Sept. 8, 1931. E. B. ALLEN 1,822,854

SAFETY DEVICE FOR SEWING MACHINES

Filed June 28, 1930 5 Sheets-Sheet 1

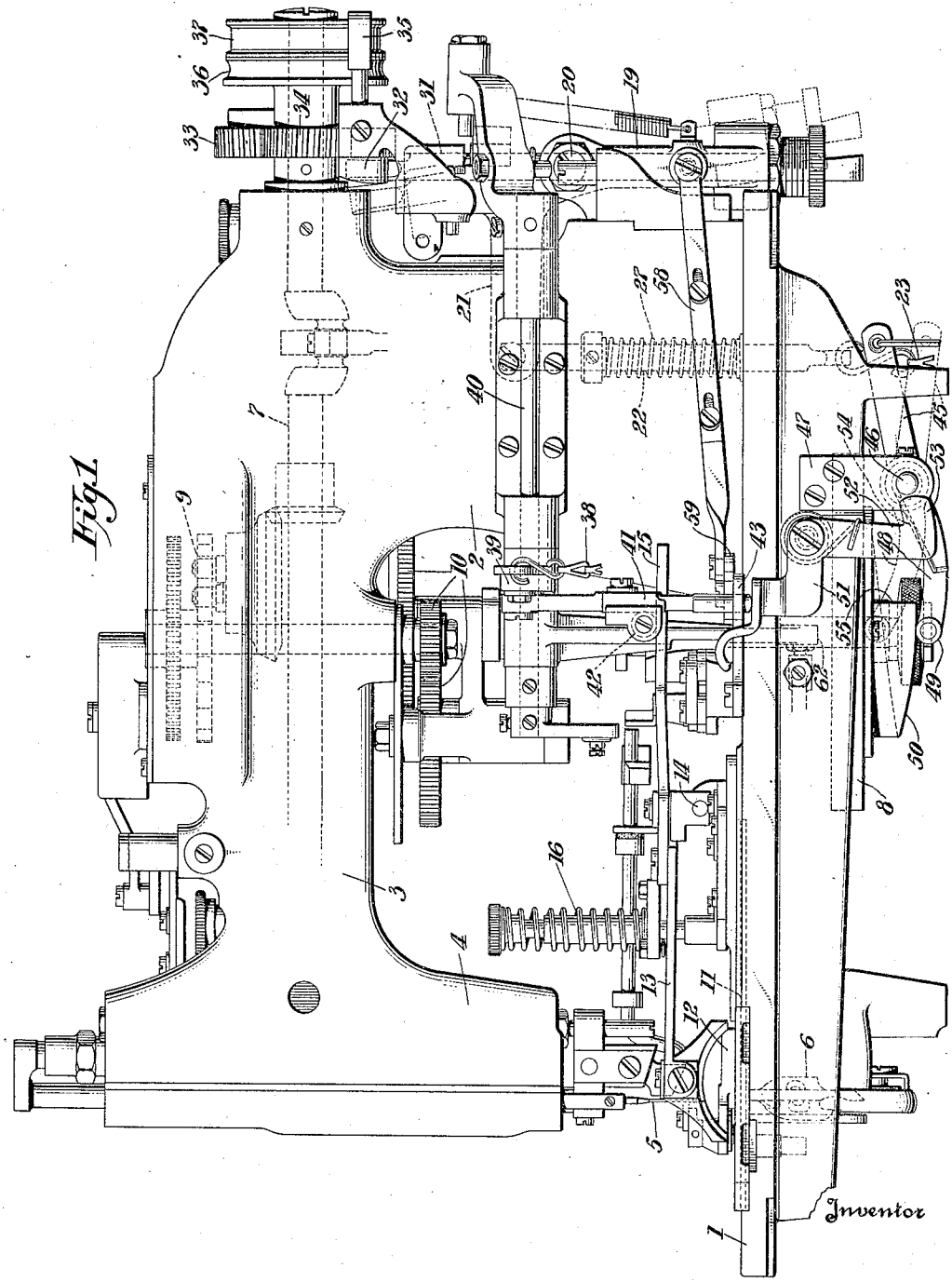


Fig. 1.

