

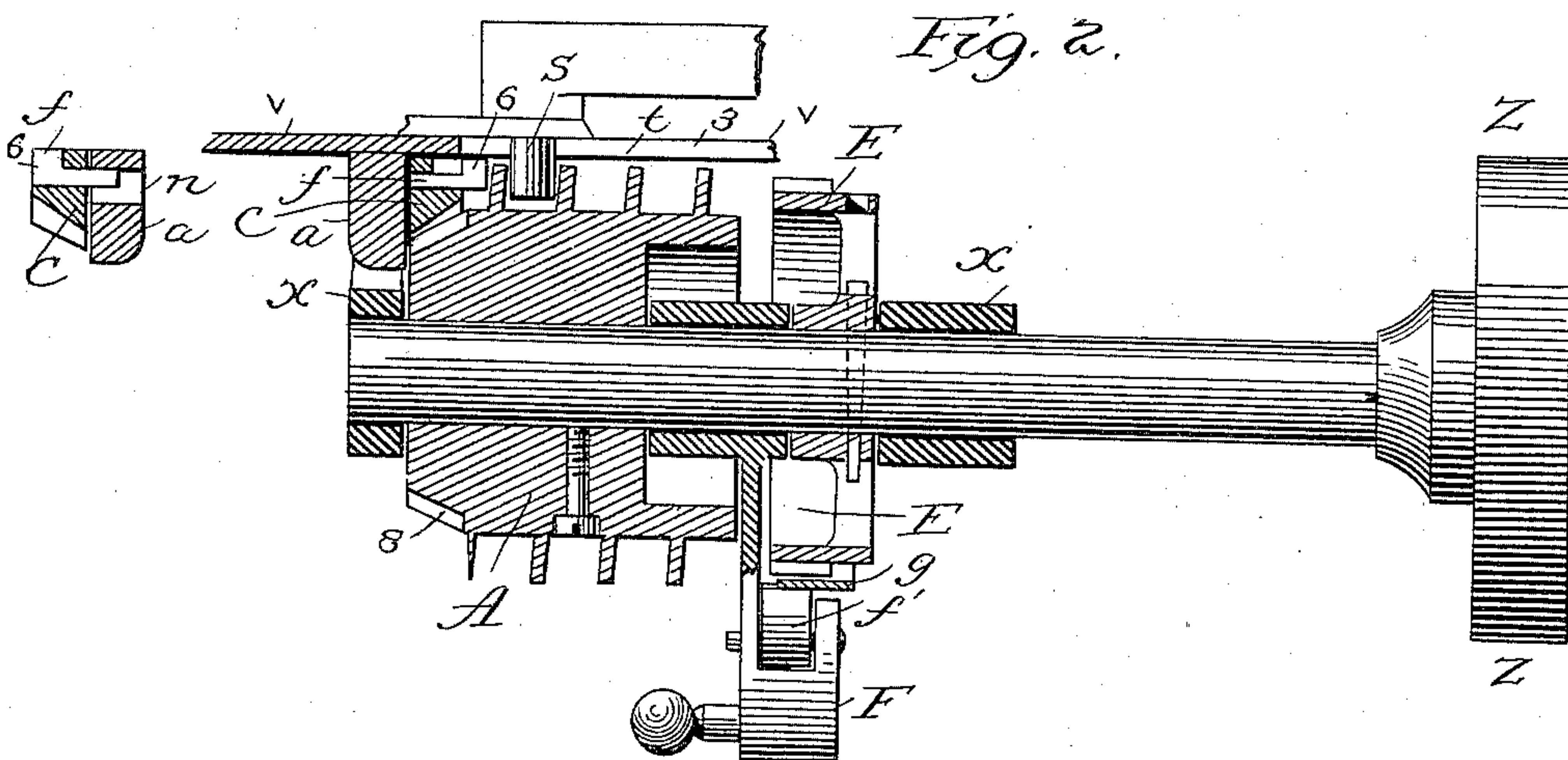
