(No Model.) 3 Sheets—Sheet 1.

W. RAEUCHLE.

BUTTON HOLE SEWING MACHINE.

No. 277,928. Patented May 22, 1883.

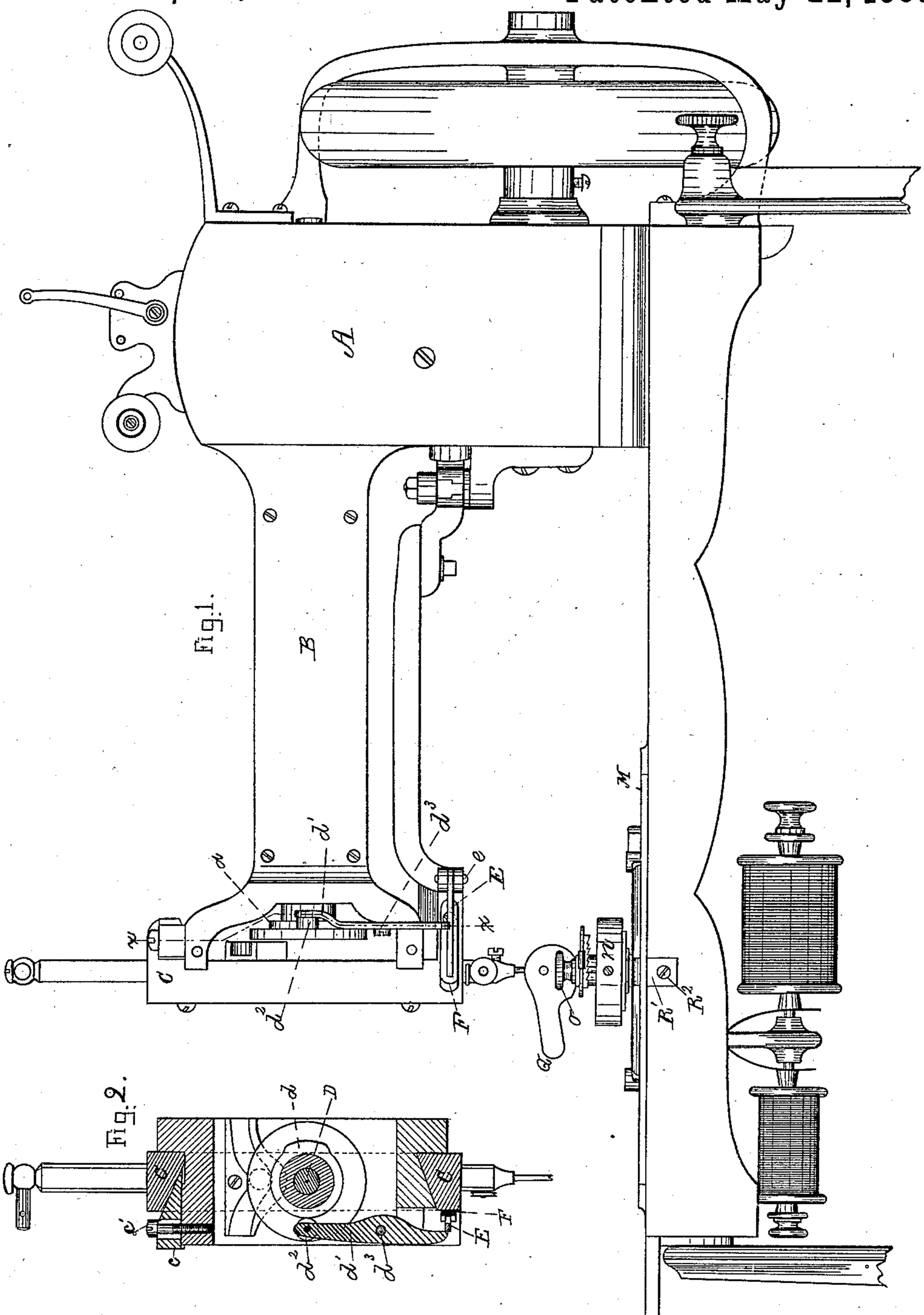

Fig. 1.

