Feb. 21, 1961 F. EBERL 2,972,242

KNITTING MACHINE

Filed April 21, 1958

2 Sheets-Sheet 1

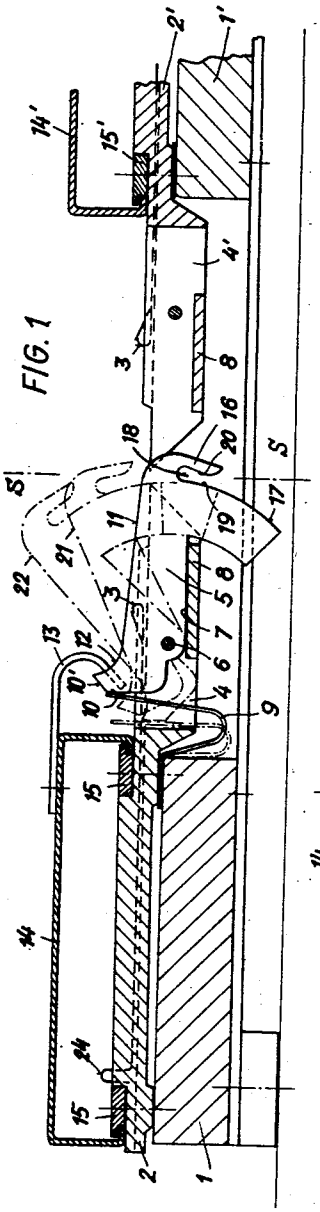


FIG. 1

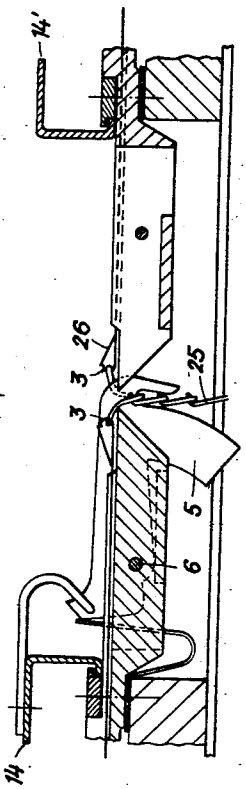


FIG. 2

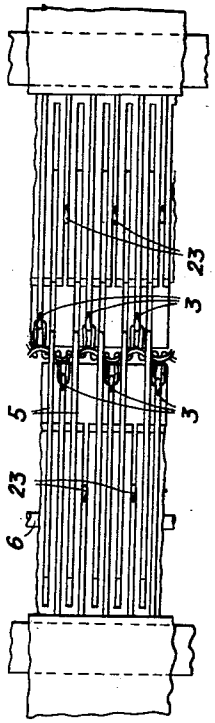


FIG. 3a

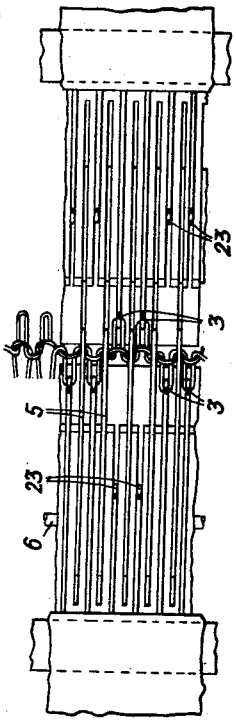


FIG. 3b

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FIG. 4

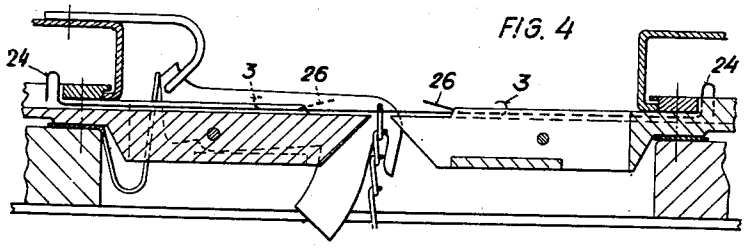


FIG. 5

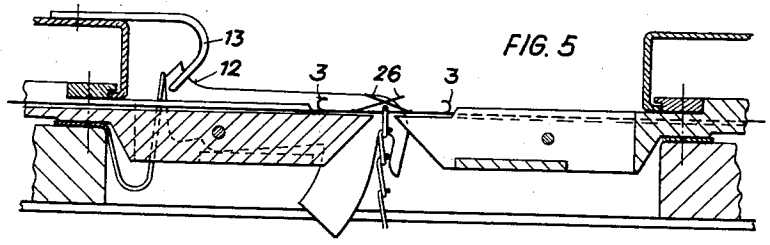


FIG. 6

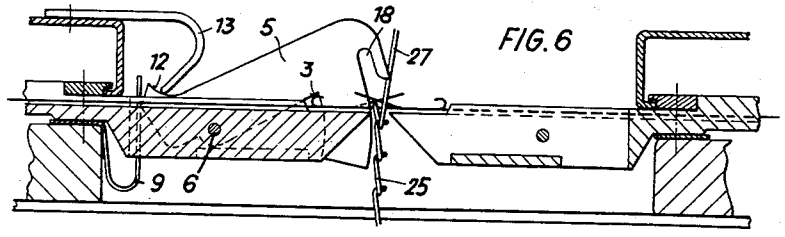


FIG. 7

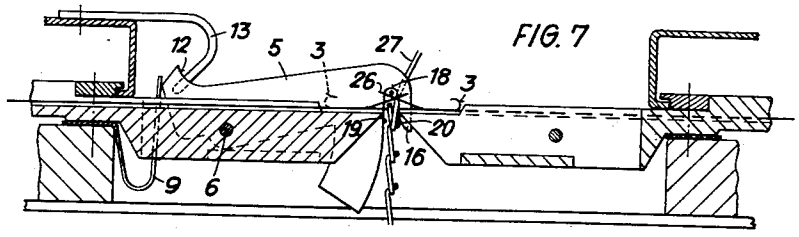
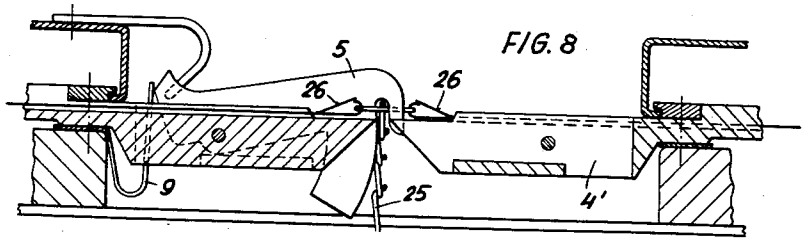


FIG. 8



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2,972,242

KNITTING MACHINE

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Claims priority, application Austria May 8, 1957

2 Claims. (Cl. 66—64)

This invention relates to a knitting machine which comprises two needle beds, each of which comprises latch needles guided parallel to each other in the bed and a carriage which is movable on the needle bed transversely to the direction of movement of the latch needles to operate the same, while hooked sinkers are adjustably mounted between the latch needles and arranged to be operated by a cam on the carriage.

In known machines, in which a row of sinkers is associated with each needle bed or row of latch needles, it is difficult to knit a fine-meshed one-by-one rib fabric because in this case the thread is laid between the staggered latch needles of the two needle beds and a certain spacing between the sinkers of the two needle beds must be ensured to enable the sinkers to be moved without mutual interference. This spacing required that a knitted fabric of the type described was obtainable only with relatively large meshes.

It is an object of the invention to eliminate these disadvantages. The machine according to the invention is characterized by a single row of sinkers, which are arranged one beside the other and of which the pair of edges disposed on opposite sides of the slot partially defined by the hook form the thread-engaging surfaces for the formation of the stitches by the latch needles of both needle beds. In the vicinity of the plane in which the latch needles are operated, the edges of the slot extend preferably at equal distances from the plane of symmetry between the two needle beds.

The elimination of a row of sinkers between the two needle beds as compared with the known machines enables the two needle beds to be more closely spaced and the gap between them to be reduced so that a one-by-one rib fabric can be knitted with smaller meshes than before. Because only a single row of sinkers is required, the manufacture is simplified and material is saved whereas the range of types of knitting operations and patterns is not restricted.

