July 16, 1940. R. H. LAWSON ET AL 2,208,307

ADJUSTABLE CAM MOUNT FOR KNITTING MACHINES

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FIG. 1.

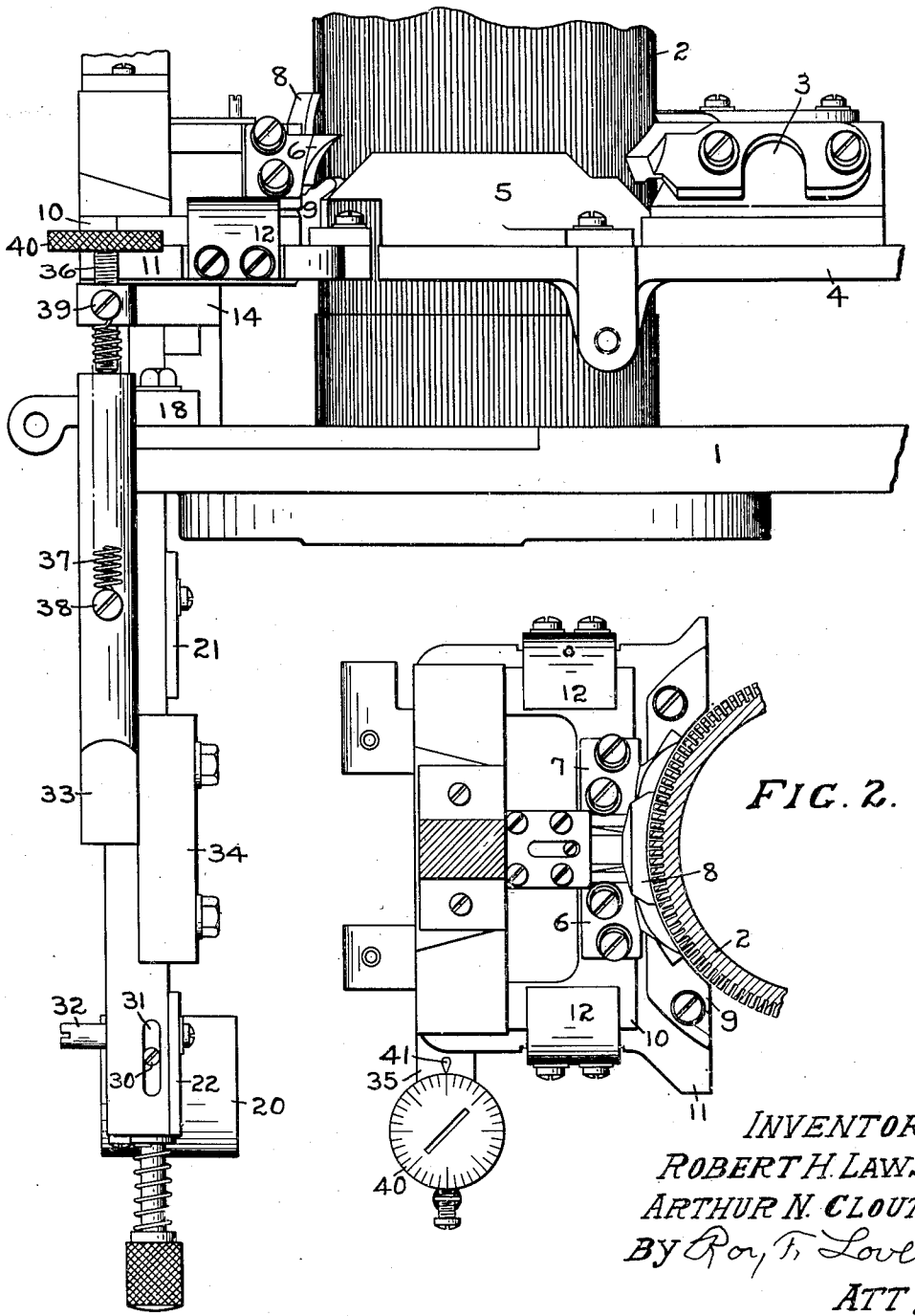


FIG. 2.

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FIG. 4.

