

(Model.)

E. C. SMITH.
LOCK.

3 Sheets—Sheet 1.

No. 476,086.

Patented May 31, 1892.

Fig 1

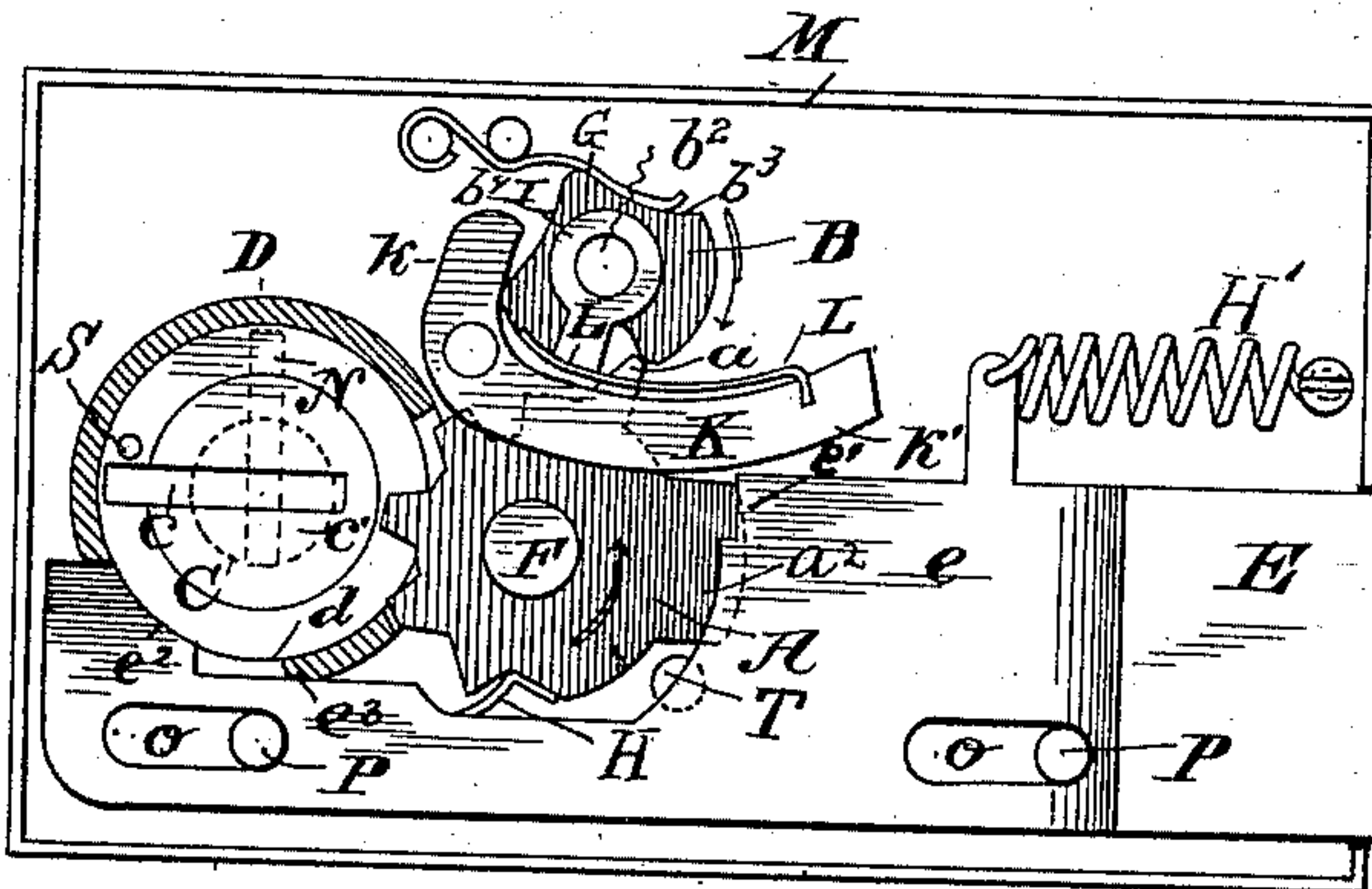


Fig 2.

