

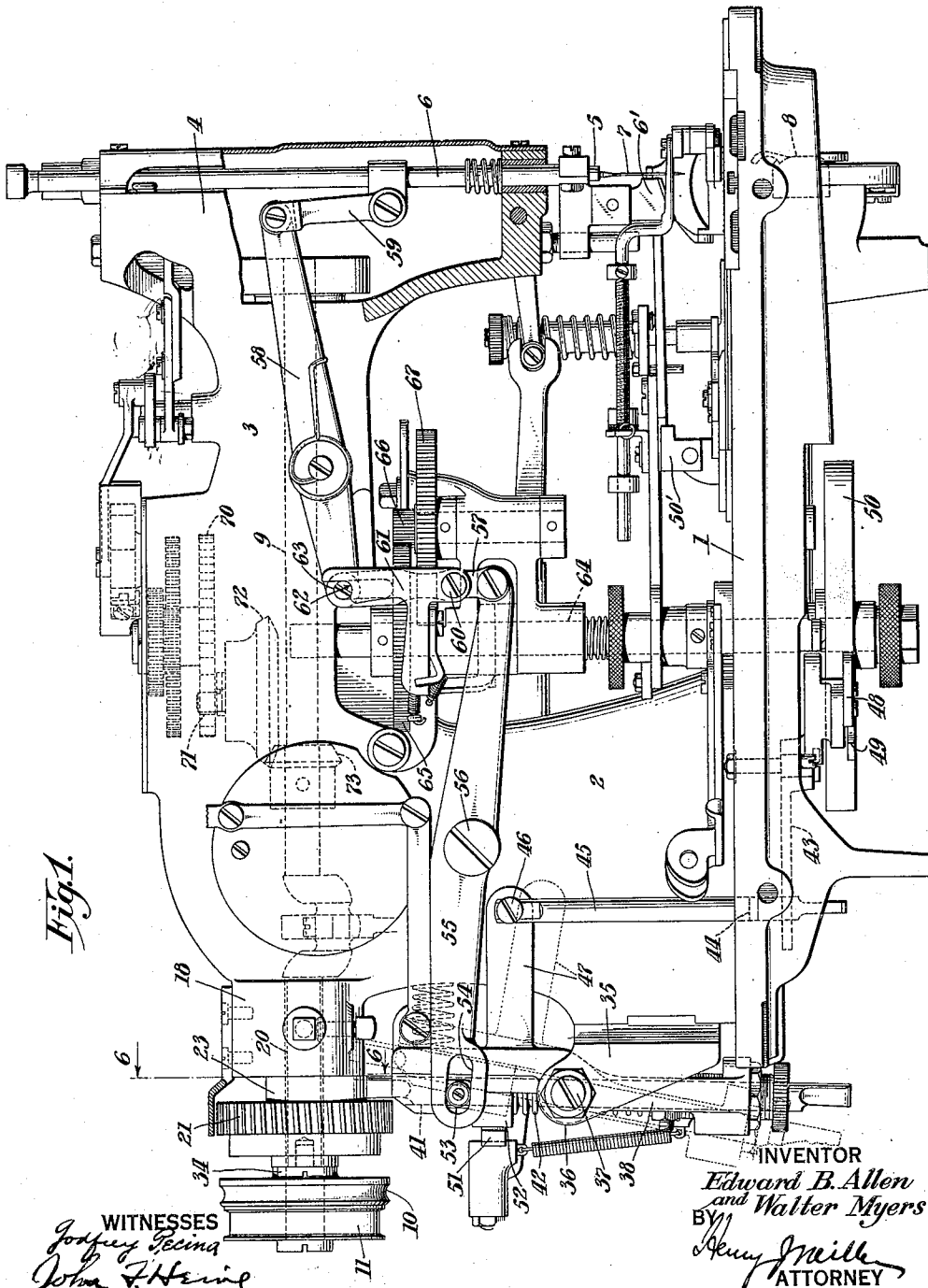
Sept. 20, 1932.

E. B. ALLEN ET AL

1,878,091

STOP MOTION DEVICE

Original Filed April 24, 1928 5 Sheets-Sheet 1



Sept. 20, 1932.

