

Oct. 14, 1941.

I. W. GROTHEY ET AL

2,259,375

CLAMPING AND CUTTING MECHANISM FOR CIRCULAR KNITTING MACHINES

Filed Dec. 23, 1938

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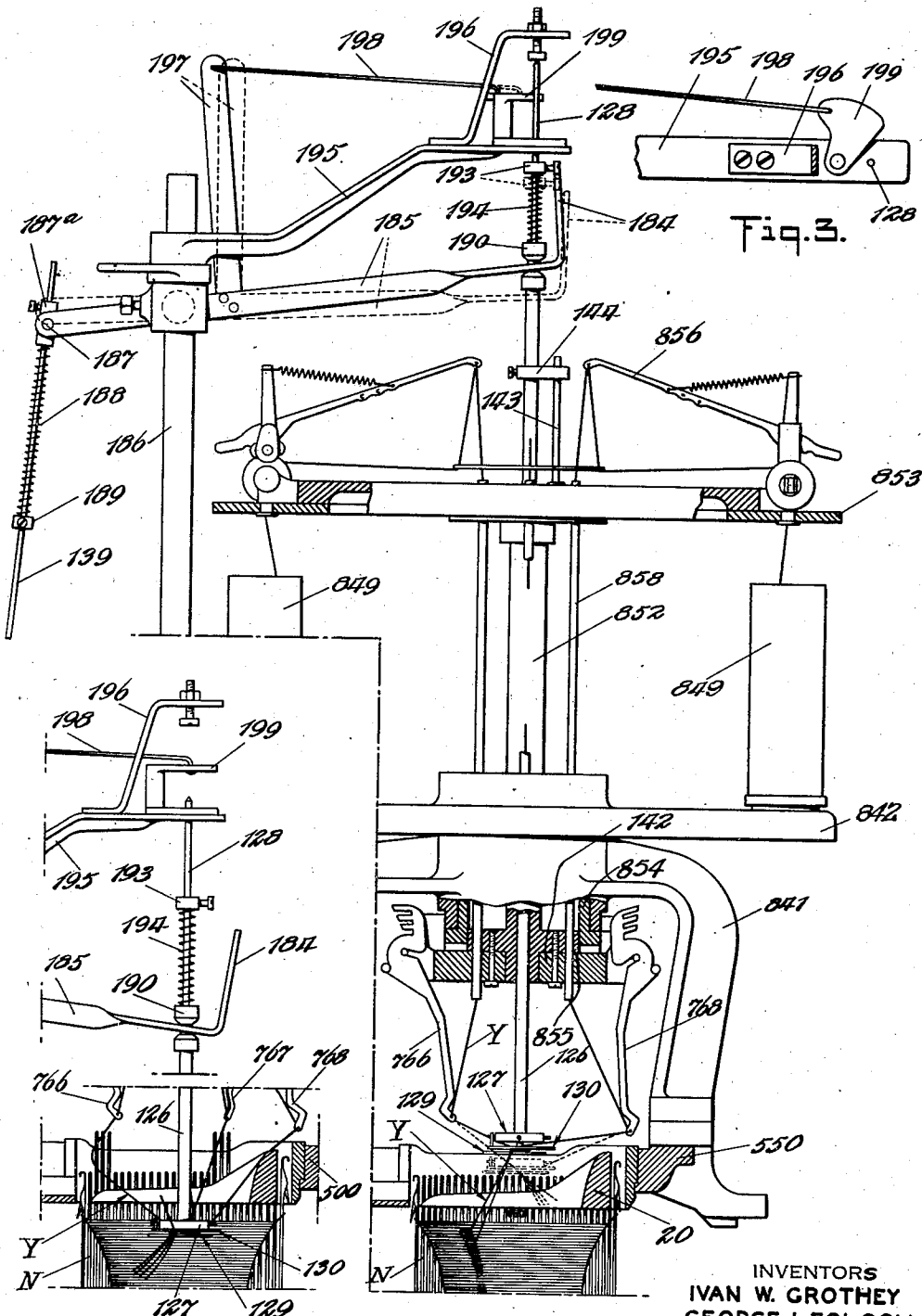


Fig. 2.

Fig. 1.

