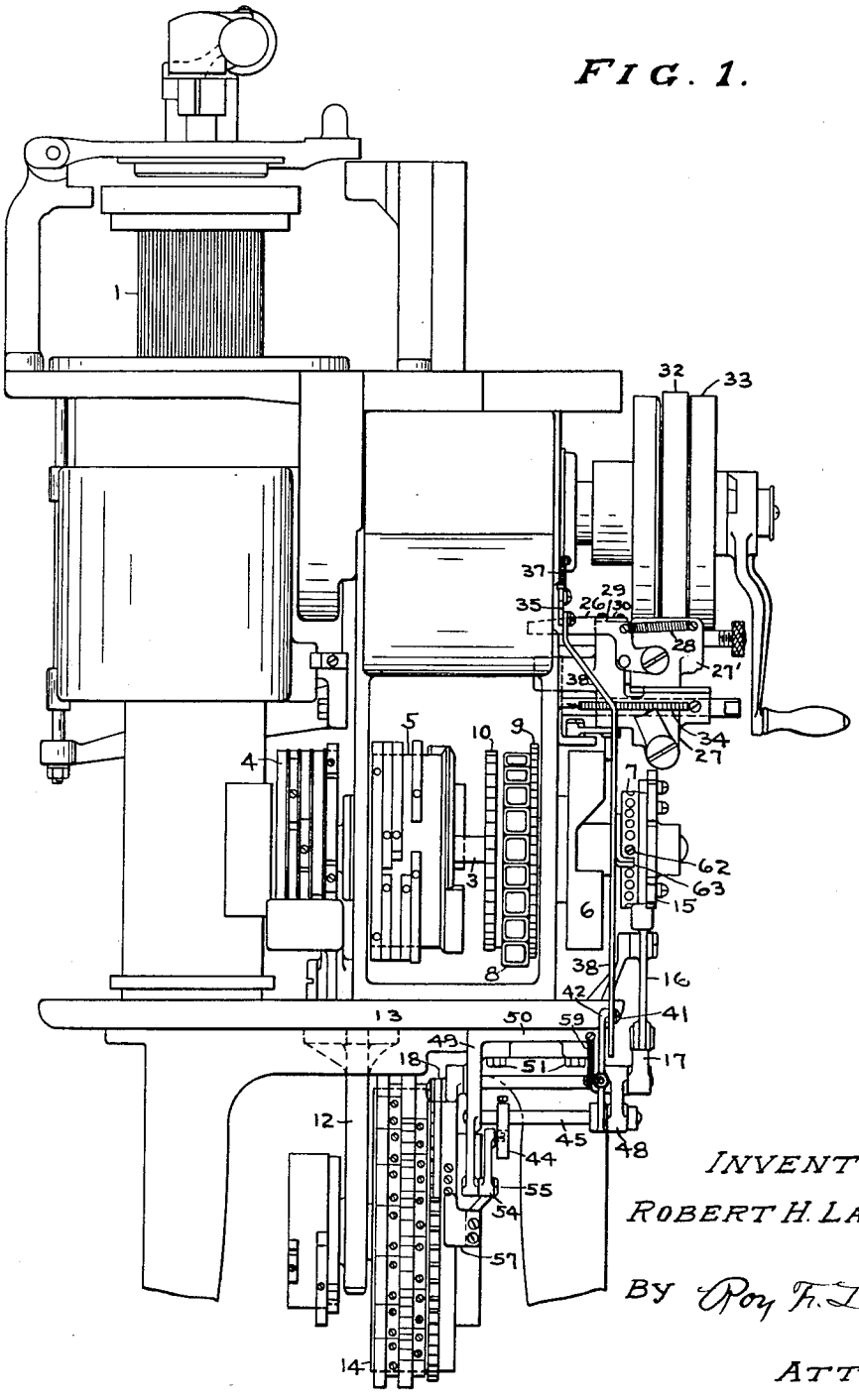
May 1, 1934. R. H. LAWSON 1,956,990

STOP MECHANISM

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FIG. 1.