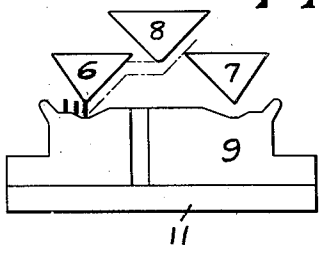


FIG. 3.

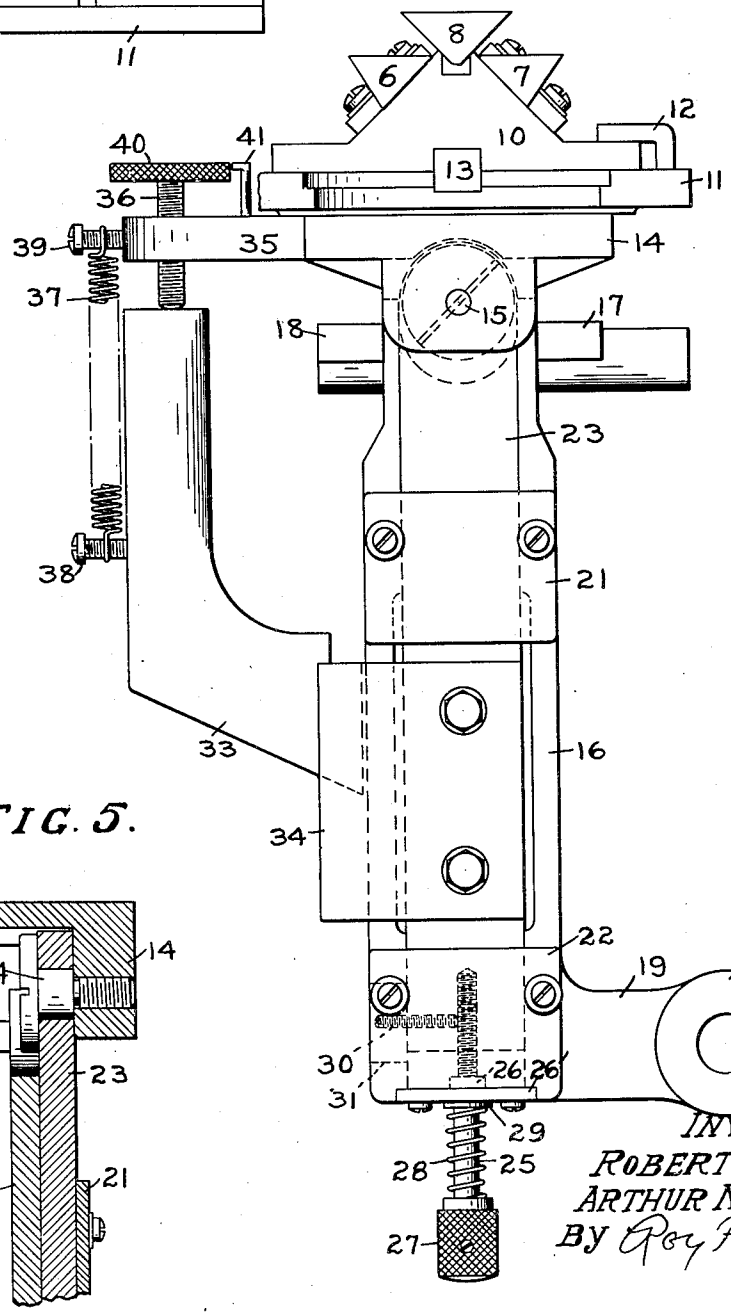


FIG. 5.

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FIG. 6.

