

No. 858,858.

PATENTED JULY 2, 1907.

H. H. CUMMINGS.
PRESSER FOOT LIFTING MECHANISM.

APPLICATION FILED AUG. 19, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

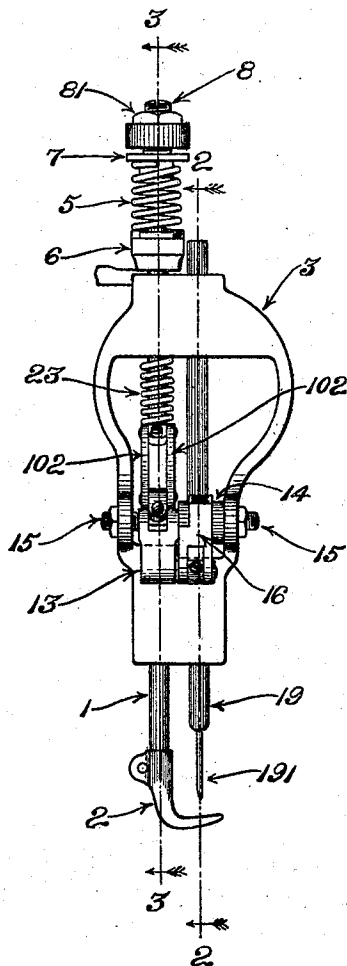
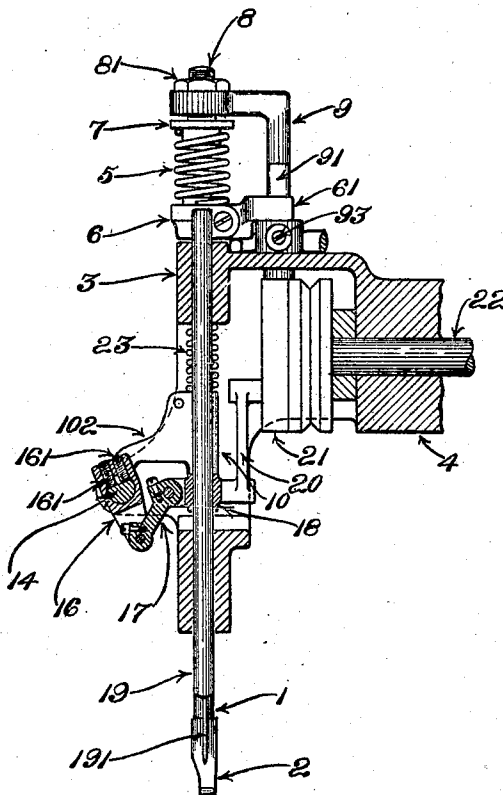


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4.

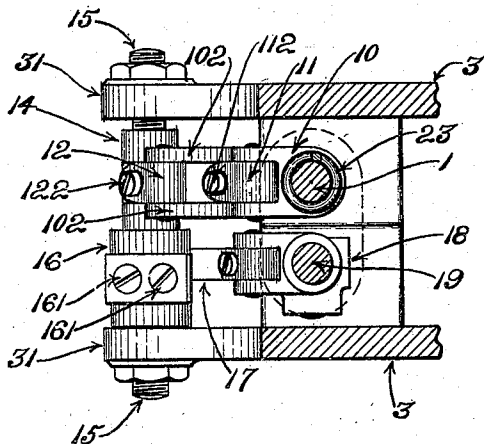


Fig. 3.

