

(No Model.)

2 Sheets—Sheet 1.

J. G. GREENE & P. DIEHL.

BUTTON HOLE ATTACHMENT FOR SEWING MACHINES.

No. 335,125.

Patented Feb. 2, 1886.

Fig. 1.

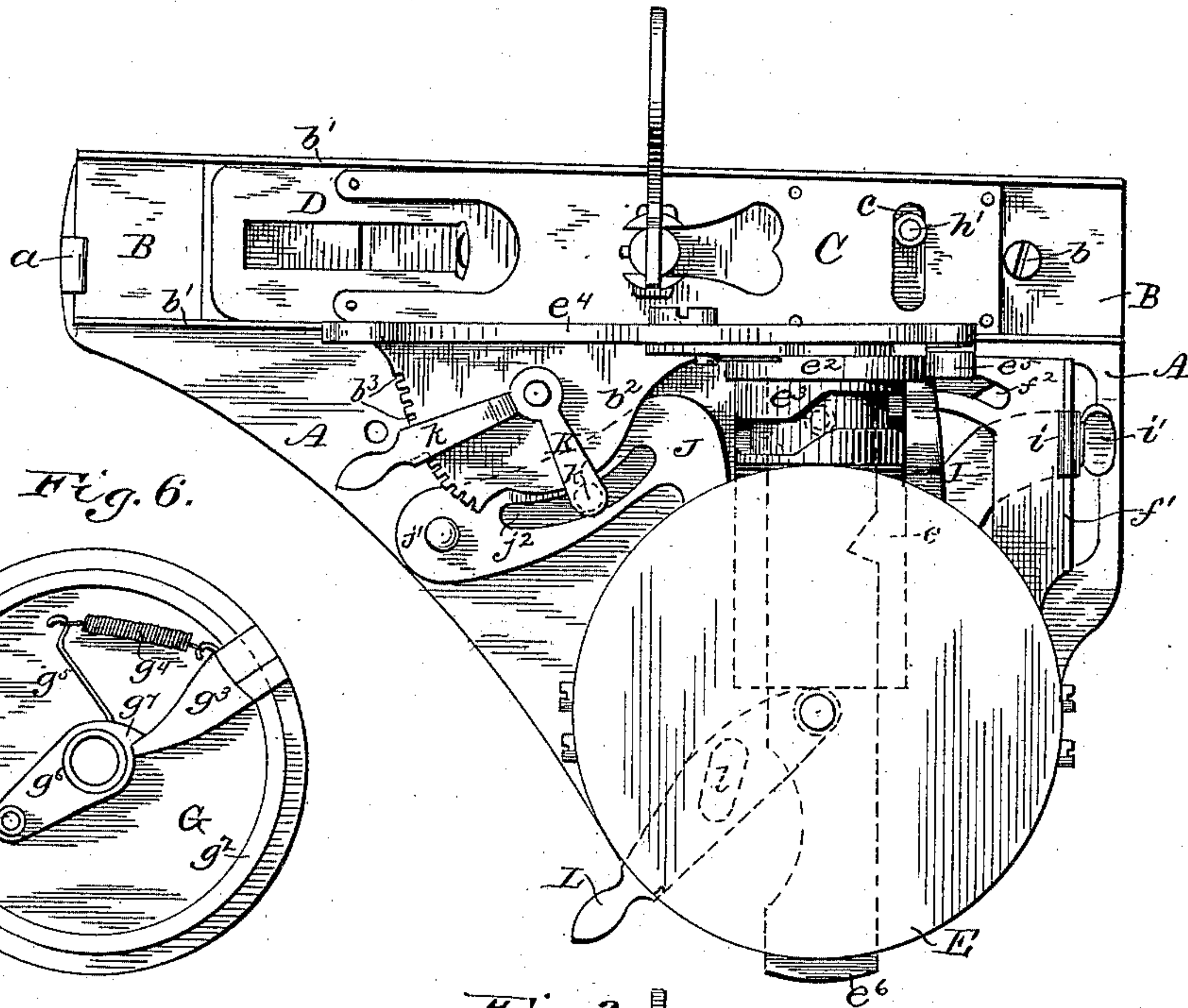


Fig. 6.