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STOP MOTION DEVICE

Original Filed April 24, 1928

5 Sheets-Sheet 2

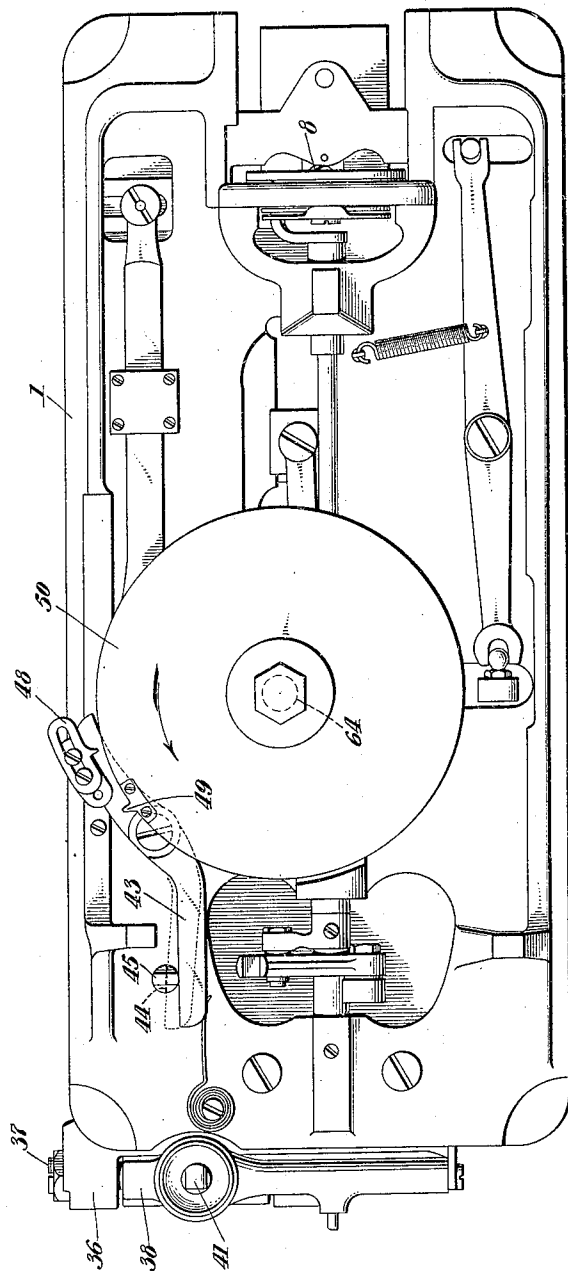


Fig. 2.

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STOP MOTION DEVICE

Original Filed April 24, 1928 5 Sheets-Sheet 3

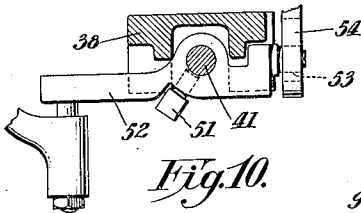


Fig. 10.

