May 3, 1932. E. B. ALLEN 1,856,900

WORK CLAMP MECHANISM FOR SEWING MACHINES

Filed April 4, 1930 3 Sheets-Sheet 1

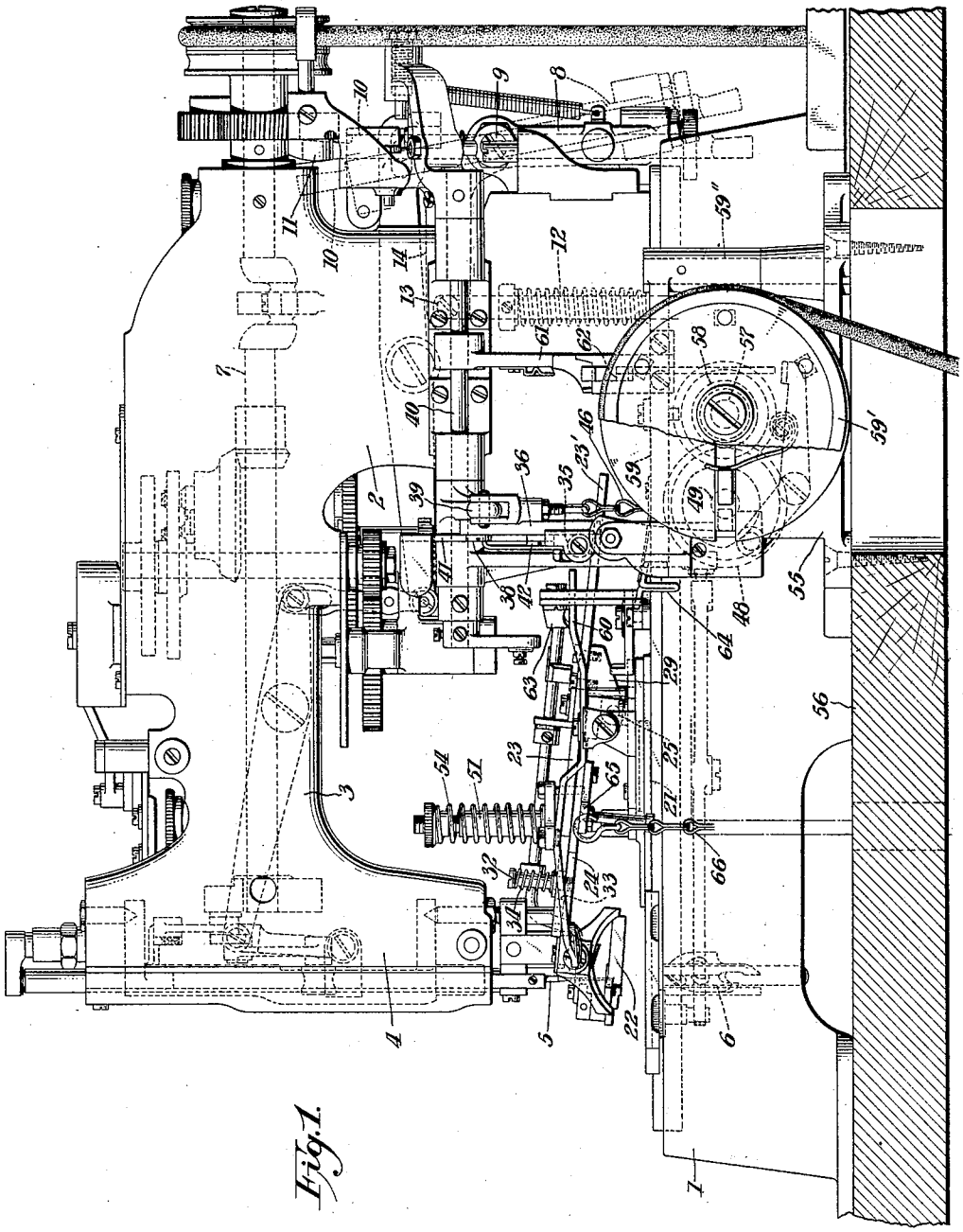

Fig. 1.