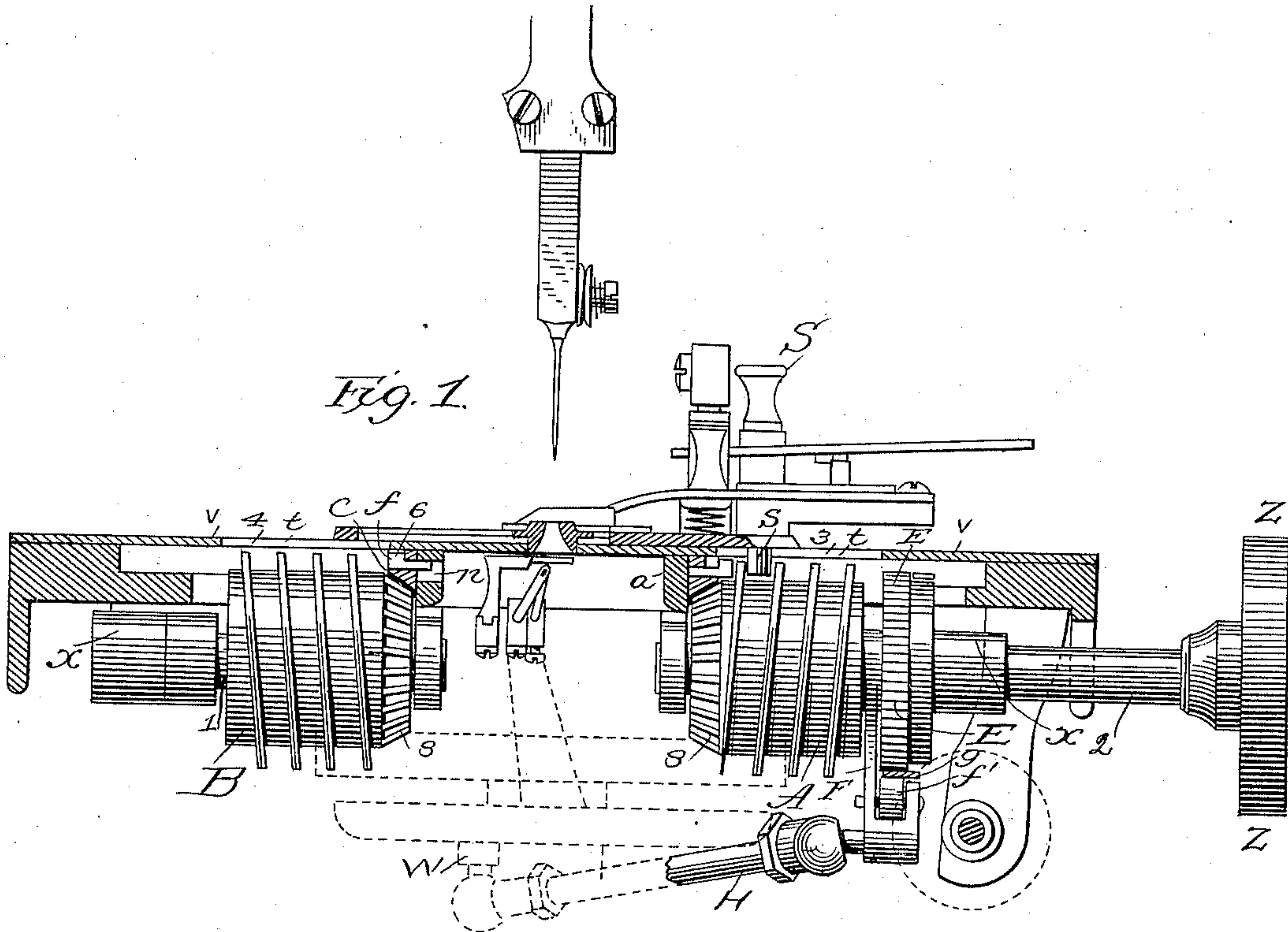
(No Model.)