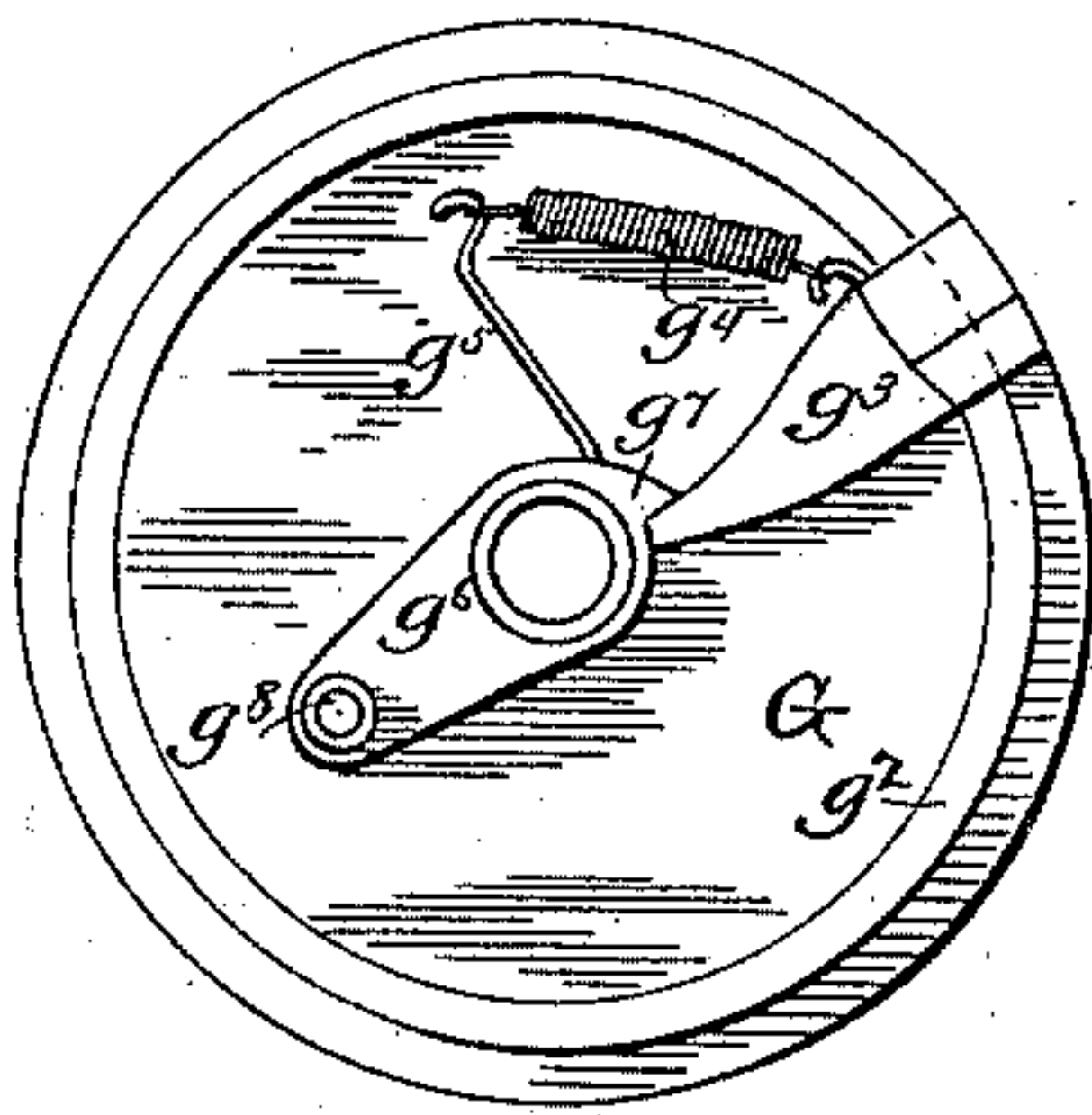


Fig. 2.

