

(No Model.)

4 Sheets—Sheet 1.

W. SCHOTT.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 379,666.

Patented Mar. 20, 1888.

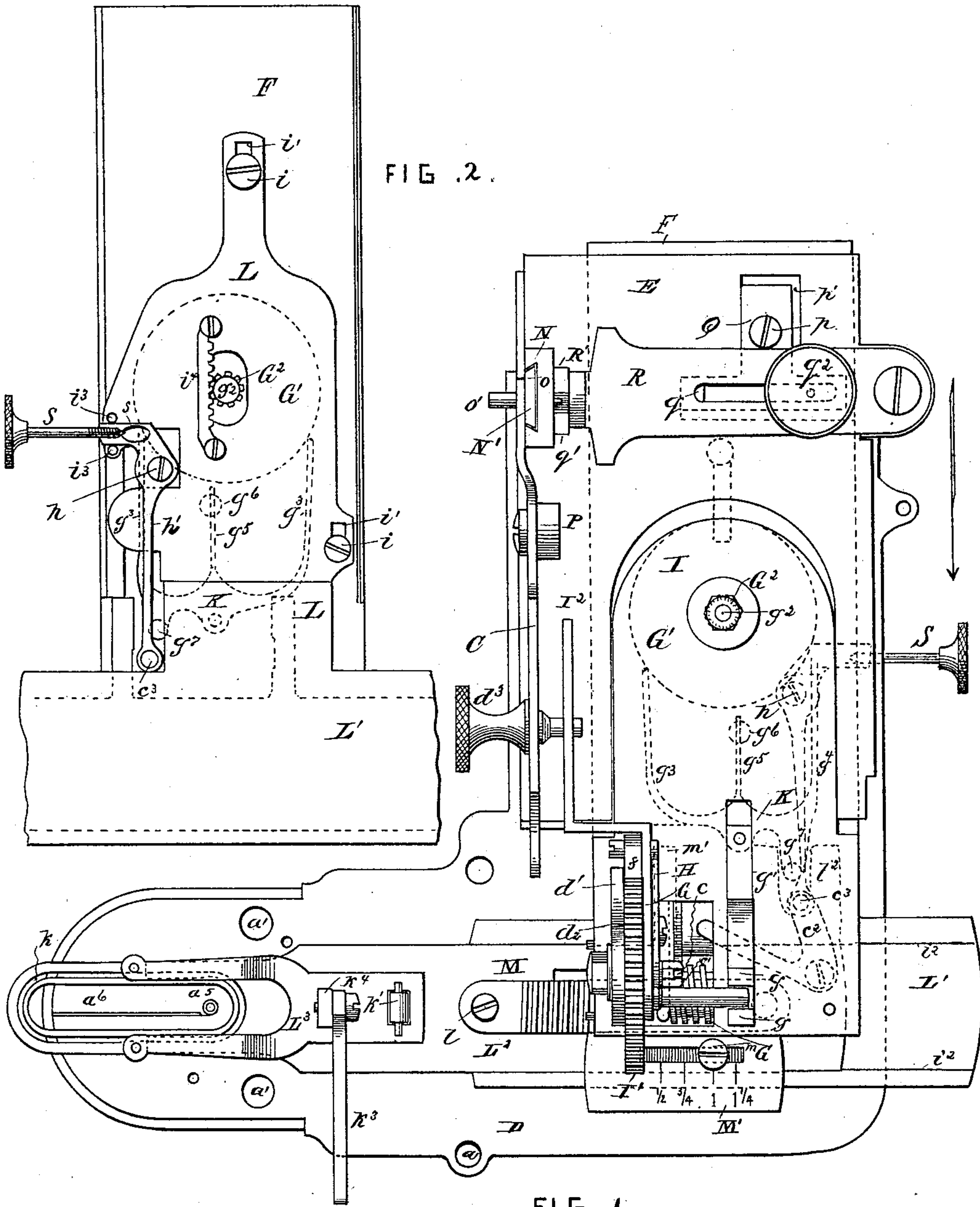


FIG. 1.

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INVENTOR:

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BY

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(No Model.)

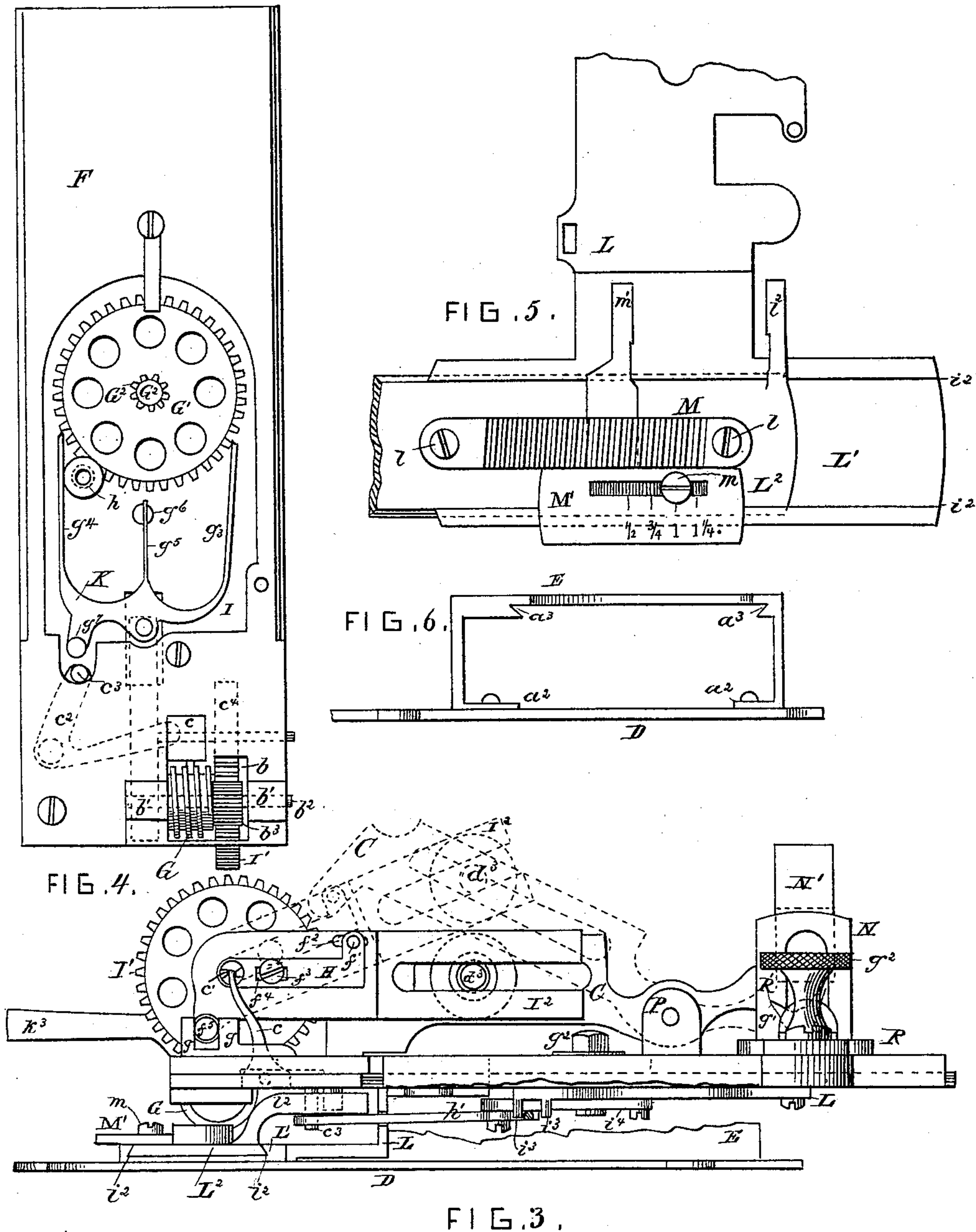
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4 Sheets—Sheet 3.

