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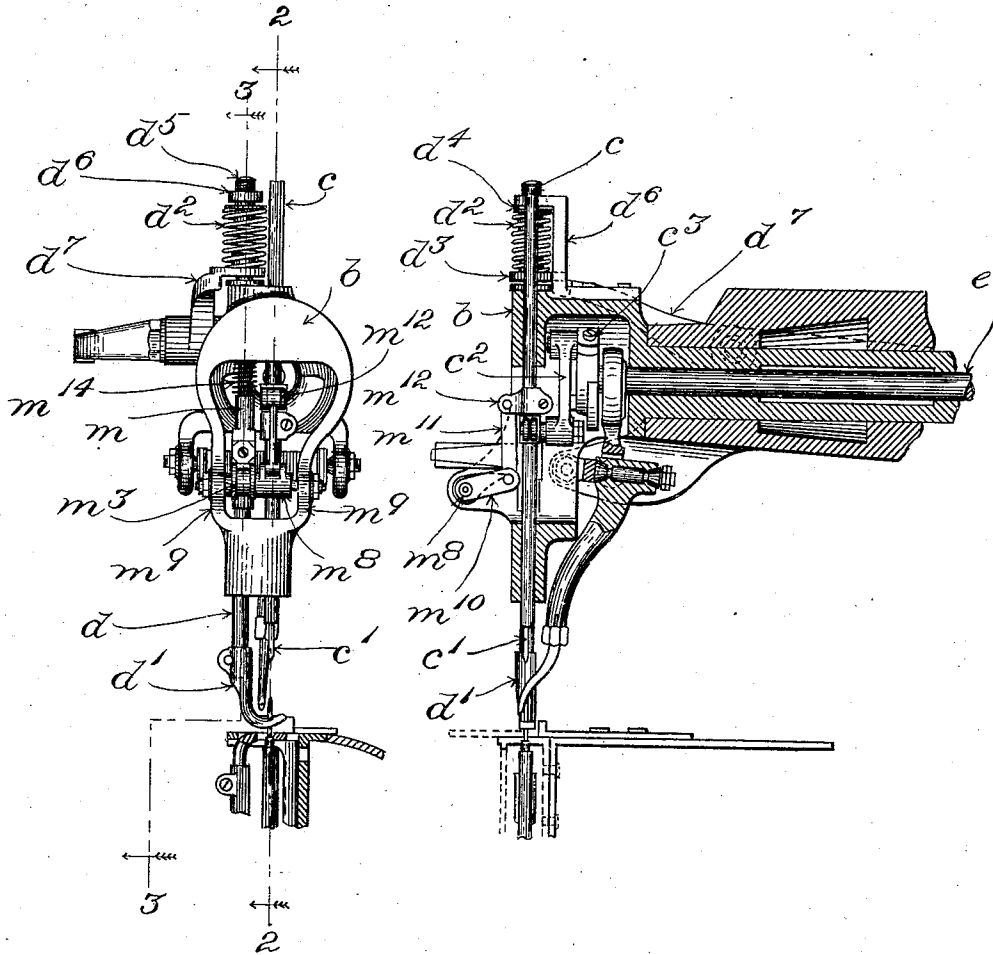


Fig. 1.

Fig. 2.

Witnesses:

Oscar F. Hill

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Inventor:

Frank W. Merrick

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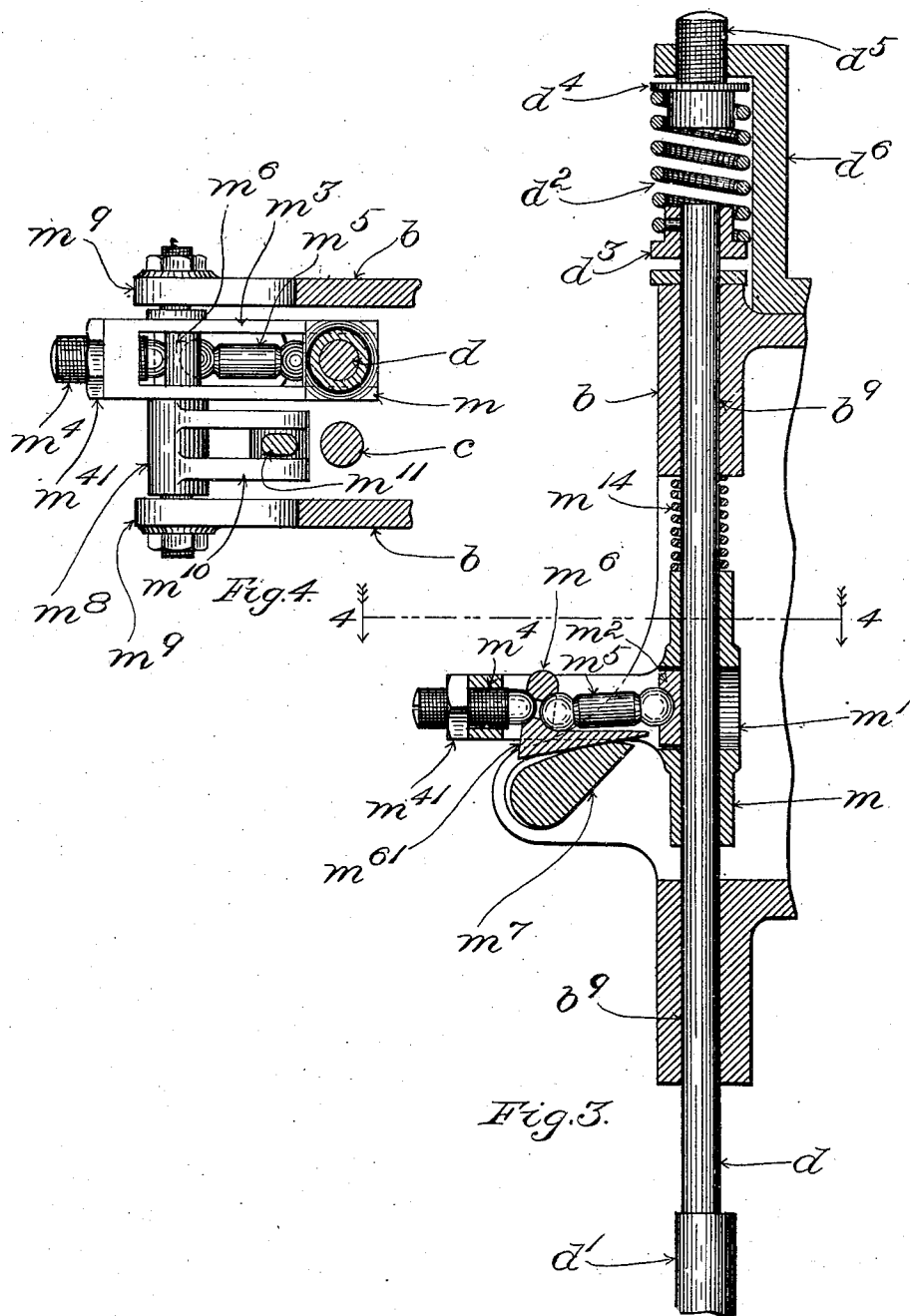
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2 SHEETS—SHEET 2.



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 Oscar F. Hill
 Edith J. Anderson.

Inventor:
 Frank W. Merrick
 by Chas. F. Randall
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UNITED STATES PATENT OFFICE.

FRANK W. MERRICK, OF BOSTON, MASSACHUSETTS.

AUTOMATIC PRESSER-FOOT-LIFTING MECHANISM FOR SEWING-MACHINES.

No. 879,565.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed July 2, 1906. Serial No. 324,293.

To all whom it may concern:

Be it known that I, FRANK W. MERRICK, a citizen of the United States, residing at Boston, in the county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Automatic Presser-Foot-Lifting Mechanism for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Certain classes of sewing machines are furnished with automatic mechanism comprising a clamp coöperating with the presser-bar, and actuating means for said clamp whereby it is caused to grip or become engaged with the said bar and then move the latter in the direction of the length thereof. Such mechanism generally is employed for the purpose of effecting automatically the lifting of the presser-foot alternately with the formation of the stitches in the operation of a sewing machine.

My invention has especial reference to mechanism of the general character and mode of operation aforesaid.

The general objects of the invention are in part to obviate tendency to spring the bar by the action of the force operating at the clamp to move the latter and the bar endwise, and also obviate the consequent wear between the bar and its bearings; to obviate blows, thumping, etc., resulting from play or lost motion between the arm or lever pertaining to the clamp and the tappet which applies force to the said arm or lever; and to produce a practical, durable, simple, powerful, and highly efficient form of clamp.