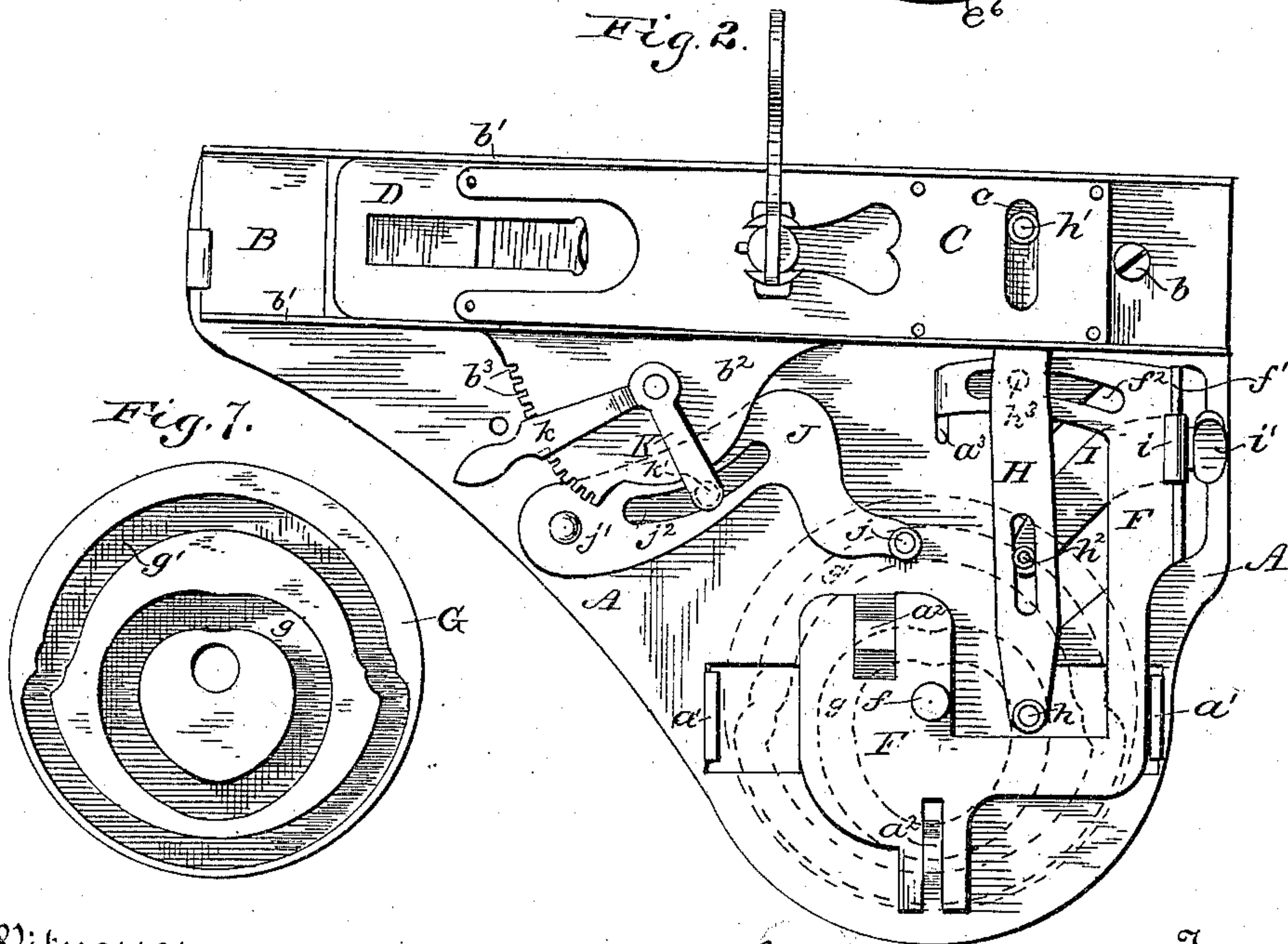
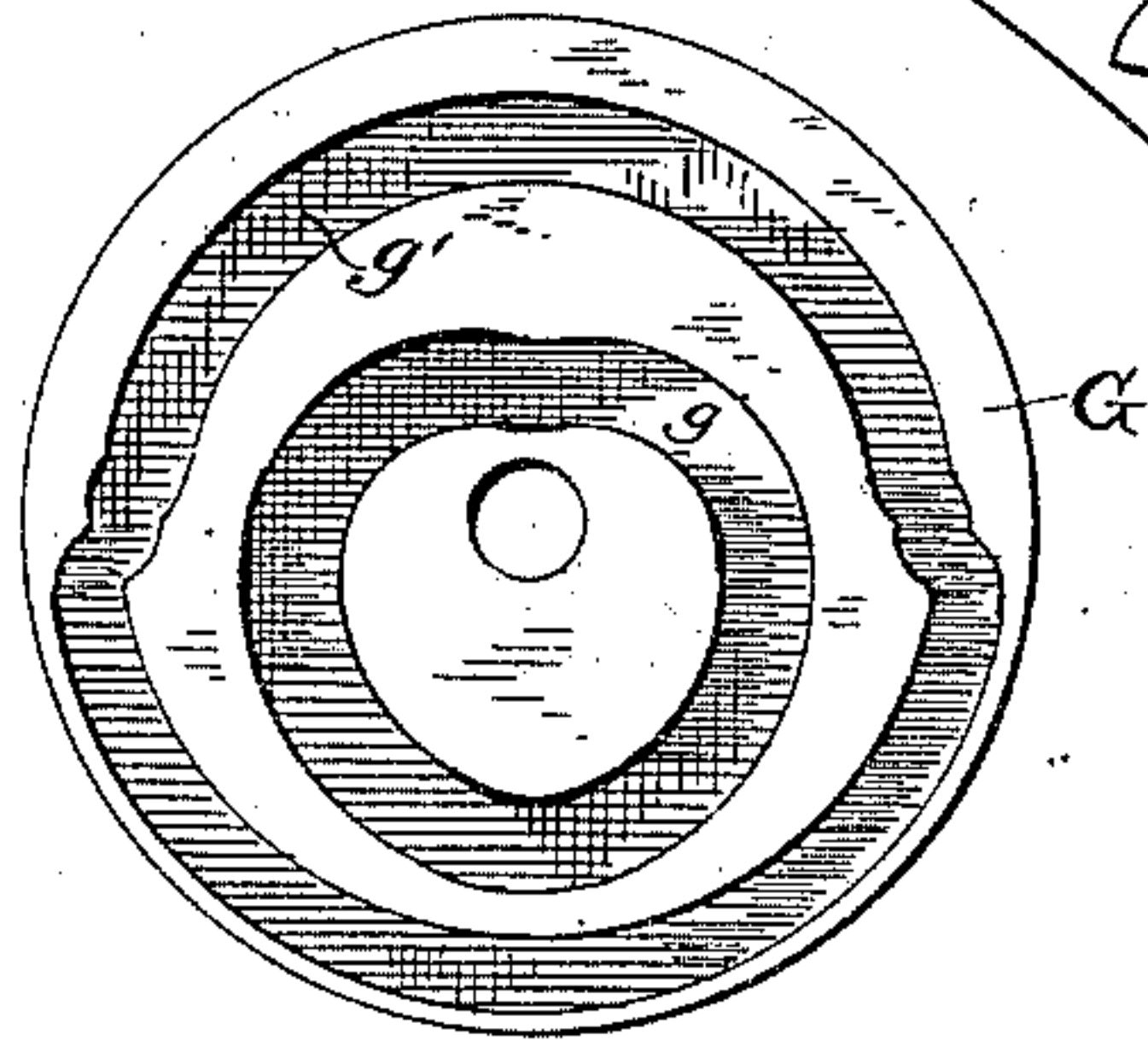


Fig. 7.



