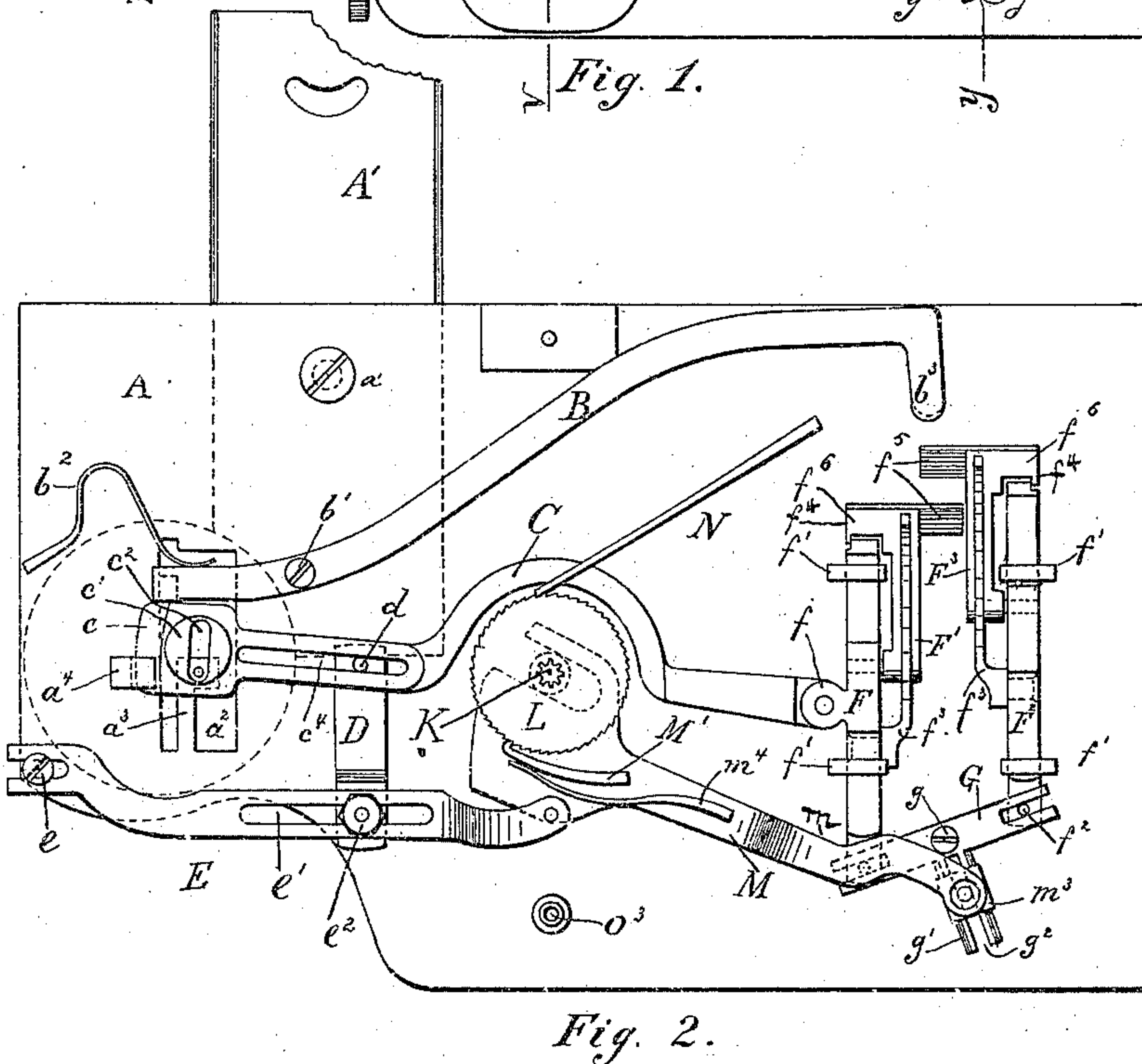
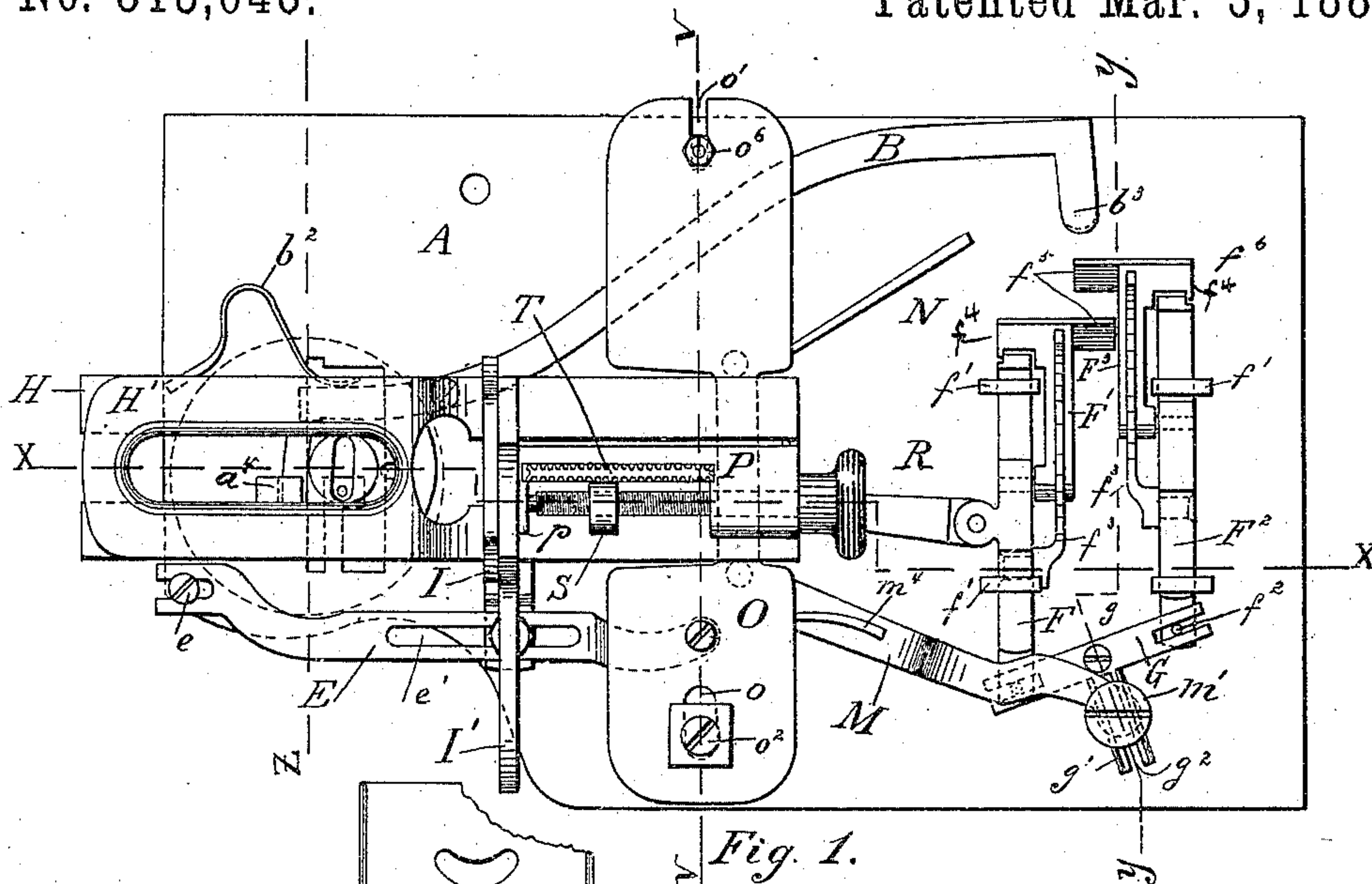


C. S. BATDORF.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 313,046.

Patented Mar. 3, 1885.



WITNESSES:

L. Holmboe
R. B. Dyrenforth.

INVENTOR

Charles S. Batdorf
BY
Price & Fisher
ATTORNEYS

(Model.)