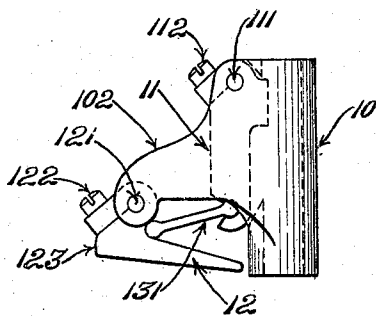
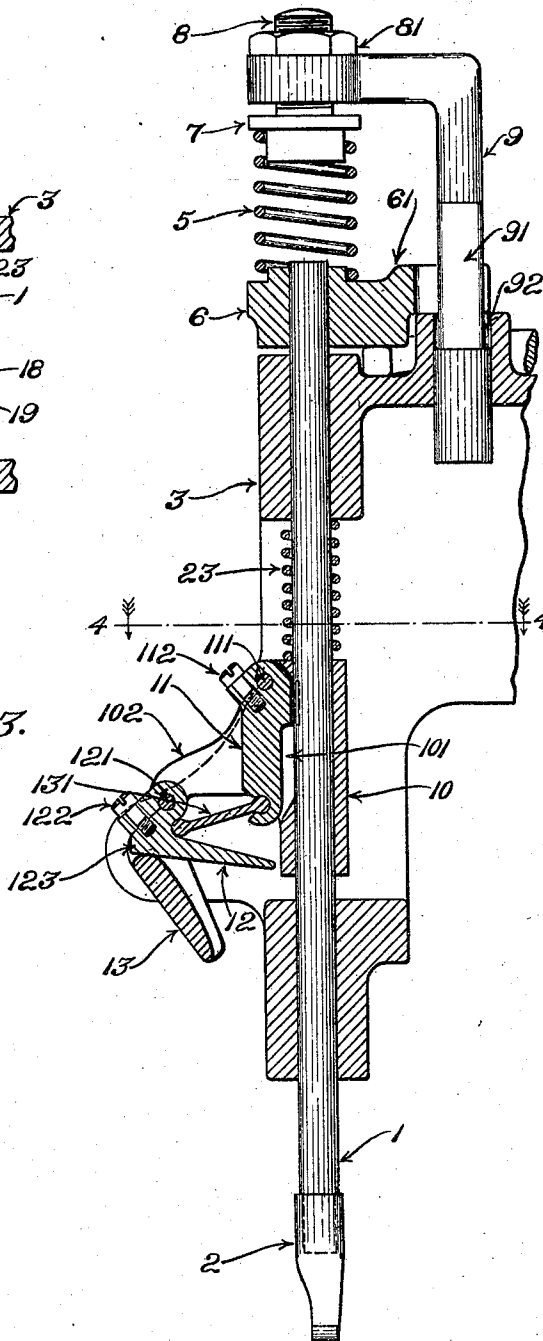


Fig. 5.

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UNITED STATES PATENT OFFICE.

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PRESSER-FOOT-LIFTING MECHANISM.

No. 858,858.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed August 19, 1904. Serial No. 221,378.

To all whom it may concern:

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

Sewing machines of certain classes are furnished with mechanism comprising, essentially, a clamp coöperating with the presser-bar of a machine, and actuating means for the said clamp acting in the operation of the machine to cause the clamp to grip or become engaged with the said presser-bar and then move the latter in the direction of the length thereof. Such mechanism is employed, for instance, for the purpose of effecting automatically the lifting of the presser-foot alternately with the formation of the stitches in the working of a sewing machine.

The present invention has reference to mechanism of the general character aforesaid. It is more especially designed as an improvement in automatic presser-foot lifting mechanism. I do not, however, limit myself to the use of the features of the invention in this precise connection, solely.

The invention will be explained with reference to the drawings, in which is illustrated an embodiment thereof, and in the course of the description of the said embodiment the various objects and advantages thereof will be set forth.

In the drawings,—Figure 1 shows in end elevation the head of a sewing machine having the said embodiment of the invention applied thereto. Fig. 2 is a view thereof mainly in vertical section in the plane indicated by the dotted line 2, 2, Fig. 1, looking in the direction indicated by the arrows at the ends of such line. Fig. 3 is a view thereof mainly in vertical section in the plane indicated by the dotted line 3, 3, Fig. 1, looking in the direction indicated by the arrows at the ends of such line. Fig. 4 is a view in horizontal section in the plane indicated by the dotted line 4, 4, Fig. 3, looking in the direction indicated by the arrows at the ends of such line. Fig. 5 shows the clamp-device separately in side elevation.

Having reference to the drawings,—A presser-bar is shown at 1, the presser-foot attached to the lower end thereof being indicated at 2. The presser-bar is mounted, as usual, in guide-bearings in the upper and lower portions of the head 3 of a sewing machine at the outer extremity of the arm or gooseneck 4 forming part of the frame of the said machine. To cause the presser-foot to bear against the material beneath the same, a depressing spring is applied in connection with the presser-bar, as usual. The depressing spring in the

