March 23, 1965 W. MAYER 3,174,307

THREAD CHANGING APPARATUS

Filed March 6, 1961 4 Sheets-Sheet 1

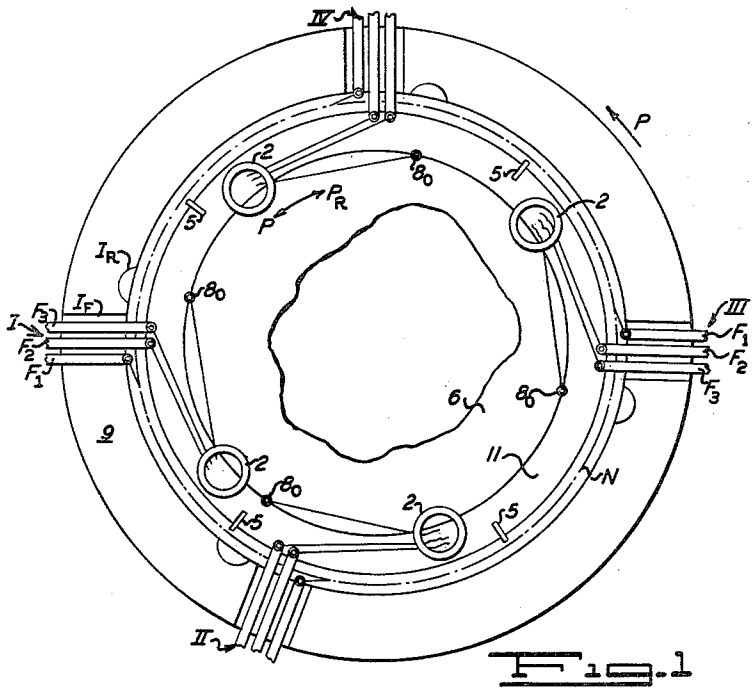

Fig. 1

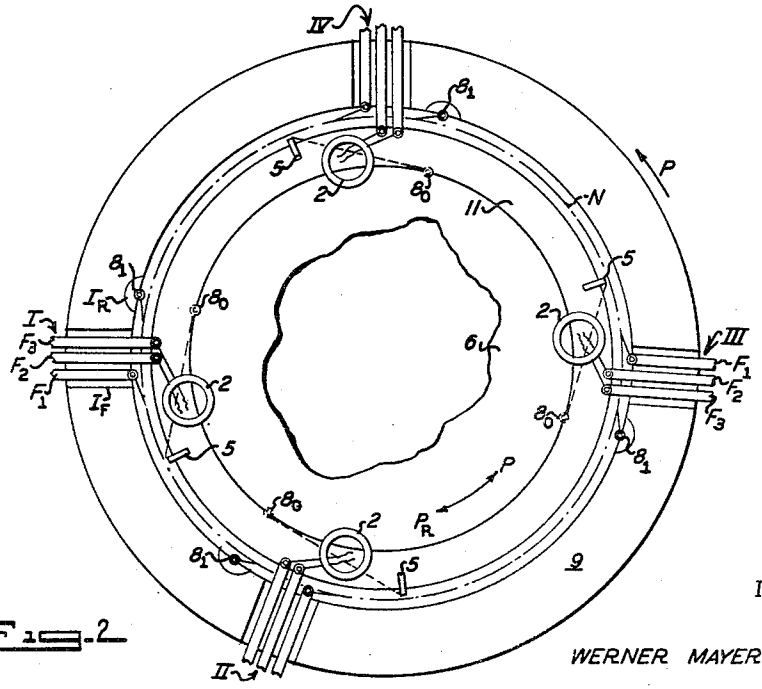

Fig. 2

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March 23, 1965 W. MAYER 3,174,307

