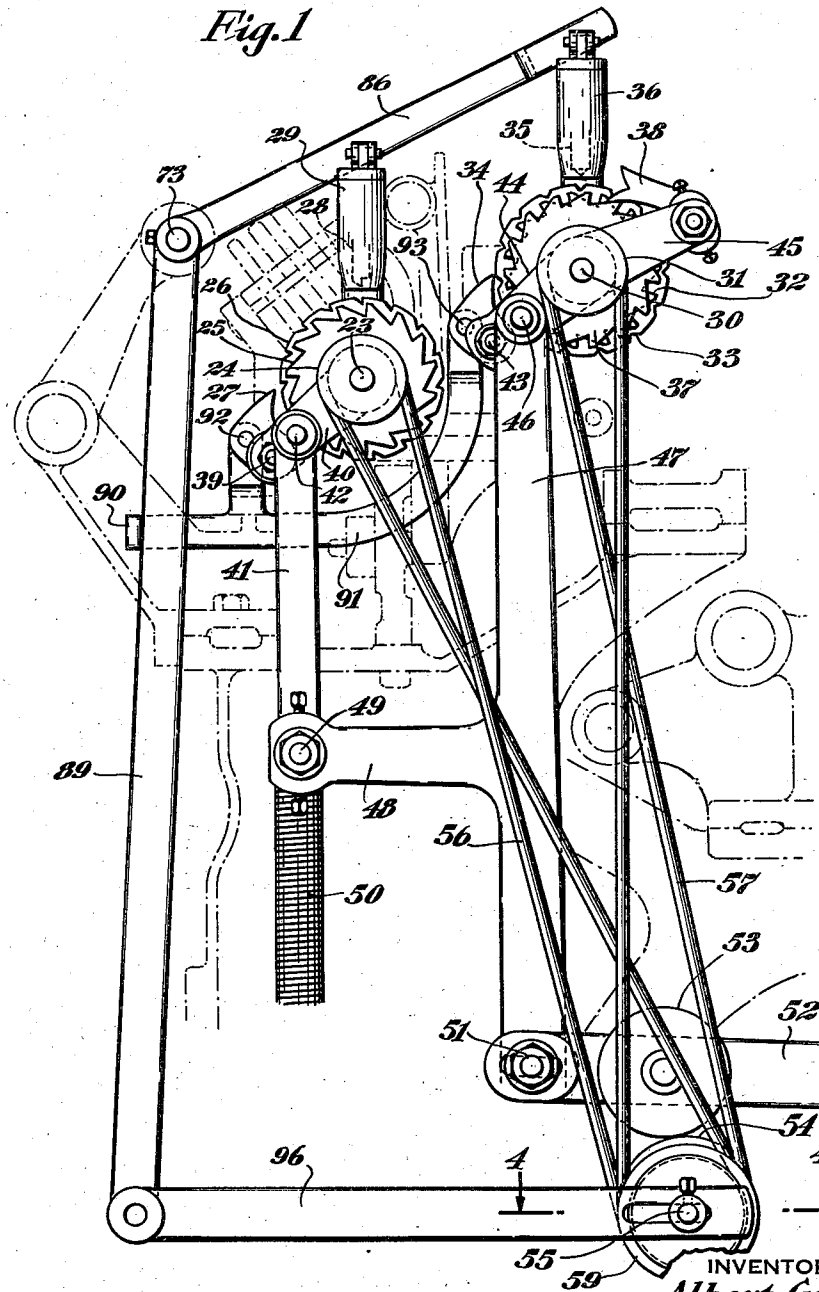
Dec. 17, 1935. A. GEE 2,024,519

AUTOMATIC RACKING-OUT MECHANISM FOR KNITTING MACHINES

Filed April 24, 1930 3 Sheets-Sheet 1

Fig. 1



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AUTOMATIC RACKING-OUT MECHANISM FOR KNITTING MACHINES

Filed April 24, 1930 3 Sheets-Sheet 2

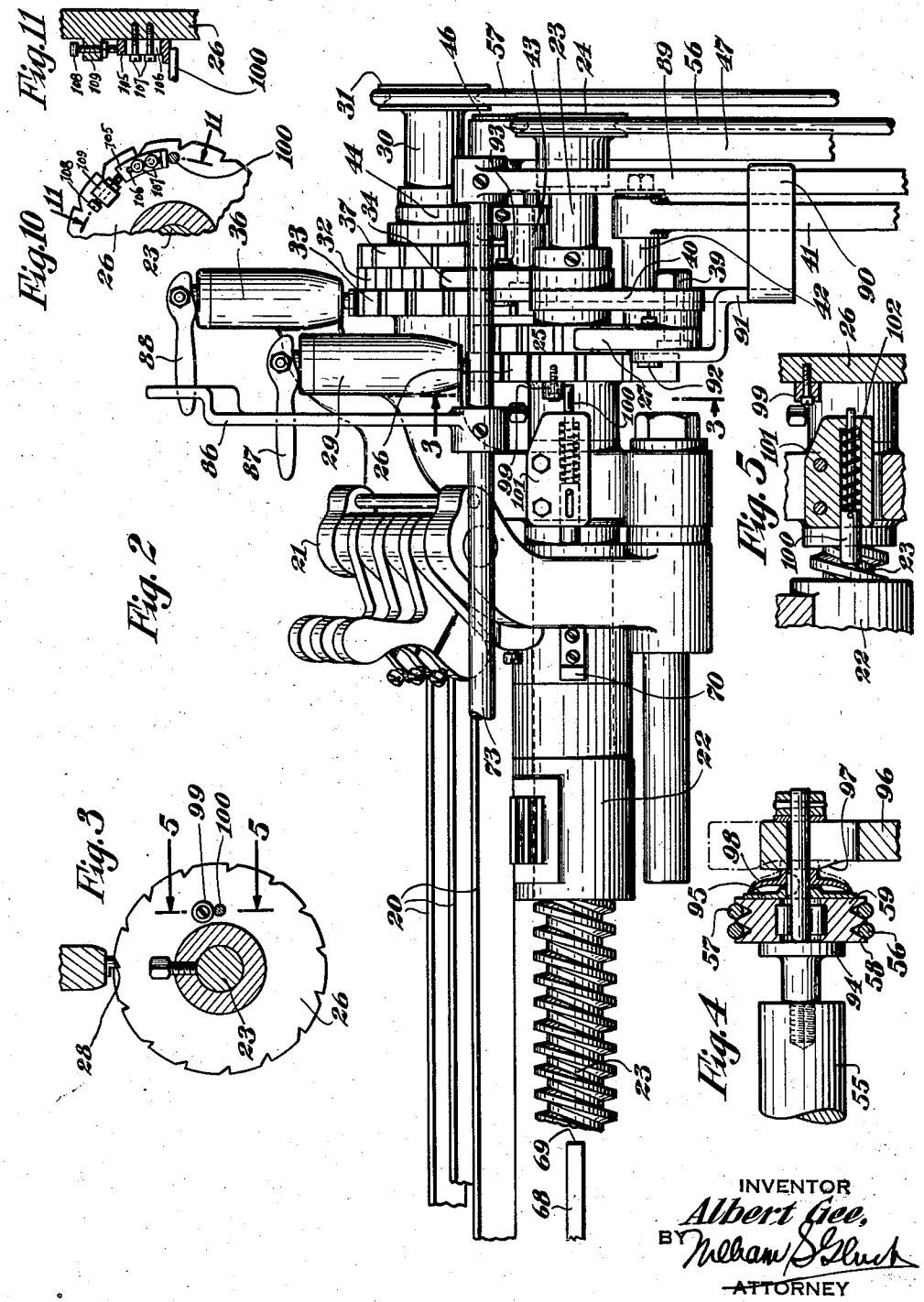


Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 10

Fig. 11

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AUTOMATIC RACKING-OUT MECHANISM FOR KNITTING MACHINES

Filed April 24, 1930 3 Sheets-Sheet 3

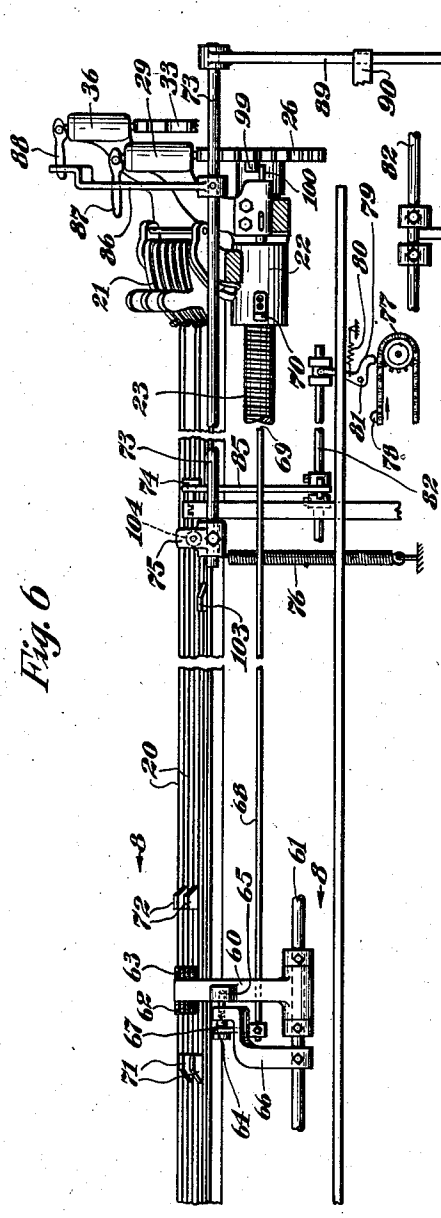


Fig. 6

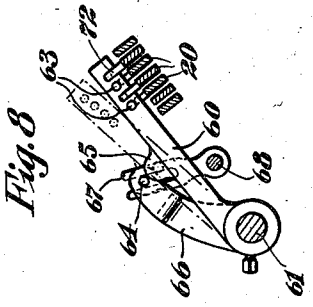


Fig. 8

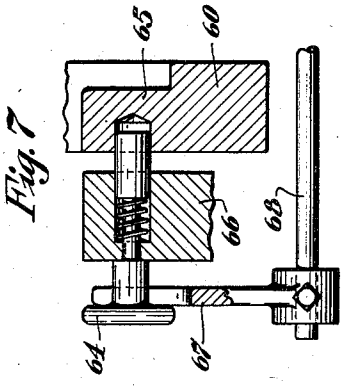


Fig. 7

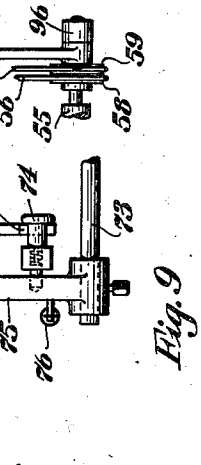


Fig. 9

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UNITED STATES PATENT OFFICE

2,024,519

AUTOMATIC RACKING-OUT MECHANISM FOR KNITTING MACHINES

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Application April 24, 1930, Serial No. 446,818

17 Claims. (Cl. 66—89)

My present invention relates generally to knitting machines, and has particular reference to certain automatic mechanism to be associated with a knitting machine of the full-fashioned type.

It is a surprising fact that, despite the complexity of a knitting machine of this general character, a very great amount of attendance on the part of an operator is necessary in causing the machine to fulfill its several successive and contemplated functions. It is a general object of my present invention to provide an arrangement which will in a large measure reduce the amount of attendance necessary upon such a machine and which will provide for automatically carrying out certain functions at predetermined times.

