

[54] **PROCESS AND DEVICE FOR DOUBLING
ON A DOUBLE NEEDLE BED, RIB END
KNITTING MACHINE**

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66/148

[56] **References Cited**

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[57] **ABSTRACT**

A process and apparatus for knitting a rib end on a greater width of needles than that of the panel to which said rib end is destined, and to automatically bring said rib end to the width of said panel during the transfer of said rib end to a magazine reed.

4 Claims, 11 Drawing Figures

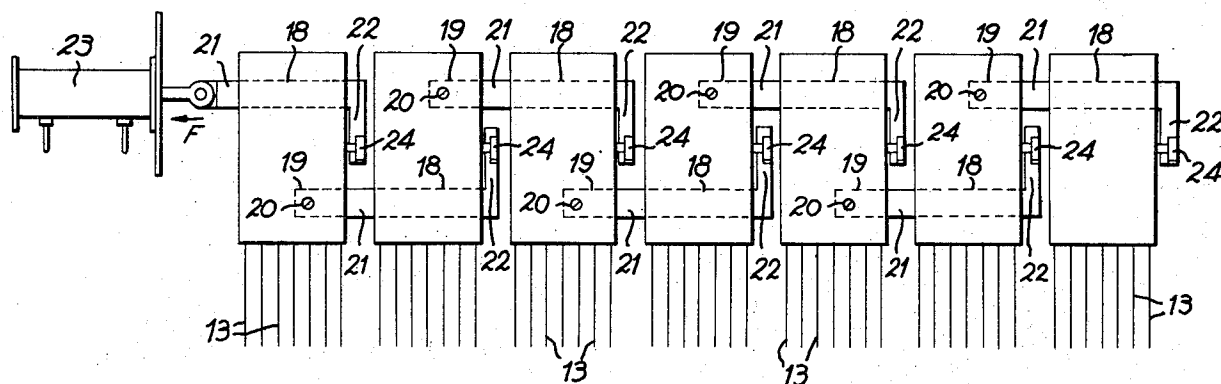
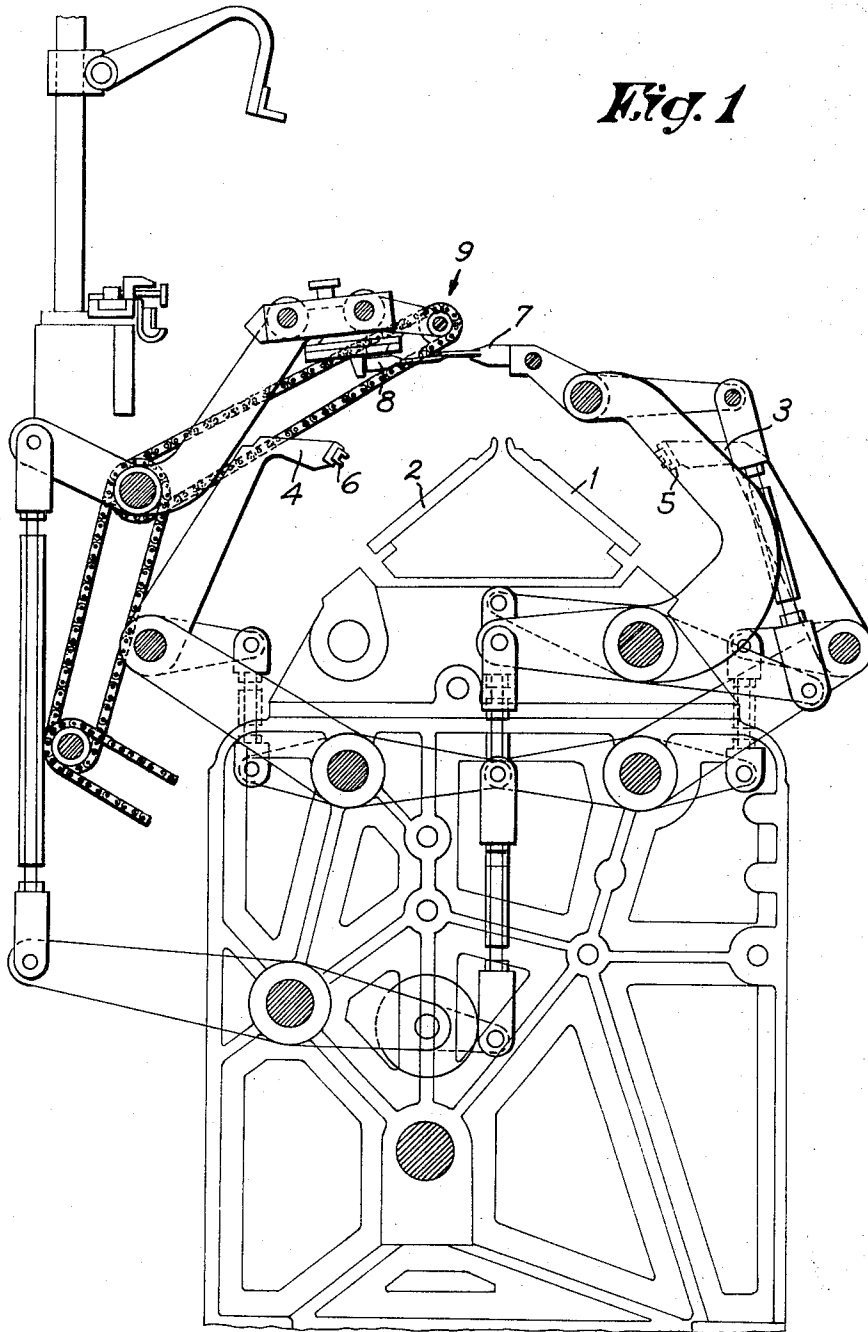
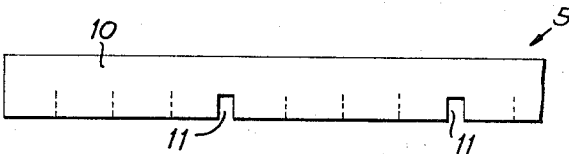
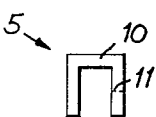
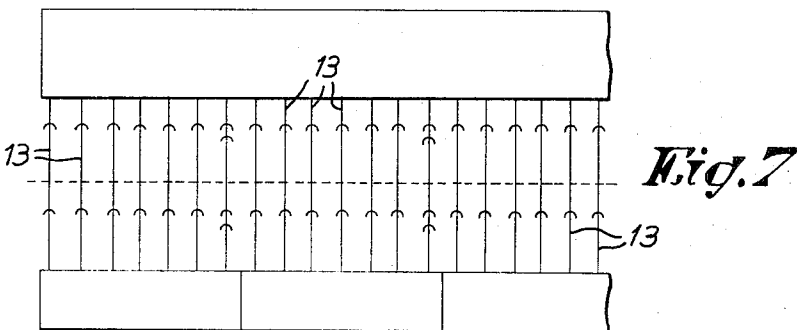
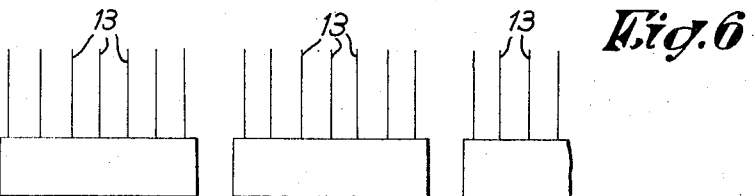
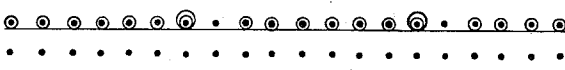
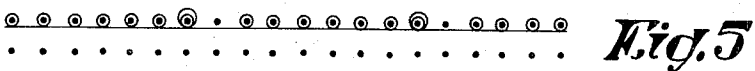
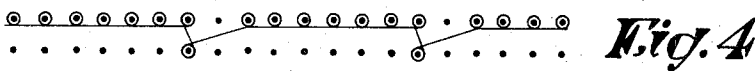
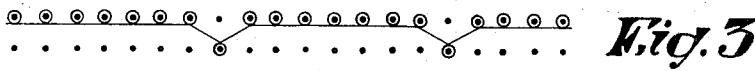
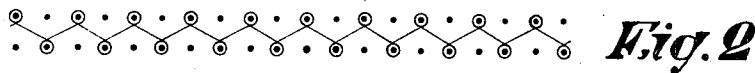


