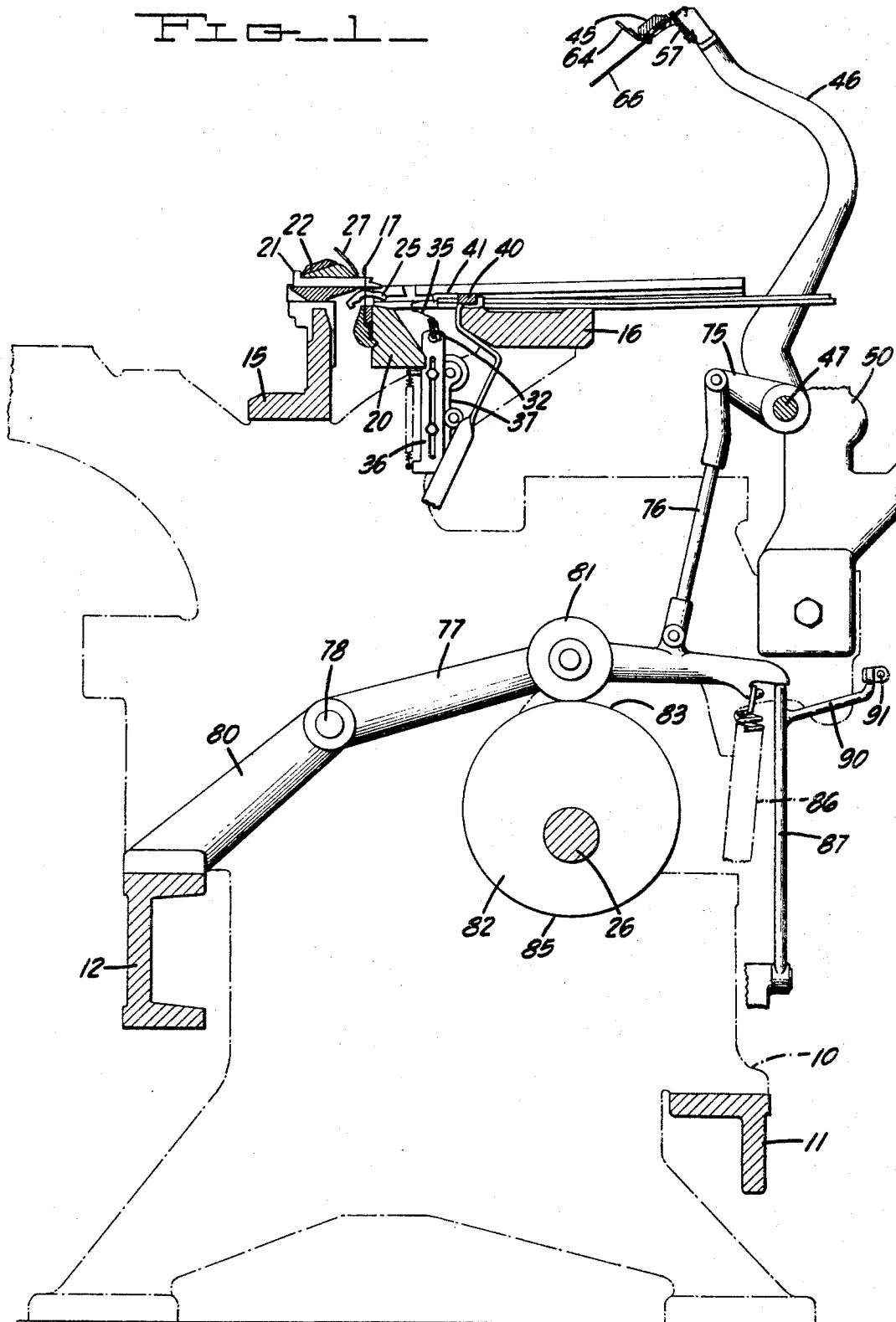
3,444,705

FABRIC POSITIONING MECHANISM FOR KNITTING MACHINES

Filed Dec. 8, 1967

Sheet 1 of 3

FIG. 1



May 20, 1969

E. R. ZIEMBA

3,444,705