Inventor

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Witness:

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WORK CLAMP MECHANISM FOR SEWING MACHINES

Filed April 4, 1930 3 Sheets-Sheet 2

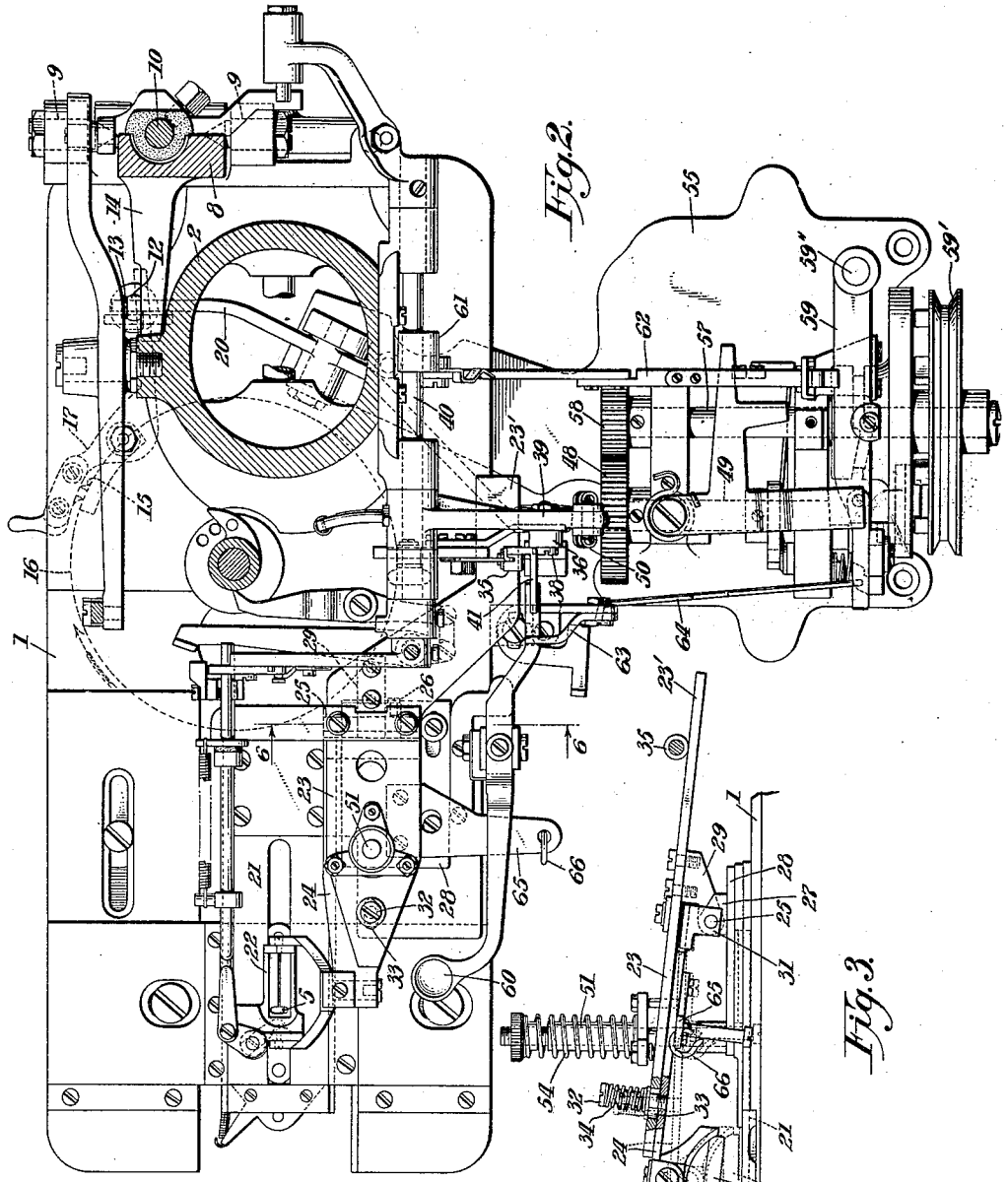

Fig. 2.