Fig. 1





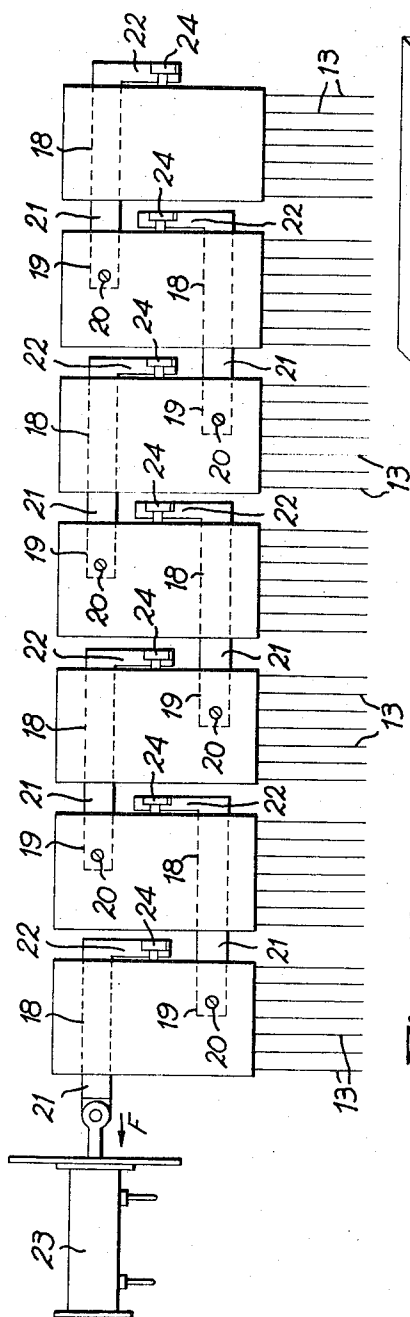


Fig. 10

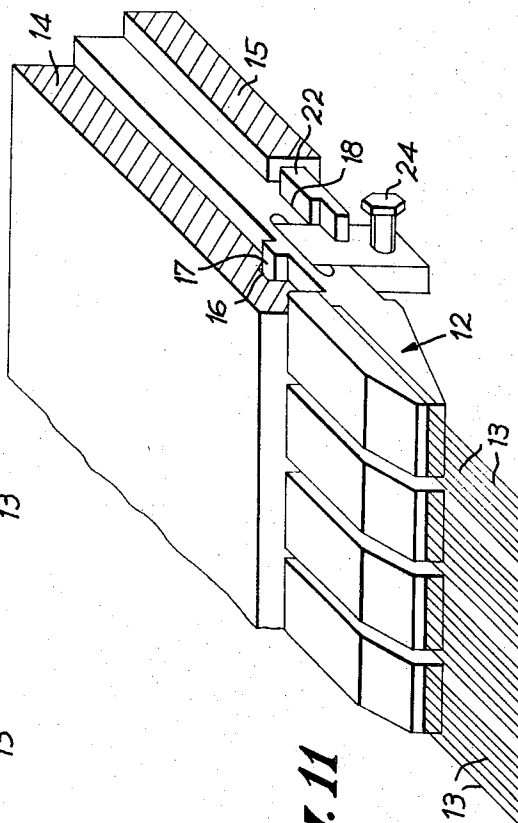


Fig. 11

PROCESS AND DEVICE FOR DOUBLING ON A DOUBLE NEEDLE BED, RIB END KNITTING MACHINE

This invention concerns a process and device for doubling on a double needle bed rib end knitting machine equipped with a device for transferring the rib ends on to a magazine reed by means of a transfer reed.

A machine of this type is, for example, described in the Applicant's Belgian patents Nos. 675,851 and 728,048.