FABRIC POSITIONING MECHANISM FOR KNITTING MACHINES

Filed Dec. 8, 1967

Sheet 2 of 3

FIG. 2

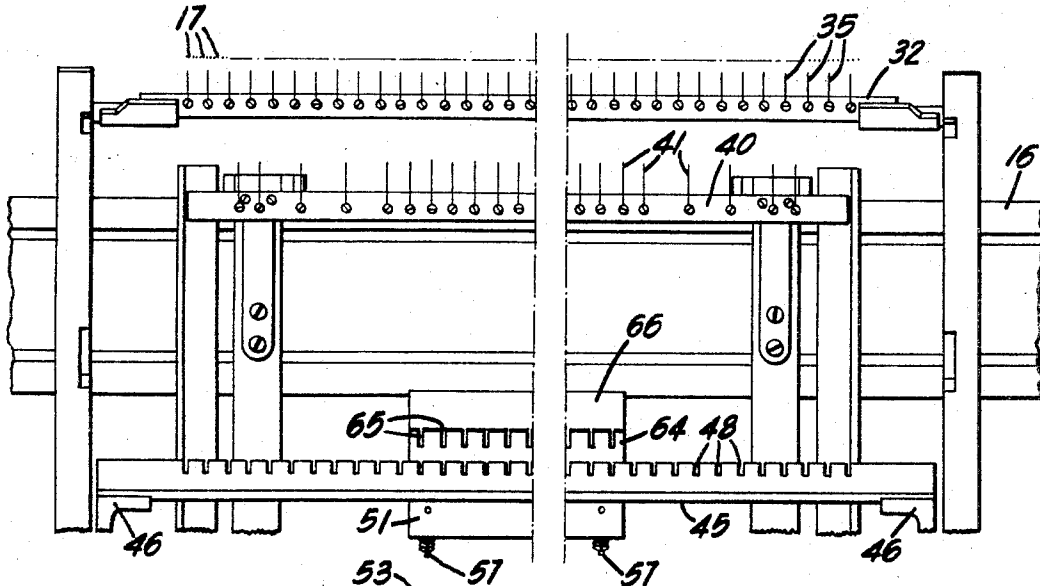


FIG. 3

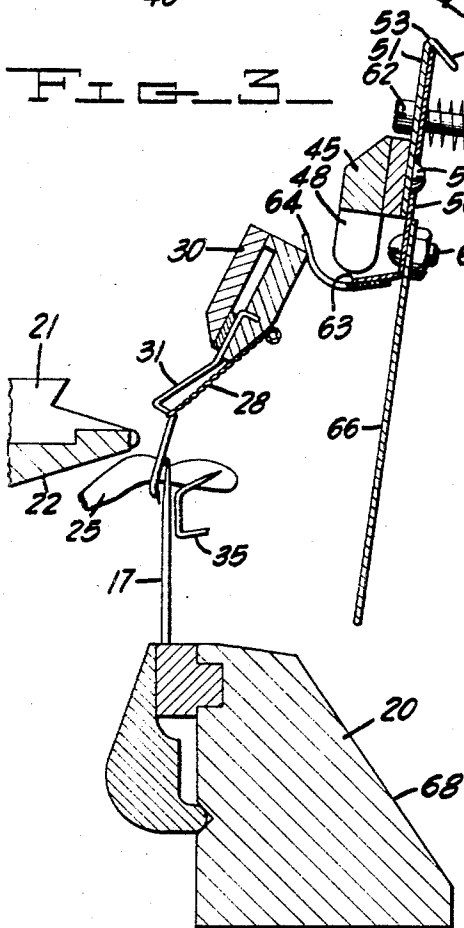
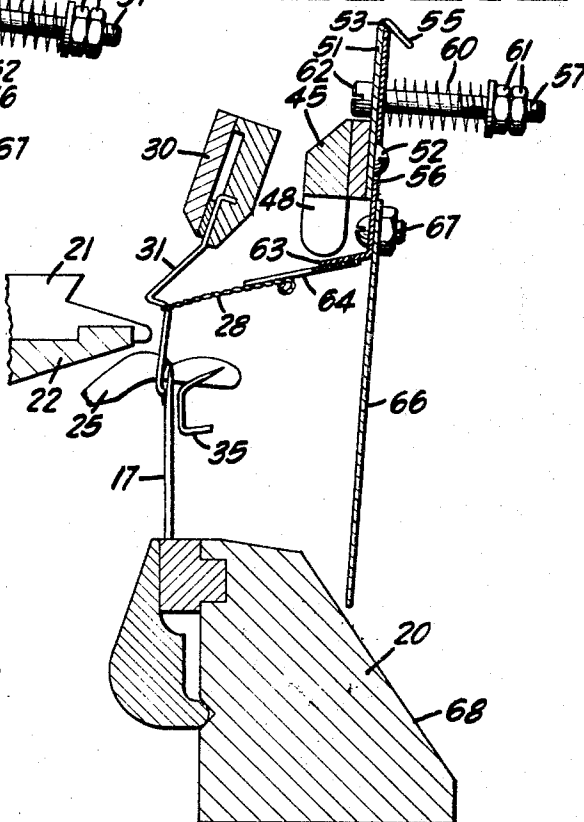