Witness:
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SAFETY DEVICE FOR SEWING MACHINES

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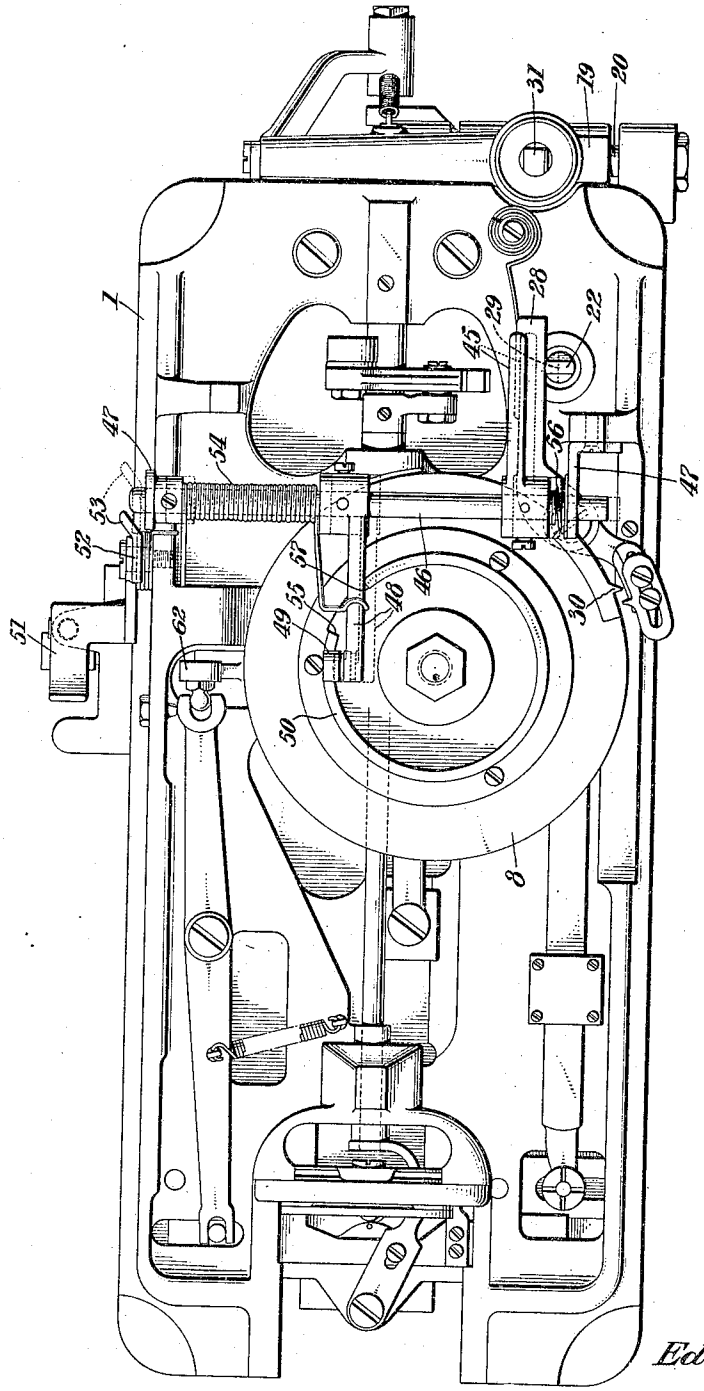


Fig. 2.

