

(Model.)

3 Sheets—Sheet 1.

J. P. HALLENBECK.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 277,128.

Patented May 8, 1883.

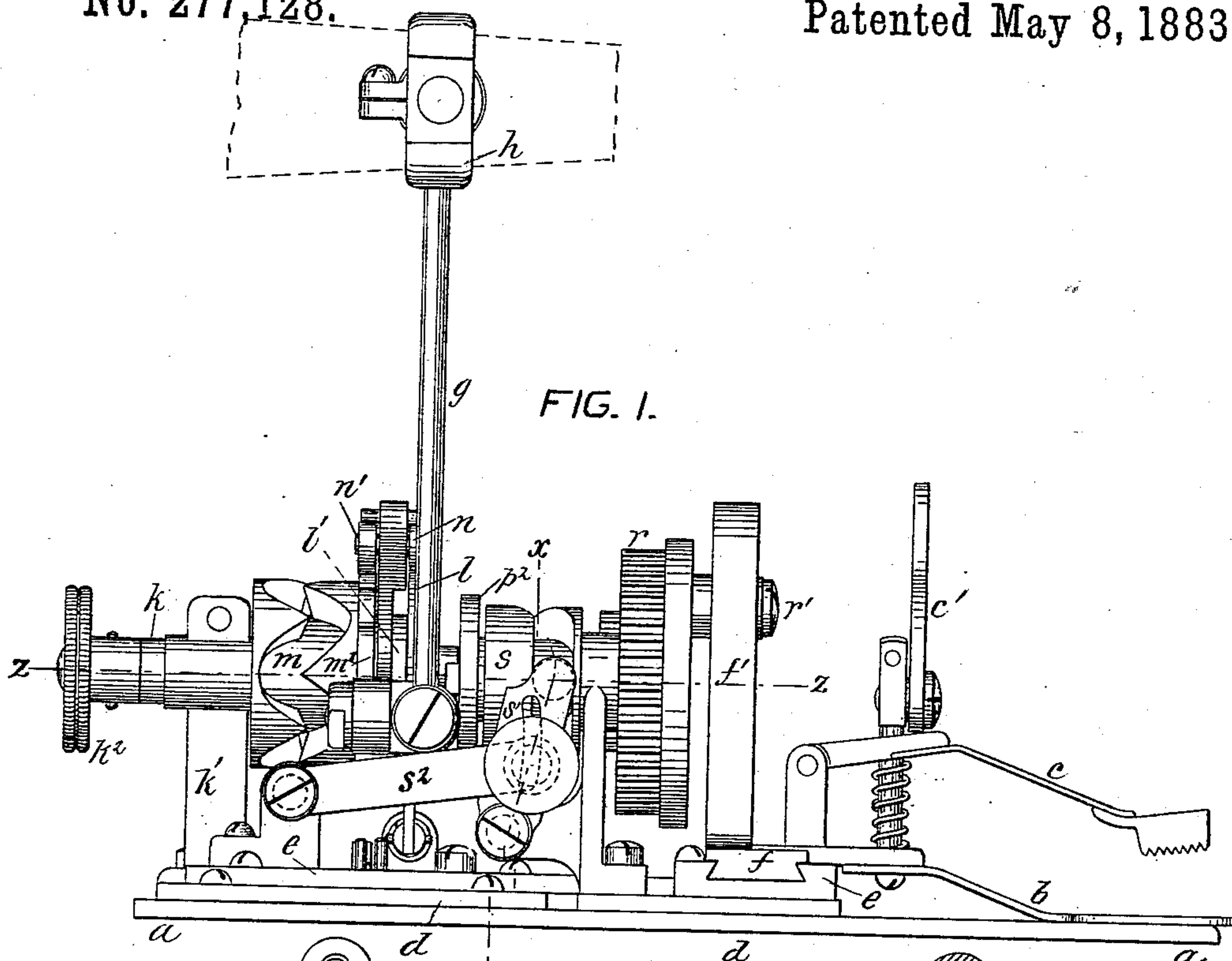


FIG. 1.

