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Heine et al.

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[54] **STITCH LENGTH REGULATOR**

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[73] Assignee: **The Singer Company**, New York, N.Y.

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[52] **U.S. Cl.** **112/210**

[51] **Int. Cl.** **D05b 27/22**

[58] **Field of Search** ..... 112/157, 158 R, 158 A, 112/203, 206, 207, 209, 210, 211, 212, 215

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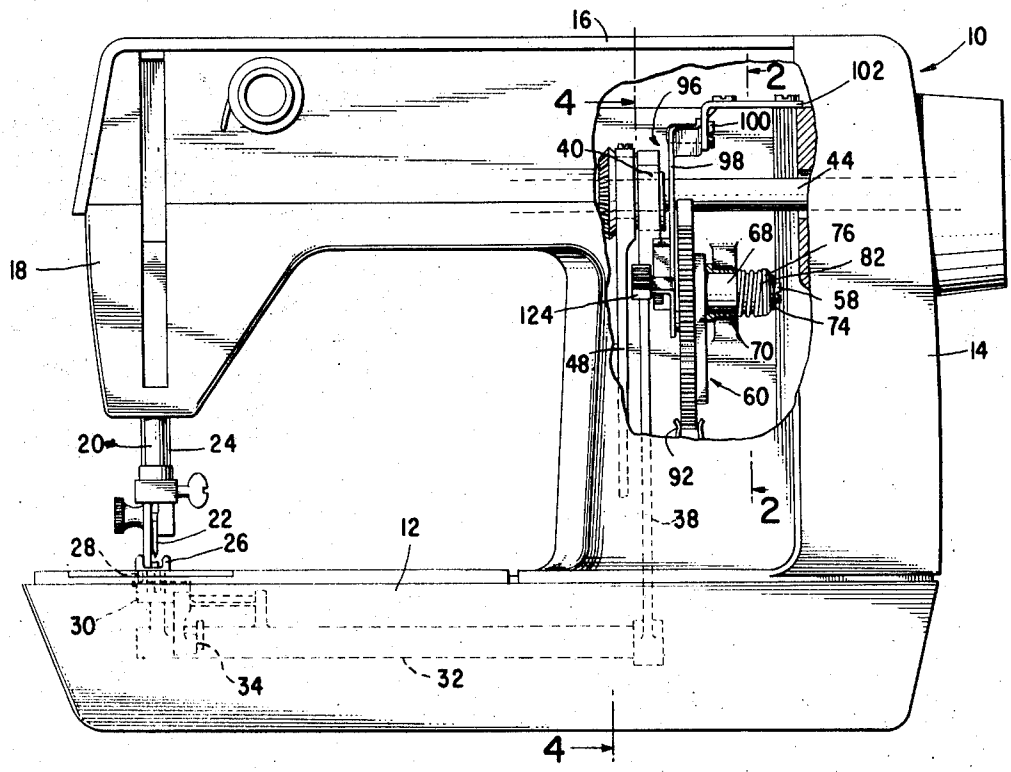
[57] **ABSTRACT**

A stitch length regulator for a sewing machine having a feed regulating guide block secured to and pivotably movable with a stud shaft journaled in a bushing in the machine casting. A feed regulator control dial is mounted on the bushing so that its pivot point is common with the feed regulator slide block. A feed regulating control lever is pivotably mounted in the machine and engages a drive pin on the guide block. A follower on the control lever is received in a radial slot having inner and outer cam contours formed in the dial. The contours of the cam correspond to reverse and forward stitch lengths respectively and the follower is biased so as to normally engage the outer cam contour for forward stitching. The control lever includes an arm projecting externally of the machine housing with a reversing knob at the free end thereof. Manual rotation of the feed dial causes the control lever to pivot in relationship to the location of the follower on the outer cam track to control the disposition of the feed regulator guide block. Reverse stitch is obtained by depression of the reversing knob so that the follower is forced to ride on the inner cam contour to effect a reverse stitch length equivalent to the forward stitch length previously selected.

