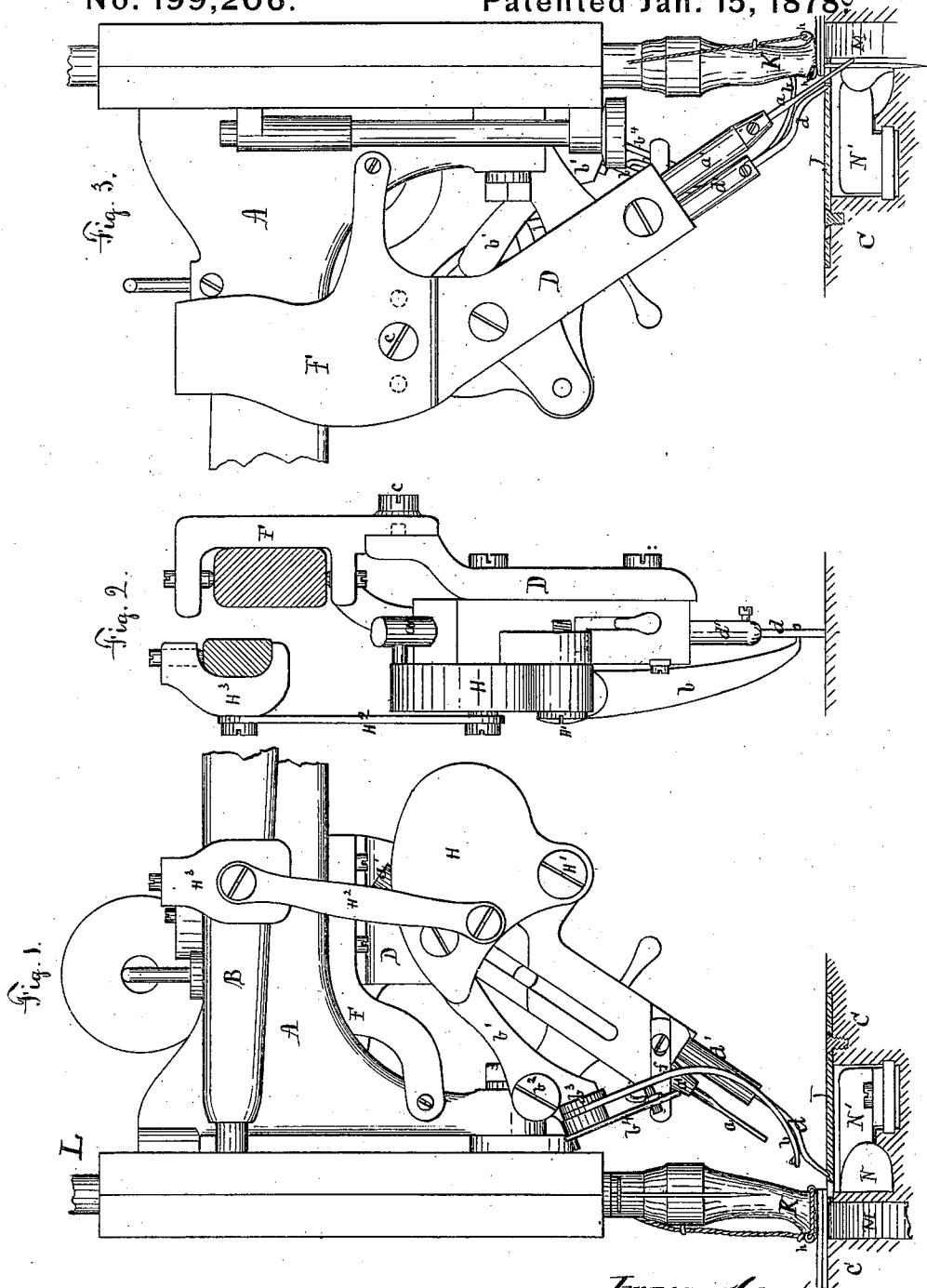


T. S. L. HOWARD.
Button-Hole Sewing-Machine.
No. 199,206. Patented Jan. 15, 1878.



Inventor

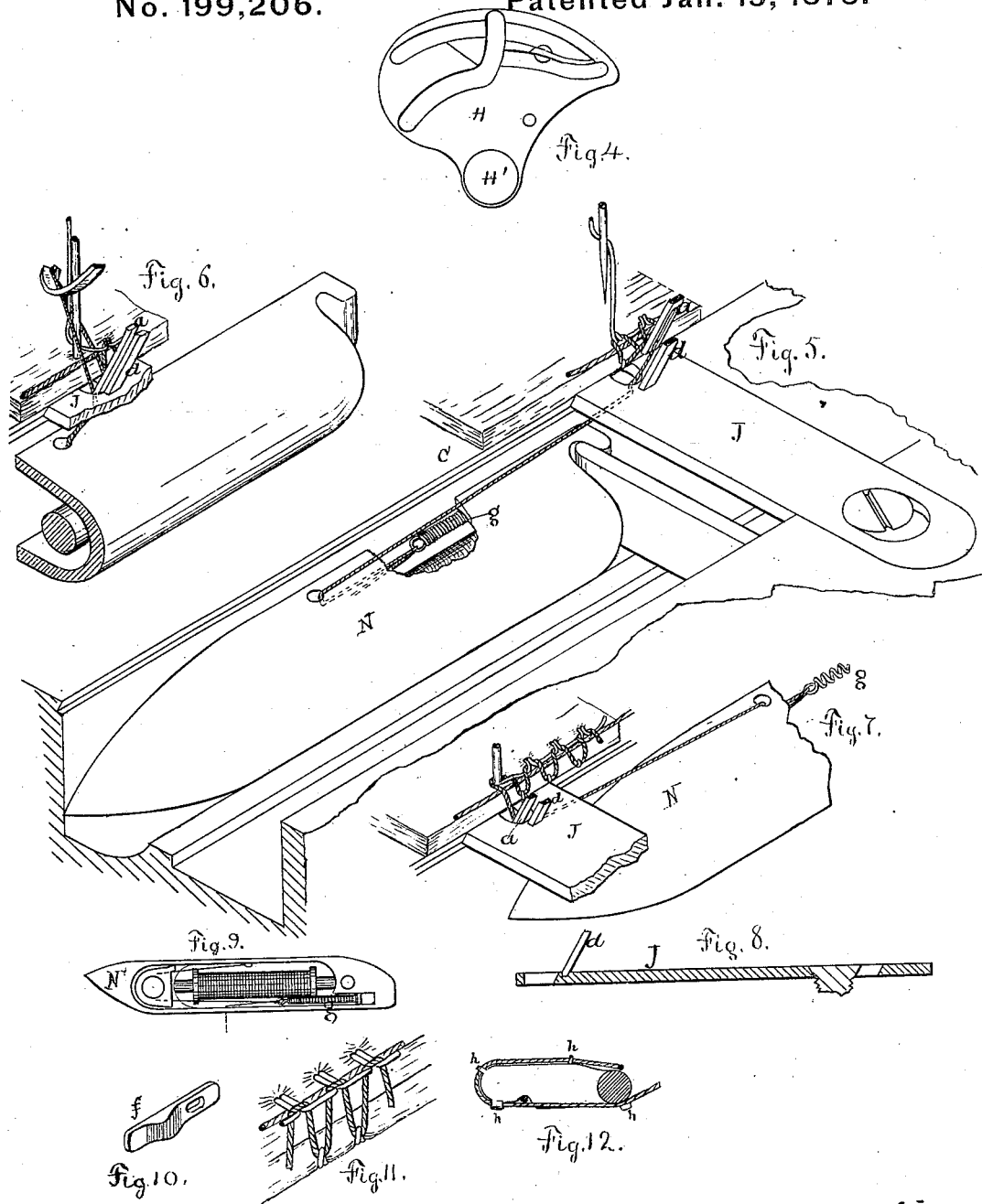
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UNITED STATES PATENT OFFICE.

THOMAS S. L. HOWARD, OF SOMERVILLE, ASSIGNOR TO GEORGE W. SIMMONS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN BUTTON-HOLE SEWING-MACHINES.

Specification forming part of Letters Patent No. **199,206**, dated January 15, 1878; application filed February 16, 1876.

To all whom it may concern:

Be it known that I, THOMAS S. L. HOWARD, of Somerville, in the county of Middlesex, State of Massachusetts, have invented an Improved Sewing-Machine for Overseaming, Working Button-Holes, and like Work, of which the following is a full, clear, and exact description, taken in connection with the accompanying drawings, making a part of this specification.

