A. F. FIFIELD.

SEWING MACHINE.

APPLICATION FILED SEPT. 10, 1914.

1,273,348.

Patented July 23, 1918.

2 SHEETS—SHEET 1.

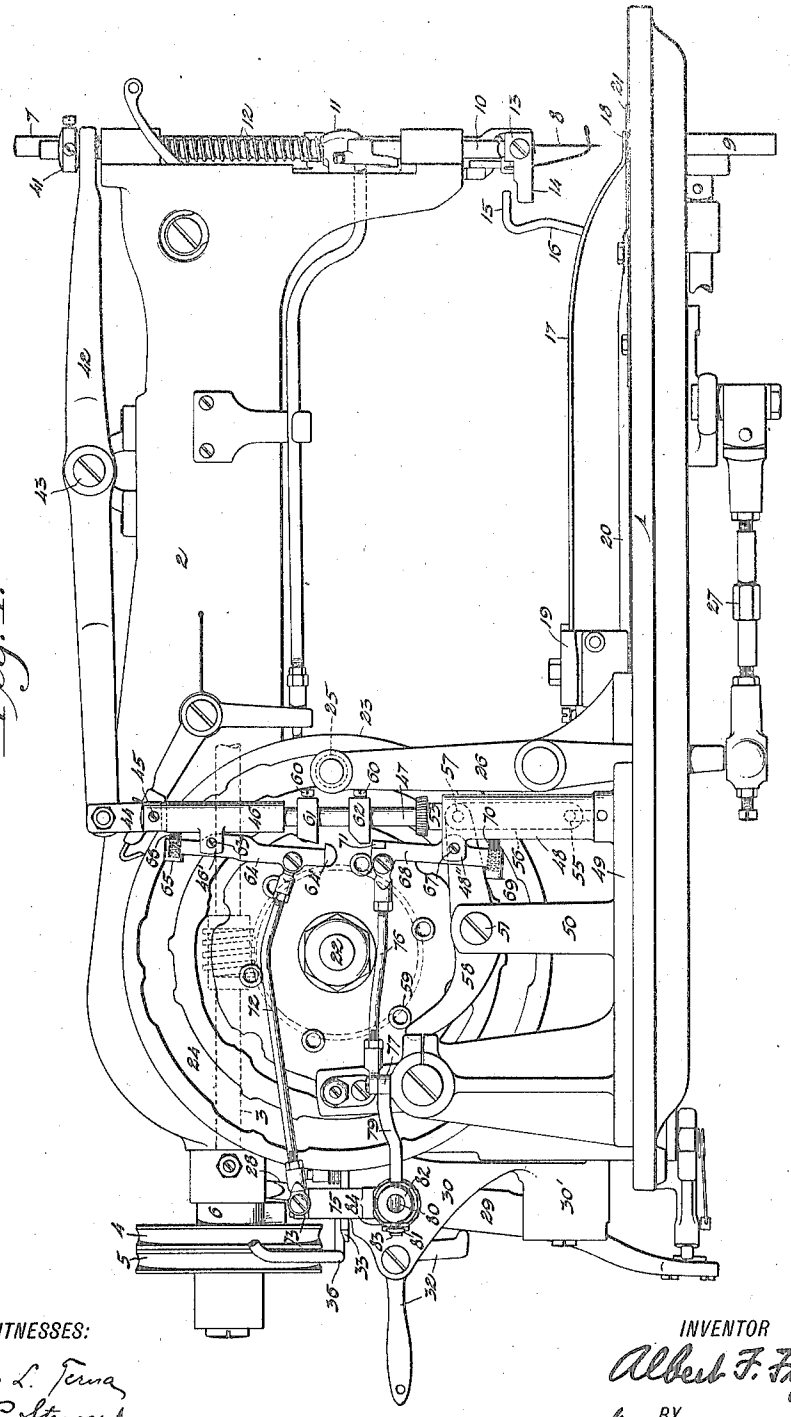


Fig. 1.

