

May 28, 1968

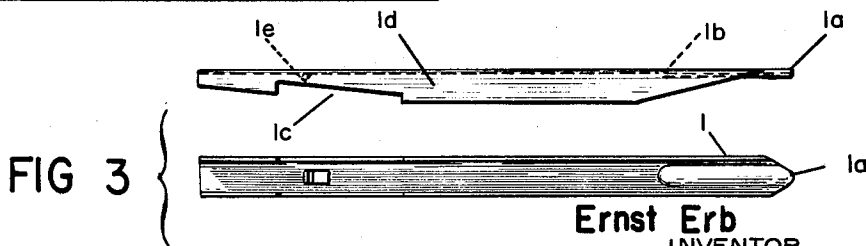
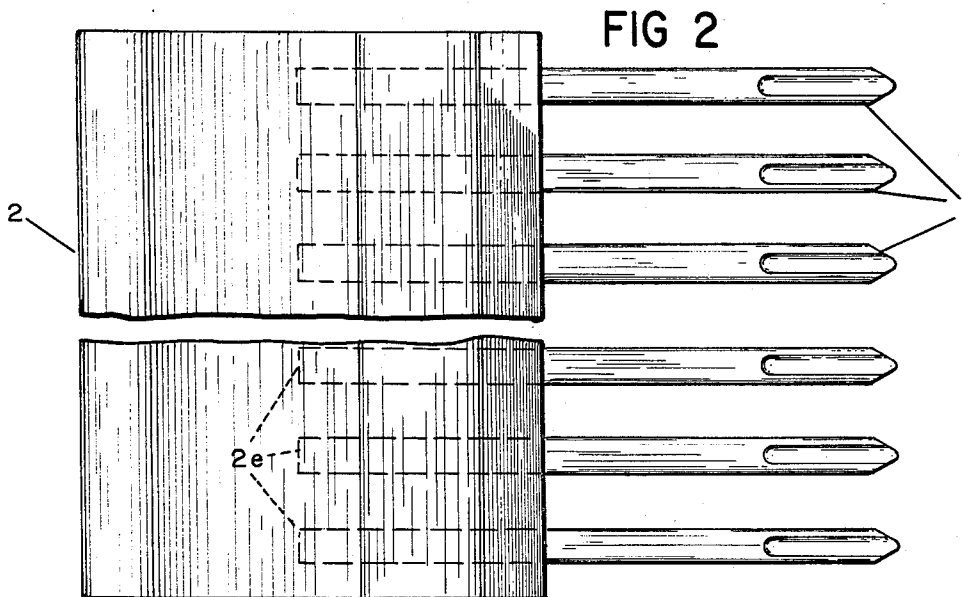
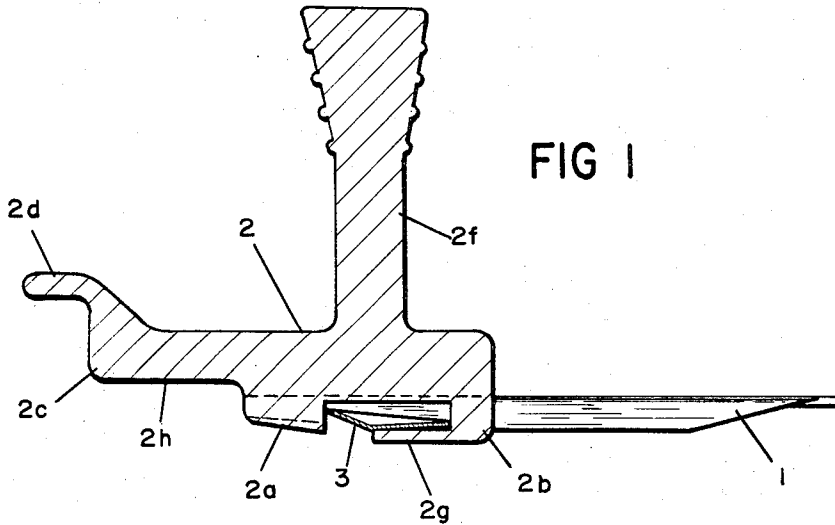
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3,385,083

DEVICE FOR TRANSFERRING STITCHES Laterally and
Transversely on Manual Knitting Machines

Filed July 21, 1965

3 Sheets-Sheet 1



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DEVICE FOR TRANSFERRING STITCHES Laterally and
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3 Sheets-Sheet 2