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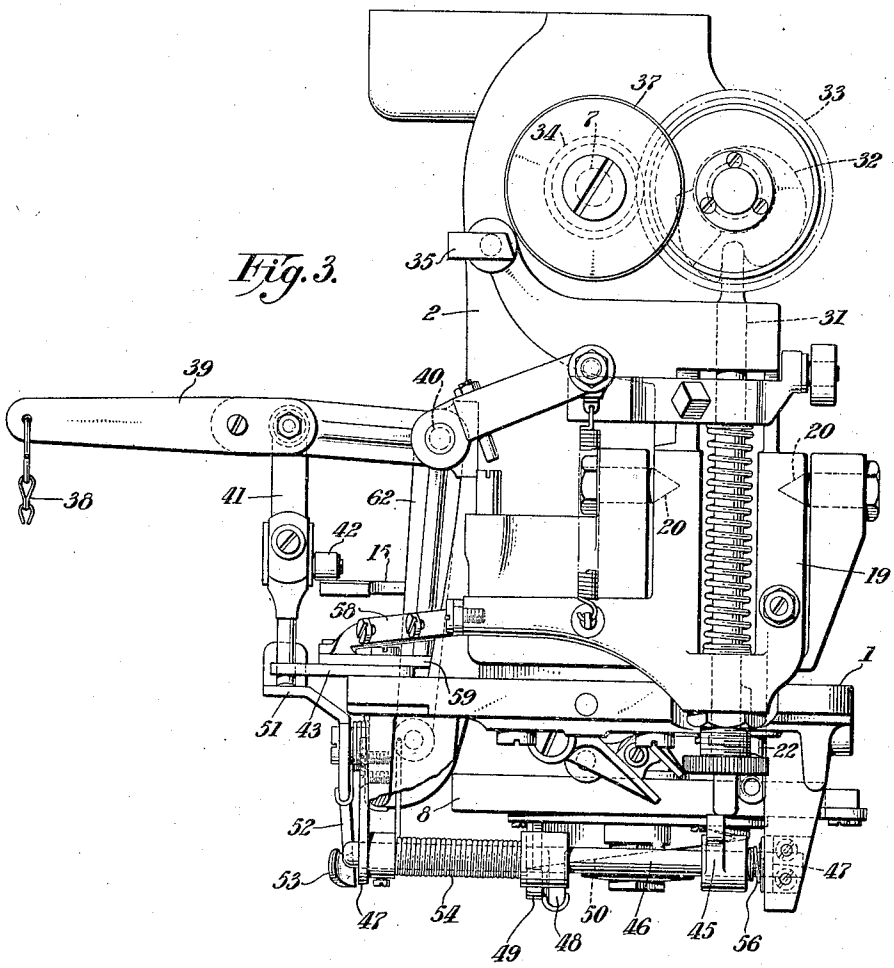
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SAFETY DEVICE FOR SEWING MACHINES

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Fig. 3.



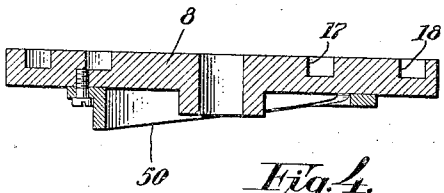


Fig. 4.

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Sept. 8, 1931. E. B. ALLEN 1,822,854