My present invention has more particular reference to the automatic "racking out." In a machine of this character, one or more yarn-carrier rods are reciprocated to lay successive courses in position for engagement by the knitting needles. The travel of these yarn-carrier rods is altered in a predetermined manner and at certain times to provide for the contemplated narrowing of the article being knitted. This predetermined alteration of the yarn-carrier rod travel is usually effected by providing stops for the respective yarn-carrier rods and advancing these stops in an intermittent and predetermined manner axially with respect to the rods so as to limit their reciprocation.

At the same time, certain bars which carry a set of so-called "narrowing points" or needles are similarly reciprocated to pick up certain loops at predetermined times and shift them so as to carry out the narrowing operation. Stops are provided for these last-mentioned bars, and these stops are also shifted intermittently in a predetermined manner.

A general object of my present invention is to provide for the automatic return of the several stops hereinbefore mentioned after their function has been carried out.

In the machine herein illustrated by way of example, the stops are carried upon worm boxes or interiorly-threaded carrier nuts which are mounted upon worm shafts, the latter shafts being rotated in a predetermined manner to advance the carrier nuts at predetermined times. The mechanism for accomplishing this may consist of, for example, a ratchet and pawl arrangement, together with a detent which holds each worm shaft in a locked condition between rotations thereof. In acordance with my present invention, I provide an arrangement whereby these worm shafts are automatically caused to rotate in reverse direction after the worm boxes carried thereby have been advanced to the desired extents.