2 Sheets—Sheet 1.

E. M. PHELPS.  
BUTTON HOLE SEWING MACHINE.

No. 344,678.

Patented June 29, 1886.



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*Walter D. Macdonald*  
*J. L. Middleton*

Inventor  
*Eugene M. Phelps*  
by *Joyce & Co.*  
*Atty's*

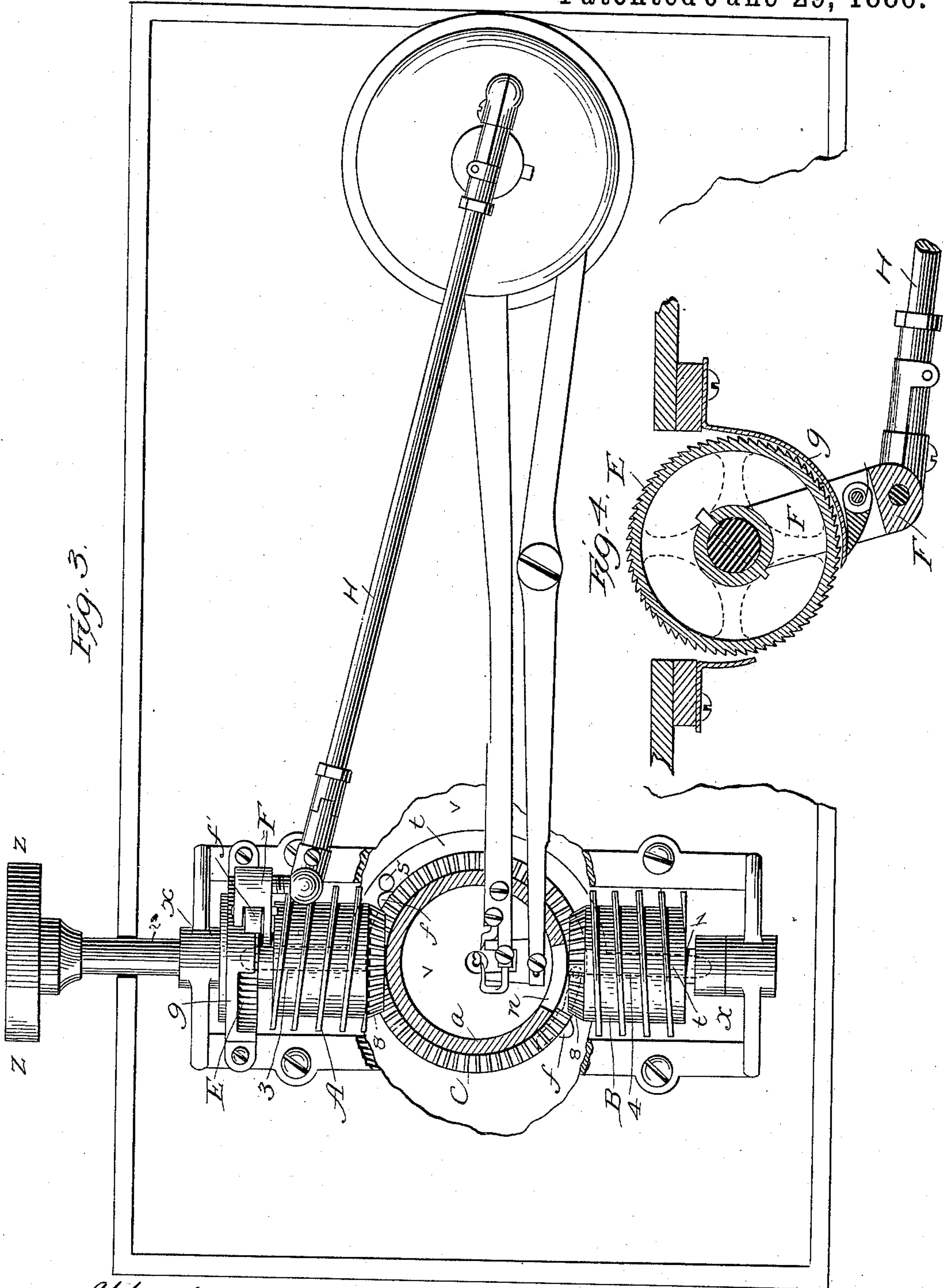
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# UNITED STATES PATENT OFFICE.