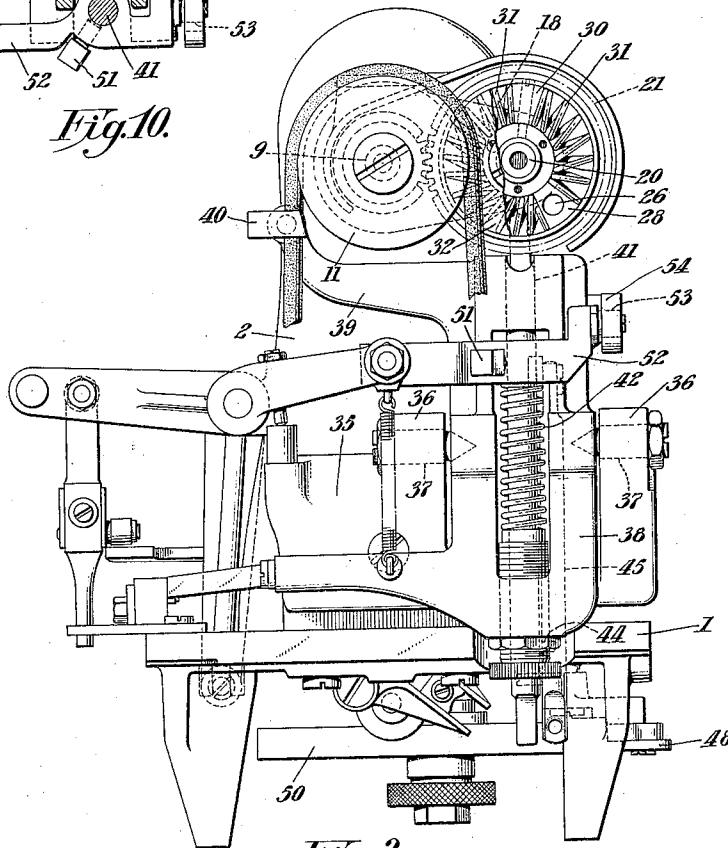


Fig. 3.

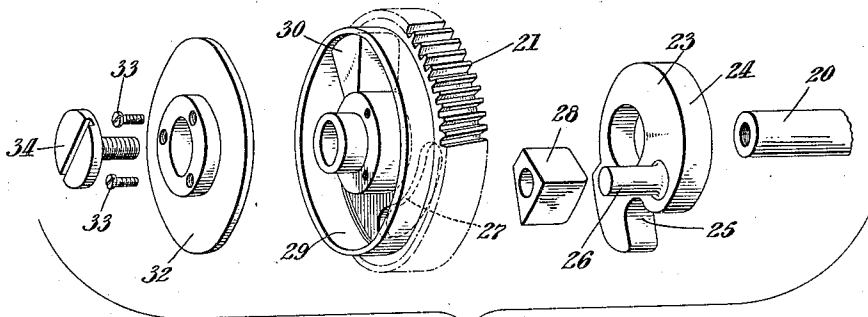


Fig. 4.

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STOP MOTION DEVICE

Original Filed April 24, 1928 5 Sheets-Sheet 4

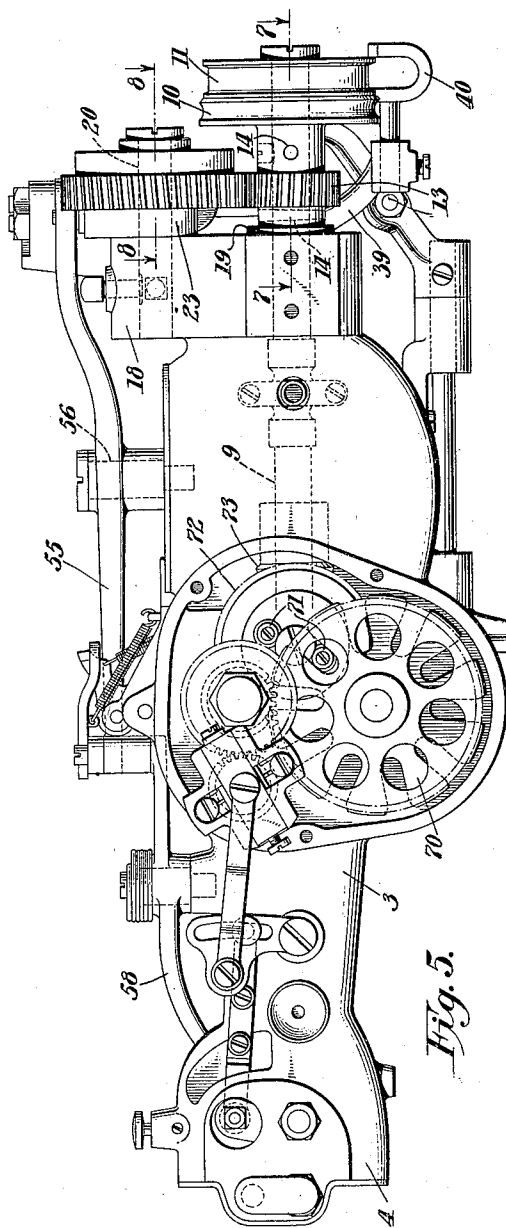


Fig. 5.