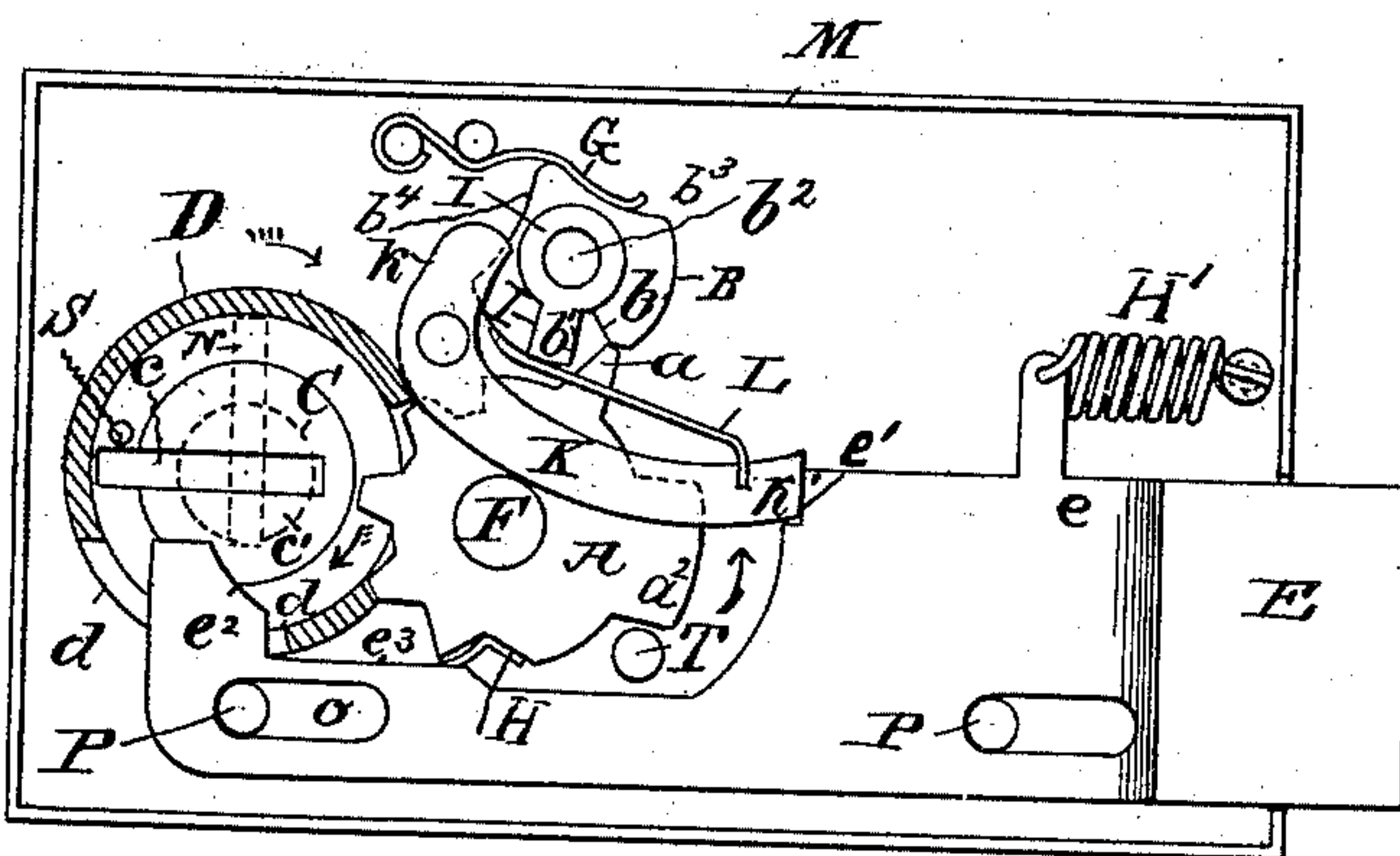