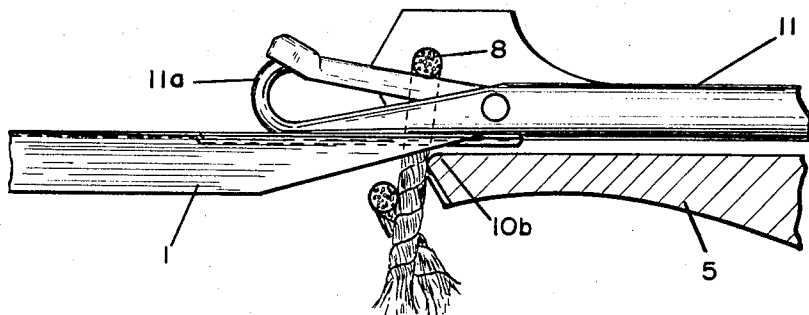


FIG 4

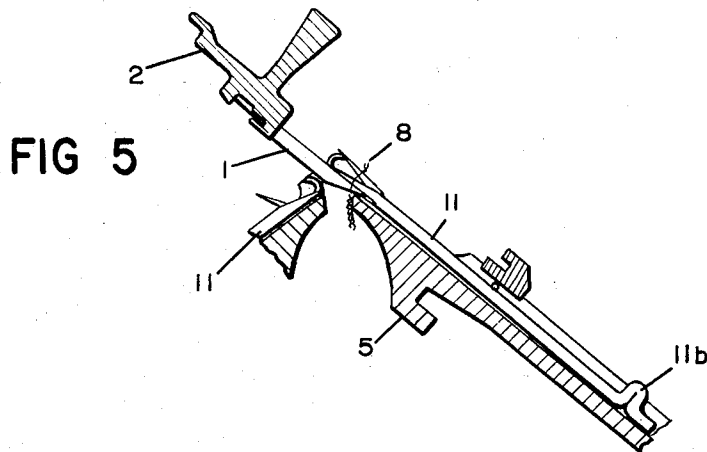


FIG 5

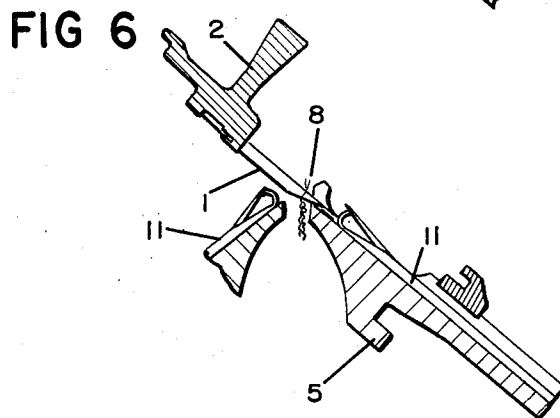


FIG 6

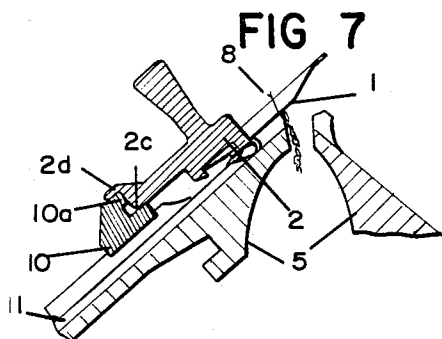


FIG 7

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FIG 8

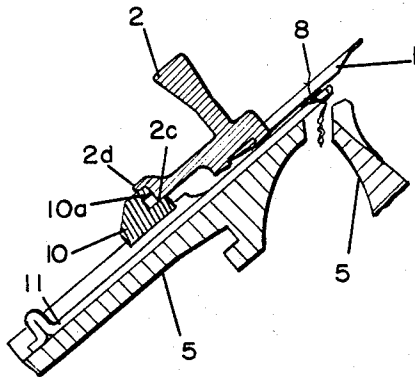


FIG 9

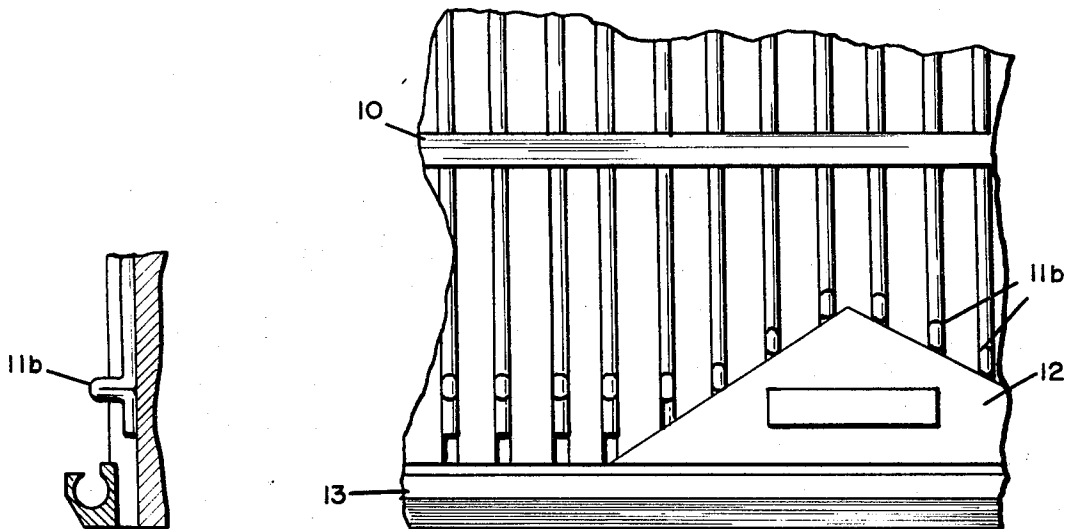
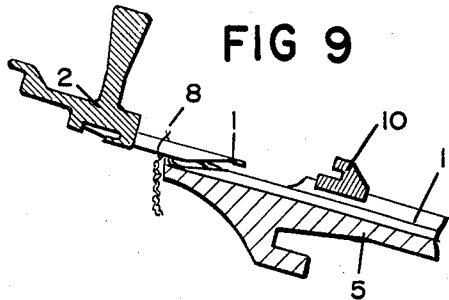


FIG 10

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3,385,083

DEVICE FOR TRANSFERRING STITCHES LATERALLY AND TRANSVERSELY ON MANUAL KNITTING MACHINES

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Claims priority, application Switzerland, July 22, 1964, 9,631/64

3 Claims. (Cl. 66—90)

ABSTRACT OF THE DISCLOSURE

A device for the transfer of stitches laterally or transversely which is secure in operation. A body member with a profiled part has releasably mounted therein spaced parallel stitch transfer elements. The transfer elements are made of thin sheet steel of U-shaped cross-section having recesses at the sides. The profiled part is provided with two spaced slotted strips to receive the transfer elements and one of such strips is provided with an inwardly directed nose to receive a locking strip to releasably lock the transfer elements in the body member. Each transfer element has a rounded point and a concavity at the back adjacent such point to secure accurate cooperation with the needle in transferring the stitch and also the U-shaped construction allows secure cooperation with the needle to receive the stitch.

Devices are known for industrial straight- and circular knitters by means of which stitches from the rear needle bed can be transferred to needles of the front needle bed or vice versa. These devices are very complicated and expensive, since special needles are necessary. Also, special locks are necessary which effect the cooperation of the rear and the front needles.