Witnesses

W. A. Conant Jr.
Ed Smith

Inventors:

Jas G. Greene & Philip Diehl.
By their Attorney Henry Calvert.

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2 Sheets—Sheet 2.

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Fig. 3.

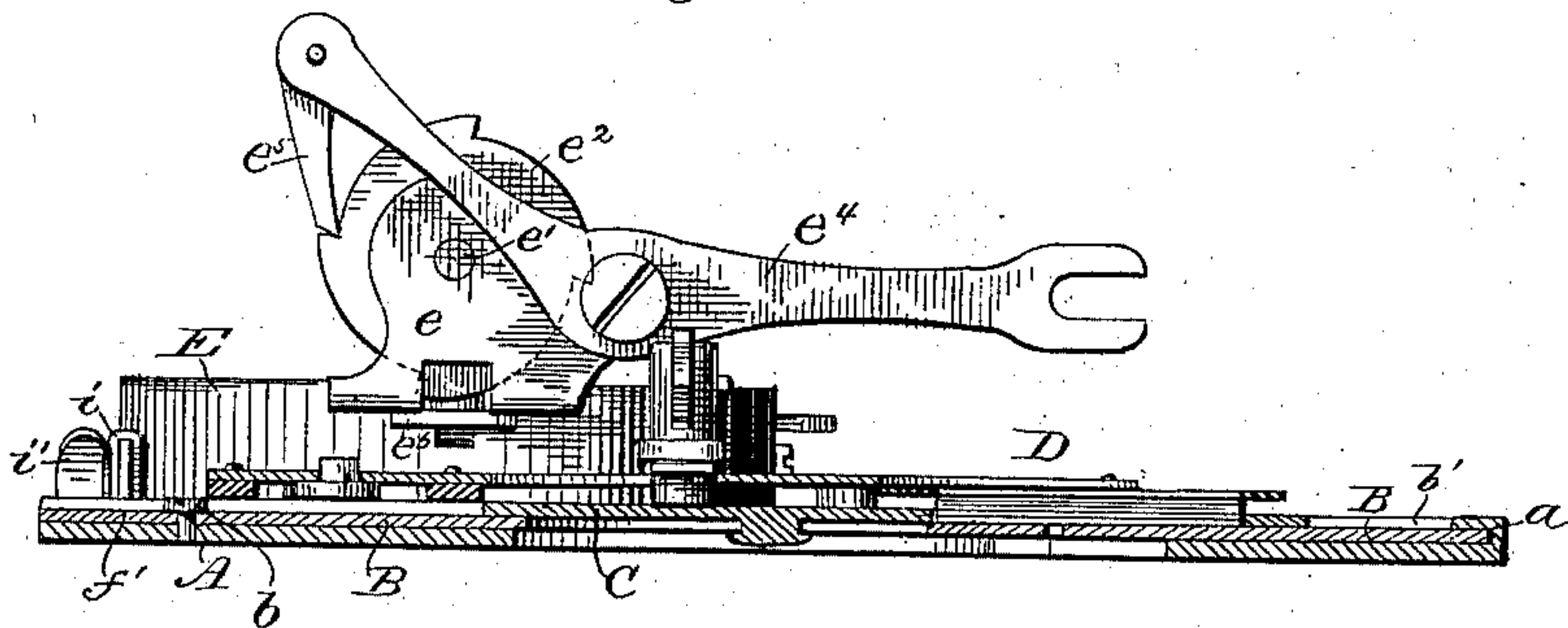


Fig. 4.