FIG. 4



**May 20, 1969**

**E. R. ZIEMBA**

**3,444,705**

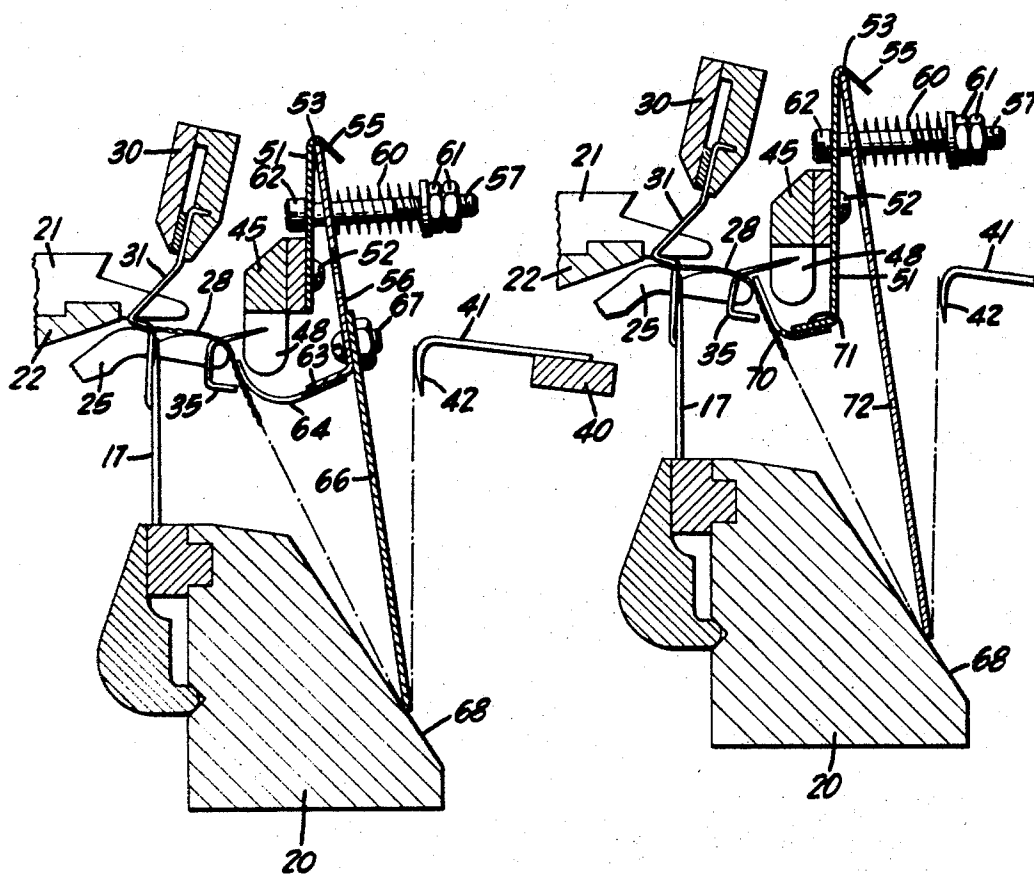
# FABRIC POSITIONING MECHANISM FOR KNITTING MACHINES

Filed Dec. 8, 1967

Sheet 3 of 3

FIG. 5.