Also, tickler combs are known, by means of which entire groups of stitches can be mechanically transferred laterally. Also, for manually operated knitting machines small tickler combs are known, by means of which a number of stitches can be manually transferred together. Manual tickler combs with one to six needles are usual. For combs of more than ten needles, for instance for reversing the top of a stocking, quite some experience is necessary, because first of all all the eyes of the tickler-needles have to be hooked into the same number of needle hooks. Then, the needles are pulled upwards with the combs so far until the stitches are positioned behind the needle tongues in order to push the needles with the comb downward again, so that the stitches come above the tongues onto the shaft of the tickler needles. Then the comb has to be removed from the needle hooks in order that the transfer of the stitches onto the desired needles can be facilitated.

For the transfer the eyes of the tickler needles have to be hooked again into the corresponding needle hooks in order to accomplish by pulling forward said needles and overturning of the tickler combs that its stitches are brought into the hooks of said needles. All of these manipulations require long experience and besides, often tickler needles are broken off at their eyes, or the hooking

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of all tickler needles is not accomplished perfectly on all needles so that those stitches fall off. It has been the dream of any knitter since the invention of the double bed machine by Lamb to find a possibility to accomplish the transfer of entire or partial rows of stitches laterally onto the neighboring needles or transversally onto the needles of the opposite needle bed. So far, most of the efforts were not successful by way of the well known tickler needles because until now nothing besides the expensive and complicated industrial mechanisms has been devised which would be rational for the home industry or for household machines.