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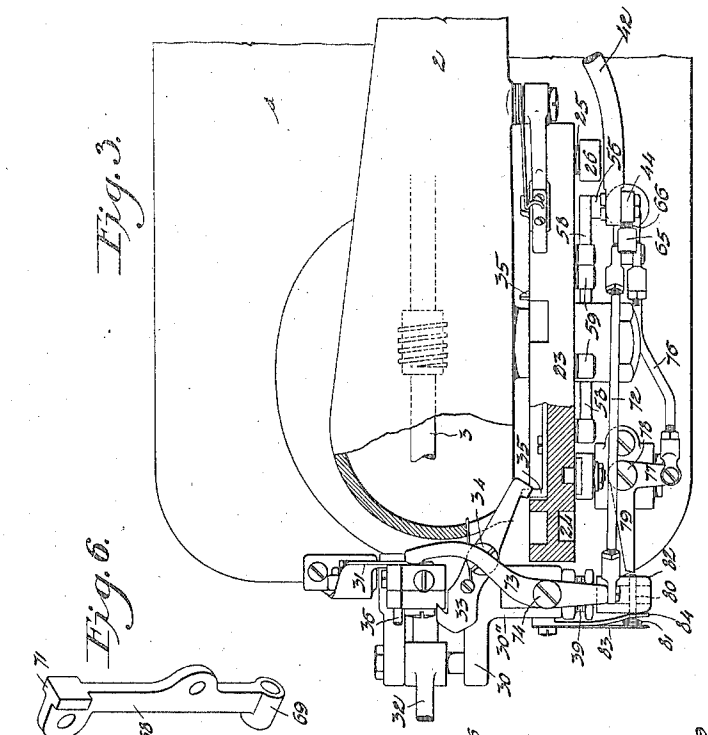


Fig. 3.

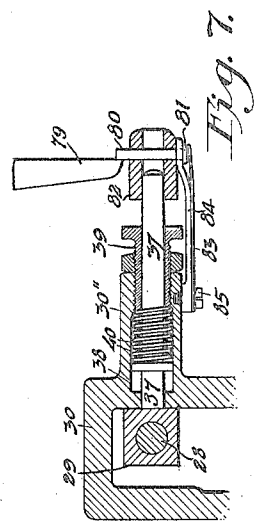


Fig. 7.

Fig. 6.

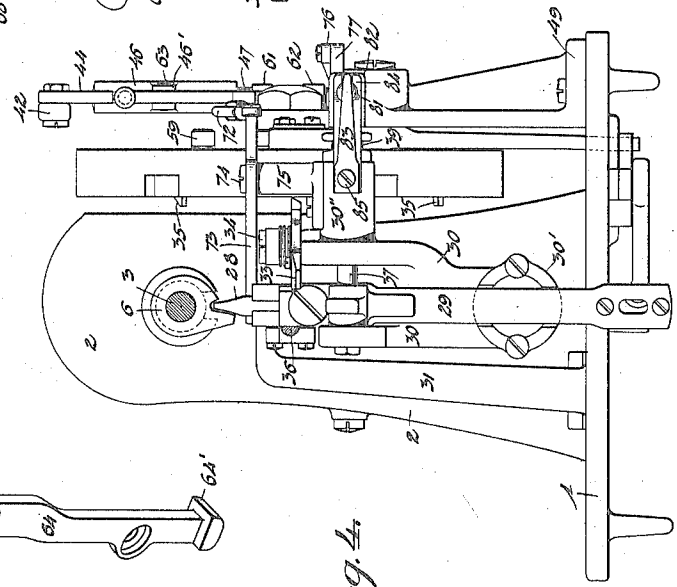


Fig. 2.

Fig. 5.

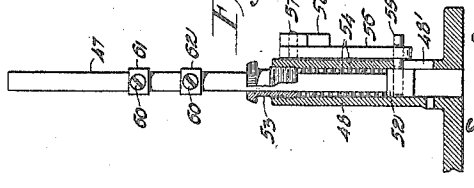


Fig. 4.

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UNITED STATES PATENT OFFICE.

ALBERT F. FIFIELD, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

SEWING-MACHINE.

1,273,348. Specification of Letters Patent. Patented July 23, 1918.

Application filed September 10, 1914. Serial No. 860,884.

To all whom it may concern:

Be it known that I, ALBERT F. FIFIELD, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates more particularly to an improvement in that class of presser-foot lifting or clamp-operating mechanism employed in sewing machines for producing detached groups of stitches, such as button sewing or tacking machines, in which the work is automatically clamped in stitching position at the beginning and is released at the end of each stitch-forming period. The invention has for its object partly to provide a simple, compact and effective presser-foot lifting or work-clamp operating mechanism of the class described, and partly to provide such a mechanism adapted for embodiment in different types of sewing machines and in connection with different styles of work-holding devices.