FI-6-



1

2

3,444,705

## FABRIC POSITIONING MECHANISM FOR KNITTING MACHINES

Edward R. Ziembra, Reading, Mass., assignor, by mesne assignments, to North American Rockwell Corporation, Pittsburgh, Pa., a corporation of Delaware

Filed Dec. 8, 1967, Ser. No. 689,171

Int. Cl. D04b 15/04, 9/40, 27/34

U.S. Cl. 66—148

8 Claims

### ABSTRACT OF THE DISCLOSURE

Means for positioning a preformed welt during transfer of the welt to the needles of a straight bar or full-fashioned knitting machine for attachment of the fabric draw-off means of the machine thereto.

### BACKGROUND OF THE INVENTION

#### Field of the invention

The invention is specifically directed to fabric positioning or deflecting means in a full-fashioned knitting machine having means for transferring a preformed welt to the needles of the machine and first and second fabric draw-off bars for engaging and tensioning the welt and body fabric subsequently knitted thereto, the deflecting means including a first member for deflecting the welt into position to be engaged by the first draw-off bar and a second member for deflecting the free end of the welt out of the path of the second draw-off bar during its movement to engage the welt.

#### Description of the prior art

In full-fashioned knitting machines adapted to knit flat selvage body fabric portions to preformed rib welts as required to form outerwear garments such as sweaters and the like, the welts are initially placed on transfer bars and the latter are mounted on and carried by conveyor means to the knitting sections or heads of the machine. The transfer bars are then automatically removed from the conveyor means by a second means which is operated to transport the transfer bars to the needles of the knitting heads and the transfer bars and needles are then operated to transfer the welts from the transfer bars to the needles generally in the manner set forth in British Patent No. 995,091, published Apr. 15, 1964. Immediately following transfer of the welts to the needles of the knitting heads draw-off means is manually attached to the welts, or the draw-off means is automatically attached to the welts during the transfer operation, to draw off and tension the welts and body fabrics subsequently knitted thereto.

In one form of draw-off mechanism developed for automatic attachment to the preformed welts, such mechanism being of the type disclosed in the application of Herbert E. Haehnel and Erich M. Kaese, Ser. No. 469,415, filed July 6, 1965, now Patent No. 3,390,550 and assigned to the assignee of the instant application, a first draw-off hook bar is attached to the welt to apply tension to the welt before the transfer bar has completed its transferring operation, and a second draw-off bar is then attached to the tensioned welt before the knitting of the body fabric to the welt is started. Thereafter both the first and second draw-off bars act to draw off the welt and body fabric, as the latter is knitted, until the first bar reaches a stopped position. The welt is then disengaged from the first draw-off bar as the second draw-off bar continues to draw off the welt and body fabric in the manner set forth in said application. Normally the welts are positioned during the transfer operation so that attachment of both draw-off bars will result in the application of substantially uniform

tension to the welt and body fabric subsequently knitted thereto. However, in some instances very short welts tend to wrinkle excessively or the free ends of such short welts initially tend to curl upwardly along the transfer bar and then curl upwardly over the sinkers and away from the first draw-off bar and in consequence the first draw-off bar may miss the welt or only partially engage the welt. This in turn results in defective attachment of the second draw-off means to the welt and the application of uneven tension to the fabric. Also it sometimes occurs that the free ends of the long welts overlie the second draw-off bar which results in interference between the second bar and the welt and causes the defective attachment of the second bar to the welt. The instant application is directed to an improvement to the mechanism of said Patent No. 3,390,550 which serves to solve the above noted problems.