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BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

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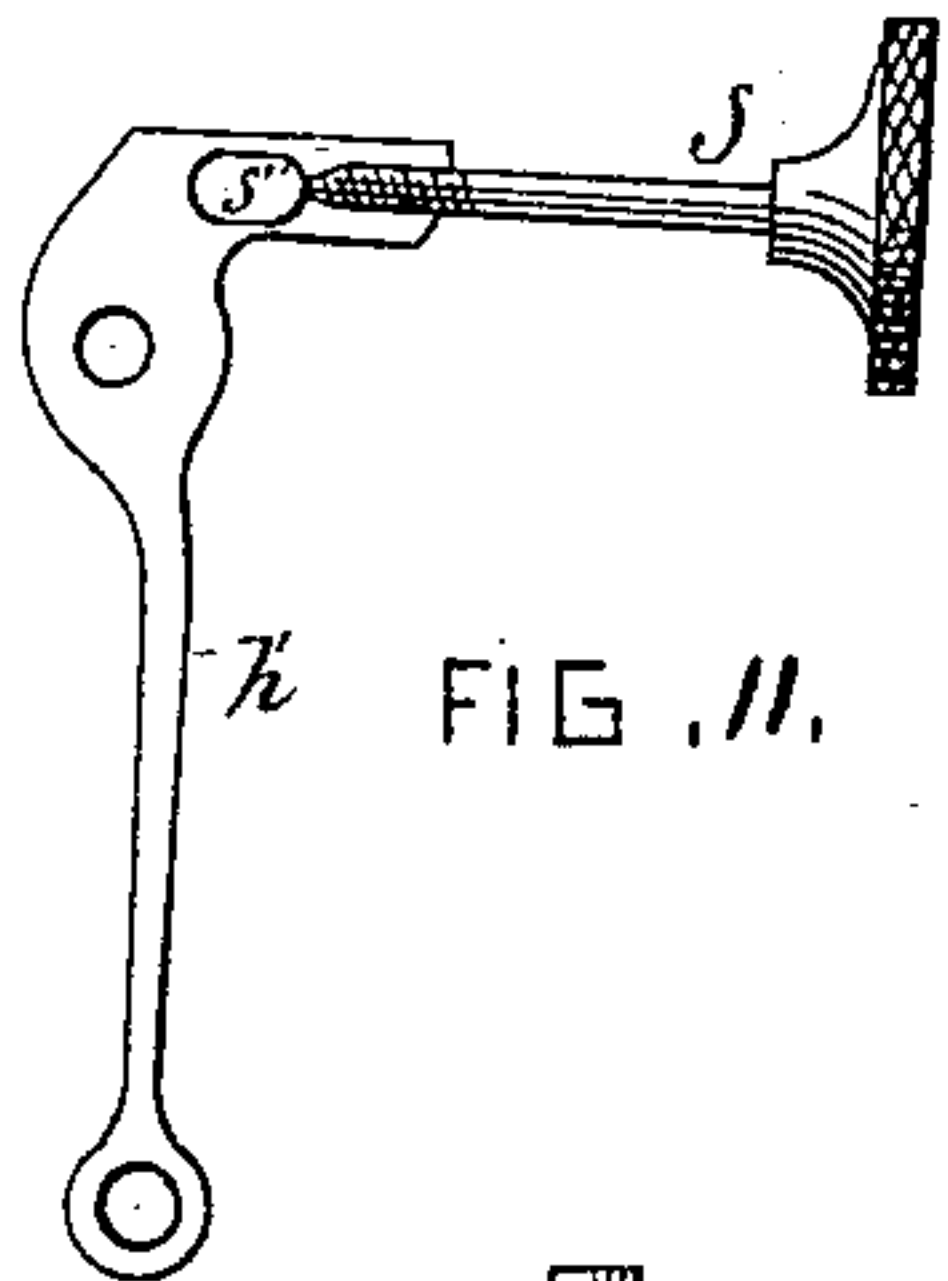


FIG. 11.

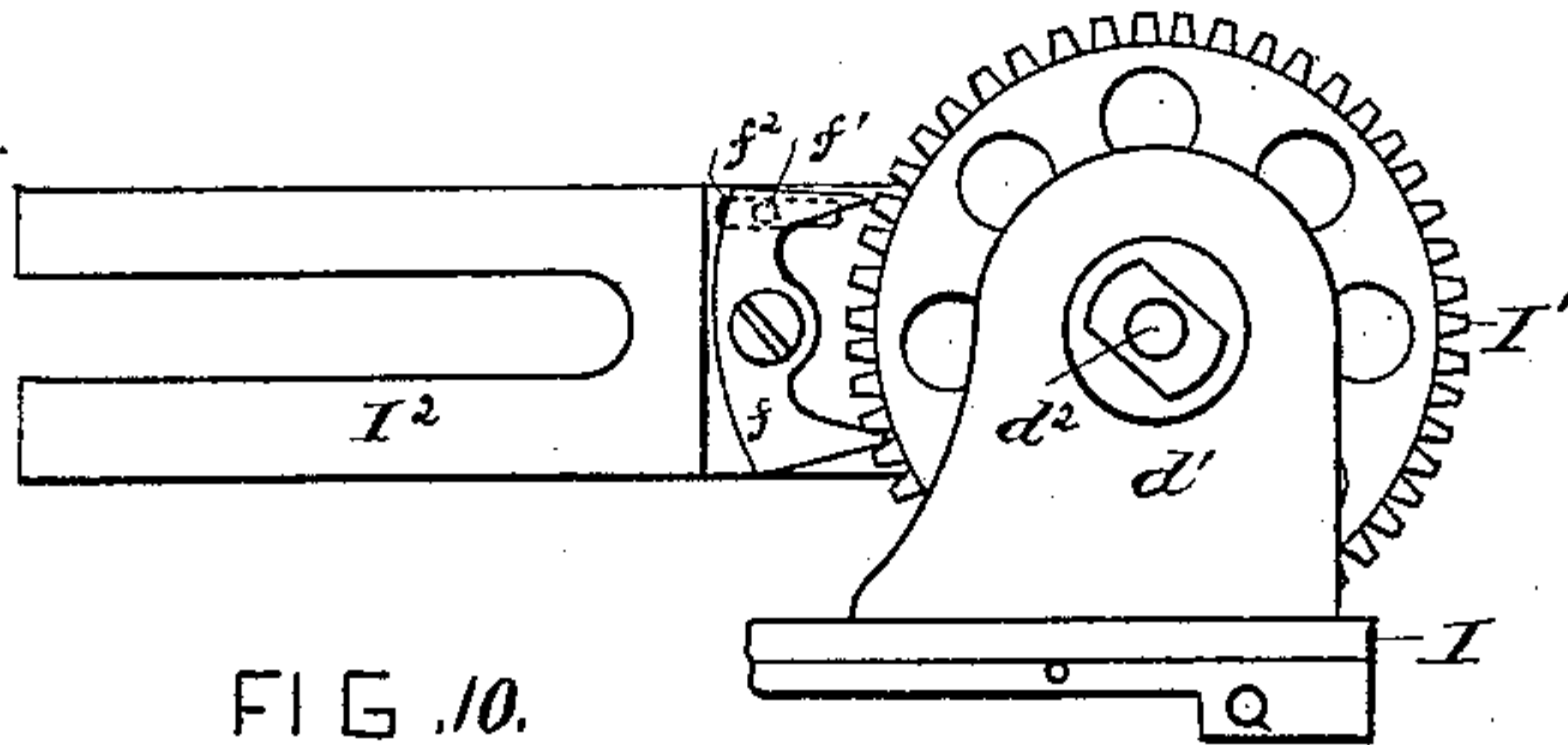


FIG. 10.