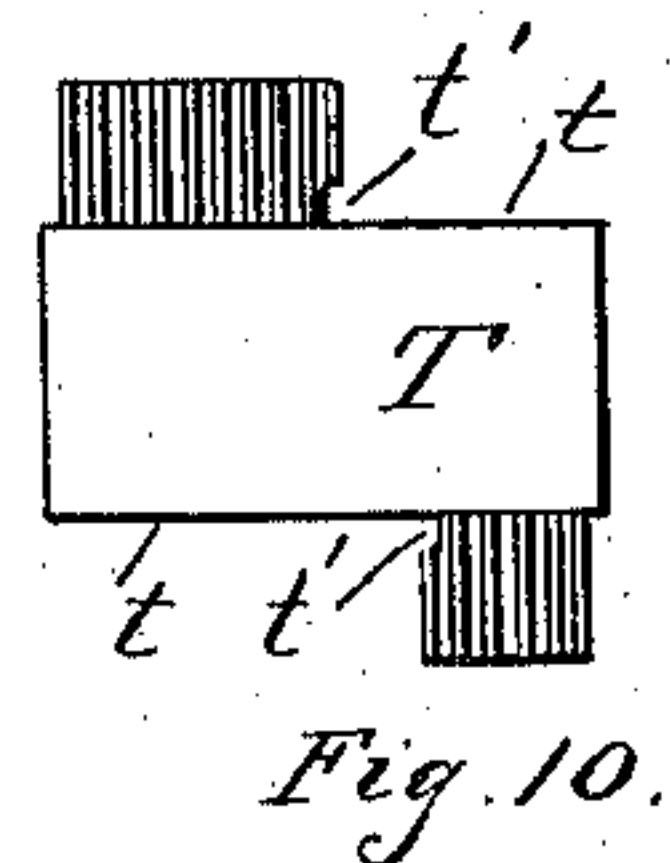
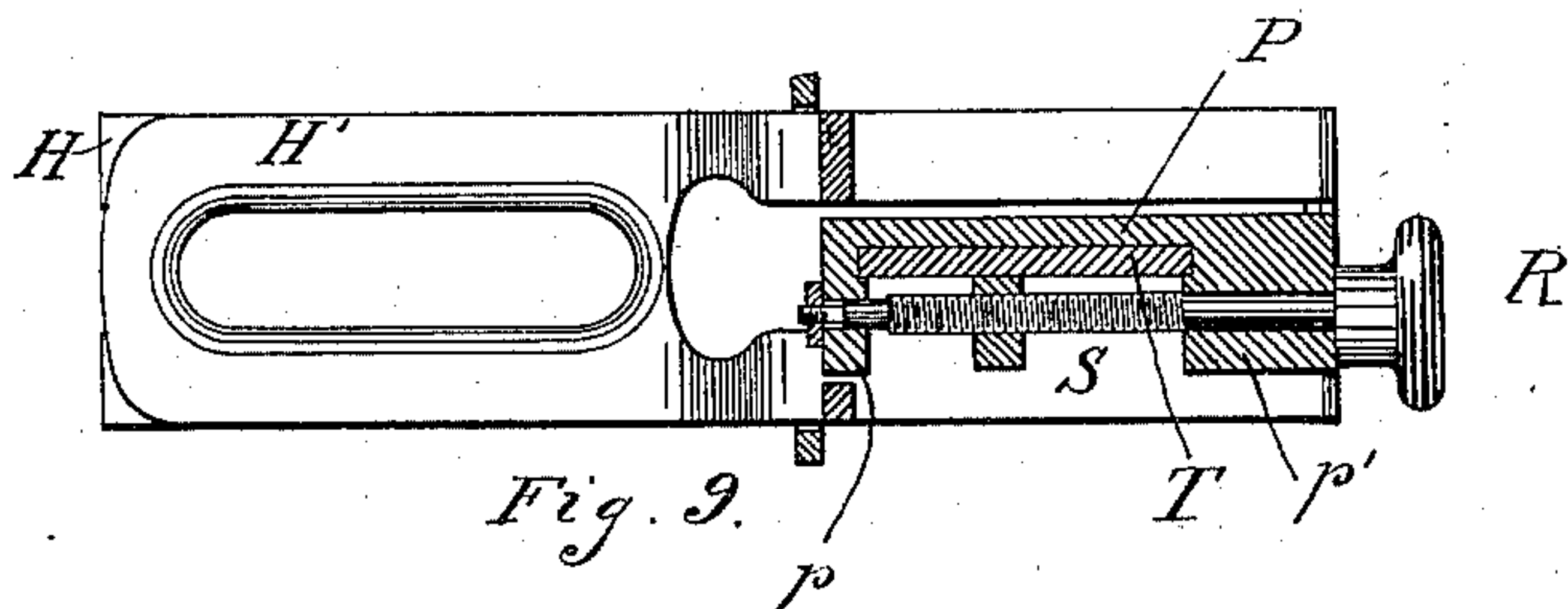
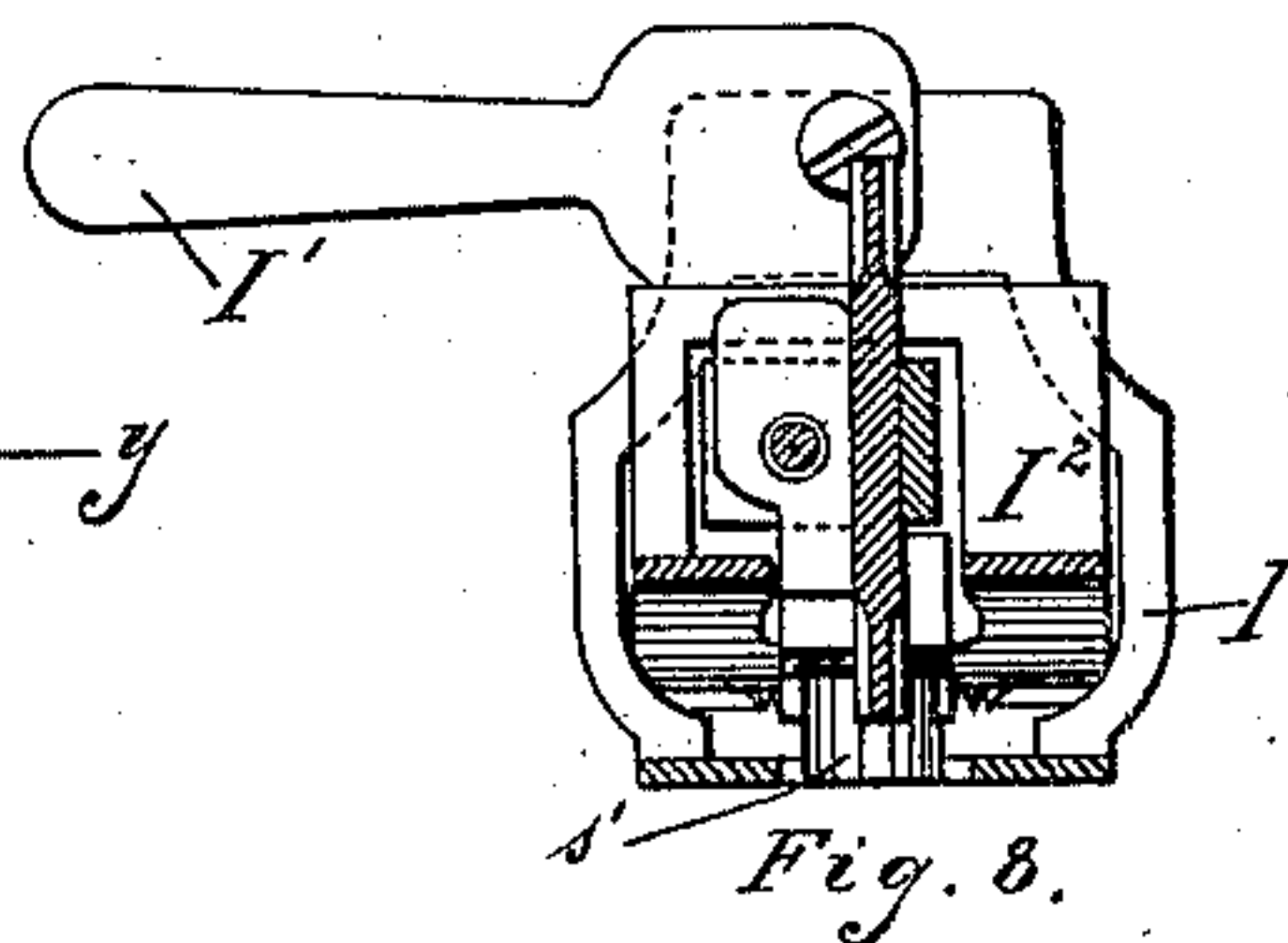
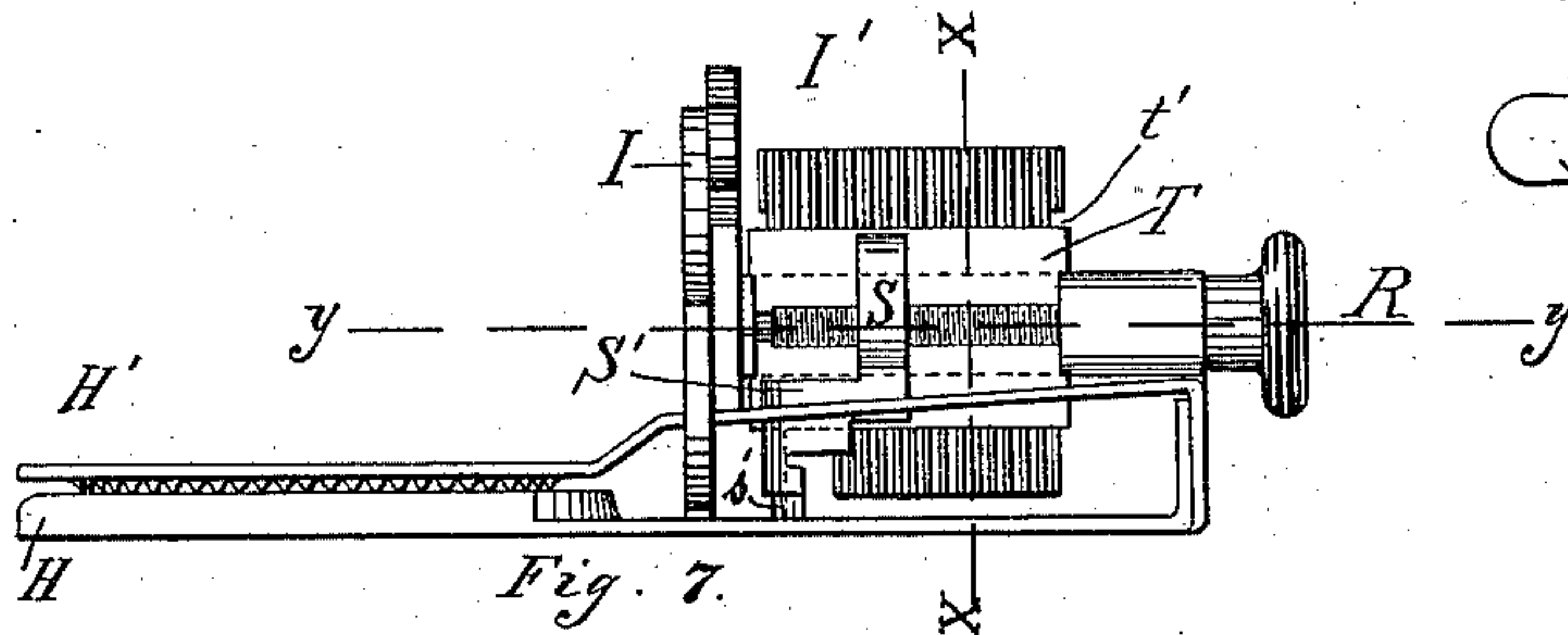
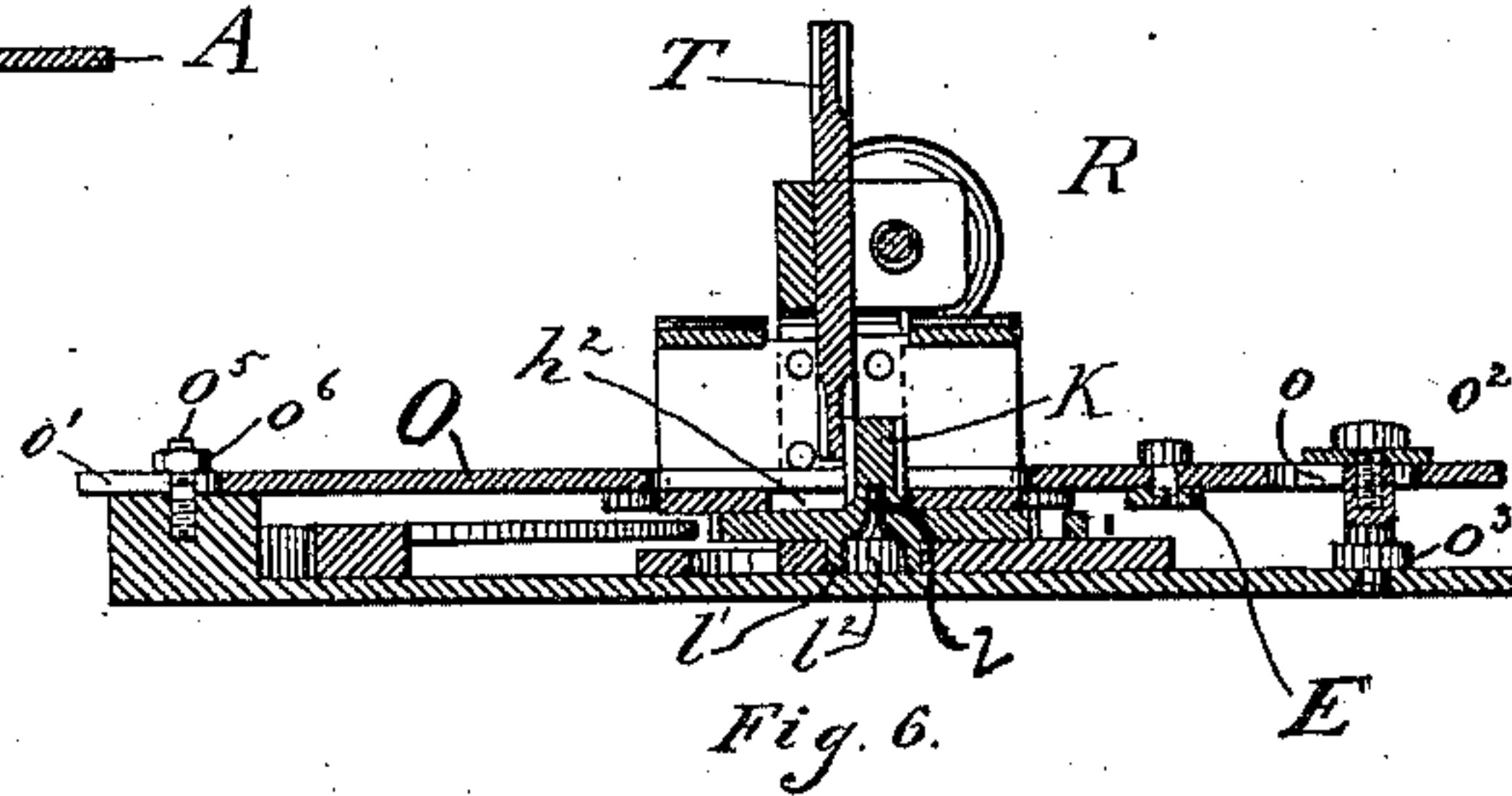