6 Claims, 5 Drawing Figures



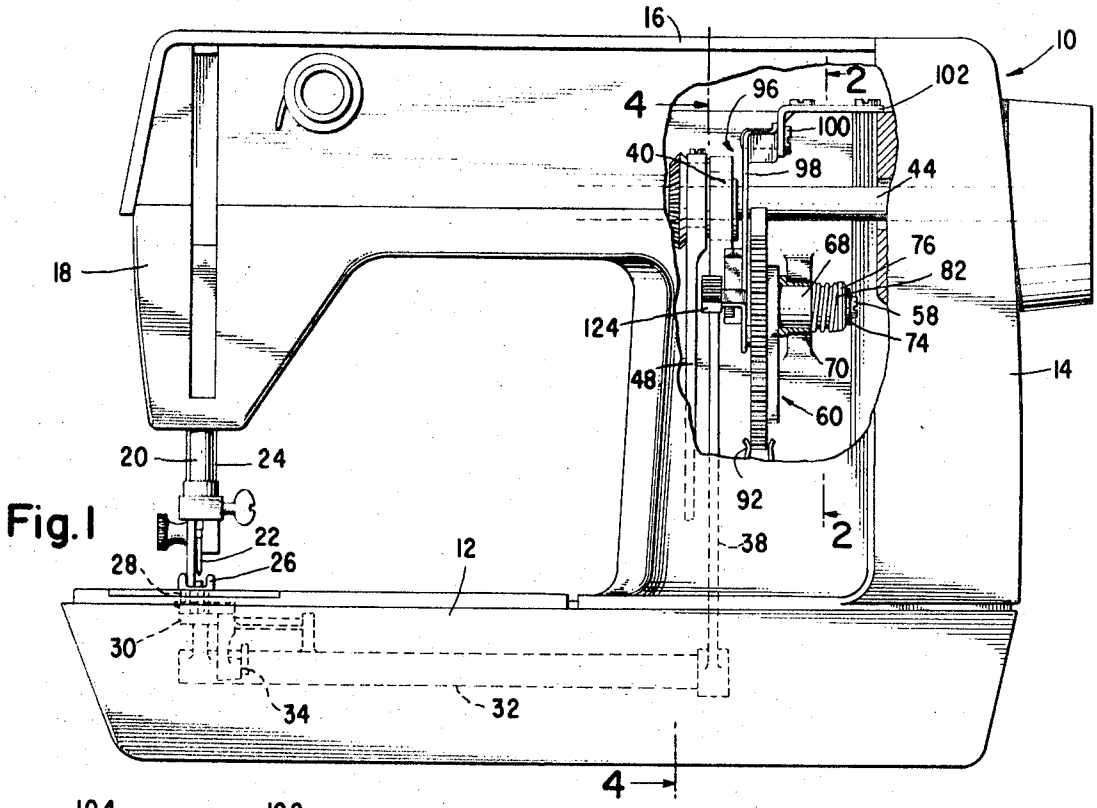


Fig. 1

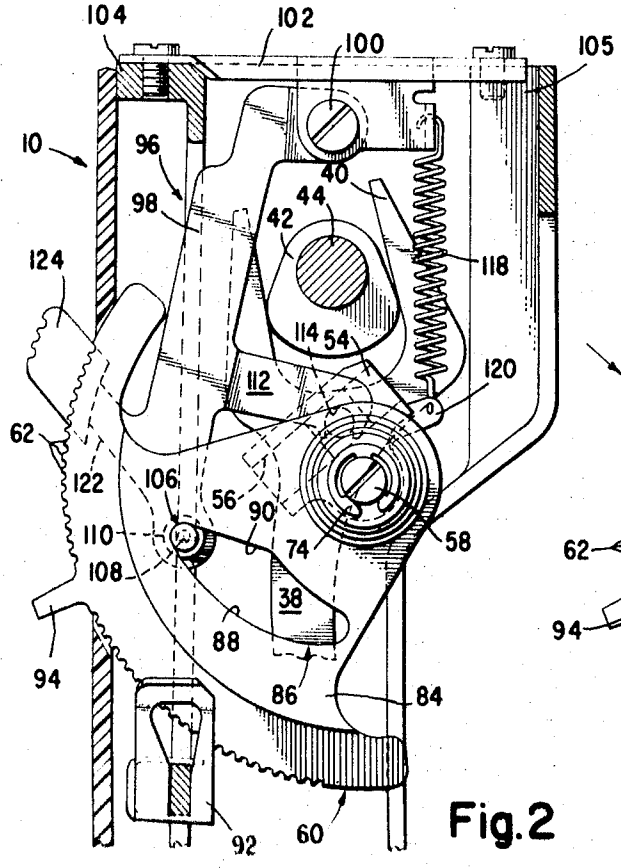


Fig. 2

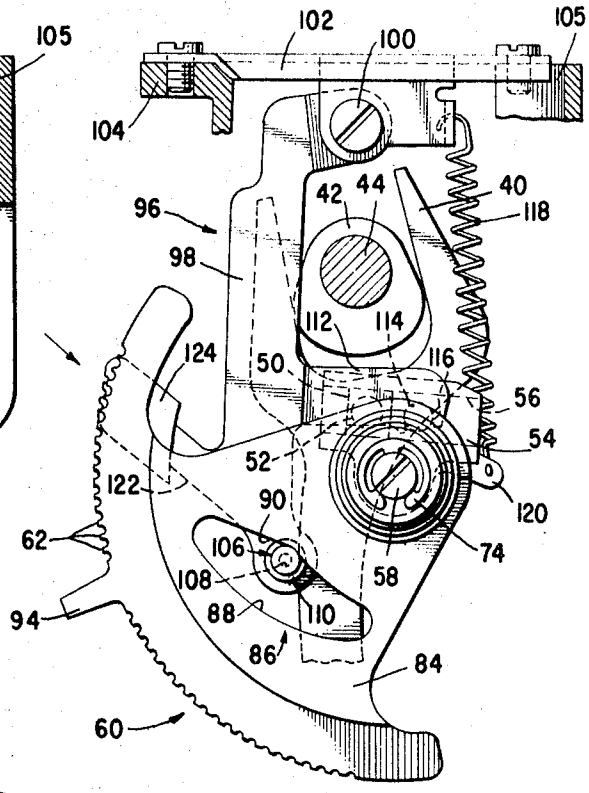


Fig. 3

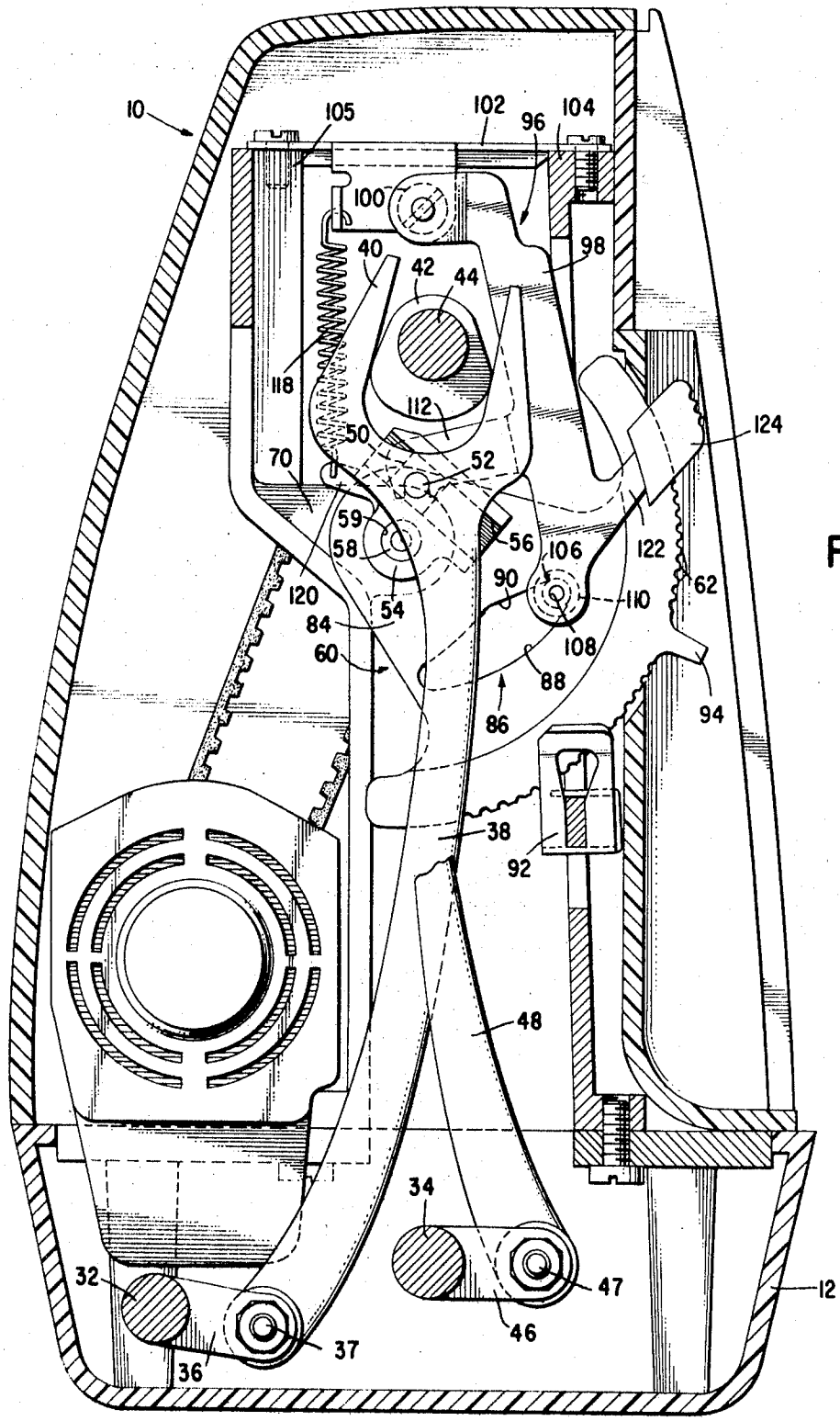

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Fig. 4

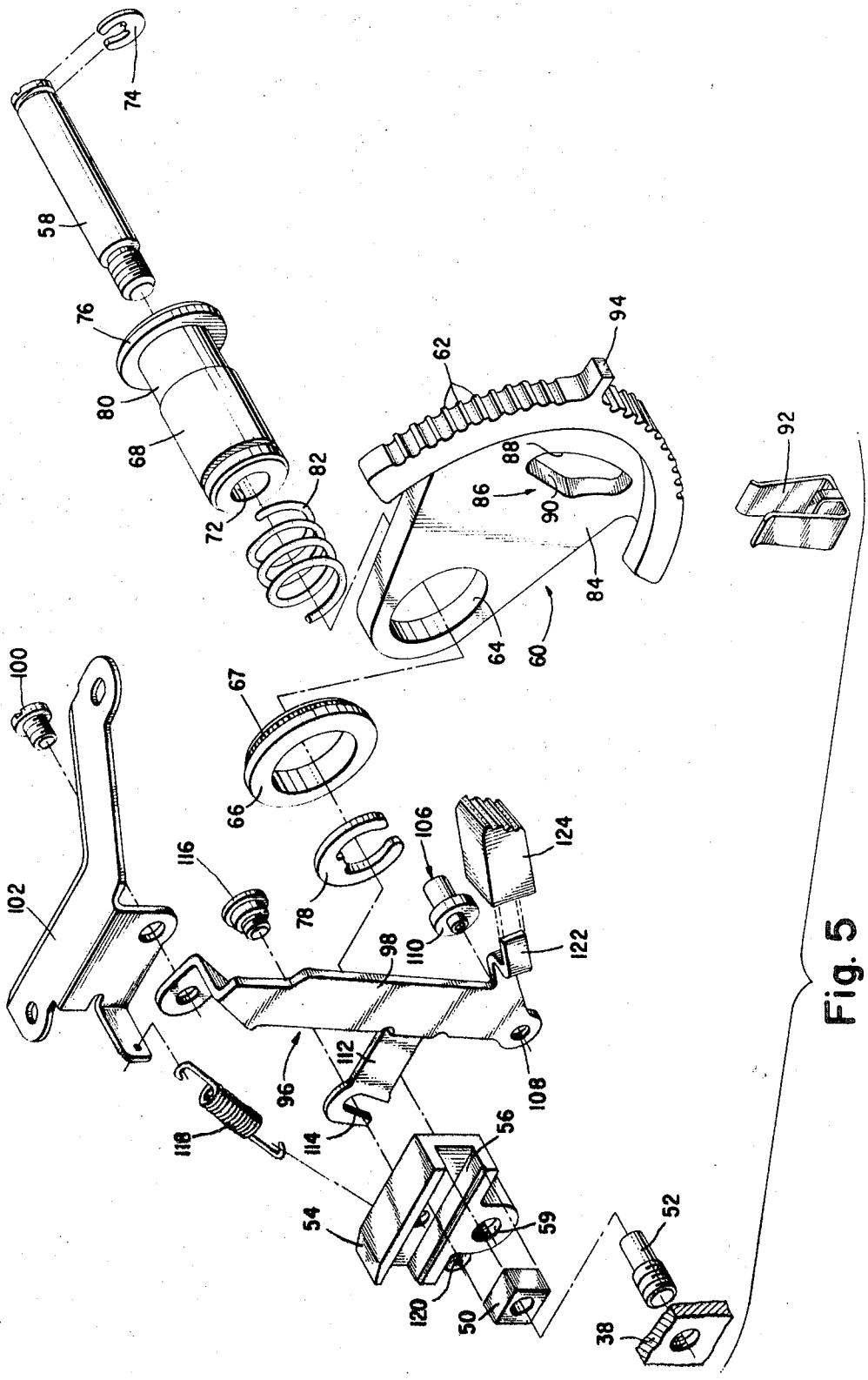
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Fig. 5

STITCH LENGTH REGULATOR

BACKGROUND OF THE INVENTION

This invention relates to sewing machines and more particularly to a means for regulating the stitch length thereof.