THREAD CHANGING APPARATUS

Filed March 6, 1961 4 Sheets-Sheet 2

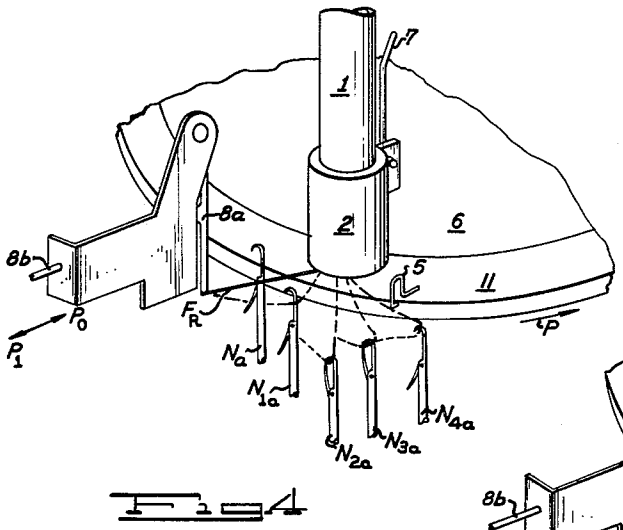

Fig. 1

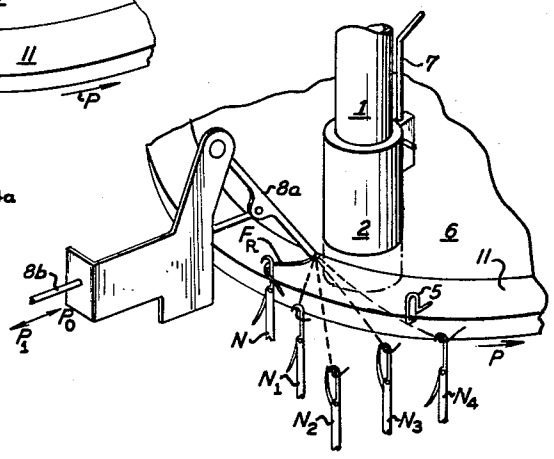

Fig. 3

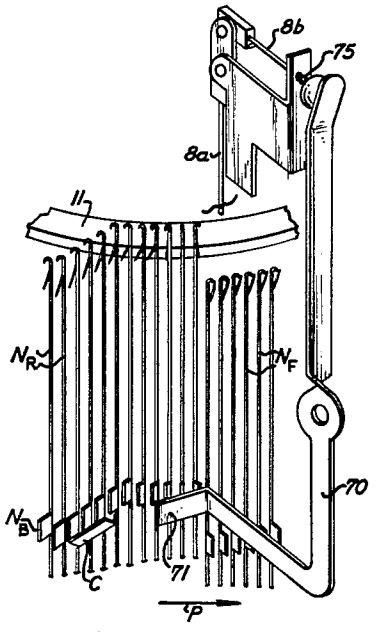

Fig. 10

Fig. 11

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March 23, 1965 W. MAYER 3,174,307

THREAD CHANGING APPARATUS

Filed March 6, 1961 4 Sheets-Sheet 3

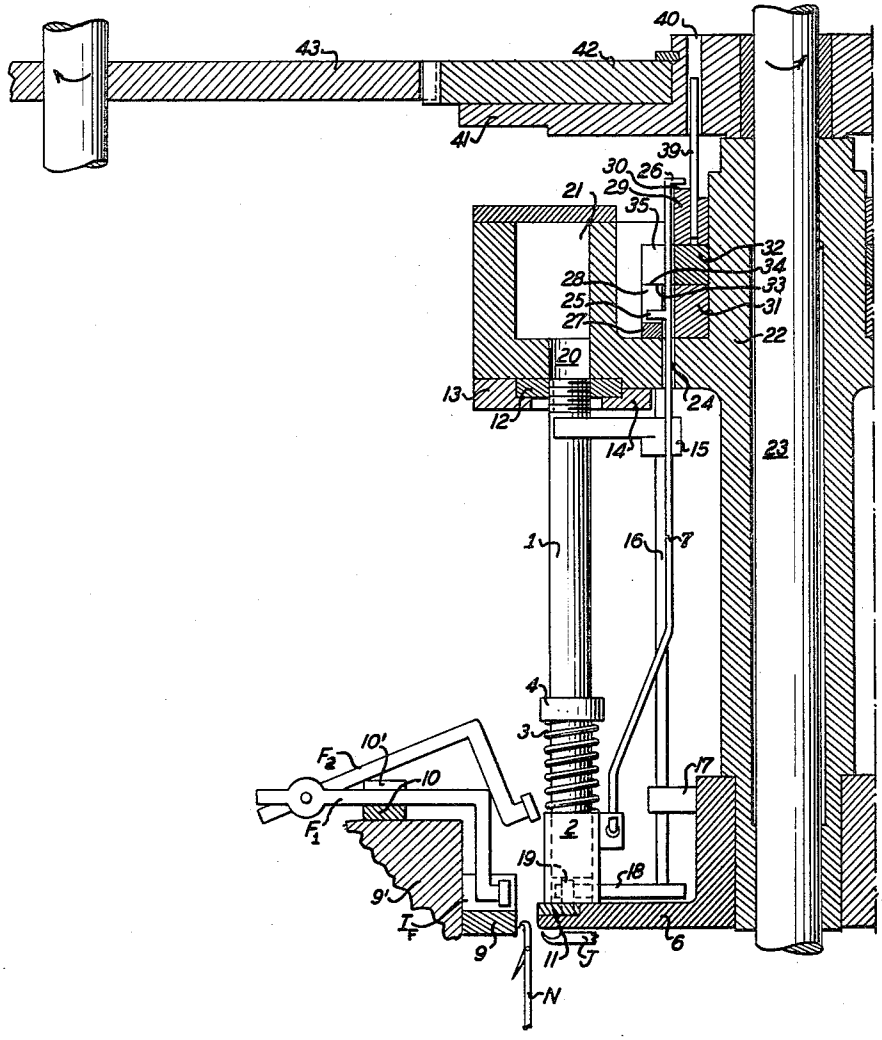

Fig. 5

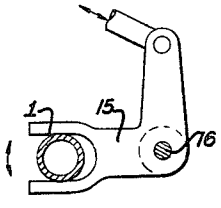

Fig. 5a

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March 23, 1965 W. MAYER 3,174,307