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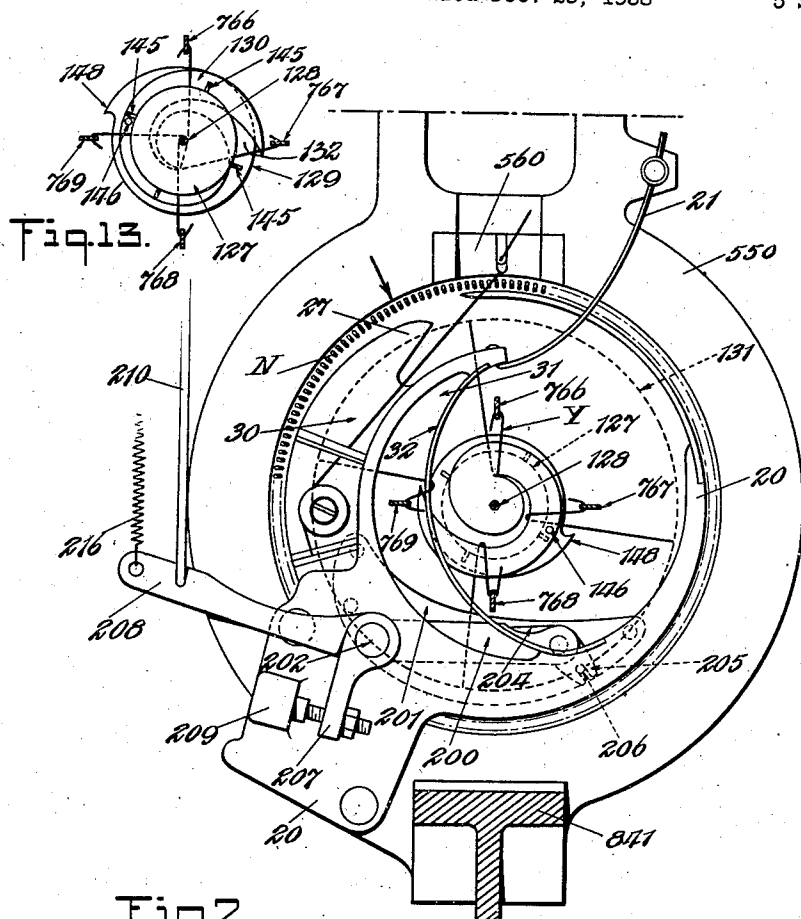
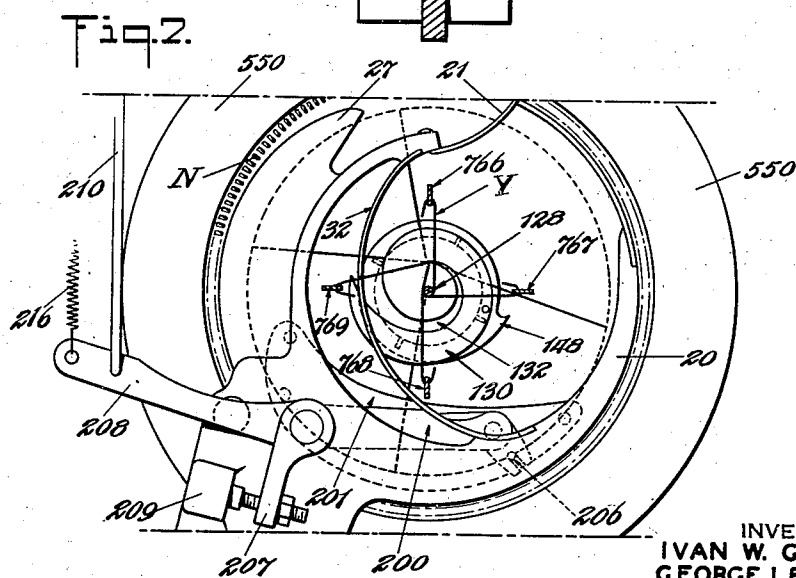


Fig. 6.