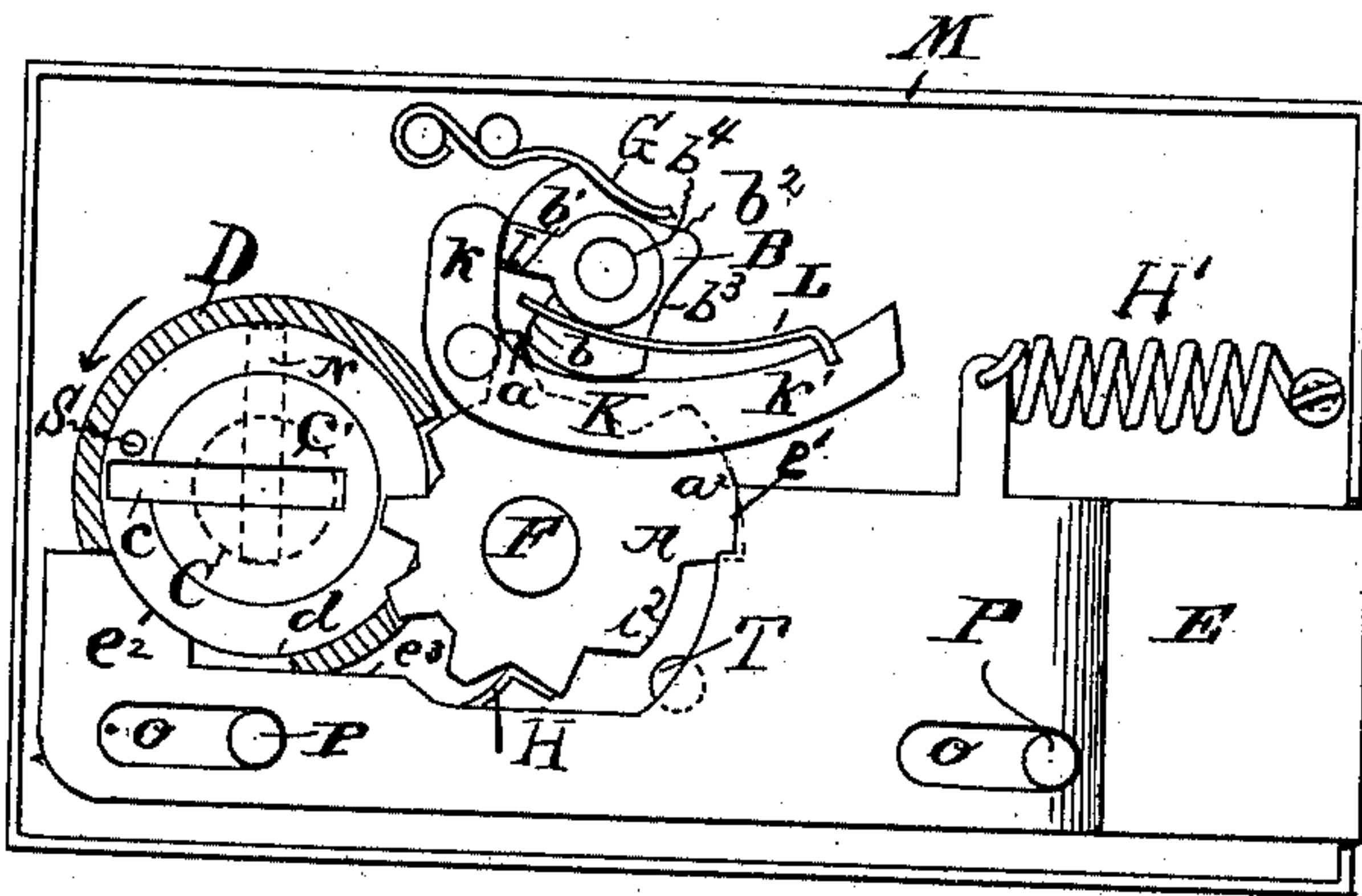