EUGENE M. PHELPS, OF LYNN, MASSACHUSETTS.

## BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 344,678, dated June 29, 1886.

Application filed December 3, 1885. Serial No. 184,613. (No model.) Patented in Germany July 31, 1884, No. 33,484.

*To all whom it may concern:*

Be it known that I, EUGENE M. PHELPS, of Lynn, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Button-Hole Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an improvement upon the button-hole sewing-machine shown in Letters Patent granted to D. W. G. Humphrey by the United States Patent Office, Nos. 115,857 and 123,348, and has been patented in Germany under date of July 31, 1884, No. 33,484.

The object of my invention is, first, to secure an easier and more uniform movement in the operation of the clamping-plate by which the proper movement is given in sewing the button-holes; and, secondly, my object is to enable the operator to move the clamp-plate either backward or forward without disengaging it from its feeding mechanism, whereby it is moved in the regular operation of the machine.

My invention consists, first, in combining with the toothed ring which rotates the clamping-plate a pair of worm-shafts for giving the longitudinal movement to the clamp-plate.

It consists, in the second place, in means for disengaging the rod or shaft which moves the feeding mechanism of the clamp-plate, whereby the clamp may be shifted independently of the other mechanism of the machine either backward or forward in order to allow the operator to adjust the machine without disengaging the clamp-plate whenever such adjustment may be rendered necessary by the breaking of the thread.

In the accompanying drawings I have shown only enough of the machine to illustrate my invention, the other parts of the machine being the same as those in common use.

In these drawings, Figure 1 is a vertical section through the machine-table from front to rear, showing the worms and their connections in side elevation. Fig. 2 is a vertical section through one of the worms, showing the pawl-and-ratchet mechanism also in section. Fig. 3 is a view of the under side of the machine, portions of the frame being broken away to show the hub and the intermediate geared ring. Fig. 4 shows more clearly and in section the shield placed over the ratchet-wheel

on the worm, shown to interrupt the action of the pawl.

In these drawings, *v* represents the top plate of the machine, adapted by means of the button *S* and slot *t* (all of ordinary construction) to carry a clamp-plate of the Humphrey or similar machine.

The beveled gear *C* is mounted on a ring or hub, *a*, and has the arms *f f* pivoted to swing horizontally into recesses *n n* in the hub, so as to catch the pin of the clamp-plate when out and to avoid it when in the recess, all as in the aforesaid patents.

In the frame-work *x x* of the machine are mounted shafts 1 and 2, carrying reversed worms *A* and *B*. These worms lie with their axes in line with the straight parts 3 and 4 of the slot in the top plate of the machine.

It will be understood by those familiar with the working of the Humphrey and like machines that the pin of the clamp-plate projects down through the slot and is caught by the upwardly-projecting ends 6 of the arms *f* when at the end of the straight slot 4 nearest the needle, and is carried around from the terminus of this slot to the beginning of the straight slot 3, upon the opposite side of the needle, and that the sides of the button-hole are stitched while the plate is moving in line with the straight slots, and the end of the hole is stitched while the plate is turning on the semicircular slot. The points of the worm-threads catch the pin *s* of the clamp-plate when it is brought to the entrance of the straight slots into range with said points, and the arm *f* is pushed aside into its recess when the pin reaches the entrance of the slot 3, and in the same manner as in the aforesaid patent; but the worm-threads, being of uniform pitch, move the plate with the same leverage throughout, and do not vary in pitch or required force, as in the case with the cams, and the machine may therefore run at greater speed. The ends of the worms are formed with bevel-gears 8, which mesh with the bevel-gear *C* of the ring *a*, the gears on the worms being of half the diameter of the ring-gear. There are three coils of the worm-thread on each shaft, and the clamp is drawn along one side of the button-hole by three revolutions of the worm. It is given the half-turn by one revolution of the worm, and thus



the movement around the end of the button-hole is accelerated and the spacing of the stitches justly proportioned. The proportions of the worms to the central ring may be varied without other change.

