Dec. 5, 1950 B. P. PINKVOSS 2,533,197

TRIMMER MECHANISM FOR SEWING MACHINES

Filed Feb. 6, 1947 4 Sheets-Sheet 1

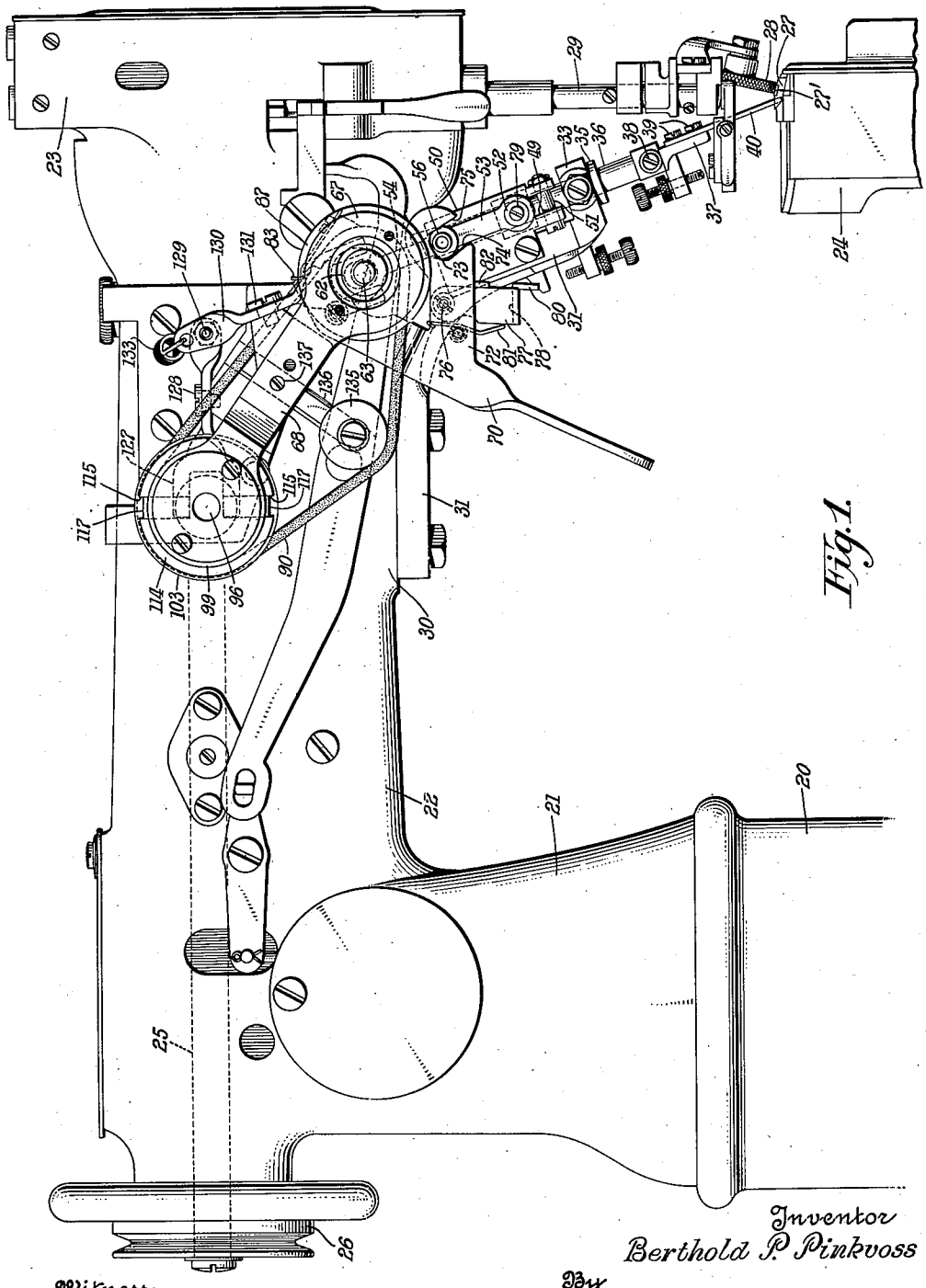

Fig. 1.

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TRIMMER MECHANISM FOR SEWING MACHINES