THREAD CHANGING APPARATUS

Filed March 6, 1961 4 Sheets-Sheet 4

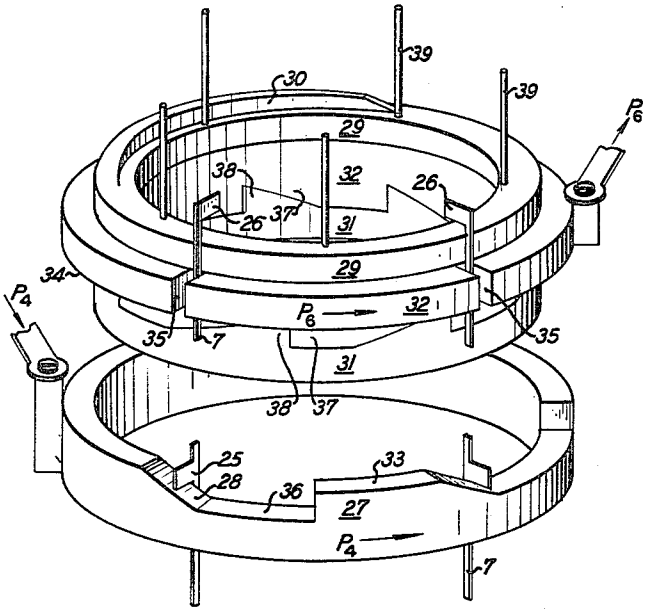

Fig. 6

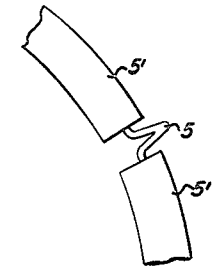

Fig. 8

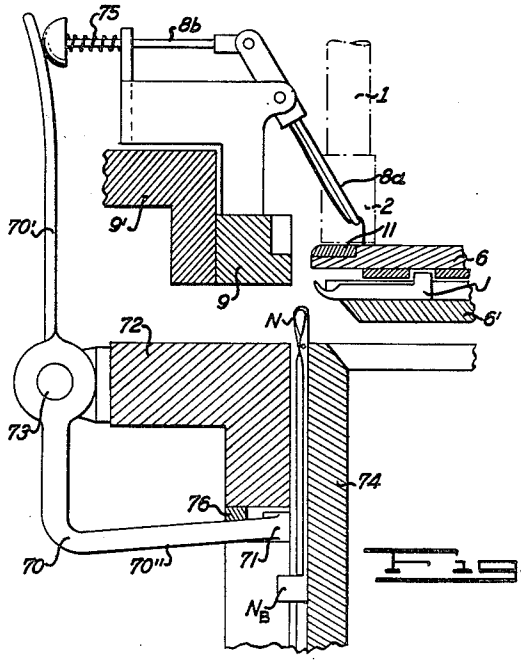

Fig. 9

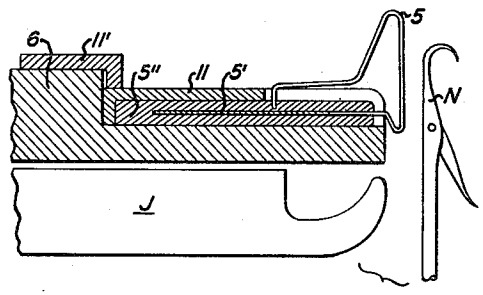

Fig. 7

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United States Patent Office 3,174,307 Patented Mar. 23, 1965

3,174,307

THREAD CHANGING APPARATUS

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Filed Mar. 6, 1961, Ser. No. 93,804
Claims priority, application Germany, Mar. 18, 1960, Sch 27,608
16 Claims. (Cl. 66—134)

The present invention relates to a thread changing apparatus for circular knitting machines, and more particularly for circular knitting machines used for the production of seamless hose, wherein the reinforcement thread is severed immediately adjacent the edge of the reinforcement portion during the knitting operation.

As is known, partially reinforced tubular fabrics are continuously produced on circular knitting machines, the reinforcement thread guide being inserted and withdrawn during each rotation of the cylinder, so that the reinforcement thread is fed to the needles disposed along a definite portion of the periphery of the cylinder only. On the other hand, the reinforcement thread is not worked in along the remaining portion of the periphery of the cylinder and merely floats at the back of the fabric being knitted. These floating thread pieces must be removed after the knitting process by means of an additional operation. Particularly, in the case of seamless fine or sheer stockings, turning the stocking inside out in order to remove the floating threads, manually cuting the floating threads, and repeating the turning of the stocking right side out, all represent an onerous task which frequently results in damage to the stocking and the slowing down of production.

Several devices have already been adopted, by means of which it is possible to sever the floating threads along the non-reinforced portion of the stocking during the knitting process. These devices as a rule comprise mechanical grippers or clampers and shears of the most varied constructions, for example, as described in U.S. Patent 2,667,053 and 2,749,731. A number of these devices is associated moreover with a suction system in order to remove the severed thread ends in consequence of the clamping and cutting operation (see for example U.S. Patent 2,810,280).