In the drawings, Figures 1, 2, and 3 are elevations of the operative parts of an ordinary sewing-machine with my improvements. All the other figures are for illustration.

My improved machine is the same in its general principles as that described in Letters Patent of the United States, Reissue No. 5,728, dated January 13, 1874—that is to say, its main parts are the under-thread catcher or looper *a*, the finger *b*, and mechanism for actuating them at the proper times, in such a manner that the under-thread catcher shall pull the under thread in the form of a loop above the surface of the fabric, and bring it into such relation to the finger that the finger will carry one part of the loop over the edge of the fabric, so that the needle will pass through the loop.

In the drawings, A is the overhanging arm, B the lever which actuates the needle-bar, C the table or bed, K the presser-foot, L the needle-bar, M the feed-wheel, N the shuttle, and N' the shuttle-carrier, of an ordinary sewing-machine—in this case the machine known as the "Howe" machine.

The looper *a*, the finger *b*, and their operating mechanism are secured to a bed-piece, D, which is accurately adjusted, and firmly secured to the clamping bed-piece F. This clamping bed-piece F is a casting with jaws provided with set-screws, by which it can be secured firmly and adjusted accurately to the stationary arm A of the sewing-machine. It will vary, of course, in size and shape to suit the different kinds of sewing-machines, and, when the sewing-machine is originally constructed with the view of applying my improvements, may be cast in one piece with the arm A. To this bed-piece F the bed-piece D, which supports the operating parts of the mechanism for overseaming, is attached by means of the screw *c*, and adjusted by dowl-

pins, as shown in Figs. 2 and 3. The purpose of this arrangement of the two bed-pieces D and F is, that when the clamping bed-piece F is once adjusted in its place upon the sewing-machine, (which requires some skill in order to bring the finger and looper into exact relation with the throat and needle of the sewing-machine,) it need never be removed; and the only part required to be removed when the machine is to be used for plain sewing is the bed-piece D, which can readily be removed by taking out the screw *c*, and as easily replaced, and when replaced it will bring the operating parts of the mechanism into the exact relations requisite.

The looper and finger receive their motions from the cam H, which is provided with grooves on its inner side, each of which receives a pin, one of which projects from the lever *b*¹ of finger *b*, and the other from the stock *a*¹ of looper *a*. These grooves are so formed in relation to the axis H¹ of cam H as to give the necessary motions to the looper and finger when the cam oscillates on its axis. (See Fig. 4, which shows these grooves.)

The cam H is actuated by the needle-lever B by means of the connecting-rod H², and this connecting-rod is secured to the needle-lever by the clamp H³, which is accurately adjusted to the needle-lever when the attachment is first applied. When the attachment is to be removed the end H² is disconnected from the clamp H³. This cam may, of course, receive its motion from any other suitably-moving part of the machine.

As the sewing-needle descends, the looper-stock *a*¹ is moved downward by the cam H, carrying the looper *a* through the throat in the throat-plate J on the bed C, and with its elongated eye directly under the point of the sewing-needle, which continues its descent, (the looper *a* remaining stationary,) and passes through the eye of the looper. The under thread is then carried by the shuttle through the loop of the needle-thread and the needle rises, thus pulling the under thread into the eye of the looper—that is, it will pull it in at the first stitch, for at every continuous stitch afterward the under thread passes from the fabric through the eye of the looper to the shuttle, as is seen in the enlarged diagrams

Figs. 5, 6, and 7, in which the loop of under thread is clearly shown as it is while the operation is in progress. As the needle rises, after its point leaves the eye of the looper *a*, the looper is retracted, carrying with it a loop of the under thread. (See Fig. 5.) The looper *a* passes obliquely through the throat of the machine (a throat-plate, *J*, having a throat in it to receive both the sewing-needle and the looper *a*, being substituted for the ordinary throat-plate) just over and so as to clear the shuttle, and to or under the rim of the feed-wheel or the feed-ratchet.

The looper *a* is guided by a guard, *d*, which is secured to its stock *d'*, which stock can be raised and lowered. The end of this guard enters a depression in the throat-plate, which holds it securely in place. This is shown enlarged in Figs. 5 and 8. This guard *d* also prevents the looper's striking against the edge of the cloth in working button-holes.