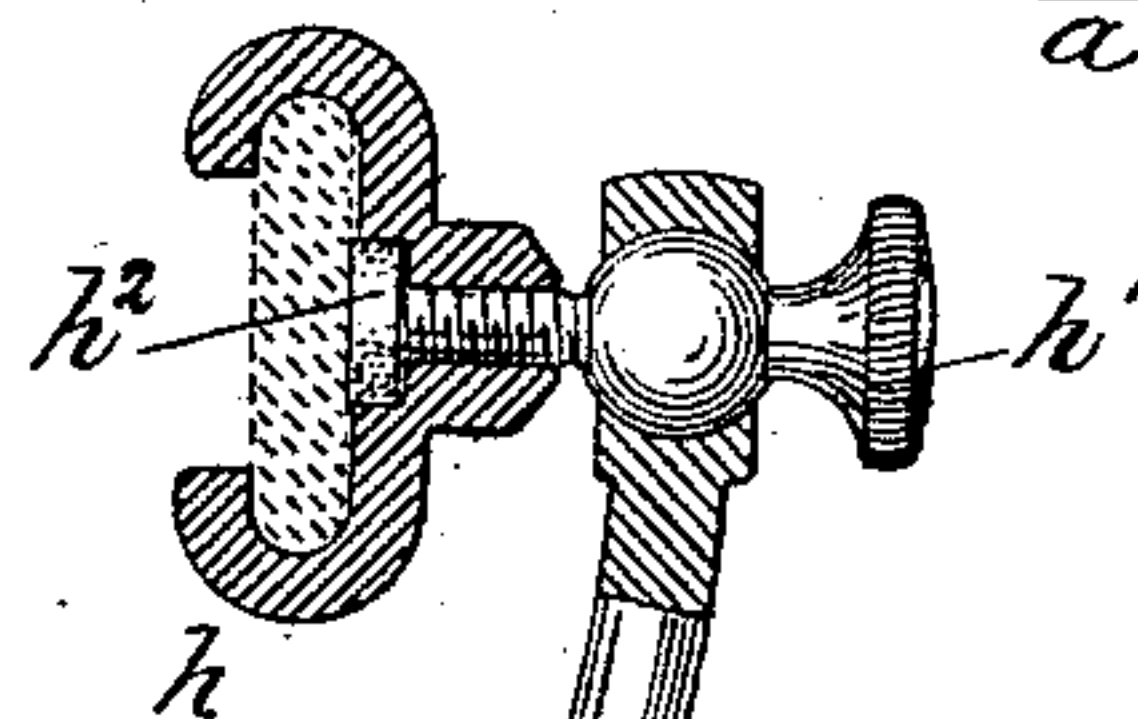
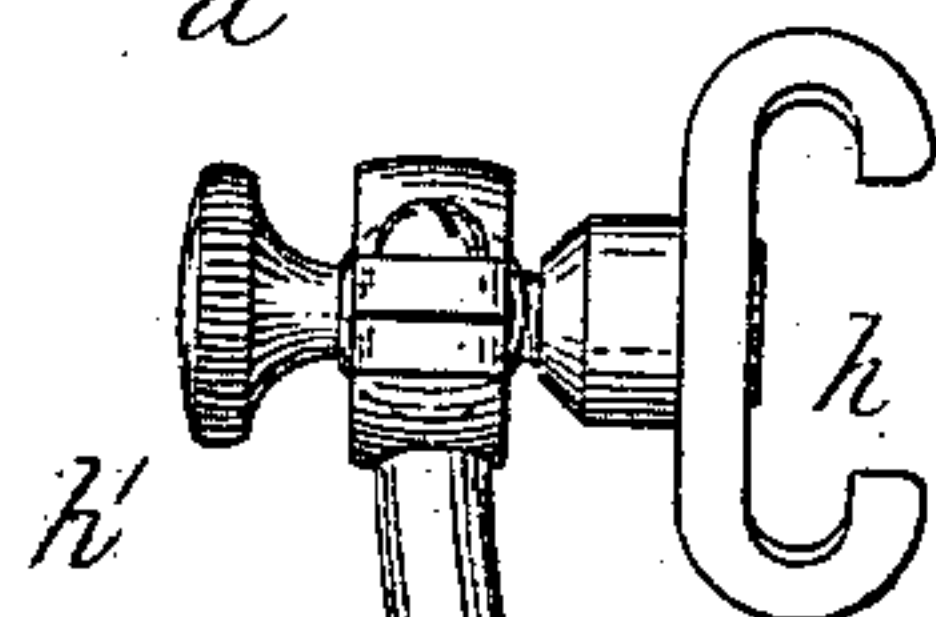