These known devices, however, have proved to possess certain deficiencies, and therefore do not represent a satisfactory solution. Among these difficulties is the fact that the cutting device and the gripper should not occupy more than a very restricted space in view of the very compact form of construction utilized, particularly in the case of multi-feed fine-or sheer hosiery knitting machines. In order to assure reliable gripping and severing of the reinforcement threads at each revolution of the cylinder, the clamping action should occur as closely as possible to the reinforcement thread guide in use. Since the clamping and severing device should, therefore, in each instance, assume a definite position relative to the thread guide in order to clamp and sever a thread, it is necessary to associate a separate clamping and severing device with the reinforcement thread guide which is laterally disposed relative to the principal thread guide. This, however, is impossible to achieve owing to the limitations of space.

The thread should moreover be severed as near as possible to the edge of the reinforcement portion, in order to ensure that the remaining thread ends are short and unnoticeable. The arrangements used heretofore for this purpose, generally speaking, have been too complicated and do not in fact fulfilll the desired requirements.

In order to be able to sever the floating reinforcement threads immediately adjacent the edge of the reinforcement portion, even where the width of the reinforcement portion varies therealong, it is necessary to control the severing and insertion operations in relation to the needle selected for the reinforcement operation by means of a pattern system. This is impossible to achieve in the case of known thread changing devices. Accordingly, the floating threads can only be severed in the known thread changing devices immediately adjacent the edge of the reinforcement portion where a definite width of reinforcement is concerned.

The foregoing deficiencies and difficulties are eliminated in accordance with the present invention by virtue of the fact that means for clamping and severing the threads, disposed on rings mounted concentrically relative to the cylinder in a rotatable manner, are in each instance associated with the principal thread guides or with the reinforcement thread guides as required, by means of a rotary movement. The severing elements are disposed on a supporting ring co-axial with the cylinder, which is rotatably mounted on the dial cap and is jointly displaced with a second supporting ring for suction pipes. The thread grippers or clamps are actuated by means of a cam ring rotatably and co-axially disposed relative to the cylinder in relation with the pattern drum or pattern chain generally customarily used in circular knitting machines for the production of hosiery (see British Patent 810,225). Thus, the thread grippers are actuated by means of a cam ring during the knitting operation using the principal thread guide whereas during the knitting of the reinforcement portion, the thread grippers are actuated by means of another continuously rotating cam ring in relation with cylinder rotation. By means of a coupling ring bearing against an abutment ring, the continuously rotating cam ring is lifted and is thereby placed in the position required for the actuation of the grippers. In order to enable the reinforcement thread to be severed as near as possible to the edge of the reinforcement portion, essentially known electrically heated severing elements (see British Patent 810,225) are laterally disposed on the burner ring in such manner that they project beyond the periphery of the burner ring or of the dial cap. In order to adapt the insertion and withdrawal and thus also the severance of the reinforcement thread, with respect to the width of the reinforcement portion in each instance, the reinforcement thread guide may be controlled by means of a feeler unit detecting the lugs or butts of the needles selected to work the reinforcement portion knitting.

The present invention is hereinafter to be particularly described with reference to the accompanying drawings.

FIGURES 1 and 2 show the burner-carrying rings in the various positions relative to the thread guides, in plan view;

FIGURE 3 shows the withdrawal of the reinforcement thread in a perspective view;

FIGURE 4 shows the insertion of the reinforcement thread in a perspective view;

FIGURE 5 shows the control device for the actuation of the thread gripper, in section;

FIGURE 5*a* shows a detail taken from FIGURE 5 in plan view;

FIGURE 6 shows a perspective view of a detail taken from FIGURE 5;

FIGURE 7 shows the disposition of the severing unit in section;

FIGURE 8 shows a detail taken from FIGURE 7, in plan view;

FIGURE 9 illustrates the control of the reinforcement thread guide in the withdrawn position, in section, in accordance with an alternate embodiment of the invention;

FIGURE 10 shows a perspective view of the reinforce-

ment thread guide inserted by means of the lugs or butts of the needles selected to work the reinforcement portion, covering the alternate embodiment shown in FIGURE 9;

FIGURE 11 shows the disposition of the feeler jaw of FIGURE 10 in plan view.

The object of the present invention will be described with reference to a four-feed system of circular knitting machine for the production of seamless hose.

The invention may also be utilized to advantage, however, in the case of circular knitting machines exhibiting a different number of feeds.

FIGURE 1 shows the ring **9** supporting the thread guides. The principal thread guides F_1, F_2, and F_3 are disposed at the feeds or stations I to IV, and the reinforcement thread guide 8_0, in diagrammatical plan view. The cylinder with the needles N rotates counter-clockwise in the direction of arrow P. Severing units **5**, associated with the corresponding principal thread guides F, are disposed on the ring **11** to allow the threads to be severed. In the position illustrated in FIGURE 1 of the burner-carrying ring **11** and of the grippers or clampers **2**, the reinforcement thread guide 8_0 as well as the principal thread guides F_2 and F_3 are withdrawn during the knitting of the non-reinforced fabric portions. Only one principal thread guide F_1 is in operating position at each feed station. The withdrawn threads are clamped beneath the grippers **2**.