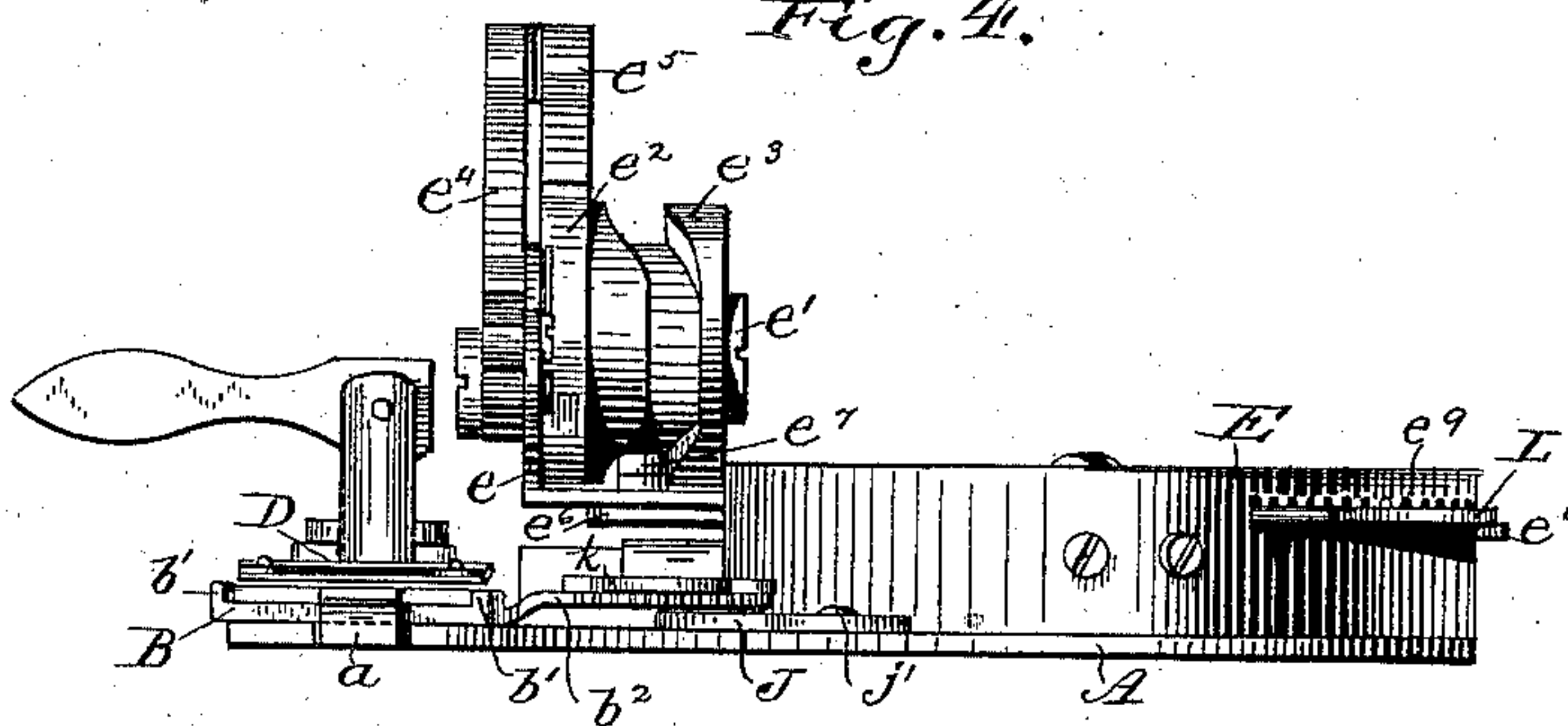
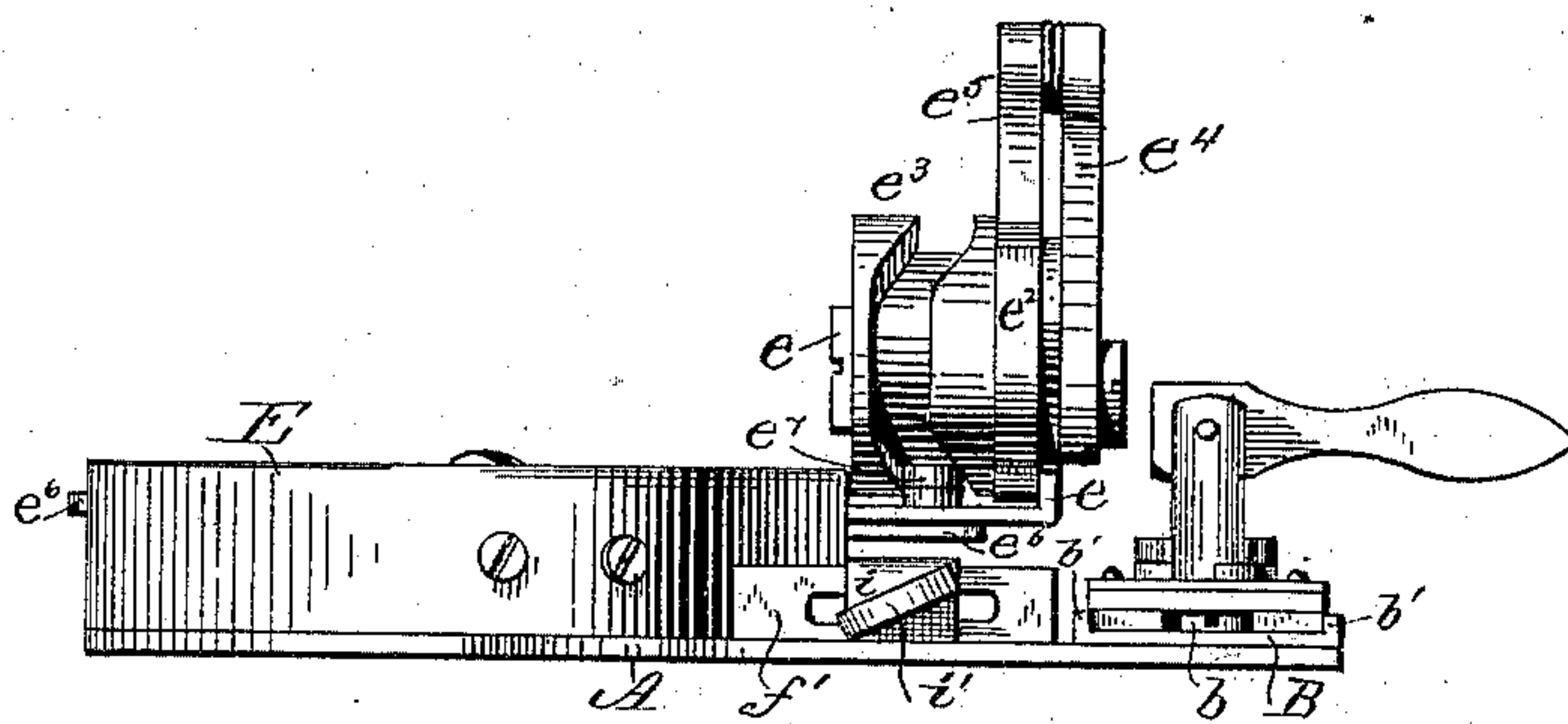


