(No Model.) 2 Sheets—Sheet 1.

I. W. LITCHFIELD.

SEWING MACHINE.

No. 386,837. Patented July 31, 1888.

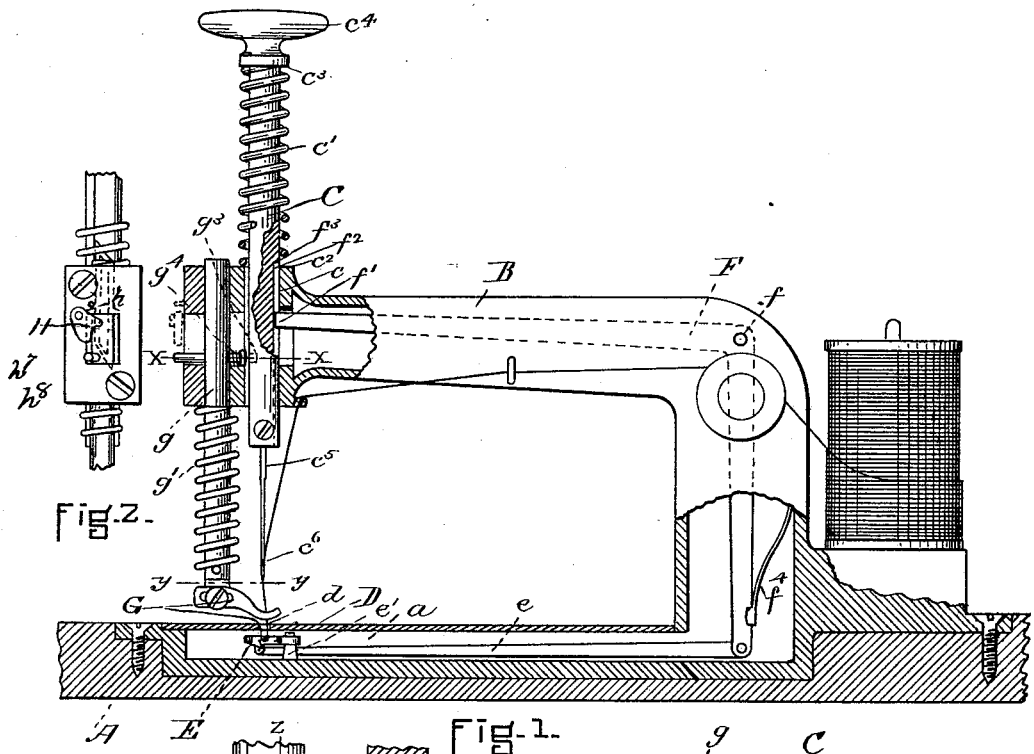

Fig. 2. Fig. 1.

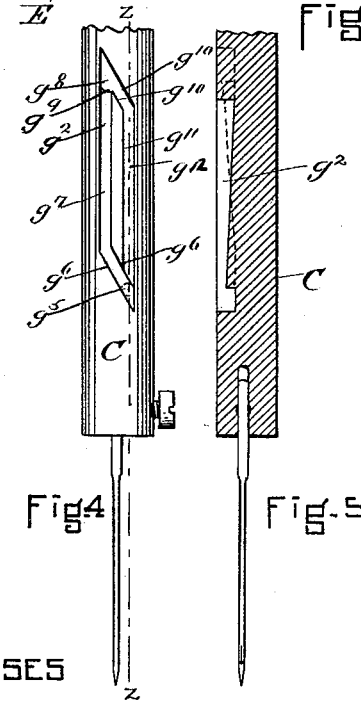

Fig. 4 Fig. 5.

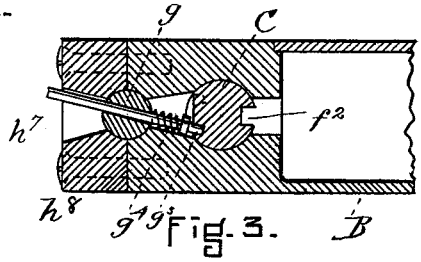

Fig. 3.

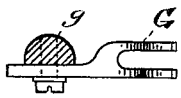

Fig. 6.

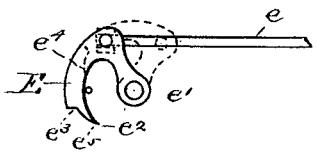

Fig. 7.

WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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SEWING MACHINE.

No. 386,837. Patented July 31, 1888.

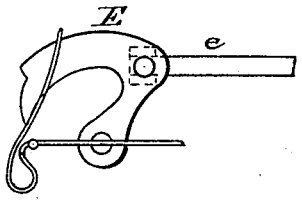

Fig. 8.

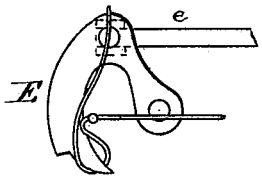

Fig. 9.

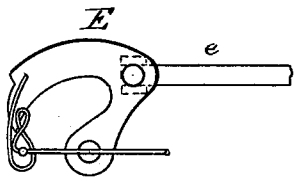

Fig. 10.