An embodiment of a machine according to the invention is shown by way of example in the drawing in which:

Fig. 1 is a diagrammatical cross-sectional view of the machine;

Figs. 2 and 4 to 8 illustrate different positions during the knitting operation; and

Figs. 3*a* and 3*b* are top plan views associated with Fig. 2, illustrating the knitting of two different patterns.

The knitting machine shown in Fig. 1 has two needle beds 2, 2', of usual construction, which are carried by a base 1, 1'. The parallel latch needles 3 are guided in the grooves of the needle beds. The arrangement is such, by way of example, that the latch needles 3 can be displaced in a common horizontal plane. The front ends of the two needle beds 2, 2' form the sinker beds 4, 4'. The two sinker beds 4, 4' face each other with a narrow gap between them.

The sinkers 5 are pivoted in the left-hand needle bed 2 by means of a shaft 6 which is fixed in the sinker bed 4. Each sinker 5 is disposed between two latch needles 3 (see Figs. 3*a* and 3*b*).

The sinker 5 consists of a flat stamping. In the initial position, shown in full lines in Fig. 1, the straight lower edge 7 of the sinker engages a stop 8 of the sinker bed 4. This stop serves also as a stiffening means. The sinker is held in this position under the pressure of a U-shaped leaf spring 9, one limb of which is angularly bent. These springs are suitably combined for all sinkers in a single rakelike member mounted between the base 1 and the needle bed 2. The ends of the springs 9 engage the end edge 10 which extends vertically in the initial position of the sinker.

The top edge 11 of the sinker 5 is upwardly inclined toward the shaft 6 and terminates in a rounded portion 12 which is connected to the end edge 10 by a short, straight connecting edge 10'. This rounded portion 12 is engageable by a sinker-tilting cam 13 for operating or pivoting the sinkers. This tilting cam 13 is mounted on the carriage 14 which is guided on the needle bed for movement in a direction transverse to the sinkers. This carriage 14 slides in the usual manner along guides 15 and has the actuating means (not shown) required for operating the latch needles 3.

The upper front portion of the sinker forms a long hook 16 which partially defines a slot 18 with the adjacent front edge 17. In the formation of stitches, the two opposing edges 19, 20 defining this slot 18 serve as thread-engaging surfaces for the latch needles of both needle beds. As is apparent from Fig. 1, the end of the slot lies in the initial position of the sinker somewhat below the horizontal plane in which the latch needles are displaceable; this has the purpose of causing the knitting which has been formed to be pulled downwardly. The tilting cam 13 causes the sinker to swing about the shaft 6. The arrangement is such that the slot moves along an arc of a circle which is tangent to the plane of symmetry S—S between the two needle beds. Slightly below the plane in which the latch needles are displaced the edges of the slot are equidistant from the plane S—S. The end position 21 of the sinker and a retracted position 22, in which the sinker 5 is inoperative, are indicated with dash-and-dot lines in Fig. 1.

The mode of operation of this machine is as follows: Figs. 2 and 3 show the machine in sectional and top plan views, adjusted for knitting a one-by-one rib pattern. As is apparent from Fig. 3*a*, every other latch needle of each needle bed 2, 2' is moved into the position of Fig. 1 in which its butt end 24 will not be engaged by the usual actuating means such as advancing and retracting cams provided in the carriage. These needles are designated 23. Fig. 3*b* is a top plan view similar to that of Fig. 3*a* but showing the needles 3, 23 readjusted by pairs, for the knitting of a two-by-two-rib pattern. The needles 3 opposite the needles 23 are in operative position ready for knitting. Each of these needles holds a stitch of the knitting 25, disposed in the plane of symmetary S—S between the two needle beds.

The two carriages 14, 14' which are coupled to one another, suitably by a detachable connection (not shown), are moved to cause the butt ends 24 of the latch needles 3 to be displaced by advancing cams of the carriages. These advancing cams cause first a movement of the latch needles toward and beyond the plane of symmetry S—S (Fig. 4). In this operation the last-formed stitch of the knitting 25 slides over the opening latch 26 of the needle 3. In Fig. 4 the latch needle has reached its most advanced position. The further movement of the carriages then causes the movement of the needle to be reversed by the retracting cam.