More particularly, it is a feature of my invention to provide an automatic arrangement which operates at a predetermined time to withdraw the detent from each of the worm shafts, disengage the pawl and ratchet arrangement, and at the same time render operative a reversing mechanism which is normally retained in an inoperative condition.

In the preferred embodiment herein illustrated the automatic operation above referred to is initiated by the encounter between a projection carried upon a continuous member, such as a chain, and a movable element, such as a pivoted bell crank. I have, for example, shown a latch arrangement which holds all the reversing mechanism in normally inoperative condition, and a means whereby the latch is tripped by the movement of the last-mentioned pivoted element, when such element is encountered and moved by the projection on the chain.

In order that this automatic racking out procedure may be accomplished efficiently and prior to the shutting off of the entire machine, it is another feature of my invention to provide a substitute set of stops for the yarn-carrier rods, and to place this substitute set of stops into operation automatically just prior to the time that the normal stops are automatically returned to their initial positions. In the embodiment herein illustrated, I have shown a latch arrangement which holds the substitute set of stops in a normally inoperative condition, and I have provided for the tripping of this latch by means which is associated with the carrier nut itself. In other words, my present invention provides for the customary step-by-step advance of the carrier nut, for the release thereby of a substitute set of stops for the carrier rods, and for the subsequent return of the carrier nut and its associated parts to an initial position.