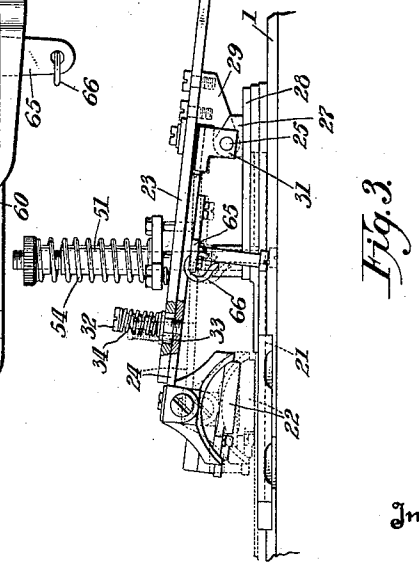

Fig. 3.

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WORK CLAMP MECHANISM FOR SEWING MACHINES

Filed April 4, 1930 3 Sheets-Sheet 3

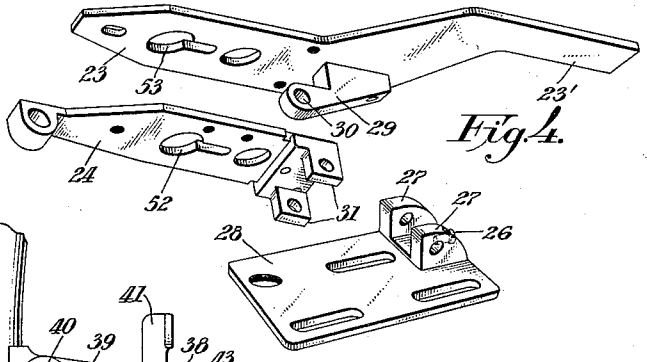

Fig. 4.

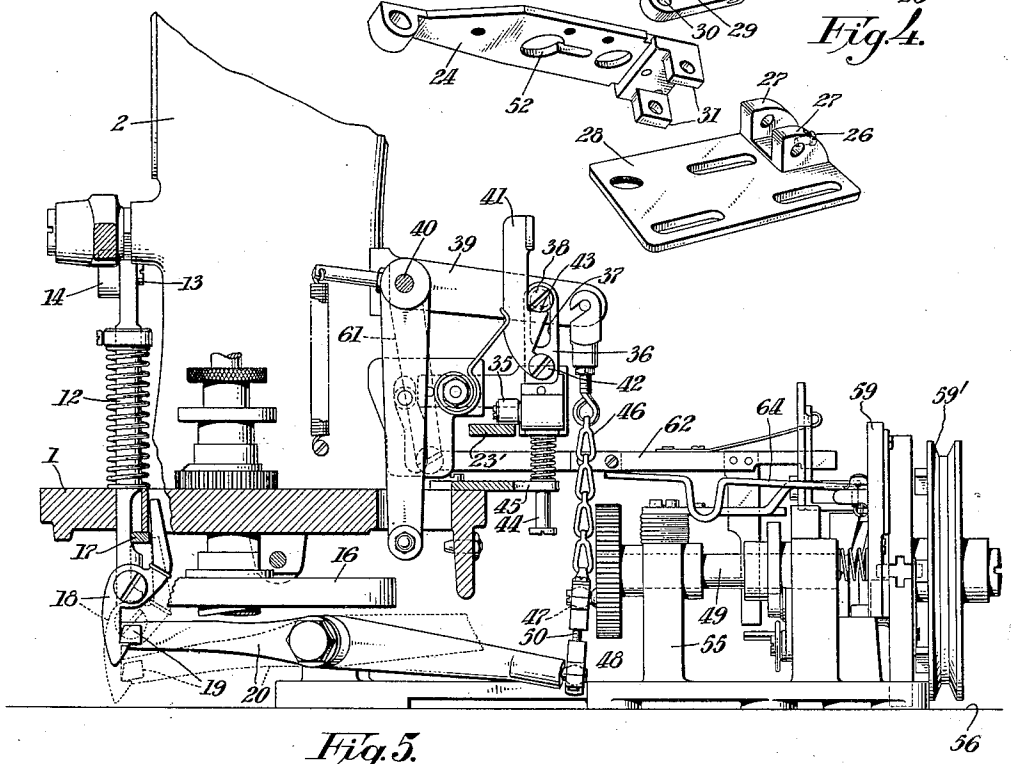

Fig. 5.