Fig. 5 shows the position in which the opened latches

26 of the needles 3 have positioned themselves over the last-formed stitch of the knitting. At this time the movement of the latch needles is interrupted for a short period while the sinker-tilting cam 13 begins to run up on the rounded portion 12 of the previously stationary sinker 5 and starts the pivotal movement thereof (Fig. 6).

The sinker 5 is now swung against the action of the spring 9 about the shaft 6. Being lifted along an arc of a circle, the end of the slot 18 disengages the knitting 25 and in the lifted end position of the sinker (Fig. 6; 21 in Fig. 1) is sufficiently spaced above the horizontal plane in which the latch needles are displaced to permit the insertion of the thread 27 by means of the thread guide, not shown.

A continued movement of the carriage will cause the tilting cam 13 to slide off the rounded portion 12 so that the sinker 5 returns to its initial position under the action of the spring 9. Fig. 7 shows the position of the sinker before it has reached its initial position; the thread 27 inserted by the thread guide has been applied to the still open latches 26 of the needles 3 and is overlain by the sinker hook 16 so that the thread is guided between the edges 19, 20 in the end portion of the slot 18. Then the needles 3 continue their retracting movement.

As is generally usual in knitting, the last-formed stitch now causes the latches 26 to be closed and the newly inserted thread 27 is pulled to the required length for the formation of a stitch. The new loop thus formed carries the stitch formed last.

This position is shown in Fig. 8, shortly before the sinker has reached its initial position. Thereafter the sinker 5 is lowered entirely under the pressure of the spring 9 and pulls also the knitting 25 downwardly. Now the position according to Fig. 2 has again been reached and the next course can be formed.

During the knitting of a two-by-one rib pattern the thread 27 extends from the hook of a latch needle 3 of the bed 4 through the end of the slot 18 to the hook of the two adjacent opposite needles 3 of the bed 4' (Fig. 8). During the knitting of a two-by-two rib pattern (Fig. 3*b*) the thread 27 extends between the hooks of two latch needles 3 of the bed 4 and then across the gap between the two needle beds to the two adjacent latch needles 3 of the other needle bed 4'; again, the two opposed edges 19, 20 which define the slot 18 in the sinker 5 straddle the thread in the formation of stitches by the latch needles of both needle beds. In this operation the thread extends between two latch needles of the needle beds 4 around the edge 19 of the sinker 5 disposed between them while further extending between two needles of the bed 4' around the edge 20 of the hook 16 of the intervening sinker.

The machine according to the invention has the advantage that a one-by-one rib pattern can be produced in any desired fineness and the need for providing a separate row of sinkers for the second needle bed is eliminated without any restriction regarding the knitting techniques and patterns for which the machine is suitable. It is obvious that weft knitting can be obtained with one of the two needle beds which, for this purpose, are detachably connected to each other.

The invention is not restricted to the illustrative embodiment shown and described but permits of various modifications thereof. More particularly, the sinkers instead of being pivoted on a shaft may be mounted in the sinker bed to be movable up and down along a straight line. The spring means acting on the sinkers to return them into their initial position may be formed in any desired manner, e.g. as coil springs engaging the lower edge of the sinkers. Instead of being displaceable in a common horizontal plane, the latch needles may be mounted in the two needle beds for movement at an angle to each other.

What is claimed is:

1. A knitting machine which comprises two opposed, elongated needle beds extending generally in a horizontal plane, two interleaved sets of latch needles, the needles of each set being guided along parallel paths in a respective one of said needle beds, said sets of needles being provided with thread-engaging means, a single row of sinkers disposed between said latch needles for movement in a vertical plane, each of said sinkers being formed with a hook and with two opposed edges defining a slot for receiving behind said hook a thread about to be engaged by said needles, and carriage means mounted on said needle beds for movement thereon transversely to the directions of movement of said needles and sinkers, said carriage means being adapted to engage and operate said needles and sinkers to form said thread into stitches, said sinkers being adapted to straddle said thread with said two opposed edges during the formation of said stitches.

2. A knitting machine as set forth in claim 1, in which said latch needles are moveable in a common plane and said edges of each sinker are substantially equidistant from the plane of symmetry between said needle beds in the vicinity of said common plane in the lowermost position of said sinker.

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