present instance is a spiral-spring 5, Figs. 1, 2 and 3. It is confined between a block or collar 6, fast upon the upper end of the presser-bar above the top of the head 3, and a stationary upper collar 7. For the purpose of enabling the tension of the said depressing-spring 5 to be varied as required, in order to adjust the pressure of the presser-foot upon the material beneath it, the upper collar 7 is provided upon the lower end of a screw 8, the threaded stem of the latter being fitted within an interiorly-threaded hole that is tapped through the horizontal arm of a bracket 9, the said bracket being fixed to the head 3 and rising therefrom. By turning the screw 8 in one direction or the other the collar 7 is lowered or raised as may be necessary, and the tension of the spring is thereby varied in proportion as the spring 5 is compressed or relieved from compression. The screw 8 is provided with a lock-nut 81 to prevent accidental loss of the adjustment thereof. In order to prevent the presser-bar and presser-foot from turning so as to swing the latter into an improper position, the collar 6 is provided with an extension 61 that is slotted as indicated in Fig. 3 to fit the upright stem of the bracket 9. The said slotted extension is free to slide up and down the said upright stem, and hence the vertical movements of the presser-bar are not interfered with, but lateral displacement of the presser-foot in consequence of rotary movement of the presser-foot and presser-bar around the axis of the latter is obviated. To assist in alining the screw 8 and collar 7 with the presser-bar, and in preventing accidental shift horizontally of the horizontal arm of bracket 9 by which said screw is carried, the opposite sides of the upright stem of the said bracket are flattened, as indicated at 91, Figs. 2 and 3, for engagement with the side-walls of the slot in the extension of collar 6. The lower end of the stem of bracket 9 is received in a socket 92 in the top of head 3, see Fig. 3, and removably secured therein by means of a clamping-screw 93, Fig. 2. The loosening of the said clamping-screw, and removal of the bracket affords opportunity to withdraw the presser-bar from its guide-bearings in head 3, after the disengagement of the presser-foot from the lower end of the presser-bar. The parts as thus far described, and the arrangement thereof, are not directly involved in the invention, and various changes may be made therein in practice, if deemed desirable.

I will now proceed to describe the parts which are more immediately involved in the invention. A sleeve or block 10 is fitted upon the presser-bar 1, within the opening at the outer end of the head 3, and between the upper and lower guide-bearings for the presser-bar in the said head. The said sleeve or block constitutes the body of the clamp which I employ. It has a sliding fit upon the presser-bar, to enable the sleeve or

block and presser-bar to move vertically with relation to each other when not locked together. At one side of the sleeve or block a slot 101, Fig. 3 is formed through the wall thereof, the said slot extending vertically throughout the greater portion of the length of the sleeve or block, and at opposite sides of the slot the cheeks 102, 102, which are parallel with each other. The cheeks receive between them lever-members comprising the clamping-lever 11 and the actuator-lever 12. The said lever-members 11 and 12 respectively are provided with pivot-pins 111 and 121, respectively, the bearings of which are constituted by holes that are formed through the said cheeks. The pivot-pins occupy holes that extend transversely through the said lever-members.

For the purpose of enabling each lever-member to be tightened upon the pivotal pin which occupies the hole therein, so as to grip and hold the said pin in place to guard against accidental endwise movement, a slit is made in the lever-member, leading from the exterior surface of the latter to the transverse hole, and a screw 112 or 122 is provided to draw the sides of the slit toward each other, thereby contracting the said hole in diameter. In the drawings, although not necessarily in the case of all embodiments of the different features of the invention, the clamping-lever 11 makes contact directly with the presser-bar 1. See Fig. 3.

Movement is transmitted to the primary or clamping-lever 11 from the secondary or actuator-lever 12, for the purpose of causing the presser-bar to be gripped by the clamp. The two lever-members 11 and 12 constitute in effect a compound lever. The arrangement of the said lever-members, and the mode and means of their operative connection or engagement with each other, may vary more or less in practice. The arrangement shown in the drawings is a convenient one. I usually place the two lever-members in operative connection or engagement with each other, for the purpose of transmitting movement from the actuator-lever 12 to the clamping-lever 11, by means of a strut, as 131, Fig. 3, interposed between the said lever-members. The said strut is shown formed with enlarged and rounded ends, the lever-members being represented as formed with concave seats receiving the said ends, making knuckle-joints. Preferably, one or each of the seats in the lever-members is proportioned to take in somewhat more than half of the diameter of the corresponding rounded enlarged end of the strut, the outer portions of the seat converging about the enlarged end somewhat so as to clasp the enlargement more than halfway around the same. This construction, while permitting free working of the end of the strut in the seat during action, retains the said end within the seat, and prevents the strut from becoming detached and falling away, either during the operation of assembling the parts or when the parts are being handled in setting or adjusting the same. The strut is applied to the seat, formed as just explained, by passing the enlarged end of the strut edgewise into the seat, and also is disengaged therefrom by an edgewise movement. The actuator-lever 12 is operated by means of a tappet 13 forming part of a rocker 14, which latter in the present instance is conveniently arranged at the outer end of head 3, the axis of the said rocker