Filed Feb. 6, 1947 4 Sheets-Sheet 2

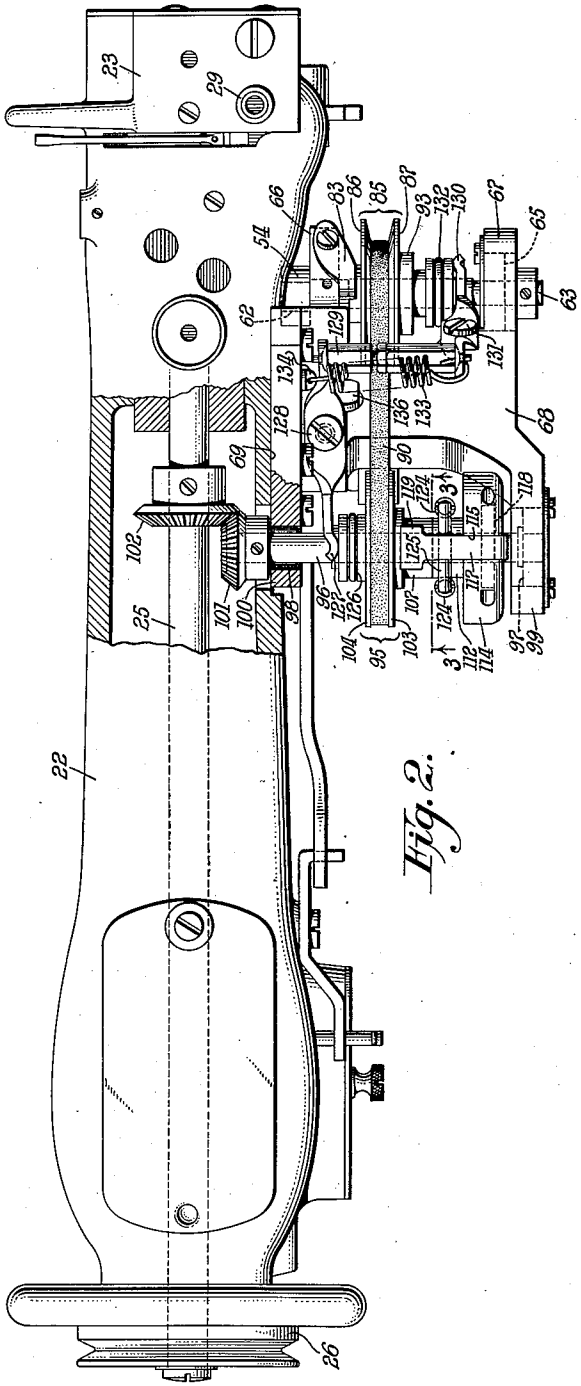

Fig. 2.

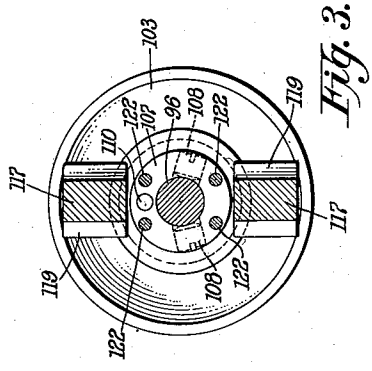

Fig. 3.

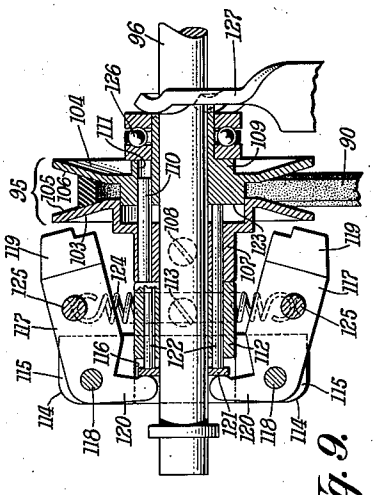

Fig. 9.

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TRIMMER MECHANISM FOR SEWING MACHINES

Filed Feb. 6, 1947 4 Sheets-Sheet 3

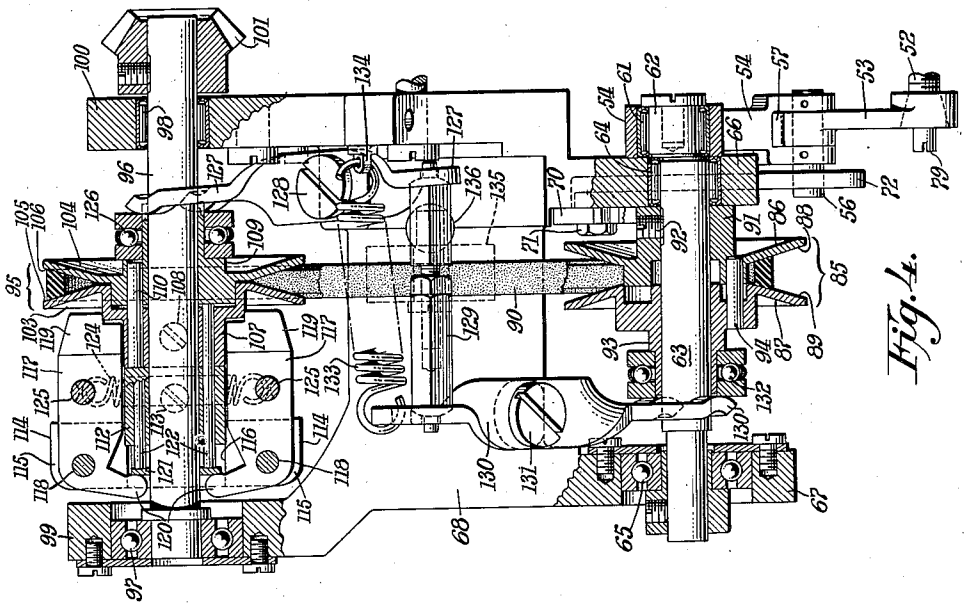

Fig. 4.