Fig. 2.

Witnesses.
James W. Watson
Henry Chadbourn

Inventor.
William Raeuchle

(No Model.) 3 Sheets—Sheet 2.

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Fig. 10.

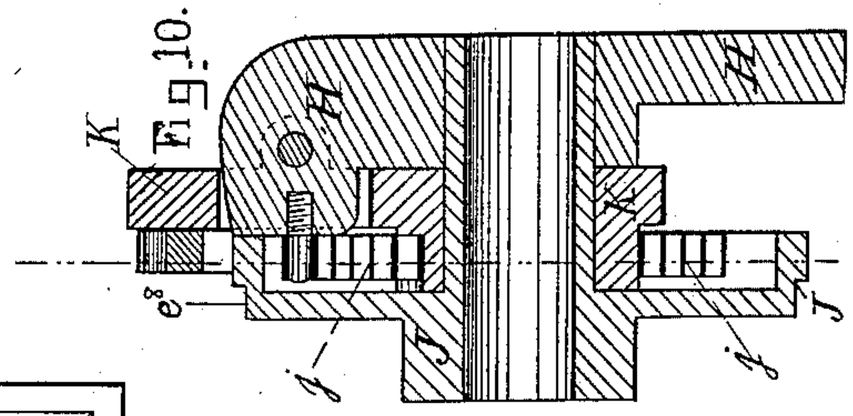


Fig. 3.