As preferably constructed, the machine comprises stitch-forming mechanism of any usual or suitable kind and a work-holder which may be either a well known form of presser-foot coöperating with the throat-plate in holding the material at the stitching point or a work-clamp having upper and lower work-gripping members and means for moving it in a defined path relatively to the stitch-forming mechanism in positioning the stitches. The machine preferably has a cycle cam for imparting the requisite feeding movements to the work-holder and carrying one or more tripping points for a stop-motion controlling the period of action of the stitch-forming mechanism.

The machine preferably has a presser-bar carrying the presser-foot or having a connection with the upper member of a work-clamp and adapted to be operated by a rock-lever periodically coupled with a spring-actuated lifting member automatically set for operation in opposition to its spring by a connection with the cycle cam in which position it is detained by suitable coupling means, the said coupling means being normally spring-pressed into operative position but adapted to be retracted by independent connections with the stop-motion.

In the accompanying drawings, Figure 1 is a side elevation of a machine constructed with the present improvements, Fig. 2 a rear end elevation of the same and Fig. 3 a plan of the rearward portion thereof. Fig. 4 is a sectional elevation of the lifting member and certain of its accessories, and Figs. 5 and 6 are perspective views of the coupling levers for said lifting member. Fig. 7 is a sectional plan, upon an enlarged scale, of a portion of the stop-motion with one of the coupling lever retracting devices.

The sewing machine frame comprises the usual bed-plate 1 and bracket-arm 2 in which is journaled the main-shaft 3 carrying the fast and loose grooved belt-pulleys 4 and 5, the pulley 4 having rigidly connected therewith the peripherally notched stop-motion cam 6. In the head of the bracket-arm is journaled the reciprocating needle-bar 7 carrying the needle 8 coöperating with a shuttle within the shuttle-race 9 beneath the bed-plate. Also journaled within the head of the bracket-arm is the presser-bar 10 having fixed thereon the collar 11 between which and the upper bearing boss is the presser-bar spring 12 normally pressing the bar downwardly. The presser-bar carries at its lower end the collar 13 having a rigid lateral arm 14 normally disposed beneath and adapted to engage the cross-member 15 of a post 16 carried by the spring-arm 17 of the work-clamp having the foot 18 affording the upper clamping jaw and secured at the opposite end upon the block 19 which is itself secured upon the rigid work-holder arm 20 having at its forward end the work-supporting plate 21 constituting the lower work-clamping member.

Mounted upon the transverse wormwheel-shaft 22 is the cycle cam-wheel 23 provided in its outer face with the cam-groove 24 entered by a stud 25 of the rock-lever 26 having operative connections including the pitman 27 beneath the bed-plate with the work-clamp for imparting lateral jogging movements thereto in positioning the stitches upon the work.

The stop-motion is of well known form and comprises the spring-pressed plunger-bar 28 mounted in the vibratory stop-lever 29 which is journaled in the bearing lug 30′ of the bearing bracket 30 for movement both longitudinally and transversely of the main-shaft, being normally forced backwardly by

means of the flat spring 31. By means of the angle-lever 32 the stop-lever 29 is tilted to disengage the plunger-bar 28 from the peripherally notched stopping cam 6, in which position the lever 29 is detained by the hooked rearward arm of the spring-pressed latch-lever 33 fulcrumed at 34 and having a forwardly extending arm normally disposed within the range of movement of the series of tripping points 35 upon the inner face of the cam-wheel 23. The tilting of the latch-lever 33 by engagement of one of the tripping points 35 therewith permits the stop-lever 29 to assume operative position with the upper end of the plunger-bar 28 in operative engagement with the stopping cam 6 and the belt fork 36 in position to guide the belt upon the loose pulley 5.

The sidewise movement of the lever 29 under the momentum of the main-shaft is arrested by engagement of said lever with the inner end of the buffer-pin 37 journaled within the socket 30'' of the bearing bracket 30 and having within said socket the flange 38 between which and the end of the bushing 39 is interposed the buffer-spring 40.