In household sewing machines it is known to feed the work by driving the feed dog in a to and fro motion through the medium of a rock shaft driven by a pitman obtaining its motion from a triangular cam mounted on the main shaft. To vary the feed stroke, a shiftable means in the form of a guide block having a slideway therein is pivotably connected to the standard of the machine and a slide block is pivotally connected to the pitman and slidably mounted within the slideway in the guide block. The pivotal orientation of the guide block slideway controls the displacement of the bottom of the pitman as the main shaft rotates. Proper positioning of the guide block slideway can selectively effect a forward feed from a minimum to a maximum or a reverse feed from a minimum to a maximum.

Heretofore, various means have been devised to control the pivotal orientation of the guide block slideway and, ultimately, the stitch length of the sewing machine. Generally, these means have involved complex parts which are difficult and expensive to manufacture, and moreover utilize more space in the sewing machine than would be desirable. In a small light weight sewing machine, of the type disclosed in co-pending United States application No. 115,213 filed Feb. 16, 1971 and assigned to the assignee of the present invention, it is mandatory to have a feed regulating device which is compact as well as inexpensive. Furthermore, the utilization of a carrying case of the type disclosed in the aforesaid co-pending application requires a minimum projection of the feed controls from the housing of the machine in order to provide the proper placement of the carrying case jacket. Many of the prior art stitch regulating devices have been found to be deficient in meeting these considerations.