In the machines of the class described heretofore used the gears by which the clamp was moved to feed the cloth to the needle were made capable of turning in the forward direction only.

In the operation of the machine the clamp was turned by the revolution of the shaft and pawl and ratchet-wheel, but could be turned in one direction only. It might be turned forward either by machinery or by hand, but could not be turned backward. This made it necessary whenever a thread broke to disconnect the clamp-plate from the worm or arm of the central wheel and move it back to the point on the cloth where the thread was broken, and then to adjust it forward by turning the shaft by hand.

The operation of detaching the plate and moving it back requires considerable time and renders the work of the operator more tedious and laborious and seriously retards the work. In order to obviate this difficulty I have provided means whereby the mechanism which imparts motion to the mechanism which directly feeds the cloth may be disconnected, and thus the clamp-plate be moved backward by hand whenever such motion may be rendered necessary by the breaking of the thread. The means hereinafter shown for accomplishing this purpose consist of a shield placed over the ratchet-wheel E and covering part of the periphery of said wheel, and extending through a part of the motion of the pawl by which said wheel is moved. The ratchet-wheel E is on the shaft of the worm A. The pawl *f'* is carried on an arm, F, pivoted on the same shaft by the side of the wheel, and is operated by the reciprocating rod H. The shield *g*, curved to conform to the periphery of the ratchet-wheel, is fixed to the under side of the table and extends over the space on the ratchet-wheel periphery, over which the pawl passes when the needle is raised. It will be understood that, as the needle descends twice in this machine before the cloth is moved for a new stitch, the pawl may remain over the shield all the time between two successive feed-movements, excepting that required for the single elevation and descent of the needle—that is to say, the last one necessary to complete the stitch before the cloth is removed. This mechanism is provided, therefore, for the automatic disconnection of the pawl, and if the needle be up when the thread breaks the operator may move back the worm-gear by means of the hand-wheel Z Z, placed on the shaft of the worm A, extending through the casing to the front. Very slight movement is required for this purpose, and very much less

time than that required in the construction heretofore used. In case the needle is down when the thread breaks the operator has simply to move the balance-wheel until the pawl is disconnected from the ratchet-wheel and rests upon the shield, and the worm may then be operated through the hand-wheel.

In order to give the required reciprocating movement to the rod H, I attach it to the crank-arm W on the vertical shaft of the machine. This is much easier than the cam-and-lever mechanism heretofore used. The worm-shafts are mounted in bearing-pieces fixed to the under side of the table, and their construction and operation is the simplest possible. The first movement of the wheel E gives the circular movement to the ring-gear, and this ring-gear transmits its motion to the second worm.

I am aware that a single worm has been shown in the United States Patent to Humphrey, No. 152,231, combined with the plate sliding longitudinally and carrying a second circular plate having the rotary movement. My invention differs from this in having two worm-shafts connected by an intermediate wheel or ring, the intermediate wheel or ring performing the double office of giving rotary movement to the clamp-plate and transmitting motion to the second worm, one worm giving the movement for one side of the button-hole and the other for the other side; and my invention on this point differs from the United States patent of Humphrey, No. 115,857, in substituting the worms with the intermediate wheel or ring for the scroll of the said Humphrey patent, and the new effect produced by this substitution is that I obtain a uniform and easy movement, which is not possible with the scroll, for the reason that in the latter part of the movement of the clamp-pin toward the center of the scrolls the leverage is less and the movement therefore more difficult, which seriously impairs the speed of the machine.

I claim as my invention—

1. In a button-hole sewing-machine, in combination with the ring C and the slotted plate and clamp-pin, the reversed worms A and B, provided with bevel-gears meshing with the bevel-gear on the ring C, and mechanism for operating the parts specified, all substantially as described.

2. The ring C, slotted plate, and reversed worms A and B, adapted to receive the pin of the clamp-plate, bevel-gears on the shafts of the worms, meshing with a bevel-gear on the ring C, a ratchet-wheel on the shaft of the worm A with its pawl, and the operating-rod and the shield, all as set forth.

EUGENE M. PHELPS.

Witnesses:

F. W. BEALE,  
C. B. TUTTLE.