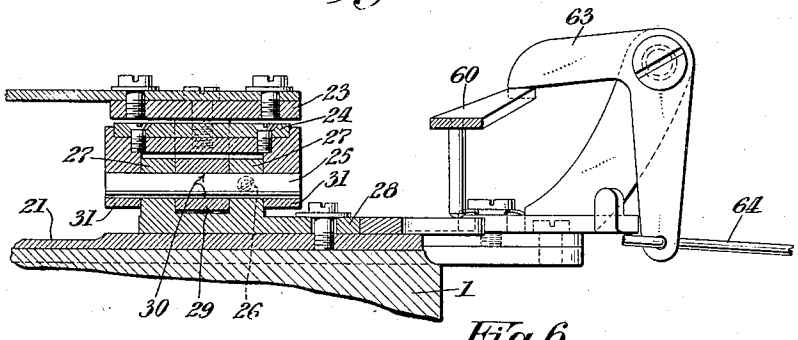

Fig. 6.

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Patented May 3, 1932 1,856,900

UNITED STATES PATENT OFFICE

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WORK-CLAMP MECHANISM FOR SEWING MACHINES

Application filed April 4, 1930. Serial No. 441,496.

The present invention relates to sewing machines and is herein shown as embodied in a buttonhole sewing machine of the full-automatic type, i. e., a machine which, when started, will perform all of its operations automatically in proper sequence and then come to rest.

The invention has for an object to improve the construction and mode of operation of sewing machines of the group-stitching type having a work-clamp, and particularly to provide an improved construction of work-clamp mechanism for such machines.

The invention consists in the devices, combinations, and arrangements of parts hereinafter described and claimed.

The several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art from the following description taken in connection with the accompanying drawings which illustrate the several features of the invention as embodied in a buttonhole sewing machine.

Fig. 1 is a side elevation of the machine. Fig. 2 is a horizontal section through the bracket-arm standard of the machine, showing the sewing machine bed and associated mechanism in plan. Fig. 3 is a side elevation of the work-clamp of the machine. Fig. 4 is a disassembled perspective view of certain elements of the work-clamp. Fig. 5 is a transverse vertical section through the machine bed, looking toward the bracket-arm standard, and Fig. 6 is a transverse vertical section through the work-clamp, taken on the line 6—6, Fig. 2.

The sewing machine illustrated herein is constructed substantially in accordance with the disclosure of the application of Edward B. Allen, Serial No. 400,767, filed Oct. 19, 1929. The machine is constructed with a bed 1, from which rises the standard 2 of the bracket-arm 3 terminating in the head 4. The stitch-forming mechanism comprises the reciprocating and laterally vibrating needle 5 and cooperating shuttle 6 which are operated as usual by the main-shaft 7 to make the usual zigzag buttonhole overseam commonly used in so-called "straight" buttonholes.

The period of operation of the stitch-forming mechanism is controlled by the usual stop-motion device including the tilting stop-motion lever 8, fulcrumed on the trunnion-screws 9, and carrying the upwardly spring-pressed stop-plunger 10 adapted to enter a notch in the stop-cam 11 running with the main-shaft 7. The stop-motion lever 8 is tilted to running or dotted-line position, Fig. 1, by a down-pull on the starting rod 12 connected at 13 to an arm 14 rigid with and extending forwardly from the stop-motion lever 8. The rod 12 is released to stop the stitch-forming mechanism by the action of a tripping point 15 on the usual feed-wheel 16 which runs with the stitch-forming mechanism. When the stitching operation is completed, the tripping point 15 engages and swings a lever 17 which, in turn, trips the latch 18, Fig. 5, from engagement with the block 19 on the operating lever 20, thus allowing the rod 12 and stop-motion lever 8 to return from running or dotted line position, Figs. 1 and 5, to full line or stopping position.

