

Feb. 15, 1966

J. STAHL ETAL

3,234,761

CLIPPING MECHANISM FOR CIRCULAR KNITTING MACHINES

Filed May 14, 1962

3 Sheets-Sheet 1

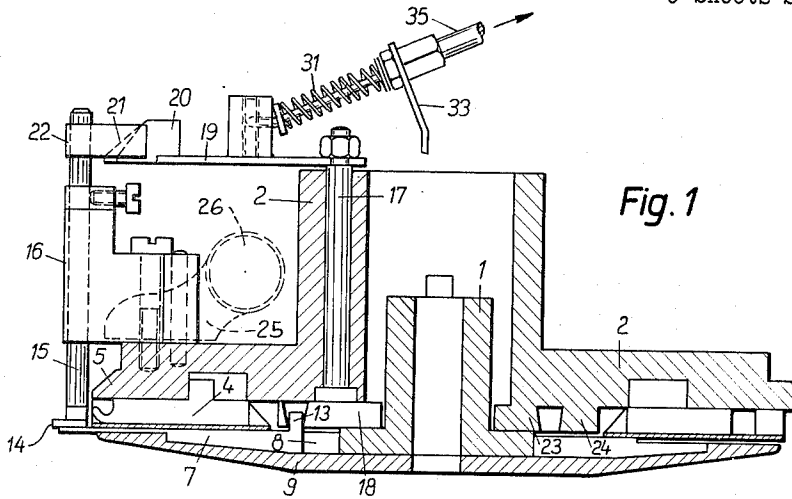


Fig. 1

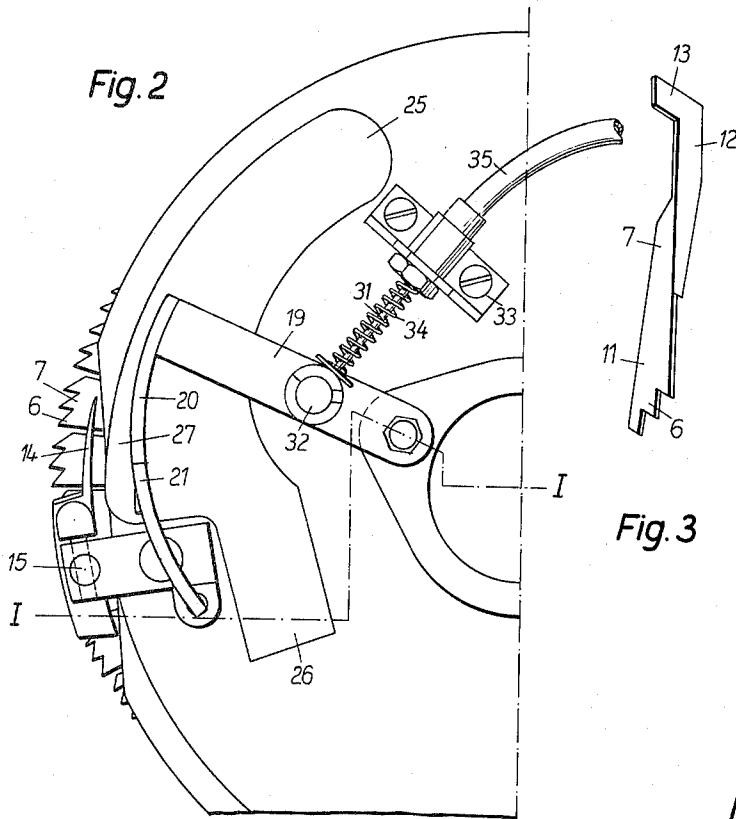


Fig. 2

Fig. 3