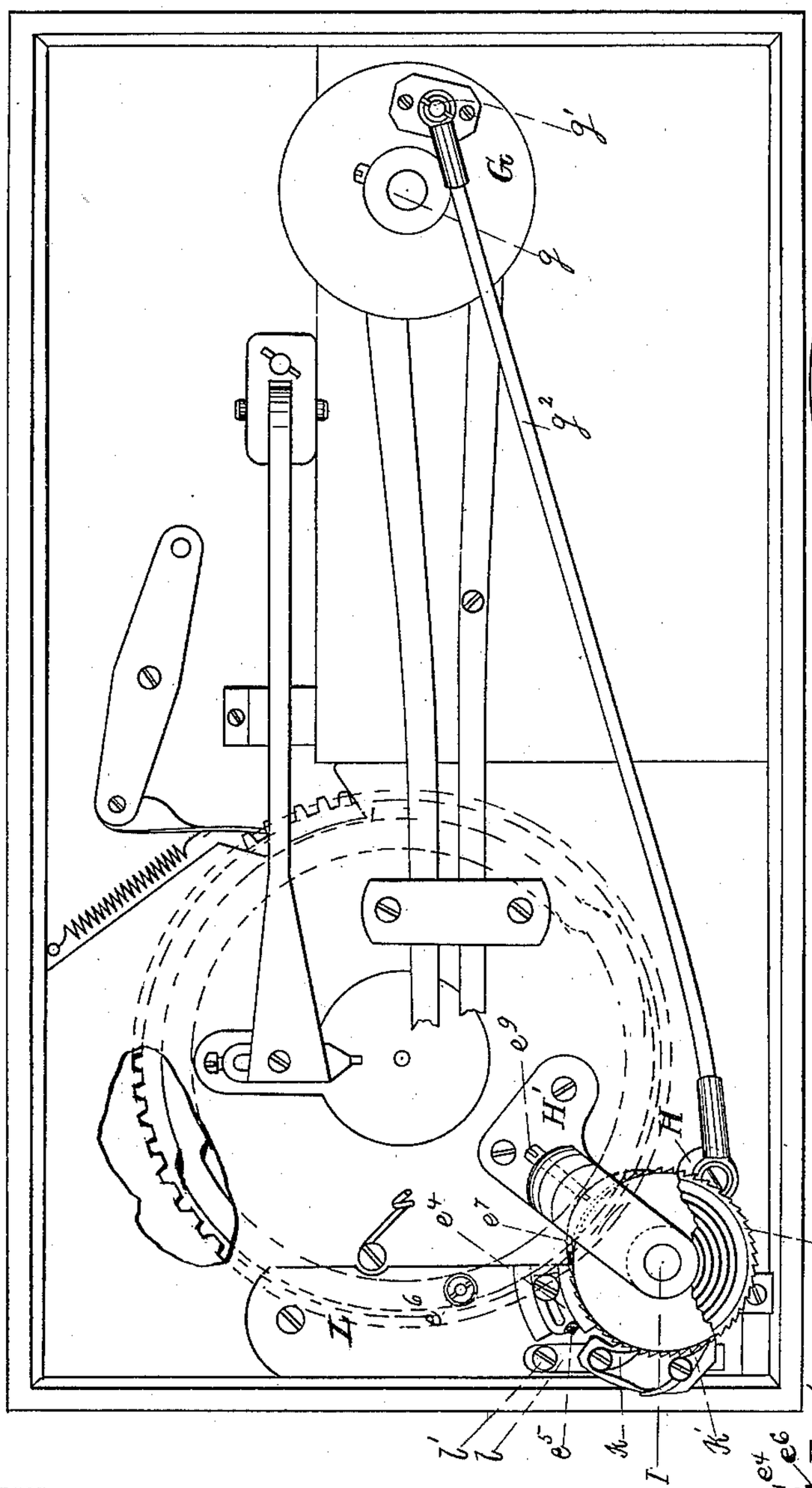


Fig. 9.

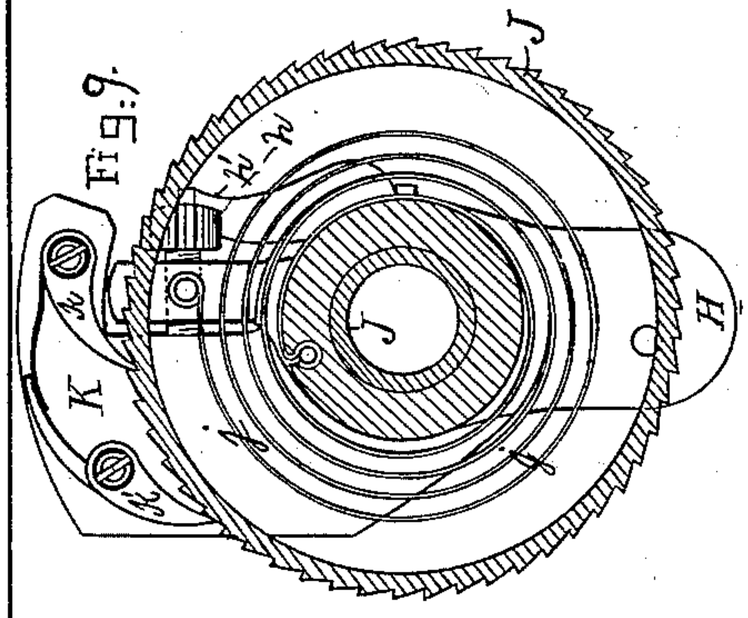


Fig. 6.

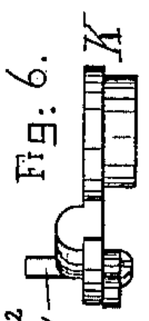


Fig. 7.

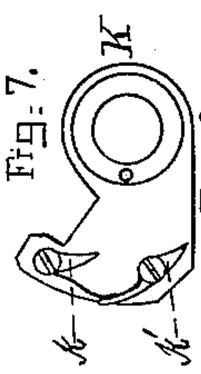


Fig. 8.