Fig. 5.



Witnesses

W. A. Cornish
E. D. Smith

Inventors:

Jas. G. Greene & Philip Diehl
By *Thos. Attorney* *Henry L. Loomis*

UNITED STATES PATENT OFFICE.

JAMES G. GREENE AND PHILIP DIEHL, OF ELIZABETH, NEW JERSEY, ASSIGN-
ORS TO THE SINGER MANUFACTURING COMPANY OF NEW JERSEY.

BUTTON-HOLE ATTACHMENT FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 335,125, dated February 2, 1886.

Application filed September 29, 1885. Serial No. 178,566. (No model.)

To all whom it may concern:

Be it known that we, JAMES G. GREENE and PHILIP DIEHL, citizens of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Button-Hole Attachments for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to that class of button-hole attachments for sewing-machines in which the work-holding clamp receives its movements through mechanism operated from the needle-bar of the machine, and in which all the movements necessary to work both sides and bar both ends of a button-hole are automatically effected, the object of our invention being to produce an attachment of the class referred to which will be comparatively simple in construction and strong and positive in operation.

In the drawings forming part of this specification, Figure 1 is a plan view of our attachment, and Fig. 2 a similar view with some of the parts removed. Fig. 3 is a side view, partly in section; and Figs. 4 and 5, front and rear end views, respectively. Fig. 6 is a detail plan view of the feeding and cam wheel, and Fig. 7 a bottom view of the same.

A denotes the base-plate, which carries all of the parts, and which is to be attached to the work-plate of a sewing-machine.

B is a vibrator pivoted at its rear end by a screw-pin, *b*, to the base-plate, and provided with upwardly-projecting ribs *b'* at its edges to form a guideway, in which slides the feed-plate C, carrying the work-holding or cloth clamp D. A small hook, *a*, on the base-plate holds down the forward end of the vibrator, but does not interfere with its lateral movements.

Secured to lugs or standards *a'* on the bed-plate A is a cap or housing, E, to which is rigidly attached a bracket, *e*, having a stud, *e'*, on which is journaled a ratchet-wheel, *e²*, and cam-wheel *e³*. A lever, *e⁴*, is pivoted to the bracket *e*, and forked at one end for engagement with the needle-bar screw, said lever being provided at its other end with a spring-pawl, *e⁵*, engaging the ratchet-wheel *e²*. The cam-wheel *e³* is provided with a cam-groove

having straight offset portions corresponding in number to the teeth of the ratchet-wheel, said offset portions being connected by inclined portions. The ratchet and cam wheels are integral or are rigidly secured together, so as to move coincidently.

Mounted in the top of the cap E, so as to move transversely thereof, is a slide, *e⁶*, having a pin or roller, *e⁷*, engaging the groove of the cam-wheel *e³*. By making the cam-wheel with straight and inclined portions, as shown, it is obvious that the slide *e⁶* and the parts moved thereby will have periods of rest and of motion during the time the cam-wheel is moving, and thus the full throw of the lever *e⁴* and the pawl *e⁵*, carried thereby, may be imparted to the ratchet-wheel (to avoid concussion which might be occasioned by lost motion between the pawl and the teeth of the wheel) without moving the slide and its attached parts during too long a period of time. The object of this operation will be explained further on.

F is a sliding plate, guided on the bed-plate A by the lugs *a²* on the latter, and provided with a pin, *f*, on which is journaled the feeding and cam wheel G. The slide *e⁶* is provided with a hole, entered by the pin *f*, so that the movements of the said slide are imparted to the sliding plate F, the wheel G, and the parts engaging the latter. The wheel G is provided with cam-grooves *g* and *g'*, the former of which is the feeding-cam groove, being engaged by a pin or roller, *h*, on one end of a feed-lever, H, said lever having at its opposite end a pin or roller, *h'*, engaging the sliding feed-plate, or, as herein shown, entering a slot, *c*, in the rear end of the clamping-plate, which is attached to the feed-plate, and thus serving to feed or move the said feed-plate longitudinally. The fulcrum-pin *h²* of the lever H is carried by a bar or regulator, I, having a loop, *i*, and set-screw *i'*, by which it may be adjustably secured to a slotted lug or standard, *f'*, on the sliding plate F, the said lever H being slotted to admit of the adjustment of its fulcrum-pin. Thus the throw of the lever H may be varied to suit different lengths of button-holes. The lever H is also provided with a pin, *h³*, (indicated by dotted lines in Fig. 2,) entering a slot, *f²*, in an arm of the sliding plate F, said arm being steadied by having its

outer end downwardly turned and engaged in a slot, a^3 , in the bed-plate A. Thus the lever H, while free to swing on its fulcrum-pin, which moves with sliding plate F', will be caused to reciprocate with the said sliding plate.