SAFETY DEVICE FOR SEWING MACHINES

Filed June 28, 1930 5 Sheets-Sheet 4

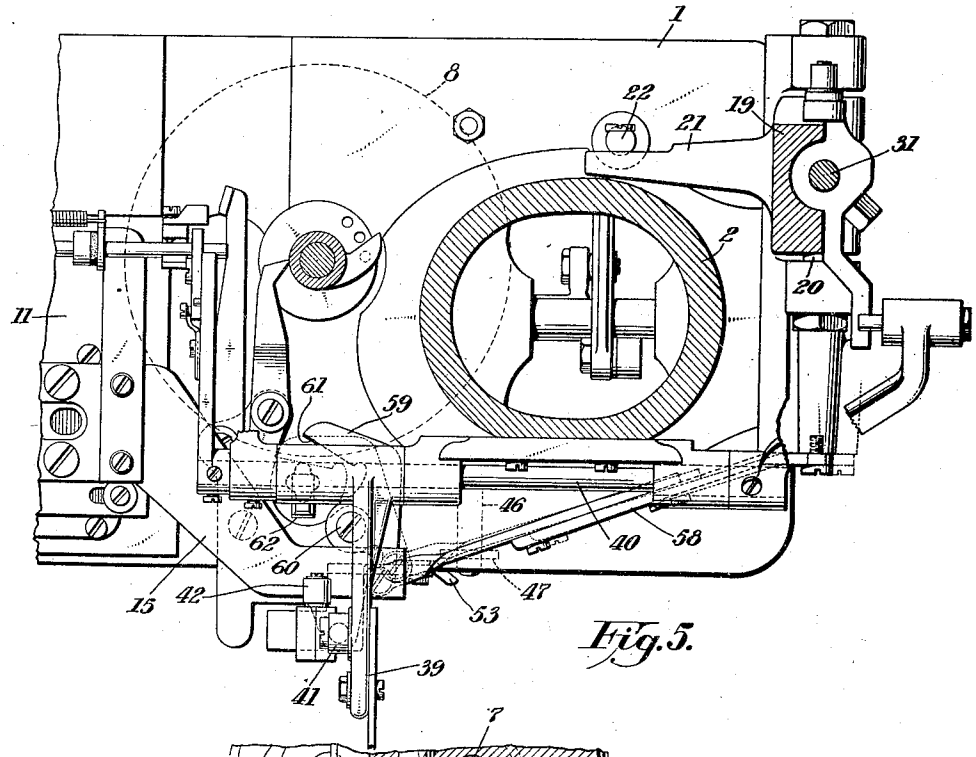


Fig. 5.

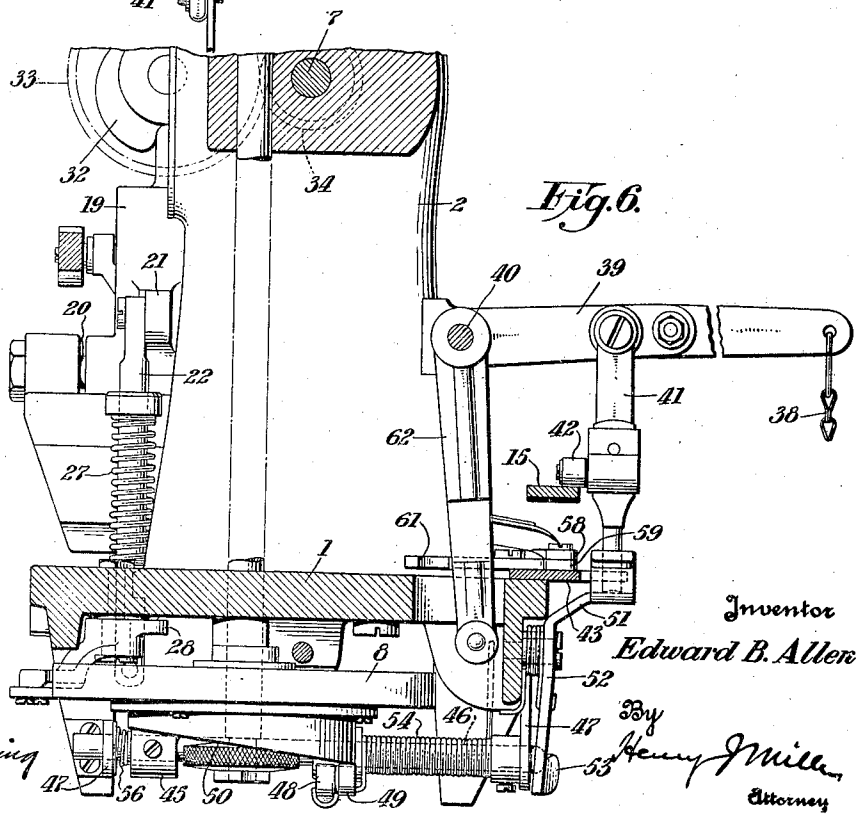


Fig. 6.