#### Summary of the invention

Briefly summarized the invention resides in the provision of means cooperating with the draw-off mechanism of a full-fashioned knitting machine said means including a first member which is movable to engage and press a preformed welt transferred to the needles of the machine into position to be engaged by first and second draw-off bars of the draw-off means, a second member for deflecting the free end of the welt to prevent interference between the welt and second draw-off means during movement of the latter for attachment to the welt, a support on which the first and second members are mounted and means for operating the support to move the first and second members to their welt pressing and welt deflecting positions.

#### Brief description of the drawings

FIG. 1 is a cross-sectional view taken transversely through a full-fashioned knitting machine having mechanism according to the instant invention applied thereto;

FIG. 2 is a plan view of a portion of one of the knitting sections of the machine as viewed from the right of FIG. 1;

FIG. 3 is a cross-sectional view on an enlarged scale of a portion of FIG. 1 but with the parts shown in different operating positions relative to FIG. 1;

FIGS. 4 and 5 are views similar to FIG. 3 but with the parts shown in different positions relatively to FIG. 3; and

FIG. 6 is a view similar to FIG. 5 but showing a modified form of the invention.

Referring to FIG. 1 of the drawings there is shown a portion of a multisection full-fashioned knitting machine for knitting fabric blanks, such as for sweaters and the like, the machine including a center frame 10, a front beam 11, back beam 12, a center bed 15 and a front bed or table 16. The beams and beds are secured to the center frames and to end frames (not shown) to form the usual framework of the machine. Each knitting section of the machine has a row of spring bearded needles 17 which are carried in a needle bar 20 and which cooperate with sinkers 21, slidably mounted in slots in a sinkerhead 22 secured to the center bed 15, and knockover bits 25. The needles, sinkers and knockover bits are conventionally operated by lever means and cams (not shown) on a camshaft 26 to form yarn, fed thereto by yarn carriers, one of which is shown at 27, into loops of the fabric blanks. The carriers 27 are secured to carrier rods which are reciprocated back and forth across the row of needles 17 by driving devices such as friction boxes or the like which are in turn reciprocated by coulier mechanism (not shown) in a conventional manner.

Each knitting section of the machine is also provided with means for transferring a preformed welt such as shown at 28 to the needles such means including a bar 30 having points 31 on which the preformed welt is initially

3

placed. The bar 30 is operated from a position at the front of the machine to engage the points with the needles as shown in FIG. 3. The bar 30 and points 31 are then operated with the needles 17, sinkers 21 and knockover bits 25 to transfer the welt 28 from the points to the needles as the needles and points rise from the positions of FIG. 5. The bar 30 is then returned to its position at the front of the machine. The bar 30 and the mechanism for operating the bar to transfer welts to the needles 17 form no part of the instant invention and may be of the type disclosed in said British Patent No. 955,091, or other similar types conventionally provided on full-fashioned knitting machines.

Each knitting section is also provided with draw-off means, for attachment to the preformed welt, of the type disclosed in said Patent No. 3,390,550. Such means serves to draw-off and tension the welt and fabric subsequently knitted thereto and includes a first draw-off bar 32 having hooks 35. The bar 32 is carried on brackets 36 mounted on levers 37 which are pivotally mounted for movement from an inactive position in which the hooks 35 are remote from the needles to a position in which the hooks are adjacent the needles for attachment to the welt as hereinafter set forth. The draw-off means also includes a second draw-off bar 40 having hooks 41 with downwardly turned ends 42 (FIG. 5). The second bar 40 is movable from a position adjacent the front of the machine to an intermediate position and the bar is then movable from the latter position to a position adjacent the needles to engage the hooks 41 with the fabric. With the exception of the time of operation of the bars 32 and 40 as hereinafter set forth the structure and operation of the bars and operating means therefor is the same as disclosed in said patent.