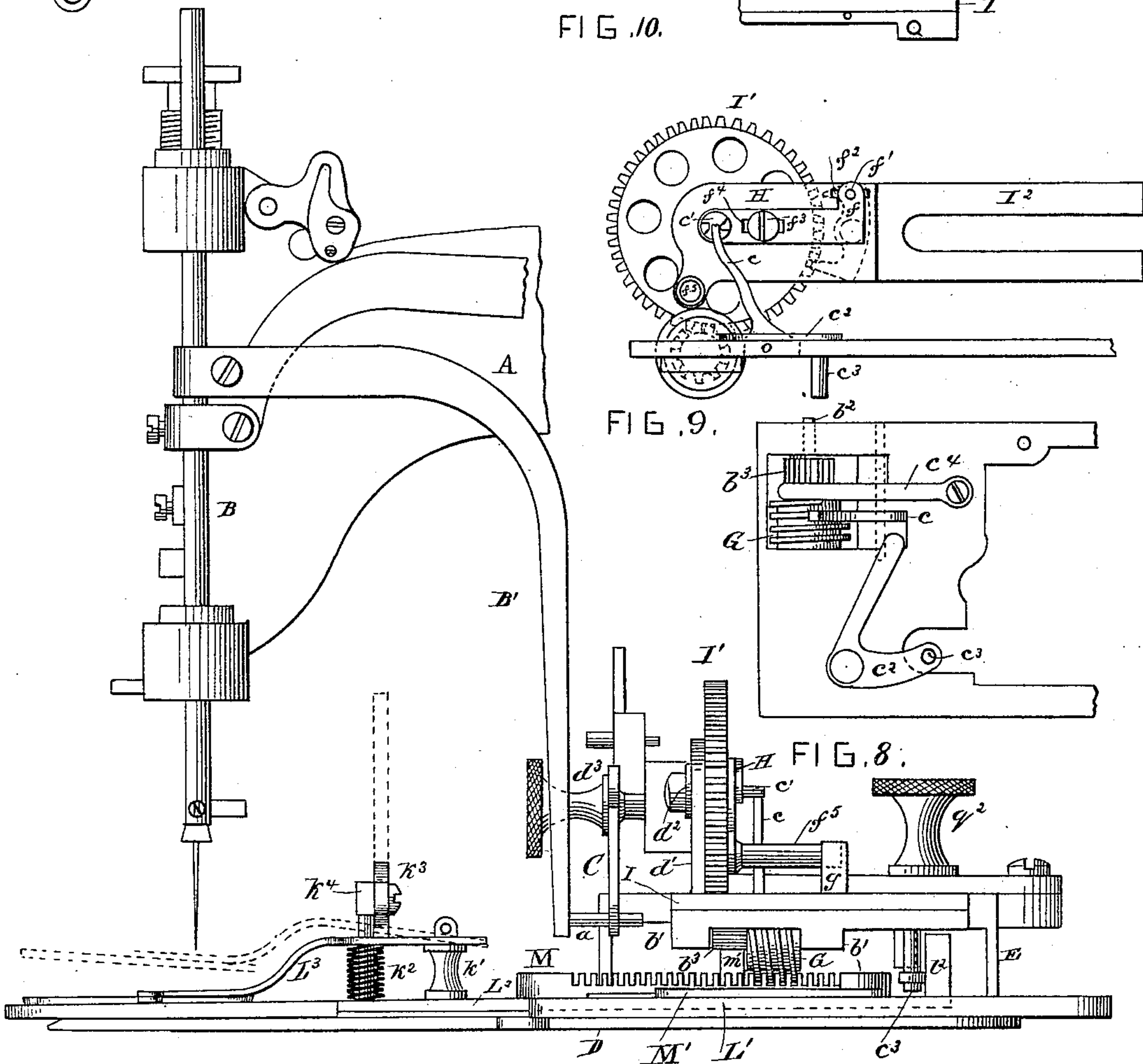


FIG. 7.

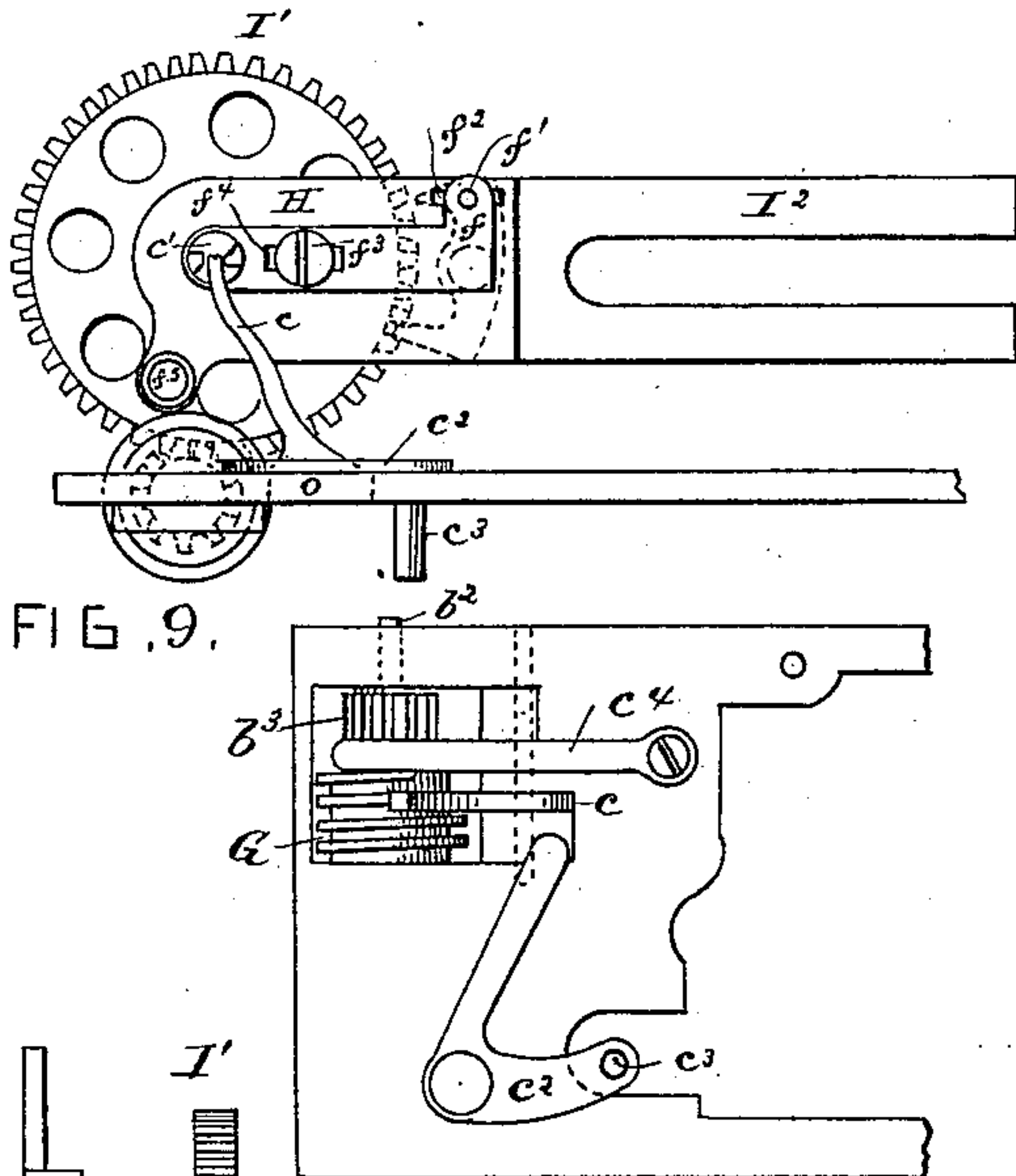


FIG. 9.

