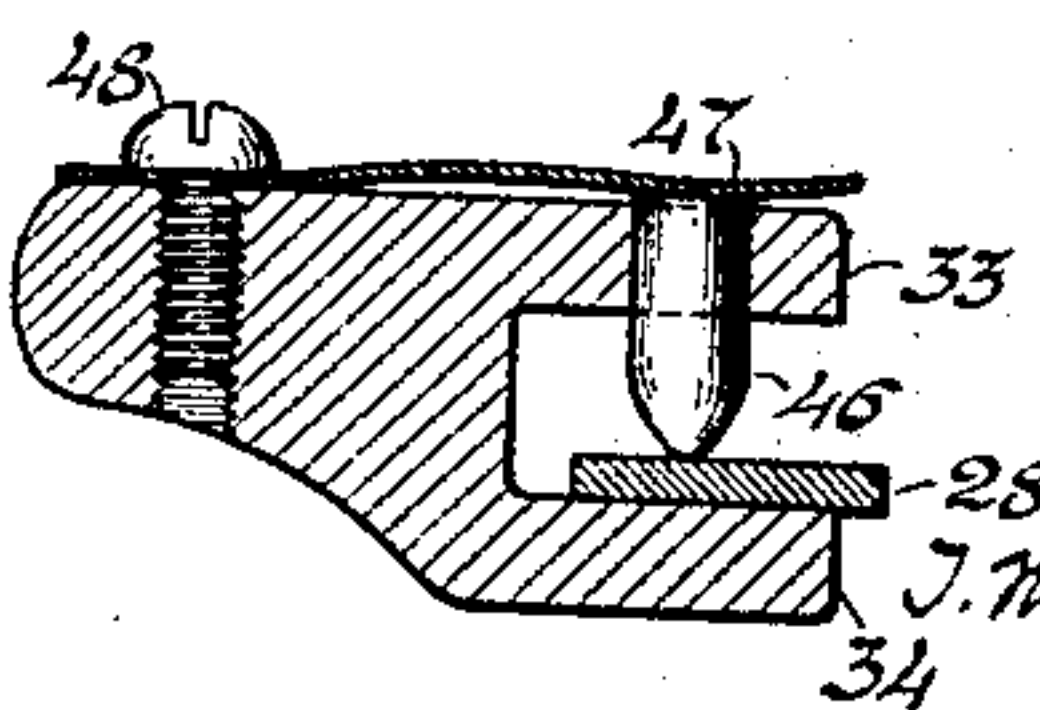


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TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

WORK-CLAMP-OPERATING DEVICE FOR SEWING-MACHINES.

No. 931,700.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, THOMAS M. McLAUGHLIN and ROBERT R. HUGHES, JR., citizens of the United States, residing at Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Work-Clamp-Operating Devices for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement in that class of machines designed for producing groups or successions of stitches in the attaching of buttons to garments and in stitching tacks and buttonholes in fabrics.

The invention has for its object to provide means whereby the opening of the work-clamp is effected by automatically acting means so that the last stitch of a group, or the severing of the threads at the end of a stitching operation, may be wholly completed before the work is released or disturbed by the opening of the work-holder.

The present improvement is embodied in a machine of the character described in which the upper or movable clamp-member is yieldingly connected with an operating lever having a treadle or knee-lever connection for depressing the same in opposition to the clamp opening spring to close the clamp, and a cam device also acting upon said lever to maintain the clamp closed during the production of a group or succession of stitches of predetermined number and to thereafter release the same to permit the opening of the clamp under the action of said spring.

The invention will be understood by reference to the accompanying drawings, in which—

Figure 1 is a rear side elevation of a flat button sewing machine of the well-known Singer type represented in the United States patent to J. J. Sullivan, No. 777,564, dated December 13, 1904. Fig. 2 is a bottom plan view of a portion of the jogging mechanism for the work-holder. Fig. 3 is a perspective view of the work-clamp and the means for opening and closing the same, and Fig. 4 is a transverse section through the forked end of the operating lever.