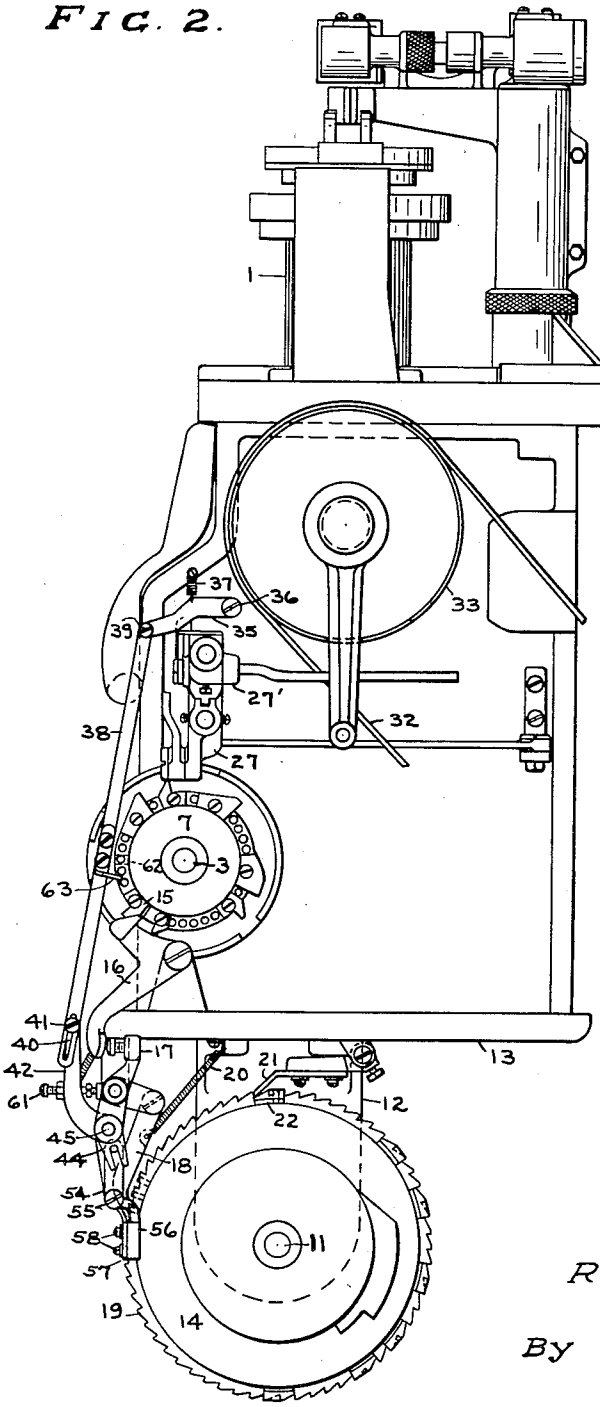
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STOP MECHANISM

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FIG. 2.



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FIG. 3.