In view of the different manner of operation of the reinforcement thread guide **8**, a different distance of the clamping and severing means than necessary with respect to the principal thread guides is required in order to ensure reliable clamping and severing of the thread. The burner-carrying ring **11**, with the severing units **5** and the grippers **2**, are therefore rotated in a direction contrary to the direction of revolution of the cylinder, i.e. in the direction of arrow P_R so as to become associated with the reinforcement thread guide **8** at a definite distance required for thread clamping and severing to take place therewith. During the working of the reinforcement portion, the reinforcement thread guide **8** swings back and forth for each reinforcement row or course of stitches, between the operating position 8_1 shown in FIGURE 2 and the withdrawn position 8_0 shown in FIGURE 1. During this time the main thread is continuously fed by means of the principal thread guide F_1, for example. When non-reinforced fabric areas are to be knitted once more, the clamping and severing devices are turned back again and associated with the principal thread guides F at the distance corresponding to thread changing therewith.

The ring **9** is provided with a recess I_R for each reinforcement thread guide **8** and a recess I_F for the principal thread guides at each knitting feed station.

FIGURE 3 illustrates the withdrawn position of the reinforcement thread F_R at the final edge of the reinforcement portion being knitted. After the last needle N taking part in the working of the reinforcement portion has run past, the reinforcement thread has just been withdrawn by the thread guide 8_a. The grippers **2**, which, for example, are constructed in the manner disclosed in copending U.S. application Serial No. 93,803, filed simultaneously herewith, entitled Thread Clamping Device, are positioned for slidable displacement on a suction pipe **1** so as to provide thereby suction nozzle means under the control of a draw-rod **7**. Specifically the suction nozzle means includes pipe **1** as a tubular suction nozzle member and gripper **2** as a tubular extension member, said members being concentrically positioned for telescopic movement with respect to one another, for extension and withdrawal of the extension member, i.e. gripper **2**. At the moment shown, the gripper **2** is opened, i.e. withdrawn, in order to allow the reinforcement thread to be brought beneath the pipe aperture for clamping purposes. A suitable source of suction will be applied to pipe **1** so that suction will be available when gripper **2** is raised or withdrawn as shown in FIGURE 3. The needle N will pass through the positions N_1 to N_4 carrying the thread F_R along therewith.

In the needle position N_4, the thread F_R touches the severing device **5**, the same being an electrically heated severing unit, for example, whereby such thread is severed. The unattached thread end is sucked into the opening of pipe **1** since gripper **2** is still in raised position. Gripper **2** is then extended or clamped against the burner-carrying ring **11** and the dial cap **6** in response to downward movement by control rod **7**. The burner-carrying ring **11** is suitably disposed for slidable displacement along a peripheral groove in dial cap **6** and the thread guide 8_a is suitably actuated by means of rod 8_b in the direction of the arrows P_1 and P_0 by conventional control linkages.

FIGURE 4 illustrates the insertion of the reinforcement thread F_R at the starting row of the reinforcement portion in a similar manner to that covered in FIGURE 3. The thread guide 8_a inserts the thread, clamped by means of gripper **2**, in front of the first needle N_a taking part in the working of the reinforcement portion. The thread is consequently grasped and drawn along by the needle N through the positions N_{1a} to N_{4a}. In the needle position N_{4a}, the clamped thread F_R touches the severing unit or burner **5**, so that the clamped thread end is left behind to be drawn off by suction through pipe **1** when the gripper **2** is next raised.

In order to ensure that the thread ends are as short as possible, the severing unit **5** is constructed and disposed in the manner shown in FIGURES 7 and 8. The burner-carrying ring **11** is rotatably positioned upon the dial cap **6** and is secured against axial displacement by means of a bracket **11'**. A burner-ring comprising separate pieces **5'** and the severing units **5** connecting the latter, is, for example cast into the burner-carrying ring **11** with an insulating mass **5''**. The severing unit **5** then projects upwardly and laterally beyond the periphery of the burner-carrying ring **11** as well as beyond that of the dial cap **6**. Accordingly, the needles N will travel past close to the severing unit **5** whereby the thread will be severed a very short distance behind the last stitch. The positioning of the particular transfer jack J with respect to the needle N passing thereby is shown in relation to the position of the burner or severing unit **5**.

FIGURES 5, 5*a*, and 6 illustrate the control means for the thread grippers **2** which upon being associated with the principal thread guides F are actuated by means of the pattern drum or pattern chain employed (see British Patent 810,225). The thread grippers **2**, on the other hand, are in each instance actuated in relation to the cylinder rotation where they are associated with the reinforcement thread guides **8**. The accompanying drawings illustrate only such parts as are necessary to an understanding of the operation of the object of the present invention. The operation of the pattern rings by means of the pattern drum or of other known control units, occurs, in the customary manner (see British Patent 810,225) and is, therefore, not particularly described.