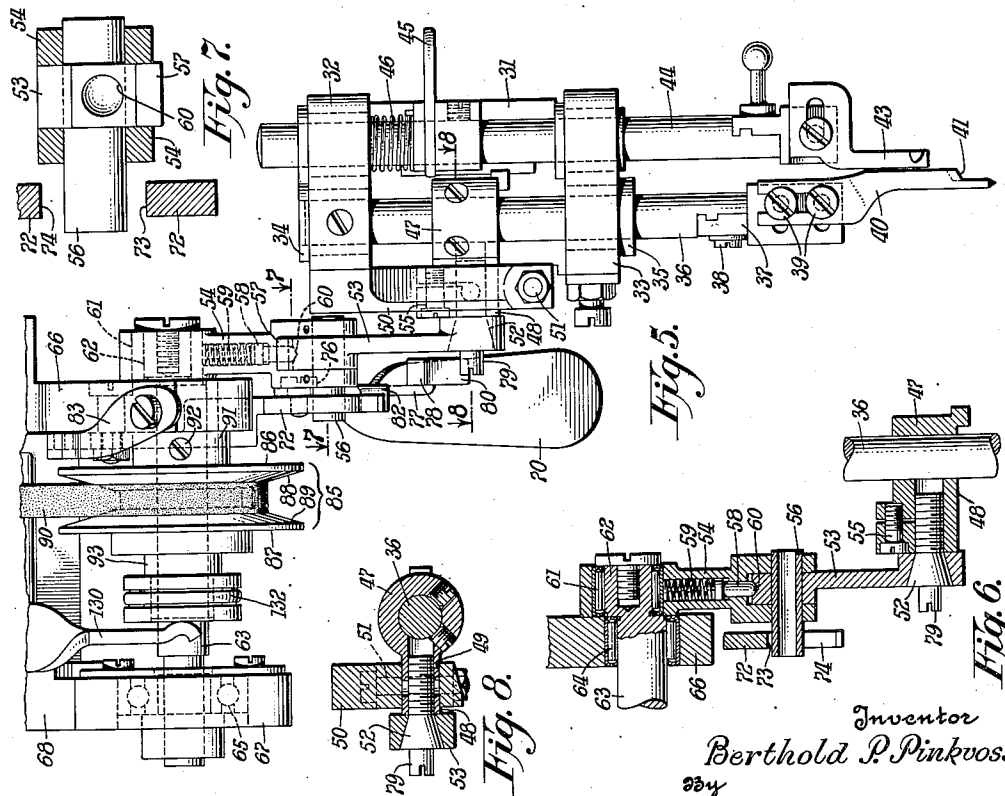

Fig. 5.

Fig. 7.

Fig. 8.

Fig. 6.

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TRIMMER MECHANISM FOR SEWING MACHINES

Filed Feb. 6, 1947 4 Sheets-Sheet 4

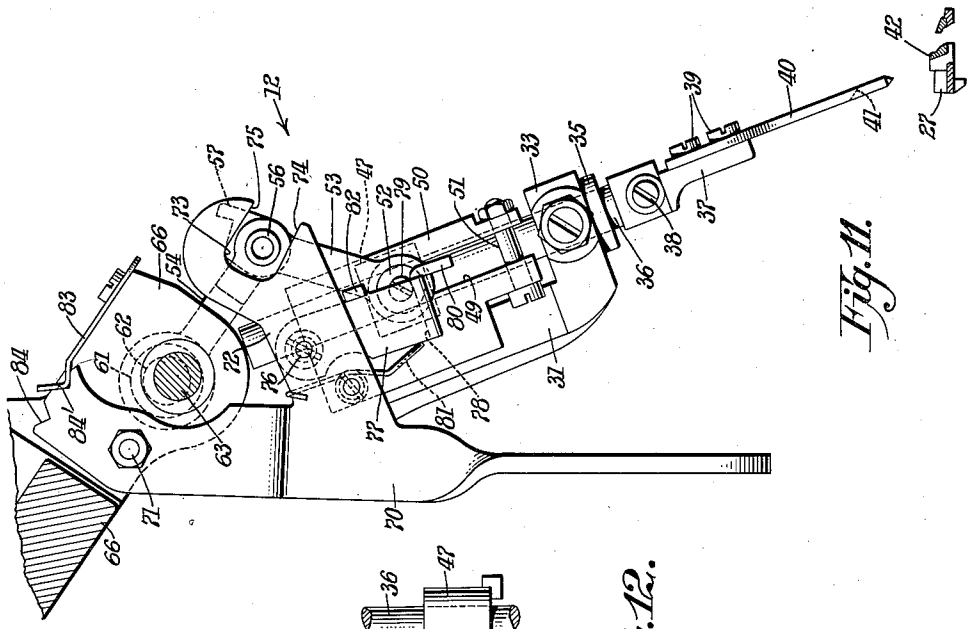

Fig. 11.

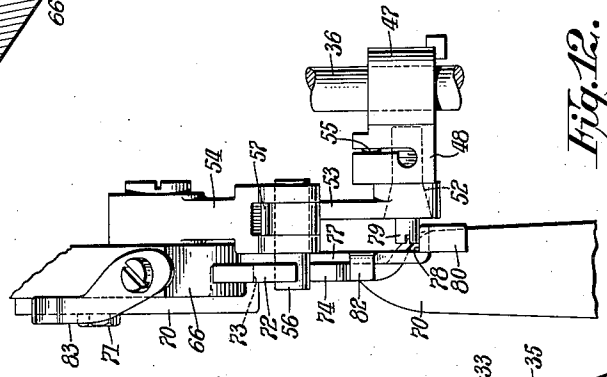

Fig. 12.

Fig. 10.

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UNITED STATES PATENT OFFICE

2,533,197

TRIMMER MECHANISM FOR SEWING MACHINES

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Application February 6, 1947, Serial No. 726,909

17 Claims. (Cl. 112—125)

1

This invention relates to trimmer mechanisms for sewing machines and has for its primary object to provide an improved actuating mechanism for the movable trimmer knife thereof, which actuating mechanism is responsive to the speed of the sewing machine to effect a change in the relative frequencies of operation of the trimmer and stitching mechanisms.

A further object of the present invention is to provide a trimmer-knife actuating mechanism including speed-responsive means which functions to reduce the speed of operation of the trimmer-knife as the speed of operation of the sewing machine increases and vice versa.

Another object of the present invention is to provide a trimmer-knife actuating mechanism with an improved form of latching means effective for maintaining the trimmer in its retracted or inoperative position.

In prior combination stitching and trimmer machines, it has been customary to actuate the trimmer-knife a plurality of times for each reciprocation of the sewing machine needle to effect the production of smoothly trimmed edges about a sharp curve in the work. Such a machine is disclosed in the U. S. Patent of R. S. Painter, No. 2,108,138, issued Feb. 15, 1938. In the machine disclosed in this patent, the trimmer-knife is actuated from a separate electric motor which drives the trimmer-knife at a constant speed. By varying the speed of the sewing machine from high speed operation during straightaway stitching to lower speed operation when stitching about a sharp curve, the ratio of the relative frequencies of reciprocation of the trimmer and sewing needle is increased from one to many times one. While the large number of reciprocations of the trimmer-knife relative to the needle produces a smooth seam about a sharp curve, the reciprocations are excessive and result in a rapid dulling of the trimmer-knife cutting edge as it repeatedly passes the cooperating stationary ledger-member or blade.