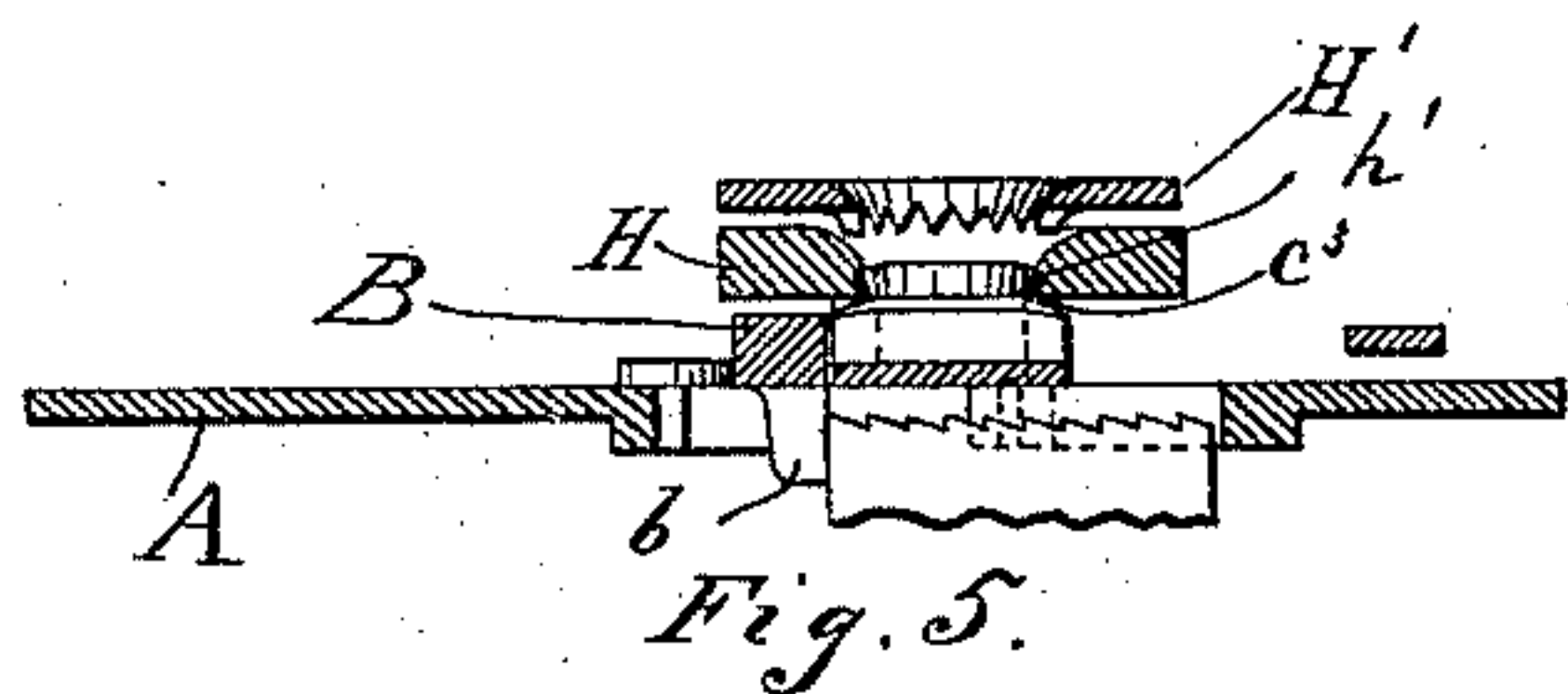
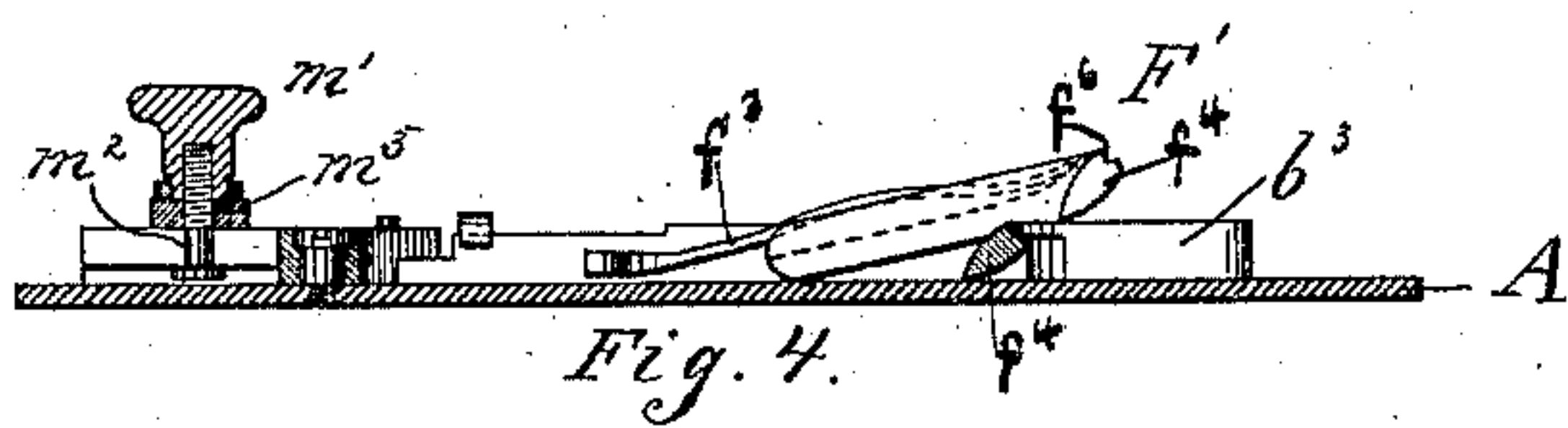
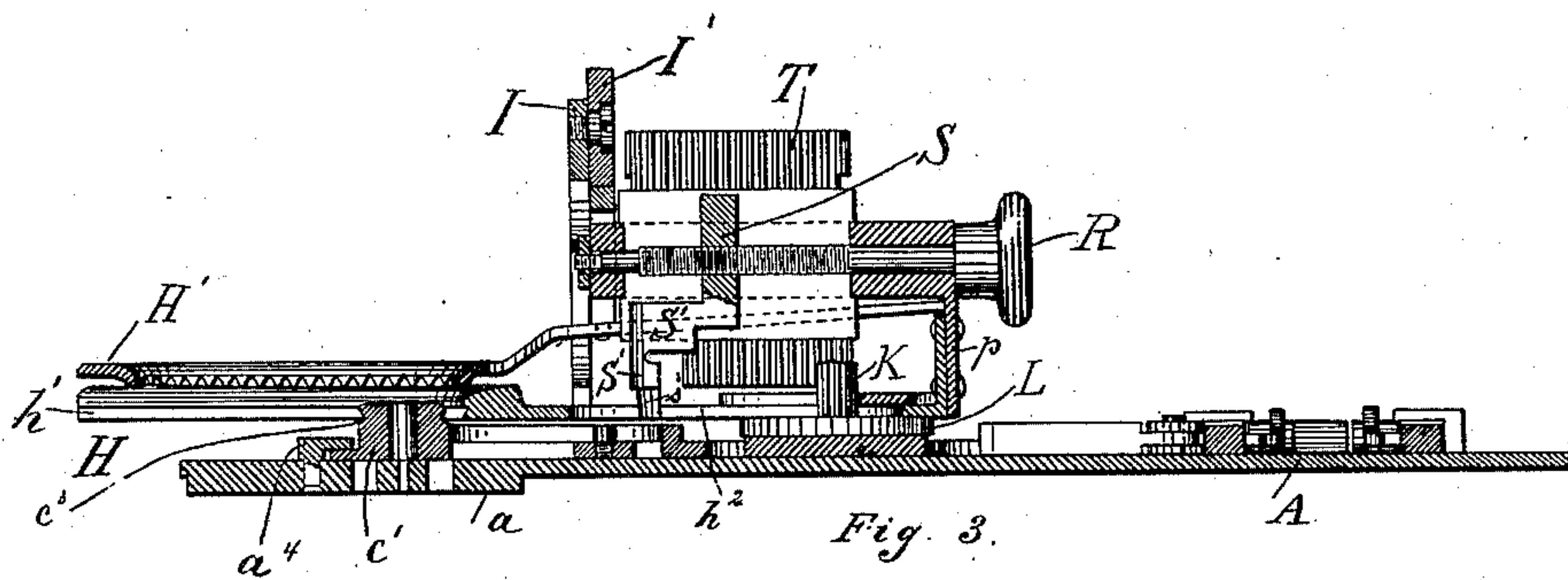
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C. S. BATDORF.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