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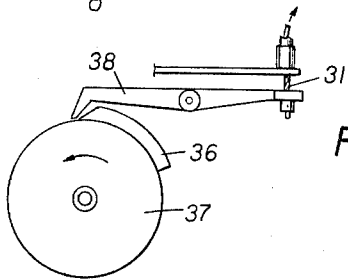
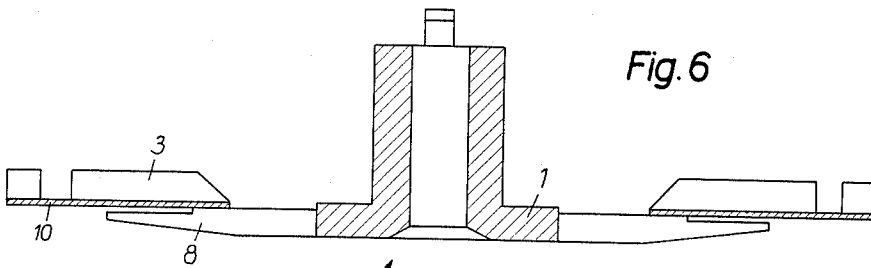
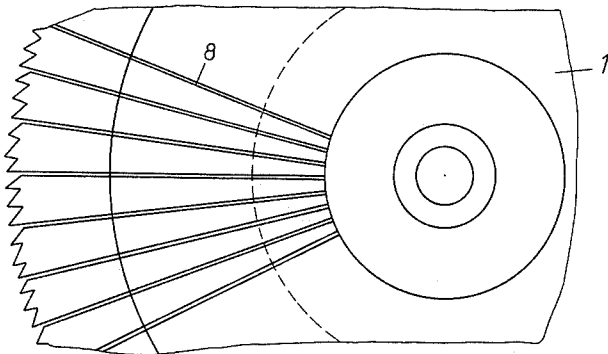
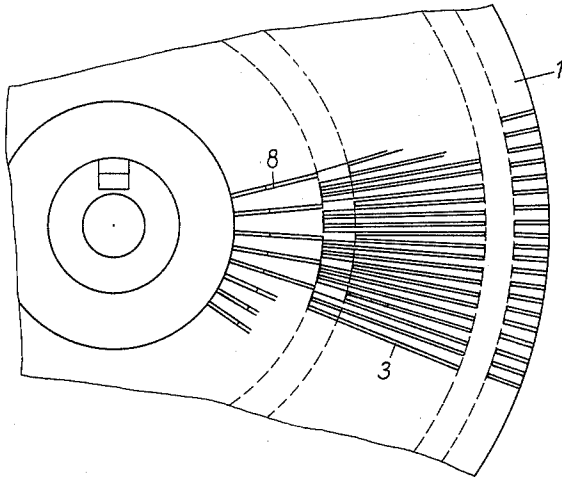
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3 Sheets-Sheet 3