The present trimmer-knife actuating mechanism is designed preferably to impart one reciprocation to the knife for each reciprocation of the needle during the high speed operation of the machine, and then in response to the decrease in the speed of the sewing machine automatically to increase the frequency of reciprocation of the knife relative to that of the needle, the increase being of the order of about two or three, to one. The effect of this speed-responsive drive is a reduction in the total number of reciprocations of the trimmer-knife past its cooperating ledger-

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blade with the consequence of longer knife cutting-edge life.

The present invention consists in the trimmer knife-bar actuating mechanism hereinafter described in connection with the accompanying drawings which illustrate a preferred embodiment of the invention and in which:

Fig. 1 is a rear side elevation of a sewing machine provided with the improved trimmer actuating mechanism, the lower portion of the sewing machine frame being broken away.

Fig. 2 represents a top plan view of the sewing machine with a portion of the bracket-arm in section to illustrate the gear drive with the mainshaft of the sewing machine.

Fig. 3 represents an enlarged sectional view taken substantially along the line 3—3, Fig. 2.

Fig. 4 represents an enlarged top plan view of the speed-responsive drive with certain of the parts in section to illustrate more clearly the details thereof.

Fig. 5 is an enlarged elevational view of the trimmer-bar, the bearing support therefor, and the actuating toggle linkage for reciprocating said trimmer-bar.

Fig. 6 represents a sectional view taken longitudinally of the trimmer-bar actuating toggle showing the spring detent for maintaining the the toggle-links in their straightened position.

Fig. 7 represents an enlarged sectional view taken substantially along the line 7—7, Fig. 5.

Fig. 8 represents an enlarged sectional view taken substantially along the line 8—8, Fig. 5.

Fig. 9 represents a sectional view similar to the upper portion of Fig. 4, but with the two weights swung outwardly into a position such that the tails of the weight-carrying levers bias the belt-pulley flanges apart to reduce the pulley's effective diameter and thereby reduce the speed of reciprocation of the trimmer-knife.

Fig. 10 is an enlarged front elevational view, partly in section, of the trimmer bracket and the mechanism supported thereby, showing, in dotted lines, the manually controlled trimmer throw-out lever in its trimmer operating position, and, in full lines, the trimmer throw-out lever in an intermediate toggle breaking position.

Fig. 11 is a view similar to Fig. 10, but with the trimmer throw-out lever in its trimmer inoperative position with the trimmer knife latched in its raised or inoperative position.

Fig. 12 is a side elevational view of the toggle-linkage taken in the direction of the arrow 12 in Fig. 11.

Referring to the drawings which illustrate a

preferred embodiment of the present invention, the sewing machine has a frame including a base-standard 20 supporting the arm-standard 21 of a bracket-arm 22 terminating in a head 23 which overhangs an upright work-supporting post 24.

Journaled in the bracket-arm 22 is a horizontal main-shaft 25 carrying at its rear end a combined belt-pulley and balance-wheel 26 adapted to be connected to any suitable power source by means of which the sewing machine is brought into and controlled as to its speed of operation. At its forward end the main-shaft 25 is connected in the usual way to a needle-carrying endwise reciprocatory needle-bar (not shown). During the stitching and feeding operations, the work is yieldingly depressed toward and into cooperation with a conventional feeding element 27' operating through a throat-plate 27 provided on the work-supporting post 24, by a roller-presser 28 carried on a spring-biased presser-bar 29.

Secured to a suitable boss 30 provided on the under side of the bracket-arm 22 is a trimmer bracket 31 having a vertically inclined portion thereof provided with vertically spaced bearing lugs 32 and 33 (Fig. 5). The bearing-lugs 32 and 33 are provided with apertures which are alined in a vertically inclined direction, the upper bearing-lug 32 having a bearing-bushing 34, and the lower bearing-lug 33 a bearing bushing 35. Journaled for endwise reciprocation in the bearing-bushings 34 and 35 is a knife-carrier or -bar 36, to the lower end of which a knife-holder plate 37 is adjustably secured by a screw 38. Adjustably attached by screws 39 to the knife-holder plate 37 is the vertically slotted shank of a trimmer-knife 40 provided with a cutting edge 41. Cooperating with the trimmer-knife 40 in severing the work is a stationary ledger-blade 42 supported on the throat-plate 27. The trimmer-knife 40 has a path of movement to sever the work substantially parallel to the line of seam formation, and the movement of the knife in a vertically inclined path transverse to the plane of the work results in the production of undercut trimmed edges. Accordingly, in the trimming of shoe linings, the trimmed edge of the lining is concealed by the beveled edge of the shoe-upper, as is well understood in the art.

To facilitate in properly feeding the work to the trimmer-knife 40, there is provided the usual edge-guide 43 (Fig. 5) adjustably carried on a spring-depressed rod 44 endwise shiftable in the bearing-lugs 32 and 33 of the bracket 31. The edge-guide 43 may be retained in its raised or inoperative position, as shown in Fig. 5, by a latch-lever 45, the spring 46 serving to bias the edge-guide downwardly into its operative position when the latch-lever is released.