The invention consists in the improved construction and combinations of parts by means of which these and the various other objects of the invention are attained, and will now be explained with reference to the accompanying drawings, which latter represent certain portions of a sewing machine having applied thereto automatic presser-foot lifting mechanism containing one embodiment of the invention.

In the accompanying drawings,—Figure 1 is an end elevation of the head of a sewing machine having the said embodiment of the invention applied thereto, certain details being in section. Fig. 2 is a view in vertical section on the line 2 2 of Fig. 1. Fig. 3 is a view in vertical section on the plane indicated by the line 3 3 in Fig. 1. Fig. 4 is a view

in horizontal section on the plane indicated by the line 4 4 in Fig. 3.

Having reference to the drawings,—at *b* is represented part of the head of a sewing machine, and at *c* an awl-bar fitted to work in bearings in the said head and carrying the awl *c'*. The said awl-bar is shown as operatively connected by means of a link *c²* with a crank *c³* on an operating shaft *e*. Thereby the awl-bar and awl are reciprocated in usual manner.

At *d* is shown a bar fitted to bearings *b^o b^o* (see more particularly Fig. 3) in the head *b* and carrying the usual presser-foot *d'*. A spring for depressing the bar *d*, hereinafter termed the presser-bar and presser-foot is shown at *d²*, it being in the present case in the form of a spiral spring that is compressed between the collar *d³*, attached to the upper portion of presser-bar *d*, and a collar *d⁴* carried by a screw *d⁵* fitting a screw-threaded hole in a bracket *d⁶* attached to the head *b*. By turning the said screw, the tension of the spring *d²* may be varied in order to adjust the pressure of the presser-foot against the material beneath the latter. For the purpose of lifting the presser-foot manually, whenever required, the usual lifting lever *d⁷* is provided, its forward extremity being arranged to take under an extension of the collar *d³*.

The foregoing parts form a portion of the usual mechanism of a sewing machine, and are shown and described for convenience in presenting the invention, and in order that the nature and relations of the latter may be more readily understood. The character and arrangement of the said parts may be varied in practice, as deemed desirable.

I will now proceed to describe the automatic mechanism, for lifting and lowering bar *d* alternately with the formation of the stitches, in which my invention is shown as embodied. In the said embodiment of the invention a block or sleeve *m* is fitted upon the presser-bar *d*, within the opening of the head *b* and between the bearings *b^o b^o* in the said head to which the presser-bar is fitted, the said sleeve being slotted transversely, as at *m'*, and receiving in the slot a block *m²* making contact with the surface of the presser-bar. The sleeve is formed or provided with a bracket *m³* extending horizontally therefrom, as shown most clearly in Fig. 4, and formed with an opening or slot ex-

tending vertically therethrough. The outer portion of the bracket m^3 is formed with a threaded hole and to the said hole is fitted an abutment screw m^4 , the latter having a rounded or convex inner end which projects horizontally into the opening of the bracket m^3 . A check-nut m^{41} is applied to the said abutment screw m^4 , to prevent accidental turning of the latter after it has been adjusted. The back of the block m^2 is formed with a cup or concavity receiving the rounded or convex inner end of a strut m^5 , the outer end of the said strut m^5 being likewise rounded or convex. Between the said outer end of the strut m^5 and the inner end of the abutment screw m^4 is interposed one arm of a lever m^6 , the said arm having rounded concavities in its opposite faces receiving the rounded or convex proximate ends of the strut and abutment screw. The lever m^6 is provided with a horizontally extending arm which coöperates with a tappet m^7 with which a rock-shaft m^8 is provided. The said rock-shaft extends transversely across the face of the head b , and is pivoted to opposite brackets m^9 m^9 with which said head is provided. For the convenient actuation of the rock-shaft, it is furnished with an arm m^{10} , which latter is connected by means of the link m^{11} with a block m^{12} Figs. 1 and 2 that is made fast to the awl-bar. Through the described connections the rock-shaft m^8 is actuated from the awl-bar. A spring m^{14} Figs. 1 and 3 surrounds the presser-bar d between the upper end of the sleeve m and a portion of the head b above the same. It operates with a tendency to depress the sleeve so as to hold the lever m^6 at all times resting against the tappet m^7 .