Another feature of my invention lies in providing an arrangement whereby each worm shaft is finally brought to rest in a position in which its corresponding detent may properly engage therewith prior to the commencement of the succeeding operation of the machine. In the preferred embodiment illustrated, I have shown one way of accomplishing this by providing a projection or lug upon the ratchet wheel, this lug encountering and being halted by a projec-

tion carried by the worm box or carrier nut itself. The parts are so arranged that the ratchet wheel will be brought to rest in exactly a position in which its corresponding detent may properly engage therewith.

It will be understood that certain phases of my invention, and particularly the feature last-mentioned, are independent of other features. For example, the automatic halting of the ratchet wheel at a predetermined position may be usefully resorted to even in cases where the worm shafts are rotated in reverse direction by manual operation of a handle or the like.

For the attainment of the foregoing objects and such other objects as may hereinafter appear or be pointed out, I have constructed a device embodying the features of my invention and illustrated in the accompanying drawings, wherein—

Figure 1 is a fragmentary end view of a knitting machine of the present general character showing my invention associated therewith, the dot-and-dash lines indicating portions of the knitting machine having no direct relationship to my present invention;

Figure 2 is a fragmentary elevation viewed from the left of Figure 1;

Figure 3 is a cross-sectional view taken substantially along the line 3—3 of Figure 2;

Figure 4 is a fragmentary plan view, partly in section, taken substantially along the line 4—4 of Figure 1;

Figure 5 is a cross-sectional view taken substantially along the line 5—5 of Figure 3;

Figure 6 is a diagrammatic view taken in substantially the same direction as Figure 2 and showing the manner in which the several parts of my present mechanism co-operate;

Figure 7 is an enlarged view, partly in section, taken in the same direction as Figure 6 and of a portion of the mechanism at the left of Figure 6;

Figure 8 is an enlarged cross-sectional view taken substantially along the line 8—8 of Figure 6;

Figure 9 is a plan view on an enlarged scale of a portion of the mechanism shown in the central portion of Figure 6;

Figure 10 is an enlarged detail view taken in substantially the same direction as Figure 3, and showing a modification, and

Figure 11 is a cross-sectional view taken substantially along the line 11—11 of Figure 10.

Referring for the moment to Figure 6, it will be observed that I have shown a plurality of yarn-carrier rods 20, and it will be understood that these rods are arranged in suitable guideways or tracks which permit them to be reciprocated by a friction box mechanism of customary character, not shown. Not all of these rods are necessarily employed at one time, and each one thereof supports a yarn-feeding device so that during the reciprocation of the rod, the yarn is laid first in one direction and then in the other for engagement by the needles. Customarily, the machine is started by shifting one group of rods toward one end of the machine and by shifting the remaining group toward the other end of the machine. For example, alternate rods may be shifted toward the right, as viewed in Figure 6, and the remaining rods may be shifted toward the left end of the machine, which is not illustrated in Figure 6.

The reciprocation of the rods is limited not only by the reciprocation of the friction boxes and allied mechanism, but also by the arrangement of stops or abutments at opposite ends of the machine. For example, I have shown a series of stops 21 arranged at the right of Figure 6, and adapted to be encountered by respective rods during the reciprocation of the latter.

The stops shown in a general manner at 21 are carried upon a worm box or carrier nut 22 which is interiorly threaded and which is mounted upon a worm shaft 23. At predetermined times, and in accordance with a predetermined plan, the carrier nut 22 is advanced intermittently toward the left, as viewed in Figure 6, and this is accomplished by intermittent rotational movements imparted to the shaft 23. Such advance of the carrier nut 22 causes the stops 21 to be shifted accordingly, and in this way reduces the reciprocal travel of those yarn-carrier rods which encounter the stops 21. After the article being knitted has been completed, and before a subsequent knitting operation can be initiated, the worm box 22 must be returned to its initial position, as shown in Figure 6, and the several carrier rods are again shifted, usually by hand, to their respective ends of the machine.

In Figure 1, I have shown the end of the worm shaft 23, and mounted thereon is a belt pulley 24, a ratchet wheel 25, and a notched detent wheel or disc 26. A pawl 27 is adapted normally to be in engagement with the ratchet wheel 25 to advance the latter intermittently in clockwise direction, as viewed in Figure 1. A detent 28, reciprocally mounted in a housing or sleeve 29, is normally urged downwardly into engagement with one of the notches of the detent wheel 26, the detent thereby serving to lock the shaft 23 between its rotational movements.

An additional shaft 30 is mounted alongside of the shaft 23 and is screw-threaded in the same general manner. This shaft carries worm boxes or nuts which are not illustrated but which serve as stops for the bars which reciprocate and carry the narowing points or needles. On the shaft 30 is a similar belt pulley 31, a ratchet wheel 32, and a detent disc or wheel 33. The ratchet wheel 32 is driven in an intermittent manner by the pawl 34; and a detent 35, mounted in a housing 36, engages with the detent wheel 33.