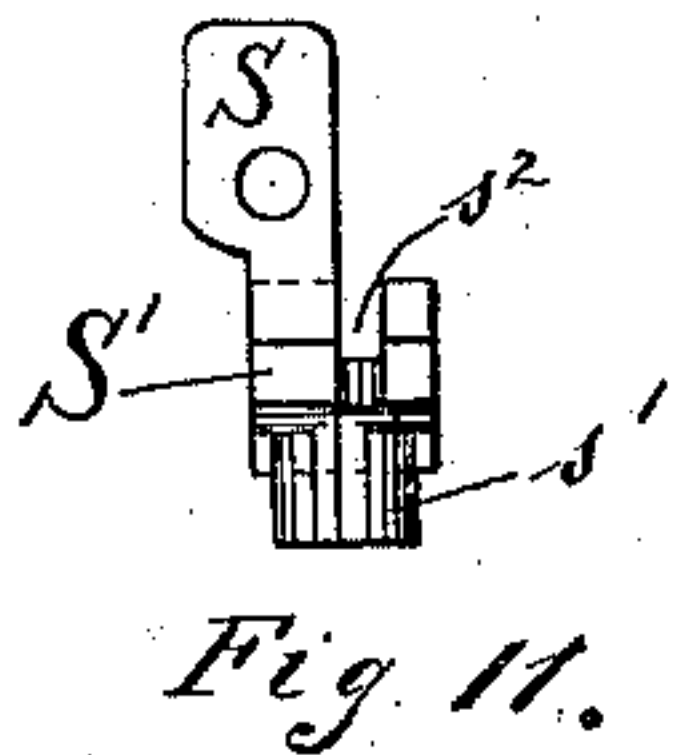
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L. Holmboe
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INVENTOR