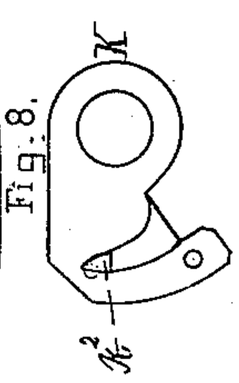


Fig. 5

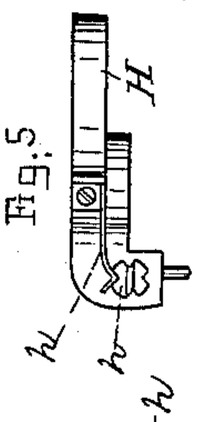
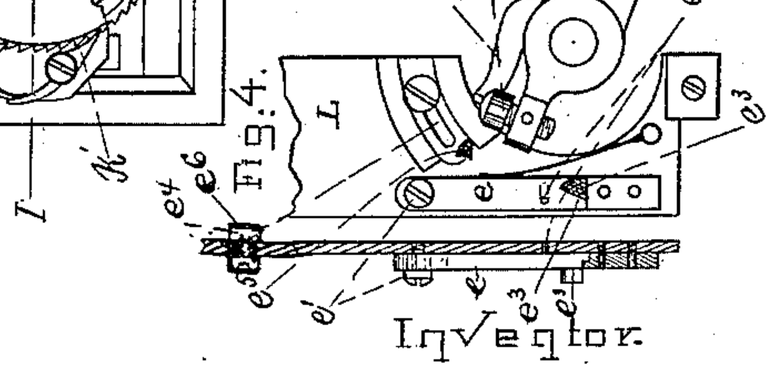


Fig. 4.



Witnesses.

James W. Watson.
Henry Chadbourn

Inventor.

William Raeuchle

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Fig. 11.

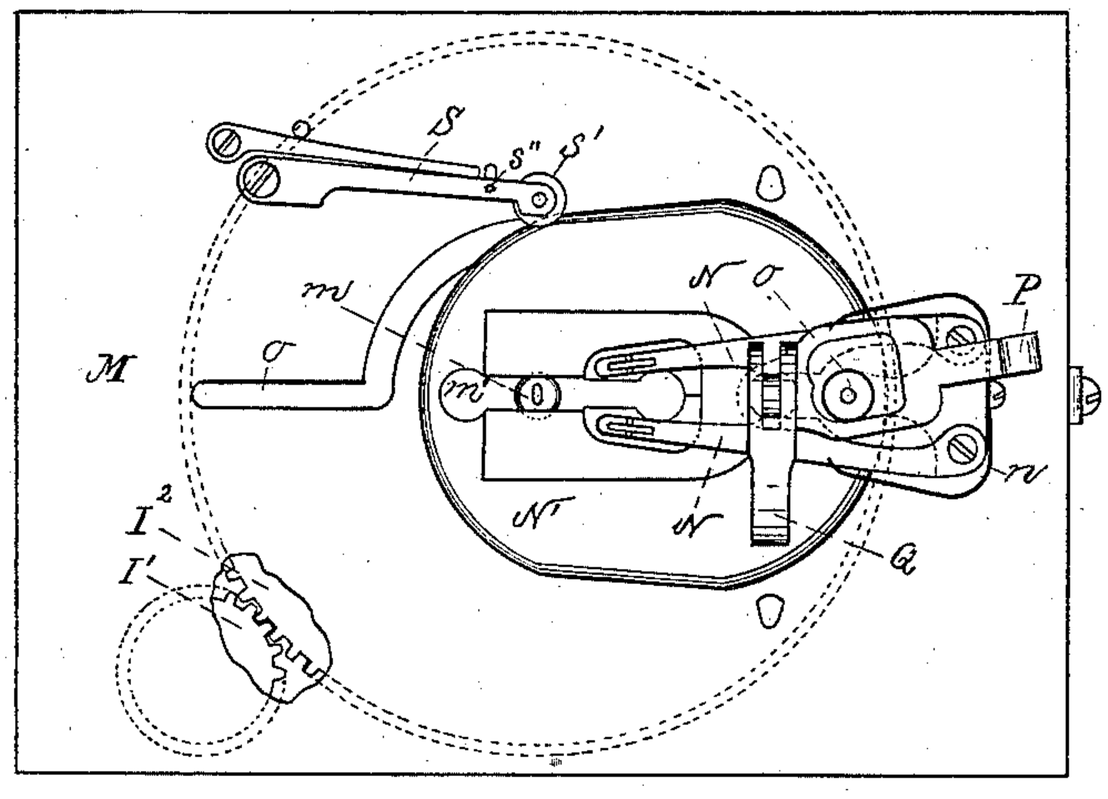
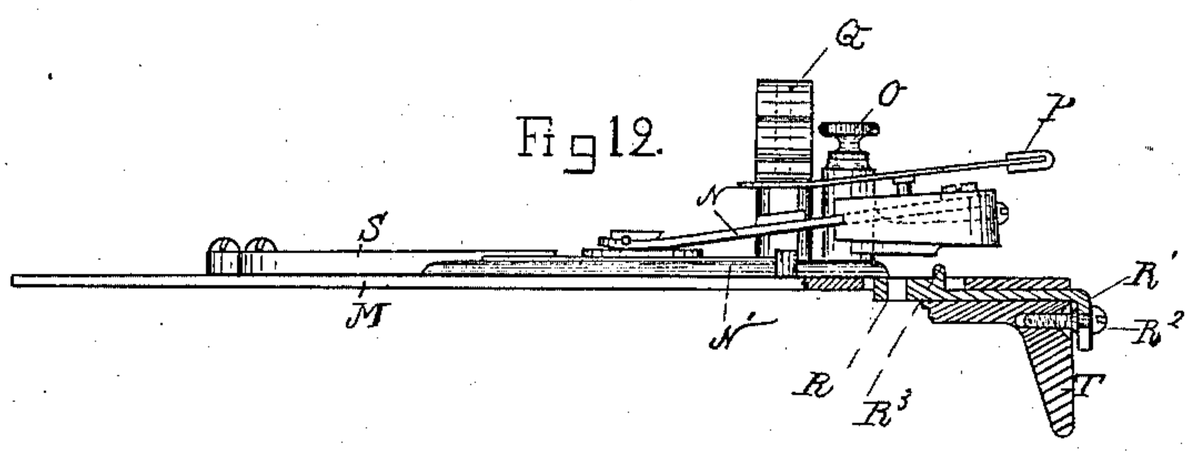