To reciprocate the knife-bar 36, the latter has suitably secured thereto a collar 47 having a flat sided lateral extension 48 which is slidably disposed in a guide-slot 49 formed in a guide-block 50 integral with the trimmer-bracket 31. The guide-block 50 functions to restrain the knife-bar 36 against turning in its bearings, and the guide-slot 49 is open at the lower end of the guide-block so that the slot may be adjusted as to width by means of a bolt 51 to take up wear. Threaded into the end of the lateral extension 48 is a stud 52 (Fig. 6), the conical body-portion of which is embraced by the lower end of a pair of interconnected toggle-links 53 and 54. The stud 52 is prevented from loosening accidentally in the lateral extension 48 by means of a screw 55 which is adapted to draw together the split portions of the extension 48.

The toggle-links 53 and 54 are pivotally interconnected by a hollow knuckle-pin 56; the straightened position of the toggle-links 53 and 54 being determined by a stop-lip 57 integral with the upper end of the link 53 and adapted to engage the link 54. To maintain the toggle-links 53 and 54 in straightened position, there is provided in the upper toggle-link 54 a detent in the form of a pin 58 (Fig. 6) biased by a coil-spring 59 into a suitable pin-receiving cavity 60 formed in the upper end of the lower toggle-link 53. As will be seen in Figs. 4 and 6, the toggle-link 54 at its upper end is shaped to embrace a needle-bearing 61 mounted on a rotary actuator in the form of an eccentric 62 preferably integral with a rotary shaft 63. The rotary shaft 63 is journaled in a needle-bearing 64 and a ball-bearing 65 carried in the downwardly inclined pair of limbs 66, 67 of a substantially H-shaped supporting bracket 68 removably secured to a flat seat 69 (Fig. 2) milled on the back of the bracket-arm 22. The rotary shaft 63 is adapted to be driven by mechanism to be described later in this specification. From the above description it will be understood that as the shaft 63 is rotated the eccentric 62, through the straightened toggle-links 53 and 54, will effect a reciprocation of the trimmer-bar 36 in its bearings 34 and 35. The knife 40 carried by the trimmer-bar 36 thus is caused to cooperate with the stationary ledger-member 42 in severing the work presented to the trimmer-knife.

In machines of the present type it is frequently desirable to render the trimming mechanism inoperative and to that end manually operable lever-means is provided for buckling or "breaking" the toggle links 53, 54, whereby the trimmer-knife actuating means is disabled and the knife 40 is raised to an inoperative or retracted position. The lever-means in the present machine comprises a hand-lever 70 pivoted at its upper end on a stud 71 threaded into the limb 66 of the bracket 68. The hand-lever 70 intermediate its ends is provided with an angular extension or limb 72 slotted adjacent its free end, as at 73, to form opposed abutment or side walls 74 and 75 disposed to loosely straddle the extended end of the knuckle-pin 56 of the toggle-links 53, 54. To provide for holding the trimmer-knife 40 in its raised or retracted position as shown in Fig. 11, the angular extension 72 has pivoted thereto, as at 76, a latch 77 having an offset lower end affording a horizontal stop-ledge 78 adapted to cooperate with the trimmer-knife carrier, and in the present case preferably with the projecting head 79 of the toggle-stud 52. At its forward end the stop-ledge 78 is formed with a depending lip 80. As viewed in Fig. 1, the latch 77 is normally biased in a counterclockwise direction by a spring 81 into a position such that a trip-lug 82 on the latch 77 engages the lower edge of the hand-lever extension 72.

Consider now the operation of the hand-lever 70 in moving the toggle-links 53, 54 from a "straightened" position, in which they constitute a pitman for reciprocating the knife-bar 36 from the eccentric 62, to a "broken" pisition, in which the trimmer knife is inoperative. Referring to Fig. 1, the trimmer-knife 40 is shown in its normal operative position; the hand-lever 70 being retained in its illustrated position, with the side walls 74 and 75 of the hand-lever extension 72 spaced from the knuckle-pin 56, by a spring

catch 83 seated in a suitable notch 84 formed in the upper end of the hand-lever 70. When it is desired to render the trimmer-knife inoperative, the hand-lever 70 is manually swung from the position shown in Fig. 1 and in dotted lines in Fig. 10, to the position shown in Fig. 11. The sequence of operations caused by the swinging of the hand-lever 70 is as follows: Manual pressure applied to the hand-lever 70 swings the same in a counterclockwise direction (Fig. 1), moving the side-wall 74 of the hand-lever extension 72 into contact with the knuckle-pin 56. Sufficient pressure applied on the hand-lever 70 overcomes the resistance offered by the toggle detent 58, thus initially breaking the toggle-links 53, 54. As the hand-lever 70 continues to move the toggle-links are further broken, thus retracting the trimmer-bar 36 and moving the latch 77 on the hand-lever extension 72 into a position, as shown in Fig. 10, in which position the depending lip 80 on the latch 77 contacts the toggle-stud-head 79. Further movement of the hand-lever 70 causes an additional retraction of the trimmer-bar 36, the latch 77 during this further movement being forced to pivot about its fulcrum 76 against the action of the spring 81 until the toggle-stud-head raises above the level of the stop-ledge 78. The latch 77 then snaps into the position shown in Figs. 11 and 12, with the stop-ledge 78 underlying the toggle-stud-head 79. Thus, the trimmer-bar 36 is latched in its fully retracted position with the knuckle-pin 56 disposed in spaced relation relative to the side-walls 74 and 75 of the hand-lever extension 72. With the trimmer-bar 36 securely held in retracted position, continued rotation of the eccentric 62 merely results in a slight pivotal movement of the toggle-links 53, 54 about the axes of the stud 52, knuckle-pin 56 and eccentric 62, without imparting any actuations whatever to the trimmer-bar 36. The absence of the customary spring means for retaining the trimmer-knife 40 in its inoperative position and the existence of clearance between the knuckle-pin 56 and the side walls 74 and 75 of the hand-lever extension 72, minimizes the load applied to the eccentric 62 during the operation of the machine with the trimmer-bar 36 retracted. The clearance between the knuckle-pin 56 and the extension 62 eliminates wear on the knuckle-pin 62 or side walls 74 and 75, and also permits the hand-lever 70 to remain stationary in the retracted position of the trimmer-knife 40 (Fig. 11) or in the operative position of the trimmer-knife (Fig. 1). The spring catch 83 seated in the notch 84' maintains the hand-lever 70 stationary and in the position illustrated in Fig. 11.