The machine, as thus far described, is of the well known Singer No. 68 type, substantially as disclosed in the United States Patent to G. S. Gatchell, No. 798,130, of August 29, 1905.

The presser-bar 10 has near its upper end the collar 41 beneath which it is embraced by the forked forward extremity of the rock-lever 42 mounted intermediate its ends upon the fulcrum stud-screw 43 sustained by the bracket-arm. From the rearward end of the rock-lever 42 depends a link 44 whose lower end enters and is pivotally secured by means of the pin 45 within the forked upper end of the socket member 46 entered by the upper portion of the reciprocatory actuating bar or lifting member 47 whose lower portion enters the fixed tubular post or support 48 rising from the base 49 of a bearing bracket provided with an adjacent post 50 carrying the transverse fulcrum-stud 51.

The bar 47 is provided at its lower end with the collar 52 between which and the end of the bushing 53 at the upper end of the support 48 is interposed the presser-lifting spring 54. The collar 52 carries the lateral stud-pin 55 projecting through the slot 48' of the support 48 and through the apertured lower end of the link 56 whose apertured upper end is entered by the pivotal pin 57 by which it is operatively connected with the forwardly extending arm of the rock-lever 58 mounted upon the fulcrum-stud 51 and having a rearwardly and upwardly extending arm disposed within the path of movement of the series of roller-studs 59 mounted upon the adjacent face of the cam-wheel 23.

The bar 47 has secured thereon intermediate the member 46 and the support 48 by means of set-screws 60 the catch-blocks 61 and 62, each having a lower operative face and beveled rearward end, as represented in Fig. 1. The socket member 46 is formed with a lateral forked lug 46' in which is pivotally mounted by means of the transverse screw-pin 63 the catch-lever 64 having in the extremity of its upper arm the socket 65 between the bottom of which and the member 46 is introduced the spring 66 by means of which the hooked extremity 64' of its depending arm is maintained normally in operative relation with the catch-block 61. By reason of the provision of means whereby it may be temporarily coupled to the actuating bar or member 47, the socket member 46 constitutes a follower for the latter and as such partakes of its operative movements.

The support 48 is also provided with a lateral forked lug 48'' in which is pivotally mounted by means of the stud-pin 67 the catch-lever 68 provided at the extremity of its lower arm with the socket 69 between the bottom of which and the support 48 is interposed the spring 70 by means of which the tooth 71 at the extremity of the upper arm is pressed normally into operative relation with the catch-block 62. The catch-levers 64 and 68 constitute releasable connections by means of which the reciprocatory bar or lifting member 47 is detachably coupled with the socket members 46 and 48.

The lower arm of the catch-lever 64 is connected by means of the link 72 with one arm of a rock-lever 73 whose other arm extends adjacent the forward side of the stop-lever 29, said rock-lever being fulcrumed by means of the screw-stud 74 upon the post 75 sustained by the socket 30''.

The upper arm of the catch-lever 68 is connected by means of the link 76 with the lateral arm 77 of an elbow-lever fulcrumed at 78 and provided with a rearwardly extending arm 79 having a beveled extremity. The extremity of the elbow-lever arm 79 is adapted for engagement with the adjacent end of a cross-pin 80 mounted in a transverse aperture of the collar 82 fixed upon the outer end of the buffer-pin 37, said cross-pin having a head 81 pressed by means of the flat spring 83 upon the inclined outer face of the forked arm 84 which is secured upon the boss 30'' by means of the fastening screw 85.

At the completion of a stitching operation, the actuating bar 47 is maintained in its lower position by action of the spring 54, the engagement of the catch-lever 64 with the block 61 thereon serving to couple with it the socket member 46 by which the rock-lever 42 is tilted to lift the presser-bar in opposition to the spring 12 and thereby lift the upper clamp-member or presser-foot through engagement of the arm 14 with the

post 15 16, in the present instance. In rocking the stop-lever 29 to disengage the plunger-bar 28 from the stopping cam 6 in starting the machine the rock-lever 73 is engaged by the lever 29 and the catch-lever 64 disengaged from the block 61, thereby uncoupling the member 46 from the bar 47 and permitting the presser-foot to descend upon the work under the action of the spring 12, in which condition of the parts the stitching proceeds.