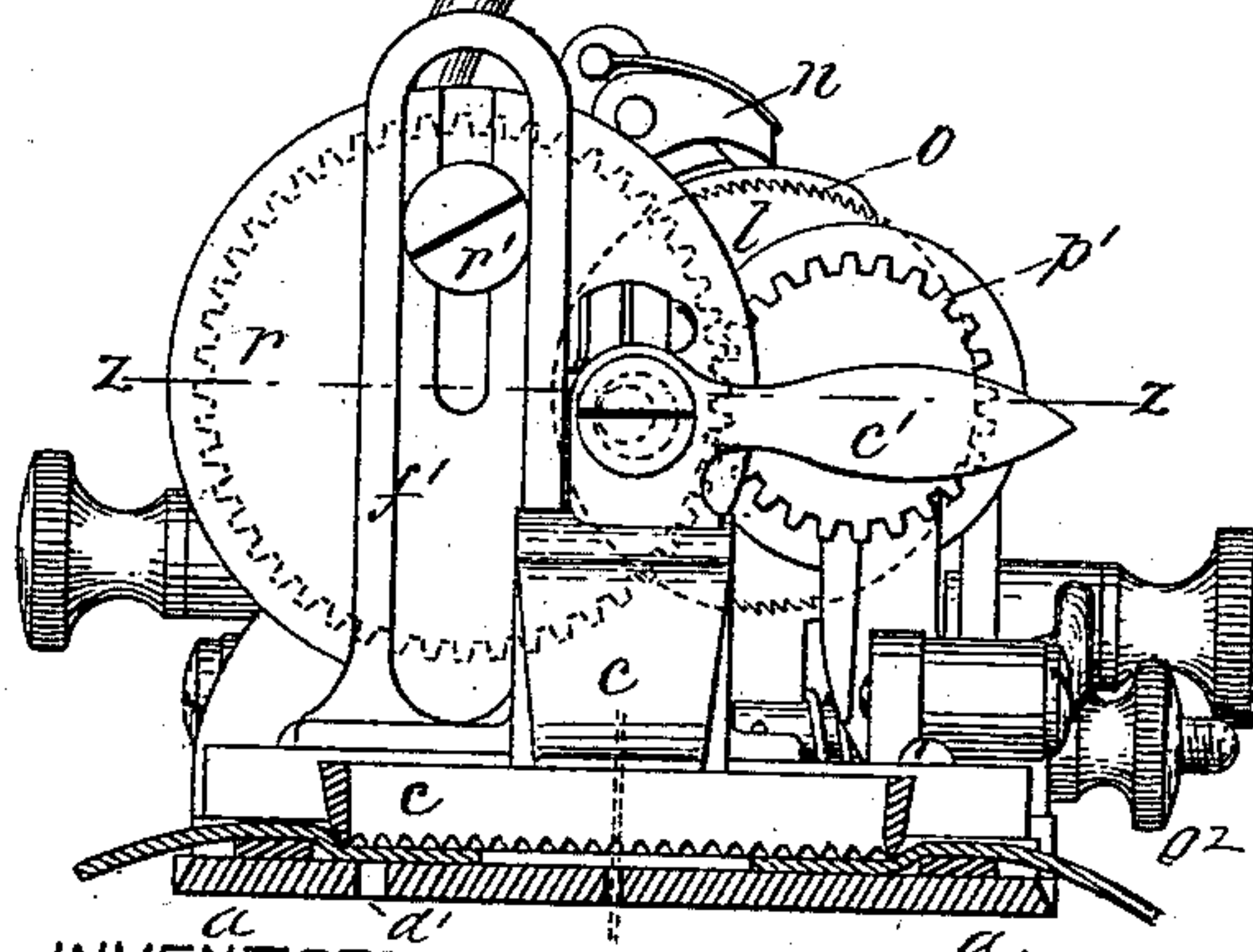
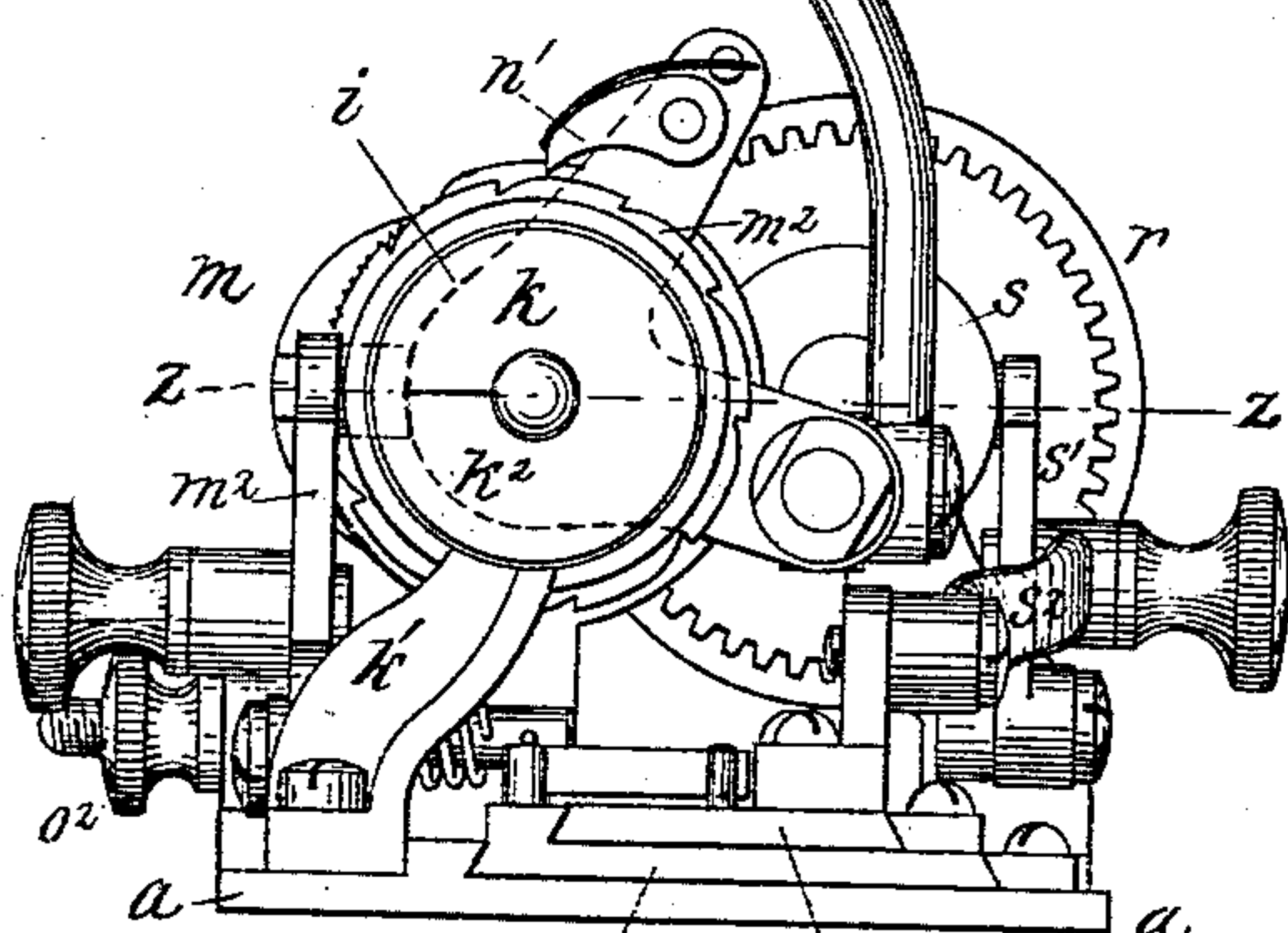