The toggle-links 53, 54 may be moved into their straightened position and thereby slidably shift the trimmer-bar 36 into the operative position thereof by actuation of the hand-lever 70. Beginning with the parts in the position shown in Fig. 11, movement of the hand-lever 70 about its fulcrum 71, in a clockwise direction, will first move the hand-lever extension 72 into contact with the trip-lug 82 after which continued movement of the hand-lever 70 will force the latch lever 77 to pivot about 76 against the action of the spring 81, thus shifting the stop-ledge 78 from beneath the toggle-stud-head 79. About the time the stop-ledge 78 has cleared the toggle-stud-head 79, the side wall 75 of the hand-lever extension 72 has moved into contact with the knuckle-pin 56, and further movement of the

hand-lever 70 effects a straightening of the toggle-links 53, 54, thus depressing the trimmer-bar 36. The normal straightened position of the toggle-links 53, 54 is determined by the stop-lip 57 on the toggle-link 53 engaging the toggle-link 54, the detent 58 serving to maintain said toggle-links 53 and 54 in their straightened position.

The preferred form of speed-responsive means for reciprocating the trimmer-bar 36 will now be described. Referring to Fig. 4, the rotary shaft 63, between its bearing supports 64 and 65, has mounted thereon a belt-driven pulley-assembly, generally indicated as 85, the pulley-assembly including two separable flanges 86 and 87 having opposed divergent side-walls 88 and 89 defining a belt-groove adapted to accommodate a V-belt 90. The pulley-flange 86 is provided with a hub 91 which is fixed on the shaft 63 by a set-screw 92. The pulley-flange 87 has integral therewith an elongated hub 93 bored to slide endwise on the shaft 63 relative to the fixed pulley-flange 86. To prevent relative turning between the two pulley-flanges 86 and 87, there is preferably provided a cylindrical locking pin 94 fixed at one end in the flange-hub 93 and having its other end slidably received in an aperture in the flange-hub 91. The locking-pin 94 keys the two pulley flanges 86 and 87 together so that they rotate as one, but permits the pulley-flange 87 to shift lengthwise of the shaft 63 relative to the fixed pulley flange 86, whereby the effective pitch diameter of the pulley-assembly 85 can be varied.

The V-belt 90 derives its driving power from a second pulley-assembly 95 carried on a rotary shaft 96 journaled at one end in the ball-bearing 97 and at its other end in a needle-bearing 98, the ball-bearing and the needle-bearing being supported in the upwardly inclined limbs 99 and 100 of the H-shaped supporting bracket 68. The shaft 96 at its inner end is driven through the bevel gears 101, 102 (Fig. 2) by the arm-shaft 25 of the machine. The pulley-assembly 95, like the pulley-assembly 85, comprises two separable flanges 103 and 104 having opposed divergent side walls 105 and 106 defining a belt-groove for the V-belt 90. As shown in Figs. 4 and 9 the pulley-flange 103 is provided with a hub 107 secured to the shaft 96 by the set-screws 108. The pulley-flange 104 is formed with a hub 109 bored to slide lengthwise of the shaft 95 toward and away from the fixed pulley-flange 103. To prevent relative rotation between the pulley-flanges 103 and 104, the hub 107 of the pulley-flange 103 has pressed into it a locking pin 110 having its projecting end slidingly disposed in a hole 111 (Fig. 9) drilled in the hub 109 of the pulley-flange 104.

It will be understood from the above description that power to drive the endwise reciprocating trimmer-bar 36 is obtained from the rotary arm-shaft 25 of the sewing machine and that the power is transmitted from the rotary shaft 96 which is geared to the arm-shaft through the pulley-and-belt drive to the rotary shaft 63, the eccentric 62 on the shaft 63 reciprocating the trimmer-bar 36 through the toggle-links 53 and 54 when they are in their "straightened" position. When the sewing machine is operating at slow speed, i. e. of the order of below approximately 1000 stitches per minute, the component parts of the speed-responsive drive are in the position shown in Fig. 4. When in this position, it will be seen that the effective diameter of the pulley-assembly 95 is greater

than the effective diameter of the pulley-assembly 85, resulting in a frequency of reciprocation of the trimmer-bar 36 of about twice that of the sewing needle.

To effect a decrease in the number of reciprocations of the trimmer-bar 36 as the speed of the machine increases, there is provided a speed-responsive governor mounted on the rotary shaft 96 adjacent the pulley-assembly 95. The governor, as shown in Figs. 2, 4 and 9, comprises a collar 112 fixed on the shaft 96 by a set screw 113, the collar 112 having at one end a cylindrical head or flange 114. The collar-flange 114 is provided with two diametrically arranged slots 115 each opening at its outer end in the periphery of the collar-flange 114 and at its inner end in a counterbore 116 coaxial with the shaft-bore in the collar 112. Disposed in the slots 115 are two bell-crank arms 117 fulcrumed on the transverse pivot-pins 118 pressed into the collar-flange 114. Each of the arms is weighted at its outer end, as indicated at 119. At its inner ends, each of the arms is formed with a tail 120 adapted to engage the outer face of a thrust-washer 121 (Figs. 4 and 9) mounted on and slidable longitudinally of the rotary shaft 96. The inner face of the thrust-washer 121 contacts the ends of four thrust-pins 122 endwise slidable as shown in Figs. 3 and 9 in alined apertures formed in the collar 112 and the pulley-flange hub 107, the other ends of the four thrust-pins bearing upon the inner face 123 of the pulley-flange-hub 109. The two bell-crank arms 117 are normally biased into a collapsed or closed position, as shown in Fig. 4, by two coil-springs 124 disposed on opposite sides of the rotary shaft 96 and connected at their opposite ends to spacer-pins 125 passing through the body of each of the bell-crank arms 117.