During the stitching operation the cam-wheel 23 performs a partial rotation and thereby carries one of the roller-studs 59 into engagement with the tail of the rock-lever 58 which acts through the link 56 to gradually lift the actuating bar 47 to enable the tooth 71 of the catch-lever 68 to snap beneath the catch-block 62 under the action of the spring 70, as represented in Fig. 1, the catch-lever 64 remaining retracted.

The actuation of the latch-lever 33 by one of the tripping points 35 releases the stop-lever 29 for movement under the action of its spring 31 into operative engagement with the stopping cam 6 whereby the rock-lever 73 is disengaged and the catch-lever 64 is permitted under the action of its spring 66 to reëngage the catch-block 61. In the lateral movement of the stop-lever under the momentum of the moving parts in the stopping of the machine, the buffer-pin 37 is thrown outwardly, carrying with it the tripping cross-pin 80 whose head 81 rides down the incline of the arm 84 and permits its opposite end to project beyond the collar 82 and in advance of the extremity of the elbow-lever arm 79.

In the recoil of the pin 37 under the action of the spring 40 to final stopping position, the pin 80 engages the elbow-lever arm 79 (Fig. 7) and tilts the same sufficiently to retract the catch-lever 68 from operative engagement with the catch-block 62 thereby permitting the bar 47 to descend under the action of the lifting spring 54, carrying with it the rock-lever 42 which remains coupled therewith by means of the catch-lever 64, and lifting the presser-bar, and with it the presser foot, in opposition to the weaker presser-bar spring 12 and spring-arm 17 of the work-clamp.

It will be observed that the work-holder operating means of the present improvement imposes little, if any, additional load upon the delicately adjusted stop-motion parts, and particularly the spring-pressed buffer-pin, the members 29 and 37 being utilized merely for retracting the catch-levers 64 and 68 and even this subordinate function of the buffer-pin 37 being performed after the performance of its normal function in cushioning the sidewise movement of the stop-lever 29 under the action produced by the momentum of the machine. The power required in the operation of the work-holder is derived exclusively from the cam-wheel 23 which is in practice positively driven by a worm-and-wormwheel connection with the main-shaft 3.

As represented in the drawings, the cam-wheel 23 is shown provided with a plurality of sets of operative portions designed to effect a series of stitching operations for each rotation of the cam-wheel, an actuating stud 59 for the rock-lever 58 being provided for each stitching period, as will be readily understood.

It is evident that the present improvement is not limited in its adaptation to any particular type of sewing machine or work-gripping device engaging the work during the stitching periods, and that it is susceptible of very material modification in constructive features without departure from the invention. By the employment of a presser-bar journaled in the bracket-arm head and the provision of presser-bar operating means disposed adjacent the bracket-arm standard and entirely clear of the work-handling devices, the present improvement is evidently applicable to either flat-bed or cylinder-bed machines, while the compact form and arrangement of the component elements of the device readily adapts it to existing machines of the class referred to without substantial alteration thereof.

As will be observed, the presser-bar in the normal operation of the present mechanism, is under the influence of both the coil-spring 12 and the spring clamp-arm 17, and that either of these spring elements may be readily employed separately in producing or permitting the clamping of the work in the stitching operation by a slight and obvious adaptation of the mechanism.

I wish it to be understood that all of the presser-foot operating mechanism herein shown and described and the accessories thereof involving elements of patentability are of my invention.

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

1. In a sewing machine, a presser-bar, a spring normally acting thereon, a reciprocatory lifting member, a support, independent releasable couplings between said member and the presser-bar and between said member and said support, a spring acting upon said lifting member in opposition to the presser-bar spring, means for shifting the lifting member in opposition to its spring, and controlling means for alternately establishing and interrupting the couplings between the lifting member and the presser-bar and between the lifting member and said support.

2. In a sewing machine, in combination with stitch-forming mechanism, a presser-bar, oppositely acting stronger and weaker

springs therefor, means acting while the stitch-forming mechanism is in operation for compressing the stronger spring, releasing means therefor, and means acting automatically in a stitch-forming cycle subsequent to the compressing of said stronger spring for alternately connecting and disconnecting the stronger spring and said presser-bar.

3. In a sewing machine, a support, a reciprocatory actuating member, a follower therefor, a work-engaging element connected therewith, a spring acting upon said follower, a stronger spring acting upon said actuating member, means for shifting said actuating member in opposition to its spring, coupling means between the actuating member and said support, coupling means between said actuating member and follower, and automatic controlling means acting successively upon said coupling means whereby the follower is subjected alternately to the action of each of said springs.