In operation, the rise of the awl-bar serves through the connections which have been described to turn the rock-shaft m^8 in a manner to cause the tappet m^7 to swing upwardly. The tappet in its rise operates upon the lever m^6 pertaining to the toggle, operating the latter to lock or clamp the block m^2 and sleeve m to the presser-bar, and as soon as the locking or clamping has been effected the continued upward movement of the tappet m^7 serves to raise the connected sleeve and presser-bar. By the descent of the awl-bar the tappet m^7 is swung downwardly, lowering the presser-bar and presser-foot, the release or unclamping of the presser-bar being occasioned when the heel m^{61} of the lever m^6 takes bearing against the concentric portion or hub of tappet m^7 .

The parts m m^2 constitute the form of clamp which I prefer to employ in practice, because of the simplicity, strength and efficiency thereof, because it is easily manufactured and applied, and because of the fact that the same has little or no tendency to roughen or injure the bar d in consequence of its action in connection therewith. I do

not in all cases limit myself to the employment of a clamp of this form, however, and contemplate the employment of different forms of clamps in some embodiments of the main principle of the invention.

The improved form of toggle which constitutes a feature of the illustrated embodiment of the invention, and which involves one portion of the invention, is simple, strong, and exceedingly powerful. It is inexpensive to manufacture, free from liability to breakage, and convenient to assemble and adjust. Its joints are easily fitted, and such trifling wear as occurs during use may quickly and conveniently be taken up by adjustment of the abutment screw.

An important feature of the invention consists in arranging the axis of movement of the tappet m^7 adjacent the outer portion of bracket m^3 , with the operative portion of the said tappet m^7 extended inwardly toward the presser-bar as shown clearly in Fig. 3 so as to engage the clamp-closing device, *i. e.*, the lever m^6 between the knuckle or joint of the toggle and the presser-bar, the horizontal arm of lever m^6 being also extended inwardly from the center of motion of such lever toward the presser-bar, as in the illustrated embodiment of the invention. This enables the lifting force which is transmitted from the upwardly swinging tappet m^7 through the horizontal arm of the lever m^6 to act along lines parallel with the presser-bar passing between the said knuckle or joint and the presser-bar, closely adjacent to the presser-bar. There is very little tendency during the lift to spring the presser-bar and cause the same to bind in its bearings. Hence, the resistance which has to be overcome in raising the presser-bar and presser-foot, and the wear between the presser-bar and the said bearings, are not materially increased through this cause. The action, in other words, is rendered easier than would be the case were the lifting tappet arranged to act at the opposite side of the knuckle or joint of the toggle, the wear and tear of the presser-bar and its bearings are much less, and less strain devolves on the parts through which the actuation of the lifting tappet is derived. The arrangement, also, is considerably more compact than it is possible to make one in which the lifting tappet and arm or lever engaged thereby extend outwardly from the presser-bar, inasmuch as a certain distance is necessary to be occupied in order to secure the length of toggle-members, levers, arms, etc., requisite in attaining the required power in the clamping action.

The acting surface of the tappet makes rolling contact with lever m^6 , and as the tappet swings downwardly the said lever comes gradually to take bearing against the concentric portion of the said tappet, while in the upward swing of the tappet the lifting of

the lever is as gradually begun and continued. In consequence, the entire toggle arrangement, including sleeve *m*, is at all times supported on the said tappet, and blows, thumping, etc., resulting from play or lost motion between the tappet and lever are obviated. As the said concentric portion of the tappet presents itself to the heel of the lever-like toggle-member *m*⁶, the presser acts to swing the latter in a manner to break or bend the toggle, thereby relieving the hold of the clamp upon the presser-bar.

It will be perceived that my improved devices are equally well fitted for use elsewhere than in sewing machines, and I do not in all cases restrict myself to the employment of the same in the latter connection.

What I claim is:—

1. In combination, the bar, a clamp applied thereto having in connection with one of the members thereof an outward extension, a strut having one of the ends thereof in bearing contact with a seat on the other member of the clamp, a lever-like toggle-member in bearing contact with an abutment with which the said extension is provided and also with the other end of said strut, and a tappet co-acting with said lever-like toggle-member to close said clamp upon the bar and then occasion endwise movement of the bar.