Prior to operation of the bar 30 to transfer a welt to the needles 17, the bar 32 is operated from an inactive position of FIG. 1 to a position in which the hooks 35 thereon are adjacent the needles 17 with the tips of the hooks below the upper surfaces of the knockover bits as shown in FIGS. 3 and 4 and the bar 40 is moved to its intermediate position as shown in FIGS. 1 and 5. The bar 30 is then operated to engage the points 31 with the needles 17 and the needles and points are lowered to the positions of FIG. 5 with the welt positioned between the sinkers, which are partially advanced at this time, and the knockover bits. The bar 32 and hooks 35 are then operated to engage and tension the welt. As the needles 17 and points 31 rise the welt is transferred from the points to the needles. While the bar 30 is being returned to the front of the machine and before the machine operates to knit the first course of the body fabric to the welt, the second draw-off bar 40 is moved from its intermediate position to its position adjacent the needles 17, the bar 40 also being raised slightly at this time and then lowered to engage the hooks 41 in the tensioned welt intermediate the hooks 35 and the needles. Thereafter during the subsequent formation of the body fabric both bars 32 and 40 are operated in the draw-off direction to tension the fabric until the bar 32 reaches its inactive position. The bar 40 then continues to draw off the welt and body fabric and disengages the welt from the hooks 35 in the same manner set forth in connection with the formation of a turned welt in said Patent No. 3,390,550.

In most instances the welt is normally positioned during the transfer operation so that attachment of both bars 32 and 40 to the welt will result in the application of a uniform tension to the welt and body fabric knitted thereto. However, many of the short welts tend to wrinkle excessively or the free ends of such short welts initially tend to curl upwardly along the back of the transfer bar 30. Under these conditions although the starting course of the welt will be correctly positioned between the sinkers and knockover bits during the transfer operation, this tendency to wrinkle and curl sometimes results in the inadvertent engagement of the needles in the welt as the

4

needles rise to complete the transfer operation or causes defective engagement of the hooks 35 with the welt and this in turn results in the defective attachment of the hooks 42 in the welt and the application of uneven tension by the bar 40 and hooks 42 to the welt and body fabric subsequently knitted thereto. Also when the free end of a long welt overlies the hooks 41 in the intermediate position of the second draw-off bar 40 during the transfer operation and does not drop off the hooks when the hooks are moved to fabric engaging position, interference between the hooks and welt very often causes the defective attachment of the hooks in the welt and results in the application of uneven tension to the welt and fabric knitted thereto.

In order to correctly position the welt during transfer to the needles 17 for engagement by the hooks of the first and second draw-off bars the welt is deflected into engagement with the knockover bits and the free end, when it overlies the hooks of the second bar, is positively deflected from the path of the hooks of the second bar before the first and second bars are operated to engage the hooks thereof with the welt. The means for this purpose according to the instant invention includes a support bar 45 having its opposite ends secured to arms 46 fixed on a shaft 47 (FIGS. 1 and 2). The shaft 47 is mounted for oscillating movement in brackets 50 secured to the center frames 10 (FIG. 1) to move the arms 46 and bar 45 between a raised inactive position and a lowered active position by means and for purposes hereinafter set forth. The lower edge of the bar 45 is provided with slots 48 which are aligned with the points 35 in the bar 32, the slots providing clearance for the points when the bar 45 is in active position and the bar 32 is operated to engage the welt as above set forth. A first plate member 51, secured to the bar 45 by screws 52, has an angularly extending ear portion 55 defining a seat 53 for receiving the upper edge of a second plate 56. The plate 56 is supported on bolts 57 extending through apertures in the plate 56 and the plate 51. Springs 60 mounted on the bolts 57 between the plate 56 and adjustable lock nuts 61 threadably carried on the free ends of the bolts maintain head portions 62 of the bolts in abutting engagement with one face of the plate 51 and normally maintains the plate 56 in abutting engagement with the other face of the plate 51. The springs 60 also permit pivotal movement of the plate 56 relative to the plate 51 about the fulcrum defined by the upper edge of plate 56 and seat 53 of plate 51, in the manner and for purposes hereinafter set forth.