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Sept. 8, 1931. E. B. ALLEN 1,822,854

SAFETY DEVICE FOR SEWING MACHINES

Filed June 28, 1930 5 Sheets-Sheet 5

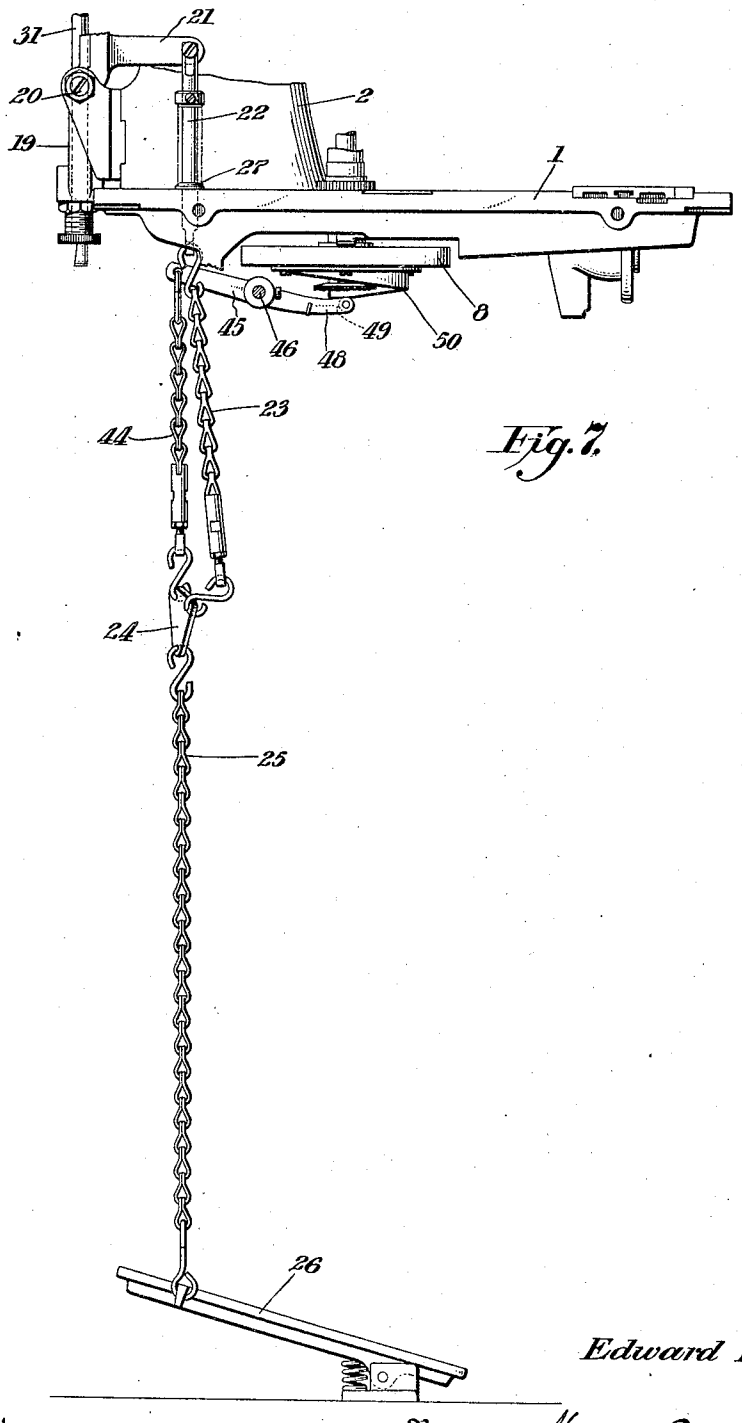


Fig. 7.

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UNITED STATES PATENT OFFICE

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SAFETY DEVICE FOR SEWING MACHINES

Application filed June 28, 1930. Serial No. 464,557.