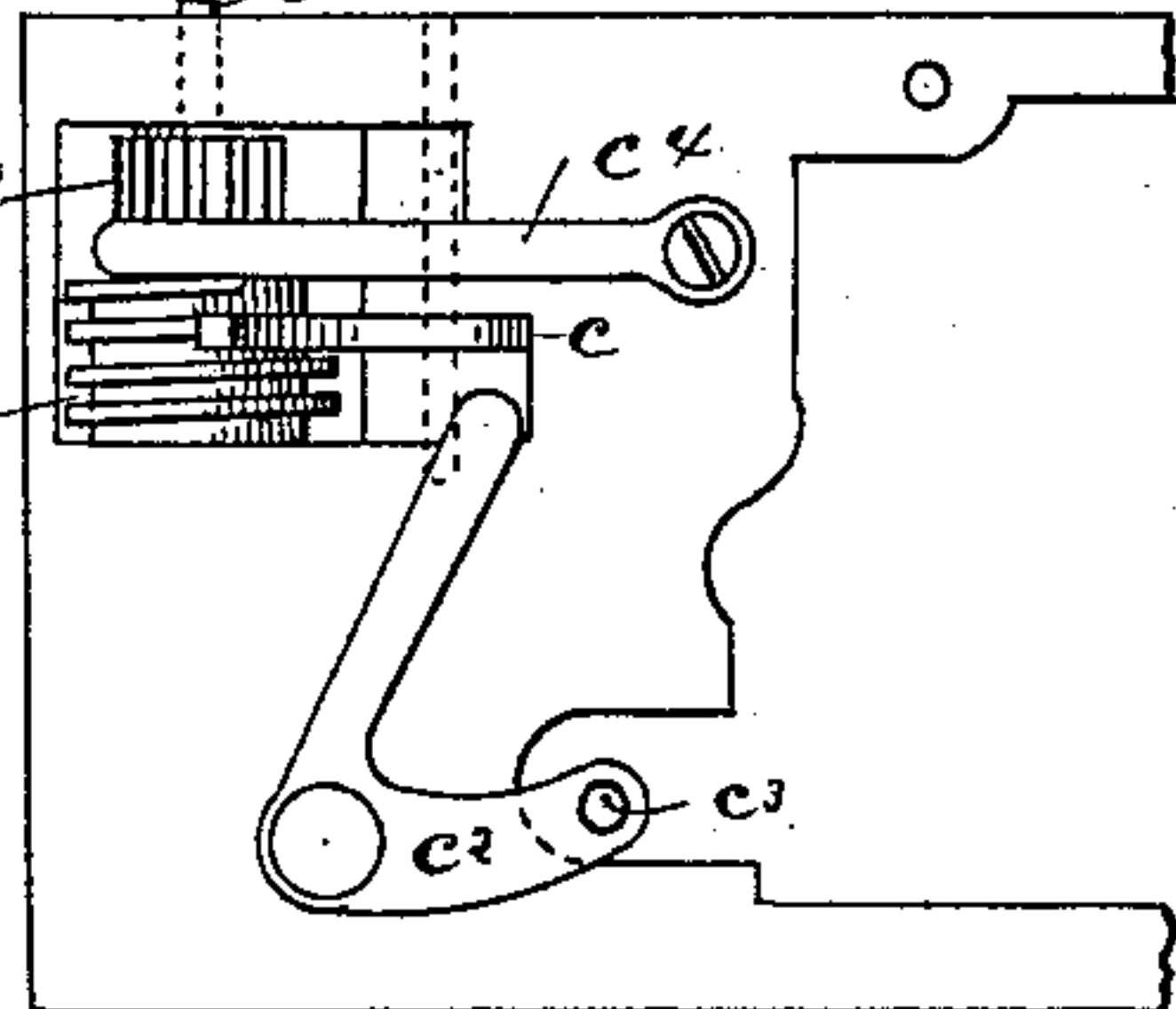


FIG. 8.

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Fig. 13.

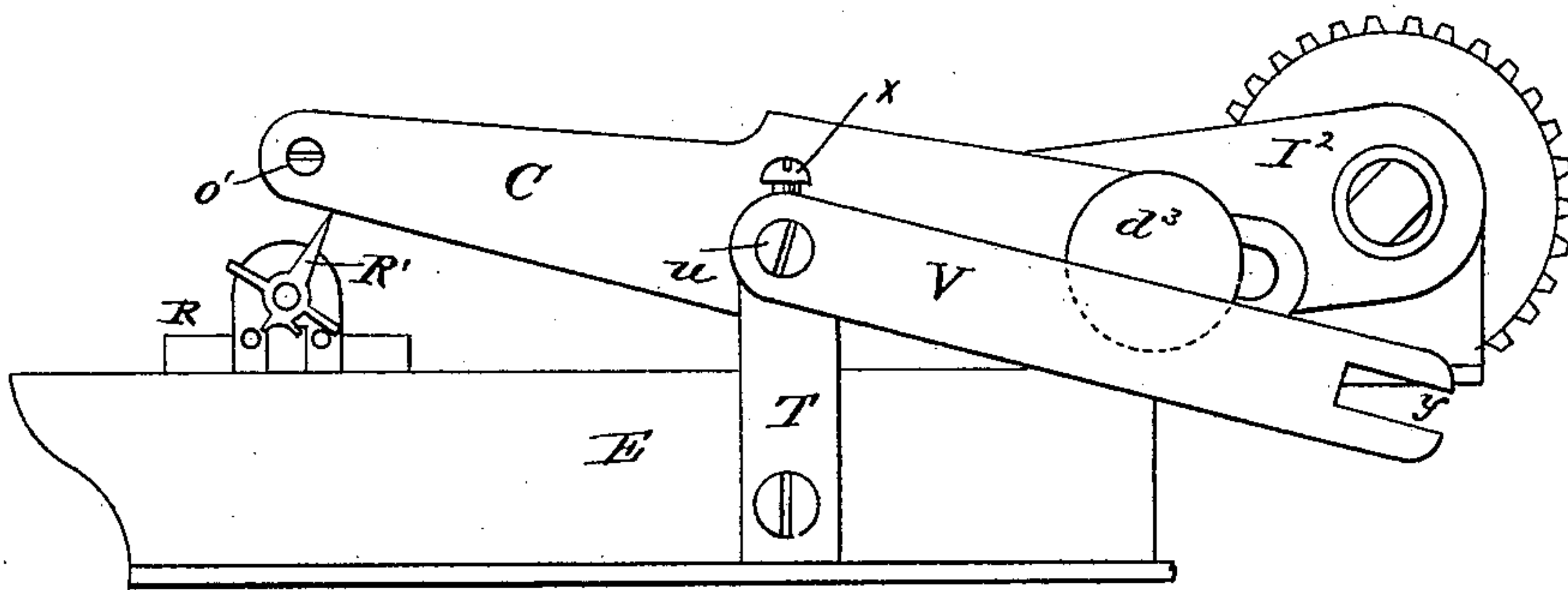
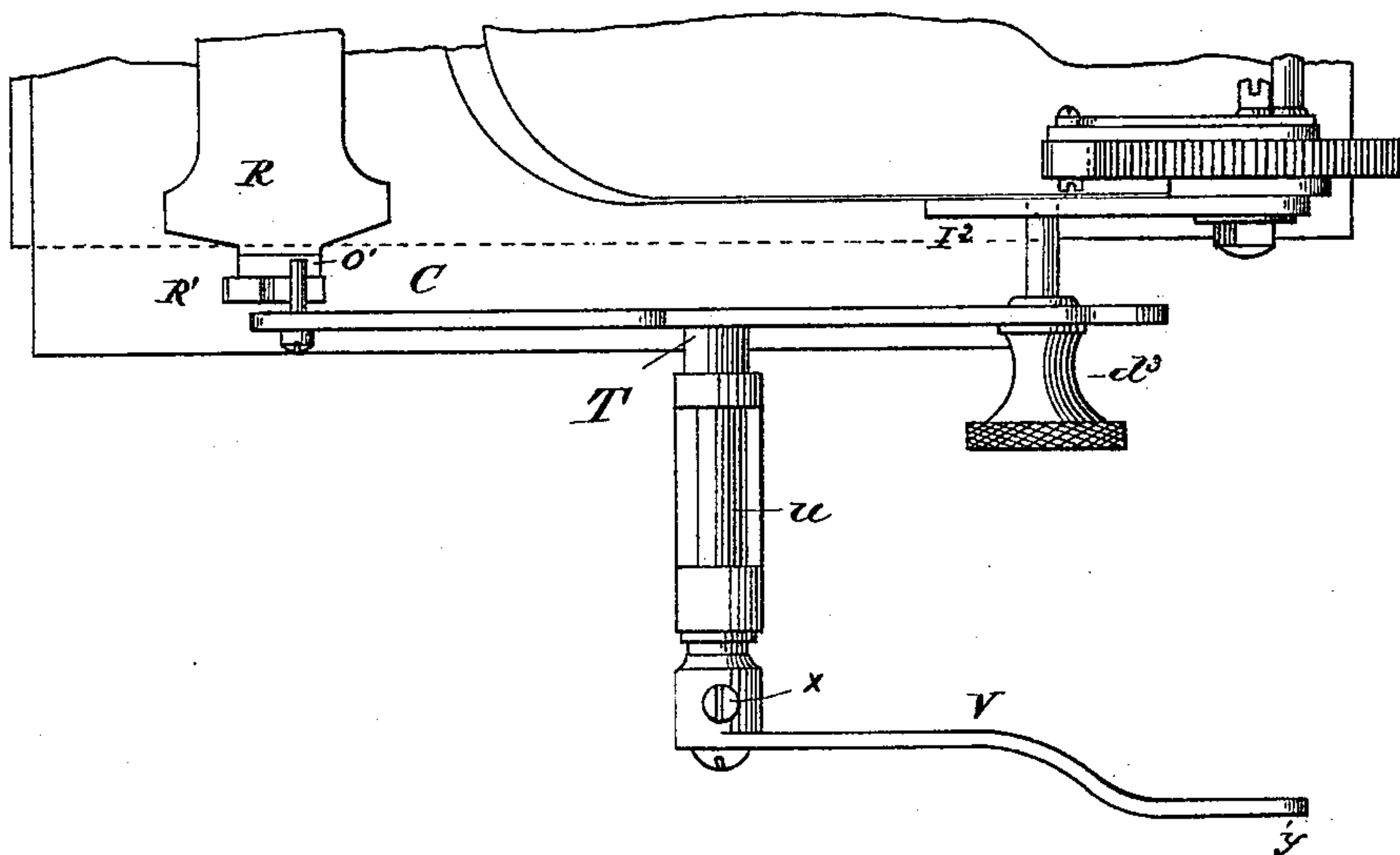


fig. 12.