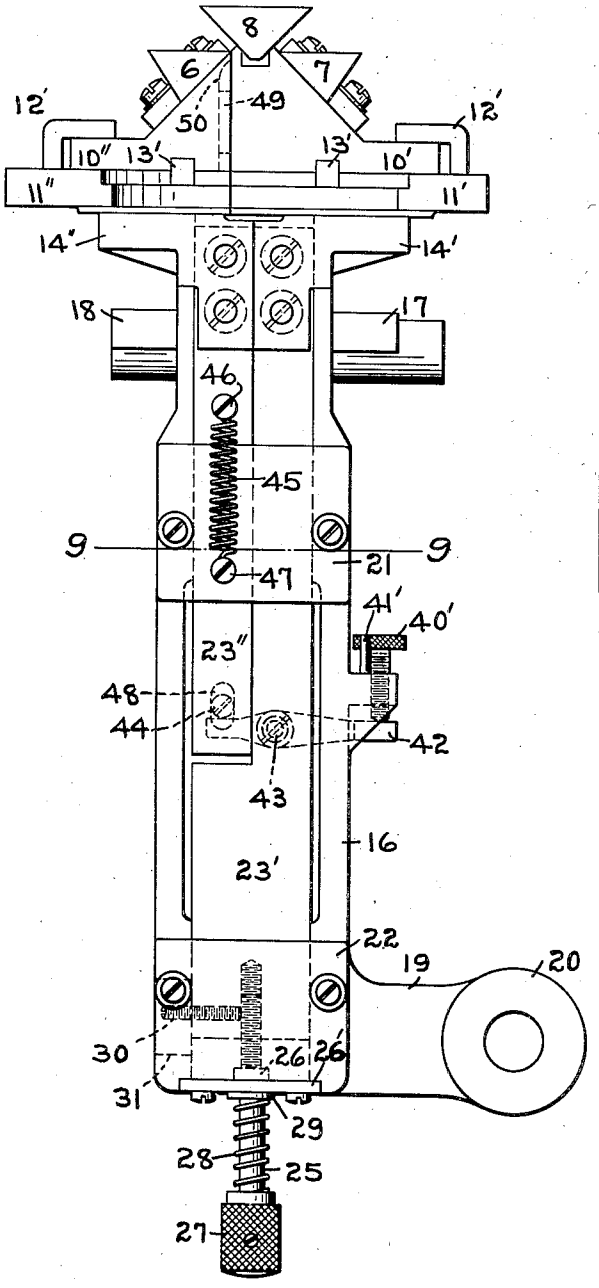


FIG. 9

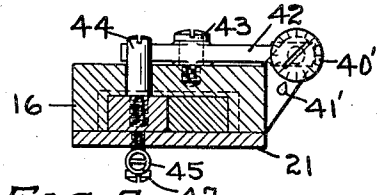


FIG. 7.

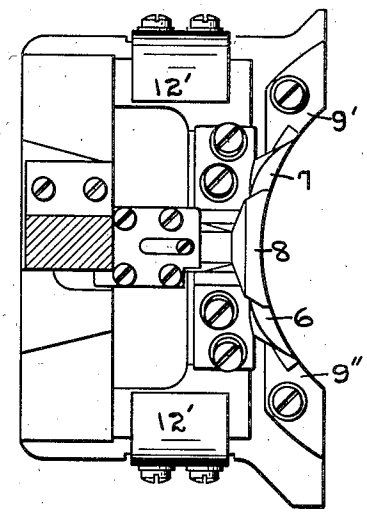
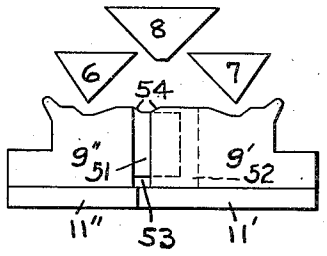


FIG. 8.



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UNITED STATES PATENT OFFICE

2,208,307

ADJUSTABLE CAM MOUNT FOR KNITTING MACHINES

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Application July 9, 1935 Serial No. 30,476
In Canada July 10, 1934

7 Claims. (Cl. 66—43)

This case is concerned with an adjustable mounting for the cam block of a knitting machine, more especially cam blocks for use in the split-foot type knitting machines wherein certain portions of the fabric are knitted in a rotary manner and other portions in a reciprocatory manner.

In the drawings:

Fig. 1 is an elevation showing the invention as applied to a split-foot knitting machine, enough of that machine being shown to properly associate the invention therewith;

Fig. 2 is a view, partly in section, showing the auxiliary cam block and adjusting mechanism as seen from above;

Fig. 3 is an elevation of the invention as seen from the inside of the machine;

Fig. 4 is a view showing the knitting cam and the path of needle butts passing therethrough;

Fig. 5 is a sectional view showing in detail the connection between the cam block assembly and the fashioning bar;

Fig. 6 is a view similar to Fig. 3 but showing a modification;

Fig. 7 is a fragmentary plan view of the modification shown in Fig. 6;

Fig. 8 is an elevational view of the cams, being similar to Fig. 4; and

Fig. 9 is a section taken along the line 9—9, Fig. 6.