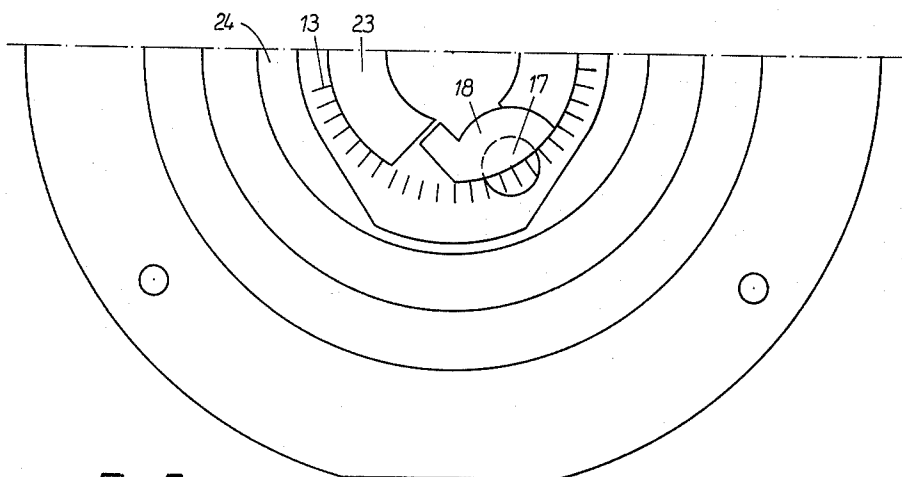


Fig. 7

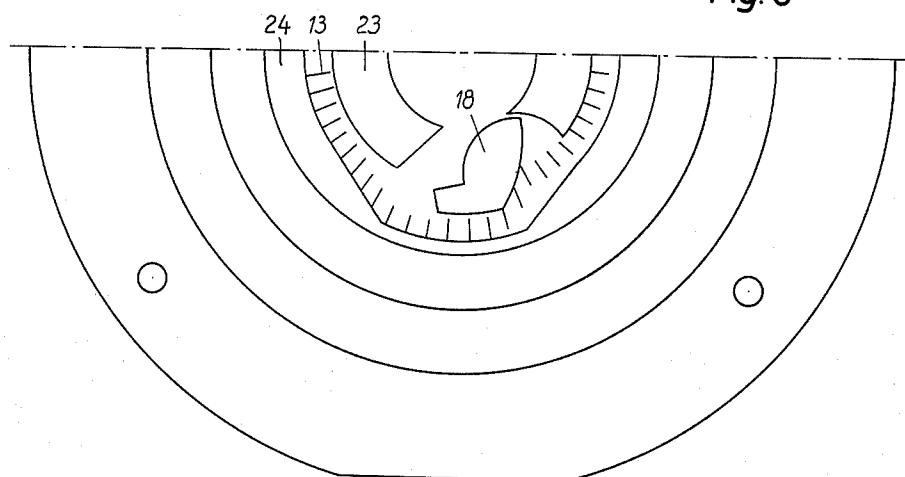


Fig. 8

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## CLIPPING MECHANISM FOR CIRCULAR KNITTING MACHINES

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Filed May 14, 1962, Ser. No. 194,223

Claims priority, application Germany, May 23, 1961,

H 42,667

8 Claims. (Cl. 66—140)

The present invention relates to a clipping mechanism for a circular knitting machine, especially for producing seamless stockings, similar to the type as described in the U.S. Patent No. 2,810,280.

In circular knitting machines, especially those for producing seamless stockings, it is necessary during the knitting operation to cut off the unwanted yarns or floaters at those points where a yarn change occurs. The clipping mechanisms which have been used for this purpose prior to this invention had the disadvantage that they did not clip the unwanted yarns sufficiently short on the fabric so that the remainder of these yarns had to be shortened thereafter by hand. This additional clipping operation not only increased the cost of production of the particular fabric, but there was also always the danger that by a careless manipulation of the clipping tool the fabric itself might be damaged or ruined entirely.

More recently, a yarn clipping mechanism has also been developed for automatic circular knitting machines for making seamless stockings. This mechanism comprises a serrated ring which is inserted between the dial cap and the dial and is provided with teeth similar to those of a circular saw blade, and a clipping blade which engages upon and is operatively associated with the teeth of the serrated ring. In the operation of this mechanism, the teeth of the serrated ring take along the unwanted threads which are to be clipped and at the same time act like one blade of a pair of scissors, the other blade of which is formed by the clipping blade. This known mechanism also comprises a suction device which is mounted on the dial cap for removing the clipped thread ends and for holding the yarn parts which are temporarily not needed in the knitting operation in an arrested position. The serrated ring and the clipping blade of this known mechanism are disposed above the dial so that the dial hooks can freely emerge and catch and rehook the yarn when making the welt of the stocking.

This known mechanism has, however, also the disadvantage that, after the foot-reinforcing yarns have been clipped, the ends remaining on the fabric are still so long that they must again be shortened by a separate mechanism after the stocking has been taken off the knitting machine. Whereas the remaining ends of the yarns, and especially of the foot-reinforcing yarns should not be longer than 2 to 3 mm., the ends remaining after the yarns are cut off by this prior clipping mechanism still have a length of 8 to 14 mm.