The lever *b*¹ of the finger *b* is pivoted to the bed-piece *D* at *b*², and the finger *b* is pivoted to this lever at *b*³, as shown in the drawings. The finger *b* can be turned up out of the way on its pivot *b*³, and this pivot also enables it to move sidewise as it moves back and forth. Its motions sidewise are caused by the spring *b*⁴ and the cam *f*. As the finger *b* moves forward to carry one thread of the loop held by the looper to the needle, (see Fig. 6,) it would strike the needle unless it were moved sidewise, and would not carry its thread around the needle properly unless it moved back again sidewise after its point has passed the needle. Consequently the cam *f* is so formed (see Fig. 10) as to cause the finger to move sidewise against its spring *b*⁴ as it moves forward far enough for its point to clear the sewing-needle, and to be moved sidewise by its spring *b*⁴ after its point has passed the sewing-needle, thus carrying its point well around and back of the sewing-needle, and making it certain that the sewing-needle shall pass through the loop of the under thread. (See Fig. 6.) The point or end of the finger *b* is so shaped that as it moves back on its pivot *b*³ it will cause the thread which lies in front of the looper to enter the fork of the finger with certainty.

All this is fully shown in the drawings. (See especially the enlarged diagram, Fig. 6.)

The cam *f* should be adjustable, and to this end it is so mounted in the bed-piece that it can be moved endwise for adjustment, its set-screw passing through a slot in it, as shown in the drawings.

As soon as the looper *a* reaches its highest point the cam *H*, which actuates the lever *b*¹, throws the lever *b*¹ forward slightly, thus throwing the finger *b* slightly backward, and causing it to take the forward thread of the loop in the looper in its fork. The lever *b*¹ is then thrown backward by its cam *H*, which causes the finger *b* to move forward, carrying its thread with it. As it moves forward, the cam *f* and spring *b*⁴ cause it to move on its pivot *b*³, and its end thus clears the sewing-

needle, and gets around and behind it. While the finger *b* is in this position the sewing-needle descends until its point enters the fabric through the loop of the under thread, held open by the finger *b* and the looper *a*; and as soon as the point of the sewing-needle is in the fabric the cam *H* actuates the lever *b*¹, so as to throw the finger *b* back to its original position, where it remains until the looper *a* rises again with another loop of the needle-thread, when it is again thrown slightly back and then forward, as before.

In the machine which I have improved there were no means for properly taking up the slack of the loop of under thread when the finger *b* moved back—both its first backward motion, when it presses one thread of the loop sidewise, and its main backward motion to drop the loop—the motion of the shuttle being alone relied upon for this purpose, and this was a grave practical difficulty with such machines, imperfect work often resulting because this slack was not properly taken up. The main feature of my invention relates to taking up this slack, and consists in leading the under thread through an eye which is connected to a small spring. This spring is put under tension as the looper and finger enlarge the loop of under thread, and its reaction takes up all the slack of that loop. The operation of this spring will be most clearly seen at the first backward movement of the finger, in order that the fork may take the loop, when one side of the end of the finger presses one thread of the loop sidewise, and the spring straightens it, thus bringing it directly in the fork of the finger, and at the main backward movement of the finger as it drops its thread the spring pulls the loop closely around the needle. (See Fig. 7.) This is an important improvement in this class of machines, as it remedies what has heretofore been a serious practical difficulty. I prefer to arrange this spring in the shuttle, as seen in the drawings, especially Figs. 5 and 9, where *g* represents the spring. In Fig. 5 it is shown contracted, and in Fig. 7 it has just taken up all the slack of the loop and pulled the loop closely around the needle.

In making button-holes a stout thread is usually laid upon the edges of the fabric. This is accomplished in my machine by the use of the thread-guide *h*, attached to the presser-foot, which is a simple contrivance by which a stout thread is so guided as to be sewed to the fabric by the button-hole stitch.

What I claim as my invention is—

The combination of the shuttle provided with the spring *g*, the looper *a*, and finger *b*, substantially as described, whereby the slack of the loop of the under thread is properly taken up, as above explained.

THOMAS S. L. HOWARD.

Witnesses:

HENRY A. STONE,
CHAS. F. SLEEPER.

2,000. wms