The object of the present invention is to provide a novel process and device for the transfer of stitches in a lateral as well as in a transverse movement which is very secure in its function and which device can be built inexpensively in order to be utilized for home-work and household machines.

A further object of the invention is to accomplish the following:

(1) When making a 1:1 transfer in plain, the stitches of the front needle bed can be transferred together to the free needles of the rear bed;

(2) On the Lamb double-bed machine, double purl effects in stocking stitch can be obtained by virtue of the fact that alternate stitches of the entire last row are transferred to the front or rear needle bed for the rows corresponding to the desired pattern to be stitched in purl or plain;

(3) Open-work patterns can be knitted in stocking stitch, or other "cable"-type patterns knitted in other stitches in an economical manner;

(4) Decreasing or increasing of a piece of knitting from the center outwards can be effected economically.

In the accompanying drawings, an embodiment of the invention is illustrated.

FIGURE 1 illustrates a cross-section through the mechanism;

FIGURE 2 is a plan view of the mechanism;

FIGURE 3 shows a transfer element in elevation, plan and section;

FIGURE 4 is an enlarged illustration of a transfer element showing it inserted into the stitch beneath the needle head;

FIGURES 5 to 9 illustrate details of a method in accordance with the invention; and

FIGURE 10 illustrates a needle cam in partial plan and partial end view at the moment when the needles are being advanced.

FIGURES 1 and 2 illustrate a stitch transfer mechanism indicated generally at 2 having a profiled part 2f made for example of aluminium. At the underside of this profiled part there are two spaced and mutually parallel strips 2a and 2b. In these strips, there are several parallel slots 2e (FIGURE 2) disposed perpendicularly in relation to the longitudinal axes of the strips, into which slots stitch transfer elements 1 are inserted.

The transfer elements 1 (FIGURE 3) are constituted substantially by thin-walled U-section pieces, the forward parts of which are in the form of a rounded tip 1a. The two side portions of the U-section piece each contain a recess 1c near the rear end of the transfer elements. If the elements 1 are now so inserted in the slots 2e of the

component 2f, that the recesses 1c come to be situated in the space between the two strips 2a and 2b, then the elements 1 can be anchored to the component 2f with the aid of locking strips 3. The locking strips 3, preferably made of a springy material such as sheet steel, are so inserted between the elements 1 and a nose 2g provided on the bottom end of the strip 2b, that they locate the transfer elements 1. At the rear part of the transfer elements 1, a tongue 1e (FIGURE 3) projects from above into the space bounded by the two portions 1d, this tongue very considerably simplifying the removal of the elements 1 from the components 2. In other words, if an ordinary transfer tool needle is inserted in the rear end of the elements 1, as fitted in the profiled component, then the strip 3 is first of all forced slightly downwards by the tip of said needle so that the left-hand edge (FIGURE 3) of the recess 1c can pass over the edge of the locking strip 3. As soon as the tip of the transfer tool needle hits the nose 1e of the transfer element 1, the transfer element 1 is forced out of the slot 2e of the profiled component 2.

In a preferred embodiment, the transfer elements 1 are constituted by thin sheet steel. Their tips are rounded so that they can easily be introduced into the stitches. Again, at least at the forward part near the tip, the elements 1 should be as smooth as possible. The back parts of the transfer elements exhibit an inwardly-directed concavity 1b at the forward part in the neighborhood of the tip 1a, the function of which will be apparent from the ensuing description. The profiled component 2f also exhibits a horizontal arm 2h extending from the upper part of the strip 2a, the end of which arm has the form of a projecting lip 2d. Beneath the lip 2d a shoulder 2c is created.

The application of the stitch transfer mechanism 2 will now be described making reference to FIGURES 4 to 10.

FIGURE 4 illustrates the head or hook 11a of a needle 11 located in the channel of a needle bed 5 and situated in the incomplect cast-off position. On the closed tongue of the needle head 11a, a stitch 8 is suspended ready for transfer to the opposite needle bed. First of all, the transfer elements 1 are fed into the stitches 8 beneath the needles 11 (FIGURE 4) as illustrated on a larger scale in FIGURE 4. The needles can be placed in the incomplete cast-off position using a slide which has facility for special adjustment of the cam, or using a needle rule. In this position, the stitches are still held at their full opening by the full cross-section of the needle shank so that the transfer elements 1 can easily and surely be introduced into the stitches. By means of the concavity 1b in the transfer elements already mentioned, definite centering of the transfer elements with the needles is achieved. Since the tips 1a of the elements 1 are rounded and polished, the elements 1 pass easily through the stitches and cannot hit the threads.