Fig 12.



Witnesses.

James D. Watson.

Henry Chadbourn.

Inventor.

William Raeuchle.

UNITED STATES PATENT OFFICE.

WILLIAM RAEUCHLE, OF BOSTON, MASSACHUSETTS.

BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 277,928, dated May 22, 1883.

Application filed September 11, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM RAEUCHLE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Button-Hole Sewing-Machines; and I do hereby declare that the same are fully described in the following specification and illustrated in the accompanying drawings.

My invention relates to improvements in button-hole sewing-machines, and has reference more particularly to the feed mechanism and other details, as hereinafter described, and specifically set forth in the claims.

Referring to the drawings, Figure 1 is a side elevation of a machine provided with my improvements; Fig. 2, a vertical section on the line *x x*, Fig. 1; Fig. 3, a bottom view; Figs. 4 to 10, inclusive, details of the feed mechanism; and Fig. 11 represents a plan of the clamp and guide-plate, and Fig. 12 a side view of the same, with a portion of the guide-plate and bed of the machine in section.

Like letters refer to like parts in all the figures.

A represents the standard, and B the arm, of the machine, in which are located the usual vertical and horizontal shafts, and beneath the arm are located the usual means for reciprocating the needle-bar carrier, which, with other parts not fully shown and described, may be of any well-known suitable construction.

By referring to Figs. 1 and 2 it will be seen that the needle-bar carrier C is mounted on the arm in a dovetail bearing, the slanted face of which at the top is formed by or constitutes a wedge, *c*, which, by means of a screw, *c'*, passing through a slot in the body of the wedge into the arm of the machine, is rendered adjustable, in order to prevent lost motion and secure accuracy in the movements of the carrier and to take up the natural wear of the parts. On the end of the horizontal shaft D, and in rear of the usual needle-bar-operating mechanism, is a cam, *d*, which at each reciprocation of the needle-bar projects against the upper end of the lever *d'*, provided with a friction-roller, d^2, and pivoted to the arm of the machine at d^3, thus forcing its lower end against a horizontal lever, E, pivoted at *e* on the lower end of the carrier C, between which lever and the carrier is located a pair of spring-nippers, F.