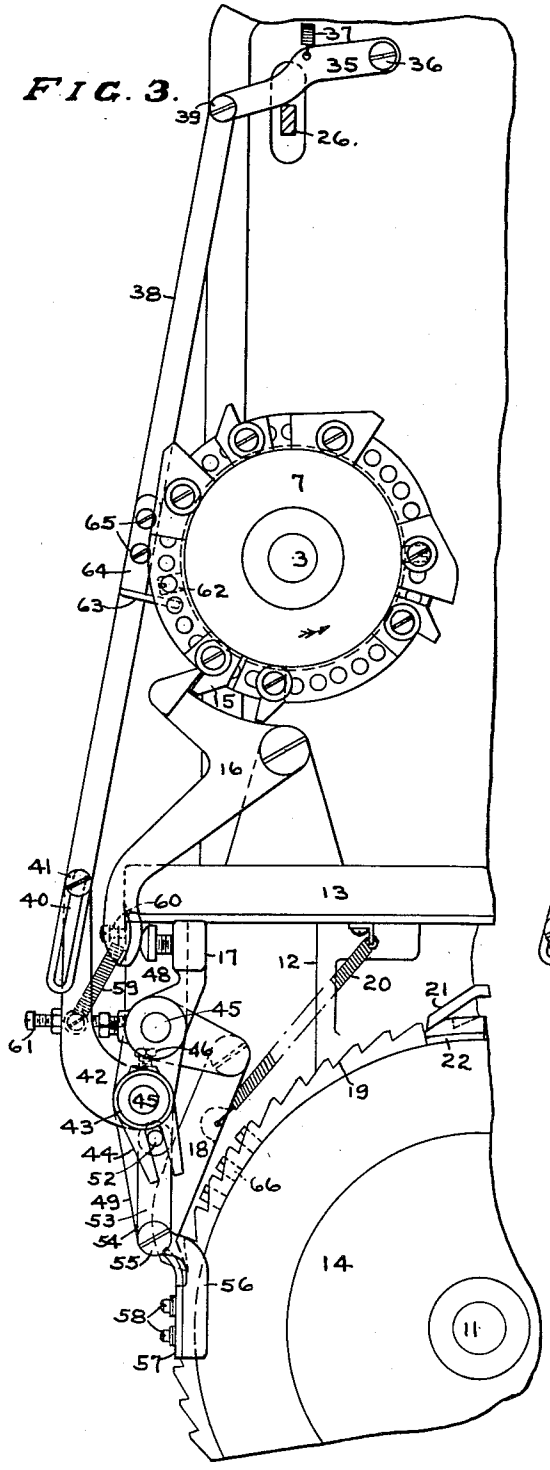
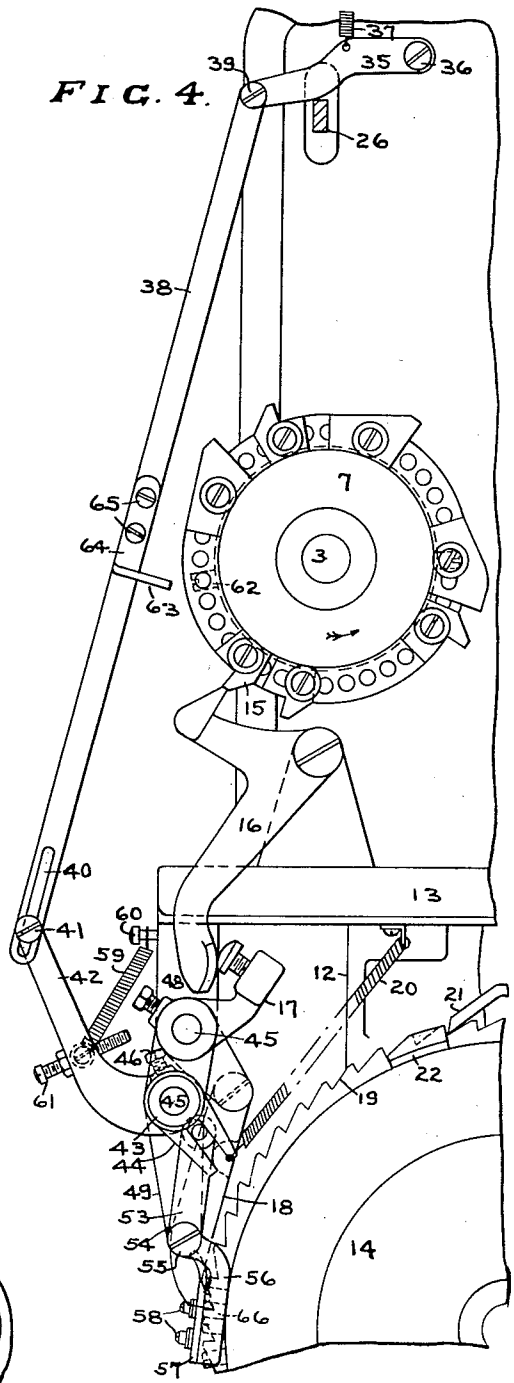


FIG. 4.



