

[54] **LOOPER**

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[56]

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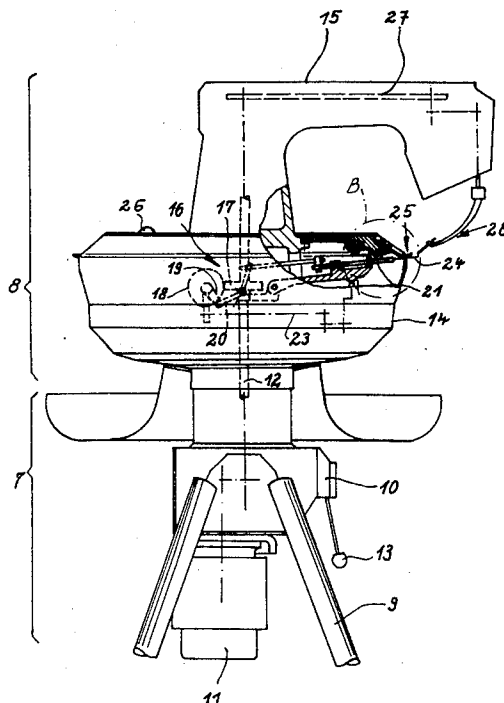
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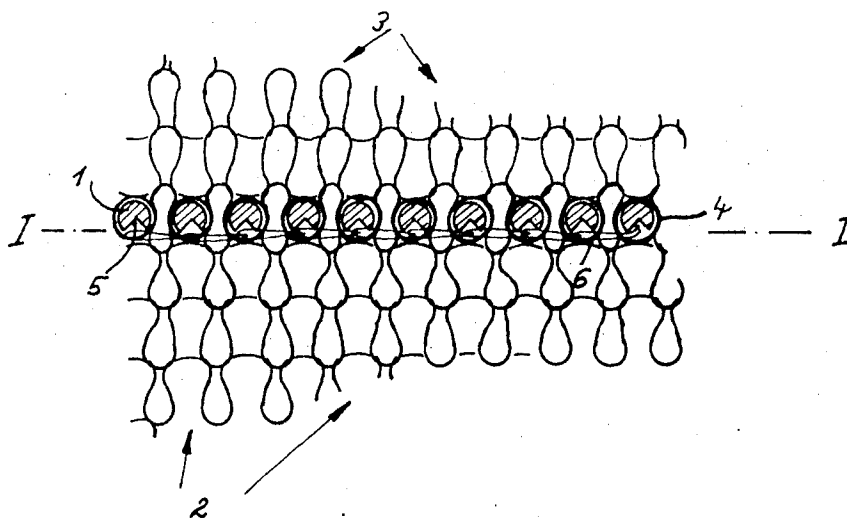
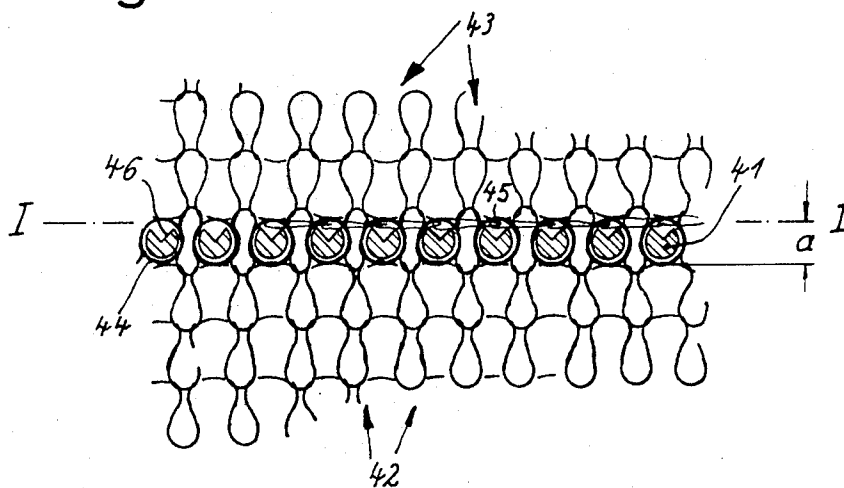
**ABSTRACT**

A looping machine wherein a sewing needle engages in a groove on the underside of the row needles on the side corresponding to the downwardly hanging section of material into the looping material for the purpose of stitch formation. The entire drive for the sewing needle is disposed below the crown of the row needles.