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# UNITED STATES PATENT OFFICE.

WILLIAM SCHOTT, OF NEW YORK, N. Y., ASSIGNOR TO THE SCHOTT BUTTON HOLE ATTACHMENT COMPANY, OF SAME PLACE.

## BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 379,666, dated March 20, 1888.

Application filed December 11, 1886. Serial No. 221,254. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM SCHOTT, of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Button-Hole Attachments for Sewing-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention is designed as an improvement on the button-hole attachment for sewing-machines for which I have obtained Letters Patent of the United States Nos. 292,591, 310,915, 336,165, 348,640, and 351,802; and its object is to perfect said attachment, making automatic in their action the devices that control the length of the button-hole, the devices that control the length of the button-hole bars and thereby the width of the button-hole opening or center space, and also the devices that change the direction of movement of the cloth-clamp and its connections, and applying, in lieu of certain parts already patented, as aforesaid, other novel mechanisms and combinations thereof, whereby the attachment is greatly simplified and made more durable and effective.

Reference is to be had to the accompanying drawings, forming part of the specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of my improved button-hole attachment. Fig. 2 shows the reverse of the clamp-carrying plate and its attachments connected with the reciprocating foot. Fig. 3 is a side elevation of the attachment with parts broken away to exhibit other parts. Fig. 4 shows the reverse of the reciprocating foot and attachments. Fig. 5 is a plan of a portion of the angle-plate carrying in its grooved head the cloth-clamp plate with attached worm-rack and adjustable gage-plate for regulating the length of the button-holes. Fig. 6 is a front elevation of the carrier-plate in position on the bottom plate. Fig. 7 is a front elevation of my button-hole attachment secured to the head of a Wheeler & Wilson sewing-machine. Fig. 8 is a plan of a portion of the reciprocating foot, showing also the at-

tached square-threaded feed-worm which gives motion to the cloth-clamp plate and a portion of the improved device for reversing the motion of said worm. Fig. 9 is a side elevation of a portion of the reciprocating foot, feed-lever, and feed cog-wheel, and of the finger-lever which operates to throw the feed-pawl in and out of connection with the feed cog-wheel. Fig. 10 is a reverse side elevation of the same. Fig. 11 is a plan of the expanding lever and screw. Fig. 12 is a side elevation of a portion of the button-hole attachment, showing modifications of certain parts. Fig. 13 is a plan of the same.

In the drawings, Fig. 7, A represents the head of a Wheeler & Wilson sewing-machine, B the needle-bar thereof, and B' an arm suitably secured at its upper end to the needle-bar and having projecting from its lower end a stud, *a*, which engages in the fork of the actuating-lever C to impart to parts of the button-hole attachment the motion of said needle-bar when the sewing-machine is in operation.

The bottom plate, D, of the attachment is designed to be securely fastened to the throat-plate or back-slide of a sewing-machine by means of screws entered through the screw-holes *a'*, or by being riveted to the throat-plate, if it be thereto attached. This bottom plate is a new feature in my improvements on button-hole attachments, and is adopted for the reason that it has been found best to have a constant and unvarying support for other parts of the device. It is provided with a needle-hole, *a<sup>5</sup>*, and a slot, *a<sup>6</sup>*, for a button-hole cutter to pass into when cutting a button-hole. The carrier-plate E also differs from those previously patented, and consists of a flat plate having a broad opening extending from its front edge to about its center, with sides bent down at right angles, said sides having inward-extending lugs *a<sup>2</sup> a<sup>2</sup>*, through which screws are entered to secure said plate to and parallel with the bottom plate, D, as best shown in Fig. 6, so that the two plates together form, as it were, a rectangular box with open ends, and in the reverse face of the plate E are two parallel longitudinal grooves, *a<sup>3</sup> a<sup>3</sup>*, for the reciprocating foot F to slide in. These plates D E may be joined together in any other con-



venient manner without departing from my invention.

The reciprocating foot F, set in the grooves  $a^3$  of the carrier-plate E, has in its front end a rectangular opening,  $b$ , at the sides of which, on the reverse side of the plate, are lugs  $b'$   $b'$ , Figs. 4, 8, and 9, in which is journaled a shaft,  $b^2$ , carrying a pinion,  $b^3$ , and a square-threaded worm, G, both rigidly connected with each other and adapted to move loosely on their shaft. Directly in rear of this worm G, and in the opening  $b$ , is pivoted by its base an upward-extending finger-lever,  $c$ , Figs. 3, 7, 8, and 9, which is designed to be constantly engaged in the slotted lug  $c'$  of the pawl-actuating plate H, for the purposes hereinafter set forth. Also, on the front of the reciprocating foot F is pivoted an elbow-lever,  $c^2$ , one arm of which operates as a spring and has its free end resting on the base of the finger-lever  $c$  in such a manner that on change of position it may cause the tip of said lever to force the pawl-actuating plate H in either direction to make the attached feed-pawl engage one or the other of its ends, as the case may be, in the feed cog-wheel I', hereinafter described, to revolve the same in one or the other direction, or cause said plate H to remain in a central position, with its attached pawl disengaged from said cog-wheel. From the extremity of the other arm of this elbow-lever  $c^2$  a pin,  $c^3$ , (best shown in Figs. 3, 4, 7, 8, and 9,) extends down through the reciprocating foot to make contact with certain mechanism, hereinafter described, by which the said elbow-lever may be moved to operate the finger-lever  $c$ . On the front end of said reciprocating foot is also fixed a counter friction-spring,  $c^4$ , (best shown in Fig. 8,) which extends over and in contact with the pinion  $b^3$ , to prevent the reaction of said pinion  $b^3$ , and worm G, for holding them in position when the changes in the direction of the motion of the feed cog-wheel I' are being made.

The wheel-carrying plate I, made narrow and with rounded rear end to correspond with the opening in the plate E, is secured by suitable screws (not shown) to the reciprocating foot F on the top thereof, and has extending up from one edge a standard,  $d'$ , in which is journaled an axle,  $d^2$ , carrying, loosely set thereon, the feed cog-wheel I', that meshes with the pinion  $b^3$  on the worm-shaft  $b^2$ , and said axle  $d^2$  carries, rigidly fixed on its inner end, the feed-lever I<sup>2</sup>, whose slotted rear end is adjustably held by screw-stud  $d^3$  in contact with the actuating-lever C.

The feed-lever I<sup>2</sup> is centrally bent at right angles for accommodation of other parts of the mechanism, its forked end being again bent parallel with its front end, as best shown in Fig. 1. On this front end, near the aforesaid bend, is pivoted the double feed-pawl  $f$ , Figs. 1, 9, and 10, adapted to engage with the teeth of the feed cog-wheel I', and a pin,  $f'$ , extends at right angles from this pawl  $f$  through a slot,

$f^2$ , in the feed-lever I<sup>2</sup> into the tail of the pawl-actuating plate H, which latter is movably secured, so that it may be moved by the lever  $c$  on the face of the feed-lever I<sup>2</sup>, by a screw,  $f^3$ , that passes through a slot,  $f^4$ , in the said plate and into the said lever, Figs. 3 and 9.