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FIG. 6.

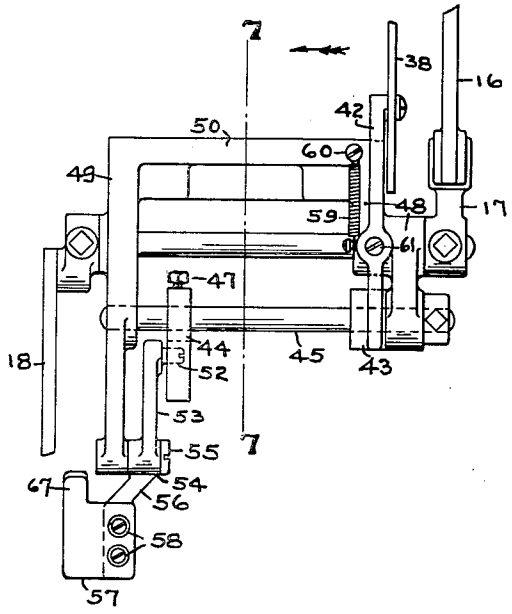


FIG. 7.

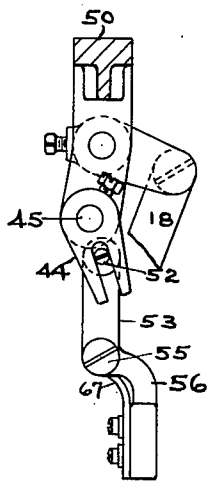


FIG. 8.

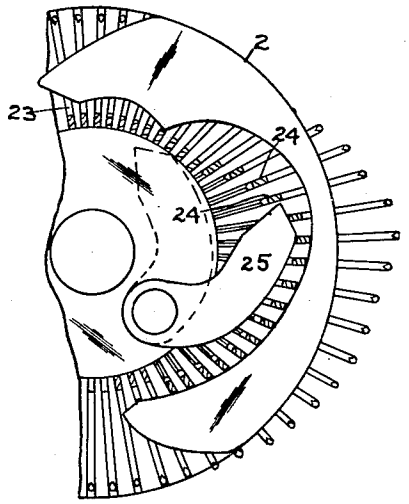
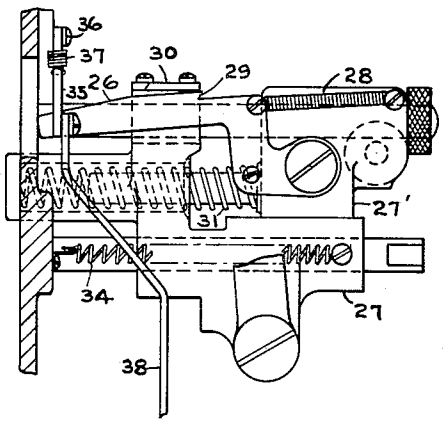


FIG. 5.



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Patented May 1, 1934 1,956,990

UNITED STATES PATENT OFFICE

1,956,990

STOP MECHANISM

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Application March 9, 1931, Serial No. 521,064

7 Claims. (Cl. 66—157)

This invention relates to a new and improved stop motion and is particularly intended for use in knitting machines which are adapted to knit rib fabric and plain fabric in one continuous operation, although the invention is not limited, in its application, to any particular type of knitting or other machine.