The shaft 30 carries an additional ratchet wheel 37 actuated by a pawl 38 at predetermined times, whenever the pawl 38 is thrown into operative position, the purpose of this additional ratchet wheel being to regulate the rotational movements of the shaft 30 in the required manner. The pawl 38 and ratchet wheel 37 have no direct bearing upon my present invention, however, and have been shown merely for the purpose of depicting the true relationship of parts in a machine of the character illustrated.

The manner in which the pawls are operated is shown clearly in Figure 1. The pawl 27 is pivoted at 39 to an arm 40 having its other end freely mounted upon the shaft 23. A bar 41 is pivoted at 42 to the link 40 and extends downwardly therefrom.

In a similar manner, the pawl 34 is pivoted at 43 to one end of an arm 44 freely mounted upon the shaft 30 and having a portion 45 which supports the pawl 38. At 46, a bar 47 is pivoted to the arm 44 and extends downwardly therefrom.

The bar 47 has a portion 48 which is pivoted at 49 to the lower end of the bar 41, and a spring 50 tends to draw both the bars 41 and 47 downward. The lower end of the bar 47 is pivoted

as at 51 to the end of a lever 52 which carries a cam follower or roller 53. The roller 53 is in engagement with a cam 54 or the like mounted upon a suitable driving shaft 55 which may, if desired, be the cam shaft of the machine but need not necessarily be this particular shaft.

Springs, which I have not shown, tend normally to hold the pawls 27 and 34 in operative engagement with their respective ratchets, and at predetermined times the cam 54 pushes the roller 53 upwardly against the action of the spring 59, thereby causing the pawls to advance their respective ratchet wheels in a step-by-step clockwise direction, as viewed in Figure 1. This rotates the shafts 23 and 30 in predetermined manner and causes a step-by-step advance of the carrier nut 22 (upon the shaft 23) and the carrier nuts which I have not shown but which are mounted upon the shaft 30.

The belt 56, engaging with the pulley 24, and the belt 57, engaging with the pulley 31, extend downwardly into association with pulleys 58 and 59, respectively, loosely mounted upon the driving shaft 55. Under ordinary conditions, therefore, the pulleys 58 and 59 are not driven and the belts 56 and 57 do not interfere with the predetermined action of the pawls and ratchets hereinbefore described.

In the knitting of a full-fashioned stocking blank, the carrier nut 22 remains in its initial position for a certain period of time; then advances intermittently to provide for the narrowing of the calf portion; it then remains stationary for a period; and it finally advances intermittently again to provide for the narrowing of the heel tabs. After the heel tabs have been knitted, it is customary to knit a few additional courses, which are known as "looper courses". It is during the knitting of these loose or "looper" courses that my present invention provides for the automatic racking out or return of the several stop boxes or nuts to their original positions.

Inasmuch as the withdrawal of the carrier nut 22 during its return movement carries with it the stops 21, and inasmuch as certain stops are still required during the knitting of the looper courses, I provide a set of substitute stops which are normally inoperative and which are automatically brought into action just prior to the retractive movement of the carrier nut 22.

Thus, in Figure 6, I have shown an arm 60 pivotally mounted upon a shaft or rod 61 and carrying at its free end a series of projections or stops 62 and 63. The arm 60 is normally held in the upward position shown in dot-and-dash lines in Figure 8, and this is accomplished by means of the latch pin 64 which is normally urged toward the right (in Figure 6) by a spring, (see Fig. 7). This pin is adapted to engage within an apertured boss 65 on the arm 60. The pin 64 is mounted in an arm 66 supported by the shaft 61.

A yoke 67 engages the pin 64 and is mounted on a rod 68 extending parallel to the carrier rods and terminating at a predetermined point 69. The rod 68 is positioned in the path of a projection or lug 70 carried by the nut 22.

Upon viewing Figure 6, it will be noted that when the carrier nut 22 has advanced by a predetermined extent toward the left, the lug 70 will encounter the end 69 of the rod 68 and shift the latter toward the left. This causes the pin 64 to be withdrawn from the lug 65, and permits the arm 60 to drop by gravity into the position shown in full-lines in Figure 8.

In this position, the stops 62 and 63 are interposed in the paths of projections 71 and 72 mounted upon the several carrier rods 20. One stop serves for each carrier rod, and, for example, one of the projections 71 is adapted to encounter one of the stops 62 during the reciprocation of the corresponding carrier rod. Such encounter serves to stop the movement of the rod in the same manner as one of the stops 21 has theretofore functioned, and the stops 62 are, therefore, substitute stops which take the place of the stops 21. It will be understood that a similar group of stops corresponding to those designated at 21 is arranged at the opposite end of the machine. The stops 63 serve as substitutes for the last-mentioned stops, which have not been shown.