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5 Sheets-Sheet 5

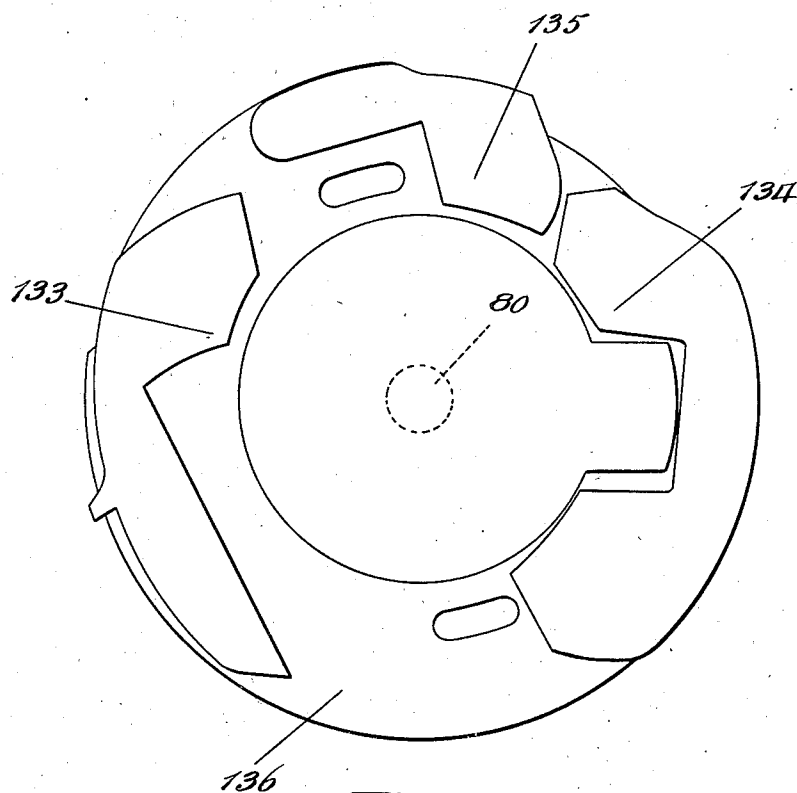


Fig. 11.

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2,259,375

CLAMPING AND CUTTING MECHANISM FOR
CIRCULAR KNITTING MACHINES

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22 Claims. (Cl. 66—134)

This invention relates to yarn clamping and cutting means for circular hosiery knitting machines, and more particularly to automatic means suitable for handling wrap yarns. One object of the invention is to clamp and cut wrap yarns in a manner which clears the space inside the needle circle so that bights of other yarns can sweep around inside the circle, i. e., in the knitting area without becoming entangled with the wrap yarns, and which will permit the wrap yarns to be reintroduced automatically at a later point in the knitting.

In making half hose with wrap patterns therein and with elastic incorporated in the top, it is often desirable to place the elastic thread in spaced courses and skip the other courses without cutting the elastic. This means that repeatedly during the making of the top, bights of yarn between the last needle to take the elastic and the yarn finger will be sweeping around inside the needle circle at about the level at which the elastic is fed. It is obvious that such bights of elastic would tangle with any wrap yarns passing vertically through the needle circle from the wrap yarn fingers to the fabric. If the hose are being knit in string work, the same problem may arise in connection with other yarns. According to the present invention, means are provided which automatically gather, clamp and cut the wrap yarns and hold them above the knitting area when not needed, returning them to position for the wrap yarn fingers to introduce the yarns when it is time for the wrap patterning to begin. If each piece of hosiery is being knit and pressed off individually, then the present invention gives a saving in wrap yarns.

In the drawings,

Fig. 1 is a view in side elevation, partly sectional, of the upper part of a Scott & Williams revolving needle cylinder machine embodying the invention, showing the clamping means and associated parts in solid lines in their highest position gathering yarns, and in dotted lines in their intermediate position holding the yarns out of action;

Fig. 2 is a view in side elevation of the clamping means and associated parts in the lowermost or feeding position;

Fig. 3 is a plan view of the stop shown in Fig. 1 and adapted to release the clamping means from its two lower positions to move to the two upper positions;

Fig. 4 is a side view similar to Fig. 1, showing the clamping means and associated parts in solid lines in a low position with the yarns released, and in dotted lines in yarn out-of-action position;

Fig. 5 is a plan view similar to Fig. 3, of the stop of Fig. 4;

Fig. 6 is a plan view of the latch ring, needle

circle and clamping and cutting means, showing four wrap yarns being gathered into the clamping means;

Fig. 7 is a plan view similar to Fig. 6, showing the yarns clamped and the parts in the dotted line or intermediate position of Fig. 1;

Fig. 8 is a plan view similar to Figs. 6 and 7, showing the yarns clamped and the cutter about to operate;

Fig. 9 is a side view of the pattern disk and levers controlling the clamping means;

Fig. 10 is a perspective view of the levers controlled from the main pattern drum for operating the cutter;

Fig. 11 is a side view of the pattern disk and the cams for controlling the clamping means;

Fig. 12 is a side view of a half hose containing a wrap pattern and a top with elastic incorporated therein, such as can be made by the machine shown in Figs. 1 to 11, inclusive; while

Fig. 13 is a plan view of the spiral and lower disk with the wrap yarns in the spiral.

The invention will be shown and described embodied in the well-known Scott & Williams seamless hosiery knitting machine having a revolving needle cylinder, such for instance as shown and described in the patent to Robert W. Scott No. 1,152,850, dated September 7, 1915, and containing wrap pattern mechanism of the type shown in the patents to William N. Taggart Nos. 2,025,913, dated December 31, 1935, and 2,117,920, dated May 17, 1938, and in the patent to Albert E. Page and Harry Swinglehurst, Jr., No. 1,906,204, dated April 25, 1933.