In the drawings:

Fig. 1 is a view in front elevation of so much of the mechanism of a knitting machine as pertains to the present invention and cooperates with the stop motion to effect the desired purpose;

Fig. 2 is a view of the mechanism shown in Fig. 1, but in side elevation;

Fig. 3 is a fragmentary view, enlarged with respect to the showing in Fig. 2, showing the stop motion mechanism, the main and auxiliary pattern drums of the machine being shown out of timed relation with respect to one another;

Fig. 4 is a fragmentary view in side elevation similar to Fig. 3, but showing the main and auxiliary pattern drums in timed relation with one another;

Fig. 5 is an enlarged view of the belt shipping mechanism, with parts broken away, more clearly to show the construction;

Fig. 6 is a detail view showing a bracket and parts carried thereby for controlling the movements of the stop motion;

Fig. 7 is a sectional view taken along the line 7—7, Fig. 6 and looking in the direction of the arrow; and

Fig. 8 is a detail view showing the necessity for maintaining the dial needles retracted during reverse strokes of reciprocating knitting.

In the specific application of the stop motion herein disclosed, the same is shown as applied to a knitting machine having a needle cylinder 1 and a needle dial 2, the needle cylinder and needle dial each having needles independently mounted therein in the usual manner, the dial and cylinder needles being adapted to knit rib fabric and the cylinder needles alone being adapted to knit plain fabric.

The constructions and operations of the dial and cylinder needles are not a necessary part of the present invention and therefore the needles and means for controlling the same have not been disclosed in detail.

A main cam shaft 3 is shown upon which are mounted various cam drums and cams for controlling the operations of the knitting machine during the knitting of a fabric such as a stocking or half hose. Mounted upon the main cam shaft to turn therewith are a series of drums 4, 5, 6 and 7, each said drum having cams mounted thereon to control certain of the operations incidental to the knitting of a stocking or other fabric, which operations, however, are not necessarily a part of the present invention and will not be described in detail. The shaft 3 is intermittently advanced, from time to time and as desired, by means of a pattern, sprocket chain 8 which is mounted upon the hub of a ratchet 9, the latter being loosely mounted upon the shaft 3 and being advanced every four or more courses by means of the usual pawl mechanism not herein shown and not of itself a necessary part of the present invention. Fast to the shaft 3 and adjacent to the pattern chain 8 is mounted a ratchet wheel 10 which has irregularly spaced teeth on the periphery thereof, the said teeth being intermittently engaged by pawl means (not shown) which are controlled from lugs on the pattern chain 8 in a manner usual in Banner machines; and as the construction for advancing the ratchet 10 is not of itself a necessary part of the present invention, a detailed showing of the parts for so advancing the ratchet 10 has been omitted.

In addition to the main cam shaft 3 there is also provided an auxiliary cam shaft 11 which is supported as by means of a bracket 12 depending from and connected to the underside of the oil pan or plate 13 which forms part of the machine frame. The said auxiliary shaft has mounted thereon cam drums 14 primarily controlling the operation of the knitting machine during the knitting of rib fabric, i. e., when the needles in the dial 2 are knitting in cooperation with the needles in the needle cylinder 1; while the hereinbefore described cam drums and cam carried by the shaft 3 control the various knitting operations during the knitting of plain fabric such as the plain portions of a leg of a stocking and heels and toes as well as looper's rounds, etc.

The drums carried by the cam shaft 3 and the drums carried by the cam shaft 11 are normally maintained in timed relation, the cam shaft 3, preferably, being intermittently advanced, as hereinbefore described, during the knitting of plain portions of a stocking or other fabric; while at the commencement of rib knitting, cams, such as cam 15, which are removably mounted upon one face of the drum 7, engage and rock a bell crank lever 16, pivotally supported on the machine frame, which lever 16 in turn rocks a lever 17, one arm of which lever carries pawl 18 which pawl is held in engagement with ratchet teeth 19 as by means of a spring 20. Rocking of lever 17 causes pawl 18 to advance the lower cam shaft 11 and cam drums carried thereby, the auxiliary cam shaft being then advanced by means of a second pawl 21 theretofore reciprocating idly along the upper face of an idler 22. The pawl 21 is constantly reciprocated by means not a necessary part of the invention and not specifically disclosed. It will thus be understood that the cam shaft 3 is intermittently advanced during the knitting of plain portions of a stocking or