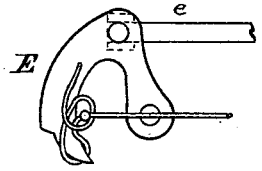

Fig. 11.

Fig. 12.

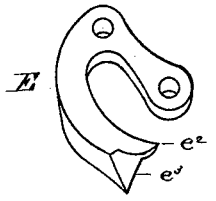

Fig. 13.

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UNITED STATES PATENT OFFICE.

ISAAC W. LITCHFIELD, OF WARWICK, ASSIGNOR OF ONE-HALF TO PHILIP K. DUMARESQ, OF NEW YORK, N. Y.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 386,837, dated July 31, 1888.

Application filed September 28, 1885. Serial No. 178,368. (No model.)

To all whom it may concern:

Be it known that I, ISAAC W. LITCHFIELD, of Warwick, in the county of Orange and State of New York, a citizen of the United States, have invented a new and useful Improvement in Sewing-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to a sewing-machine adapted to be operated by impulse given by hand directly to the needle-bar. It further relates to various details of construction, all of which will hereinafter be more fully described.

Referring to the drawings, Figure 1 shows, part in vertical section and part in side elevation, a machine having the features of my invention. Fig. 2 is a front elevation to illustrate a portion of the feed-operating mechanism, reference to which is hereinafter made. Fig. 3 is a horizontal section upon the line *x x* of Fig. 1. Fig. 4 is a view, enlarged, in front elevation, of the needle-bar and a cam-slot formed therein. Fig. 5 is a view in vertical section of the needle-bar upon the line *z z* of Fig. 4. Fig. 6 is a horizontal section upon the line *y y* of Fig. 1, showing, in plan, the presser-foot. Fig. 7 is a view in plan of the looping device, showing, in dotted and full lines, the position which it bears in relation to the needle in forming the loop. Figs. 8, 9, 10, and 11 show various positions of the looper, hereinafter described. Fig. 12 is a plan view of the stitch. Fig. 13 is a perspective view of the looper.

A represents the bed of the machine.

B is a bracket or arm fastened to the bed of the machine and supporting the needle-bar C, which has a vertical movement in the hole *c* at the front end of said bracket. This bar is movable downward against the pressure of the spring *c'*, which surrounds it, and bears at its lower end upon the surface c^2 of the bracket and at its upper end against the surface c^3 of the head or push-knob c^4. The needle-bar supports the needle c^5, having the eye c^6.

D is the throat-plate of the machine, and *d* the throat. Beneath the throat-plate is a recess or space, *a*, in which the looper E and the rod *e* for operating it are contained. The looper comprises a curved or inverted V-shaped arm or device pivoted at *e'* back of the throat, and having the sharp point or projection e^2 extending from the shoulder e^3. This looper is so shaped, pivoted, or operated that its point e^2 is arranged to describe a movement upon an arc from a position at e^4, Fig. 7, to a position at e^5, which arc grazes the vertical line upon which the needle reciprocates. At the first downward movement of the needle-bar the looper is drawn back by rod *e* to the position indicated by the dotted lines in Fig. 7, and is timed so that on the upward movement of the needle-bar the looper returns in season to engage with the thread and form a loop.

On the second downward movement of the needle-bar the needle passes into the loop held open for its reception by the point of the looper, which almost immediately retreats, leaving the loop around the needle. Another upward movement of the needle-bar causes the looper to engage with the thread and form a loop below the first loop and in this way complete the first stitch. It is therefore necessary that the point of the looper should be so shaped as to readily leave the thread after it has moved it forward from the needle to form the loop, when its movement is reversed.

In Fig. 8 I have shown the position of the looper before it is moved to form the loop. In Fig. 9 I have represented its position after it has formed the loop, the thread being formed thereon. In Fig. 10 I show the position of the loop, looper, and thread after the loop has been formed and the looper withdrawn, and in Fig. 11 I show a stitch formed and the looper engaged in forming the loop of the next following stitch.

The looper-bar *e* is reciprocated by means of the bent lever F, which is pivoted at *f* and moved by the needle-bar C. The end *f'* of the lever projects into a recess, f^2, formed in the side of the needle-bar, thus providing the shoulder f^3, which comes in contact with the lever upon the downward movement of the needle-bar and moves it downward, and a spring, f^4, serves to automatically return the lever F upon the upward movement of the needle-bar.

G is the presser-foot, and it is also used as a feeding device. It is mounted on the rod or bar g, is held in position by the spring g', and the rod or bar g is adapted to be turned a part of a revolution forward and back each reciprocation of the needle-bar, and also to be lifted vertically, whereby the presser-foot is provided with four motions in relation to the work—namely, a movement downward upon the same to clamp it to the throat-plate, a movement forward to feed it, an upward movement, and a backward return movement. To provide it with these movements I have formed in the face of the needle-bar a cam recess or groove, g^2, of peculiar construction, which is connected with the presser-foot bar g by means of the spring-holding pin g^3, the pin passing through the hole in the presser-foot bar and being forced outwardly therefrom constantly by means of the spring g^4. (See Fig. 3.) The end of the pin enters the groove or guiding-recess g^2, and upon the beginning of the downward movement of the needle-bar the pin is at the point g^5 of the recess, (see Fig. 4,) and immediately upon the downward movement the guiding-surfaces of the recess cause the pin g^3 to be moved horizontally and thereby turn the presser-foot bar and presser-foot, and the presser-foot is then held locked or stationary during the remainder of the downward movement of the needle-bar, or while the pin is in the straight portion g^7 of the recess.