**10 Claims, 5 Drawing Figures**



*Fig. 1 Prior Art*



*Fig. 2*

Fig. 3

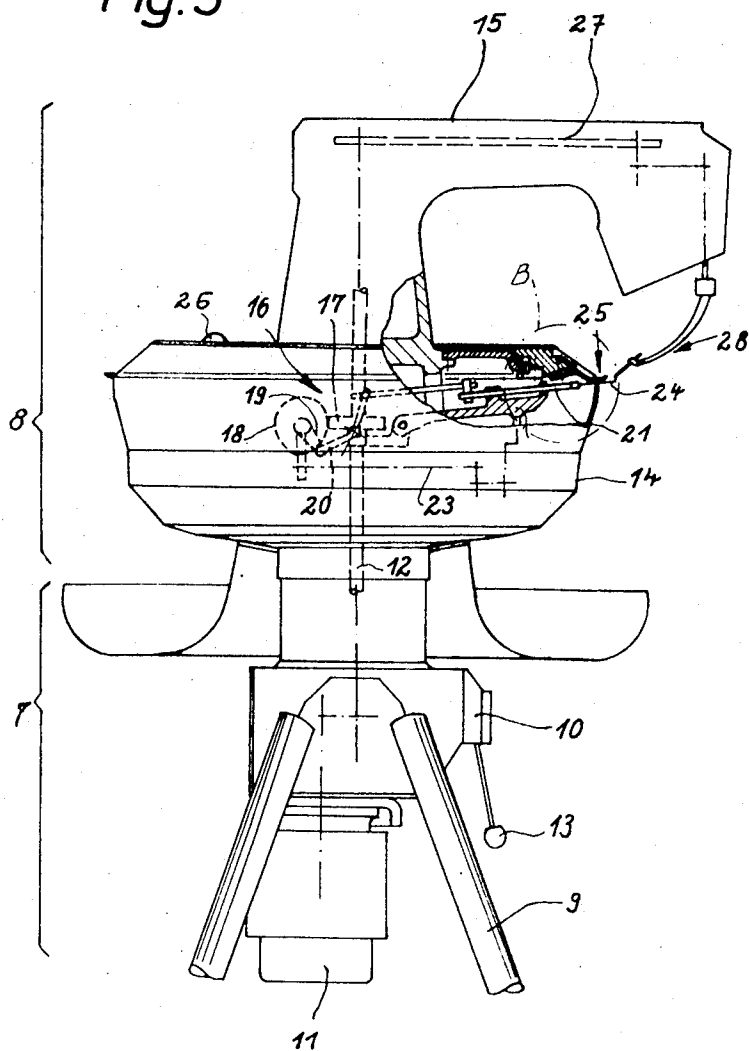


Fig. 4

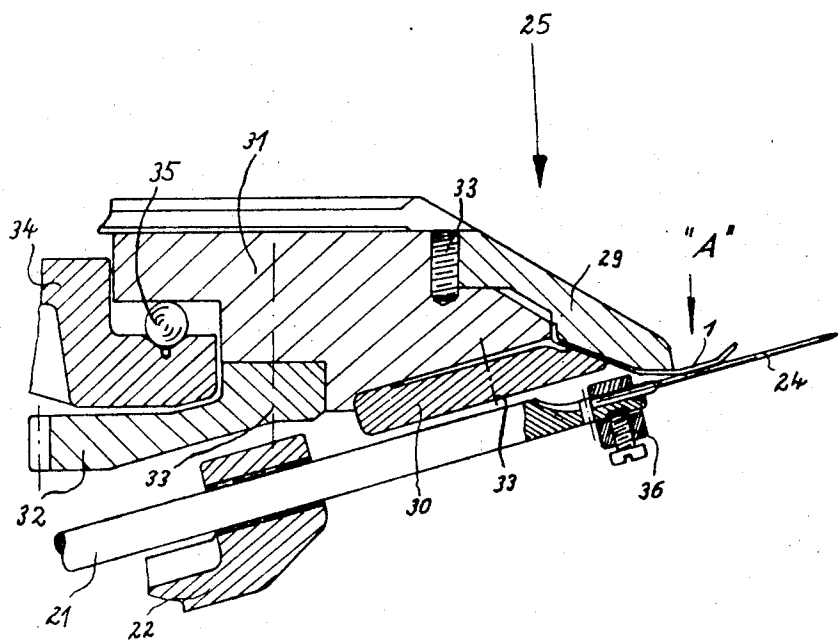
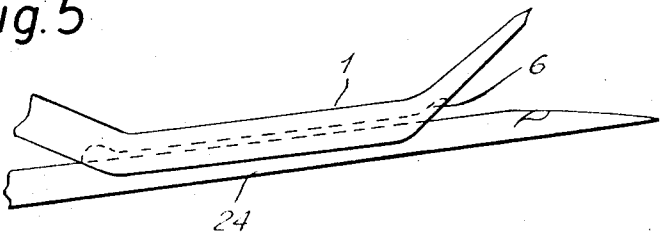