J is the vibrating and shipper lever, having a pin or roller, j , engaging the shipping-cam groove g' in the wheel G, the said lever being pivoted by the pin j' to the plate A. The vibrator or vibrating plate B is provided with a projection, b^2 , on which is pivoted an elbow-lever, K k , the arm K of which carries a pin, k' , entering a slot, j^2 , in the shipper-lever J, the other arm, k , having a small tooth adapted to engage the notches b^3 in the curved edge of the projection b^2 . The arm k is a spring-arm, and may be raised slightly to disengage its tooth from that one of the notches b^3 , in which it may be entered, and the said lever will then be free to be turned on its fulcrum to adjust the pin k' in the slot j^2 of the lever J. Thus it will be seen that the wheel G is connected with the vibrator B and the work-clamp carried thereby through the levers J and K k and the projection b^2 on the plate B, so that the reciprocating movements of the said wheel will be communicated to the vibrator to cause the latter and the cloth-clamp carried thereby to move laterally of the button-hole for the purpose of forming the overedge-stitches. It will also be apparent that the cam-groove g' of the wheel will at the proper time change the position of the lever J to shift the work laterally when the end of the button-hole is reached, and thus cause a bar to be formed at the end of the button-hole, and also bring the opposite side of the button-hole beneath the needle, this timing of the lateral and longitudinal movements of the work being secured by the proper relative arrangement of the cam-grooves g and g' of the wheel G.

As the lateral shifting of the work through the operation of the cam-groove g' in the slowly-rotating wheel G occupies the time necessary to form a number of stitches, a strong bar will be formed at the ends of the button-holes to properly finish the same.

The depth of the overedge-stitches may be varied by changing the position of the lever K k to shift the pin k' in the slot j^2 of the lever J, said pin serving as an adjustable connection between the uniformly-moving shipping and vibrating lever J and the cloth-clamp, and the shipping or lateral movements to bring one side or the other of the button-hole beneath the needle will also be varied by this same adjustment of the lever K k .

The feeding-cam wheel G is provided in its upper side with an annular flange or rib, g^2 , engaged by a dog, g^3 , the outer end of which latter has a yielding connection by spring g^4 and a small rod or pin, g^5 , with the pivoted end of a lever, g^6 , swinging on a hub of the wheel G, said lever having a projection, g^7 , engaging the tail of said dog. The dog g^3 bites on the rib g^2 when moving in one direction and slides freely over said rib when moving

in the opposite direction in a well-known manner to impart an intermittent rotary movement to the said wheel from the swinging lever g^6 . The lever g^6 is provided with a pin or roller, g^8 , engaging an inclined slot, l , (see dotted lines in Fig. 1,) in an adjusting-lever, L, pivoted to the cap or housing E. As the lever L is stationary, it is obvious that the lever g^6 , reciprocating bodily with the wheel G, will be caused to vibrate on the hub of the said wheel, owing to the engagement of the pin or roller g^8 in the inclined slot l , this movement of the lever g^6 being imparted to the dog g^3 to give an intermittent rotary movement to the wheel G.

The speed of rotation of the wheel G to make the stitches nearer to or farther from each other lengthwise of the button-hole is varied by changing the position of the adjusting-lever L to vary the inclination of the slot therein relative to direction of the reciprocating movement of the wheel G. This is done in the present instance by pressing down on the lever to spring a small tooth thereon out of engagement with one of a series of notches, e^3 , (see Fig. 4,) on the edge of the slot in the cap E, through which the end of the lever L projects. The said lever will then be free to be adjusted to any desired position, and as soon as released by the operator its tooth will again be sprung into engagement with a holding-notch.

The operation of our invention is as follows: Motion being imparted to the lever e^4 the pawl carried thereby will impart an intermittent rotary movement to the ratchet-wheel e^2 and the cam-wheel e^3 , the latter, through the pin or roller e^7 , reciprocating the slide e^6 and the feeding and cam wheel G connected therewith. The reciprocating movements of the wheel G are communicated to the vibrator B, the feed-plate C, and the work-clamp through the vibrating and shipper lever J and the lever K k , having the pin k' , the latter lever being carried by the projection b^2 of the vibrator. The vibrating movements of the feed-plate and work-clamp are for the purpose of forming the overedge-stitches, as before explained. Owing to the straight portions of the groove in the cam-wheel e^3 the cloth-clamp will be at rest during the time the needle is in the work, and will be moved both longitudinally and laterally during the latter part of the upward movement of the needle-bar. The wheel G, while reciprocating laterally, will be slowly rotated by the clutching mechanism above described, and will thus, through the lever H, which is connected with the cam-groove g' of said wheel and with the feed-plate, impart an intermittent longitudinal movement to said plate and the work-clamp carried thereby to move the work lengthwise of the button-hole. When the end of the latter has reached the needle, the cam-groove g' of the wheel G will change the position of the vibrating and shipper lever J to slowly shift the work, thus barring the end of the button-

hole and bringing the other side thereof beneath the needle. The feed-plate will then be moved longitudinally in a direction the reverse of its first movement, to work the other side of the button-hole, and when the other end of the button-hole is reached the barring operation is repeated and the button-hole is then completed.