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Price & Fisher

ATTORNEY S

(Model.)

3 Sheets—Sheet 3.

C. S. BATDORF.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

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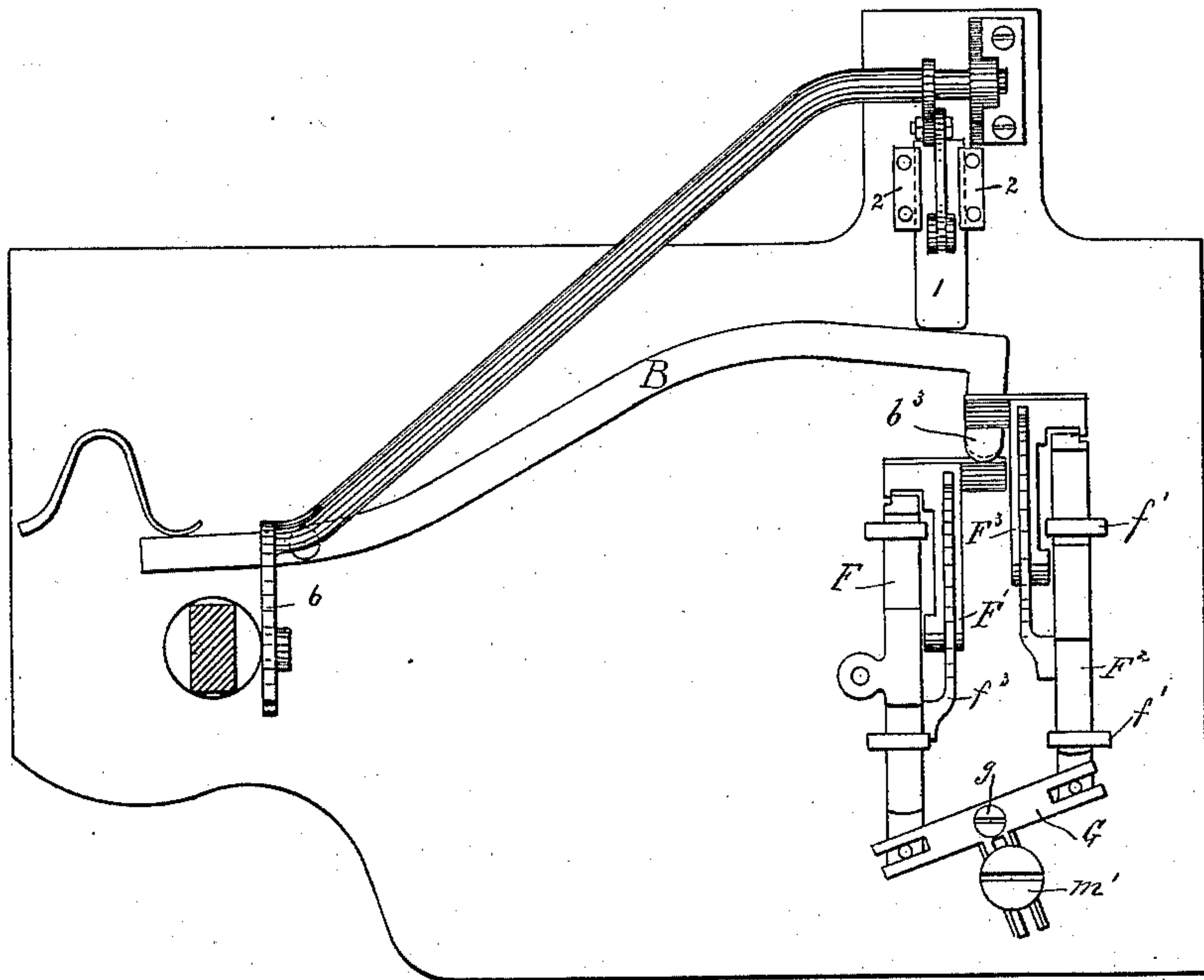


Fig. 12.