FIG. 2.

FIG. 3.



WITNESSES:

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Jos. E. Gavin

INVENTOR:

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(Model.)

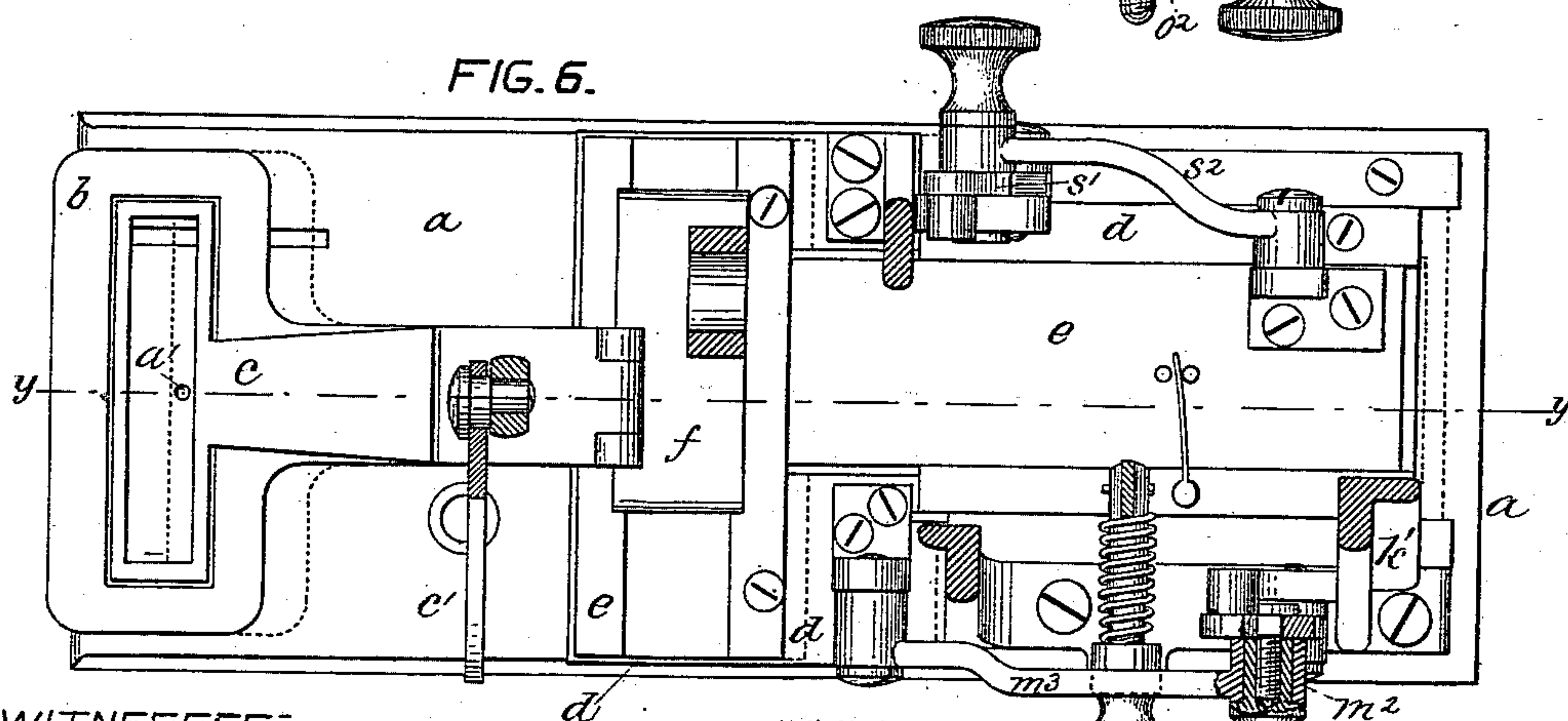
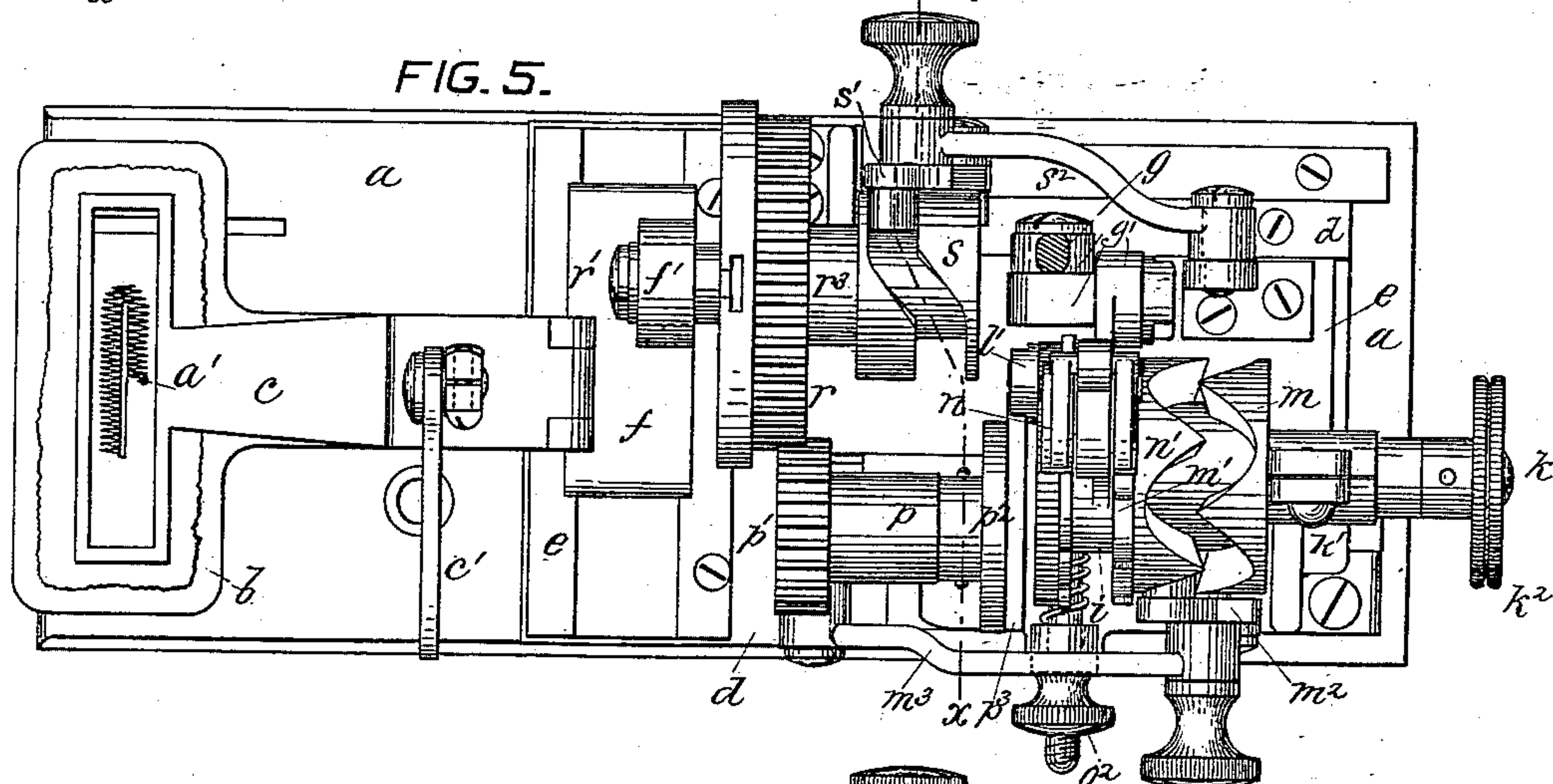
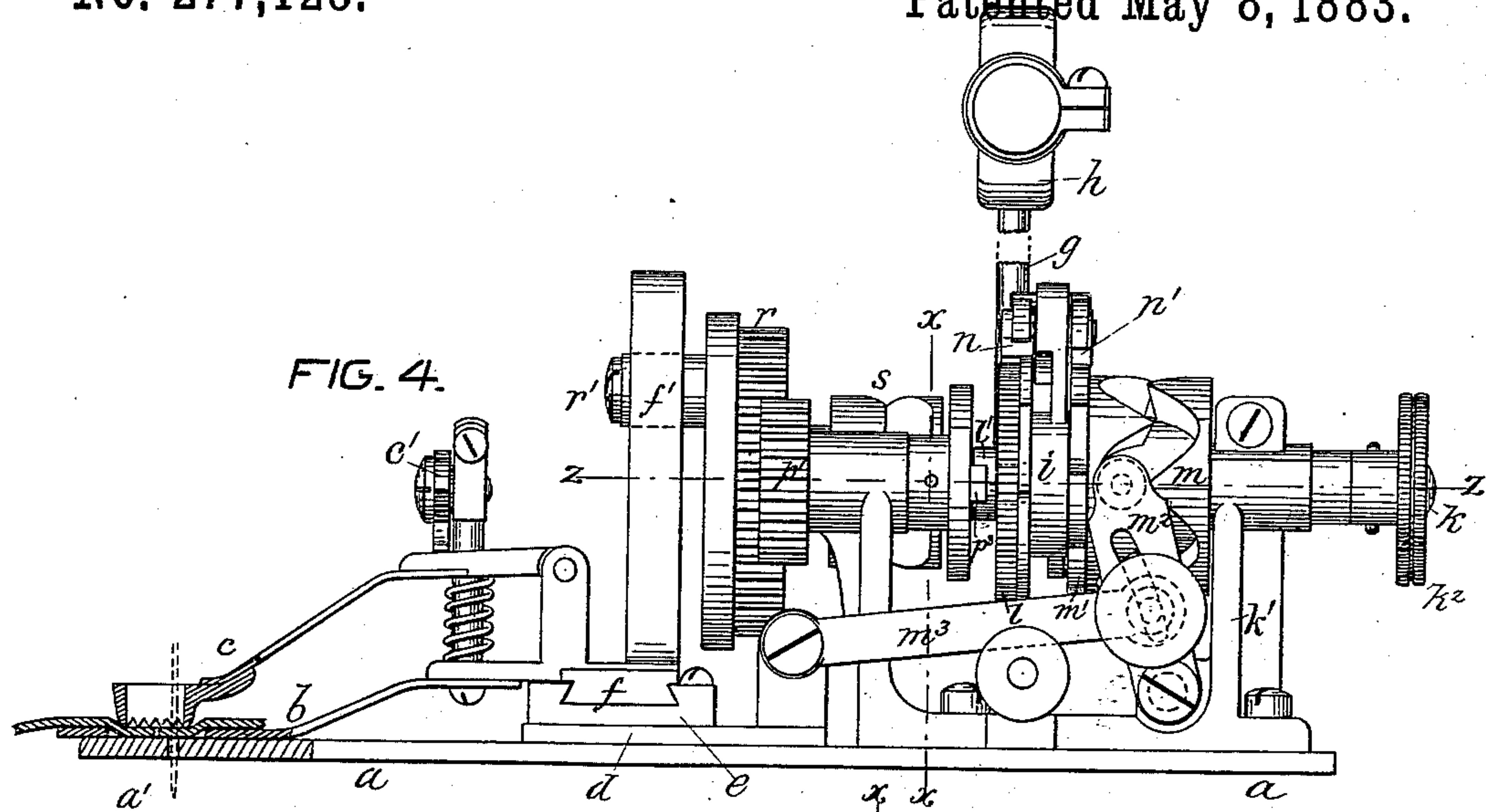
3 Sheets—Sheet 2.