This invention relates to sewing machines which automatically sew a group of stitches in accordance with a predetermined pattern and then come to rest; tacking and barring machines, button hole sewing machines and machines for sewing on buttons being examples of sewing machines of this general type. A machine of the type in question commonly includes a stop-motion device which controls the period of action of the stitch-forming mechanism and this stop-motion device includes an element which is manually shiftable to running position to start the machine. The starting element is normally retained by a latch in running position while the sewing operation is in progress and is automatically tripped or released by a cam or other device when the sewing operation is completed, whereupon the starting element is shifted by a spring to stopping position in a direction opposite to that in which it was manually shifted to start the machine.

Through carelessness or inattention, it sometimes happens that an operator will be exerting a starting force upon the manually controlled element at the time it is automatically released to stop the machine and, because of this force, it cannot be moved by its spring to stopping position. The machine will not, under such conditions, come to rest at the end of a sewing period and will repeat the sewing operation.

The present invention has for an object to provide a simple form of safety device for insuring against interference by the operator with the automatic stopping of the machine at a predetermined time after it has been manually started.

To the attainment of the ends in view, the invention consists in the devices, combinations and arrangement 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 of a preferred embodiment of the invention, taken with the accompanying drawings in which Fig. 1 is a side elevation of a Singer 71-class buttonhole sewing machine embodying the invention. Fig. 2 is a bottom plan view of the machine. Fig. 3 is a rear end elevation of the machine. Fig. 4 is a section through the feed-wheel of the machine. Fig. 5 is a plan view of a portion of the machine bed, showing the standard in horizontal section. Fig. 6 is a transverse vertical section through the machine bed, looking toward the standard, and Fig. 7 is a side view of the machine as connected with the starting pedal.

The machine is constructed with a bed 1, standard 2, bracket-arm 3 and head 4 carrying the reciprocating and laterally vibrating needle 5 which cooperates below the bed 1 with the oscillatory shuttle 6 to form stitches. The needle and shuttle are driven as usual by the main-shaft 7 which, through the usual reduction gearing, drives the feed-wheel 8 in step-by-step fashion, so that the feed-wheel will make one complete rotation per buttonhole-producing cycle. The feed-wheel driving mechanism is preferably constructed in accordance with the disclosure of the patent to Allen, No. 1,629,139, of May 17, 1927, and includes the usual pin-and-star-wheel drive 9 and reduction gearing 10. Such mechanism is also disclosed in the Allen and Myers application, Serial No. 272,416, filed Apr. 24, 1928.

The work is held in the usual work-clamp including a lower plate 11 and an upper clamping foot 12 carried by the clamp-lever 13 fulcrumed at 14 on the lower plate 11 and having a tail-piece 15 which may be pushed downwardly to open the work-clamp against the pressure of the clamp-closing spring 16.

During the sewing operation, the work-clamp is moved over the bed 1 by the usual connections with the longitudinal and lateral feed-cam grooves 17, 18 in the upper face of the feed-wheel 8; such movement of the work-clamp serving to place the stitches in the desired order or arrangement around the buttonhole.

The stop-motion device is preferably constructed substantially in accordance with the disclosure of the Allen and Myers application previously referred to, and includes a control element movable between running

and stopping positions, such control element having the form of a tilting stop-motion lever 19 fulcrumed at 20 and having rigid therewith a forwardly extending arm 21 to which is connected the vertical starting rod 22 which extends downwardly through the bed 1 and is connected by a chain 23 to a junction-link 24, Fig. 7, from which a chain 25 extends down to the starting pedal 26. A spring 27 urges the rod 22 upwardly and, during the sewing, the rod 22 is held in its down-position by a latch 28, Fig. 2, which engages a notch 29, in the side of the rod 22; the latch being operated by the tripping point 30 on the feed-wheel 8 to release the rod 22 when the sewing operation is completed.