4. In a sewing machine, in combination, stitch-forming mechanism adapted to perform in succession a plurality of stitch-forming cycles, a presser-bar, a pressure spring therefor, a presser-bar lifting spring of greater strength, means operating during the action of the stitch-forming mechanism for compressing said lifting spring, and means tripped into action in a complete stitch-forming cycle following the period of compression of said spring whereby the presser-bar is successively subjected to the action of said springs.

5. In a sewing machine, in combination, stitch-forming mechanism, a stop-motion device for controlling the period of action thereof, a presser-bar, a pressure spring therefor, a presser-bar lifting spring, means actuated independently of the stop-motion device for compressing said lifting spring, and means tripped into action by a connection with said stop-motion device whereby the presser-bar is successively subjected to the action of said springs.

6. In a sewing machine, the presser-foot operating mechanism comprising a reciprocatory actuating bar, a spring applied thereto, a follower for said bar, means for shifting said bar endwise in opposition to its spring, a detent for maintaining said bar in its shifted position, a coupling for detachably connecting said bar with the follower, and means for insuring the simultaneous engagement of said detent and coupling with said bar while its spring is compressed and for thereafter retracting said detent and coupling from operative relation with said bar.

7. In a sewing machine, in combination, a presser-bar, a spring therefor, an actuating member, a spring therefor, a support, means including a cam for shifting the actuating member in opposition to its spring, a stop motion device, and means controlled in its action by said stop motion device for maintaining said actuating member shifted in opposition to its spring and for the temporary coupling of said member with the presser-bar and for thereafter rendering said locking and coupling means successively ineffective.

8. In a sewing machine, in combination, stitch-forming mechanism, a stop-motion comprising a lever mounted for lateral movement derived from the momentum of the moving parts in arresting the stitch-forming mechanism, and a spring-pressed buffer-pin to receive the impact of said lever, of a presser-bar, and operating means therefor including a spring-pressed actuating member adapted for connection with said presser-bar, and controlling means therefor including an element actuated by the recoil of the buffer-pin immediately following each impact arresting action.

9. In a sewing machine, in combination, a presser-bar, a spring therefor, a lifting bar, a detachable connection between said bars, a spring acting upon said lifting bar oppositely to the influence of the presser-bar spring thereon, means for shifting said lifting bar from an initial position to an operative position in opposition to its spring, and means whereby the connection of the presser-bar with the lifting bar is established in such operative position of the latter and the bar is thereafter returned to initial position and its connection with the presser-bar interrupted.

10. In a sewing machine, in combination, stitch-forming mechanism, a stop motion comprising a lever mounted for lateral movement derived from the momentum of the moving parts in arresting the stitch-forming mechanism, and a spring-pressed buffer-pin to receive the impact of said lever, of a spring-pressed presser-bar, and operating means therefor comprising a reciprocating bar, a reciprocatory socket member fitted to said bar, a connection between said socket member and the presser bar, a support for said bar, a coupling between said bar and reciprocatory socket member, a coupling between said bar and said support, a spring acting upon said bar in opposition to the action of the presser-bar spring upon the reciprocatory socket member, means for shifting said bar in opposition to its spring for engagement of its coupling with the support, means for controlling the coupling between said bar and the reciprocatory socket member including an element actuated by the vibratory stop-motion lever, and means for controlling the coupling between said bar and said support including an element actuated by said buffer-pin.

11. In a sewing machine, in combination, a

spring pressed presser-bar, a presser-bar lifting member, a spring acting upon said member in opposition to the thrust of the presser-bar spring, means for shifting said member in opposition to its spring, and a releasable coupling operable without shifting the lifting member whereby said presser-bar may be uncoupled from said lifting member.

12. In a sewing machine, in combination, a spring-pressed presser-bar, a reciprocatory member, a spring acting thereon in opposition to the presser-bar spring, means for shifting said member in opposition to its spring, a support, couplings for operatively connecting said member respectively with the presser-bar and with said support, and means for successively retracting said couplings from operative position.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALBERT F. FIFIELD.

Witnesses:
W. H. HUGG,
JAMES R. ROSS.