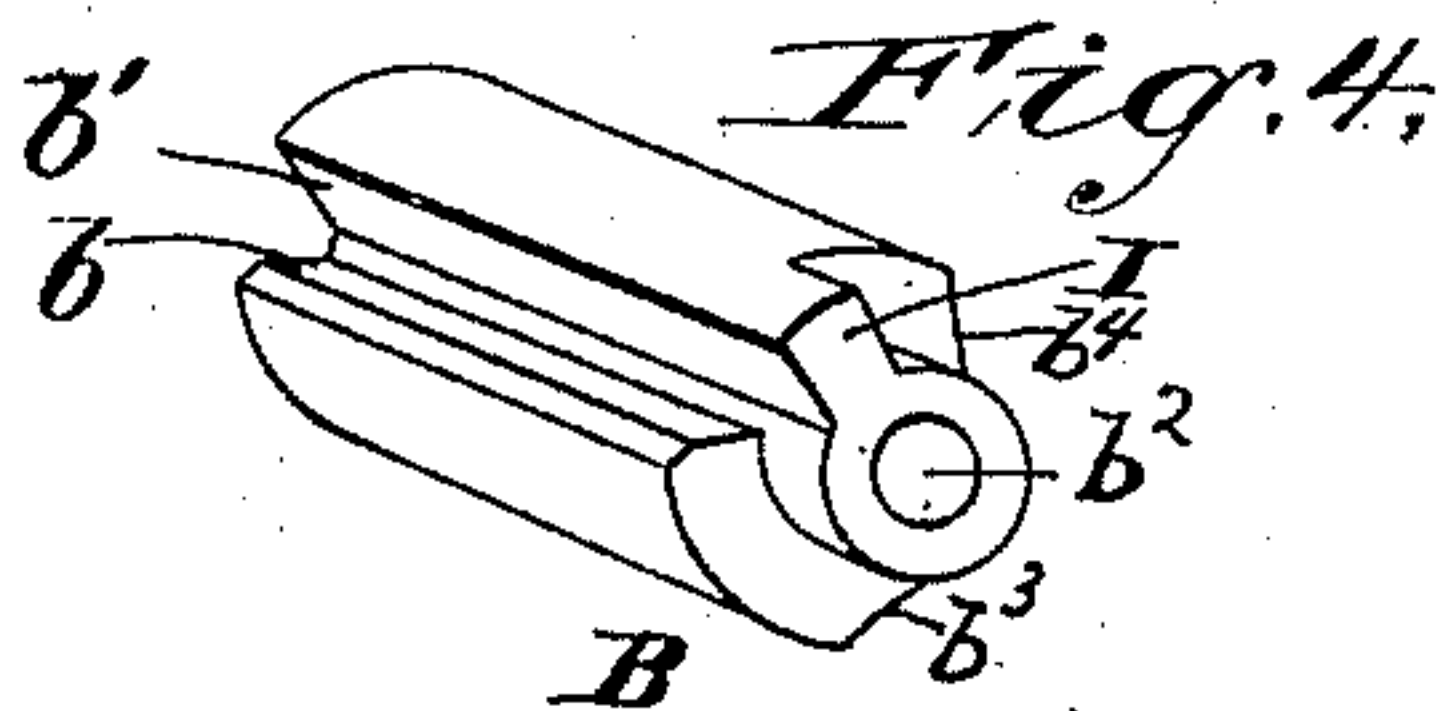