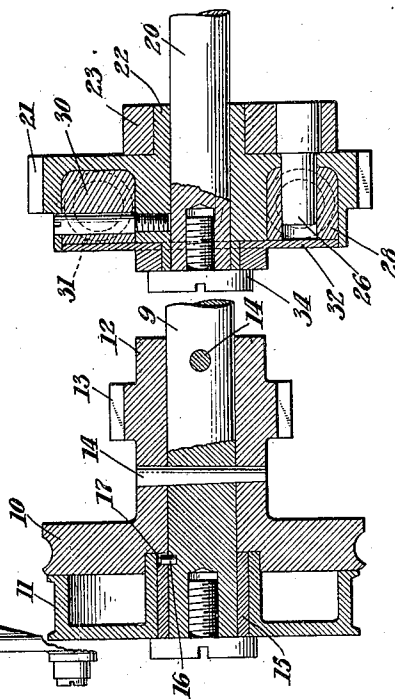


Fig. 7.

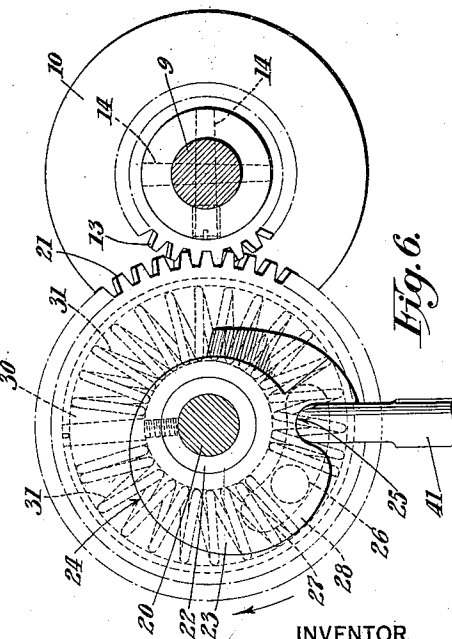


Fig. 6.

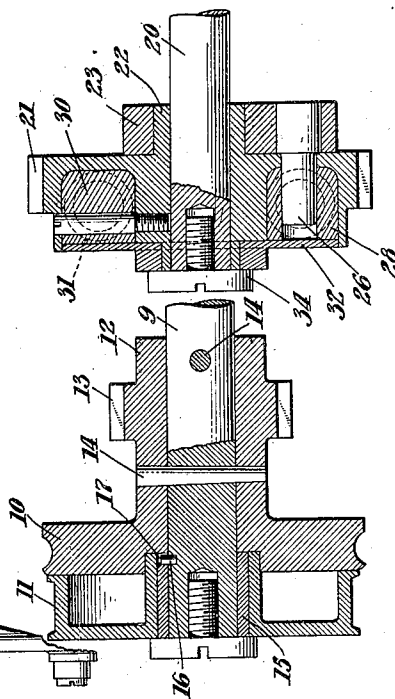


Fig. 8.

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STOP MOTION DEVICE

Original Filed April 24, 1928 5 Sheets-Sheet 5

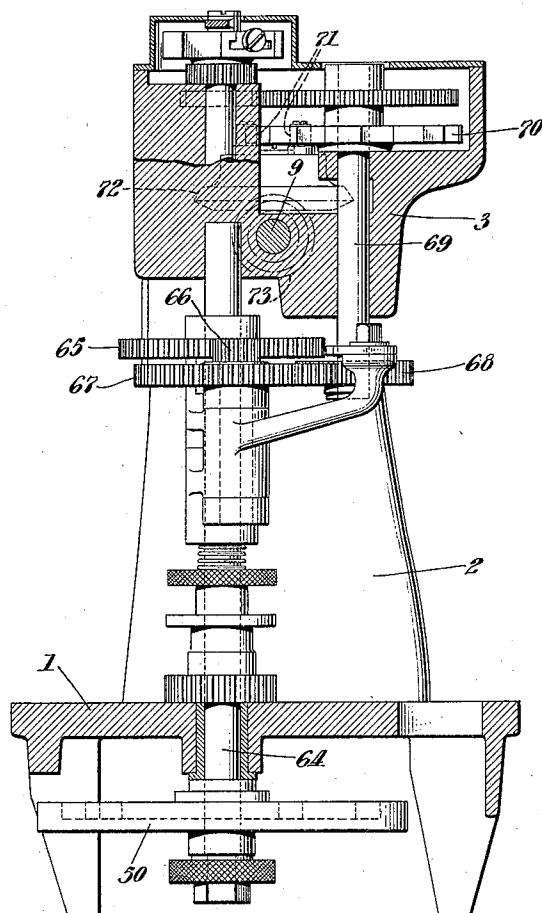


Fig. 9.