At the end of the downward movement of the driver-bar the spring-pin enters the portion g^8 of the recess, which is deeper than the upper portion of the part g^7, and the under edge of which is curved, as represented at g^9, so that upon the lifting of the needle-bar the presser-foot is lifted from the throat-plate and work; but it almost immediately leaves the shoulder g^9 and is guided by the guiding-surface g^{10} of the recess, so that it turns the presser-foot bar back to the position in which it was at the beginning of the downward movement of the driver-bar, and it is held in that position during the remainder of the upward movement of the driver-bar.

In order that the recess may always serve to turn the presser-foot bar, I make that part of the turning portion of the recess into which the vertical part g^{11} enters deeper than the straight part g^{12}, and by so doing form a shoulder or guide which prevents the pin from returning by the portion g^{11} of the recess, the pin being forced by the spring into the deeper part of the recess, and is therefore obliged, upon the movement of the driver-bar, to be moved by the portions g^6 of the recess, and this construction is true of the upper part of the recess, so that the pin is compelled to take a continuous movement in one direction.

To trip the pin from the shoulder g^9 and prevent it from rising to the top of the vertical slot, as well as from catching on said shoulder g^9, there may be used a cam, H, shaped substantially as shown in Fig. 2, pivoted at h and arranged on the bracket B to move as a turn-button and serve as a stop or abutment when turned into the path of movement of the pin, so that the pin shall come in contact therewith upon the movement of the needle-bar and presser-foot bar—that is, the button H may be turned back out of the way of the pin g^3, or may be turned forward, so that a cam-face stands in the way of said pin in rising. If the button be turned back, the spring-pin will rise to the top of the mortise h' in the front of plate h^8 on bracket B, when permitted to do so. If turned forward, the spring-pin will be sooner shifted into the descending groove in the needle-bar. The needle-bar spring is more powerful than the presser-foot-bar spring and operates to lift the presser-foot and its rod during its upward movement until the spring-pin is tripped, and to hold it slightly lifted until the beginning of the downward movement of the needle-bar, when the presser-foot-bar spring becomes sufficiently strong upon compression of the needle-bar spring to throw the presser-foot upon the work and keep it there. If the cam is thrown back so as not to engage the spring-pin, the presser-foot is lifted a much greater distance and provision for the insertion of the work obtained.

In operation the work is placed beneath the presser-foot and over the throat. The thread is led through the eye of the needle from the spool and suitable tension devices. The needle-bar is then pushed down by hand impulse, the needle passed through the material and throat, and the stitch formed as above described. Upon the upper part of the downward portion of the reciprocation of the needle the work is fed by the presser-foot, as already described.

It is obvious that in lieu of operating the needle-bar by hand it can be connected by a lever and suitable connecting devices with a treadle, or the connecting device or mechanism may be such that it may be run either by hand or by foot, as may be desired.

The advantages of the invention arise from the simplicity of the construction, which is so cheap and simple as to enable the machine to be operated by hand impulse directly applied to the needle-bar, as above described, and also from the cheapness with which the device can be manufactured, owing to its peculiar construction and the few parts necessary for carrying the invention into effect.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination of the driver-bar C, operated as described, having the recess f^2, provided with the shoulder f^3, the lever F, pivoted at f, the end of which enters the said recess f^2, the connecting-rod e, and looper E, and spring f^4, all substantially as described.

2. The needle-bar supported in a bracket, as described, so as to reciprocate vertically, the bell-crank lever F, pivoted in the frame and having engagement with a shoulder on the needle-bar, the looper-bar e, connected to said

lever, and the looper connected to said bar, all in combination, substantially as described.

3. The bracket, the needle-bar reciprocating vertically therein, the presser-foot rod practically parallel with the needle-bar and supported in bearings so as to turn on its own center, a cam-groove in the needle-bar, of the character described, and a spring-pin in the presser-foot rod extending into said groove and guided therein, all combined in a sewing-machine, in the manner and for the purpose described.

4. The combination of the bracket, the needle-bar supported therein and having a spring-lifting device, the presser-foot and its bar parallel with the needle-bar and connected thereto by slot-and-pin connection, and a presser-spring of less strength than the needle-bar spring, all substantially as described.

5. The combination of the needle-bar, the presser-foot bar, and a slot-and-pin connection between the two, the bracket, and a movable stop on the bracket in position to engage the pin of the presser-rod and keep it from rising, as set forth.

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Witnesses:
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ROBT. M. FRYER.