From the lower and front end of the feed-lever I<sup>2</sup> a stud,  $f^5$ , Figs. 1, 3, 7, and 9, projects at right angles to engage in the jaws  $g$ , Figs. 3 and 7, of a forked double pawl, K, which pawl K is held in a horizontal position against the under side of the wheel-carrying plate I by resting on the face of the reciprocating foot F and by the projection of its jaws  $g$  up through a slot,  $g'$ , preferably dovetailed, Fig. 1, in the said wheel-carrying plate I, and on the rear and rounded end of the wheel-carrying plate I, on the under side thereof, is pivoted, by pivot  $g^2$ , the horizontal barring cog-wheel G' and pinion G<sup>2</sup>, which revolve in a horizontal plane. This double pawl K, which is in the shape of a yoke with projecting handle, Figs. 1 and 4, its jaws  $g$  being on said handle at right angles thereto, has its legs  $g^3$   $g^4$  made thin, so as to be capable of easily springing, and of such length that they make operative contact, one on each side of the cog-wheel G', with the teeth thereof when desired; and to further secure the said pawl K in central position to hold its legs normally out of contact with the cog-wheel teeth a spring-tongue,  $g^5$ , is extended centrally from between the legs into a slot in a stud,  $g^6$ , which is also secured in the under side of the said wheel-carrying plate I, said slot permitting the said tongue to move back and forth in some degree for the matter of adjustment. On a shoulder of this yoke-pawl K is a round projecting stud,  $g^7$ , the function of which will be hereinafter set forth. Also fixed on the under side of the wheel-carrying plate I is a standard,  $h$ , Figs. 2 and 4 on which is pivoted an expanding elbow-lever,  $h$ , whose long eyed arm is engaged over the pin  $c^3$  of the lever  $c^2$ , constructed to spring or yield slightly under pressure, the functions of which will be hereinafter set forth.

A T-shaped angle-plate, L, is movably secured to the bottom of the reciprocating foot F by screws  $i$ , passing into said foot through slots  $i'$  in said plate, as indicated in Fig. 2, and its head or front end, L', which is extended transversely to the body, has parallel dovetailed grooves  $i^2$ , on and in which the cloth-clamp plate L<sup>3</sup> rests and slides.

From the reverse side of the angle-plate L, near an edge thereof, two studs,  $i^3$ , project downward for the short arm of the expanding lever  $h'$  to engage between, so that the said lever may be operated by the movement of said plate. Also on the under side of the plate L is secured a pinion-rack,  $i^4$ , that is designed to be engaged by the pinion G<sup>2</sup>, which projects down through a slot in the plate L. (Shown best in Fig. 2.)

The cloth-clamp plate L<sup>2</sup>, above alluded



to, which is entered into the grooves  $i^2$  of the head  $L'$  of the plate  $L$ , so that it may be moved to the right and left therein, has an ellipsoidal or oblong slot or opening,  $k$ , in its narrower end, over and upon which the button-holes to be stitched are designed to be placed. A post,  $k'$ , fixed on said plate  $L^2$ , has hinged on or to its top the cloth-clamp  $L^3$ , which is further supported by a spiral spring,  $k^2$ , that permits the depression of said clamp and operates to return it to the normal position when released by the cam-lever  $k^3$ , which is used to force said clamp down for holding the material to be stitched. Said cam-lever  $k^3$  is pivoted on the head of a standard,  $k^4$ , that rises from the plate  $L^2$  and passes up through the spring  $k^2$  and clamp  $L^3$ . (Best shown in Figs. 1 and 7.)

On the face of the clamp-plate  $L^2$ , and parallel therewith, is secured, by screws  $l$ , a flat rack,  $M$ , having formed in its upper face square-edged parallel teeth set at a suitable angle for the meshing therewith of the worm  $G$ , by means of which the said plate  $L^2$  is moved lengthwise to the right and left during the operation of stitching a button-hole.

The thread and teeth, respectively, of the worm  $G$  and rack  $M$  are made square-edged, to provide against the possibility of the disengagement of the former from the latter because of any resistance that may be offered to the right and left motion of the plate  $L^2$  by the material held in the cloth-clamp when a button-hole is being stitched. Were the said screw-threads and teeth of the usual  $V$  shape, the liability of the disengagement of the worm from the rack would be very great when operating on heavy goods. Also secured on the rear end of the plate  $L^2$ , and extending at right angles from the inward edge thereof, is an upward and rearward projecting stop-finger,  $l^2$ , Figs. 1, 3, 5, and 7, whose functions will be hereinafter set forth. By the outer edge of the rack  $M$  on said plate  $L^2$  a measuring-gage,  $M'$ , is held by screw  $m$ , so that it may be moved in the direction of the length of said plate. The slotted head of this gage  $M'$  has a graduated scale marked on it, as shown, whereby may be measured the desired length of button-holes. The shank of this gage is carried beneath the rack  $M$ , as indicated in Figs. 1, 5, and 7, said rack having its under face cut away between its ends, as shown in Fig. 7, to afford room for the said gage shank, and said shank has on its extremity a stop-finger,  $m'$ , which projects upward and rearward parallel with the finger  $l^2$  of the plate  $L^2$ . Said gage may be set in any desired position to measure and determine the length of a button-hole by loosening the screw  $m$  and moving the gage, so as to increase or diminish, as the case may be, the space between the rigid finger  $l^2$  and the adjustable finger  $m'$ , and then said gage should be fixed rigidly in place by turning down the screw  $m$ .

As in my Patents Nos. 310,915 and 336,165, above referred to, there rises from one side of

the carrier-plate  $E$ , near the rear end thereof, a vertical standard or frame,  $N$ , having a groove,  $o$ , for holding and guiding a gate,  $N'$ , which is provided with a horizontal rod,  $o'$ , rigidly fixed in it and extending through beyond each face thereof. The outer end of this rod  $o'$  is designed to be engaged in an end of the actuating-lever  $C$ , that is pivoted on a standard,  $P$ , fixed on the carrier-plate, and with the other end of said lever  $C$  the stud  $a$  of the arm  $B'$  (attached to the needle-bar of the sewing-machine) makes connection, as hereinbefore set forth, Fig. 7, whereby the motion of said needle-bar is transmitted to said lever  $C$ , and by it to the feed-lever  $I^2$  through its connection therewith—the adjustable stud  $d^3$ . By adjusting this stud  $d^3$  to the one hand or the other, as may be desired, in the slot of the lever  $C$  and fork of the lever  $I^2$ , the limit of the motion of the said lever  $I^2$ , and consequently of its attached feed pawl  $f$ , over the teeth of the feed cog-wheel  $I'$  is determined, and consequently the extent of the peripheral movement of the said cog-wheel and that of the pinion and worm  $b^3$   $G$ , respectively, (with the former of which the said cog-wheel meshes,) at each upward reciprocation of the needle-bar, and as the distance traveled by the cloth-clamp plate  $L^2$  (which holds the material to be stitched) between the downward strokes of the needle-bar is governed through the engagement of the worm  $G$  in the rack  $M$  by the distance covered by the periphery of the cog-wheel  $I'$  at each upward stroke of the needle-bar, it follows that in stitching a button-hole the distance between the stitches may be determined by the adjustment of said stud  $d^3$ , to regulate the throw of the lever  $I^2$ .

Adjustably secured by a screw,  $p$ , on the reciprocating foot  $F$ , beneath a corresponding and larger aperture,  $p'$ , in the carrier-plate  $E$ , is a transversely-slotted yoke,  $Q$ , like that shown and described in the Patent No. 310,915, above referred to, designed for engagement with the mechanism for moving the said foot  $F$ , the shank of said yoke being extended rearward.

A reciprocating lever,  $R$ , constructed and operated like that shown in the Patents Nos. 310,915 and 336,165, above referred to, is pivoted at one end on the carrier-plate  $E$ . Across the face thereof is a flattened plate having a central longitudinal slot  $q$ . A spring (not shown) secured on the under face of the lever  $R$  has its free end bearing up against the inferior points of the said latch  $R'$ , for the purpose of holding the latter temporarily at whichever angle it may be moved by the downward motion of the rod  $o'$  when the latter is forced down alternately upon the inclined planes of the head of the said latch.

A screw-stud (not shown) having its head so as to be movable therein in the slot of the yoke  $Q$  and its shoulder in the slot of the reciprocating lever  $R$ , with its threaded end projecting up through said lever and provided



with a thumb-nut,  $q^2$ , serves as the adjustable connection between the lever R and the reciprocating foot F. By loosening this nut  $q^2$  the operator is enabled to move the screw-stud on which it is fixed along the slots of the yoke Q and lever R, and thereby adjust—shorten or lengthen—the throw or reciprocation of the said foot F, which receives its motion from said lever, and consequently shorten or lengthen the bite of the stitches.