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(Model.)

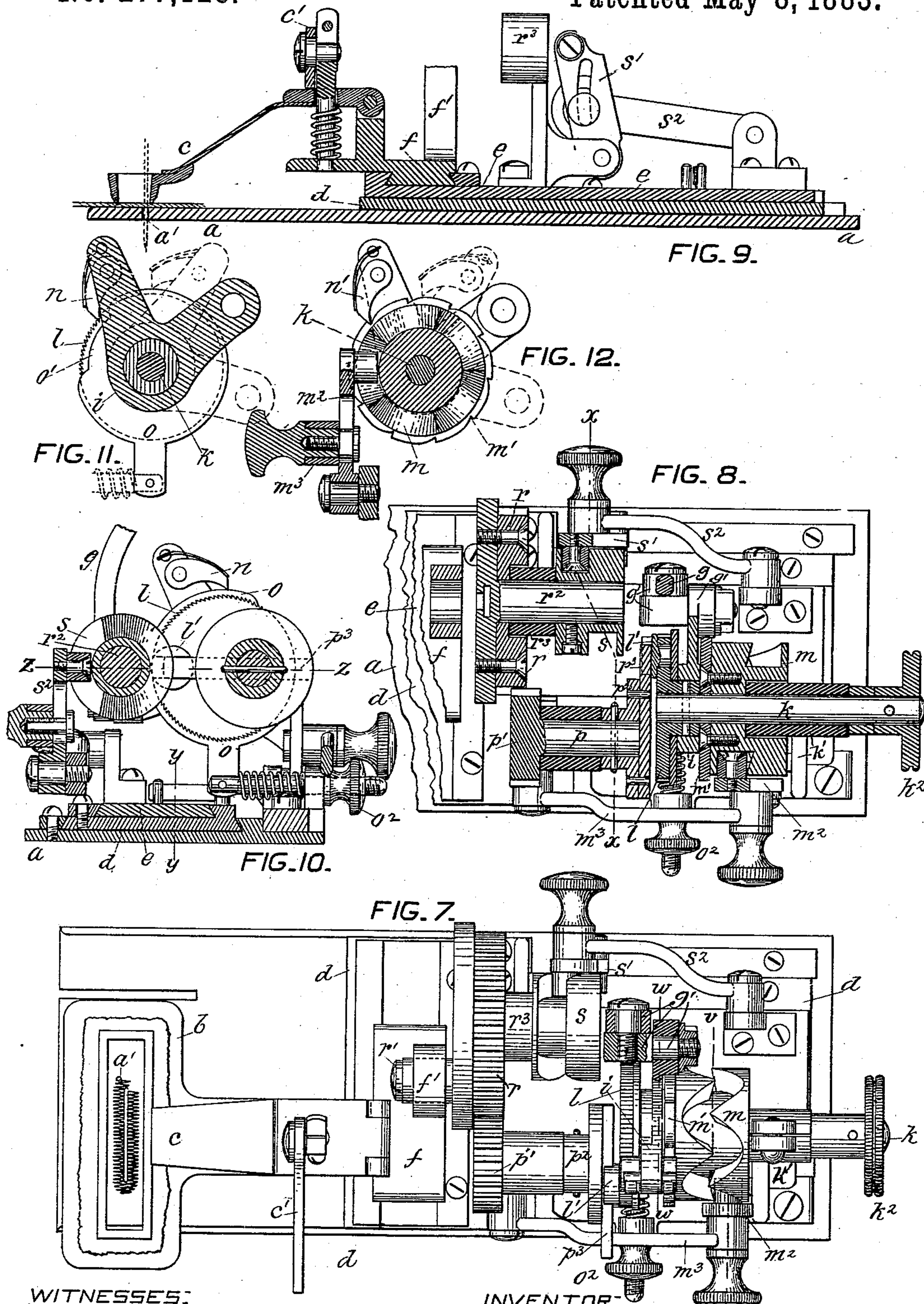
3 Sheets—Sheet 3.