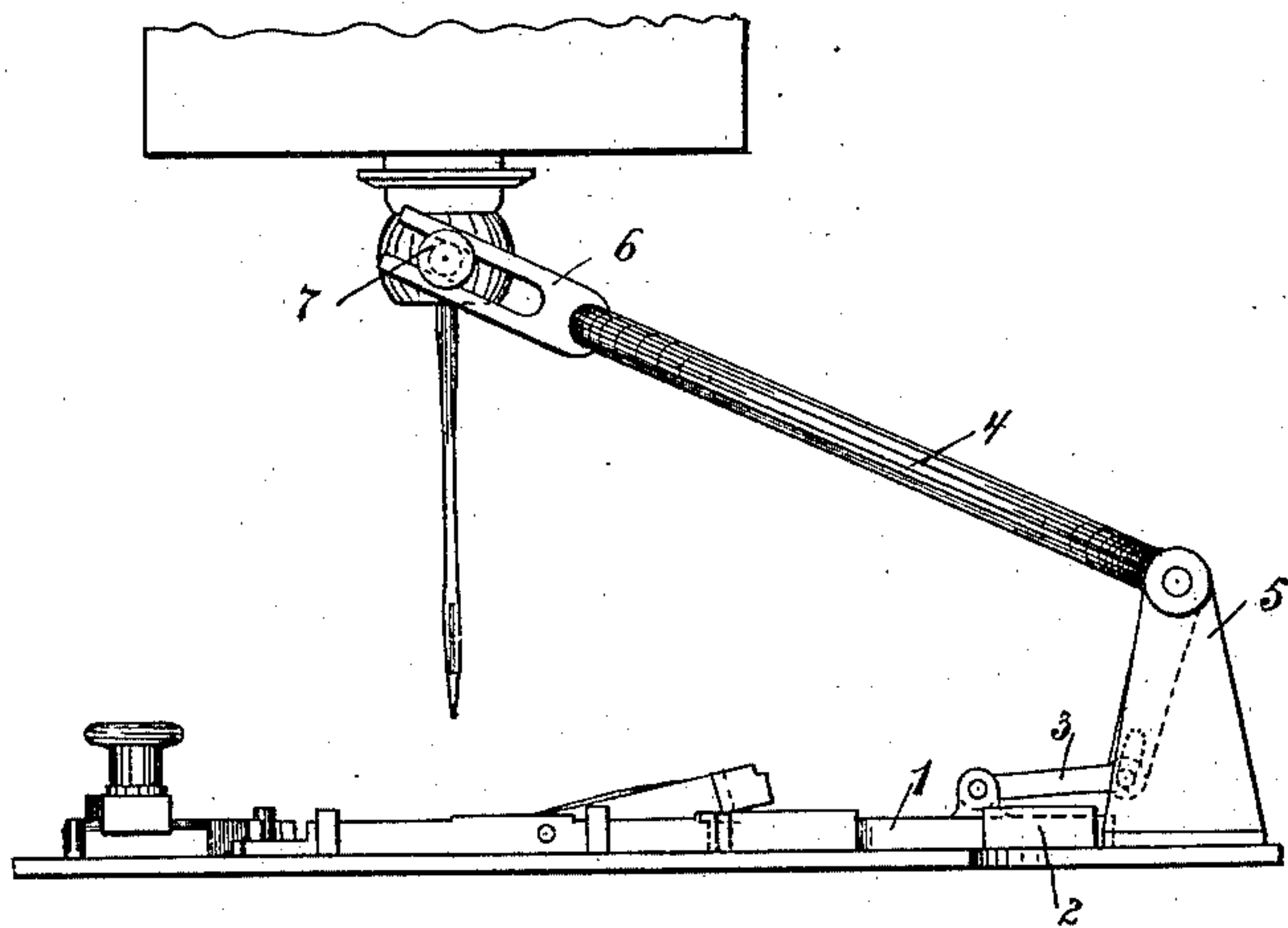


Fig. 13.

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ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES S. BATDORF, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
JOHN W. BATDORF, OF SAME PLACE.

BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 313,046, dated March 3, 1885.

Application filed March 14, 1884. (Model.)

To all whom it may concern:

Be it known that I, CHARLES S. BATDORF, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful improvements in Button-Hole Attachments for Sewing-Machines, of which I declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My present invention has for its object, first, to provide improved mechanism whereby a work-holding clamp may be vibrated beneath a sewing-machine needle; and, second, to furnish improved mechanism whereby the necessary vibrating and reciprocating movements may be given to such work-holding clamps to enable button-holes to be formed in fabric.

To this end my invention consists in imparting movement to a work-holding clamp by suitable mechanism acted upon by the feed of the sewing-machine.

My invention also consists in certain improved mechanism for giving to the work-holding clamp the vibrating and reciprocating movements necessary in the formation of button-holes, as will be hereinafter described, illustrated in the drawings, and particularly defined in the claims at the end of this specification.

Figure 1 is a plan view of my improvements as embodied in an attachment for ordinary four-motion-feed sewing-machines. Fig. 2 is a plan view with portions removed for the purpose of illustrating subjacent parts. Fig. 3 is a view in vertical longitudinal section on line *xx* of Fig. 1. Fig. 4 is a view in vertical transverse section on line *yy* of Fig. 1. Fig. 5 is a view in vertical transverse section on line *zz* of Fig. 1. Fig. 6 is a view in vertical transverse section on line *vv* of Fig. 1. Fig. 7 is a detail view in side elevation of the work-holding clamp and the movable rack-bar carried thereby. Fig. 8 is a view in vertical transverse section on line *xx* of Fig. 7. Fig. 9 is a view in horizontal section on line *yy* of Fig. 7. Fig. 10 is a detail side view of the movable rack-bar. Fig. 11 is a front view of the rack-bar clamp detached.

Fig. 12 is a plan view of parts of my improved attachment, showing means for operating the same from the needle-bar of the machine. Fig. 13 is a view in end elevation of the mechanism shown in Fig. 12.

A designates the base-plate, upon the under side of which is formed or suitably attached the circular enlargement *a*, adapted to fit around the feed in the space occupied by a like plate commonly found in sewing-machines—for example, the common four-motion feed—and having slide-plate *A'*, that will replace the ordinary shuttle-race slide when the attachment is applied to a machine. The plates *A* and *A'* are preferably connected together by means of the screw *a'*, which, when the attachment is to be placed on or withdrawn from the machine, allows the plate *A* to be raised slightly until the enlargement *a* is in place around the feed, when, by means of this screw, the plate *A* will be clamped firmly to the plate *A'*, which, with the enlargement *a*, will hold the attachment securely upon the machine.

Within the enlargement *a* and the portion of the base-plate above it is formed the feed-opening *a²*, and in this opening is held the usual needle-guard, *a³*.

Through the opening *a²*, and in position to be struck by the feed in its forward movement, passes the dependent foot *b* of the driving-lever *B*, Fig. 5, that is pivotally connected to the base-plate by the screw *b'*, and is acted upon by the spring *b²*, and has a bent end, *b³*, the function of this lever being to transmit motion from the machine-feed to the work-holding clamp, in a manner to be presently explained.

Upon the base-plate *A*, at the forward edge of the opening *a²*, is formed the guide-lug *a⁴*, beneath the overhanging edge of which, and held in place thereby, moves the cut-away end *c* of the vibrating lever *C*, that serves to give the necessary vibratory lateral movement to the work-holding clamp, and has formed thereon the rounded enlargement *c'*, having a needle-slot, *c²*, and a guide-groove, *c³*, adapted to receive corresponding V-shaped ribs or flanges of the work-holding clamp, as will hereinafter appear. In the forward portion of this vibrating lever *C* is formed the long slot *c⁴*, and

within this slot projects the pivot-pin d of the adjusting-bar D, the outer end of which is furnished with the guide-ribs d' , between which is held the lever E. The forward end of this lever E is slotted, and is held to the base-plate by means of the screw e , and its central portion is provided with the long slot e' , through which passes set-screw e^2 , that serves to connect the lever E to the adjusting-bar D.

The central portion of the vibrating lever C is bowed, as shown in Fig. 2, to allow space for other parts, and its rear end is pivotally connected to the lug f , that projects from the side of the slide-bar F of the overriding pawl F', which, with the companion slide-bar F² and pawl F³, serves to communicate movement to the vibrating lever C from the driving-lever B and the machine-feed. The slide-bars F and F² are held in a manner free to move within the guide-loops f' , and are connected together by means of the rocking bar G, that is pivotally attached by the screw g to the base-plate, and which is furnished with slots in its ends to receive the pins f^2 of the slide-bars.

To the inner sides of the slide-bars are pivoted the overriding pawls, each of which is provided in its upper surface with a groove, (shown in dotted lines, Fig. 4,) within which rests the spring f^3 , that is attached to the slide-bar, and serves to hold the pawl normally against the base.

The term "overriding" is herein employed to designate that the pawls are so constructed as to ride or pass over each other in their reciprocating movement.

The overriding pawls are preferably T-shaped, as shown, the outer arms, f^4 , being cut away to form flanged seats, within which fit the ends of the slide-bars, and the inner arms, f^5 , being formed somewhat heart-shaped in cross-section, as shown in Fig. 4, with a groove, f^6 , in the upper portion, to receive the flanged end of the arm b^3 of the driving-lever B.

From the construction of parts as thus far defined it will be seen that when, by the operation of the machine-feed striking the arm b of the driving-lever B, the rear end, b^3 , of this lever will be thrust forward until it strikes the end f^4 of the pawl F³ (assuming the parts to be in the position shown in Figs. 1 and 2) and forces the arm f^5 of this pawl to lift and pass beneath the arm f^5 of the pawl F', at the same time, through the medium of the rocking bar G, forward movement will be imparted to the pawl F', causing it to override pawl F³ and rest upon the end b^3 of the driving-lever (see Fig. 4) until the pressure of the machine-feed is withdrawn and the spring b^2 retracts the driving-lever to its first position, ready to receive the next stroke of the feed. During this operation a vibration in one direction has been given to vibratory lever C, and a like movement thereof will occur with each movement of the pawls. As the lever C vibrates upon the pin d , it will be readily seen that the

extent of vibration of the forward end of this lever can be controlled at will by shifting the position of the adjusting bar D, and, bearing in mind the fact that the work-holding clamp is connected (as will hereinafter more fully appear) to the end of this vibrating lever, it is obvious that the position of the adjusting-bar D will serve to determine the extent of the lateral throw of this clamp, and consequently the length of each stitch that is made. Thus, for example, if the machine is making a very small button-hole, and a very narrow stitch is desired, the adjusting-bar D will be moved forward, thereby bringing the pivot-pin d to the front of the slot e' , and consequently lessening the lateral movement of the work-holding clamp.