The rotation of burner-carrying ring **11** as well as that of the suction pipes **1** occurs jointly and is actuated in relation to the pattern drum. The transmission links for said rotary motion acts on the one arm of the angle lever **15** whereas the other arm of the angle lever **15** straddles the pipe **1** in the manner of a fork as illustrated in FIGURES 5 and 5*a*. The angle lever **15** is attached to a vertical shaft **16** secured on the one hand in the gear case **22** and on the other hand in a bearing block **17** attached to the flange of the dial cap **6**, said shaft being rotatably mounted. An additional fork lever **18** which actuates the burner-carrying ring **11**, by means of pin **19**, is attached to the lower extremity of the shaft **16**.

The thread guides F_1 and F_2 are shown, thread guide F_1 being in active knitting position at this particular moment. Thread guide F_1 is maintained in active position and thread guide F_2 is maintained in inactive knitting position in consequence of the cam ring **10** having

the upper cam surface 10' for actuating the thread guides F. This arrangement is described in detail in co-pending U.S. application Serial No. 42,355, filed July 12, 1960.

Two butts or lugs 25 and 26, which operate in conjunction with the corresponding cam rings 27 and 29, respectively are disposed on the draw rod 7 in order to control the thread gripper 2. During the thread change by the principal thread guides F, the gripper 2 is controlled by means of the pattern drum acting through the cam ring 27 mounted co-axially to the cylinder axis in a rotatable manner. By rotating the control ring 27 in the direction shown by the arrow P_4, the butts 25 of the draw rod 7 impinge on the oblique cam surface 28, the gripper 2 thereby being opened. When withdrawing and inserting the reinforcement thread in order to produce partially reinforced fabric areas, the thread gripper 2 must be actuated for each revolution of the cylinder. This is performed by means of the cam ring 29, which is co-axially mounted relative to the axis of the cylinder on a cam ring support means, i.e. coupling ring 32. Cam ring 29 revolves continuously at the same speed as the cylinder, receiving its drive through the pins 39 from the driving disc 41 and the spur gear 42 operatively connected with drive gear 43 for driving the dial 6'. The pins 39 are secured in the rotating cam ring 29 and are slidably disposed in the axial direction in guide bores 40 of the driving disc 41.

It will be appreciated that by means of the loaded coil spring 3 disposed between the collar 4 and the gripper 2, on pipe 1, gripper 2 will be normally downwardly urged into extended position in clamping contact with the dial cap 6. Beneath the dial cap 6, of course, is the dial 6' (shown more clearly in FIGURE 9), the dial 6' being driven by shaft 23 through the elements 41, 42, and 43.

FIGURE 6 illustrates more specifically the operation of the cam rings 27 and 29 and of the coupling ring 32. In the position shown in FIGURE 6, the butts 26 of the draw rod 7 do not come into engagement with the rotating cams 30, that is to say the thread grippers 2 are actuated by means of the cam ring 27 during association with the principal thread guides. If the thread gripping and severing device is associated with the reinforcement thread guide 8, the pattern drum not only causes the rotary displacement of the burner-carrying ring 11 and of the suction pipe 1, but simultaneously also of the coupling ring 32 in the direction shown by the arrow P_6. During this time, the cam ring 27 remains in its idle position. Owing to the rotation of the cam ring support means or top support cam ring, i.e. coupling ring 32, the oblique faces 38 of the second ring cam means or bottom cam ring, i.e. stationary abutment ring 31, and the corresponding faces 37 of the coupling ring 32 slide on each other so that coupling ring 32 will be upwardly displaced in axial direction. The rotating cam ring 29 is thereby lifted simultaneously, so that the clamps or grippers will now be actuated by the cam surfaces 30 acting through the butts 26 of the draw rods 7. The draw rods 7 are guided in the slots 35 of the coupling ring 32 and are rotatably displaced with the latter when ring 32 is rotatably displaced by the cam drum linkage in the direction of the arrow P_6 and in the return direction. Accordingly, the butts 25 will slide along the straight recess surfaces 36 of the cam ring 27. Of course, the radially outer undersurface 34 of ring 32 will slidably engage the top surface 33 of the ring 27 at the start of the rotatable movement of ring 32 and of course the surfaces 34 and 33 will be in sliding engagement when ring 32 is returned to downward axial position and ring 27 is rotatably displaced.

The supporting ring 12 of the suction pipes 1 is located by means of supports 13 and 14 for slidable displacement of suction pipes 1 upon rotation of these pipes from a position adjacent the principal thread guides to a position adjacent the reinforcement thread guide. The top end of the grippers 2 is in each case inserted within an elongated slot 20 for communication with the suction chamber 21 thereabove. The slot 20 corresponds in shape to the rotary path of movement of the clamping and severing devices.

In the same way, of course, as the grippers 2 and in turn the pipes 1 are rotatably displaced so also will be the draw rods 7 in each instance. In order to accommodate the rotational displacement of rods 7 with respect to the housing 22, correspondingly shaped slots 24, with respect to slots 20, are provided in housing or gear case 22.