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BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 277,128.

Patented May 8, 1883.



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UNITED STATES PATENT OFFICE.

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BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 277,128, dated May 8, 1883.

Application filed April 16, 1880. (Model.)

To all whom it may concern:

Be it known that I, JOSEPH P. HALLENBECK, formerly of Troy, in the county of Rensselaer and State of New York, but now of New York city, have invented certain new and useful Improvements in Button-Hole Attachments for Sewing-Machines, of which the following is a specification.

This invention is related to that class of attachments in which the cloth-clamp or work-holder is mounted on and impelled from a number of overlying sliding plates, to which vibrating movements are imparted independently, in different directions and at different times, to produce the required movement of the work under the needle—such, for instance as that shown in Patent No. 252,052, January 10, 1882, to Morris and Hallenbeck, and also in a previous patent, issued May 7, 1878, to the same parties, No. 203,287. My present attachment, however, is more especially designed for those machines having a vibrating needle-arm, and for family use, and my invention aims to provide a compact and efficient attachment of this kind, which shall be capable of easy operation and possess ample and convenient means of adjustment, and which also may be attached to the machine without requiring any mutilation or refitting thereof, to which ends the invention embodies a number of novel features, as hereinafter fully described and claimed.

In the drawings annexed, Figure 1 presents an elevation of the rear side of my improved attachment; Fig. 2, an elevation of the rear end, and Fig. 3 an elevation of the front end, shown in section through the work-holder. Fig. 4 is an elevation of the front side, with the work-holder, &c., shown in section. Fig. 5 is a full plan view, and Fig. 6 a plan view shown partly in section, with some of the upper parts removed. Fig. 7 is a plan view, partly in section, with the parts shown in the position assumed when the needle is at its highest point. Fig. 8 is a horizontal section of the rear portions of the attachment, taken on the line $z z$ in Figs. 1, 2, 3, 4, and 10. Fig. 9 is a longitudinal section of lower portion of the same at the lines $y y$ in Figs. 6 and 10, the lower open plate of the work-holder being removed. Fig. 10 is

a transverse section at the line $x x$ in Figs. 1, 4, 5, and 8. Figs. 11 and 12 are fragmentary sections of the ratchet feeding and driving part of the attachment.

In the drawings, a indicates the base-plate of the attachment, which is preferably of rectangular form, as shown, and is attached to the work-plate of the sewing-machine in any suitable manner, with the needle-hole a' properly registered with the needle of the machine. The fabric in which the button-hole is to be worked, being first slit with a hole or cut of the required size, is placed upon the work-holding plate or foot b , and is held in place by the cloth-clamp c , which is pivoted at one end, and is normally raised by a spring, but is forced down upon the work by the cam-lever c' . The clamp has a slot or opening amply large for any ordinary-sized button-hole, and its under face is toothed to better hold the fabric, while the under foot or holder, b , has a slot sufficiently larger than the clamp to permit the partial projection of the cloth and clamp into the same, as shown in Figs. 3, 4, 5, and 6. In operating on fabrics, however, which do not admit of being thus bent short, the under foot, b , may be detached and the fabric held between the toothed face of the clamp and the base-plate, as seen in Fig. 9. This work-holder, however, is substantially the same as heretofore used in similar attachments, and hence forms no part of my present invention, and it is also mounted on and impelled from a number of oversliding plates or slides, according to the principle of the former attachments referred to; but the mechanism for actuating these slides is partly of a novel character and partly similar to that shown in the patents of Morris and Hallenbeck hereinbefore referred to, and said mechanism forms the subject of the present application as hereinafter claimed.

Now, d indicates the lower sliding plate of the series, which rests upon the base-plate a , and is capable only of a sliding movement or reciprocation longitudinally of the base-plate and transversely of the button-hole.

e indicates the intermediate or "change" plate, which rests upon the former, and is also capable of sliding in a similar direction, but independently of the under plate.