The machine has the usual circle of independent latch needles N revolving in a slotted needle cylinder (not shown). There is the usual guard or shear bracket 20 inside the needle circle for keeping the wrap yarns Y out of the needles which are not to take the pattern yarns. There also is a separator 30 formed as part of the shear bracket 20. The separator and a guide wire 21 keep the wrap yarns and body yarns separate at the point where the body yarns are fed to the needles (Figs. 6, 7 and 8). When a body yarn is put out of action it is held above the notch formed by a shoulder 27 on the separator 30 and by the main yarn clamp (see Page and Swinglehurst Patent 1,906,204 above referred to). The separator 30 has an opening edge 32 to guide the wrap yarns, this edge being spaced from the main part of the separator to permit access in back of the edge to the parts below the separator. The shear bracket 20 and separator 30 are shown as a unitary element. The separator, shoulder and associated wire are omitted from Figs. 1, 2 and 4 in the interests of clarity.

The latch ring 550 is pivoted on a post at the rear of the machine, as usual, and carries the following usual parts mounted on it. There is

a wrap yarn or main bracket 841 mounted directly on the latch ring at the front and rear of the machine, supporting the wrap head 142 which carries the wrap yarn fingers 766, 767, 768, 769. Just above this bracket 841 is a bobbin disk 842 resting on the bracket and carrying the wrap yarn bobbins 849. By means of a set screw a gland 854 is supported by the bobbin disk and a shaft 852 is supported inside the gland. On the lower end of the shaft is a shoulder 855 to which is screwed the wrap head 142. The shaft 852 supports a takeup bracket 853 above the bobbins 849. On the takeup bracket are takeups 856 for the individual wrap yarns. Extending through the take-up bracket, the gland and the wrap head, are yarn tubes 858 for the individual wrap yarns. Each wrap yarn goes upwardly from its bobbin 849 through its own spring takeup 856 and downwardly through its tube 858 to a position below the wrap head where it is threaded through the feeding end of a yarn finger 766, 767, 768 or 769. As described in the issued patents to Taggart and to Page and Swinglehurst above mentioned, these pattern yarn fingers 766—7—8—9 are adapted to swing their feeding ends across the needle circle whenever it is desired to use that particular wrap yarn in the fabric, the remainder of the wrapping operation being described in these patents. The fabric can be pressed off the needles at any subsequent rack of the main pattern drum.

The novel clamping means is located in the middle of the needle cylinder below the wrap head and is adapted to move vertically to carry out the necessary manipulations of the wrap yarns in the following manner. Some of the principal elements of this clamping means are two elements vertically movable independently of the wrap head either as a unit or independently. The shaft 852 is hollow and mounted inside it is a clamp tube 126 on the lower end of which is mounted a circular plate or disk 127 which will be called the clamp. Inside of this clamp tube 126 is a small rod 128 which is revolvable with relation to the tube. Fixed tightly on the lower end of the rod and below the clamp are a disk or lower plate 129 and above that plate a spiral disk or spiral 130. The lower disk 129 and the spiral 130 are separated about $\frac{1}{8}$ " by a shoulder which is shown formed on the disk. The diameter of the lower disk is such as to underlie the middle part of the spiral 130 but not the outermost end. The relative dimensions of these two parts can be seen in Figs. 6, 7, 8 and 13. In order that it may gather the yarns to be clamped, the outer end of the spiral 130 extends outward to a point radially beyond the operating edge 32 of the separator 30. The circle formed by the upper edge of the knitted fabric inside the needles is marked by the line 131 and a wrap yarn Y is shown extending from the last course knitted to each pattern yarn finger 766—7—8—9 (Figs. 6, 7 and 8). The yarn fingers are above the separator so that the yarns coming from the fingers must pass radially inside the edge 32 of the separator to reach the needles. The yarns therefore contact the edge of the lower plate 129, with the result that if the point of the spiral 130 were to stop revolving it would engage the pattern yarns running through the fingers. Such stoppage, of course, need be only relatively to the pattern yarn finger to gather the yarns and preferably should not be a movement relatively to the separator edge 32. Thus when the spiral is kept stationary in the position shown in Figs. 75

6 and 7 and the needle cylinder and pattern yarn fingers are revolved counterclockwise, as they appear in these two figures, each of the pattern yarns will in turn be caught in the opening 132 of the spiral 130 and brought into the inner end of that opening. This relative movement between the spiral and the yarn fingers guides the bights of the pattern yarns Y coming from the fabric in between the spiral and the lower plate 129 (Figs. 1, 6 and 7). When the spiral 130 and clamp 127 are pressed against each other, the pattern yarns are clamped.