Fig. 5



## LOOPER

## BACKGROUND OF THE INVENTION

The present invention relates to a looping machine with an advancing needle row bed formed by individual needles of this needle row, with grooves extending in the longitudinal direction and, more particularly, to a looping machine wherein the material to be looped and to be connected by a warp or chain stitch, by means of stitch-forming tools with a needle stitching from the inside toward the outside or vice versa, is transferred onto these row needles.

A looper serves for bordering and/or combining looping material, such as hoisery or knitted goods or the like by a single or double-thread warp stitch. In this procedure, the stitch-forming tools must engage stitch by stitch the sections of material to be combined and sew the same together. In order to attain this objective, it is necessary first to transfer the looping material such as knitted or hoisery goods manually onto the row needles of the looping machine in accordance with stitches and rows, i.e., stitch by stitch and row by row. This operation, for example the bordering of a cut piece of material with a looping edge, can be conducted as described immediately hereinbelow.

First of all, the looping edge which is produced in accordance with quite a specific scheme, i.e., according to a predetermined knitting sequence with a specific number of auxiliary stitches, is transferred stitch by stitch and row by row, for example manually, in the transfer or the long loop row. Thereafter, the blind transfer onto the row needles of the material to be attached is effected, and furthermore the turning down of the looping edge and another stitch-by-stitch and row-by-row transfer thereof. The further procedure in this operation and the techniques being employed in connection therewith need not be discussed in detail herein.

In conventional looping machines, the connection of the looping material transferred onto the machine is effected by means of a single-or double-thread warp or chain stitch by means of a sewing needle guided successively on each needle of the needle row in a groove. This sewing needle can form the seam on the inside of the needle row crown as well as on the outside, i.e., the needle stitches either from the inside toward the outside or vice-versa.

In known looping machines, the looping seam is formed above the row needles. Since the borders or edges, in the above-described transfer technique customary nowadays, are transferred in such a manner that these borders are disposed above the row needles and the top rows are positioned underneath the row needles, the stitch loop held in each instance by the row needle remains perforce underneath the looping seam. After detaching the top rows, these stitch loops remain standing. This results in a slovenly and thus unattractive appearance of the looped goods, especially when the hem and the section of material deviate from each other with respect to color. However, in order to make it possible for the manufacturer to deliver the looped material in a fastidious condition, care must be taken that the overhanging stitch loops are placed against the looping seam. This is effected by pulling the borders or the edge back by hand.

However, considering the fact that the working step which is executed by the looping personnel, for example, by hand, is basically correspondingly more expensive due to the time consumed in the transfer operation as compared to the looping step proper and due to the special training such personnel must receive, there is an even further increase in the cost of the looped material by the thus-necessary aftertreatment. Besides, the stitch pattern becomes irregular because of the differing draw or pull at the edges or borders caused by this additional working step.

## SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to overcome the aforementioned problems and disadvantages encountered heretofore in the prior art devices.

The present invention is aimed at the problem of providing a looping machine wherein the above-described disadvantages do not occur, so that additional operations on the looped material can be eliminated.

The foregoing problems have been solved in accordance with the present invention by providing that the sewing needle engages, in grooves on the underside of the row needles on the side corresponding to the downwardly hanging section of material into the looping material for the purpose of stitch formation. Due to the fact that the sewing needle penetrates underneath each row needle, the looping seam is formed in this plane, i.e., the stitch loops normally projecting beyond the looping hem are seized at their lowermost arches and sewed together.