In knitting machines which knit fabric by relative rotation of needles and cams at times, and by reciprocating one or the other of these elements at other times, very accurate adjustment of the stitch drawing cams must be made so that the stitches drawn by one of the cams will appear to be of the same length as stitches drawn by the other or opposed cam. When assembling the cams and their block in a new machine, the cams may be adjusted to accurate distances above the cam carrying plate but when the machine is started up, due to other irregularities such as misalignment between said plate and the plane of rotation of the needle cylinder, equal length stitches will not be drawn. The mechanism herein described provides an easy and accurate means of adjusting said cam assembly without disturbing any of its other functions so that equal length stitches will be drawn.

After the machine has been operated for some length of time unequal wear is bound to occur in the cams so that from time to time, slight adjustment must be made to maintain proper stitch length in adjacent courses when knitting in a reciprocatory manner. This control of stitch length during reciprocation is very essential when knitting split-foot stockings, especially so in knitting the instep of such stockings wherein that instep is knitted of the same yarn which was used to knit the leg portion, and by the same cams.

The invention has been illustrated with respect to the auxiliary cam set of a Banner type, split-foot machine wherein the leg and instep are knitted at the auxiliary side and of the same yarn. The description is to be taken as illustrative of one embodiment of the invention which is by no means limited to use in split-foot machines nor is it limited to the auxiliary side of such machines. The invention is useful wherever opposed stitch cams are used for knitting during reciprocatory work.

Referring to Figs. 1 and 2, the circular base 1 and needle cylinder 2 of a split-foot knitting machine are shown. The main cam block is generally indicated by numeral 3 and is mounted to be vertically moved for purposes of fashioning and to be withdrawn from active position at certain times all in a manner similar to that shown and described in Canadian Patent 337,677. This main cam block is slidably attached to plate 4 which also has fixed thereto, front needle raise cam 5.

An auxiliary cam block is shown at the opposite side of Fig. 1 and has stitch drawing cams 6 and 7, center cam 8 and needle raise cam 9, the latter preferably being formed in two parts. The two parts of the raise cam in effect constitute separate cams, each of which functions with one of the stitch cams, see Figs. 4 and 8. The stitch cams and center cams are attached to a block 10 which slides radially of the machine in a guideway formed between cam plate 11 and clamps 12, better shown in Fig. 2. The key 13 serves to guide the block so that it will slide radially in a definite pathway. The mechanism for moving this cam block towards and from the cylinder is not shown since it is well known and has been shown in the patent above mentioned. Center cam 8 may be individually moved to and from active position by the usual method.

Cams 6 and 7 are attached to the side of cam block 10 in such a manner that they may be adjusted in a vertical direction. When setting up the machine the cam block is placed upon a flat surface and a gage of the proper height is used to set these cams at equal distances from the same flat surface. The needle raise cam 9 is adjustably attached to cam plate 11 and the spacing between this cam and the stitch cams is such that needle butts passing between the two have

just sufficient space so that they pass without undue friction and no over-travel of a needle is possible. Cam plate 11 is secured to a supporting member 14 which is adapted to be adjusted about a pivot point 15.

As was shown in the Canadian patent above mentioned, this auxiliary cam assembly is capable of being moved in a vertical direction for purposes of changing stitch length when fashioning or for other reasons, said vertical motion being imparted by means of a suitable fashioning cam. An elongated bracket 16 having integral extensions 17 and 18 extending therefrom at its upper end is attached to circular base 1, by means of these extensions. This bracket also has an angular projecting arm 19 which terminates in a bearing member 20. This bearing 20 is permanently connected to some suitable part of the machine frame or extension thereof. Bracket 16 has a groove machined lengthwise thereof which in cooperation with plates 21 and 22 attached by suitable screws or bolts at the grooved side of said bracket, complete a rectangular guideway within which a bar 23 is adapted to slide vertically. This bar is pivotally attached at 15 to a supporting member 14. Referring to Fig. 5, the connection between the two, in the form of a shouldered screw 24 bearing within the bar and threaded into said support, may be seen.