By the construction thus far described it will be seen that, as the thread is carried by the guide-eye at the top of the needle-bar and by the eye of the needle, it during the reciprocation of the carrier C remains in the same place between the spring-nippers and under the same part of the lever E, as they are both secured to the needle-bar carrier C, and as the back of lever E, on which the end of lever *d'* slides when pressed by lever *d'*, is parallel to the line of motion of the carrier, the lever *d'*, being stationary, acts evenly upon the lever E, which reciprocates bodily, compressing the nipper on the thread, and thus firmly and directly holds the same and insures greater regularity and uniformity in the stitch.

Referring to Fig. 3, G represents a disk, rigidly attached to the vertical shaft *g* of the machine. To the wrist-pin *g'* of the disk is suitably jointed a connecting-rod, g^2, the opposite end of which is coupled to a lever, H. Supported on a bracket, H', is a short vertical shaft, I, to the upper end of which is fixed a pinion, I', that meshes with the usual feed-wheel, I^2. (See Fig. 11.) The lever H is fulcrumed on the hub of a ratchet, J, which rotates on the shaft I. Between the ratchet and lever, and fulcrumed upon the hub of the former, is a pawl-carrying sector or plate, K. (Shown detached in Figs. 6, 7, and 8, respectively, in elevation, top, and bottom views.) At the free end of lever H is a set-screw, *h*, the head of which is notched for the reception of a spring-catch, *h'*, (see Fig. 5,) to prevent unintended rotation of the screw in its seat. Said screw *h* is arranged to strike against the pawl-plate K during the forward or feeding movement of the free end of the lever H, as hereinafter described. The two pawls *k k'* are pivoted to the plate and spring-pressed into the teeth of the ratchet J, and are of such proportional relative lengths that as one rests fully in one of the teeth of the ratchet the other lies at about the center of the incline of another tooth, so that the forward movement of the ratchet is limited, for as the ratchet advances by intervals of half a tooth each pawl falls alternately, and the same effect is produced as if the number of teeth on the ratchet were doubled. In this manner any multiple of a half-

tooth advance can be secured, and thus the length of the stitches accurately regulated to the most practical fineness.

On the upper side of the plate K is a projecting stud, k^2, which in the return or backward and non-operating movement of the pawl-plate comes in contact with projections located on the shifting plate L, pivotally secured on the under surface of the base of the machine. (See Figs. 3 and 4.) On this plate L is a bar, l, pivoted at l', and spring-pressed to a position determined by a pin, l^2, projecting into a slot formed in the plate. The bar l is provided with a projection l^3. An adjustably-secured bar, l^4, having a projection, l^5, is also provided on the plate L, and a friction-roller, l^6, projects from plate L, and rides in a cam-groove (not shown) formed in one side of the feed-wheel I^2. Within the ratchet is a coiled spring, j, one end of which is secured to the free end of the lever H and the other end to the hub of the pawl-plate K, as clearly shown in Figs. 9 and 10. An elliptical spring, l^7, is arranged inside of the bracket, H', to bear on a shoulder, l^8, of the ratchet J, the pressure being regulated by a screw, l^9, (see Fig. 3,) so that the said spring shall act as a detent to prevent a backward movement of the ratchet during a similar movement of the lever H and pawl-plate K.

By the construction thus far described it will be seen that during one-half a revolution of the disk G the lever H is drawn at its pivoted end backward by means of the connecting-rod g^2, and the free end of the lever is thrown forward, and the set-screw h is adjusted so that sooner or later in said forward movement of the free end it shall strike against the pawl-plate K and carry it along with the lever, and by means of the pawls the ratchet J also to the end of the throw, while during the return movement of the lever, which is caused during the remainder of the rotation of the disk G, the spring j is tightened about the hub of the plate K until the friction thereof is overcome, and it (the plate) caused to follow the lever in its backward movement, when the pawls take into other teeth, ready for another step in the feed. The distance which the pawl-plate and pawls shall so follow back is determined by the projection on the plate L, against which the projection k^2 of the pawl-plate shall abut, and the shifting-plate projection is selected by means of the friction-roller l^6 and cam-groove of the feed-wheel I^2, which, if the stitches are being formed in the side of the button-hole, will bring the projection l^3 into the path of the projection k^2, and stop the further backward movement of the pawls, so that a less feed of material is caused; or if the eye of the button-hole is being stitched the same mechanism brings the projection l^5 into said path, so that a greater feed of the material about a central point shall be caused in order to properly lay the stitches about and within the eye.