extending horizontally, parallel with and across the said outer end. The rocker is mounted upon center-screws 15, 15, which are applied to lugs 31, 31, extending outwardly from the front and rear sides of the head 3. For the convenient actuation of the rocker in proper timing with the action of the other working parts of the machine it is in the present instance provided with an arm, 16, Figs. 1, 2 and 4, which is sleeved upon the rocker and made fast thereto by means of clamping-screws 161, 161, Fig. 4, the said arm being joined by means of a link 17, Figs. 2 and 4, to ears projecting from one side of a collar 18 which is mounted upon a vertically reciprocatory bar 19, herein serving as an awl-bar and carrying an awl 191. The bar 19 has connected therewith actuating devices of suitable character, such devices in the present instance comprising a link 20 having its lower extremity pivotally joined to the collar 18, aforesaid, and a hub 21, provided with a crank-pin having the upper extremity of the link connected therewith, and mounted upon the operating shaft 22 which is supported in bearings in the arm or gooseneck 4, all substantially as usual.

For the purpose of enabling the time of closing the clamp and beginning the lift of the presser-bar, and also the extent of the lift of the presser-bar and presser-foot, to be regulated when desired, the rocker and tappet 13 are made angularly adjustable around the axis of motion of the rocker. This adjustability is secured by flattening transversely, as shown in Fig. 2, the portion of the rocker 14 against which the inner ends of the clamping-screws 161, 161, bear, and by disposing the said clamping-screws to make contact with the transversely-extending flat surface of the rocker at opposite sides, circumferentially, of the middle of the said surface. By turning the respective screws more or less the rocker and its tappet may be adjusted angularly with relation to the arm 16, and thereby the desired timing and extent of lift may be secured. To obviate any tendency to lateral displacement of the actuator-lever 12, the rocker and top of the tappet 13 are grooved to receive the said actuator-lever. An expanding spiral-spring 23, encircling the presser-bar 1, is confined between the top of the sleeve or block 10 and the upper portion of the head 3. It acts expansively with a tendency to move the clamp downward.

In operation, the rise of the awl-bar serves through the connections between the same and the rocker to turn the latter in a manner to cause the tappet 13 to swing upwardly. In thus swinging, the said tappet presses upwardly against the actuator-lever 12. The rise of the clamp being resisted by the spring 23, the pressure of the tappet acts to turn the actuator-lever upon its pivotal connection with the cheeks 102, 102, and close the clamp firmly against the presser-bar. Further movement of the actuator-lever upon the pivot-pin 121 being then impossible, the clamp is raised bodily, carrying with it the presser-bar and presser-foot and compressing the springs 5 and 23. As the tappet swings downwardly after completing its upward movement, it lowers the clamp, presser-bar, and presser-foot, which descend in unison until the presser-foot seats itself upon the material being operated upon. This relieves the clamp of the force exerted by

spring 5, and relaxes the pressure of actuator-lever 12 against the tappet, the pressure still remaining being only that which is due to the action of spring 23 and to the weight of the clamp. Thereby the hold of the clamp upon the presser-bar is relaxed, and the clamp is permitted to follow the tappet 13 down. In order to insure the complete release of the presser-bar, the actuator-lever is furnished with a heel 123 extending to the opposite side of the pivotal axis of the actuator-lever from the portion of the latter upon which the tappet acts in clamping and lifting. As the parts complete their descent the said heel comes into contact with an inner portion of the tappet, thereby causing the actuator-lever to be turned so as to open the clamp fully.

The acting surface of the tappet makes rolling contact with the actuator-lever 12, and as the tappet completes its downward swing the said actuator-lever comes gradually to take bearing against the portion of the tappet at its axis of movement, while in the upward swing of the tappet the lifting of the actuator-lever is gradually begun and continued. In consequence, the entire clamp is at all times supported on the tappet, and blows, thumping, etc., resulting from play or lost-motion between the tappet and lever are obviated. Preferably, the actuator-lever 12 and strut 131 are combined and arranged to act together on the principle of a toggle, in order to gain an increase of power. Still further power is secured by the employment of the secondary lever 11, and by causing the strut to engage therewith at a point so situated with respect to the pivotal axis of such lever, and to the radial distance from such axis of the part which makes contact with the presser-bar, as to give effective leverage. This employment of a compound lever is of great value, practically, inasmuch as it remedies deficiencies which exist when the clamp is provided with a simple actuator-lever or the like. It heretofore has been proposed to employ in a lifting arrangement, in combination with a toggle, a block actuated thereby and sliding in an opening in the side of the sleeve or block, to engage with the presser-bar. This construction gives an insufficient hold upon the presser-bar for some uses, and is unreliable in its action in lifting the presser-bar, there being a tendency to slip. In case the toggle were set fine enough to overcome the tendency to slip, the toggle would lock and fail to release the clamp so as to permit the latter to let go. The compound-lever arrangement characterizing my present invention enables ample power to be secured for perfect action, without it being necessary to cause the middle joint of the toggle to approach so closely to the line connecting the outermost joints as to occasion a tendency to lock.