SUMMARY OF THE INVENTION

It is, therefore, a primary object of this invention to provide in a small light weight sewing machine an improved stitch length regulating mechanism which is simple, inexpensive, and compact, and which presents a minimum protuberance on the outside of the housing.

A further object of this invention is to provide a feed regulating mechanism for a sewing machine which will provide for an accurate adjustment of the stitch length setting in both a forward and reverse feed mode.

These objects and others are met by the present invention which provides a stitch regulating mechanism utilizing the pivot point of the guide block as a common pivot for a feed control dial. The dial includes a camming track having forward and reverse stitch contours. A control lever having a follower engages the cam surface at a location determined by the pivotal position of the dial and transmits this information to the guide block which is positioned thereby. Reverse stitch feed is accomplished by depressing a button form on the control lever which places the follower on the reverse contour portion of the cam.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and object of this invention, reference should be had to the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a front elevational view of a sewing machine, shown with parts broken away and in section, embodying a regulating device constructed in accordance with the present invention;

FIG. 2 is a cross section taken substantially along line 2—2 of FIG. 1 showing the stitch regulator in its maximum forward feed position;

FIG. 3 is a cross section similar to FIG. 2 but showing the stitch regulator in its maximum reverse position;

FIG. 4 is a cross section taken substantially along line 4—4 of FIG. 1 with the stitch regulating mechanism in the same position as that shown in FIG. 2; and

FIG. 5 is a disassembled perspective of the stitch regulating mechanism of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, wherein like numerals designate similar parts, an embodiment of the present invention is disclosed in a sewing machine having a housing generally designated as **10** comprising a work supporting bed **12** from one end of which rises a standard **14** supporting a bracket arm **16** overhanging the bed and terminating at its free end in a hollow sewing head **18.** Mounting for endwise reciprocation in the need is a needle bar **20** carrying, at its lower end, a thread carrying needle **22** which cooperates with a suitable loop taker (not shown) as is well known in the art to form stitches at a needle point. Further mounted in the head **18** is a presser bar **24** to which a presser foot **26** is secured at its lower end.

The presser foot cooperates with feed dog **28** which is secured to a feed bar **30.** A feed advance and return rock shaft **32** is pivotably secured to the feed bar **30** to provide feed advance and return motion to the feed dog while the remainder of the conventional four motions is supplied to the feed dog by a lift and descend rock shaft **34** cooperating with the feed bar by means of a cam (not shown) in a manner well known in the art. A feed advance rock arm **36** is integrally formed as part of the rock shaft **32** and is pivotally connected by means of a pivot screw **37** to a pitman **38.** A pitman which is positioned in the standard **14** has a fork shaped cam follower **40** at its upper end so as to grasp, and thereby be oscillated by, a triangular shaped cam **42** mounted on the main or arm shaft **44** of the sewing machine. Similarly a lift and descend rock arm **46** is integrally formed with the rock shaft **34** and is pivotally connected by the pivot screw **47** to a pitman **48,** the latter being driven by an eccentric (not shown) on the arm shaft.

To control the path of oscillation of the pitman **38,** thereby to control the feed advance movement and hence the stitch length, a slide member **50** is pivotably mounted on a stud pin **52** which is threaded into the pitman **38.** A guide block **54** having a slideway **56** for receiving the slide member **50** is supported for pivotal movement by a pivot shaft **58** threaded into a hole **59** in the guide block. The shaft **58** is journaled in the housing substantially parallel to the main or arm shaft **44** in a manner which hereinafter be described. It should be understood that the angular disposition of the guide block **54** and thus the slideway **56** cooperating with the slide member **50** determines the path of oscillation of the pitman **38** and thereby the rocking

movement of the rock shaft 32 and, consequently, the feed dog advance and return movement. When the guide block 54 is disposed such that the slideway 56 is parallel to the rock arm 36 the pitman 38 merely oscillates about the pivot screw 37 without transmitting any vertical movement to the rock arm 36 and, therefore, the rock shaft 32 thus not partake of any movement. This is the zero feed condition, the slideway 56 being in a neutral position. When the guide block 54, and thus the slideway 56, is disposed at any other angle, oscillation of the pitman 38 results in a vertical movement of the rock arm 36 and, therefore, a rocking movement of the shaft 32 to thereby effect a positive feed.