The stop-motion lever 19 carries the usual stop-plunger 31, which, in the full line position of the lever 19, Fig. 1, cooperates with the stop-cam 32, Fig. 3. The stop-cam 32 is connected through buffer-springs (not shown) to the gear 33 which is double the size of and meshes with the pinion 34 on the main-shaft 7, as described in said Allen and Myers application. The stop-motion lever 19 carries the usual belt-shipper 35 for shifting the driving belt (not shown) from the tight pulley 36 to the loose pulley 37 and vice-versa; such pulleys being carried at the rear end of the main-shaft 7.

In a sewing machine installation of the present character there is customarily provided a second pedal (not shown) known as the clamp-lifting pedal and connected by a chain 38 to an arm 39 fulcrumed to turn upon and relative to the rock-shaft 40. The arm 39 has connected to it a vertical rod 41 carrying a roller 42 which engages the clamp-lever tail-piece 15 and depresses the latter when a down-pull is exerted on the chain 38. The rod 41 is guided at its lower end in a bracket 43 fixed to the bed 1.

According to the present improvement there is provided a mechanism independent of the operator for insuring that there shall be slack in the starting chain 23 when the stop-motion device is tripped to stop the machine, so that the rod 22 cannot be prevented by the operator from moving upwardly under the influence of its spring 27 when it is released by the latch 28.

There is connected to the junction-link 24 a chain 44 which extends upwardly and is connected to a lever-arm 45 fixed to the rock-shaft 46 journaled in brackets 47 below the bed 1. The rock-shaft 46 is endwise movable in the brackets 47 and has fixed to it a second arm 48 carrying a roller 49 which engages the spiral safety-cam 50 on the under side of the feed-wheel 8 and is gradually depressed by the latter, during the sewing operation, until it finally exerts a strain on the chain 25 and forcibly lifts the latter and the pedal 26, and provides slack in the chain 23 by the time the feed-wheel reaches stopping position; such position of the feed-wheel is shown in the several figures of the drawings. The cam 50 will overcome any force which the operator may, unwittingly or otherwise, be exerting on the starting pedal and avoids interference by the operator with the proper action of the stop-motion device.

After the machine has come to rest, the operator exerts a down-pull on the chain 38 to open the work-clamp and, in so doing, forces the rod 41 downwardly, whereupon its lower end engages and swings a bell-crank lever 51, 52, Fig. 1, causing its cam-inclined lower end 53 to wipe past the end of the rock-shaft 46 and force the latter downwardly, Fig. 2, or to the right, Fig. 3, thereby shifting the roller 49 inwardly and off of the spiral cam-track 50, as shown in dotted lines in Fig. 2, whereupon the spring 54 returns the levers 48 and 45 to initial or starting position shown in dotted lines, Fig. 1, and restores cooperative relation between the chain sections 23 and 25, so that the operator may exert a down-pull on the chain section 23 and 25 to start the machine on the next sewing operation.

When the clamp has been lowered and the machine started, the end 55 of the cam 50 moves past the roller 49, and the spring 56 restores the shaft 46 and connected levers 45, 48 to full line position, Fig. 2, so that the roller 49 will be in position to be engaged by the beginning end 57 of the cam 50. The gap between the ends 55 and 57 of the cam 50 permits this return movement of the roller 49.

There is connected to the stop-motion lever 19 a link 58 which is connected to a lever 59 fulcrumed at 60 on the bed 1 and having an inclined end 61 which, when the stop-motion lever 19 is shifted by the operator to running or dotted line position, Fig. 5, engages the downwardly extending lever-arm 62 rigid with the clamp-lifting lever 39 and forcibly moves the levers 62, 39 in a direction to lower the work-clamp. This device positively insures that the work-clamp will be closed and the rod 46 will be released for its restoring endwise movement by the spring 56, when the machine is started.

The invention is not to be understood as limited to the particular type and construction of stop-motion device shown, or to the form and arrangement of parts disclosed in the preferred embodiment of the invention, as it is obviously susceptible of various other embodiments within the spirit of the invention.