Having thus described our invention, we claim, and desire to secure by Letters Patent—

1. In a button-hole attachment for sewing-machines, the combination, with a feed-plate and work-clamp, of an intermittingly-rotated cam-wheel, a slide reciprocated by said wheel, a feeding and cam wheel movable with said slide, and feeding and vibrating levers connected with said feeding and cam wheel and said feed-plate, and adapted to transmit motion from the former to the latter, whereby said feed-plate will be moved longitudinally to feed the button-hole beneath the needle and be reciprocated laterally to form overedge-stitches, substantially as set forth.

2. In a button-hole attachment for sewing-machines, the combination, with the feed-plate and cloth-clamp, of a stationary bracket or standard, an operating pawl-carrying lever pivoted to said bracket, cam and ratchet wheels also supported by said bracket, a slide reciprocated by said cam-wheel, a feeding and cam wheel movable with said slide, a feeding-lever operated by said feeding and cam wheel and loosely connected with said feed-plate, and a vibrating and shipping lever also operated by said cam-wheel and connected with said feed-plate, substantially as set forth.

3. In a button-hole attachment for sewing-machines, the combination, with the base-plate, of a vibrator pivoted thereto, a feed-plate guided longitudinally of said vibrator and carrying a work-clamp, a reciprocating and intermittingly-rotating feeding and cam wheel, and feeding and vibrating levers connected with said wheel and feed-plate and adapted to transmit motion from the former to the latter, substantially as set forth.

4. In a button-hole attachment, the combination, with a feed-plate and work-clamp, of a feeding and cam wheel, a reciprocating slide for moving said wheel laterally, mechanism comprising a lever having a pin or roller and connections for intermittingly rotating said wheel, and a normally stationary but adjustable lever having an inclined slot in which said pin or roller works to vibrate said lever, substantially as set forth.

5. In a button-hole attachment, the combination, with a feed-plate and work-clamp, of an intermittingly-rotating feeding and cam wheel, a reciprocating slide for moving said wheel laterally, a sliding plate by which said wheel is carried, a feeding-lever connected with said wheel and feed-plate, and an adjustable fulcrum for said lever movable with said sliding plate, substantially as set forth.

6. In a button-hole attachment, the combi-

nation, with the feed-plate and work-clamp, of a reciprocating and intermittingly-rotating feeding and cam wheel, a sliding plate by which said wheel is carried, and a feeding-lever connected with said wheel and feed-plate and also having a pin-and-slot connection with said sliding plate, whereby said feeding-lever will be caused to reciprocate with said wheel and sliding plate, substantially as set forth.

7. In a button-hole attachment, the combination, with the feed-plate and a vibrator in which said plate moves longitudinally, of a single vibrating and shipping lever having an adjustable connection with said vibrator, and a reciprocating and intermittingly-rotating feeding and cam wheel for operating said lever, substantially as set forth.

8. In a button-hole attachment, the combination, with the feed-plate and work-clamp, of a single lever connected with said feed-plate, and serving the double purpose of moving the feed-plate laterally to form the overedge-stitches, and of shifting said plate to bar the end of the button-hole and to bring the second side thereof beneath the needle when the first side has been worked, said lever having an adjustable fulcrum for varying the lateral throw of said plate, substantially as set forth.

9. In a button-hole attachment, the combination, with the base-plate, the feed-plate, and the work-clamp, of a cap or housing attached to said base-plate, an operating-lever, ratchet and cam wheels, and a slide, all supported by said cap, a feeding and cam wheel reciprocated by said slide, mechanism comprising a lever having a pin or roller, and connections for intermittingly rotating said feeding and cam wheel, an adjusting-lever pivoted to said cap and having an inclined slot engaged by said pin or roller, and feeding and vibrating levers connected with said feeding and cam wheel and said feed-plate, substantially as set forth.

10. The combination, with the feed-plate, the work-clamp, and the vibrator B, having the projection b^2 , of the reciprocating and intermittingly-rotating feeding and cam wheel G, having the cam-grooves g and g' , the feeding-lever H, and the vibrating and shipping lever J, having a slot, j^2 , and the adjusting-lever K k , pivoted to the projection b^2 and having a pin or roller engaging said slot, substantially as set forth.

11. The combination, with the base-plate, of the vibrator B, pivoted at its rear end to said base-plate, and the overhanging integral projection or hook a on the latter for holding down the forward end of the said vibrator, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

JAMES G. GREENE.
PHILIP DIEHL.

Witnesses:

E. H. BENNETT,
WM. H. INSLEE.