A further feature of the machine is provided with a needle row crown and the present invention resides in that the entire drive for the sewing needle penetrating underneath each row needle, is disposed below the needle row crown. Accordingly, the entire drive for the sewing needle is advantageously protected within the top of the machine so that the needle crown passes over into a free area.

Furthermore, the sewing needle can consist of a conventional spring beard needle, in accordance with a preferred embodiment of the invention. According to another preferred feature of the present invention, the stitch forming tools are driven by way of kinematic trains which are to be exactly controlled with respect to their inertial forces so that the looping machine can operate vibration-free at very high speeds.

The advantages attainable with the present invention reside particularly in the avoidance of stitch loops extending beyond the looping seam, as they occur when the sewing needle penetrates above the row needle. The stitch loop is engaged at its lowermost curved portion so that the looping seam in each case represents the end of the edges or the hem sections. A strictly defined, clear transition is accomplished between the parts to be connected, so that cumbersome finishing operations by highly paid personnel are eliminated. The looped goods leave the needle crown of the looping machine in a flawless condition.

## BRIEF DESCRIPTION OF THE DRAWING

These and further objects, features and advantages of the present invention will become more apparent

from the following description when taken in conjunction with the accompanying drawing which shows, for purposes of illustration only, an embodiment in accordance with the present invention and wherein:

FIG. 1 shows a looping product produced by means of a looping machine in accordance with the state of the art known heretofore;

FIG. 2 shows a looping work produced with a looping machine according to the present invention;

FIG. 3 is a lateral view of a looping machine according to the present invention;

FIG. 4 is an enlarged sectional view through the needle row crown in the plane of the encircled area B of FIG. 3; and

FIG. 5 is an enlarged view of a row needle in cooperation with a sewing needle.

#### DETAILED DESCRIPTION OF THE DRAWING

Referring now to the drawing and, in particular, to FIG. 1, a portion of a needle row crown is schematically illustrated in a developed planar projection to show the arrangement in accordance with the state of the prior art. The row needles 41 carry a piece of material 42 which is to be sewn together, for example, with a facing 43. First of all, one side of the facing 43 is transferred stitch by stitch and row by row. Thereafter, the piece of material 42 is transferred to the needles without regard to stitches and rows, i.e., in a blind fashion, and after turning down the free side of the facing 43, the latter is likewise transferred in accordance with stitches and rows. It can be seen that, when conducting this operation, stitch loops 44 extending around the row needles 41 underneath the point of penetration 45 of the sewing needle (not shown) are left standing. Grooves 46 serve for guiding the sewing needle, and these grooves are formed on the upper side of each row needle 1. The looping seam formation takes place in the plane I — I, i.e., in the plane of the row needle grooves 46. However, this results in the effect that the stitch loops 44 of each individual stitch remain standing in the transfer row underneath plane I — I at a spacing "a," which can be reduced by knitting the transfer row, i.e., normally the long loop row, in short stitches. This, however, results in a reduction in the working efficiency of the looping personnel.

The stitch loops 44, which project at the distance "a," loosely extend from the piece of material, so that an undeveloped or a slovenly total impression of the looped material results. This impression can become even more unattractive, especially due to differences in color. However, in order to obtain a clean or strictly defined termination of the looping trim 43, the latter must be pulled back in the upward direction toward the looping seam by hand, so that the stitch loops 4 contact this seam, as illustrated in FIG. 2. This illustrated condition can be attained either by an expensive finishing operation or by means of a looping machine according to the present invention, wherein a piece of material 2 and a facing 3 are connected in each case in the point of penetration 5 of the sewing needle.

The row needles 1 shown in FIG. 2 correspond to a looper according to the present invention, as illustrated in the lateral view of FIG. 3. This looping machine consists essentially of a stationary bottom part or base 7 and a rotatable top machine part or superstructure 8.

The stationary bottom part consists of, inter alia, a tubular framework 9 attached to a gear 10, underneath which the drive motor 11 is mounted by flange means.