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

1. A sewing machine having, in combination, stitch-forming mechanism, a work-clamp, a feed-cam and connections for relatively moving the stitch-forming mechanism

and work-clamp to group the stitches in accordance with a predetermined pattern, a main-shaft for driving said stitch-forming mechanism and feed-cam, a stop-motion device for controlling the period of operation of said main-shaft, said stop-motion device including a control element movable between running and stopping positions, manually operated means connected to said element and movable in one direction by the operator to shift said control element to running position, and means actuated by said main-shaft for automatically moving said manually operated means in the opposite direction while the sewing operation is in progress.

2. A sewing machine having, in combination, stitch-forming mechanism, a stop-motion device for controlling the period of operation of the stitch-forming mechanism, a work-clamp, a feed-wheel and connections for relatively moving the stitch-forming mechanism and work-clamp during the sewing period, manually operated means connected to said stop-motion device and movable by the operator in one direction to start the machine, and a cam on said feed-wheel and connections for moving said manually operated means in the opposite direction while the machine is in operation.

3. A sewing machine having, in combination, stitch-forming mechanism, a stop-motion device for controlling its period of operation, a work-clamp, manually operated work-clamp-opening means, manually operated starting means connected to the stop-motion device and movable by the operator in one direction to start the machine, automatic means connected to said manually operated starting means for moving the latter in the opposite direction while the machine is in operation, and means connected to be operated by said clamp-opening means for disconnecting said automatic means from said manually operated starting means.

4. A sewing machine having, in combination, stitch-forming mechanism, a stop-motion device for controlling the period of operation of the stitch-forming mechanism, a work-clamp, a feed-wheel and connections for relatively moving the stitch-forming mechanism and work-clamp during the sewing period, manually operated means connected to said stop-motion device and movable by the operator in one direction to start the machine, and a cam on said feed-wheel and connections for moving said manually operated means in the opposite direction while the machine is in operation, work-clamp opening means, and means actuated by said work-clamp opening means for disconnecting said manually operated means from said cam.

5. A sewing machine having in combination, stitch-forming mechanism, a stop-motion device, a starting pedal connected to said stop-motion device, and means running with the machine for automatically raising said pedal, during the sewing operation, in opposition to any force which may be exerted upon said pedal by the operator.

6. A sewing machine having, in combination, stitch-forming mechanism, a work-clamp, a feed-wheel and connections for relatively moving the stitch-forming mechanism and work-clamp during the sewing period, a stop-motion device, a starting pedal connected to said stop-motion device, and a cam on said feed-wheel and connections for raising said pedal during the sewing period in opposition to any force which may be exerted upon said pedal by the operator.

7. A sewing machine having, in combination, stitch-forming mechanism, a work-clamp, a feed-wheel and connections for relatively moving the stitch-forming mechanism and work-clamp during the sewing operation, a stop-motion device, a starting pedal connected to said stop-motion device, a safety cam on said feed-wheel, an endwise movable rock-shaft, a cam-follower fixed to said rock-shaft and connections for raising said pedal during the sewing operation, work-clamp opening means, and means connected to said work-clamp opeing means and operated by the latter to move said rock-shaft endwise and disengage said cam-follower from said safety cam.

8. In a sewing machine, stitch-forming mechanism, a work-clamp, a feed-wheel and connections for relatively moving the stitch-forming mechanism and work-clamp during the sewing to place the stitches in accordance with a predetermined pattern, a stop-motion device including a spring-biased control element shiftable between running and stopping positions, a manually operated starting element and pull-device connected to said control element to shift the latter against the force of its biasing spring to running position, a latch for holding said control element in running position, means for tripping said latch when the sewing is completed, and a cam on said feed-wheel and connections for exerting an upward pull on said pull-device before the said control element is released, so that said element may freely move to stopping position regardless of any force exerted by the operator upon the starting element.

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

EDWARD B. ALLEN.