f indicates the upper slide, to which the work-holder is directly connected, and which is guided in transverse ways on the change-plate *e*, and is thus capable of moving transversely from side to side thereon and parallel to the length of the button-hole, but at right angles to the movement of the under plates. The movement imparted to the slide *f* is hence the "feed motion," and is a continuous step-by-step movement from one side of the change-plate to the other, so as to make the stitches at proper distance along each longitudinal edge of the button-hole. The motion imparted to the change-plate is the "change motion," which occurs only at each end of the button-hole, to shift or change the stitching from one side of the hole to the other, while the motion imparted to the under plate, *d*, is the overseaming motion, and is a constant reciprocation, which so shifts the button-hole transversely under the needle as to cause the needle to first enter the slot and then the margin of the cloth, so as to produce the overseaming or "over-edge" stitch upon the edge of the button-hole, as will be readily understood. Now, the mechanism by which these movements are imparted to the several slides is driven from the vibrating arm of the sewing-machine by the small pitman *g*, which is of proper length and curve to suit the machine for which this attachment is intended, as seen best in Figs. 2 and 3. The pitman is connected with the arm by a clamp, *h*, which embraces the same, and is held thereto by a binding-screw, *h'*, the bearing-point of which is cushioned by a washer, *h''*, of leather or similar material, as seen in Fig. 3. The actuated end of this pitman has a jointed connection with this clamp by means of a spherical eye, which fits freely on a spherical enlargement on the screw *h*, as seen in Fig. 3, thus forming a ball-and-socket joint. The lower end of this pitman connects by a species of universal joint, *g'*, (shown best in Figs. 5, 7, and 8,) to one arm of a double-armed driving-hub, *i*, which is mounted loosely on the spindle *k*, between a fine-toothed ratchet-wheel, *l*, keyed on the end of this spindle, and a cylindrical cam, *m*, loose on the spindle. This spindle forms the main driving-spindle of the attachment, and is supported about midway of its length in a bearing, *k'*, rising from the bed-plate *a*, and is fitted with a milled knob, *k''*, on its outer end, by which the spindle may be turned by the hand when required to bring the mechanism to any desired position. The upper arm of the driving-hub *i* carries two pawls, *n* *n'*, one of which, *n*, engages with the fine ratchet-wheel *l*, and the other, *n'*, with wide ratchet-teeth on a projecting ratchet-rim, *m'*, on the cam *m*. The pawl *n* of the ratchet-wheel *l* is, however, out of engagement therewith during the main portion of its stroke, as it rides over the raised edge of a disk, *o*, which is mounted loosely on the spindle *k*, close to the ratchet-wheel, and is indented with a notch, *o'*, which, by turning the disk slightly one way or the other,

may be so placed as to cause the pawl *n* to fall into engagement with the ratchet-wheel sooner or later toward the end of its stroke, so as to move the ratchet the distance of one or more teeth, as may be required in regulating the feed of the button-hole relative to the needle. The disk is thus adjusted by turning the nut *o''*, the screw of which connects to a radial projection on the disk *o*, as seen best in Figs. 10 and 11, a spring on this screw serving to press the disk in the opposite direction and take up the slack of the screw. The other pawl, *n'*, however, is in constant engagement with the ratchet-rim *m'* of the cam *m*, and the teeth of this ratchet-rim correspond in number to the inclines or changes of the cam, and the impulse imparted to the driving-pitman and the pawls is sufficient to move the cam the distance of one tooth and one incline at each active stroke, while the ratchet-wheel *l* is moved but a small fraction of this distance, or equal to one or a few teeth, at the same time. Now, the cam *m* actuates the short lever *m''*, which is connected to the lower slide or plate, *d*, by the small pitman *m'''*, and thus imparts to this plate a regular reciprocation during the operation of the machine, thus producing the overseaming motion at the button-hole. The step-by-step feed motion, however, is produced by the movement of the ratchet-wheel *l*, which is coupled to an intermediate shaft, *p*, provided with a pinion, *p'*, which meshes with a gear-wheel, *r*, and this wheel has a projecting crank-pin, *r'*, which works in a slotted upright, *f'*, on the slide *f*, and thus moves this slide and its attached work-holder transversely back and forth on the change-plate *e* with a step-by-step movement, which produces the longitudinal or feed movement of the button-hole. This large crank or gear-wheel *r* is carried by a shaft, *r''*, supported in a bearing, *r'''*, which is mounted on the under or reciprocating slide, *d*, and on said shaft is also fixed a cylindrical cam, *s*, having two changes or inclines which produce the "change" movement by means of the short lever *s'*, pivoted on a lug projecting from the bearing of the shaft *r''*, and connected by the pitman *s''* with the change-plate *e*. The lever *s'* of the change-cam *s* and the lever *m''* of the overseaming-cam *m* are each slotted where their respective pitmen connect, and are provided with projecting milled-headed screws, which are engaged with said slots, and by loosening the screws and setting the same higher or lower in the slot and again tightening them the stroke of the respective movements will be adjusted as required. The crank-pin *r'* is adjustable in a slot in the wheel *r* to suit the length of the button-hole, and the nut *o''* regulates the feed or the fineness of the stitch along the length of the button-hole by the means already described.

It will therefore be observed that in this attachment all the motions have ample means of adjustment, and, moreover, the adjusting-

knobs project in a prominent and accessible manner therefrom, enabling the several adjustments to be made quickly and accurately, and in a very easy manner.

5 It will also be observed that by turning the knob k^2 on the driving-spindle k the work-holder may be quickly advanced or returned to any point, enabling the stitching to be commenced or continued from any part of the button-hole, and as the cam m is loose on the spindle, the aforesaid movement of the work-

holder may be made without moving the cam. It will be observed that the intermediate shaft, p , is placed slightly eccentric to the ratchet feed-wheel l , which drives it, and that 15 this shaft has a crank-disk, p^2 , at its driven end, having a diametric crank-rib, p^3 , on its face, which is engaged by a slotted or forked crank boss, v , on the side of the ratchet-wheel, as seen best in Figs. 4, 5, 7, and 10. The shaft 20 p is thus driven by a variable crank, which causes the rotation of its driving-pinion p' , the gear-wheel r , and change-cam s to be quickened at certain points, and as the pinion p' is half the diameter of the crank-wheel r , the rotation of this crank-wheel will be accelerated at each half-revolution thereof. Now, these parts are so arranged that these fast motions occur when the crank r' of the wheel r is passing its dead-points at each end of the button-hole, and when the inclines of the change-cam 30 come into action to shift the stitching from one side of the button-hole to the other, so that the increase of speed at each end of the crank's throw, where its feed motion would be otherwise slow, causes the work-holding slide to be fed with practically uniform speed at all points, thus rendering the stitching uniform all around the button-hole.

40 It may now be observed that not only is the mechanism of this attachment capable of perfect and easy adjustments, but all the motions are effected automatically and in a positive manner, and all within a compact space.

45 It may be further observed that my present attachment is distinguished from most previous ones, in that the several sliding plates are each actuated independently by a train of mechanism which is impelled from one source—viz., the pitman g and its actuated pawl-arm i —which renders the construction more simple and compact and the action more direct and positive. On the other hand, in most former attachments the power is applied to the 55 plates from distinct sources or from one plate to another.