WITNESSES
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UNITED STATES PATENT OFFICE

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STOP-MOTION DEVICE

Application filed April 24, 1928, Serial No. 272,416. Renewed September 11, 1931.

This invention relates to devices for stopping machines, such as sewing machines, at a predetermined time and with the parts in a predetermined position.

One form of stop-motion device commonly used is shown in the patent to Allen, No. 743,213, of Nov. 3, 1903. It comprises a stop-cam fixed to the driven machine shaft and formed with an eccentric-portion followed by a stop-notch; such cam being connected through buffer-spring means to the driven shaft. A tilting stop-motion lever carrying a spring-pressed plunger is arranged to move the plunger sidewise to a position within range of the eccentric portion of the stop-cam which depresses the plunger and finally permits the plunger to rise into the stop-notch, thereby abruptly stopping the shaft and locking it in a predetermined position. The shock of stopping the moving parts of the machine is borne by the buffer-spring means between the stop-cam and the machine shaft. This shock is in the nature of a sharp hammer blow and is such that quite a strong buffer-spring is required to absorb it. Known stop-motions of this character are a speed-limiting factor of machines to which they are applied. In fact a machine with such a stop-motion must be operated at a moderate speed or considerable difficulty is experienced with buffer-spring breakage and distortion or undue wear on the parts.

The present invention has for an object to provide a stop-motion device, which will permit of higher machine speeds with increased production, and in which the shock of stopping the machine is materially reduced and buffer-spring breakage is overcome. Another object of the invention is to adapt the stop-motion device for use more particularly with buttonhole sewing machines in which the power for operating the buttonhole cutter is derived from the momentum of the machine acting preferably through the stop-motion device after the machine is disconnected from its driving means; a further object being to secure increased power for operating the buttonhole cutter.

Still further, the invention has for an ob-

ject to provide a stop-motion device in which the time-period in which the stop-motion lever may be tripped to secure proper cooperation of the parts is broadened, thus rendering it unnecessary to adjust the tripping time with as high a degree of accuracy as heretofore.

To the attainment of the ends in view, the usual stop-cam of the stop-motion device, instead of being mounted upon the driven shaft of the machine, is associated preferably with an idly running gear meshing with a smaller pinion fixed to the driven shaft, whereby the stop-cam is caused to run, say, at one-half the speed of the driven shaft. When applied to a buttonhole sewing machine, this gear and stop-cam may conveniently be mounted on a stud carried by the machine frame at one side of the main-shaft; the usual stop-motion lever being moved laterally from its old position below the main-shaft, to its new position below the gear. Since the stop-cam runs at half its former speed, it follows that the machine has twice the time to run under its own momentum from the time the power is thrown off until the positive stop comes into play. This increased coasting time results in an absorption of energy by friction in the machine bearings and a lessening of the energy to be absorbed by the stop-motion device. Furthermore, the character of the blow imparted to the buffer-spring means is changed. Instead of being in the nature of a sudden or sharp hammer blow, it is more like a push and can be better absorbed by the buffer-spring with less strain upon the latter. Still further, when applied to a buttonhole sewing machine of the type where the buttonhole cutter is operated by the down-motion of the stop-plunger under the influence of the eccentric portion of the usual stop-cam, the two-to-one reduction gearing gives increased power for cutting the buttonhole, as may be desirable with heavy materials or when cross-seams are encountered.

In the accompanying drawings, Fig. 1 is a side elevation of a 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. 100

4 is a disassembled perspective view of the idly running gear and associated parts, including the stop-cam. Fig. 5 is a top plan view of the upper parts of the machine carried by the bracket-arm. Fig. 6 is a section, on an enlarged scale, on the line 6—6, Fig. 1. Fig. 7 is a section on the line 7—7, Fig. 5. Fig. 8 is a section on the line 8—8, Fig. 5. Fig. 9 is a transverse vertical section through the machine bed and bracket-arm, showing the driving connections for the feed-wheel which latter carries the usual stop-motion tripping-point, and Fig. 10 is a transverse section through the stop-motion lever.