The control means which will now be described makes these clamping operations possible and also certain other manipulations. The primary control for the spiral 130 and the clamp 127 is shown in Fig. 9 and consists of a set of cams 133, 134, 135 on a disk 136 on the pattern chain shaft 80. (The disk and cams could be unitary, if desired.) This disk is racked around in unison with the main pattern drum 120. As it appears in Fig. 9, the disk revolves in a clockwise direction and is read by the end of an arm 137 pivoted on the main frame A of the machine. This arm 137 extends rearwardly past the main pattern drum and its rear end is connected to an upwardly extending flat bar 138. The movements of the upper end of this flat bar 138 are transmitted to a vertical rod 139 by a rocker arm 140 pivoted on an extension 141 on the frame of the machine about the level of the bedplate B.

The manner in which this rod 139 is connected to the clamp tube 126 and the spiral disk rod 128 can be seen in Figs. 1 and 4. The upper end of the vertical rod 139 is connected to a horizontal lever 185 pivoted on a post 186 on the wrap head bracket 841. The connection between the rod 139 and the horizontal lever 185 is not only pivotal but partially spring-pressed. Pivotality is carried on the rod 139 in the rear end of the horizontal lever is a stud 187 through which the upper end of the rod slides freely. Below the stud is a freely sliding collar and a compression spring 188 on the rod 139, the lower end of the spring being held by an adjustable collar 189. It will be seen that upward movement of the rod 139 will result in the forward end of the horizontal lever 185 being lowered. The compression spring 188 allows the wrap head to be tipped backwards when desirable. Above the horizontal arm 185 on the rod 139 is a collar 187a with a set screw tight on the rod. This makes it possible for the rod to pull the rear end of the lever down.

The forward end of this horizontal or main lever 185 is at the center of the machine and above the axis of the needle cylinder. It is connected to the clamp tube 126 by means of two collars 190 fixed on the upper end of the tube 126 and it is slotted to take up the changes in angular relation between the horizontal lever 185 and the tube 126. It will be seen that the vertical movements of the clamp 127 and the rocking of the horizontal lever 185 are always in unison with each other. The vertical movements of the rod 128 carrying the spiral 130 are also controlled by the horizontal lever 185 but through the intermediary of the following springs and stops. There is an adjustable collar 193 tight on the rod 128 above the upper main collar 190 on the clamp tube 126. Between this upper main collar 190 and the adjustable collar 193 there is a compression spring 194. Thus when the lever 185 raises the clamp tube 126, the compression spring 194—acting through the

collar 133—will cause the rod 128 to be raised unless prevented by one of the stops to be described. Mounted on the post 186 above the horizontal lever 185 is a bracket 195 overlying the axial center of the machine. There is a small hole through this arm 195 at the axial center of the machine through which projects the upper end of the rod 128. Above the arm 195 and carried thereon is a limit stop 196 for the rod 128. When the upper end of the rod 128 is in contact with the limit stop 196, the spiral 130 is in the solid line position shown in Fig. 1. In this position the spiral and clamp are separate and the machine is ready to gather the yarns to be clamped.

This rod 128 which carries the spiral 130 also has a removable intermediate stop associated with it. This is shown in Figs. 1 to 5 and comprises an arm 197 extending upwardly from the horizontal lever 185. From this arm a rigid wire 198 extends to a pivoted plate 199 overlying the axial center of the machine. This plate is so pivoted that it will overlie the pin 126 and prevent its rising above a fixed level in certain positions of the horizontal arm 185 (see the solid line position in Fig. 5). This intermediate stop is used in connection with the release of the wrap stripe yarns after patterning begins.

As already explained, if the spiral is forced to remain stationary while the wrap yarns rotate, it will catch the wrap yarns as they pass and cause them to be drawn into the inner end of the opening 132 formed by the spiral. To stop the rotation of the spiral for this gathering operation, there is an upwardly extending end 184 on the horizontal lever 185. This end is adjacent the rod 128 and extends upwardly to a level in the neighborhood of the set screw of the collar 133 on the rod 128. The end is bent at such an angle that it swings into the path of the set screw on the rod when the horizontal lever is in its uppermost position (see the solid line position in Fig. 1). In this position the end prevents the set screw on the rod from revolving and the point of the spiral is stopped while underlying the edge 32 of the separator, as shown in Figs. 6 and 7. The clamp 127 and spiral 130 are kept revolving with the wrap yarns except when the spiral is held for the gathering of the wrap yarns. The drive is obtained from the takeup bracket acting through the clamp tube 126. As shown in Figs. 1 and 4, there is a pin 143 upstanding on the takeup bracket 353 and revolving therewith. Sliding up and down on this pin in accordance with the vertical movements of the clamp tube 126 is an arm 144 rigidly carried on the tube. The tube always revolves with the takeup bracket and the wrap fingers. This motion can be transmitted to the spiral 130, except when gathering the wrap yarns, by means of interengaging pins on the clamp 127 and spiral 130 (see Fig. 13). In the drawings there are four pins 145 radiating from the periphery of the clamp ninety degrees apart. To engage one of these radiating pins there is a vertical pin 146 on the periphery of the spiral. This vertical pin 146 is of such length that its upper end is below the pins on the clamp when the spiral is gathering the wrap yarns (solid line position of Fig. 1). Thus the vertical pin clears the radiating pins when the spiral and clamp are separated to gather the yarns, at which time the spiral is held from rotation by the end 184

of the arm 185 engaging the set screw in the collar 133.