The work is held in a work-clamp which is moved longitudinally and laterally over the bed 1 by the usual connections with the feed-wheel 16, to place the stitches around the buttonhole. The work-clamp comprises the usual lower work-supporting plate 21 and upper clamping foot 22 which, unlike the construction disclosed in said Allen copending application, is not mounted directly upon the main upper clamp-lever 23, but is carried instead by a supplemental lever 24 disposed beneath the main upper clamp-lever 23; the levers 23 and 24 being independently fulcrumed preferably upon the same fulcrum pin 25 which is fixed by the screw 26, Fig. 6, in the ears 27 rising from a plate 28 screwed to the lower clamp-plate 21. Referring to Figs. 4 and 6, it will be seen that the main upper clamp-lever 23 has fixed to it a downwardly and forwardly extending block 29 apertured at 30 to rock upon the fulcrum pin 25 between the supporting ears 27, while the supplemental upper clamp-lever 24 has fixed to it the spaced ears 31 which are apertured to receive and rock upon the fulcrum-pin 25

at the outer sides of the supporting ears 27. A stud-screw 32, Fig. 3, fixed to the supplemental upper clamp-lever 24 rises through a clearance aperture 33 in the main upper clamp-lever 23 and has interposed between its head and the main clamp-lever 23 a relatively weak compression spring 34 which tends to maintain the lever 24 in contact with or parallel to the main lever 23, as shown in full lines in Fig. 3.

The tail 23′ of the main upper clamp-lever 23 extends rearwardly under a roller-stud 35 carried by the vertically disposed slide-bar 36, Fig. 5, formed in its upper end with a slot 37 entered by a screw 38 threaded into the clamp-lifting rock-arm 39 fulcrumed to turn upon and relative to the usual stop-motion-operated rock-shaft 40 mounted horizontally at the side of the standard 2 and common to machines of the straight buttonhole sewing type represented for example in the patent to Allen, No. 885,310, of Apr. 21, 1908. A spring-pressed latch 41, Fig. 5, pivoted at 42 to the slide-bar 36 and having a shoulder 43 engaging under the screw 38, operatively couples the slide-bar 36 to the rock-arm 39 for operation by the latter. The screw-pin 44, constituting the lower end of the slide-bar 36, is guided in the stationary arm 45 fixed to the bed 1. The rock-arm 39 is connected by the chain 46 to the ball crank-pin 47 on the gear 48 fixed to the shaft 49 of a mechanical machine-operator fully disclosed in the said Allen copending application. The rock-lever 20, Fig. 5 is also connected to the ball crank-pin 47 by means of the link 50.

Rising from the lower clamp-member 21 is a vertical post 51 which passes through clearance apertures 52, 53 in the respective upper clamp-levers 24, 23, and is surrounded by a comparatively strong spring 54 which presses downwardly upon the clamp-lever 23 and forces the clamp-foot 22 into clamping engagement with the work. A down-pull on the chain 46, therefore, forces the roller stud 35 downwardly upon the tail 23′ of the main upper clamp-lever 23 and raises the front end of the clamp-lever 23 against the pressure of the spring 54 and opens the work-clamp. When the down-pull on the chain 46 is relieved, the spring 54 closes the work-clamp.

The shaft 49 carrying the ball crank-pin 47 is journaled in the frame 55 of the automatic machine operator which is stationed on the power-bench 56, alongside the sewing machine. There is also journaled in the frame 55 a driving shaft 57 carrying a pinion 58 of one-half the size of and meshing with the gear 48. The ball-crank pin 47 is thus given a semi-rotational impulse with the shaft 49 for each complete rotation of the driving shaft 57. The shaft 57 is connected through a manually controlled one-rotation clutch-device including the usual clutch-controlling gate 59 to the constantly running pulley 59′. This type of one-rotation clutch is well known and is disclosed in the Allen copending application previously referred to. It will suffice for the purposes of the present disclosure to explain that the gate 59, which is fulcrumed on the vertical stud-pin 59″, may be swung inwardly about the pin 59″ by a connection with the finger starting lever 60 to initiate one revolution of the shaft 57 to start the sewing machine. This initial revolution of the shaft 57 carries the ball crank-pin 47 from its lowest position, Fig. 5, to its highest position (not shown). This movement of the crank-pin 47 relieves the pull on the chain 46 and allows the spring 54 to close the work-clamp. It also acts through the link 50 and lever 20 to pull down on the rod 12 and start the stitch-forming mechanism.