The operative portion of tappet 13 extends from the axis of motion of the rocker toward the presser-bar, and the arm of the actuator-lever that is engaged by the said tappet extends from the pivot of the actuator-lever in the same direction. This enables the lifting force which is transmitted from the upwardly swinging tappet 13 to act along lines at the same side of the said pivot and axis, and also of the toggle-joint, as the presser-bar, closely adjacent the presser-bar. There is very little tendency during the lift to spring the presser-bar and cause the same to bind in its guide-

bearings in the head of the machine. Hence, the resistance which has to be overcome in raising the presser-bar and presser-foot, and the wear between the presser-bar and its guide-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 pivot and axis aforesaid, 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 outward from the presser-bar, inasmuch as a certain distance is necessary to be occupied in order to secure the length of levers, etc., requisite in attaining the required power in the clamping action, and in attaining the required length of lift.

It will be perceived that my improved devices are fitted for use in other connections beside sewing machines. Therefore, I do not in all cases restrict myself to the employment of the said devices in the latter connection.

What I claim is:—

1. The combination with the bar, of the clamp provided with the compound lever, acting with multiplied leverage in effecting the grip, and comprising a clamping-lever and an actuator-lever both carried by the clamp-body, and means actuating said actuator-lever and operating the clamp to grip the bar and move the latter endwise.
2. The combination with the bar, and the tappet, of the clamp composed of the sleeve or block fitted to the said bar, and the compound lever acting with multiplied leverage in effecting the grip and comprising a clamping-lever and an actuator-lever, both pivotally connected with the said sleeve or block, the said clamping-lever engaging the bar and the actuator-lever in operative engagement with the clamping-lever and itself actuated by the tappet to operate the clamp and move the bar endwise.
3. The combination with the bar, and the tappet, of the clamp provided with the clamping-lever and with the toggle mounted upon the clamp-body actuating the said clamping-lever and itself actuated by the said tappet.
4. The combination with the bar, and the tappet, of the clamp provided with a clamping-lever, and with a toggle actuating the said clamping-lever and comprising an actuator-lever engaged by the said tappet and a strut intermediate the actuator-lever and clamping-lever the clamping-lever and actuator-lever being carried by the clamp-body.
5. The combination with the bar, of the clamp having a compound-lever, the latter carried by the clamp-body and the tappet transmitting force to the said compound-lever along lines at the side of the pivot of the lever-member engaged thereby which is toward the said bar, to thereby actuate the clamp and move the bar endwise.
6. The combination with the bar, and the clamp having a clamping-lever, and a toggle in operative connection with the said clamping-lever, said clamping-lever and toggle carried by the clamp-body of a tappet transmitting force to the said toggle along lines at the side of the toggle-joint or knuckle at which the bar is located.
7. The combination with the bar, of the clamp having a compound lever carried by the clamp-body, and the tappet engaging with a member of the said compound lever to actuate the clamp and move the bar endwise, and supporting the clamp at all times.
8. The combination with the bar, of the clamp provided with a compound-lever embracing a clamping-lever and an actuator-lever both carried by the clamp-body, and clamping-actuating means applying force to the actuator-lever at the side of the fulcrum thereof at which the bar is located.

9. The combination with the bar, of the clamp having
a compound-lever embracing a clamping-lever and an
actuator-lever both carried by the clamp-body, and a tap-
pet engaging said actuator-lever, supporting the clamp at
5 all times, and transmitting force to the actuator-lever at
that side of the pivot of the actuator-lever at which the
bar is located to close the clamp and move the bar endwise.
10. The combination with the bar, and the clamp having
a clamping-lever and a toggle in operative connection with
10 the said clamping-lever both carried by the clamp-body, of
a tappet transmitting force to the said toggle along lines
at the side of the toggle-joint or knuckle at which the bar
is located, and supporting the clamp at all times.

11. The combination with the bar, of the block, the
clamping lever in connection with the said block, the ac- 15
tuator lever also in connection with the said block, and
carried thereby, and actuating means for the said actuator
lever operating the same to cause the bar to be clamped
and raised.

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

HENRY H. CUMMINGS.

Witnesses:

CHAS. F. RANDALL,
ALAN TARR.