The rib ends knitted on such a machine are intended for jersey machines. As it is sometimes desirable, for reasons of extensibility or elasticity, to knit the rib ends on a larger width than that of the jersey panels, to which they must be fitted, it is necessary to bring the last row of each rib end to the exact width of the said jersey panels, whilst respecting the gauge.

The term used for that operation is "doubling".

So far, that operation has had to be done by hand, by skilled labour. It is therefore costly.

The object of the present invention is to mechanize the doubling process.

To that end, a process is proposed which, after a rib end has been knitted on some of the needles of a machine of the considered type, consists of simultaneously transferring some of the loops of one needle bed on to the free needles of the other needle bed; of racking one needle bed in relation to the other; of then transferring the remaining loops from one needle bed on to the already laden needles of the other; of simultaneously picking up all the loops on one needle bed in a manner known per se; of bringing closer together the groups of loops thus picked up, so as to have a distance of one needle spacing between any two varied stitches, and of transferring the loops thus brought closer together on to the said magazine reed in a way known per se.

The invention also concerns a device for the implementation of this process, as will be seen more clearly from the following description of an embodiment of the invention, given as an illustration and not intended to be restrictive. With reference to the appended drawings:

FIG. 1 is a diagrammatic cross-section of a machine enabling implementation of the invention;

FIGS. 2 to 7 represent diagrammatically the successive steps of the proposed process;

FIGS. 8 and 9 respectively are vertical section and end views of the front needle raising device, more specifically of the needle catch bar thereof;

FIG. 10 is a diagrammatic plan view of the transfer reed; and

FIG. 11 is a perspective view of part of the reed according to the principle of FIG. 10.

As shown in FIG. 1, a rib end machine of the type under consideration comprises, per knitting head: a front needle bed 1 and a rear needle bed 2; two needle raising devices 3 and 4 comprising U-shaped needle catch bars 5 and 6 intended to cover the needle heels of the corresponding needle bed, to bring these needles into high or low position; a transfer reed 7; a magazine reed 8 and a transfer device 9. This unit is well-known. Briefly it works in the following manner: after the last row of loops of a rib end has been knitted, all the loops are transferred to the needles of one needle bed 2 by an appropriate movement of raising device 3 and 4. Then reed 7 picks up these loops from the needles of

needle bed 2 and carries them with the rest of the rib end, of course, opposite to the teeth of magazine comb 8. The transfer device 9 passes the said loops from reed 7 to reed 8.

These operations are repeated cyclically until the desired number of ends has been obtained on reed 8. The latter is then removed to be dispatched to a jersey machine. Means are provided for racking the needle beds. These well-known provisions are not part of the invention.

The process which is the subject hereof is now described with reference to FIGS. 2 to 7.

A 1 × 1 fabric is first knitted as shown in FIG. 2. When the last row is finished, the loops of the front needle bed 1 are transferred on to the free needles of the rear needle bed, except for the loops to be doubled, which are temporarily left on the front needle bed (FIG. 3). The front needle bed is then racked one needle spacing (FIG. 4) and the remaining loops on needle bed 1 are transferred to the already laden needles of needle bed 2 (FIG. 5). All the loops are now on the needles of the rear needle bed. In the example illustrated, where doubling is desired every seventh loop, the loaded needles are divided into groups of seven, separated each time by two needle spacings the last needle of each group bearing two loops.

The groups of loops situated on the said rear needle bed are then picked up simultaneously (FIG. 6). Then these groups are brought one needle spacing closer together so as to have a continuous row of loops to the gauge of the machine; this row is then presented to the magazine reed 8.

For the implementation of this process, two adaptations are necessary to the known mechanism briefly described hereinbefore: the modification of the needle raising devices to effect the transfer in two phases; and the conditioning of the transfer reed.

In the front needle bed 1, high heel needles are used for loops concerned with the first transfer and low heel needles for the other loops. Opposite the low heel needles, the lower wing 10 of the U-shaped catch bar 5 of the front needle raising device 3 has grooves 11 the depth of which enables a low heel to pass but not a high one.

Thus, in its first upward movement, raising device 3 carries along all the high heel needles, whereas in its second upward movement, after racking the front needle bed, it will carry along all the needles, since grooves 11 are then placed opposite the high heel needles.