In order to vary the angular disposition of the guide block 54, this invention provides an adjusting disk or dial 60, preferably sector shaped and composed of plastic, having an operator influenced thickened peripheral portion 62, preferably knurled or slotted as shown. The disk 60, remote from the portion 62, includes a circular hole or bore 64 into which is pressed a steel bearing insert 66 having a knurled portion 67 to provide a positive lock within the bore. A bushing 68 is supported in a boss 70 formed in the casting of the machine housing frame and the insert 66 is journaled on one end of the bushing. The pivot shaft 58 is journaled within a bore 72 formed in the bushing 68 and is axially secured in this position by means of its connection with the guide block 54 at one end thereof and a lock ring 74 at its other end. It should be understood that the shaft 58 is concentric or coaxial with the pivot axis of the dial 60, thereby minimizing the amount of space utilized by the stitch length regulating the amount of space utilized by the stitch length regulating mechanism. The bushing 68 includes on its end remote from the dial a portion 76 of increased diameter to axially lock the bushing against movement toward the left at FIG. 1, while a lock ring 78 locks its other end from axially slipping out of the insert 66. A reduced portion 80 of the bushing receives a coil spring 82 which acts between the portion 76 and a casting 70 to urge the bushing 68 and the dial 60 toward the right in FIG. 1 thereby to correct for any manufacturing inaccuracies.

Cut into web portion 84 of the dial 60 is a cam slot 86 having marginal edges of varying radial distances from the axis of the bore 64. The cam surface 88 furthest from the axis is contoured to correspond to forward feed while the cam surface 90 radially closer to the axis is inversely related to the surface 88 to correspond to reverse feed. A U-shaped spring clip 92 secured in the housing maintains the dial in the selected feed or stitch length position shown by the location of indicator 94 opposite in an numerical index (not shown) marked on the standard 14.

In order to transmit the information of the cam 86 to the guide block 54, this invention provides a control lever 96 comprising a first arm 98 pivotably mounted by means of a screw 100 to a bracket 102 secured to a pair of shoulders 104 and 105 on the casting in the top of the standard. At the bottom of the lever 96 a cylindrical follower member 106 is pressed fitted into a hole in the arm 98 and positioned axially properly by means of an enlarged diameter portion 110 integrally formed with the follower member. The control lever 96 includes a second arm 112 offset from and substantially normal to the arm 98 having a slotted hook portion 114 at its free end. A shoulder screw 116 is secured to the guide block remote from the pivot shaft axis and is received within the hook 114 so as to provide a slidable connection between the guide block 54 and the control lever 96. A coil spring 118 secured at one end to the bracket 102 and at the other end to an ear 120 formed on the guide block constantly urges the block in a direction to force the lever 96 clockwise about the screw 100 as seen in FIGS. 2 and 3, thereby normally maintaining the follower member 106 on the forward feed cam surface 88. Thus, when the dial 60 is turned, the position of the follower relative to the cam surface 88 is changed, whereby the forward stitch length is changed.