When the speed of rotation of the shaft 96 exceeds a certain amount, centrifugal force causes the bell-crank arms 117 to swing about their pivots 118 into an open position, such as illustrated in Fig. 9. In moving from closed position to open position, the tails 120 of the two bell-crank levers 117 acting on the thrust-washer 121 shift the thrust-pins 122 endwise, cause the movable pulley-flange 104 to separate from the fixed pulley-flange 103. This separation of the two pulley-flanges 103, 104 increases the width of the V-belt groove defined by the divergent faces 105 and 106, thus permitting the belt 90 to move closer towards the axis of rotation of the pulley-assembly 95, whereby the effective diameter of the pulley-assembly is decreased.

To effect a simultaneous increase in the effective diameter of the pulley-assembly 85 when the effective diameter of the pulley-assembly 95 is automatically decreased, a linkage is provided which connects the movable flange-member of the pulley-assembly 95 to the movable flange-member of the pulley-assembly 85. Referring to Fig. 4, the extended hub 109 of the pulley-flange 104 is reduced to accommodate a thrust-bearing 126 which is engaged by the bifurcated upper end of a lever 127 fulcrumed at 128 on the supporting bracket 68. The lower end of the lever 127 is shaped to receive one end of a two-piece extensible push-rod 129, the other end of which rides in a seat provided in the upper end of a second lever 130 fulcrumed at 131 on the supporting bracket 68. At its lower end the lever 130 is bifurcated to straddle the rotary shaft 63 and bear against a thrust-bearing 132 mounted on the reduced portion of the pulley-flange-hub 87. A coil-spring 133 connected at one end to the upper end of the lever 130 and at its other end to an eye 134 on the bracket 68 normally biases the pulley assemblies 85 and 95 into the position shown in Fig. 4, which is the position occupied by these parts during low speed operation of the sewing machine. A suitable belt-tightener is provided for taking up slack in the belt 90 and, in its preferred form (Fig. 1), comprises a belt-engaging wheel 135 freely journaled on the lower end of a flat sided rod 136 adjustably clamped by a set-screw 137 in the supporting bracket 68.

Referring to Fig. 4, it will be understood that the coil-spring 133 normally biases the flange-sections 103 and 104 of the pulley-assembly 95 into their "closed" position, in which position the effective diameter of the pulley-assembly 95 is at a maximum. Since the length of the belt 90 is fixed, the tension thereon, as it runs on the pulley-assembly 85, is sufficient to force the belt towards the axis of the shaft 63 and, in so doing, the flange-sections 86 and 87 of the pulley-assembly 85 are urged into their separated relation, which is determined by the position of the lever 130, and which position can be regulated by adjustment of the length of the push-rod 129. As previously indicated, the tension of the coil-spring 133 is sufficient to maintain the pulley-assemblies in the positions shown in Fig. 4 during low speed operation of the machine. When the speed of the machine is increased beyond a certain extent, the weighted arms 117 of the speed-responsive device swing outwardly in response to centrifugal force into a position shown in Fig. 9. When this occurs, the tails 120 of the weighted arms 117 move inwardly against the thrust-washer 121 causing it to engage and shift the four thrust-pins 122 against the inner face of the pulley-flange-hub 107, thus forcing the pulley-flange 104 to separate from the fixed pulley-flange 103. This movement of the pulley-flange 104, through the thrust-bearing 126, lever 127 and push-rod 129, swings the lever 130 in a counterclockwise direction (Fig. 4) so that its bifurcated lower end bears heavily against the thrust-bearing 132 and forces the pulley flange 87 toward the pulley-flange 86, thus increasing its effective diameter.

From the above it will be seen that an increase in speed beyond a predetermined amount will result in a simultaneous change in the effective diameters of the two pulley-assemblies 85 and 95, the change in diameters being of a character to decrease the ratio of the relative frequencies of the trimmer and stitching mechanisms.

Having thus set forth the nature of the invention, what I claim herein is:

1. In a sewing machine having stitch-forming mechanism including a movable needle, actuating mechanism for operating said needle, a trimmer associated with said stitch-forming mechanism including a movable knife, actuating mechanism for operating said knife, and a device rendered effective by centrifugal force and included in one of said actuating mechanisms for automatically controlling the frequency of movement of one of said movable members.

2. In a sewing machine having stitch-forming mechanism including a movable needle, actuating mechanism for operating said needle, a trimmer associated with said stitch-forming mechanism including a movable knife, actuating mecha-

nism for operating said knife, and a device responsive to centrifugal force included in one of said actuating mechanisms for automatically decreasing the frequency of movement of one of said movable members as the frequency of movement of said other movable member is increased.

3. In a sewing machine having stitch-forming mechanism including a reciprocatory needle, mechanism including a rotary shaft for actuating said needle, a trimmer associated with said stitch-forming mechanism including a reciprocating knife, actuating mechanism connected to said rotary shaft for reciprocating said knife, and a device operated by centrifugal force and associated with said trimmer actuating mechanism for varying the frequency of reciprocation of said knife with respect to said needle.

4. In a sewing machine having a frame, stitch-forming mechanism including a reciprocatory needle, mechanism including an actuating shaft for reciprocating said needle, a trimmer associated with said stitch-forming mechanism including a reciprocatory knife, and mechanism for actuating said knife, said last-named mechanism including spaced rotary shafts, a variable diameter pulley-assembly mounted on each of said rotary shafts, a belt connecting said pulley-assemblies together, and means including a speed responsive device mounted on one of said rotary shafts for varying the size of each of said pulley-assemblies.