In the preferred embodiment of the invention illustrated, 1 represents the bed of the sewing machine from which rises the standard 2 of the bracket-arm 3 terminating in the head 4 in which the usual needle-bar 5 and buttonhole cutter-bar 6 are mounted. The needle-bar 5 carries the usual eye-pointed needle 7 which cooperates with the usual shuttle mechanism 8 to form the buttonhole stitches. The cutter-bar 6 has fixed to its lower end the usual buttonhole cutting knife 6' which, at the end of the sewing operation, is projected downwardly to cut the buttonhole slit.

The needle and shuttle mechanisms are driven in the usual manner from the main-shaft 9 which is journaled within and lengthwise of the bracket-arm 3 and carries at its rearward end the tight and loose belt-pulleys 10 and 11. The pulley 10 has an elongated hub 12 in which gear-teeth are cut forming a pinion 13; the hub 12 being fixed to the main-shaft 9 by means of the taper-pins 14 disposed on opposite sides of the pinion 13 and bearing a 90° angular relation to one another, as shown in Fig. 6. The loose pulley 11 is journaled on the bushing 15, Fig. 7, which is confined to rotate with the shaft 9 by means of the pin 16 which enters a notch 17 in the bushing.

The sewing machine frame is formed at the bend of the bracket-arm, adjacent the upper end of the standard 2, with a boss 18 which is laterally offset from the rear main-shaft bearing 19 and has fixed thereto the stud-pin 20 on which is journaled the gear-wheel 21 meshing with the pinion 13. As will be noted in Figs. 3 and 5, the stud-pin 20 is parallel to the main-shaft 9 and is disposed substantially at the level of such main-shaft; being merely displaced to one side of the latter. The gear-wheel 21 has a forwardly extending hub 22 on which is journaled the usual stop-cam 23 having the eccentric stop-plunger-depressing portion 24 followed by the stop and rebound-preventing notch 25. The stop-cam 23 has fixed thereto a pin 26 which extends through a slot 27 in the face of the gear 21 and has fitted thereon a block 28. The block 28 is disposed within the cavity 29, Fig. 4, of the gear 21 and there is also fixed with-

in the cavity 29 a second block 30; a pair of buffer-springs 31 being disposed within the cavity 29 between the fixed abutment-block 30 and the movable block 28. A cover-plate 32 closes the cavity 29 and is held thereon by screws 33. The screw 34 holds the entire gear-wheel assembly on the stud-pin 20.

Mounted on the standard 2, at the base of the latter, is the bracket 35 having spaced arms 36 for the trunnion-screws 37 which support the tilting stop-motion lever 38 formed at its upper end with a lateral arm 39 carrying the belt-shipper fork 40. Mounted to slide vertically in the stop-motion lever 38 is the usual stop-plunger 41 which is pressed upwardly by the spring 42. When the stop-motion lever 38 is in running or dotted line position, Fig. 1, the upper end of the plunger 41 is disposed forwardly of the cam 23 and is out of range of the latter. When the stop-motion lever 38 assumes its stopping or full line position, Fig. 1, the plunger 41 is moved to a position under or within range of the cam 23, whereupon the eccentric portion 24 of such cam first depresses the stop-motion plunger 41 against the force of the spring 42 and then releases the plunger as the latter rides off of the end of the eccentric portion 24 and is projected upwardly into the stop-notch 25.

The stop-motion lever 38 is held in its running or dotted line position, Fig. 1, by means of a latch-lever 43 which enters the notch 44 in the side of the rod 45 connected by the screw 46 to the arm 47 rigid with the stop-motion lever 38. The latch 43 carries the adjustable tripping-point 48 which is acted upon at the end of the sewing cycle by the tripping-point 49 carried by the feed-wheel 50; the feed-wheel being connected in the usual manner to move the work-clamp 50' on the bed 1 to feed the work.