other fabric while the shaft 11 is intermittently advanced during the knitting of rib portions of a stocking or other fabric. Should, however, the two shafts 3 and 11 be out of time for any reason, cams carried by the lower cam shaft 11 would or might so control the movements of the dial needles 23 during the reverse strokes of reciprocating knitting, such as heel and toe knitting, that the said dial needles would or might be projected or maintained in advanced position (Fig. 3) during such reverse strokes of heel and toe knitting, in which event the butts 24 of the said dial needles 23 would engage a cam 25 and become broken. Therefore it is necessary that the two shafts 3 and 11 be maintained in timed relation the one with the other, and if the two shafts be out of timed relation the one with the other, some means must be provided automatically to stop the machine before a smash has occurred, and it is with that in view that the stop motion now to be described, is operatively connected with the two shafts 3 and 11.

A lever or detent 26 (Figs. 1 and 5) is pivotally carried by a belt shipping bracket 27 which includes an auxiliary bracket 27', the said lever 26 being retained in the position shown in Fig. 1 by means of a spring 28 which maintains the interengagement between the notch 29 provided in the upper edge of the lever or detent 26, and a plate 30 which serves normally to maintain the bracket 27' in the extreme lefthand position shown in Fig. 1. However, when the detent or lever 26 is rocked upon its pivot the detent is released from engagement with the plate or stop 30 and thereupon a spring 31 forces the belt shipping bracket 27' to the extreme righthand position shown in Fig. 5 which movement of the bracket 27' shifts the belt 32 onto the loose pulley 33 thereby stopping the machine. Coil springs 34 normally maintain the belt shipping bracket 27 in the position shown in Fig. 1.

Referring particularly to Figs. 3 and 4 wherein enlarged views of the stop motion control mechanism are shown, a lever 35, which is pivotally mounted on the side of the machine frame as by means of a screw 36, is normally maintained, as by means of a coil spring 37, in a position so as not to release the detent 26. As hereinbefore stated when the main and auxiliary shafts 3 and 11 respectively are in timed relation the one with the other, the drums are in the relative relations shown in Fig. 4 at which time a link 38, which is pivotally mounted at one end at 39 on the lever 35, is pivotally and slidably connected at its other end by means of the interengagement of a slot 40, provided in that end of the link 38, with a pin or screw 41 mounted upon and carried by one arm 42 of a lever 43. The lever 43 consists of the arm 42 and a second arm 44 which is laterally spaced from the said arm 42, the two arms being respectively connected to a short pin or shaft 45 by screws 46, 47. The shaft 45 is journalled in bracket arms 48 and 49 which are carried by and form part of a bracket 50, the latter being connected to the underside of the oil pan 13 as by means of screws or bolts 51. The lever arm 44 is bifurcated and the two arms straddle a pin or stud 52 which projects laterally from and forms part of one arm 53 of a lever 54 which lever 54 is pivoted intermediate its ends, as by means of a screw 55, to an extension of the bracket arm 49. The other arm 56 of the lever 54 has attached thereto a plate 57 as by means of screws 58, the said plate 57 extending laterally over the ratchet teeth 19 for a purpose presently to be described.

Connected to the lever arm 42 intermediate the ends of the same is a coil spring 59 the other end of the said coil spring being connected to a pin or screw 60 which is itself connected to the bracket 50. The coil spring 59 tends normally to maintain the lever arm 42 and link 38 in the relative positions shown in Fig. 3 in which positions pin or screw 61, which extends through the lever arm 42 intermediate the ends thereof, engages the depending bracket arm 48 and thereby limits the inward movements of the lever arm 42 and link 38.