In relation to the known machine, the control of the raising devices will be adapted to obtain the above-described cycle of two successive transfers, which presents no difficulty for a craftsman.

As regards transfer comb 7, this is constituted, in accordance with the invention, by a series of teethbearing blocks 12. In the example under consideration, in which a doubling must be effectuated every seventh stitch, each of these blocks has seven teeth 13. These blocks 12 are guided between two flats 14 and 15. To that end, flat 14 has a guide groove 16 into which a transversal projection 17 of each block 12 fits.

On its lower side, each block 12 has two transversal grooves 18 and 19.

In one of the grooves 18 or 19 of a block 12 is fixed the end 20 of a branch 21 of an L-shaped hook transversing groove 18 or 19 of the following block, and of which the other branch 22 extends parallel to the oppo-

site lateral side of the said following block. As shown in FIG. 10, these hooks are staggered; the end of the hook traversing the extreme left block, in this Figure, is connected to the stem of a double-effect jack 23, which is integral, for example, with flat 15, whereas the extreme right block is traversed by only one hook.

On its side nearest to the associated branch 22, each block is fitted with an adjustable screw 24 forming a stop. The above-mentioned L-shaped hooks and screw 24 are dimensioned and adjusted so that when the jack 23 is actuated in the direction of arrow F (FIG. 10), blocks 12 separate to a distance such that there is a space equal to two needle spacings between two groups of neighbouring teeth, whilst a movement in the opposite direction reduces this space to one needle spacing.

It is obvious that other means of controlling blocks 12 can be contemplated. Should the machine to be equipped be conditioned to knit two cuffs simultaneously on one and the same knitting head the above-described transfer reed would be made in two halves, simultaneously controlled for opening and closing.

What I claim is:

1. A process for making rib ends on a double needle bed rib and knitting machine and transferring the rib ends onto a magazine reed having a smaller width than said rib ends as knit by means of a variable width transfer reed, comprising knitting a rib end on selected needle bed needles, simultaneously transferring groups of loops of one needle bed onto the free needles of the other needle bed; racking said one needle bed in relation to said other needle bed at least one needle spacing; transferring the remaining loops from said one needle bed onto the already laden needles of said other needle bed to thereby make varied loops in said groups of loops; simultaneously picking up all the loops from said one needle bed in a manner known per se by said transfer reed; bringing closer together on said transfer reed the said groups of loops thus picked up until a distance of one needle spacing exists between any two varied loops; and transferring all the loops thus picked up and brought closer together onto the said magazine reed from said transfer reed in a manner known per se.

2. In a rib end knitting machine having a double needle bed, means for transferring selected loops of formed rib ends of one needle bed to the other needle bed to form groups of loops; means for racking said one needle bed with respect to said other needle bed at least one needle spacing and transferring the remaining loops on said one needle bed to the already laden needles of said other needle bed to thereby form at least one varied loop in each of said groups of loops on said other needle bed; said groups of loops being separated by more than one needle spacing between said varied loops; an adjustable width transfer reed for simultaneously picking up said groups of loops from said other needle bed, said transfer reed having means for adjusting its width whereby the spacings between said groups of loops may each be reduced to a single needle spacing; a magazine reed of less width than said rib ends as knitted; and means for transferring said groups of loops to said magazine reed, whereby said groups of loops may be transferred to said magazine reed after said transfer reed has been adjusted to leave only single needle spacings between said groups of loops.

3. The knitting machine of claim 2, further wherein said adjustable width transfer reed comprises a plurality of teeth holding blocks, and means for moving said blocks with respect to each other to at least a first position where a distance equal to a single needle spacing exists between all of said blocks, and to at least a second position where a spacing equal to some multiple of said needle spacing exists between said blocks, said blocks further each having groups of teeth corresponding in number to the number of loops in each of said groups of loops, and each of said teeth in said groups of teeth being spaced one needle spacing apart.

4. The knitting machine of claim 3, further wherein said adjustable width transfer reed includes means interconnecting said blocks for causing all said blocks to move together or further apart substantially simultaneously when the width of said transfer reed is adjusted.

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