Referring to Figs. 11 and 12, m represents the button, placed above the center of the feed-wheel L^2 and through the slot of the clamp-plate upon which the material to be sewed is held by the clamps N, the clamp guide-post being represented at O, and the guide-slot at o. The clamps N are pivoted, as shown, and are pressed toward each other and the spreading-lever P by a spring, n, and are depressed by a lever, Q. (Clearly shown in Figs. 1, 11, and 12.) By this construction and arrangement of the clamps they are adapted to be spread without springing them out of shape, and are readily removable for replacement or repair.

R represents a clamp-rest to hold the clamp while cutting a button-hole. Said rest is made adjustable in the forward end of the guide-slot O of the plate M and bed T of the machine, by means of the set-screw R^2, acting on the bent projection R' of the rest. R^3 is a stop on the rest to prevent the clamp from being pulled too far forward, as by such a withdrawal of the clamp a button-hole might be cut in the wrong place, or the clamp-plate loosened by bringing the button within the eye of the button-slot m' in the lower clamp-plate, N'.

S represents a spring-pressed lever, provided with a friction-roller, s', which acts to keep the lower clamp-plate against the button m. A pin, s^2, limits the inward movement of the lever S. By this construction a more elastic spring can be used than when the roller s' is mounted directly on the spring, as heretofore.

Having thus described my invention, what I claim is—

1. A reciprocating needle-bar carrier provided with a horizontal lever pivoted thereto, and with interposed spring-nippers, in combination with a lever pivotally secured to a fixed portion of the arm, and means for intermittently operating the levers, substantially as shown and described.

2. The combination, with the main shaft of a sewing-machine, of a reciprocating needle-bar carrier, needle-reciprocating mechanism, spring-nippers arranged in line with and extending throughout the throw of the carrier, a lever pivoted to the same and extending over the nippers, a lever pivoted to a fixed portion of the arm, and a cam adapted to intermittently operate said lever, substantially as shown and described.

3. The combination, with the vertical shaft, of a disk, a connecting-rod, a lever fulcrumed on the hub of a ratchet-wheel, a plate carrying pawls and means for varying the backward movement of said plate, substantially as shown and described.

4. The combination of a lever fulcrumed on the hub of a ratchet, an interposed pawl-plate, and a coiled spring secured at one end to said lever and at the other end to the hub of said plate, substantially as shown and described.

5. The combination of a lever and pawl-plate fulcrumed upon the hub of a ratchet, a coiled spring secured to the lever and plate, and a set-screw interposed between the lever and plate, substantially as shown and described.

6. The combination of a lever-and-pawl plate, the latter provided with a projection or stop, and both fulcrumed on the hub of a ratchet, a shifting plate provided with projections or stops, and means for selecting the stops of the shifting plate, substantially as shown and described.

7. The combination of a clamp and an adjustable clamp-rest provided with a stop, substantially as shown and described.

8. The combination of the shaft D, cam *d*, lever *d'*, pivoted to the arm B, lever E, pivoted to the carrier C, and the spring-nippers F, substantially as shown and described.

9. The combination of the lever H, ratchet J, and plate K, having the stop k^2 and pawls *k k'*, the shaft I, pinion I', and feed-wheel I^2, with the shifting plate L, provided with the adjustable bar l^4 and spring-pressed bar *l*, as set forth.

10. The combination of the pivoted clamping-arms N N, the spring *n*, operating upon both arms, the spreading-cam P, and the depressing-lever Q, substantially as shown and described.

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

WILLIAM RAEUCHLE.

Witnesses:
HENRY CHADBOURN,
JAMES W. WATSON.