The work-holding clamp consists, essentially, of the jaws H and H', and the rear portions of these jaws are elastic, and are connected together, as seen in Figs. 3 and 7. The lower jaw, H, has formed therein the broad slot h , the side edges or ribs, h' , of which are V-shaped to fit within the peripheral groove c^3 on the enlargement c' of the vibrating lever C, and by this means the work-holding clamp is securely connected to the end of such lever.

To the lower jaw, H, is attached the yoke-standard I, through which passes the upper jaw, H', and to the top of this standard is pivoted the clamp-lever I', which bears against the yoke-standard I² on the upper jaw, H', and serves to force this jaw downward when the work is to be clamped.

In the rear portion of the lower jaw, H, is formed the broad slot h^2 , through which rises the drive-pinion K, connected to or formed integral with the ratchet-wheel L, journaled on the arbor l , affixed to the base-plate, having upon its under surface a sleeve, l' , that elevates the ratchet-wheel a sufficient distance above the base-plate to permit the free movement of the sliding rod M, the slotted end of which encompasses the sleeve l' , as clearly shown by dotted lines in Fig. 2. The upwardly-bent portion m of the sliding rod M is connected by means of the thumb-nut m' , screw m^2 , and flanged slide-clip m^3 to the arm g' of the rocking bar G, having the slot g^2 , with suitable shoulders, as seen in Fig. 4, against which bears the head of the screw m^2 . By thus connecting the end of the rod M to the rocking bar, its position relative to the pivotal point g can be varied and the extent of movement imparted to the rod can be adjusted, for a purpose to be presently stated. A pawl, M', carried by the sliding rod M and pressed forward by the spring m^4 , gears with the ratchet-wheel L, and a spring check-pawl, n , serves to guard the ratchet-wheel against backward movement. Through the rear of the work-holding clamp extends the guard-plate O, having central cut-away portion, as shown in Fig. 1, and having slots o and o' formed therein. A set-screw, o^2 , passes through the slot o and enters the threaded post o^3 , and through the slot o' passes the screw-stud o^4 , rising from the lug o^5 , and fur-

nished with the nut o^6 . The guard-plate is thus held in place, but with sufficient freedom of movement to allow for the shifting of the work-holding clamp in passing from one side of the button-hole to the other.

To the under side of the guard-plate O the end of the lever E is connected by the set-screw e^4 , that passes through the plate. It will thus be seen that any lateral shifting of the work-holding clamp will be communicated through the guard-plate O, the lever E, and the adjusting-bar D to the vibrating lever C.

To the rear of the work-holding clamp is suitably connected, as by a depending lug, p , the rack-bar frame P, the central portion of which is cut away, as shown in Fig. 9, and in the ends p^1 and p^2 of this frame are journaled the ends of the clamp-screw R. Upon the threaded portion of this screw is carried the threaded nut S, to which is connected the depending rack-bar clamp S' , that moves within the slot h^3 of the upper clamping-jaw, H' . This clamp S' is provided in its upper surface with the groove s^2 , adapted to receive the shoulder t of the double-faced or cam rack-bar T, the teeth of which are in gear with the driving-pinion K. The teeth of the rack-bar extend, as shown in Fig. 1, upon both its faces and ends, so as to form a continuous rack, with which the driving-pinion will engage. A depending guard-lip, s' , of semicircular form, serves to retain the pinion in gear with the rack when at the forward end thereof, and a like function is performed at the rear end of the rack by the end of the slot h^2 of the lower jaw, H. As it is by means of this double-faced rack-bar that reciprocating motion is imparted from the driving-pinion to the work-holding clamp, it will be readily seen that the length of the bar will determine the extent of movement of the work-holding clamp, and consequently the length of the button-hole to be formed. In order, therefore, to allow various sizes of button-holes to be formed, a number of rack-bars of different lengths will be provided, two of such bars being preferably formed upon the same plate, as seen in Figs. 3 and 7 and in detail Fig. 10. When the cam rack-bar has been slipped between the side of the rack-bar frame P and nut S and into the groove s of the clamp S' , this clamp will be advanced by the screw R until the edge s^2 of the clamp bears within the notch t' of the rack-bar, when the latter will be held securely in place, and the semicircular guard-lip s' will be in position to insure the accurate movement of the driving-pinion in the teeth at the end of the rack-bar.

The operation of my improved mechanism is as follows: Motion being imparted to the driving-lever B from the machine-feed, this lever moves the overriding pawls and their slide-bars, which in turn impart motion to the vibrating lever C, and as this lever is connected at its end to the work-holding clamp, a vibratory movement of this clamp is effected.

The progressive or reciprocating movement

of the work-holding clamp necessary to form the length of the button-hole is obtained from the overriding pawls by means of the sliding rod M, carrying the pawl M' , that engages with the ratchet-wheel L, and each backward movement of this sliding rod causes a partial revolution of the ratchet-wheel and a corresponding movement of the driving-pinion K and the rack-bar T in gear therewith. As the driving-pinion is stationary, it will be seen that its operation will cause the rack-bar and the work-holding clamp to move forward and backward at the same time that it is vibrated. When the end teeth of the rack-bar T are in gear with the driving-pinion, the movement is sufficiently retarded to allow the end of the button-hole which at such time will be formed to be securely stitched before the succeeding side of the button-hole is begun. By this operation the ends of the button-holes are rounded. As the driving-pinion passes from the teeth of one side of the rack-bar to those of the opposite side, it forces the rack-bar to move laterally a distance equal to the thickness of the rack, and in so doing moves the work-holding clamp a sufficient distance to separate the opposite rows of stitching of the button-hole.

In forming button-holes of different lengths, it is desirable to vary the width of the stitches, the distance apart of the sides, and the distance of the stitches from each other. The first two of these adjustments are simultaneously effected by the movement of the adjusting-bar D. Thus, if a very small button-hole is to be sewed, the adjusting-bar D will be moved to the forward end of the slot e' of the lever E, thus moving the pivot-pin or fulcrum of the vibrating lever C forward, and consequently shortening the throw of the lever, and decreasing accordingly the vibration of the work-holding clamp, so that very narrow stitches will be formed. Now, the distance between the opposite rows of stitches obviously depends upon the distance that the part of the work-holding clamp immediately above the enlarged end e' of the vibrating lever is moved laterally by the driving-pinion in its lateral thrust of the rack-bar, and this in turn depends upon the movement of the end e' of the lever C, as it is connected to and moves laterally with the clamp. If, therefore, the adjusting-bar D be in the forward end of the slot of lever E, and the rack-bar be forced laterally by the driving-pinion, the movement thus imparted to the rear portion of the work-holding clamp forces the guard-plate O to one side, and it in turn causes the pivoted lever E and adjusting-bar D to draw the vibrating lever a very short distance only to one side, for the reason that the adjusting-bar D is near the fulcrum e of the lever E, where its movement is but slight, and is very near the free end of the vibrating lever C. If, however, the adjusting-bar D be moved to the opposite end of the slot e' of the lever E, the lateral movement imparted to the guard-

plate O gives a greater lateral movement to the end *c'* of the vibrating lever, for the reason that the bar D, that connects the lever E and vibrating lever C, is farther from the fulcrum or pivot-point of the former and nearer to that of the latter. The distance apart of the stitches is varied by changing the position of the sliding rod M with respect to the pivot-point of the rocking bar G, as the farther this rod is held from such point the greater will be the extent of its movement, and the motion communicated to the ratchet-wheel and driving-pinion will be correspondingly increased. The distance between the stitches can also be varied by increasing or diminishing the throw of the machine-feed in the usual manner, as by so doing the extent of movement of the driving-lever and the pawls and the sliding rod can be altered.