To initiate the reversing operation, I provide a rock-shaft or spindle 73 which is normally held in a certain predetermined inoperative position by a latch pin 74. More particularly, the pin 74 engages with a suitable opening in an arm 75 mounted upon the end of the rock-shaft 73. The arm 75 is held upwardly in the same manner as the arm 60 by the engagement therewith of the latch pin 74, but when the latch pin 74 is released, a spring 76 pulls the arm 75 downwardly and thereby imparts a slight rotative movement to the shaft 73.

The release of the pin 74 is accomplished at a predetermined time by means of a continuous member such as the chain 77. This chain is provided with a projection 78 adapted to encounter the free end of an arm 79 normally held in the position shown in Figure 6 by means of a spring 80. The arm 79 is pivoted at 81, and when the projection 78 encounters it, the upper end of the arm 79 is shifted toward the left, as viewed in Figure 6, and moves with it the rod 82. The rod 82 engages the free end of a lever 83 pivoted at 84, as shown in Figure 9. The opposite end of the lever 83 is fastened to an upwardly-extending arm 85 which engages the pin 74. Accordingly, at a predetermined time, when the projection 78 encounters the arm 79, the latch pin 74 is automatically released and the rock-shaft 73 is moved in clockwise direction, as viewed in Figure 1. The chain 77 is constantly driven by the machine, and the projection 78 is so mounted thereon that release of the pin 74 will be accomplished at exactly the desired time.

The rotation of the rock-shaft 73 accomplishes various things. It withdraws the detents 28 and 35 into their respective housings. It disengages the pawls 27 and 34 from their respective ratchets. And it renders the pulleys 58 and 59 operative to drive the shafts 23 and 30 in reverse direction.

The withdrawal of the detents is accomplished by means of an arm 86 which is fastened to the shaft 73 and which engages the free ends of the detent handles 87 and 88 respectively. Thus, when the shaft 73 is moved in clockwise direction, as viewed in Figure 1, it causes the arm 86 to press downwardly upon the handles 87 and 88, thereby withdrawing the detents 28 and 35 into their respective housings.

The disengagement of the pawls is accomplished by means of the arm 89 which is fastened at its upper end to the shaft 73 and is moved in clockwise direction along with the shaft 73. At its midportion, the arm 89 engages the bent end 90 of the strap 91, the latter being pivoted at 92 and 93 to the pawls 27 and 34

respectively. Thus, when the arm 89 moves in clockwise direction, it pulls the strap 91 toward the left, as viewed in Figure 1; and withdraws the pawls 27 and 34 from their respective ratchets and into the disengaged positions shown in Figure 1.

To render the pulleys 58 and 59 operative, a clutch device is provided, which is shown more clearly in Figure 4. Although the pulleys 58 and 59 may be composed of two separate elements, in the illustrated form I have shown them in the form of an integral member having two grooves therein. This member is interposed between a fixed collar 94 and a friction disc 95 mounted upon the driving shaft 55. When the lower end of the arm 89 moves toward the left, as viewed in Figure 1, it pulls with it the link 96, the opposite end of which is provided with the cam surface 97 bearing against the rear face of the disc 98.

Upon viewing Figure 4, it is to be noted that the normal position of the link 96 is shown in dot-and-dash lines, the pulleys 58 and 59 being free to rotate upon the shaft 55. When the link 96 is moving toward the left in Figure 1, and downwardly into the full-line position of Figure 4, it forces the disc 98 toward the left and presses the friction disc 95 against the pulley 59, thereby clutching the latter in firm engagement between the disc 95 and the collar 94. This causes the pulleys 58 and 59 to rotate with the shaft 55, and being thus driven, these pulleys actuate the belts 56 and 57 and rotate the shafts 23 and 30 in reverse directions from normal.

In order that the detent wheels 26 and 33 may be brought to rest in such positions as will enable the detents 28 and 35, when released, to re-engage with respective notches, I provide a projection upon the rear of each ratchet wheel and for engagement with a suitable projection or pin carried by each of the respective worm boxes. For example, in Figures 2 and 5, it will be noted that I have provided a projection 99 upon the rear face of the detent wheel 26. I have also provided a pin 100 within a suitable housing 101 which is urged toward the left, as viewed in Figure 5, by the spring 102. As a carrier nut 22 moves toward the right and back toward its initial position, it presses upon the left end of the pin 100 and forces the right end of the pin out of the housing 101 and into the position shown in Figure 2. In this position, the right end of the pin 100 is interposed in the path of the projection 99. Accordingly, during the counter-clockwise rotation of the shaft 23, under the action of the belt 56, the pin 99 normally encounters no obstruction, but when the carrier nut 22 has reached its original position, the projection 99 encounters the pin 100 and positively brings the rotation of the shaft and the detent wheel to a halt. The further driving power of the pulley 58 causes a slippage of the belt 56 around the pulley 24. This position of rest of the detent wheel 26 is one wherein a notch thereof is exactly beneath the detent 28, so that when the latter is again released, it will fall downwardly into engagement with this notch.