Bar 23 is capable of being adjusted in a vertical direction by means of an adjusting screw 25 having a collar 26 thereon which bears on the upper side of a plate 26' permanently attached to the lower end of bracket 16. Said screw is threaded to engage a tapped hole in the lower end of bar 23 and has a knurled thumb piece 27 secured to its lower projecting end. A spring 28 bears against a washer 29 and also against the thumb piece. This spring maintains the auxiliary cam assembly in its adjusted position, but at the same time, allows it to move upwardly when so moved by the fashioning cam (not shown) or in case of any abnormal operation. A clamping screw 30 serves to lock screw 25 in an adjusted position. A slot 31 has been cut in bracket 16 adjacent screw 30 for the purpose of allowing that screw to be moved vertically with bar 23 when that bar is adjusted and during vertical motion of said bar for the purpose of fashioning. A pin 32 is threaded into bar 23 and projects through a slot in the front side of bracket 16, said pin being engaged by a lever which is in turn operated from the fashioning cam. An angular bracket 33 offset to form an attaching portion 34 is secured by means of bolts or screws to bar 23. The supporting member 14 has an extension 35 projecting therefrom which carries an adjusting screw 36 threaded therein and in alignment with the vertical portion of element 33. A spring 37 is attached at its lower end to a screw 38 threaded within bracket 33 and at its upper end to a screw 39 projecting from extension 35. This spring has sufficient tension to maintain extension or arm 35 downwardly toward bracket 33 as far as adjusting screw 36 which abuts against this bracket, will allow. Adjusting screw 36 is provided with a knurled wheel 40 by means of which it may be turned, said wheel having graduations thereon which cooperate with a fixed pointer 41 to enable the operator to gage extremely fine adjustments.

When setting up the machine cams 6 and 7 are set at the proper height on their block as has been explained above and the block is then assembled in the machine and approximate adjustment is made by means of knurled wheel 40. Fabric will be knit and further adjustments made until equal length stitches are being drawn during reciprocations in both directions. It may be seen that since cams 6—9 are permanently attached to a unitary structure mounted on support 14, rocking of this support about its pivot does not affect relative adjustment or positions of cams, and clearance between stitch cams and needle raise cam remains constant. After a period of time one of the stitch cams is likely to become worn more than the opposite cam so that a slight adjustment by means of screw 36 will again be necessary. The operator can make this adjustment very quickly and said adjustment will not affect any of the other functions such as fashioning nor will it have any bearing upon the effectiveness with which cam block 10 may be withdrawn from active position. If at any time clearance between the stitch drawing points and cams 6 and 7 and their raise cam 9 should become too great due to excessive wear and adjustment, said stitch cams may again be individually adjusted upon block 10 and then, adjustment of support 14 resorted to for equalizing stitch length.

In Figs. 6, 7, 8 and 9 is shown a modification of the means for effecting relative adjustments of the stitch drawing cams 6 and 7 hereinbefore described. In the said figures where the parts shown are identical with those shown in Figs. 1—5 inclusive, the same reference characters are used and where substituted or modified parts are shown, prime characters are used.

Instead of effecting relative adjustments of the cams 6 and 7 by the mechanisms hereinbefore disclosed, the same result is obtained by splitting the cam block 10 into two parts, 10' and 10'', the latter and consequently the cam 6 being vertically adjustable with respect to the cam 7 of the cam block 10' to which it is attached. The downward adjustments of the knurled headed screw 60' causes the lever 42 to be rocked on its pivot 43 said pivot being shown as comprising a pin or screw carried by that portion of the bracket 16 opposite bar 23'. The other arm of the lever 42 is always in contact with a pin 44 made fast to the relatively movable bar or extension of the cam block 10'' designated by the numeral 23''. A spring 45 attached at 46 to the extension 23'' and at its other end at 47 to the plate 21 maintains the pin 44 in engagement with the lever 42. The pin 44 which is fast to the extension 23'' is limited in its vertical movements by a slot 48 provided in the bracket 16. The cam plate 11' is connected to and carried by supporting member 14' which is made fast to the bar 23' as by screws, and likewise the relatively movable cam plate 11'' is carried by supporting member 14'' which in turn is fastened as by screws to the vertically adjustable bar 23'. To assist in maintaining the cam blocks 10' and 10'' in their proper relative positions, the cam block 10' is provided with a key 49 fitting within a keyway 50 provided in the adjacent face of the cam block 10''. Also, as shown in Fig. 8, the cam 9'' is provided with a tongue 51 fitting within a recess 52 in the cam 9', a clearance 53 being provided to permit the relative adjustments of the two cams, the tongue and cam 9' are beveled as at 54 to avoid breaking of the needle butts.