The machine is constructed with the usual bed-plate 1 and overhanging bracket-arm 2 carrying the main-shaft 3 connected by

means of the worm 4 and worm-wheel 5 (represented in dotted lines in Fig. 1) to the cam-wheel 6. The cam-wheel is provided in its rearward face with a cam-groove 7 entered by a stud 8 upon the upper end of a vibrating lever 9 fulcrumed at 10 upon a bracket 11 mounted upon the bed-plate and having upon its lower end a ball-and-socket connection 12 with the rearward end of a link-member 13 having at the opposite end a swivel-block 14 carrying a clamp-screw 15 entering a segmental slot 16 in a lateral arm 17 of an angular lever mounted upon the fixed fulcrum-stud 18 and having an arm 19 pivotally connected at 20 with one end of a segmental link 21 whose other end is pivotally connected at 22 with a rectangular slide-block 23 connected with the slide-plate 24 which is in turn attached to the bottom of the lower clamp-lever 25 carrying the clamp-plate 26 at its outer end. The cam-groove 7 is formed to impart through the mechanism just described a jogging motion to the work-holder in relation to the stitch-forming mechanism.

The upper member of the work-holder is in the form of a button-clamping jaw 27 composed of separable parts mounted upon the forward end of the clamp-supporting arm 28 which is secured for a slight rising and falling movement within the bearing block 29 secured upon the rearward end of the clamp-lever 25. The clamp-arm 28 is confined against edgewise movement by means of the guide-arm 30 secured by means of a bolt 31 upon the block 29 and provided with the depending lips 32 embracing the edges of the arm 28. The middle portion of the clamp-member 28 is embraced by the spaced members 33 and 34 of the laterally disposed arm 35 of an operating lever having a hub 36 mounted upon a fulcrum-pin 37 carried by the bracket 38 attached to the bed-plate 1 and having an upright arm 39 carrying a laterally extending screw-pin 40 resting upon a peripheral cam-track of the cam-wheel 6 comprising a concentric portion 41 and a hole or depression 42 adapted to receive said pin. A clamp-lifting spring 43 connected at one end with a perforated lag 44 upon the under side of the bracket-arm and at the other end with a pin 45 upon the forward end of the clamp-arm 28, serves to normally maintain the clamp in raised

position and the screw-pin, constituting the cam follower, in operative relation with the cam-track 41 42.

The upper member 33 of the fork at the extremity of the lever-arm 35 is provided with a vertical aperture entered by a thrust-pin 46 whose rounded lower end rests upon the top of the clamp-arm 28 and whose upper end is engaged by the outer end of the flat spring 47 whose opposite end is clamped upon the lever-arm 35 by means of the screw 48. As will be observed, the thrust-pin 46 and spring 47 serve to afford a yielding connection between the operating lever and the clamp-arm, which latter normally rests upon the lower member 34 of the fork under the pressure of the spring 47, but is permitted to rise and force the thrust-pin 46 upwardly in opposition to the spring 47 under variations in the thickness of the work interposed between the members 26 and 27 of the work-holder.

As herein represented the machine comprises a rectilinearly reciprocating needle-bar 49 carrying the needle 50 which in practice coöperates with an oscillating shuttle of well-known form in the production of stitches.

As fully illustrated in the United States patent before mentioned, the main-shaft carries the fast and loose pulleys 51 and 52 to which power is communicated from the source of power by a belt controlled by the belt-shipper 53 carried by a vibrating lever 54 forming a member of a stop-motion device which is pivotally mounted at its lower end in a projection 61 on a bracket 62 and which carries a plunger-rod 63 pressed upwardly into operative relation with a stopping cam 51* rigidly attached to the fast pulley 51. The said vibrating lever is pressed laterally by the usual spring having a tendency to force the upper end of the same outward, but which tendency is restrained by the detent-lever 64 which serves to retain the start and stop-motion lever 54 in its inoperative position, as shown in Fig. 1. Mounted in ears 65 of the bracket 62 is a bell-crank lever 66 the lower arm of which impinges against the said start and stop-motion lever, so that by depressing the upper or outer arm of said bell-crank lever, which is in practice provided in its outer end with a hole 67 to receive a treadle connection, said lever may be forced inward to start the machine when desired. The forward end of the detent-lever 64 is adapted to be tripped by means of one of the two tripping points 68 upon the inner side of the cam-wheel 6 to cause the start and stop-motion lever 54 to assume its operative position and to throw the belt-shipper 53 and shift the plunger-rod 63 into operative relation with the stopping cam 51*. As in all machines of this class provided with a stop-motion device,

the momentum of the moving parts causes them to rotate for a part of a stitch-forming cycle after the tripping of the stop-motion device to bring its coacting parts into operative relation, and prior to the positive engagement of the stopping members to forcibly stop the machine at predetermined positions of the parts.