As the shape of the button-hole is controlled by that of the double-faced or cam rack-bar, it is obvious that different forms of rack-bars can be employed to produce correspondingly-shaped button-holes. Thus, for example, if it is desired to work button-holes with eyes at their ends, the end of the rack-bar will be suitably enlarged.

While I prefer that the work-holding clamp shall receive its movements from the machine-feed, it is to be understood that the general structure of my invention may be operated from the needle-bar of the machine. Such construction is illustrated in Figs. 12 and 13 of the drawings, where motion is imparted to the driving-lever B by the slide-bar I, moving between the guide-lips 2, and having pivoted thereto the link 3, that connects with the short arm of the elbow rocking-lever 4, that is journaled in the standard 5. This elbow-lever 4 is bent, as shown, and at its forward end is provided with the slotted arm 6, that fits over the needle-screw 7 or other suitable projection on the needle-bar. From this construction it will be seen that each movement of the needle-bar will operate the driving-lever and other parts of the machine, as already described.

It will be obvious to the skilled mechanic that the details of invention above set out may be varied within wide limits without departing from the scope of the invention, and I do not wish, therefore, to be understood as limited to such details.

The work-holding clamp may be a clamp for holding other work than that in which button-holes are to be formed—as, for example, a holder for buttons that are to be sewed upon fabric where it is necessary to vibrate such buttons and fabric beneath the needle, that it may alternately enter the eyes of the buttons. In fact, wherever it is desired to vibrate a work-holder beneath a needle, my improvements will be found of value. So, also, instead of being applied as an attachment, various features of improvements may be embodied in a machine, the only function of which is to form button-holes.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an attachment for sewing-machines, the combination comprising a movable work-holding device, a pivoted lever for vibrating said work-holding device, located in the path of travel of the machine-feed, and suitable connecting mechanism, substantially as described.

2. In an attachment for sewing-machines, the combination comprising a movable work-holding device, a pivoted lever having its shorter end located in the path of the machine-feed, and suitable connecting mechanism, substantially as described.

3. In an attachment for sewing-machines, the combination, with a work-holding clamp, of a pivoted lever for operating said clamp, arranged to extend in the path of the machine-feed, so as to be struck by the feed in its forward movement, a spring for holding said lever pressed forward, and connecting mechanism, substantially as described.

4. In an attachment for sewing-machines, the combination, with the base-plate and the work-holding clamp, of mechanism for imparting vibratory movement to said clamp, comprising two reciprocating pawls movably mounted in horizontal position on the base-plate and in suitable connection with the work-holding clamp, and means suitable for alternately operating said pawls, substantially as described.

5. The combination, with a work-holding clamp, of mechanism for vibrating the same, comprising a vibrating lever connected with said clamp, two reciprocating pawls in connection with said lever and movably held in horizontal position, and a driving-lever for alternately operating said pawls, substantially as described.

6. The combination, with the work-holding clamp, of mechanism for vibrating the same, comprising a vibrating lever connected with said clamp, two reciprocating pawls in suitable connection with said lever, a rocking bar suitably connected with said pawls, and mechanism for operating said pawls, substantially as described.

7. In a button-hole attachment for sewing-machines, the combination, with the work-holding clamp, of mechanism for imparting vibratory movement thereto, comprising two reciprocating overriding pawls, a vibrating lever connected with the work-holding clamp and with said pawls, and a suitable device for operating said pawls, substantially as described.

8. In a button-hole attachment for sewing-machines, the combination, with the work-holding clamp, of the vibrating lever, the reciprocating pawls, the sliding bars for said pawls, means—such as the driving-lever—for operating said pawls, and suitable connecting mechanism, substantially as described.

9. In a button-hole attachment for sewing-machines, the combination, with the work-holding clamp, of the vibrating lever, the re-

reciprocating pawls, the sliding bars, the rocking bar connecting said sliding bars, and the driving-lever, substantially as described.

10. In a button-hole attachment for sewing-machines, the combination, with the work-holding clamp having upper and lower slotted portions, of the vibrating lever having a part adapted to fit within the lower slotted portion, reciprocating pawls for operating said lever, a fixed pinion projecting through said lower slotted portion, and a rack-bar plate held within the upper slotted portion of the work-holding clamp, a ratchet-wheel for operating said pinion, a pawl for said ratchet-wheel, and a sliding rod connected to said pawl, substantially as described.

11. In an attachment for sewing-machines, the combination, with the reciprocating work-holding clamp, of mechanism for moving said clamp, comprising a single rack-bar plate having a continuous rack upon its opposite faces, a fixed pinion, and means for imparting motion to said pinion, substantially as described.

12. The combination, with the work-holding clamp and mechanism—such as a lever—for vibrating said clamp, of mechanism for reciprocating said clamp, comprising a movable double-faced rack-bar plate, a fixed pinion, a ratchet-wheel, and a sliding rod and pawl for operating said ratchet-wheel, substantially as described.

13. In an attachment for sewing-machines, the combination, with a fixed base-plate and a work-holding clamp movably mounted thereon, of operating mechanism for said clamp, comprising a pinion fixed to said base-plate, means for operating said pinion, and a removable rack-bar plate having a continuous rack around the same, substantially as described.

14. In a button-hole attachment for sewing-machines, the combination, with a work-holding clamp, of mechanism for reciprocating said clamp, comprising a fixed pinion, a vertical rack-bar plate having teeth upon each face thereof, and adapted to move around the fixed pinion, and a clamp for holding the rack-bar plate in vertical position, substantially as described.

15. In a button-hole attachment for sewing-machines, the combination, with the work-holding clamp, of mechanism for reciprocating the same, comprising a continuous removable rack-bar plate, a fixed pinion, a clamp for holding the rack-bar plate in position, and an adjustable guard for holding the pinion in gear with the rack-bar plate, substantially as described.

16. In a button-hole attachment for sewing-machines, the combination, with the work-holding clamp, of mechanism for reciprocating said clamp, comprising a fixed pinion and suitable operating mechanism, and a double-faced reversible rack-bar plate, substantially as described.

17. In a button-hole attachment for sewing-machines, the combination, with the work-holding device, of the vibrating lever and the rack-bar and pinion for vibrating and reciprocating said device, and mechanism—such as the adjusting-bar and suitable connections with the rack-bar—whereby the distance between the rows of stitches of the button-holes may be varied, substantially as described.

18. In a button-hole attachment for sewing-machines, the combination, with the work-holding clamp, the rack-bar carried by said clamp, and the pinion for said rack-bar, and a vibrating lever for said clamp, of an adjusting-bar carrying the fulcrum for said lever, substantially as described.

19. In a button-hole attachment for sewing-machines, the combination, with the work-holding device, of a rack-bar, a pinion, suitable means—such as a ratchet-wheel and lever—for operating said pinion, and means—such as a rocking bar—for operating said lever, said lever and rocking bar being adjustably connected together, substantially as described.

20. In a button-hole attachment for sewing-machines, the combination, with the work-holding device, of the vibrating lever C and suitable operating mechanism therefor, the pivoted lever E, the adjusting-bar D, and the guard-plate O, substantially as described.

21. The combination, with the work-holding clamp, of the vibrating lever C, the slide-bars F F², the pawls F' F³, pivoted thereto, rocking bar G, and driving-lever B, substantially as described.

22. The combination, with the work-holding clamp, of the vibrating lever C, the slide-bars F F², the pawls F' F³, the rocking bar G, the sliding rod M, the pawl M', ratchet-wheel L, pinion K, rack-bar T, and clamp for holding said rack-bar, substantially as described.

In testimony whereof I have hereunto set my hand this 10th day of March, 1884.

CHARLES S. BATDORF.

In presence of—

JNO. W. BATDORF,
GEO. P. FISHER, Jr.