2. In combination, the bar, a clamp applied thereto having in connection with one of the members thereof an outward extension, a strut having one of the ends thereof in bearing contact with a seat on the other member of the clamp, a lever-like toggle-member in bearing contact with an abutment with which the said extension is provided and also with the other end of said strut, and a tappet co-acting with said lever-like toggle-member to close the clamp upon the bar and move the latter endwise, the force transmitted from said tappet acting along lines at that side of the knuckle or joint of the toggle at which the bar is located.

3. In combination, the bar, a clamp applied thereto, a strut having rounded ends with one thereof fitted to a corresponding seat on one member of the clamp, a lever-like toggle-member fitting the other end of the said strut and a rounded abutment on the other member of said clamp, and a tappet co-acting with the said toggle-member.

4. In combination, the bar, a clamp applied thereto and having one of the members thereof provided with an outward extension furnished with a rounded or convex abutment, a strut having rounded or convex ends with one thereof fitted to a cup or concavity in the other member of the clamp, a toggle-member having opposite concavities receiving the said abutment and the other end of the said strut, and a tappet engaging with said toggle-member and transmitting force

along lines passing at that side of the knuckle or joint of the toggle at which the bar is located, to engage the clamp with the bar and move the latter endwise.

5. In combination, the bar, a sleeve applied to the said bar and provided with an outward extension, a movable clamp-member for engagement with said bar, an abutment screw applied to the said extension and having a rounded or convex inner end, a strut having rounded or convex ends with one thereof fitted to a cup or concavity in the said movable clamp-member, a cooperating toggle-member having opposite concavities receiving the rounded inner ends of the said abutment screw and strut, and a tappet co-acting with the said toggle-member.

6. In combination, the bar, a sleeve applied to the said bar and provided with an outward extension, a movable clamp-member for engagement with the said bar, an abutment-screw applied to the said extension and having a rounded or convex inner end, a strut having rounded or convex ends with one thereof fitted to a cup or concavity in the said movable clamp-member, a toggle-member having opposite concavities receiving the rounded inner ends of the said abutment screw and strut, and a tappet engaging with the said toggle-member at that side of the knuckle or joint of the toggle at which the bar is located.

7. In combination, the presser-bar, a clamp engaging therewith having a clamp-closing device pivotally supported in connection with the body of such clamp with its power-receiving extremity extended inwardly from its center of motion toward the presser-bar, and the tappet which acts against the under side of the said extremity to operate the said clamp-closing device in closing the clamp, and also move the latter and the presser-bar bodily.

8. In a sewing machine, in combination, the presser-bar, a toggle-clamp cooperating therewith, and a tappet acting to press upwardly against the actuating member of the toggle, at the side of the joint of the toggle which is adjacent the presser-bar, and thereby close the clamp and move the latter and presser-bar by force transmitted along lines parallel with the presser-bar at the said side of the joint.

9. In a sewing machine, the combination with the presser-bar, and a clamp cooperating with the presser-bar, of a tappet acting to press upwardly against the under side of the clamp-closing device of the said clamp, supporting the said clamp at all times, and operating to close the clamp and move the same and the presser-bar.

10. In a sewing machine, the combination with the presser-bar, and a toggle-clamp cooperating therewith, of a tappet supporting the clamp at all times, and acting upwardly

against the actuating member of the toggle at the side of the joint of the said toggle which is adjacent the presser-bar, to close the clamp and move the latter and presser-bar by force transmitted along lines parallel with the presser-bar at the said side of the joint.

11. The combination with the bar, and a clamp comprising opposite jaws and an actuating toggle, of clamp-actuating means applying force to the said toggle between the outer pivotal point of the latter and the bar, to close the clamp and operate the latter to move the bar endwise.

12. In a sewing machine, the combination with the presser-bar, of the lifting clamp therefor having one clamping member thereof provided with the outward extension, the toggle interposed between the said extension

and the other clamping-member and having a lever-like member extended toward the presser-bar, and the tappet extending from its axis of movement toward the presser-bar and acting against the under side of the said lever-like member.

13. In a presser-foot lifting mechanism, in combination, the presser-bar, a toggle-clamp engaging therewith, a lifting-tappet or arm actuating said clamp to engage and lift the presser-bar, and a spring acting directly upon the clamp to move it in opposition to the said lifting-tappet or arm.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK W. MERRICK.

Witnesses:

CHAS. F. RANDALL,
EDITH J. ANDERSON.