The plate 56 has a transversely extending flange portion 63 to which is secured, as by adhesive or other form of fastening means, a first deflecting member 64 of flexible material such as rubber or the like. The member 64 is provided with slots 65 (FIG. 2) which are aligned with the slots 48 in the bar 45 to provide clearance for the hooks 35 during their movement into engagement with the welt. A second deflecting member 66 of a relatively rigid material such as steel, is secured to the plate 56 by bolts 67. The lower end of the member 66 is adapted to engage an angularly disposed surface 68 on the needle bar 20 to pivotally move the plate 56 and member 66 relative to the plate 51 as above set forth.

Alternately, a deflecting member 70, similar to the member 64 and having slots similar to the slots 65 in the latter member, may be secured to a flange 71 formed on the lower end of the fixed plate 51 and the plate 56 and member 66 combined to form a single deflecting member 72, as shown in FIG. 6. The member 72 is also mounted on the bolts 57 and is adapted to be pivotally moved in the seat 53 formed in the plate 51 when the lower end thereof engages the surface 68 on the needle bar in the same manner as plate 56 and member 66.

The means for oscillating the shaft 47 to move the arms 46 and bar 45 between inactive and active positions includes an arm 75 also fixed on the shaft 46. The free

end of the arm 75 is pivotally connected by a link 76 to a lever 77 having one end pivoted on a shaft 78 carried in a bracket 80 secured to the back beam 12. The lever 77 rotatably carries a roller 81 for following engagement with a cam 82 on the camshaft 26. The cam 82 has a high portion 83 for operating the lever 77 to move the arms 46 to the raised inactive position of FIG. 1 and a low portion 85 for controlling the movement of the lever to move the arms to active positions under the influence of a spring 86 connected between the lever and a fixed part of the machine. The lever 77 is normally supported at the level of the high portion 82 of the cam 80 on the upper free end of a lever 87 pivotally mounted on a fixed part of the machine. The lever 87 has an arm 90 adapted to be engaged and operated by a rod 91 under the control of the pattern means of the machine (not shown) to move the lever 87 from beneath the lever 77 to permit the movement of the lever 77 to move the arms 46 and bar 45 between raised inactive and lowered active positions.

During operation of the machine to move the bar 30 to transfer the welt to the needles 17 the bar 32 is operated to move the hooks 35 to their positions of FIG. 4 adjacent the needles and the rod 91 is operated to move the lever 87 from beneath the lever 77 thereby permitting the latter to follow the cam 82 from the high portion 83 to the low portion thereof to move the arms 46, support 45 and plates thereon from inactive positions to active positions. The timing of the movements of the bar 30 and the arms 46 and bar 45 is such that as the bar 30 reaches the position of FIG. 3, the member 64 on the bar 45 engages the upper end of the bar 30. As the bars 30 and 45 then continue their downward movements the member 64 wipes downwardly along the back of the bar 30 to engage the welt if it has curled upwardly along the bar 30 as above noted, and then deflect it downwardly toward the knockover bits 25 to a substantially horizontal position indicated in FIG. 4. As the bars 30 and 45 continue their downward movement to the positions of FIG. 5 the member 64 presses the welt against the knockover bits and then wipes the welt outwardly and downwardly over the noses of the knockover bits to smooth out and hold the welt. It will be noted that when the first deflecting member 64 is mounted on the plate 56 as in FIG. 5, it is also moved outwardly as the second deflecting member 66 rides down the inclined surface 68 on the needle bar 20, to further accentuate the outward wiping action of the first member on the welt. On the other hand when the first deflecting member is mounted on the fixed plate 51 as in FIG. 6, the outward wiping action on the welt is caused by the flexing action of the member. When the free end of the welt overlies the hooks 41 in the intermediate position of the bar 40, as the bar 45 is moved to its active position, the second deflecting member 66 of FIG. 5 or the second deflecting member 72 of FIG. 6 engages and deflects the welt downwardly between the needle bar and hooks 41 as the members engage the surface 68 on the needle bar 30, as shown in these figures. The free end of the welt at this time is either completely out of the path of the hooks 41 or is in such position that it will not interfere with the subsequent movement of the hooks to engage the welt.