The cutting mechanism for the wrap yarns, which of course is necessary to provide an unobstructed space for the elastic yarn R to sweep around inside the needle circle between the courses in which the elastic is incorporated, is not mounted axially of the needle cylinder in the embodiment shown in the drawings (Figs. 6 to 10). The cutter arm 200 is carried by a pin 202 and is located above a plate 201 screwed on the bottom of the shear bracket 20. The pin 202 carrying the cutter arm 200 extends vertically upward through the bracket 20 and the arm is moved into and out of operative position by the turning of this pin. The cutting point is located about 180° in advance of the throat plate of the machine, and it is the end of the cutter arm nearest the needles as they come from the throat plate which is pivotally mounted. The free or inner end of the cutter arm is recessed slightly at 203 on the side toward the center of the machine. On the end of the cutter arm in a horizontal slot is pivoted a cutter blade 204 having an end with an open slot or fork 205 extending outwardly from the back face of the end of the arm and adapted to engage a pin 206 projecting from the plate 201 when the arm is in idle position. As can be seen by comparing the positions of the parts in Figs. 6 and 8, when the cutter arm 200 is swung radially inward toward the center of the circle the pin 206 serves to swing the cutter blade 204 to open position before the fork and pin disengage. The recess 203 in the side of the free end of the cutter arm is only in the part of the arm above the slot containing the blade 204. Below the slot the arm is substantially straight and is sharpened to form a cutting edge. In addition there is a curved safety notch or hook 147 extending from the point of the blade 204 in the manner of a fishhook (see Fig. 8). The point of the hook just overlies the cutting edge of the arm below it but is not long enough to reach the bottom of the recess 203 above it. A wrap yarn swept into the enclosure will bend into the recess 203 and get by the hook 147. Once in, and moving in a counterclockwise direction, it cannot escape. To bring the wrap yarns to the cutter there is a notch 148 in the edge of the lower plate 130 (see Fig. 13). The bights of wrap yarn projecting from the clamp to the fabric ride in contact with the periphery of the lower plate and they will be pushed by the notch into the space formed by the blade, the hook and the cutting of the arm. This arrangement also insures that the yarns to the fabric are kept taut. The mounting of the cutter blade 204 in the cutter 200 is such that it cannot open wider than the position shown in Fig. 8, and when the cutter swings back toward its inoperative position under the plate 201, any wrap yarns which have not been cut up to that time will be cut in the notch formed by the sharpened edge in the recess and the cutter blade 204.

The movement of the cutter to and from operative position can be controlled from the main pattern drum by the mechanism shown in Fig. 10. For this purpose there is a unitary stop 207 and operating arm 208 fastened on the upper end of the pin 202. There is a lug 209 on the separator which can serve as a stop post for the stop 207. The positioning of the stop is adjustable by means of a set screw. The stop 207 and the operating arm 208 are rigidly arranged with re-

lation to each other and to the post or pin 202 carrying the cutter arm 200, so that movements transmitted to the operating arm 208 move the cutter and the stop in unison therewith. The indications of a drum cam on the main pattern drum 120 are transmitted by the corresponding thrust rod 215 to the operating arm 208 by the following parts. These comprise a rocker arm 214 free to turn on a shaft 212 carried by the main frame of the machine and linked to the upper end of the thrust rod. Overlying this rocker arm 214 is a pin 213 carried by the lower arm of a bell crank lever 211 also rocking freely on the shaft 212. The upper arm of this bell crank lever is pivotally connected to a wire connecting link 210 which extends to the operating arm 208. This linkage is so arranged that when the thrust rod 215 rides up on a cam on the main pattern drum, the operating arm 208 is moved in a counter-clockwise direction and the cutter arm 200 moves to its operating position. There is a tension spring 216 connected to the free end of the operating arm 208 and to some stationary part of the machine at the rear, which tends to pull the cutter arm 200 back into its inoperative position as soon as the thrust rod 215 rides off the cam on the main pattern drum.