As actually constructed, the machine represented in the accompanying drawings is provided with thread cutting mechanism by which the upper thread is severed at the completion of each stitching operation, and the cut end of thread is disengaged from the material preparatory to a succeeding operation. According to the present improvement, the thread pulling arm 55 is carried by the depending arm 56 of a bell-crank lever fulcrumed at 57 upon a stud 58 depending from the head of the bracket-arm, and having a lateral arm 59 embraced by a laterally forked arm 60 carried by the pin 45. As will be observed, when the upper clamp-member or clamping jaw 27 is lowered from the position shown in Fig. 1 to that shown in Fig. 3 by means of the chain 61 or other connection of the lever-arm 35 with a treadle or knee-lever below the machine, the lower operative portion of the thread pulling arm 55 is shifted in one direction across the needle-path, and when the clamp is raised, the action of the arm 60 upon the bell-crank lever 56 59, causes the arm 55 to move in the opposite direction across the needle-path and to draw the cut end of needle-thread clear of the work.

In the operation of the machine, the chain 61 is drawn downwardly to lower the upper clamp-member from the position shown in Fig. 1 to that represented in Fig. 3, and the machine is simultaneously set in motion, which causes the slow rotation of the cam-wheel 6 so as to bring the concentric portion of the peripheral cam-track beneath the operative end of the follower pin 40, which serves to lock the lever 35 in operative position in which it remains throughout the stitching operation. Simultaneously with the arresting of the machine following the tripping of the stop-motion device, the hole or depression 42 in the peripheral cam-track comes beneath the point of the follower pin 40, and the latter is enabled to enter the same under the stress of the clamp-lifting spring 43, the release of the operating lever thus effected causing the automatic lifting of the upper clamp-member to release the work.

It will be observed that by loosening the lock-nuts applied to the threaded portion of the cam-follower-pin 40, the latter may be turned to adjust it upon its carrying arm 39 toward or from the cam, so as to correspondingly adjust the initial position of the lateral arm 35 to accommodate the clamp to con-

siderable variations in thickness of the work which may not be sufficiently provided for by the yielding connection between the lever-arm 35 and clamp-arm 28 afforded by the yielding pin 46 with its pressure spring 27 separate from the lever-members thus yieldingly connected.

While one of the desirable forms of the present improvement is shown and described herein, it is to be understood that the present invention is not limited to the particular embodiment herein disclosed, but is susceptible of material variation in the construction and arrangement of parts of the clamp operating mechanism.

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

1. In a sewing machine, the combination with stitch-forming mechanism and a stop-motion device for controlling the action of the same, of a work-holder comprising a movable clamping jaw and a pivotally mounted clamp-arm carrying the same, an operating lever, a yielding connection, including a separate spring, between said lever and the clamp-arm, and controlling means for said operating lever independent of the stop-motion device whereby the clamping jaw is raised from and lowered upon the work.

2. In a sewing machine, the combination with stitch-forming mechanism, of a work-holder comprising a movable clamping jaw and a clamp-arm carrying the same, an operating lever, a yielding connection, including a separate spring, between said lever and the clamp-arm, a second spring acting in opposition to the first-named spring in raising said clamping jaw, and controlling means for said operating lever comprising manually actuated means for lowering the same upon the work and automatically controlled means for maintaining the clamping jaw closed upon the work and for releasing said lever to permit the clamping jaw to rise after the production of a group of stitches of predetermined number.

3. In a sewing machine, the combination with stitch-forming mechanism and a stop-motion device for controlling the operation of the same, of a work-holder comprising a movable clamping jaw, a plural-armed operating lever, a connection between one arm of said lever and the clamping jaw, an operative connection from said arm of the lever extending below the work-holder, a rotary cam, means actuated by said cam for tripping the stop-motion device into action, a follower carried by a second arm of said lever and actuated by said cam independently of the stop-motion device, and a spring for lifting said clamping jaw and maintaining said follower in operative relation with said cam.