In the Patent No. 252,052, before mentioned, dated January 10, 1882, it may be seen that the feed motions and change motions are produced by mechanism somewhat similar to that shown in the present case—viz., by a reciprocating pawl acting on a ratchet-wheel, which ratchet-wheel is eccentrically connected by a crank to a pinion which gears into a wheel 60 twice its diameter, which wheel drives the work-holding slide by a crank, and the shaft of said

wheel is provided with a cam to produce the change motion. In this former attachment, however, these parts are placed in a recumbent position or flatwise on the base-plate, whereas 70 in my present device they are raised above the base-plate and placed in parallel positions, which renders the construction more compact. It may be further observed that, in lieu of employing a connecting-rod to drive the work 75 holding or feeding slide from the crank feed-wheel, the slide in the present device is formed with a rigid upright, which is actuated directly by a crank-pin projecting from the wheel and free to slide on the upright, which has the 80 advantage of both directness and simplicity.

It will be readily understood that, in lieu of employing positive pawls n n' acting on positive ratchet-teeth, friction pawls or clutches acting on friction-rims may be used with substantially the same effect. 85

What I claim as my invention is—

1. The combination, with a button-hole work-holder, two wheels, and means for rotating said wheels step by step, of mechanism for imparting from one of said wheels momentary to-and-fro transverse movements to the work-holder, and for imparting from the other of said wheels to the work-holder step-by-step lengthwise to-and-fro movements, and transverse movements 90 in opposite directions at the two end parts of said lengthwise movements, substantially as described.

2. The combination, with a button-hole work-holder, three slides carrying the work-holder, 95 and two wheels adapted to be rotated step by step, of mechanism for imparting from one of said wheels to one of said slides momentary to-and-fro movements transverse to the lengthwise direction of the work-holder, and for imparting from the other of said wheels to another of said slides step-by-step movements to and fro in the lengthwise direction of the work-holder, and to the other of said slides short movements transverse to and in opposite directions at the two end parts of said lengthwise movements, substantially as described. 100

3. The combination, with a button-hole work-holder, two ratchet-wheels, l m' , two pawls, n n' , and a driver, i , adapted to be moved to and fro 105 and carrying both of said pawls, of mechanism for imparting from one of said ratchet-wheels, m' , transverse reciprocating movements to the work-holder, and for imparting from the other ratchet-wheel to the work-holder lengthwise to-and-fro movements, and transverse movements in opposite directions at the two end parts of its said lengthwise movements, substantially as described. 110

4. The combination, with the feed-slide f , 115 change-slide e , main slide d , two ratchet-wheels, two driving-pawls, and a driver, i , adapted to be moved to and fro and carrying the two pawls, of mechanism for imparting from one of the ratchet-wheels reciprocating movements to the main slide, and for imparting from the other 120 ratchet-wheel to the feed-slide to-and-fro length-

wise movements, and to the change-slide movements transverse to the feed - slide at the end parts of the lengthwise movements of the latter slide, substantially as described.

5 5. The combination, with the base *a*, main slide *d*, cam *m*, and the ratchet *m'*, furnished with a driving-pawl, *n'*, and having a horizontal axis mounted on said base, of the lever *m*², connected at one end to said base and engaging
10 at its other end with said cam, and the rod *m*³, connected to slide *d* and to lever *m*² by adjusting devices, substantially as described.

6. The combination, with the work - holder, ratchet *l*, and means for imparting lengthwise
15 to-and-fro movements to the work-holder from said ratchet, of a driving - pawl, *n*, means for moving that pawl to and fro along two or more teeth of the ratchet, a ratchet - guard, *o*, and means for adjusting the latter along the ratchet,
20 substantially as described, so as to cause the pawl to engage with the ratchet during a greater or less part of each forward movement of the pawl, and thereby regulate the lengths of the lengthwise steps imparted from the ratchet to
25 the work-holder.

7. The combination, with the change-slide *e* and main slide *d*, of the cam *s*, having a horizontal axis mounted on the main slide, lever *s'*, connected at one end to slide *d* and engaging
30 ing at the other end with cam *s*, and rod *s*², connected with the change-slide and with lever *s'* by adjusting devices, substantially as described.

8. The combination, with a button-hole work-
35 holder and the feed - slide *f*, parallel to the lengthwise direction of and carrying the work-holder, of the standard *f'* on the feed - slide, wheel *r*, having a horizontal axis and a crank-pin engaging with said standard, and means
40 for rotating wheel *r* by numerous steps, substantially as set forth.

9. The combination, with the feed - slide *f*, having the standard *f'*, and change-slide *e*, carrying the feed-slide, of the wheel *r*, having a horizontal shaft and a crank-pin engaging with
45 said standard, cam *s* on said shaft, and means for imparting movements to the change-slide from said cam, substantially as described.

10. The combination, with the feed-slide *f*, having the standard *f'*, and the wheel *r*, having
50 a crank-pin engaging with said standard, of a pinion engaging with said wheel and having just half as many teeth as the latter, and a driving - wheel, *l*, having its axis eccentric to the axis of said pinion and connected there-
55 with by a sliding crank - connection, substantially as described.

11. In a work-feeding attachment for sewing-machines, the combination, with a driving-pitman, *g*, of a clasp adapted to be secured to the
60 needle-arm of a sewing-machine, and a ball-and-socket joint connecting the clasp and pitman, substantially as described.

12. In a work-feeding attachment for sewing-machines, the combination, with the pitman *g*
65 and clasp *h*, adapted to fit on the needle-arm of a sewing-machine, of the clamp-screw *h'*, connected to the pitman by a ball-and-socket joint, and adapted to fasten the clasp on the needle-arm, substantially as described. 70

13. In a work-feeding attachment for sewing-machines, the combination, with a clasp adapted to be secured on the needle - arm of a sewing-machine, and a driving-arm, *i*, adapted to be vibrated on a horizontal axis, of the rod *g*,
75 connected with said clasp and driving-arm by universal joints, substantially as set forth.

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Witnesses:

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