The construction of the mechanism having been set forth, its operation will now be described. Let us assume that the half hose shown in Fig. 12 is being knit from top to toe and that the stocking has been completed down to the toe. At this point the main pattern drum is given an auxiliary rack forward to start the ring toe and the shaft 80 carrying the disk 136 and the cams 133, 134 and 135 controlling the yarn clamping means. This brings the end of the reading lever 137 up onto the highest point of the cam 133, raising the horizontal lever 185 to its highest point. In this position of the parts the end 184 of the lever engages the set screw 193 and stops the spiral 130 from revolving (see the solid line position of the parts in Figs. 1 and 6). The rod 128 is in its highest position and the clamp 127 is separated from the spiral. About two courses later, there is a main rack and the lever 137 rides off the high point of the cam 133, dropping the tube 126 and the clamp 127 so that the yarns are clamped between the clamp 127 and the spiral 130. After the toe is completed another rack of the main pattern drum actuates the cutter mechanism to bring the cutter arm 200 and blade out to operative position, as shown in Fig. 8, where they engage the wrap yarns. At the end of four revolutions, for example, the cutter snaps back to idle position, cutting off the wrap yarns.

When it is time to introduce elastic yarn, the lever 137 is riding on the long surface of cam 134 which is lower than the high point of the first cam 133. This raises the parts to the intermediate or dotted position shown in Fig. 1 where the wrap yarns are above the fabric circle and knitting area and high enough to allow the elastic yarn to sweep under the clamp and retrieve during the making of the top.

After completion of the portion of the half hose containing the elastic yarn R (see the fabric in Fig. 4), and assuming it is time to begin the wrap pattern, the shaft 80 is racked again and the end of the lever 137 drops down onto the low end of the cam 134. The parts are now in their lowest position, as shown in Fig. 2. In this position the wrap fingers 786-7-8-9 can introduce the wrap yarns to the needles, as required by the pattern. When all the wrap yarns

needed anywhere in the pattern have been knit in, they are released from the clamp. This is done by racking the main drum and disk 136 till the lever 137 rests on the lower or leading end of the cam 135. The parts are now in the solid line position of Fig. 4. In this position the intermediate stop 199 holds down the rod 128 holding the spiral and lower disk down against the last of the upward swing of the arm 185, thereby effecting release of the yarns. The parts stay in this position until the machine is going into the knitting of the heel. At this point the disk 136 is racked again, bringing the lever 137 on the high or following portion of the cam 135. This brings the parts back to the intermediate level shown in dotted lines in Fig. 4 with the intermediate stop retracted and both the clamp and the spiral raised enough to be out of the way. The parts remain in this position till the ring toe is reached.

The sequence of vertical movements of the clamp and spiral and the position of the horizontal lever in which the revolution of the spiral is stopped can be altered without departing from the scope of our invention. Many other modifications which do not depart from the scope of our invention will occur to those skilled in the art.

What we claim is:

1. In a circular knitting machine, a circle of revolving needles, body and wrap yarn feeding means and means operating said needles to knit said yarns, in combination with revolving clamping and cutting means for said wrap yarns and means automatically operating the clamping and cutting means.
2. In a circular knitting machine, a circle of needles and wrap yarn feeding means inside the circle, in combination with vertically movable means located axially inside the needle circle, adapted to automatically clamp and release yarn from the wrap feeding means.
3. In a circular knitting machine, a circle of revolving needles, wrap yarn feeding means inside the circle and revolving means located inside the circle for clamping the yarn from said feeding means, said clamping means comprising two elements revolving with the needles vertically separable with relation to each other.
4. In a circular knitting machine, a circle of independent needles and means feeding wrap yarn so that it carries inside the circle, in combination with clamping means located axially within said circle and rotatable with relation to the yarn feeding means for the purpose of gathering yarns.
5. In a circular knitting machine, a circle of needles and a plurality of wrap yarn fingers inside the needle circle, in combination with means inside the circle adapted to clamp wrap yarns, said means being movable to hold the yarns out of action above the knitting area.
6. In a circular knitting machine, a circle of needles, a plurality of warp yarn fingers adapted to carry yarn around the needles from inside the circle and a head carrying said fingers, in combination with means adapted to clamp the yarn presented by said fingers, said means being movable independently of the head to hold the clamped yarn out of action above the knitting area.
7. In a circular knitting machine, a circle of independent needles and a plurality of wrap yarn fingers adapted to present yarn to the needles from inside the circle, in combination with yarn

clamping means inside the needle circle vertically movable into and out of position for cooperation with the fingers in presenting yarn to the needles.

8. In a circular knitting machine, a circle of independent needles and a plurality of yarn fingers normally having their feeding ends inside the needle circle, in combination with clamping means comprising two elements vertically movable with relation to each other and between which the yarns are clamped, said elements also being movable vertically as a unit with relation to the fingers to assist in positioning the yarns for wrapping.