It will be understood that the provision of the projection 99 and the cooperation thereof with the pin 100 may have a useful applicability in machines of this general character even where the return rotation of the shafts 23 and 30 is accomplished by means other than the belts illustrated. For example, where these shafts are rotated by hand, the detent wheels are properly brought to rest automatically in such positions that time need not be wasted in trying to re-engage the respective detents therewith.

In Figures 10 and 11, I have shown a preferred construction of the abutment or projection to be provided on the rear face of the detent wheel 26. The projection I have illustrated in these figures is adjustable angularly with respect to the wheel and consists of a member 105 provided with a longitudinal slot 106, a pair of set screws 107 serving to lock the member 105 in adjusted position. For more accurate adjustment of this member, and to enhance the operation of this member as a stop or abutment, I provide a stud 108 in a housing 109 and cause the end of the stud to bear against the rear end of the member 105.

Whenever the knitting operation of a leg blank has been completed and the machine stops, the operator raises the arm 60 until the latch pin 64 re-engages therewith. Although he may similarly raise the arm 75 by hand, my invention dispenses with the necessity for this additional operation by providing a projection 103 upon a suitable carrier rod, this projection cooperating with a roller 104 carried at the free end of the arm 75. Thus, upon viewing Figure 9, it will be obvious that when the rod which carries the projection 103 is moved toward the right, the arm 75 will be automatically raised to permit the latch pin 74 to re-engage therewith. Inasmuch as the rods must be shifted, in any event, to opposite ends of the machine before the knitting operation can be again started, this shifting of the rod which carries the projection 103 is not an additional procedure, but one which the attendant of the machine carries out in a customary manner.

It will be obvious that changes in the details herein described and illustrated for the purpose of explaining the nature of my invention may be made by those skilled in the art without departing from the spirit and scope of my invention as expressed in the appended claims. It is therefore intended that these details be interpreted as illustrative.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, a ratchet and pawl arrangement for rotating said shaft to advance said nut intermittently and thereby reduce the travel of said rods in a planned manner, a reversing mechanism, a normally disconnected clutch between said reversing mechanism and said shaft, and means automatically operative after a predetermined advance of said nut to disengage said pawl and ratchet and to connect said clutch.

2. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, means for rotating said shaft to advance said nut axially with respect to said rods so as to reduce the travel of said rods in a predetermined manner, a reversing mechanism for said shaft, a normally disconnected clutch between said reversing mechanism and said shaft, and means automatically operative after a predetermined advance of said nut to connect said clutch and thereby rotate said shaft in reverse direction.

3. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, a ratchet and pawl arrangement for rotating said shaft to advance said nut intermittently and thereby reduce the travel of said rods in a planned manner, a detent for locking said ratchet between rotations thereof, a reversing mechanism for said shaft, a normally disconnected clutch between said reversing mechanism and said shaft, and means automatically operative after a predetermined advance of said nut to disengage said pawl and ratchet, withdraw said detent, and connect said clutch, whereby said shaft will be rotated in reverse direction.

4. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, a ratchet and pawl arrangement for rotating said shaft to advance said nut intermittently and thereby reduce the travel of said rods in a planned manner, a detent for locking said ratchet between rotations thereof, a reversing mechanism for said shaft, a normally disconnected clutch between said reversing mechanism and said shaft, and means automatically operative after a predetermined advance of said nut to disengage said pawl and ratchet, withdraw said detent, and connect said clutch, whereby said shaft will be rotated in reverse direction; said last-named means comprising a rock-shaft, an arm carried thereby and engaging said detent, an arm carried thereby and operatively associated with said clutch, and a link engaged by said last-named arm and engaging said pawl.

5. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, means for rotating said shaft to advance said nut axially with respect to said rods so as to reduce the travel of said rods in a predetermined manner, a normally inoperative set of substitute stops for said rods, and means automatically operative after a predetermined advance of said nut to render said substitute stops operative, and means automatically operative thereupon to rotate said screw shaft in reverse direction and return the carrier nut to initial position.

6. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, means for rotating said shaft to advance said nut axially with respect to said rods so as to reduce the travel of said rods in a predetermined manner, a set of substitute stops for said rods, a latch for normally holding said substitute stops in inoperative position, and means automatically operative after a predetermined advance of said carrier nut to trip said latch and render said substitute stops operative; whereby said screw shaft may thereupon be rotated in reverse direction without affecting the travel of the yarn-carrier rods.

7. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, means for rotating said shaft to advance said nut axially with respect to said rods so as to reduce the travel of said rods in a predetermined manner, a set of substitute stops for said rods, a latch for normally holding said substitute stops in inoperative position, and means automatically operative after a predetermined advance of said carrier nut to trip said latch and render said substitute stops operative, said last-named means being interposed in the path of said nut and operative when encountered thereby; whereby said screw shaft may then be rotated in reverse direction.

8. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, means for rotating said shaft to advance said nut axially with respect to said rods so as to reduce the travel of said rods in a predetermined manner, normally inoperative mechanism for reversing the rotation of said shaft, a rock-shaft controlling said mechanism, a latch for normally locking said rock-shaft, means automatically operative at a predetermined time to release said latch, and means operative by movement of one of said yarn-carrier rods for re-latching said rock-shaft in inoperative position.

9. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, means for rotating said shaft to advance said nut axially with respect to said rods so as to reduce the travel of said rods in a predetermined manner, a detent for locking said shaft between rotations thereof, a detent wheel carried by said shaft and engageable by said detent, and means for halting said detent wheel in a predetermined angular position when said shaft is rotated in reverse direction.

10. In a knitting machine, a set of reciprocable yarn-carrier rods, stops for said rods to limit their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, means for rotating said shaft to advance said nut axially with respect to said rods so as to reduce the travel of said rods in a predetermined manner, a detent for locking said shaft between rotations thereof, a detent wheel carried by said shaft and engageable by said detent, and means for halting said detent wheel in a predetermined angular position when said shaft is rotated in reverse direction, said last-named means comprising complementary projections associated with said detent wheel and said carrier nut respectively.

11. In a knitting machine, a set of reciprocable yarn carrying rods, narrowing mechanism for varying the travel of said rods, and stops for limiting the travel of the rods, said stops being non-operative during the narrowing operation and rendered operative when the narrowing operation is completed, whereby the knitting can be continued while the narrowing mechanism is automatically returning to its initial position.

12. In a knitting machine, a set of reciprocable yarn carrying rods, narrowing mechanism for varying the travel of said rods, a set of stops non-operative during the narrowing operation, and means for rendering said stops operative and for returning the narrowing mechanism to its starting position when the narrowing operation is completed, whereby the knitting can be continued simultaneously with the return of the narrowing mechanism.

13. In a knitting machine, a set of reciprocable yarn carrier rods, stops for said rods to limit

their reciprocation, a threaded carrier nut for said stops, a screw shaft supporting said nut, narrowing mechanism including means for rotating said shaft to advance said nut axially with respect to said rods so as to reduce the travel of said rods in a predetermined manner, a normally inoperative set of substitute stops, and means automatically operative at the completion of the narrowing operation to cause the screw shaft to be reversed for return of said nut to initial position, and at the same time to render the substitute stops active for controlling the yarn carrier rods during return of the carrier nut as aforesaid.

14. In a knitting machine, a set of reciprocating yarn carrier rods; a set of normally operative stops for said rods to limit their reciprocation; narrowing mechanism including means for automatically shifting said stops to reduce the travel of said rods in a predeterminel manner; means for automatically restoring the stops to their initial or starting positions at the completion of each knitting cycle of the machine; an auxiliary set of normally-inoperative positionally-fixed substitute stops for said rods; and means for rendering the substitute stops temporarily operative during restoration of the first mentioned stops to their normal positions.

15. In a knitting machine, narrowing mechanism including a yarn carrier stop screw shaft, a narrowing point stop screw shaft, and racking means for rotating the shafts in one direction incident to narrowing of the fabric knitted in the machine; reversing mechanism including a power shaft and a normally disconnected clutch interposed between the power shaft and the screw shafts; and means automatically operative after the desired narrowing of the fabric has been accomplished, to disengage the racking means and to operate the clutch so that the two screw shafts are turned in the opposite direction for restoration of the narrowing mechanism to its initial or starting position.

16. In a knitting machine, narrowing mechanism including a yarn carrier stop screw shaft, a narrowing point stop screw shaft, and racking means for rotating the shafts in one direction incident to narrowing of the fabric knitted in the machine; reversing mechanism including a power shaft with a loose double pulley thereon, a clutch for the pulley, and belts coordinating pulleys on the respective screw shafts with the double pulley; and means automatically operative after the desired narrowing of the fabric has been accomplished, to disengage the racking means and to operate the clutch so that the two screw shafts are turned in the opposite direction with attendant restoration of the narrowing mechanism to its initial or starting position.

17. In a knitting machine, narrowing mechanism including a yarn carrier stop screw shaft, a narrowing point stop screw shaft, and racking means for rotating the shafts in one direction incident to narrowing of the fabric knitted in the machine; reversing mechanism including a power shaft with a loose double pulley thereon, a clutch for the pulley, slip belts coordinating pulleys on the respective screw shafts with the double pulley; means automatically operative after the desired narrowing of the fabric has been accomplished, to disengage the racking means and to operate the clutch so that the two screw shafts are turned in the opposite direction; and means to arrest the reverse rotation of the shafts when the narrowing mechanism has been restored to its initial or starting position.

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