All of the cams for effecting the movement of the needles, jacks, etc., have not been illus-

trated, the needles, jacks, etc., being acted upon by cams in a manner similar to that shown in Canadian Patent No. 337,677.

While the invention has been described in more or less specific terms and in relation to two particular embodiments of the same, we do not intend to limit ourselves by the specific disclosure but only by the express limitations of the appended claims.

We claim:

1. In a circular knitting machine, a cam block, stitch drawing cams on said cam block adapted to draw stitches during rotary knitting and also during reciprocatory knitting in both directions, a pivotal support for said cam block, and an abutment on said knitting machine, adjusting means on said support and engaging said abutment whereby the support may be rocked about its pivot, and resilient means for maintaining said adjusting means in contact with said abutment.

2. In a circular knitting machine, a cam block, stitch drawing cams on said cam block adapted to draw stitches during rotary knitting and also during reciprocatory knitting in both directions, a pivotal support for said cam block, and extension on one end of said support having an adjusting screw threaded therein, an abutment on said knitting machine upon which said adjusting screw bears and a spring connected at one end to said extension and at the other end to said machine for maintaining said adjusting screw in firm contact with said abutment thus holding said cam block and its support in a predetermined angular relationship.

3. The combination on a circular knitting machine of a cam block, stitch cams on said cam block and a needle raise cam extending beneath each stitch cam, and forming a unitary structure with said block, a support for said block. said support being pivotally mounted and having means associated therewith for adjusting it angularly about its pivot, whereby the relative heights of stitch cams and their respective cooperating raise cam surfaces may be varied.

4. The combination in a circular knitting machine of a cam block, stitch cams on said cam block and a needle raise cam extending beneath each stitch cam and forming a unitary structure with said block, the stitch cams and raise cams being spaced from each other only a distance necessary for needle butts to pass freely between them, a support for said block, said support being pivotally mounted and having means associated therewith for adjusting it angularly about its pivot, whereby the relative heights of stitch cams and their respective cooperating raise cam surfaces may be varied.

5. In a circular knitting machine, a cam block, stitch drawing cams on said cam block adapted to draw stitches during rotary knitting and also during reciprocatory knitting in both directions, a movable support for a part at least of said cam block and an abutment on said knitting machine, adjusting means on said support for engaging said abutment whereby the position of the support is determined by engagement of the adjusting means with said abutment.

6. In a circular knitting machine, a cam block, stitch drawing cams on said cam block adapted to draw stitches during rotary knitting and also during reciprocatory knitting in both directions, a movable support for a part at least of said cam block and an abutment on said knitting machine, adjusting means on said support for engaging said abutment whereby the position of the support is determined by engagement of the adjusting means with said abutment, and resilient means for maintaining said adjusting means in contact with said abutment.

7. In a circular knitting machine the combination of a cam block, stitch drawing cams on said cam block adapted to draw stitches during rotary and reciprocatory knitting, a needle raise cam beneath each of the stitch cams so constructed that needle butts passing between a stitch cam and raise cam will be accurately controlled, a support for said cam block constructed so that opposite stitch and raise cams may be adjusted relatively to one another without disturbing the operative relationship between cooperating stitch and raise cams, means whereby said cams and block may be moved to and from active position, and other means for bodily raising said support whereby the length of stitch may be varied, said two means last mentioned functioning independently of the means for imparting relative adjustment to the stitch and raise cams.

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