As hereinbefore stated, Figs. 2 and 3 show the relative positions of the lever arm 42 and link 38 when the shafts 3 and 11 are out of time and just prior to the beginning of reciprocating knitting such as for the heel or toe of a stocking. The periphery of the drum 7 is provided with a series of threaded holes adapted to receive therein screws 62 and when the link 38 is in the position adjacent to the drum 7 shown in Fig. 3, a lug 63, connected to and forming part of a plate 64 which is connected to the link 38 intermediate the ends thereof as by means of screws 65, projects laterally and is in the path of a pin or screw 62 when the drum 7 is advanced preparatory to reciprocating knitting.

As will be seen from inspection of Fig. 3, when the drum is advanced from the position shown therein by mechanism herein described, the pin or screw 62 shown adjacent to the lug 63, Fig. 3, will engage the said lug and cause the link 38 to move in a downward direction which will cause the lever 35 to engage the detent 26 and release the same from engagement with the plate 30, whereby the spring 31 will move the belt shipping bracket 27' from the position shown in Fig. 1 to that shown in Fig. 5 which moves the belt 32 onto the loose pulley 33 thereby stopping the machine. Thereafter the machine is reset, that is, either the shaft 3 or shaft 11 is rotated to bring the said two shafts in time with one another.

When the shafts 3 and 11 are in time the link 38 is moved from a position shown in Fig. 3 to that shown in Fig. 4 just prior to the next forward movement of the shaft 3 so that the pin or screw 62, when the drum 7 is subsequently advanced, may move past the lug 63 without engaging the same and actuating the stop mechanism in a manner hereinbefore described. The mechanism for moving the lever 43 and link 38 from the position shown in Fig. 3 to that shown in Fig. 4 prior to the next advance of the shaft 3 and drum 7, includes supplemental or auxiliary pins 66 which are mounted on the periphery of an auxiliary drum 14. The screws or pins 66 are so positioned on the surface of the drum 14 that, when the two shafts 3 and 11 and cams carried thereby are in time, one of the said pins 66 will, when rotated, engage the adjacent face of an outwardly turned portion 67 of the laterally extending plate 57 and thereby rock the lever 54 upon its pivot 55 from the position shown in Fig. 3 to that shown in Fig. 4. The rocking movement imparted to the arm 56 of the lever 54 is not great but in view of the relatively long arm 53 of the lever 54, the arc through which the pin 52 swings is greater in length than the arc through which the outwardly turned portion 67 swings. The pin 52 being seated between the bifurcations of the arm 44 of lever 43 and adjacent to the axis of the said lever, swings the pin 41 carried by the

outer end of the lever arm 42 of the lever 43 through a long arc thereby withdrawing the lug 63 from the path of a pin or screw 62.

Briefly described the operation is as follows: When the shafts 3 and 11 and cams carried thereby, are out of time (Fig. 3) there is no pin or screw 66 in a position to rock the lever 54, and consequently rock the lever 43, to the position shown in Fig. 4 and therefore the lug 63 remains in the position shown in Fig. 3 and consequently when the shaft 3 and the drum 7 are advanced in the direction of the arrow, Fig. 3, a pin or screw 62 engages the lug 63 and actuates the stop motion in the manner hereinbefore set forth.

On the other hand when the shafts 3 and 11 and cams carried thereby are in time (Fig. 4), a pin or screw 66 carried by the drum 14 rocks the lever 54 and consequently the lever 43 thereby moving the link 38 and its lug 63 to the position shown in Fig. 4 so that a pin or screw 62 may, when the shaft 3 and drum 7 are next advanced, move idly past the lug 63 without actuating the stop mechanism.