It is an object of the present invention to provide a yarn clipping mechanism for a circular knitting machine in which the serrated ring of this mechanism which revolves with the dial consists of a plurality of individual serrated clipping sinkers which are disposed underneath the dial and each of which is adapted to be reciprocated by means of a separate cam groove.

Another object of the invention is to employ the conventional control mechanism of the knitting machine to control the reciprocating movements of the clipping sinkers and particularly to effect the movement of the clipping blade into its operative or cutting position after the clipping sinkers are moved outwardly, and to effect

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the retracting movement of the clipping blade to its inoperative position before the sinkers are retracted. The yarn clipping mechanism according to the invention is designed so that the clipping sinkers are moved outwardly and the clipping blade is moved to its operative or cutting position only at the particular time when a floater or other unwanted yarn is to be cut off, while at other times these sinkers remain in the retracted position in which they do not project beyond the dial and the clipping blade then remains in its inoperative position. Since the clipping sinkers according to the invention are disposed and movable underneath the dial, the further advantage is attained that the sinkers cannot interfere with the loop arms which hang on the dial hooks.

It is a further object of the invention that, due to the mentioned arrangement of the clipping sinkers and the clipping blade, the yarns will be gripped and cut off so short that the remaining ends will be no longer than 2 to 3 mm. and therefore do not need to be further shortened as it was previously necessary.

The objects, features, and advantages of the present invention will become more clearly apparent from the following detailed description thereof which is to be read with reference to the accompanying drawings, in which:

FIGURE 1 shows a vertical section taken along line I—I of FIGURE 2 and illustrates the dial and dial cap of a circular knitting machine together with the yarn clipping mechanism according to the invention;

FIGURE 2 shows a plan view of FIGURE 2, some parts thereof being broken away;

FIGURE 3 shows a perspective view of one of the clipping sinkers;

FIGURE 4 shows a top plan view of a part of the dial without the clipping sinkers;

FIGURE 5 shows a bottom view of the dial according to FIGURE 4;

FIGURE 6 shows a vertical axial section of the dial according to FIGURE 4;

FIGURE 7 shows a bottom view of a part of the dial cap and of the cam for reciprocating the clipping sinkers, with the cam in the inoperative position; while

FIGURE 8 shows another bottom view of the dial cap and the cam, but with the cam in the operative position.

FIGURE 9 shows a part of the means for moving the control member 17.

As illustrated in the drawings, and particularly in FIGURE 1, the dial cap 2 of the inventive mechanism is disposed above the dial 1 in a manner which is conventional in circular knitting machines. That is, means are provided mounting the dial and dial cap for rotation relative to each other about the vertical axis of the dial. Dial 1 is provided in the usual manner with radial grooves 3 in its upper side in which the dial hooks 4 are guided which are controlled by cams 5 on the dial cap 2. In accordance with the invention, the individual clipping sinkers 7 which together form a ring are provided with outer or peripheral serrations 6, and they are disposed underneath the dial 1 and are laterally guided in radial grooves 8 in the lower side of dial 1. At their lower sides, the clipping sinkers 7 are guided by the upper side of a cover plate 9 which is mounted on the lower side of dial 1, while at their upper sides the sinkers are guided by lower surface portions 10 of dial 1.

Each clipping sinker 7 consists of two interconnected shank portions 11 and 12 which extend in the same direction but are turned at a right angle to each other, as shown particularly in FIGURE 3. Shank portion 11 is provided on its free end with serrations 6, while the other shank portion 12 is provided with a butt 13. The serrations 6 of the clipping sinkers 7 are operatively associated with a clipping blade 14 which is secured to the lower end of a cylindrical supporting rod 15 which is slidable