In contrast to what happens with conventional methods the transfer elements now remain in the inserted position but the corresponding needles 11 are retracted in one move by means of a needle cam 12. To do this, the inclined face of the cam 12 is passed along beneath the butts 11b of the needles 11, moving the latter one after the other in the desired direction (FIGURE 10). The stitches on the closed tongues are cast off as this happens so that they hang suspended on the transfer elements 1 (FIGURE 6).

FIGURE 5 shows the mechanism inserted beneath the needles of the front bed. FIGURE 6 illustrates a situation obtaining after the needles 11 have been retracted by a needle cam 12 and also shows how the stitches 8 are suspended upon the transfer elements. For transferring the stitches 8 to the needles of the rear bed, the entire mechanism 2 is now simply tilted over the needle heads of the rear bed, as shown in FIGURE 7. When this happens, the portions 1d of the transfer elements 1 drop

down to enclose the heads of the needles 11 at either side. The profile 2 of the mechanism then rests upon the needle bed and abuts the slide rail 10 with its shoulder 2c. This position is taken up at both sides of the machine independently of whether transfer is being made from the front bed to the rear or vice versa. The needles 11 are then moved upwards using the cam 12, until they have passed through the stitches, this is shown in FIGURE 8. The needle cam may be made of synthetic material. It is guided directly upon the needle bed, being passed along the upper slide rail 10 for retracting the needles, and along the lower slide rail 13 for advancing them (as seen in FIGURE 10).

To effect lateral transfer, the procedure is as described earlier in relation to FIGURES 4 to 6, where cast-off from the needles 11 takes place. The mechanism, with the stitches, is then lifted and shifted sideways to be set down upon the desired needles in such a manner that the hollow undersides of the transfer elements 1 are situated above the needle hooks 11a (FIGURE 9). These needles are then advanced by means of a needle cam in the same manner (FIGURE 10). The transfer mechanism can then be withdrawn again.

In this new method, transfer of the stitches both transversely and laterally is so reliable that it is not even necessary to pay any special regard to the needle tongues. It does not matter whether these latter are open or closed before the elements 1 are placed over the needle heads, provided that the preceding withdrawal parts of the stitch cam are up. Where repeated pieces of knitting in open-work patterns or other, closed patterns, are being produced the same mechanism can be used, only the appropriate or necessary elements being employed. The elements 1 which are not needed, can quite easily be removed.

As described above the following operations are executed successively:

- (1) First of all the stitches to be transferred are placed in an unfinished cast-off position on their needles;
- (2) The transfer mechanism has its appropriate elements inserted beneath those needle heads in the first bed onto which the stitches are to be carried;
- (3) The stitches are then completely cast off by retraction of the needles, so that they are now carried upon transfer elements;
- (4) The mechanism, with the picked up stitches, is then placed upon the needle heads to which the transfer is to be made;
- (5) These needles are then advanced until their heads have passed through the stitches they are to receive;
- (6) The mechanism is then withdrawn backwards from these stitches in order for knitting to be continued.

The mechanism has chiefly been described in relation to double-bed machines, but the method is also claimed in application to lateral transfer on single-bed machines.

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that various changes may be made in the process, form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its material advantages, the form hereinbefore described and illustrated in the drawings being merely a preferred embodiment thereof.

I claim:

1. A device for transferring stitches laterally or transversely comprising a body member, spaced parallel stitch transfer elements on said member, said elements being spaced at intervals corresponding to the intervals between the needles in the needle beds, said elements being made of thin sheet steel having recesses at their sides, said body member having a profiled part, two spaced slotted strips to receive said transfer elements and one of said strips having an inward pointing nose for accommodating a spring locking strip to lock said element to said body member.

2. A device as set forth in claim 1 wherein said elements are U-shaped in cross-section.

3. A device as set forth in claim 1 wherein each of said transfer elements has a rounded point and a concavity at the back adjacent said point to guide said element on the back of the needle.

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10	ROBERT R. MACKEY, <i>Acting Primary Examiner.</i>		
	MERVIN STEIN, <i>Examiner.</i>		
	R. FELDBAUM, <i>Assistant Examiner.</i>		