4. In a sewing machine, the combination

with stitch-forming mechanism, of a work-holder comprising a movable clamping jaw and a clamp-arm carrying the same, an operating lever having a portion extending above said clamp-arm, a spring-pressed thrust-pin carried by said lever and resting upon said clamp-arm, a spring for lifting said clamping jaw, manually actuated means applied to said lever for lowering said clamping jaw, and automatically actuated means acting upon said lever for maintaining the same in lowered position and for thereafter releasing the same to permit its rise under the action of the clamp-lifting spring.

5. In a sewing machine, the combination with stitch-forming mechanism, of a work-holder comprising a movable clamping jaw and a clamp-arm carrying the same, an operating lever having a portion extending above said clamp-arm and provided with an aperture, a thrust-pin extending through said aperture in the lever-arm and resting upon the clamp-arm, a spring carried by said lever-arm and engaging the adjacent end of said thrust-pin, a spring for lifting said clamping jaw, manually actuated means applied to said lever for lowering said clamping jaw, and automatically actuated means acting upon said lever for maintaining the same in lowered position and for thereafter releasing the same to permit its rise under the action of the clamp-lifting spring.

6. In a sewing machine, the combination with stitch-forming mechanism, of a work-holder comprising a movable clamping jaw and a clamp-arm carrying the same, an operating lever forked laterally to embrace said clamp-arm and having its upper member provided with an aperture, a thrust-pin extending through said aperture in the lever-arm and resting upon the clamp-arm, a spring carried by said lever-arm and engaging the adjacent end of said thrust-pin, a spring for lifting said clamping jaw, manually actuated means applied to said lever for lowering said clamping jaw, and automatically actuated means acting upon said lever for maintaining the same in lowered position and for thereafter releasing the same to permit its rise under the action of the clamp-lifting spring.

7. In a sewing machine, the combination with stitch-forming mechanism, of a work-holder comprising a movable clamping jaw and a clamp-arm carrying the same, a plural-armed operating lever having one arm yieldingly connected with said clamp-arm, a feed-cam provided with a cam-track comprising a concentric portion and a recess or depression, operative connections between said cam and the work-holder for shifting the same relatively to the stitch-forming mechanism, a follower for said cam-track mounted upon a second arm of said oper-

ating lever and adjustable thereon toward and from said cam, a spring for lifting said clamping jaw and maintaining said follower in operative relation with said cam, 5 and manually actuated means connected with said lever and leading below the work-clamp for lowering said clamping jaw upon the work.

8. In a sewing machine, the combination 10 with stitch-forming mechanism comprising a reciprocating thread-carrying needle, of a work-holder comprising a movable clamping jaw and a clamp-arm carrying the same, a laterally forked arm carried by said clamp- 15 arm, a bell-crank lever mounted upon a fixed fulcrum adjacent the needle-path and having one of its arms embraced by said forked arm, a thread-pulling arm carried by the other arm of said bell-crank lever and 20 having its operative portion movable in a path crosswise of the needle-path, an operating lever, a connection between said lever and the clamp-arm, a spring for raising said clamping jaw, and controlling means for 25 said operating lever comprising manually actuated means for lowering the same upon the work and automatically controlled means for maintaining the clamping jaw closed upon the work and for releasing said lever 30 to permit the clamping jaw to rise after the production of a group of stitches of predetermined number.

9. In a sewing machine, the combination 35 with stitch-forming mechanism and a stop-motion device therefor, of a work-holder

comprising a movable clamping jaw and a clamp-arm carrying the same, an operating lever, a yielding connection between said lever and the clamp-arm, a rotary cam, manually controlled means for actuating the stop- 40 motion device to start the machine, means automatically controlled by said cam for tripping the stop-motion device to stop the machine, manually controlled means connected with the operating lever for closing 45 the clamp in advance of the actuation of the stop-motion device, and means acting upon said operating lever automatically after the tripping of the stop-motion device for opening the work-holder. 50

10. In a sewing machine, the combination with a stitch-forming mechanism, of a traveling work-holder comprising a clamping jaw and a clamp-arm carrying the same, a spring normally acting to raise said clamp- 55 arm, an operating lever mounted upon a fixed fulcrum and having a yielding connection with said clamp-arm for moving said clamping jaw into engagement with the work, and means for actuating said oper- 60 ating lever.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

THOMAS M. McLAUGHLIN.
ROBERT R. HUGHES, JR.

Witnesses:

H. R. HEMMENS,
J. G. DEECKE.