in the vertical direction in a bearing member 16 which is secured to the upper side of the dial cap 2. Clipping blade 14 is thus adapted to be moved with a reciprocatory motion into an operative or cutting position in which it engages upon the upper surfaces of the clipping sinkers 7, and into an inoperative elevated position above the clipping sinkers. This is effected and controlled by the conventional control mechanism of the knitting machine which also effects and controls the reciprocating movements of the clipping sinkers 7. For this purpose, the lower end of a control member formed by a shaft 17 which is rotatably mounted within the dial cap 2 has a cam 18 secured thereto which in its inoperative position, as shown in FIGURE 7 maintains the clipping sinkers 7 in their retracted position, while when cam 18 is moved to its operative position, as shown in FIGURE 8, by being swiveled by shaft 17 by means of the control mechanism when a yarn change occurs, it acts upon the butts 13 of sinkers 7 so as to project the sinkers to their outer position. In all other positions, butts 13 of sinkers 7 are guided between the two cam rings 23 and 24 on the dial cap 2.

The upper end of shaft 17 carries an arm 19 with a projection 20 on its free end which has an outer beveled cam surface 21 which is adapted to engage with and to act upon an associated cam surface on an arm 22 which is secured to the upper end of rod 15 which carries the clipping blade 14 on its lower end. The cam surface 21 on projection 20 and the associated cam surface on arm 22 are designed so that the clipping blade 14 will not engage upon the sinkers 7 until the latter have been projected to their outermost position by cam 18 so as to prevent any possibility that the sinkers might hit against the clipping blade and to insure that the blade will accurately engage upon the upper surface of the sinkers. On the other hand, when the clipping blade 14 is retracted to its upper inoperative position, it is located at such an elevation that the dial hooks 4 can emerge freely without hitting against the blade.

Above the dial cap 2 a suction device 25 is mounted, the connecting piece 26 of which is connected to a suction line, not shown, which draws the clipped yarn ends into a container. This suction device 25 has a curved elongated opening which extends over a considerable part of the periphery of the dial.

The shaft 17 may be controlled by the mechanism shown in the patent to Stack No. 2,824,436. The control member 17 is moved at proper intervals by a Bowden cable 31 pivoted at 32 to arm 19. The sheath 35 of the cable is held by a bracket 33 fixed on the machine, and between this bracket and the arm 19 is a compression spring 34. The cable is subjected to tension periodically (FIG. 9) by engagement of a cam 36 carried by a driven disc 37 with a lever 38 to which the other end of cable 31 is connected.

The new clipping mechanism operates as follows:

When a yarn change is to be carried out, at which time one yarn guide is made inactive, while another yarn guide is actuated, shaft 17 is turned by the action of the control mechanism. The clipping sinkers 7 are then moved outwardly underneath the clipping blade 14 and thereafter the blade is lowered upon the projecting ends of the sinkers.

The next yarn guide which is then actuated inserts the yarn at a point which is spaced at an angular distance of about 90° from the position where the yarn is to be cut. The newly inserted yarn is then picked up and knitted by a needle, not shown. This needle moves in a counter-clockwise direction toward the clipping position. While the respective yarn guide is in the inactive position, the free end of the yarn which is to be next inserted is held arrested by the suction of the suction device even while the yarn is picked up and knitted by the needle. When the yarn passes into the area of the projected clipping sinkers 7, it is caught by the serrations thereof, taken

toward the clipping blade, and then cut off. The clipped-off end of the yarn is then sucked up by the suction device 25.

If, on the other hand, a yarn guide is made inactive at a distance of about 90° in front of the clipping position, the last needle by which the yarn has been knitted also takes the yarn along to the position where it is caught by the serrations of a clipping sinker 7. Starting from the yarn guide, the yarn is then placed tangentially underneath the suction device 25, the elongated opening of which extends along the area between the yarn guide and the clipping point. The yarn which is then caught by the clipping sinker is again moved toward the clipping blade and cut off thereby. The end of the yarn which projects from the yarn guide is held arrested by the suction device 25 and held in this position ready for the next yarn change.