Fixed to the stop-motion plunger 41 by means of the screw 51 is the horizontal bar 52 carrying at its outer end the roller 53 entering the slot 54 in the rearward end of the lever 55 which is fulcrumed at 56 on the standard 2. The lever 55 is connected in the usual manner to the cutter-bar 6 by means of the link 57, lever 58 and link 59. The link 57 has pivoted thereto at 60 the lower end of the latch 61 having at its upper end a shoulder 62 which engages under the pin 63 carried by the lever 58 and passes through the slotted upper end of the link 57. This is the usual manual release, disclosed in said Allen patent No. 743,213, for preventing the operation of the cutter-bar by the stop-motion device; the release being effected by manually swinging the link 61 to carry its shoulder 62 out from under the pin 63.

The feed-wheel 50 is mounted on the shaft 64 to the upper end of which is fixed a gear 65 meshing with the pinion 66 fast to the gear 67 meshing with the pinion 68 secured to the

lower end of the shaft 69. The shaft 69 has fixed thereto the usual star-wheel 70 which is given a step-by-step motion by the pins 71 carried by the bevel gear 72 which meshes with the driving pinion 73 fixed to the main-shaft 9.

It will be noted from the foregoing description that the power for driving the machine is not transmitted through the gearing 13, 21, but is transmitted directly from the pulley 10 to the main-shaft 9; the gear 21 which carries the stop-cam 23 running idly without noise or wear and tear while the machine is in operation.

The tripping-point 48 should be adjusted to release the stop-motion lever 38 at a time when the concentric or low portion of the stop-cam 23 is adjacent the upper end of the plunger bar 41. On the cam 23 there is an angular space of about 90° where the tripping may take place and permit the plunger-bar 41 to pass under the cam for engagement by the eccentric cam-portion 24. As the cam 23 is geared to run at half the speed of the main-shaft 9, it follows that the main-shaft may turn through a space of 180° or twice as far as would be permissible were the cam 23 mounted on the main-shaft. Hence it is not necessary to adjust the setting of the tripping point 48 to the degree of accuracy heretofore required.

It is found that with the present stop-motion device lighter buffer-springs may be used with increased machine speed and, due to the more gradual character of the blow absorbed by such buffer-springs, breakage of the latter is eliminated.

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

1. In a stop-motion device, the combination with the driven machine shaft, driving means, and means for establishing and interrupting driving relation between the driving means and driven shaft, of a stop-cam geared to said driven shaft to run idly at a reduced speed while the machine is in operation, said stop-cam having an eccentric portion followed by a stop-notch, a stop-motion lever, and a spring-pressed plunger carried by said lever and movable into and out of cooperative relation with said stop-cam, and buttonhole cutting mechanism connected to be operated by the movement of said plunger under the influence of the eccentric portion of said stop-cam.

2. In a buttonhole sewing machine having a main-shaft, the combination with a stop-motion device including means geared to the main-shaft to run at a reduced speed and a stop-cam driven by said means, of buttonhole cutting mechanism connected to be operated by said means.

3. In a buttonhole sewing machine having a main-shaft, the combination with a stop-motion device including a stop-cam geared

to said main-shaft to run at a reduced speed, of buttonhole cutting mechanism connected to be operated by said stop-cam.

4. In a buttonhole sewing machine, a main-shaft, stitch-forming mechanism, rotary means driven by the main-shaft at a reduced speed during a stitching operation, a stop-motion device including means for disconnecting the main-shaft from its source of power, and buttonhole cutting mechanism connected to be operated by said rotary means under momentum after the main-shaft has been disconnected from its source of power.

5. In a buttonhole sewing machine, a main-shaft, power-means, means for establishing and interrupting driving relation between the main-shaft and said power-means, stitch-forming mechanism, and buttonhole cutting mechanism including a rotary buttonhole-cutter-actuator connected to said main-shaft to run at a reduced speed and timed to actuate the buttonhole-cutter while the machine is running under momentum.

6. A buttonhole sewing machine having, a main-shaft, stitch-forming mechanism, a work-clamp, means for relatively moving the stitch-forming mechanism and work-clamp during a sewing period, power-means, a stop-motion device for disconnecting the main-shaft from the power-means at the end of a sewing period, a buttonhole cutting mechanism and a power-multiplying gear-connection between said main-shaft and said buttonhole cutting mechanism for actuating the latter under the momentum of the machine after the main-shaft has been disconnected from said power-means.

In testimony whereof, we have signed our names to this specification.

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