The speed of the main shaft 12 driving the looping machine can be varied, preferably infinitely, via the gear 10 by means of a hand lever 13. A shell 14, which is fixedly connected with the arm 15, accommodates in its interior the drive elements 16 for the stitch-forming tools. The drive elements 16 are illustrated schematically to simplify the understanding of the present invention. Thus, the main drive shaft 12 carries a worm gear 17 meshing with a second worm gear 18. This worm gear transmits the rotary motion to an eccentric 19, which drives the needle bar 21 via an angle lever 20. The needle bar 21 is displaceably mounted in the needle bar holder 22, and the needle bar holder 22 is arranged to be pivotable about the axis of the main drive shaft 12. By means of a gear train 23, a lateral movement is imparted to the needle bar holder 22 so that the sewing needle 24 can follow the rotary motion of the needle row arranged in the form of a needle row crown 25 i.e., ring-shaped, during the stitch formation. The needle row crown 25 can be freely rotated after operating a locking button 26. The arm 15 receives the drive means 27 for the gripper or looper 28. Thus, the stitch forming means have drive means effected via train means. The sewing needle stitches either from the inside toward the outside or from the outside toward the inside for connecting the material to be looped by means of a warp stitch.

In FIG. 4, the needle row crown 25 is shown in an enlarged view. The row needles 1 are fixedly anchored in a needle bed 29, preferably by incorporating them into the bed by casting, and are furthermore secured by means of a pressure plate 30. The needle crown body 31 carries the drive gear 32 in addition to the needle bed 29 and the pressure plate 30, and the drive gear 32 is in connection with drive means running synchronously with respect to the needle bar drive mechanism 16 (not shown). The needle bed 29 and the pressure plate 30 as well as the drive gear 32 are fixedly mounted in the needle crown body 31 by means of securing means 33, which can have any desired design. The mounting of the needle crown body 31 with respect to the partially illustrated ring 34 is effected by way of a roller or sliding bearing 35. The needle bar 21, the mounting 22 of which is partially illustrated, carries the sewing needle 24 at its free end in a clamping screw 36. For the purpose of stitch formation, the sewing needle 24 is guided in grooves 6, as shown in FIGS. 2 and 5, provided on the underside of the row needles 1, as seen in the direction "A" in correspondence with the downwardly hanging portion of the material. Thus, the looping seam is disposed correspondingly underneath each row needle 1 as can be seen, in particular, from FIG. 2. It is further noted that the drive for the needle bar and/or the drive for the gripper can be effected by cam control or by trains.

While we have shown and described one embodiment in accordance with the present invention, it is to be clearly understood that the same is susceptible of numerous changes and modifications as are encompassed by the scope of the present invention. We, therefore, do not wish to be limited to the details shown and described herein but intend to cover all such

changes and modifications as are encompassed by the scope of the present invention.

We claim:

1. Looping machine comprising an advancing needle row bed formed from individual row needles with grooves extending in the longitudinal direction thereof, and stitch forming means including a sewing needle for stitching either from the inside toward the outside or from the outside toward the inside for connecting the material to be looped by means of a warp stitch, wherein the material is transferred to the row needles, the sewing needle being operatively received in the grooves of the row needles, the grooves being provided on the underside of the row needles corresponding to the downwardly hanging material, whereby the sewing needle engages into the material for stitch formation.

2. Looping machine according to claim 1, wherein the needle row bed is ring-shaped and forms a part of a needle row crown, and the stitch forming means includes drive means for the sewing needle, said drive means being located below the needle row crown.

3. Looping machine according to claim 1, wherein the sewing needle is a spring beard needle.

4. Looping machine according to claim 3, wherein the needle row bed is ring-shaped and forms a part of a needle row crown, and the stitch forming means in-

cludes drive means for the sewing needle, said drive means being located below the needle row crown.

5. Looping machine according to claim 1, wherein the stitch forming means have drive means effected via train means.

6. Looping machine according to claim 5, wherein the needle row bed is ring-shaped and forms a part of a needle row crown, and the stitch forming means includes drive means for the sewing needle, said drive means being located below the needle row crown.

7. Looping machine according to claim 6, wherein the sewing needle is a spring beard needle.

8. Looping machine according to claim 7, further comprising a needle bar and a needle bar holder, the sewing needle being operatively held in the needle bar which, in turn, is displaceably mounted in the needle bar holder pivotable about the axis of a main drive shaft for the looping machine.

9. Looping machine according to claim 8, wherein the row needles are fixedly anchored in the needle bed, and pressure plate means is additionally provided for anchoring the row needles in the needle bed.

10. Looping machine according to claim 9, wherein the needle row crown includes a crown body carrying the needle bed and the pressure plate means.

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