9. In a circular knitting machine, a circle of independent needles and a plurality of wrap yarn fingers normally having their feeding ends inside the needle circle, in combination with axially located clamping means comprising means to gather the warp yarns together and a clamp movable vertically with relation thereto adapted to clamp the yarn against the gathering means.

10. In a circular knitting machine, a circle of needles and a plurality of wrap yarn fingers, in combination with axially located clamping means comprising a member to gather the wrap yarns together and an element to clamp the yarns against the gathering member, and means adapted to bring said two elements together and separate them vertically for clamping and releasing the yarns, said last mentioned means also being adapted to move said two elements upward as a unit to clear the clamped yarns above any yarns which may sweep around the needle circle, and cutting means for said clamped yarns.

11. In a circular knitting machine, a needle cylinder, a circle of independent needles therein, a plurality of wrap yarn fingers and clamping means for the wrap yarns axially located with relation to the needle cylinder, said clamping means comprising a clamping plate, a spiral disk to cooperate with the plate in clamping the yarns, means supporting said two means for movement vertically as a unit with relation to the needles and to cause the disk to rotate relatively to the fingers to gather the yarns together, in combination with a cutter below the clamping means to cut off the clamped yarns and means to operate the cutter and clamp to clear space for other yarns to sweep around the needle circle under the clamp.

12. In a circular knitting machine, a rotating needle cylinder, a circle of independent needles therein, a plurality of wrap yarn fingers, a wrap head supporting same above the needles, clamping means for the wrap yarns comprising a disk and a spiral gathering disk for clamping the yarns, said two elements being mounted coaxially inside the needle circle, means supporting the two elements for independent or united vertical movement independent of the head and giving them rotation in synchronism with the needle cylinder, in combination with means adapted to halt rotation of the spiral disk for a short time to cause it to gather the yarns together for clamping.

13. In a circular knitting machine, a circle of needles and means feeding wrap yarn so that it carries inside the circle, in combination with clamping means for said yarn, said means comprising two vertically sliding coaxial elements and a stop adapted to prevent one member rising

above a fixed level, thereby causing separation of the two elements and a taking or release of the yarn.

14. In a circular knitting machine, a circle of needles and means feeding yarns so that they pass inside the circle, in combination with clamping means for said yarns, said means comprising two vertically movable elements, a stop adapted to be swung into and out of operative position and means adapted to move said two elements vertically, said stop, when in its operative position, preventing the lower clamping member from rising above a fixed level, thereby causing release of the yarns between the two vertically movable elements.

15. In a circular knitting machine having means to feed an elastic thread, mechanism for forming wrap patterns, in combination with means to cut and clamp the wrap yarns above the level where the elastic is fed.

16. In a circular knitting machine, a circle of needles, wrap yarn feeding means inside the circle and means to feed an elastic thread, in combination with means adapted to place yarn from the wrap yarn feeding means above the feeding level of the elastic thread.

17. In a circular knitting machine having a circle of needles and means to feed an elastic thread in spaced courses, mechanism for forming wrap patterns, in combination with means to cut and clamp wrap yarns to provide space for the elastic thread to sweep across the circle in those courses where the elastic thread is not incorporated in the fabric.

18. In a circular knitting machine, a circle of needles, wrap yarn feeding means associated therewith and means to feed an elastic thread, in combination with clamping means for the wrap yarns located inside the circle comprising two elements vertically movable with relation to each other and adapted to move the wrap yarns above the feeding level of the elastic thread.

19. In a circular knitting machine, a circle of needles and wrap yarn feeding means, in combination with clamping means for said yarns, said means comprising two vertically movable clamping elements and stops at different levels adapted to prevent one such element rising above fixed levels, thereby causing separation of the two elements for receiving or releasing yarns, one of said stops being movable out of operative position.

20. In a circular knitting machine, a revolving circle of needles, body and rotating wrap yarn feeding means and means operating said needles to knit said yarns, in combination with a clamp for the wrap yarns independent of the body yarns adapted to revolve with said yarns.

21. In a circular knitting machine, a revolving circle of needles, body yarn feeding means and a clamp and cutter for the body yarn, in combination with wrap yarn feeding means inside the needle circle and a separate cutter and clamp for the wrap yarns rotatable therewith.

22. In a circular knitting machine, a revolving circle of needles, body yarn feeding means and a clamp and cutter for the body yarn, in combination with wrap yarn feeding means inside the needle circle, a separate cutter and clamp for the wrap yarns rotatable therewith and comprising a member adapted to gather wrap yarns into the clamping means.

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