When the parts are in the positions shown in Figs. 1 and 7, with the cloth-clamp and clamp-carrying plate in the extreme forward position, to the extreme left of the operator, with the needle-hole  $a^5$  of the bottom plate just beneath the right-hand end of the opening  $k$  of the plate  $L^2$ , and the reciprocating-foot and angle-plate drawn in or rearward to their full extent, as shown in Figs. 1 and 7, and the device is connected with a sewing-machine, substantially as shown in the latter figure, the actuating-lever C, moving up and down with the reciprocation of the needle-bar, transmits the motion to the feed-lever  $I^2$ , and thence, through the feed-pawl  $f$ , to the feed cog-wheel  $I'$ , and thence to the pinion  $b^3$ , whereby the worm G is revolved. The said worm, thus revolving and meshing in the rack M, imparts a lengthwise motion to the clamp-carrying plate  $L^2$ , moving it to the right of the operator. The actuating-lever C at the same time operates through the gate  $N'$  and stud  $o'$ , reciprocating them up and down upon the latch  $R'$ , to cause the reciprocating lever R to reciprocate the foot F, which latter carries backward and forward with it, at every reciprocation of the needle-bar, the wheel-carrying plate I, the angle-plate and its extension  $L L'$ , respectively, and the clamp-carrying plate  $L^2$  and its attachments.

In Figs. 12 and 13 modifications of certain parts of my attachment are shown, wherein the standard P is dispensed with, and in lieu thereof a bracket, T, is secured to a side of the carrier-plate E, so as to extend out at right angles therefrom, and in the bearings of this bracket is journaled a shaft, U, to the inner end of which is rigidly secured the actuating-lever C, which is thereby supported in position. On the outer end of this shaft U an arm, V, is held by a set-screw,  $t$ . The free end of said arm is slotted to engage over a stud (not shown) of the lower needle-bar clamp, so that the motion of the needle-bar may be transmitted, through the said arm V, to the lever C. In this modification, also, the frame N and gate  $N'$  are dispensed with, and the rod  $o'$  is fixed to the free end of the lever C to operate on the latch R; also, in this modification the feed-lever  $I^2$  is made straight, as shown, instead of being bent at right angles. Thus the construction of the device may be simplified without detracting from its efficiency.

In operating this device I will, for instance, begin stitching at the middle of the right-hand button-hole bar or end. The feed-pawl  $f$  is disengaged from the feed cog-wheel  $I'$ , because

the stop-finger  $l^2$  is in contact with the pin  $c^3$  of the elbow-lever  $c^2$  and has moved the spring-arm of said lever in such a position upon the base of the finger-lever  $c$  as to cause the tip of said finger-lever to move the pawl-carrying plate H forward and to hold it there, thereby disengaging both teeth of the feed-pawl  $f$  from the feed cog-wheel  $I'$ , so that the latter shall not be revolved, and consequently shall not, through the pinion and worm  $b^3$  G, respectively, give any motion to the clamp-carrying plate and its attached clamp, in which latter is held the material to be stitched. (Not shown.) At the same time the pin  $c^3$  of the elbow-lever  $c^2$  is in contact with the stud  $g^7$  of the pawl K and swings said pawl on its pivot sufficiently to make it engage one leg with the horizontal cog-wheel  $G'$ , connected with which is the pinion  $G^2$ . Now this pinion  $G^2$  is, as aforesaid, engaged with the rack  $i^4$  on the angle-plate L in such a position that three or four reciprocations of the feed-lever  $I^2$ , whose stud  $f^5$  is engaged in the jaws  $g$  of the pawl K, and consequent reciprocating longitudinal motions of the said pawl (one leg of said pawl being engaged in the teeth of the cog-wheel  $G'$ ) will cause said cog-wheel  $G'$  to revolve slowly—one tooth for every reciprocation of the needle-bar—thus, through connection of pinion  $G^2$  with cog-wheel  $G'$  and rack  $i^4$ , causing the angle-plate L and clamp-carrying plate  $L^2$  to move outward in the direction of the arrow, Fig. 1, until the rear stud,  $i^3$ , fixed in the angle-plate L, shall come in contact with the short arm of the expanding lever  $h'$ . The needle-bar and needle operating all this time, the right-hand end of the button-hole is thus stitched or barred across from center of bar to inner side of button-hole. Then, the plate L still moving outward, the rear stud,  $i^3$ , pressing against the short arm of the said lever  $h'$ , throws the long arm thereof, which is in engagement with the pin  $c^3$  of the elbow-lever  $c^2$ , inward to the right of the operator, thus forcing the spring end of said elbow-lever forward on the base of the finger-lever  $c$ , thereby causing the tip of said lever  $c$  to force the pawl-carrying plate H forward, and thereby bringing one tooth of the feed-pawl  $f$  in engagement with the feed cog-wheel  $I'$  and causing the latter to revolve, whereby the clamp-carrying plate  $L^2$  and attached clamp are moved, through pinion  $b^3$  and worm G, continuously to the right until the stitching of the inner side of the button-hole is accomplished. The gage  $M'$  at the same time being set to determine the length of the button-hole, as soon, then, as the inner side of the button-hole is stitched the stop-finger  $m'$  of said gage will, because of the movement as above of the plate  $L^2$  to the right, make contact with the pin  $c^3$  of the elbow-lever  $c^2$ , thereby throwing the spring end of said lever on the center of the base of the finger-lever  $c$ , causing the latter, through the medium of the plate H, to throw the feed-pawl  $f$  out of engagement with the feed cog-wheel  $I'$ . At the



same time the said gage-stop finger  $m'$  presses against the stud  $g'$  of the yoke-pawl K, swinging said pawl on its pivot, and thus forcing the opposite leg thereof in engagement with the cog-wheel  $G'$ . The reciprocation of the feed-lever  $I^2$ , connected, by means of its pin  $f^5$ , with the yoke-pawl handle, will cause the said horizontal cog-wheel  $G'$  to revolve, and thereby move the angle-plate L, clamp-carrying plate  $L^2$ , and clamp  $L^3$  backward opposite to the direction of the arrow, Fig. 1, through the medium of the pinion  $G^2$  and rack  $i^4$ , and during this backward movement the barring of the forward end of the button-hole is accomplished by the continued reciprocation of the needle-bar. As this backward movement approaches its close, the forward stud,  $i^3$ , on the plate L is brought in contact with the short arm of the expanding lever  $h'$ , thereby causing the long arm thereof, through the medium of the pin  $c^3$ , to swing the elbow-lever spring-arm from its position on the center of the base of the finger-lever  $c^2$  to one side thereof, whereby said finger-lever is moved to force the pawl-carrying plate H rearward opposite the direction of the arrow, Fig. 1, thus bringing the other tooth of the feed-pawl  $f$  in contact with the feed cog-wheel  $I'$  to reverse the former motion thereof. The pinion  $b^3$  and worm G now having their motion reversed by connection with the moving cog-wheel  $I'$ , the clamp-carrying plate  $L^2$ , with the rack in which said worm is engaged, is thereby moved toward the left of the operator and the opposite or outer edge of the button-hole is stitched during this movement. Then, when this is done, the stop-finger  $l^2$  of the plate  $L^2$  comes in contact with the pin  $c^3$  of the elbow-lever  $c^2$  and throws the spring end of said lever on the center of the base of the finger-lever  $c$ , moving the latter to cause the feed-pawl  $f$  to become disengaged from the feed cog-wheel  $I'$ , and at the same time the said stop-finger  $l^2$  presses against the yoke-pawl stud  $g'$  and thereby operates to arrange the parts of the device for the barring of the other half of the right end of the button-hole, in the same manner as is hereinbefore described for the barring of the first half thereof.

It will be seen that to regulate the length of a button-hole the operator will move the gage-plate  $M'$  to the right or left, as the case may be, according to the length of the hole desired or already cut in the cloth, and then secure it in place by turning down the set-screw  $m$ , thus bringing the stop-finger  $m'$  of the said gage nearer to or farther, as the case may be, from the stop-finger  $l^2$  which is parallel with it, and so that in the operation of the device the said finger  $m'$  will make earlier or later contact—earlier for a short button-hole and later for a longer one—with the pin  $c^3$  of the elbow-lever  $c^2$  as the operation of stitching progresses, thus arresting, as above set forth, the motion of the feed cog-wheel  $I'$  sooner or later, and thereby stopping the lengthwise motion of the clamp-

plate and clamp and at the same time operating, as already described, to automatically adjust certain parts of the device for the barring of the button-hole. The stop-finger  $l^2$  operates in the same manner and to the same purpose as the finger  $m'$ , its position, however, determining the beginning and end of the stitching of the button-hole.