When the sewing is completed, the action of the stop-motion device, in arresting the stitch-forming mechanism, imparts the usual rocking impulse to the shaft 40 to which is fixed an arm 61 having a bar-connection 62 for again shifting the gate 59 to initiate a second revolution of the driving shaft 57 which causes the ball crank-pin 47 to move from its highest position back to its lowest position, Fig. 5, and open the work-clamp. The connection of the gate 59 with the finger starting lever 60 includes the bell crank-lever 63 and the wire link 64.

The mechanism so far described is, with the exception of the supplemental upper clamp-lever 24, constructed substantially in accordance with the disclosure of said Allen copending application. In the machine of said copending application the clamp-foot 22 is automatically raised when the machine comes to rest and is automatically lowered when the machine is started. It requires no effort on the part of the operator to manipulate the work-clamp against the relatively considerable pressure of the clamp-closing spring 54.

For certain classes of work it is desirable to use the rectangular opening 22′ in the clamp-foot 22 as a sight or guide to the accurate positioning of the work in the work-clamp, and the clamp-foot best serves as an accurate guide when in lowered position. The present improvement permits the clamp-foot to be pulled downwardly upon the work to serve as a sight in locating the work before the machine is started and while the main clamp-lever 23 is in clamp-opening position, Fig. 3. There is fixed to the supplemental clamp-lever 24 a lateral arm 65 to which is connected a treadle-chain 66 by means of which the supplemental clamp-lever 24 may be swung from full line to dotted line position, Fig. 3, to lower the clamp-foot 22 into sighting or gaging position before the operator presses upon the starting button 60. This preliminary movement of the supple-

mental lever 24 and foot 22 requires little effort on the part of the operator as it is resisted only by the weak spring 34. As soon as the machine is started, the pressure of the heavy spring 54 is brought to bear upon the clamp-foot 22, as will be readily understood.

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

1. A work-clamp for sewing machines comprising a lower clamp-member, main and supplemental clamp-levers carried by said lower clamp-member, a clamp-foot carried by said supplemental clamp-lever, automatic means for operating said main clamp-lever, and manually operated means for moving said supplemental clamp-lever toward the lower clamp-member, and a recovery spring for lifting said supplemental clamp-lever.

2. A work-clamp for sewing machines comprising a lower clamp-member, main and supplemental clamp-levers carried by said lower clamp-member, a clamp-foot carried by said supplemental clamp-lever, automatic means for operating said main clamp-lever, and a pull-chain and recovery spring connected to said supplemental clamp-lever.

3. A sewing machine work-clamp comprising a lower work-supporting plate, a main upper clamp-lever fulcrumed on said plate, a supplemental upper clamp-lever fulcrumed for movement independently of said main upper clamp-lever, manually operated means for moving said supplemental clamp-lever toward the work-supporting plate independently of said main clamp-lever and while the latter is in clamp-opening position and a recovery spring for lifting said supplemental clamp-lever.

4. In a sewing machine, stitch-forming mechanism, a stop-motion device, a work-clamp, a clamp-closing spring, automatic means for opening the work-clamp against the force of said clamp-closing spring, and manually operated means independent of said spring for closing the work-clamp before the machine is started.

5. In a sewing machine, a work-clamp having a lower work-supporting plate, an upper clamp-foot, an automatically operated main clamp-closing lever, a supplemental clamp-lever carrying said clamp-foot, and manually operated means connected to said supplemental clamp-lever to lower said clamp-foot, said main lever being arranged to press directly upon said supplemental lever in applying clamping pressure to said clamp-foot.

6. A sewing machine work-clamp comprising, a lower clamp-member, main and supplemental clamp-levers carried by said lower clamp-member, a clamp-foot carried by said supplemental clamp-lever, a relatively strong clamp-closing spring acting upon said main clamp-lever, a relatively weak recovery spring acting upon said supplemental clamp-lever, automatic means for operating said main clamp-lever and manual means for operating said supplemental clamp-lever.

7. In a sewing machine, stitch-forming mechanism, a stop-motion device, a work-clamp having a lower clamp-member, an upper clamp-foot, a lever carrying said clamp-foot, a treadle-controlled direct pull connection with said lever for moving the clamp-foot to work-gaging position before the machine is started, and automatic means for closing the clamp after the machine is started.

In testimony whereof, I have signed my name to this specification.

EDWARD B. ALLEN.