The thread guides F and 8 are in known manner controlled in relation to a pattern drum, as for example, is described in co-pending U.S. application Serial No. 42,355. However, in the case of a modified form of the present invention, as shown in FIGURES 9, 10, and 11, provision is made for separately controlling the reinforcement thread guide 8 which renders it possible to sever the reinforcement thread at the edges of the reinforcement portion, where a variable width of the reinforcement area is encountered.

The thread guide 8_a is in this case controlled by means of a feeler unit 70 detecting the needles N_R selected to work the reinforcement portion. The needles N_R are selected in known manner, e.g. by means of a pattern device, such as is described in co-pending U.S. application, Serial No. 852,915, filed November 13, 1959, now abandoned.

The feeler unit 70 is pivotably mounted about a pin 73 on the collar 72 of the cylinder 74. The upper end 70' of the feeler unit 70 is in displaceable engagement with the actuating rod 8*b* of the pivotally disposed thread guide 8*a*. The thread guide is shown in relation to the gripper 2 and the suction pipe 1, the latter being indicated in the drawing in phantom.

In the case shown in FIGURE 9, the butts N_B of the needles N_F which do not take part in the production of the reinforcement fabric portion, run past below the feeler jaw 71 situated on the lower end 70'' of the feeler unit 70. The thread guide 8*a* remains in the withdrawn position indicated in FIGURE 9 until the butts N_B of the needles N_R used for knitting the reinforcement portion run behind the feeler jaw 71 so as to impart a pivoting motion to the feeler unit 70. The thread guide 8*a* is thereby brought into the operating position indicated in FIGURE 10. As already described, this inserts the reinforcement thread. As soon as the butts N_B of all of the needles N_R have traveled past the feeler jaw 71, the feeler unit 70 is rocked back by means of a spring 75 located on the rod 8_b, whereby the reinforcement thread guide 8*a* is withdrawn from its operating position, in the manner previously described. The reinforcement thread may, therefore, be severed at the edges of the reinforcement portion of the fabric even where said portion is of variable width, thereby preventing floating threads and the need for their subsequent removal.

It will be seen that a suitable actuating cam C may be used in the normal manner to raise the needles N_R selected for knitting the reinforcement portion of the hose, by contacting the needle butts N_B of these needles. As the raised needle butts N_B pass in the direction of the arrow P during cylinder rotation, the same contact the feeler jaw 71 moving the same in the direction of the arrow P_{F1} as noted in FIGURE 11. After the needle butts N_B of the needles N have run past, spring 75 will urge the feeler unit 70 in the direction of the arrow P_{F0}. However, because of the presence of stop 76 on collar 72, the feeler jaw 71 will not interfere with the normal running of the needles.

It will be seen that the thread guide 8*a* is positioned on the carrier ring 9 which is maintained by the carrier ring 9'. The positional relationship of the needles N, the thread guide 8*a*, the burner-carrying ring 11, the dial cap 6, the transfer jacks J, the dial 6', the pipe 1, and the gripper 2 is clearly indicated in FIGURE 9.

It is understood that the present invention is not in-

tended to be limited to the form of embodiment hereinabove specifically illustrated, but may, on the contrary incorporate other equivalent technical means without thereby exceeding the scope of the invention.

What is claimed is:

1. In a circular knitting machine having means for forming knitted tubular fabric including a needle cylinder, needles disposed in said cylinder, elements cooperating with the needles for formation of stitches at least at one knitting station, cams for effecting needle movements at said knitting station, main yarn feeding means and reinforcement yarn feeding means for said knitting station, each said feeding means being movable from an active yarn feeding position wherein yarn is fed to said needles for knitting thereby at said station to an inactive yarn feeding position wherein the yarn is in non-knitting position, and means for clamping and cutting, the improvement which comprises including as said means for clamping and cutting said yarn a common clamping and cutting means for the yarns at each said knitting station, said clamping and cutting means being mounted on support means for joint displacement from one position adjacent to the main yarn feeding means at said knitting station to another position adjacent to the reinforcement yarn feeding means at the same station and means for actuating the clamping means and energizing the cutting means at said position.

2. Improvement according to claim 1 wherein said common clamping and cutting means include a separate clamping member mounted on a support ring concentrically positioned with respect to the cylinder and a cutting element mounted on a carrier ring, and means for jointly limitedly rotating said support ring and carrier ring for effecting said joint displacement.

3. Improvement according to claim 2 wherein said clamping member is actuated at one position adjacent to the main yarn feeding means by a first cam ring concentrically positioned with respect to the cylinder and movable in one direction to effect opening of said clamping member and in the opposite direction to effect closing of said clamping member.

4. Improvement according to claim 3 wherein said clamping member is actuated at another position adjacent to the reinforcement thread feeding means by a second cam ring concentrically positioned with respect to the cylinder and continuously rotatable in one direction in dependence upon the cylinder rotation, said second cam ring being axially displaceable during rotation from a first inactive axial position to a second active axial position to effect at said position adjacent to the reinforcement thread periodic opening feeding means. and closing of said clamping member during continuous rotation at said active axial position.