In order to regulate the width of the button-hole opening or center space between the rows of stitches I have devised a novel arrangement, (shown in Figs. 1, 2, and 11,) wherein the short arm of the expanding lever  $h'$  is split, as shown at  $s'$ , and a tapering thumb-screw, S, introduced therein, by means of which said arm may be slightly spread or expanded when desired. Now, as has been hereinbefore set forth, when the button-hole attachment is operating for the barring of a button-hole, the angle plate L, provided with studs  $i^3$ , is moving forward or backward, as the case may be, and the contact of one of said studs with the short arm of the lever  $h'$ , which rests between them, causes the said lever  $h'$  to operate to stop the barring and begin or resume the stitching of the sides of the button-hole. It is evident then, the angle-plate L being in motion, that the sooner one of the studs  $i^3$  comes in contact with the lever  $h'$  the sooner will the barring be checked, the shorter the bar will be, and consequently the narrower the center space of the button-hole.

Were the distance to be traveled by a stud  $i^3$  before making contact with the lever  $h'$  invariably the same, all the button-holes made by the attachment would have center spaces of like width. To obviate this I set the studs  $i^3$  so far apart that the normal space allowed between the sides of the short arm of the lever  $h'$  and the studs  $i^3$  is such that the longest bar desirable, and consequently the widest center space, may be made in the button-hole before one of said studs shall make contact with the said lever, while by turning the set-screw S into the split end of said lever I expand the latter as may be desired, so that the said stud may make earlier contact and operate to make a shorter button-hole bar and narrower center-space.

Without departing from my invention a modification of the expanding lever herein shown may be made—for instance, the short arm of said lever  $h'$  may be made solid and externally threaded and an externally-tapering thumb-nut may be screwed thereon, so that when said nut is turned up or down it will, in effect, increase or diminish, as the case may be, the size of the short arm of the said lever between the studs  $i^3$ . Other modifications may be devised to enlarge or expand the short arm of this lever at will; but as they all must essentially be equivalents of those herein described it is not deemed necessary to specify them.

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

1. A button-hole attachment for sewing-ma-



chines containing the following elements: a carrier-plate supporting and guiding a reciprocating foot, a reciprocating foot supporting a single worm adapted for moving the cloth-clamp plate and its attachments to the right and left, means for reciprocating the reciprocating foot and regulating the bite of the stitches, means for regulating the throw of the feed-lever and thereby the distance between the stitches, devices for automatically controlling the length of a button-hole, devices for automatically controlling the length of a button-hole bar and thereby the width of the central opening of the button-hole, and devices for automatically changing the direction of movement of the cloth-clamp plate and cloth-clamp, all arranged and operating substantially as herein shown and described.

2. In a button-hole attachment for sewing-machines, substantially as herein specified, the combination, with the mechanism for transmitting the motion of the needle-bar to the cloth-clamp plate and with the cloth-clamp plate and a square-threaded rack fixed thereon, of a reversible pinion and square-threaded worm set on a shaft, the said worm and pinion receiving motion directly from the feed cog-wheel and transmitting it to the cloth-clamp plate through the medium of the rack, as herein set forth.

3. In a button-hole attachment for sewing-machines as a means for controlling the length of the button-hole bars and the consequent width of the central opening of the button-hole, the combination, with mechanisms, substantially as herein shown and described, for moving the cloth-clamp plate in and out in the direction of its width, of the lever  $c$ , the lever  $c^2$ , pin  $c^3$ , carried by the lever  $c^2$ , and the adjustable gage provided with a finger designed to engage said pin and intermediate connections, substantially as shown and described, for automatically arresting said inward and outward movement of the cloth-clamp plate as soon as a button-hole bar of the predetermined length has been made, as set forth.

4. In a button-hole attachment for sewing-machines, the combination, with an adjustable gage provided with a stop-finger adapted and arranged to be set on the attachment to fix or determine the length of a button-hole to be stitched, of suitable mechanisms comprising the stop-finger  $l^2$ , feed cog-wheel  $I'$ , elbow-lever  $c^2$ , pin  $c^3$ , carried by said lever, the lever  $c$ , and the sliding plate and attached pawl, substantially as herein shown and described, whereby the lengthwise motions of the cloth-clamp plate may be automatically arrested when the button-hole has been stitched its predetermined length on one side and be held so arrested until the barring of an end of the button-hole is completed, as set forth.

5. In a button-hole attachment for sewing-machines, provided with a cloth-clamp plate arranged to be fed lengthwise by a worm and provided with suitable mechanisms for mov-

ing said plate transversely also, the combination, with the worm-actuating mechanism, of a lever adapted and arranged to throw the said worm actuating mechanism in and out of gear, the said lever being operated intermittently, through suitable mechanism, to throw the worm-actuating mechanism out of gear by the lengthwise movement of the said cloth-clamp plate and connections and to throw the said worm-actuating mechanism intermittently, through suitable mechanism, in gear by the lateral movement of said cloth-clamp plate and connections, substantially as herein described.

6. The combination, with the feed cog-wheel  $I'$  and feed-lever  $I^2$ , of a double pawl,  $f$ , provided with stud  $f'$ , secured on said lever, a movable pawl-carrying plate,  $H$ , a finger-lever,  $c$ , and an elbow-lever,  $c^2$ , all constructed and arranged to operate substantially as herein shown and described, whereby, through suitable mechanism, the rotation of said cog-wheel is intermittently reversed and arrested when the button-hole attachment is in operation, as set forth.

7. The combination, with a barring cog-wheel,  $G'$ , pinion  $G^2$ , and rack  $i^4$ , fixed on angle-plate  $L$ , and clamp-carrying plate  $L^2$ , sliding on plate  $L$ , of a double pawl,  $K$ , and suitable mechanism, substantially as herein shown and described, for causing said pawl to rotate said cog-wheel and pinion, whereby the said plates  $L$   $L^2$  may be moved in and out, as and for the purposes set forth.

8. In a button-hole attachment for sewing-machines, the combination, with elbow-lever  $c^2$ , provided with pin  $c^3$ , yoke-pawl  $K$ , provided with jaw  $g$  and stud  $g^7$ , cog-wheel and pinion  $G'$   $G^2$ , respectively, rack  $i^4$ , fixed on angle-plate  $L$ , and feed-lever  $I^2$ , provided with stud  $f^5$ , all constructed and arranged substantially as herein shown and described, of the clamp-carrying plate  $L^2$ , provided with stop-finger  $l^2$ , whereby when the said plate  $L^2$  has moved the desired distance to the left the said combined devices are made to move the plates  $L$   $L^2$  out and in for the barring of the button-holes, as set forth.

9. In a button-hole attachment for sewing-machines, the combination, with elbow-lever  $c^2$ , provided with pin  $c^3$ , yoke-pawl  $K$ , provided with jaw  $g$  and stud  $g^7$ , cog-wheel and pinion  $G'$   $G^2$ , respectively, rack  $i^4$ , fixed on angle-plate  $L$ , and feed-lever  $I^2$ , provided with stud  $f^5$ , all constructed and arranged substantially as herein shown and described, of the gage  $M'$ , provided with stop-finger  $m'$ , whereby when the said plate  $L^2$  has moved the desired distance to the right the said combined devices are made to move the plates  $L$   $L^2$  out and in for the barring of the button-hole, as set forth.

10. In a button-hole attachment for sewing-machines, the combination, with the clamp-carrying plate and the finger  $l^2$ , of an adjustable graduated gage fixed thereon and provided with a stop-finger, substantially as



herein shown and described, said stop-fingered  
gage being parallel with the finger  $l^2$  and  
adapted to determine the length of a button-  
hole, and operating to cause the stopping of  
5 the edge-stitching of the button-hole when  
desired, as set forth.

In testimony that I claim the foregoing I

have hereunto set my hand, in the presence  
of two witnesses, this 30th day of November,  
1886.

WILLIAM SCHOTT.

Witnesses:

JACOB J. STORER,  
C. W. BENJAMIN.