In order to obtain reverse feed this invention further provides a third arm 122, offset from an oblique to the arm 98, which includes an operator influenced knurled button portion 124. Depression of the button, as illustrated in FIG. 3 of the drawings, pivots the lever 96 counterclockwise about the screw 100 and engages the follower member with the reverse cam surface 90, thereby pivoting the block 54 about the neutral point or zero feed position. This causes the pitman 38 to oscillate in a path which reverses the direction of feed provided by the feed dog 28. Inasmuch as the cam surface 90 is inversely related to the cam surface 88 depression of the button 124 effects a reverse feed of the same magnitude as the forward feed previously selected and indicated by the indicator 94. When the operator releases the button 124 the spring 118 causes the guide block 54 to revert back to its previous forward feed position thereby pivoting the control lever 96 so that the follower returns back to its previous location on the forward feed cam surface 88.

To assemble the stitch regulator in a sewing machine the bracket 102 is secured in place and the control lever 96 is secured thereto by means of a screw 100 while positioning the fork portion 114 about the shoulder screw 116. The retaining washer 74 is placed about the pivot shaft 58 which is then inserted within the bushing 68 and the spring 82 is placed about the reduced portion 80 thereof. The insert 66 is pressed within the bore 64 of the dial 60. The shaft 58 together with the bushing 68 is inserted within the bore 70 and pressed toward the left in the illustration of FIG. 1 so that the insert 66 the dial 60 can be received about the bushing. At the same time the follower 106 is positioned within the slot 86 and the lock ring is placed about the left end of the bushing 68. The shaft 58 is then threaded into the hole 59 of the guide block and the spring 118 is connected to the guide block and the bracket 102.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of the invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modification which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

Having thus described the nature of the invention, what we claim herein is:

1. A stitch length regulator for a sewing machine of the type including a housing, a rotatable main shaft and a work feed mechanism mounting in said housing, said work feed mechanism including a feed advancing rock shaft, a pitman operatively connected to said feed ad-

vancing shaft, means on the main shaft for oscillating said pitman in timed relation to the rotation of the main shaft, and guide means for controlling the path of oscillation of the pitman thereby to control the movement of said rock shaft, said stitch length regulator comprising a pivot shaft journaled in said housing substantially parallel to said main shaft, said pivot shaft operatively secured to said guide means, an operator influenced adjusting disk rotatably mounting in said housing concentric with said pivot shaft and including a cam slot having marginal edge disposed at varying radial distances from said axis, a control lever, and means for pivotably mounting said control lever in said housing, said lever being operatively connected to said guide means to influence the disposition thereof, said lever having a follower member disposed within said slot and biased into contact with the marginal edge whereby rotation of said disk changes the position of the guide means and thereby the stitch length.

2. A stitch length regulator as recited in claim 1 wherein said guide comprises a guide block having a slideway, a slide pivotally mounted on said pitman and embraced within said slideway, said guide block being secured to and rotatably supported by said pivot shaft.

3. A stitch length regulator as recited in claim 2 wherein the marginal edge of said cam slot comprises inversely related cam surfaces defining forward feed and reverse feed, respectively, said follower member being normally biased in engagement with the surface defining forward feed, said control lever having an arm including an operator influenced portion extending from the housing adjacent said disk, the arm being disposed relative to said lever mounting means and the follower member such that depression of said operator influenced portion moves the follower into engagement with the reverse feed surface.

4. A stitch length regulator as recited in claim 2 wherein said adjusting disk is mounted on a bushing secured in said housing, and said pivot shaft is supported within said bushing.

5. A stitch length regulator as recited in claim 4 wherein said control lever is mounted intermediate the disk and guide block and comprises a first arm pivotably mounted in said housing, a second arm extending from said first arm and slidably connected to said guide block remote from said pivot shaft so as to turn said guide block in relation to the position of said follower.

6. A stitch length regulator as recited in claim 6, wherein the marginal edge of said cam slot comprises inversely related cam surfaces defining forward feed and reverse feed, respectively, a spring normally biasing said guide block toward the forward stitch direction and thereby urging the follower member into engagement with the surface defining forward feed, said control lever further having a third arm including an operator influenced portion extending from the housing adjacent said disk, the third arm being disposed relative to said lever mounting means and the follower member such that depression of said operator influenced portion moves the follower into engagement with the reverse feed surface.

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