The stop mechanism hereinbefore described, although it is not necessarily so used, is preferably used with another stop motion which, however, includes the detent 26 and belt shipping mechanism 27. Furthermore, while hereinbefore disclosed as applied to a circular knitting machine shown in the patent to Hemphill 933,443, September 7, 1909, nevertheless the stop motion may be applied to other types of knitting machines or to other machines having parts or mechanisms similar to the parts or mechanisms hereinbefore disclosed, there being no intention to limit the invention otherwise than by the scope of the claims themselves.

I claim

1. A knitting machine of the character set forth having two cam shafts and cams mounted thereon for controlling the operations of the machine, the shafts being circumferentially movable and being adapted to be maintained in a certain timed relation the one with the other, one of the shafts adapted to assist in controlling the operations of the knitting machine during the knitting of plain fabric and the other adapted to assist in controlling the operations of the knitting machine during the knitting or rib fabric, in combination with means for stopping the machine when the two shafts are not in timed relation.

2. A knitting machine of the character set forth having two cam shafts and cams mounted thereon for controlling the operations of the machine, the shafts being circumferentially movable and being adapted to be maintained in a certain timed relation the one with the other, means operatively connecting the two shafts whereby circumferential movements of one of the shafts causes the other shaft to initiate its movements, one of the shafts adapted to assist in controlling the operations of the knitting machine during the knitting of plain fabric and the other adapted to assist in controlling the operations of the knitting machine during the knitting of rib fabric, in combination with means for stopping the machine when the two shafts are not in timed relation.

3. A knitting machine of the character set forth having two cam shafts and cams mounted thereon for controlling the operations of the machine, the shafts being circumferentially movable and being adapted to be maintained in a certain timed relation the one with the other, one of the shafts adapted to assist in controlling the operations of the knitting machine during the knitting of plain fabric and the other adapted to assist in controlling the operations of the knitting machine during the knitting of rib fabric, in combination with means for stopping the machine when the two shafts are not in timed relation, the stop motion being operable by means on one of the shafts.

4. A knitting machine of the character set forth having two cam shafts and cams mounted thereon for controlling the operations of the machine, the shafts being circumferentially movable and being adapted to be maintained in a certain timed relation the one with the other, means operatively connecting the two shafts whereby circumferential movements of one of the shafts causes the other shaft to initiate its movements, one of the shafts adapted to assist in controlling the operations of the knitting machine during the knitting of plain fabric and the other adapted to assist in controlling the operations of the knitting machine during the knitting of rib fabric, in combination with means for stopping the machine when the two shafts are not in timed relation, the stop motion being operable by means on one of the shafts.

5. A knitting machine of the character set forth having two cam shafts and cams mounted thereon for controlling the operations of the machine, the shafts being circumferentially movable and being adapted to be maintained in a certain timed relation the one with the other, one of the shafts adapted to assist in controlling the operations of the knitting machine during the knitting of plain fabric and the other adapted to assist in controlling the operations of the knitting machine during the knitting of rib fabric, in combination with means for stopping the machine when the two shafts are not in timed relation, and means on one shaft for preventing the actuation of the stop motion means while the two shafts are being advanced in proper timed relation the one with the other.

6. A knitting machine of the character set forth having two cam shafts and cams mounted thereon for controlling the operations of the machine, the shafts being circumferentially movable and being adapted to be maintained in a certain timed relation the one with the other, means operatively connecting the two shafts whereby circumferential movements of one of the shafts causes the other shaft to initiate its movements, one of the shafts adapted to assist in controlling the operations of the knitting machine during the knitting of plain fabric and the other adapted to assist in controlling the operations of the knitting machine during the knitting of rib fabric, in combination with means for stopping the machine when the two shafts are not in timed relation, and means on one shaft for preventing the actuation of the stop motion means while the two shafts are being advanced in proper timed relation the one with the other.

7. A knitting machine including a needle dial having a cam therein and a needle cylinder, a stop motion, in combination with means for operating the said stop motion when the dial cam is projected during reverse strokes of reciprocating knitting.

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