5. Improvement according to claim 4 wherein said second cam ring is slidably disposed on a cam ring support means axially displacable together with said second cam ring, and second ring cam means are provided for engaging said cam ring support means, said second ring cam means being operable to axially displace said cam ring support means and said second cam ring from said first inactive axial position to said second active axial position.

6. Improvement according to claim 5 wherein said cam ring support means is a top support ring and said second ring cam means is a bottom cam ring, said top and bottom rings being concentrically disposed beneath said second cam ring, the undersurface of said top ring and the upper surface of said bottom ring being provided with cooperating cam surfaces for effecting axial displacement in one direction of said top ring and in turn said second cam ring upon corresponding rotational movement of one of said top and bottom rings in one direction and axial displacement in the opposite direction upon corresponding rotational movement of said one of said top and bottom rings in the opposite direction.

7. Improvement according to claim 6 wherein said clamping member includes a combined yarn clamping and suction means having a suction nozzle means and yarn engaging surface means arranged for relative movement at each said knitting station from a closed position in yarn clamping contact with respect to one another to an opened position out of yarn clamping contact for receiving said yarn.

8. Improvement according to claim 7 wherein said knitting machine includes a dial and a stationary dial cap thereover, said yarn engaging surface means being defined by the top surface of said dial cap and said cutting element carrier ring being slidably disposed in a peripheral groove defined in the peripheral portion of said dial cap.

9. Improvement according to claim 8 wherein said suction nozzle means includes a tubular suction nozzle member and a tubular extension member, said members being concentrically positioned for telescopic movement with respect to one another, for extension and withdrawal of said extension member into and out of clamping contact with said top surface of the dial cap.

10. Improvement according to claim 9 wherein said extension member outwardly encloses said nozzle member and is axially slidable thereon, said extension member being normally resiliently urged into extended position.

11. Improvement according to claim 10 wherein a loaded coil spring disposed about said nozzle member is used to resiliently urge said extension member into extended position and a draw rod is connected to said extension member for axial movement thereof into and out of said clamping contact.

12. Improvement according to claim 11 wherein said draw rod is provided with a first and a second projection butt thereon, said first butt being positioned for separate cam contact with said first cam ring at said one of said positions and said second butt being positioned for separate cam contact with said second cam ring at said other of said positions.

13. Improvement according to claim 10 wherein said extension member is positioned between the yarn feeding means at each said knitting station and said cutting element for extension into clamping contact with said dial cap when the path of the yarn being knitted at the knitting station is situated intermediate said extension member and said dial cap.

14. Improvement according to claim 10 wherein said cutting element is an electrical resistance wire heat element insulatedly disposed on said carrier ring and projecting outwardly therefrom closely adjacent to the path of travel of the needles.

15. In a circular knitting machine having means for forming knitted tubular fabric including a needle cylinder, needles disposed in said cylinder, elements cooperating with the needles for formation of stitches at least at one knitting station, cams for effecting needle movements at each knitting station, first yarn feeding means and second yarn feeding means spaced from each other at each knitting station, each said feeding means being movable between an active yarn feeding position wherein yarn is fed to said needles for knitting thereby at said station and an inactive yarn feeding position wherein the yarn is in non-knitting position, and means for clamping and for cutting said yarn, the improvement which comprises said means for clamping and for cutting said yarn including a common clamping and cutting means for the yarns at each said knitting station, said common clamping and cutting means being mounted on support means for joint displacement from one position adjacent to the first yarn feeding means at each said knitting station to another position adjacent to the second yarn feeding means at the same station, and means for actuating the clamping means and energizing the cutting means at each said position.

16. In a circular knitting machine having means for forming knitted tubular fabric including a needle cylinder, needles disposed in said cylinder, elements cooperating

with the needles for formation of stitches at a plurality of separate spaced knitting stations, cams for effecting needle movements at each knitting station, main yarn feeding means and reinforcement yarn feeding means spaced from each other at each knitting station, each said feeding means being movable between an active yarn feeding position wherein yarn is fed to said needles for knitting thereby at the corresponding knitting station and an inactive yarn feeding position wherein the yarn is in non-knitting position at such corresponding knitting station, and means for clamping and for cutting said yarn, the improvement which comprises said means for clamping and for cutting said yarn including a common clamping and cutting means for the yarns at each said knitting station, said common clamping and cutting means including a plurality of separate spaced clamping members, corresponding to the plurality of knitting stations, mounted on a support ring concentrically positioned with respect to the needle cylinder and a corresponding plurality of separate spaced cutting elements mounted on a carrier ring, means

for jointly limitedly rotating said support ring and carrier ring to effect joint displacement of the corresponding clamping members and cutting elements from one position adjacent to the main yarn feeding means at each said knitting station to another position adjacent to the reinforcement yarn feeding means at the same station, and means for actuating the clamping members and for energizing the cutting elements at each said position.

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CERTIFICATE OF CORRECTION

Patent No. 3,174,307 March 23, 196!

Werner Mayer

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 29, for "cuting" read -- cutting --; line 69, for "fulfilll" read -- fulfill --; column 7, line 17, after "cutting" insert -- said yarn --; line 26, after "at" insert -- each --.

Signed and sealed this 14th day of September 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents