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3,017,757

YARN TAKE-UP MEANS FOR KNITTING MACHINES

Filed Oct. 16, 1957

3 Sheets-Sheet 1

FIG. 1

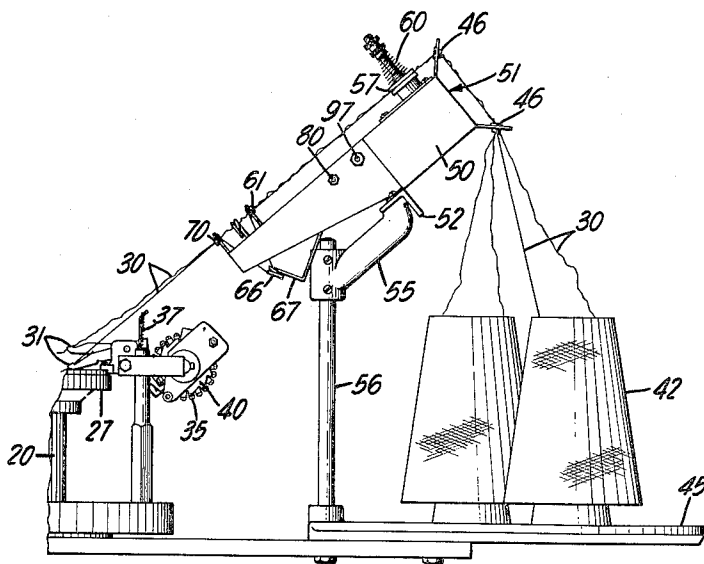
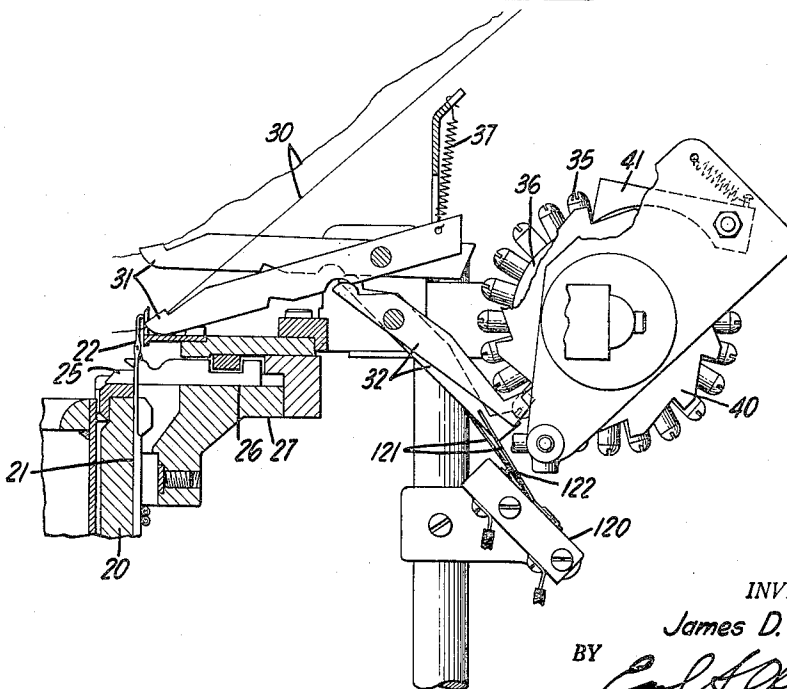


FIG. 2



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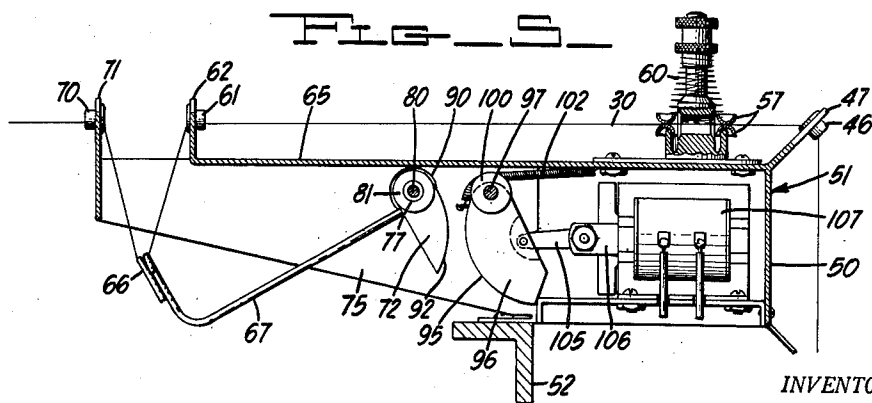
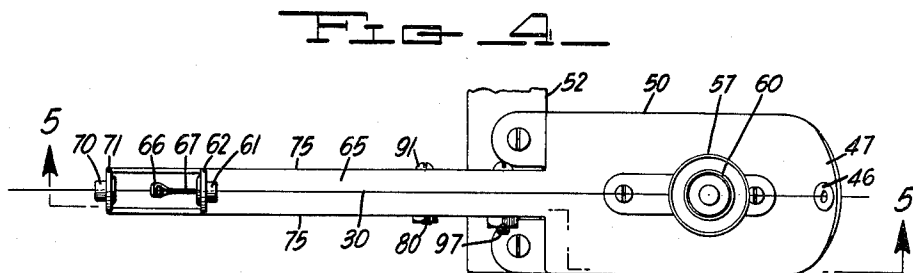
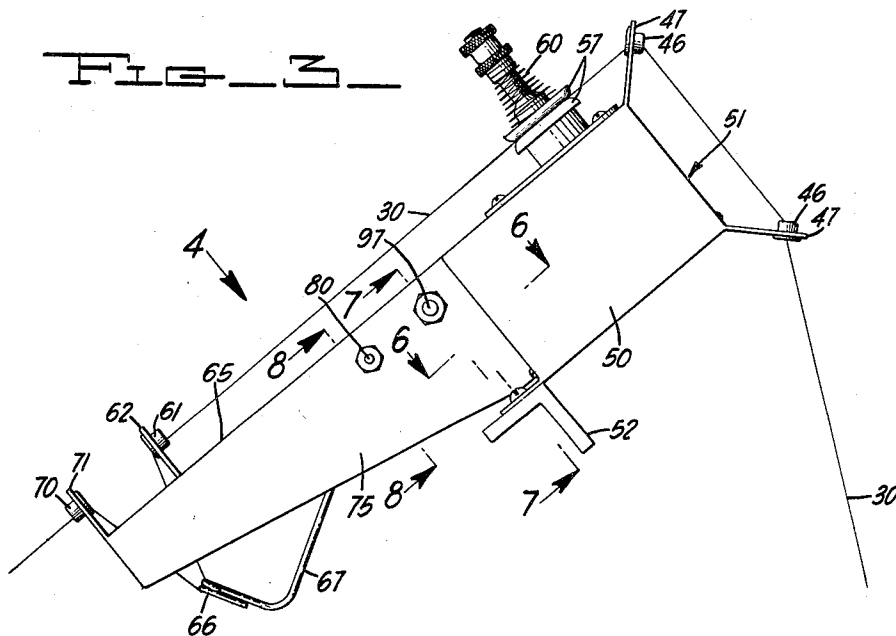
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Fig. 6

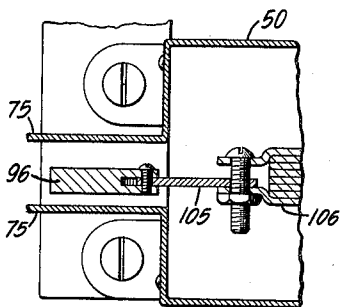


Fig. 7

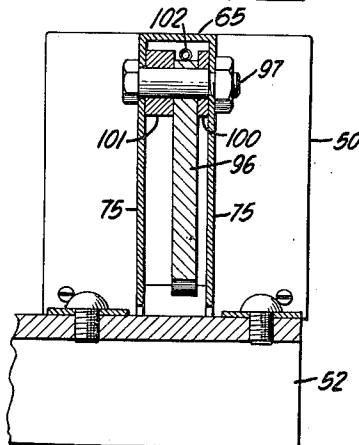


Fig. 8

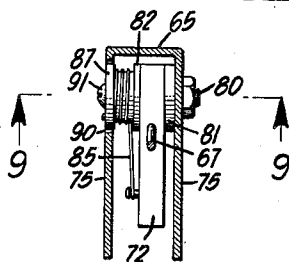


Fig. 11

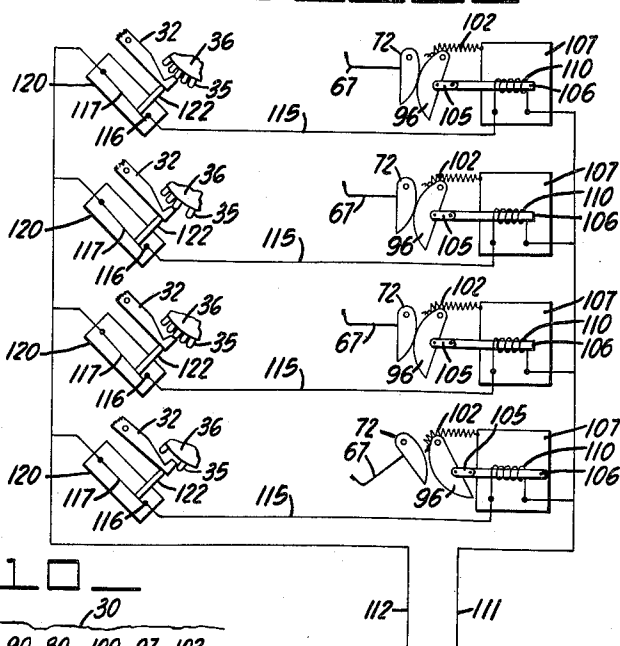
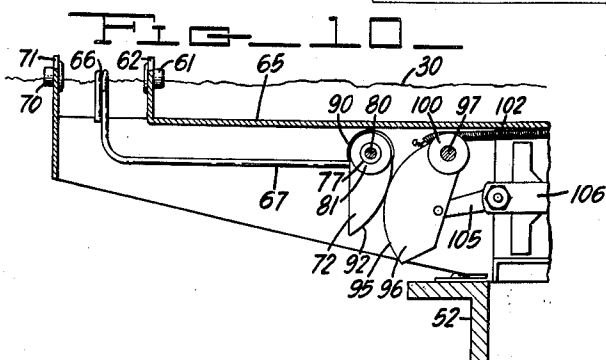
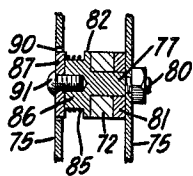


Fig. 9



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YARN TAKE-UP MEANS FOR KNITTING MACHINES

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9 Claims. (Cl. 66-146)

This invention relates to knitting machines having yarn feeding and changing mechanism for forming patterned fabrics and more particularly to means in such machines to take up the slack in and to maintain a constant tension on the yarns when in knitting position and for removing the take-up action on the yarns when in non-knitting position.

In present knitting machines and particularly machines of the type having a circular series of needles for knitting patterned tubular fabrics, the yarns employed are introduced into and removed from knitting action by yarn feeding means according to the desired pattern. Each of the yarns when in knitting action is under the control of tension means in the form of a spring actuated arm which takes up the slack in and maintains a constant tension on the yarn during the feeding thereof to the needles. When the yarn is removed from knitting action it is usually severed and clamped and in order to prevent the end of yarn from being withdrawn from the clamping means the spring actuated arm is also inactivated to remove the tension from the yarn. Heretofore, the spring actuated arms were made active and inactive by pattern means which operated in the same sequence that the yarns were introduced and removed from knitting action. Consequently when the yarn feeding sequence was changed it was also necessary to change the operating sequence of the tension arms which resulted in a considerable increase in the down time of the machine and loss of production. This down time and loss of production increased in proportion to the number of feeding stations.

It is an object of the invention to provide a knitting machine with means for taking up the slack in the yarns when in knitting position and for removing the take-up action from the yarns when removed from knitting position, which means is constructed and operated in a manner to overcome the above mentioned and other defects.

Another object of the invention is to provide a knitting machine with means which is controlled to take up the slack in and to remove the take-up action on the yarns by the same pattern means controlling the introduction and withdrawal of the yarns from knitting position.

A further object of the invention is to provide a circular knitting machine with electrically operated means for taking up the slack in and for removing the take-up action from each yarn which means is individually controlled from the yarn feeding means for each yarn as it is introduced and withdrawn from knitting position.

With these and other objects in view which will become apparent from the following detailed description of the illustrative embodiment of the invention shown in the accompanying drawings, the invention resides in the novel elements, features of construction and arrangement of parts in cooperative relationship as hereinafter more particularly pointed out in the claims.

In the drawings:

FIGURE 1 is an elevational view of a portion of the yarn feeding means of a circular knitting machine and having yarn tensioning means according to the instant invention applied thereto;

FIG. 2 is an elevational view on an enlarged scale of the yarn feeding and knitting means of FIG. 1, parts being shown in cross section and other parts being broken

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away to more clearly show details of the control means of the invention;

FIG. 3 is a view on an enlarged scale of the yarn tensioning means of FIG. 1;

FIG. 4 is a plan view of the mechanism of FIG. 3 taken in the direction of the arrow 4 of FIG. 3;

FIG. 5 is a cross-sectional view taken substantially along the line 5-5 of FIG. 4;

FIG. 6 is a cross-sectional view on an enlarged scale taken substantially along the line 6-6 of FIG. 3;

FIG. 7 is a cross-sectional view on an enlarged scale taken along the line 7-7 of FIG. 3;

FIG. 8 is a cross-sectional view on an enlarged scale taken substantially along the line 8-8 of FIG. 3;

FIG. 9 is a cross-sectional view taken along the line 9-9 of FIG. 8;

FIG. 10 is a view similar to a portion of FIG. 5 with the parts shown in different positions relative to FIG. 5; and

FIG. 11 is a view of the wiring diagram for the electrical control elements for the yarn tension means.

Referring to FIGS. 1 and 2 there is shown a portion of a circular knitting machine including a needle cylinder 20 having slots 21 in which needles 22 are slidably guided for cooperation with sinker or web holders 25 slidably mounted in radial slots 26 in a sinker bed or ring 27 carried on the needle cylinder. The needles 22 and sinkers 25 are operated in a common manner to form yarns 30 into loops of a knitted fabric. The yarns 30 are carried by yarn carriers 31 which are pivotally mounted for movement between active positions in which the yarns are fed to the needles 22 and inactive positions in which the yarns are removed from knitting action. The position of the carriers 31 is controlled by pivoted levers 32 which are actuated to move and to maintain the carriers in inactive position by buttons or pins 35 carried in spaced circumferential rows around a rotatably mounted pattern drum 36, each row of buttons being individual to one of the levers 32. Absence of buttons 35 from the individual rows permits the carriers 31 associated therewith to be moved to active positions by springs 37 (FIG. 2). A ratchet wheel 40 associated with the pattern drum 36 is rotated in timed relation to the operation of the machine by a pawl 41 which is actuated from any suitable operating part of the machine (not shown). The arrangement and operation of the yarn carriers 31 and pattern means therefor is shown for illustrative purposes only, any of the similar well known arrangements being adaptable for cooperation with the yarn tensioning and take-up means according to the instant invention, as hereinafter set forth.

The yarns 30 are withdrawn from bobbins or cones 42 which are supported on a table 45 secured to a fixed part of the machine (FIG. 1). From each cone 42 the yarn 30 passes through eyelets 46 carried in projections 47 extending from a housing 50 of a tensioning device, indicated generally at 51, one such tensioning device being individual to each yarn (FIGS. 1, 3 and 4). The housing 50 is supported on a member 52 secured to a bracket 55 carried in fixed position on a post 56 supported on the table 45. From the eyelets 46 the yarn 30 passes between a pair of cupped washers 57 which are biased together by adjustable spring means 60 to apply drag or tension on the yarn. The yarn 30 extends from the cupped washers 57 to an eyelet 61 carried in an ear 62 projecting from an upper wall 65 of the housing 50. The yarn 30 extends from the eyelet 61 through an eyelet 66 of a take-up arm 67 and through another eyelet 70 carried in an ear 71 projecting upwardly from the housing 50 and to the yarn carrier 31.

The take-up arm 67 is carried by a lever 72 which

is mounted for pivotal movement, between side walls 75 of the housing 50, on a reduced portion 77 of a stud 80 secured to one of the side walls 75 (FIGS. 8 and 9). The lever 72 is held against axial movement on the portion 77 by a spacer element 81 on the portion 77 and a shoulder portion 82 formed on the stud 80. A torsion spring 85 surrounding a portion 86 of the stud 80 between the portion 82 and a washer 87 has its opposite free ends connected to the lever 72 and the washer 87, respectively, to bias the lever in a counterclockwise direction, as viewed in FIG. 5, to take up the slack in the yarn 30 as hereinafter set forth. The left wall 75 of the housing 50 is apertured at 90 to receive the washer 87 and the washer is adjustably secured to the stud 80 by a screw 91 whereby the torsional action of the spring 85 on the lever 72 may be varied as desired.

The lever 72 is provided with a camming surface 92 which is adapted to coact with a camface 95 formed on a lever 96 pivotally mounted on a bolt 97 secured to the walls 75 of the housing 50 (FIGS. 5 and 7). The lever 96 is positioned on the bolt 97 between the walls 75 for engagement with the lever 72 by spacer elements 100 and 101, respectively, carried on the bolt. The lever 96 is biased in a clockwise direction (FIG. 5) by a spring 102, connected between the lever and the upper wall 65 of the housing 50, to engage the lever 72 and move the arm 67 to its inactive position, FIG. 10. The lever 96 is pivotally connected by a link 105 to a core member 106 of a solenoid 107 supported in the housing 50 (FIGS. 5 and 6). The core member 106 acts, when the solenoid is energized, to move the lever 96 counterclockwise out of engagement with the lever 72 thereby permitting the spring 85 to move the lever 72 and arm 67 to active position to take up the slack in the yarn.

As diagrammatically shown in FIG. 11 the core member 106 is actuated by a winding or coil 110 which is in an electrical circuit including main conductors 111 and 112 connected in a usual manner to the main source of electrical energy for the machine. One end of the coil 110 is connected to the conductor 111 and the other end of the coil is connected by a lead 115 through stationary and movable contacts 116 and 117, respectively, of a micro-switch 120, to the conductor 112. The micro-switch 120 is supported on a fixed part of the machine and has a spring blade 121 adapted to engage a button 122 of the switch. The spring blade 121 is operated by the lever 32 to depress the button 122 to actuate the movable contact 117 of the switch 120 to open and de-energize the coil 110 when a button 35 on the pattern drum 36 is moved beneath the end of the lever to remove the yarn finger from action. FIG. 11 shows a solenoid 107 and micro-switch 120 for each yarn 30, four being shown in the instant arrangement, and each of the solenoids and micro-switches are connected in like manner to the conductors 111 and 112.

When a carrier 31 is to be moved to active position to feed its yarn 30 to the needles 22, the pattern drum is indexed to remove a button 35 from beneath the lever 32 and the spring 37 biases the carrier counterclockwise to the active position of FIG. 2. Movement of this carrier 31 turns its associated lever 32 counterclockwise to disengage the spring blade 121 which permits the movable contact 117 of the micro-switch 120 to close and energize the circuit through the winding 110. Energization of the winding 110 causes the core member 106 and lever 96 of the tensioning device 31 to move toward the right to disengage the lever 72 thereby permitting movement of the tension arm 67 to engage and take up the slack in the yarn 30 as shown in FIG. 5 and as indicated at the lower portion of FIG. 11. At this time each of the levers 32 for the other carriers 31 are engaged by a button 35 to maintain these carriers in inactive position and to open the switches 120 to maintain the associated take-up arms 67 in inactive positions, as shown in FIG. 11. When the active yarn is again to be moved to inactive

position, a button 35 is indexed to engage the lever 32 which raises the carrier to inactive position and engages and depresses the spring blade 121 to open the circuit through the micro-switch 120 and solenoid 107. The spring 102 thereupon acts to move the tension arm 67 to the inactive position of FIG. 10, as hereinbefore set forth.

It will be obvious from the foregoing that irrespective of the sequence in which the carriers 31 are moved between active and inactive positions, as determined by the pattern drum 36, the tension arms 67 will be moved between active and inactive positions in the same sequence.

It will be understood that the improvements specifically shown and described by which the above described results are obtained can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. In a knitting machine having needles, a yarn carrier for feeding a yarn to said needles, and means for moving said yarn carrier between active and inactive positions, in combination with a take-up arm for said yarn, and electrical means controlled by the movement of said carrier between active and inactive positions for moving said take-up arm between active and inactive positions.
2. In a knitting machine having needles, a yarn carrier for feeding a yarn to said needles, and means for moving said yarn carrier between active and inactive positions, in combination with a take-up arm for said yarn, means for moving said take-up arm between active and inactive positions, and electrical means operated by said moving means for said yarn carrier for controlling the operation of said take-up arm moving means.
3. In a knitting machine having needles, a yarn carrier for feeding a yarn to said needles, and pattern means for controlling the movement of said yarn carrier between active and inactive positions, in combination with a take-up arm for said yarn, means for moving said take-up arm between active and inactive positions, electrical means for operating said take-up arm moving means, and means operated by said pattern means for controlling the operation of said electrical means.
4. In a knitting machine having needles, a yarn carrier for feeding a yarn to said needles, and pattern means for controlling the movement of said yarn carrier between active and inactive positions, in combination with a take-up arm for said yarn, means for moving said take-up arm between active and inactive positions, electrical means for operating said take-up arm moving means, a switch for controlling the operation of said electrical means, and means operated by said pattern means for said yarn carrier for controlling the operation of said switch.
5. In a knitting machine having needles, a yarn carrier for feeding a yarn to said needles, pattern means for controlling the movement of said yarn carrier between active and inactive positions, a take-up arm for said yarn, means for moving said take-up arm between active and inactive positions, electrical means for controlling the operation of said take-up arm moving means, and means operated by said pattern means for said yarn carrier for controlling the operation of said electrical means.
6. In a knitting machine having needles, a yarn carrier for feeding a yarn to said needles, pattern means for controlling the movement of said yarn carrier between active and inactive positions, a take-up arm for said yarn and means for moving said take-up arm between active and inactive positions including a lever, resilient means for operating said lever to move said take-up arm to inactive position, electrical means for moving said lever to permit movement of said take-up arm to active position, and means operated by said pattern means for controlling the operation of said electrical means.
7. In a knitting machine having needles, a yarn carrier

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for feeding a yarn to said needles, pattern means for controlling the movement of said yarn carrier between active and inactive positions, a take-up arm for said yarn, and means for moving said take-up arm between active and inactive positions including resilient means for moving said arm to active position, a lever, spring means for operating said lever to move said arm to inactive position, electrical means for moving said lever to permit movement of said arm to active position, and means operated by said pattern means for controlling the operation of said electrical means.

8. In a knitting machine having needles, a yarn carrier for feeding a yarn to said needles, means for moving said carrier between active and inactive positions, a take-up arm for said yarn, and means for moving said take-up arm between active and inactive positions including resilient means for moving said take-up arm to active position, a lever, spring means for operating said lever to move said take-up arm to inactive position, electrical

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means for moving said lever to permit movement of said take-up arm to active position, and means operated by the movement of said carrier to active position for controlling the operation of said electrical means.

9. In a knitting machine having needles, a yarn carrier for feeding a yarn to said needles, and means for moving said yarn carrier between active and inactive positions, in combination with a take-up arm for said yarn, means for moving said take-up arm between active and inactive positions, electrical means for operating said take-up arm moving means, and switch means operated by said moving means for said yarn carrier for controlling said electrical means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,299,621	Ruth	Apr. 8, 1919
2,856,764	Carden	Oct. 21, 1958