5. In a sewing machine having a frame, stitch-forming mechanism including a reciprocatory needle, a rotary shaft journaled in said frame and operatively connected to reciprocate said needle, a trimmer mechanism supported by said frame and including a movable knife adapted to operate adjacent said needle, and operative connections for actuating said knife, said operative connections including a first shaft driven by said rotary shaft, a second shaft spaced from said first shaft, variable diameter pulley-assemblies mounted on said first and second shafts, a belt connecting said pulley-assemblies, and means responsive to centrifugal force for varying the diameters of the respective pulley-assemblies to change the frequency of movement of the trimmer-knife with respect to that of said needle.

6. In a trimming machine having a frame, a rotary shaft journaled in said frame, trimmer mechanism supported by said frame and including a movable knife, means connecting said movable knife to said rotary shaft, and speed-responsive means rendered effective by the speed of rotation of said rotary shaft for varying the frequency of movement of said movable knife inversely to the speed of rotation of said rotary shaft.

7. In a trimming machine having a frame including a work-support, feeding means for advancing work through the machine, a movable work-severing knife, and means for moving said knife including a rotary device responsive to centrifugal force for varying the frequency of movement of said knife relative to the work-advancing speed of said feeding means.

8. In a trimming machine having a frame including a work-support, feeding means for advancing work through the machine, a movable work-severing knife, and means for moving said knife including a rotary device responsive to centrifugal force for effecting a decrease in the relative speed ratio of the movable knife and the feeding means during an increase in the work-advancing speed of said feeding means.

9. In a trimming machine having a frame including a work-support, feeding means for advancing work through the machine, a movable work-severing knife, and means for moving said knife, said means including spaced rotary shafts, variable diameter pulley-assemblies mounted on said shafts, a belt connecting said pulley-assemblies, a speed-responsive device mounted on one of said shafts and effective for varying the diameter of one of said pulley-assemblies, and means interconnecting said pulley-assemblies and rendered effective by the changing of said pulley-assembly for simultaneously producing a change in the diameter of the other of said pulley-assemblies.

10. In a trimming machine having a frame including a work-support, a movable work-severing knife, and means for moving said knife, said means including spaced rotary shafts, variable diameter pulley-assemblies mounted on said shafts and including relatively separable flange-sections, a belt connecting said pulley-assemblies, means on one of said rotary shafts responsive to centrifugal force for effecting a separation of the flange sections of one of said pulley-assemblies, and means actuated by the separation of said pulley flange-sections for causing a relative approach of the flange-sections of said other pulley-assembly.

11. In a trimming machine having a frame including a work-support, a movable work-severing knife, and means for moving said knife, said means including spaced rotary shafts, a variable diameter pulley-assembly mounted on each of said shafts and including relatively separable flange-sections, a belt connecting said pulley-assemblies, a linkage interconnecting said pulley-assemblies, a spring acting on said linkage for biasing the flange-sections of one of said pulley-assemblies into a closed position and the flange-sections of said other pulley assembly into an open position, and means on one of said rotary shafts responsive to centrifugal force for overcoming the force of said spring and causing a reversal in the flange positions of said pulley-assemblies.

12. In a trimming machine, in combination, a work-advancing feeding-element and a movable trimmer-element operable at a variable ratio of relative frequencies, means for actuating said feeding-element, means for moving said trimmer-element, and means for varying said ratio including a rotary device responsive to centrifugal force for operating said trimmer-element at different speeds.

13. In a trimming machine, an actuating element, a movable trimmer-knife carrier, connections for actuating said carrier from said element including a pair of toggle-links relatively movable into and out of toggle-straightened operative position, a manually controlled lever-member for straightening and for buckling said toggle-links, and a latch-device carried on said lever-member for maintaining said toggle-links in their buckled position.

14. In a trimming machine, an actuating element, a movable trimmer-knife carrier, connections for actuating said carrier from said element including a pair of toggle-links relatively movable into and out of toggle-straightened operative position, a manually controlled lever-member operable for straightening and for buckling said toggle-links, and a latch-device carried on said lever-member and disposed to cooperate with said

carrier in maintaining said toggle-links in their buckled position.

15. In a trimming machine, an actuating element, a movable trimmer-knife carrier, connections for actuating said carrier from said element including a pair of toggle-links relatively movable into and out of toggle-straightened operative position, a manually controlled lever-member operable for straightening and for buckling said toggle-links, and a latch-device for maintaining said toggle-links in their buckled position, said latch-device having a stop-ledge disposed to underlie a projection on said trimmer-knife carrier when the latter is in its retracted position.

16. In a trimming machine, an actuating element, a movable trimmer-knife carrier, connections for actuating said carrier from said element including a pair of toggle links relatively movable into and out of toggle-straightened operative position, a knuckle-pin having a portion extending beyond said toggle-links, a single manually controlled hand-lever having spaced abutment walls disposed on opposite sides of the extended portion of said knuckle-pin whereby movement of said hand-lever in opposite directions will straighten and buckle said toggle-links, and releasable means for locking said toggle-links in straightened and buckled positions thereof.

17. In a trimming machine, an actuating element, a movable trimmer-knife carrier, connections for actuating said carrier from said element including a pair of toggle links relatively movable into and out of toggle-straightened operative position, a pivotally supported lever-member operable for straightening and for buckling said toggle-links, and a latch-device for maintaining said toggle-links in their buckled position, said latch-device having a projecting stop-ledge, a spring for biasing said latch-device in a direction such that the stop-ledge underlies a portion of the trimmer-knife carrier, and a latch-releasing trip-lug on said latch-device disposed for engagement by said lever-member.

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The following references are of record in the file of this patent:

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