At approximately the time the bar 45 reaches its position of FIG. 5 to complete the wiping action of the first deflecting member 64, or member 70, on the welt the hooks 35 are operated to engage and tension the welt, this operation of the hooks being triggered by the movement of the bar 45 to active position in the same manner set forth in said Patent No. 3,390,550 in connection with the operation of the hooks 45 to engage the welt by the movement of the bar 105 to active position.

Immediately following movement of the bar 30 and points 31 and bar 45 to the positions of FIG. 5, the sinkers 21 are moved outwardly to hold the welt as the points 31 and needles are raised to complete the transfer of the welt from the points to the needles. The bars 30

and 45 are then returned to inactive positions and the bar 40 is operated to engage the points 41 thereon with the welts between the hooks 35 and the needles as hereinbefore set forth.

It is believed to be obvious that the action of the first deflecting member to deflect and position the welt for engagement by the hooks 35 of the first draw-off bar 32 is the same for both long and short welts transferred to the needles of the machine. Also where the welt to be transferred to the needles is of sufficient length to initially overlie the hooks 41 of the second draw-off bar during the transfer operation, such welt will be deflected out of the path of the hooks 41 by the second deflecting member 66, or 72, when the hooks are moved to engage the welts as hereinbefore set forth.

Of course, the improvements specifically shown and described, by which the above described results are obtained, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. In a straight knitting machine having a needle bar with a row of needles operable through knitting and fashioning cycles of the machine, sinkers and knock-over bits cooperating with said needles during said knitting and fashioning cycles, a transfer bar having points and movable from inactive position to an active position in which said points cooperate with said needles during a fashioning cycle of the machine to transfer a preformed welt on said points to said needles, a first draw-off bar having hooks, said first draw-off bar being movable to move said hooks thereon to engage and tension said welt during transfer of said welt to said needles, and a second draw-off bar having hooks and adapted to be moved from a position remote from said needles to a position adjacent said needles to engage said hooks thereon with said welt to tension said welt while said first draw-off bar continues to tension said welt, the improvement including a first member, support means for said member, and means for operating said support means from inactive position to an active position to move said first member to engage and deflect a welt on said transfer bar into engagement with said knockover bits for engagement by said hooks of said first draw-off bar during transfer of said welt from said transfer bar to said needles.

2. In a machine according to claim 1 in which said first member is of a flexible material, and there is means for pivotally mounting said first member on said support means.

3. In a machine according to claim 2 in which there is a second member on said support means, and said second member is movable during operation of said support means to said active position to deflect the free end of said welt downwardly between said hooks on said second draw-off means and said needle bar when said welt overlies said hooks during transfer of said welt from said transfer bar to said needles.

4. In a machine according to claim 3 in which there is means for mounting said second member on said pivotal mounting means for said first member.

5. In a machine according to claim 1, in which said first member is of a flexible material, and there is means for mounting said first member in fixed position on said support means.

6. In a machine according to claim 5 in which there is a second member on said support means, and said second member is movable during operation of said support means to said active position to deflect the free end of said welt between said hooks on said second draw-off member when said welt overlies said hooks during transfer of said welt from said transfer bar to said needles.

7. In a machine according to claim 6 in which there is means on said support means for mounting said second member for pivotal movement relative to said first member.

8. A machine according to claim 1 in which said machine includes a camshaft, and said means for operating said support means between said inactive and active positions includes a lever, a cam on said camshaft for operating said lever, and a supporting member for holding said lever in inactive position to maintain said support means in said inactive position, said supporting member being movable to release said lever to permit movement of said support means to said active position during transfer of said welt to said needles.

5

10

## References Cited

## UNITED STATES PATENTS

2,314,742	3/1943	Start et al. ....	66—148
3,390,550	7/1968	Haehnel et al. ....	66—96

Wm. CARTER REYNOLDS, *Primary Examiner.*

U.S. Cl. X.R.

66—149