Although our invention has been illustrated and described with reference to the preferred embodiment thereof, we wish to have it understood that it is in no way limited to the details of such embodiment, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed our invention, what we claim is:

1. In a circular knitting machine for producing seamless fabrics, said machine having a dial, a dial cap, means mounting the dial and dial cap for rotation relative to one another about an axis, a clipping mechanism comprising a plurality of individual clipping sinkers arranged in a plane transverse to said axis, means on the dial mounting the clipping sinkers for slidable movement with respect to the dial in directions radial to said axis, a movable control member, cam means carried by said dial cap and engageable with said sinkers upon relative rotation between the dial and dial cap, said cam means being movable between an operative position in which the clipping sinkers are moved outwardly and an inoperative position in which the clipping sinkers remain in a more inwardly position, a clipping blade, means mounting said clipping blade for movement between an inoperative position away from the plane of the clipping sinkers and a position adjacent such plane in which it cooperates with at least one of said clipping sinkers moved outwardly by said cam means, and means operatively connecting said cam means and said clipping blade mounting means to the control member for first moving some of said clipping sinkers outwardly and then moving said clipping blade to operative position when said control member is actuated.

2. In a device as claimed in claim 1, said clipping sinkers having serrations at the ends remote from the axis.

3. In a device as claimed in claim 1, said clipping blade being mounted for reciprocatory movement.

4. In a circular knitting machine for producing seamless fabrics, said machine having a dial, a dial cap, means mounting the dial and dial cap for rotation relative to one another about an axis, a clipping mechanism comprising a plurality of individual clipping sinkers arranged in a plane transverse to said axis, means at the lower side of the dial mounting the clipping sinkers for slidable movement with respect to the dial in directions radial to said axis, said clipping sinkers having serrations at their ends remote from said axis, a movable control member, cam means carried by said dial cap and engageable with said sinkers upon relative rotation between the dial and dial cap, said cam means being movable between an operative position in which the clipping sinkers are moved outwardly and an inoperative position in which the clipping sinkers remain in a more inwardly position, a clipping blade, means mounting said clipping blade for reciprocatory movement between an inoperative position away from the plane of the clipping sinkers and a position adjacent such plane in which it cooperates with at least one of said clipping sinkers moved outwardly by said cam means, and means operatively connecting said

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cam means and said clipping blade mounting means to the control member for first moving some of said clipping sinkers outwardly and then moving said clipping blade to operative position when said control member is actuated, each of said clipping sinkers having two inter-

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connected shank portions extending in the same direction but bent at a right angle relative to each other, one outer end of one of said shank portions having the serrations therein forming a section of the periphery of said ring, and the other shank portion having a butt thereon engageable by said cam means for moving said sinker.

5. In a circular knitting machine for producing seamless fabrics, said machine having a dial member, a dial cap member, means mounting the dial member for rotation relative to the dial cap member about an axis, said members having opposed faces, a clipping mechanism comprising a plurality of individual clipping sinkers arranged in a plane transverse to said axis, radial grooves means in one of said opposed faces mounting the clipping sinkers for slidable movement with respect to the members in directions radial to said axis, said clipping sinkers having serrations at their ends remote from said axis, a movable control member cam means carried by one of said members engageable with said sinkers upon relative rotation between the members, said cam means being movable between an operative position in which the clipping sinkers are moved outwardly and an inoperative position in which the clipping sinkers remain in a more inwardly position, a clipping blade, means mounting said clipping blade for movement between an inoperative position away from the plane of the clipping sinkers and a position adjacent such plane in which it cooperates with at least one of the clipping sinkers moved outwardly by said cam means, and means operatively connecting said cam means and said clipping blade mount-

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ing means to the control member for first moving some of said clipping sinkers outwardly and then moving said clipping blade to operative position when said control member is actuated.

6. In a device as claimed in claim 1, means controlled by the control member to return the clipping blade to inoperative position before the clipping sinkers are moved inwardly.

7. In a device as claimed in claim 1, suction means operatively associated with said clipping mechanism for removing the yarn ends cut off by said mechanism and for holding the free yarn ends in an arrested position.

8. In a machine as claimed in claim 1, said dial having radial grooves at the lower side thereof, said sinkers being slidable in said grooves.

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