Fig 3.



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Inventor,
Eugene C. Smith,
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his Attorney

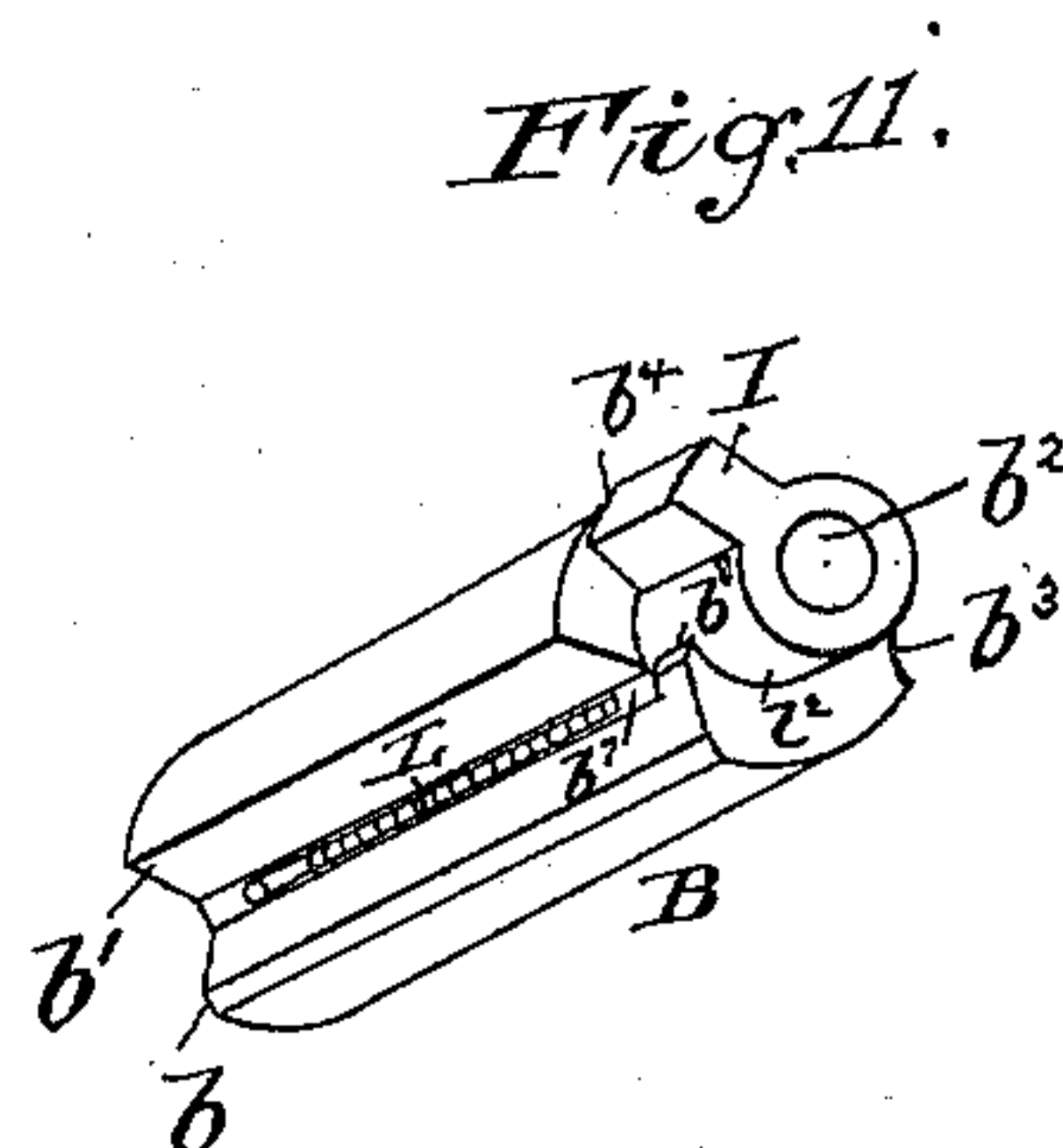
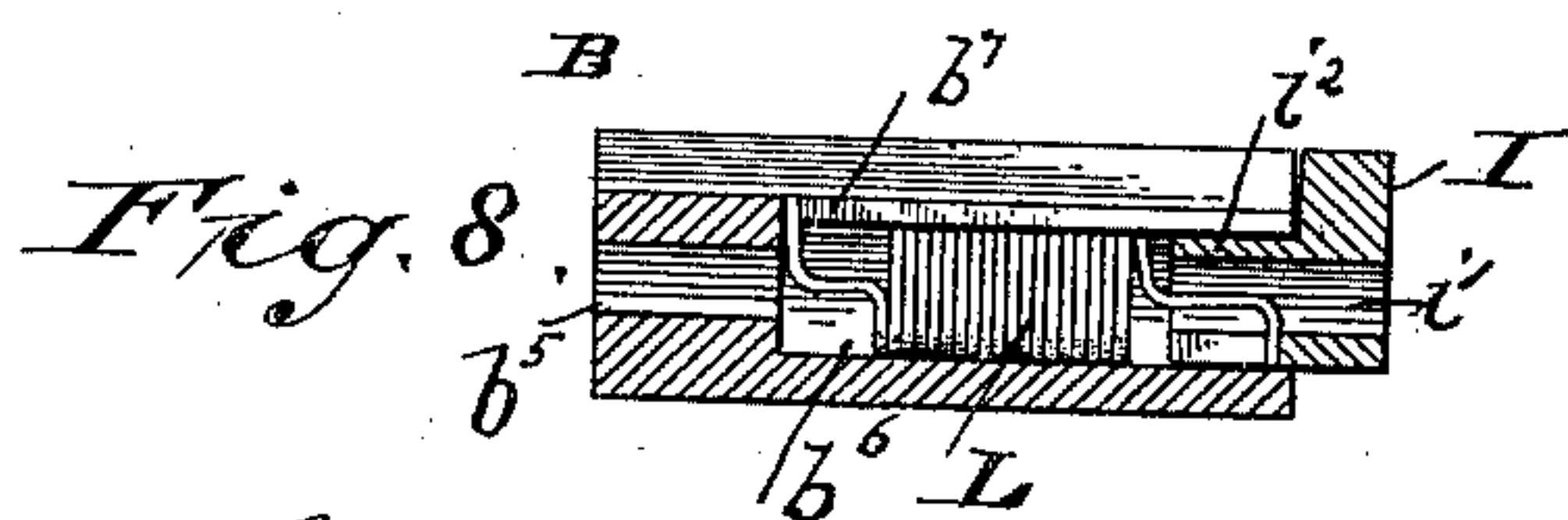
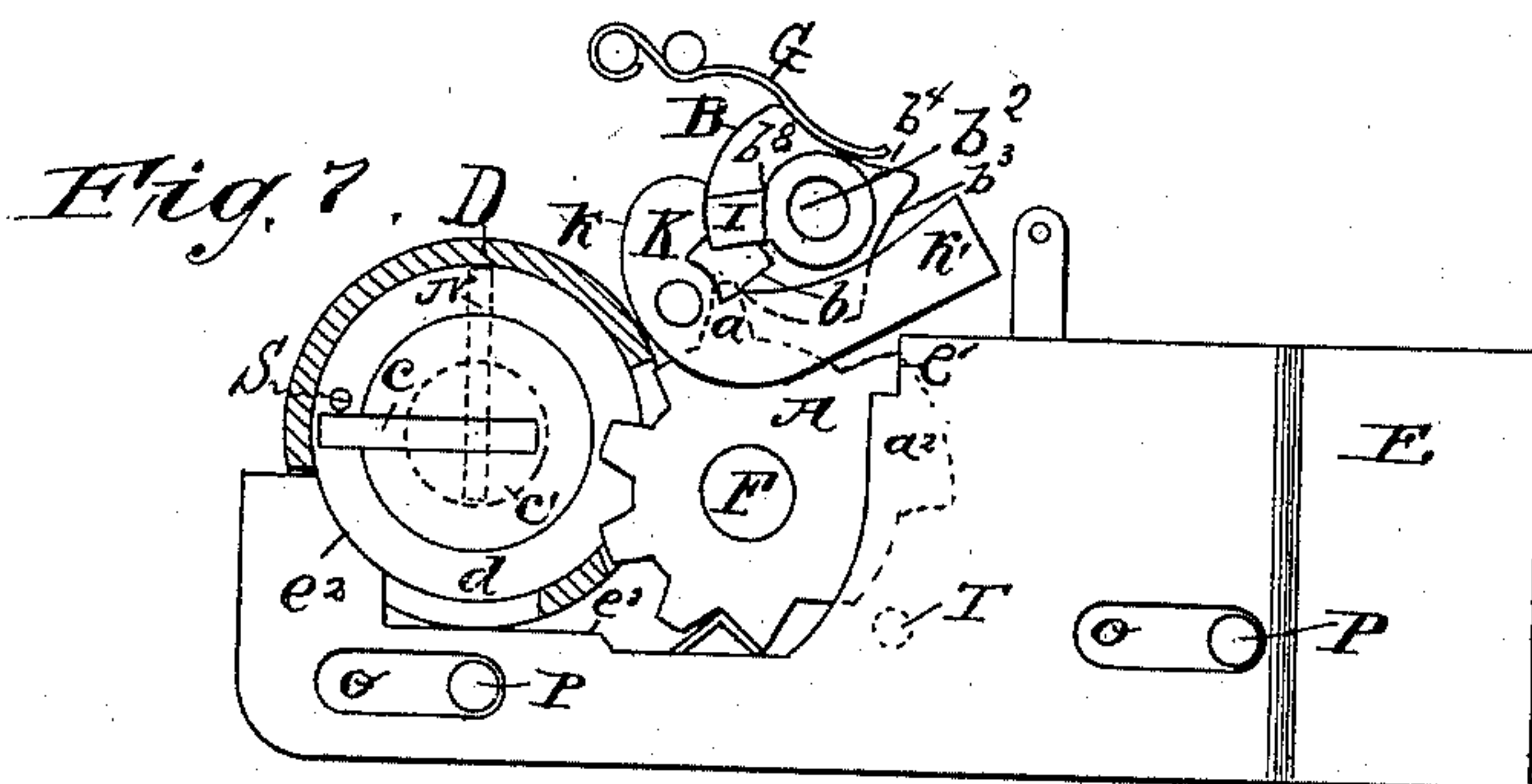
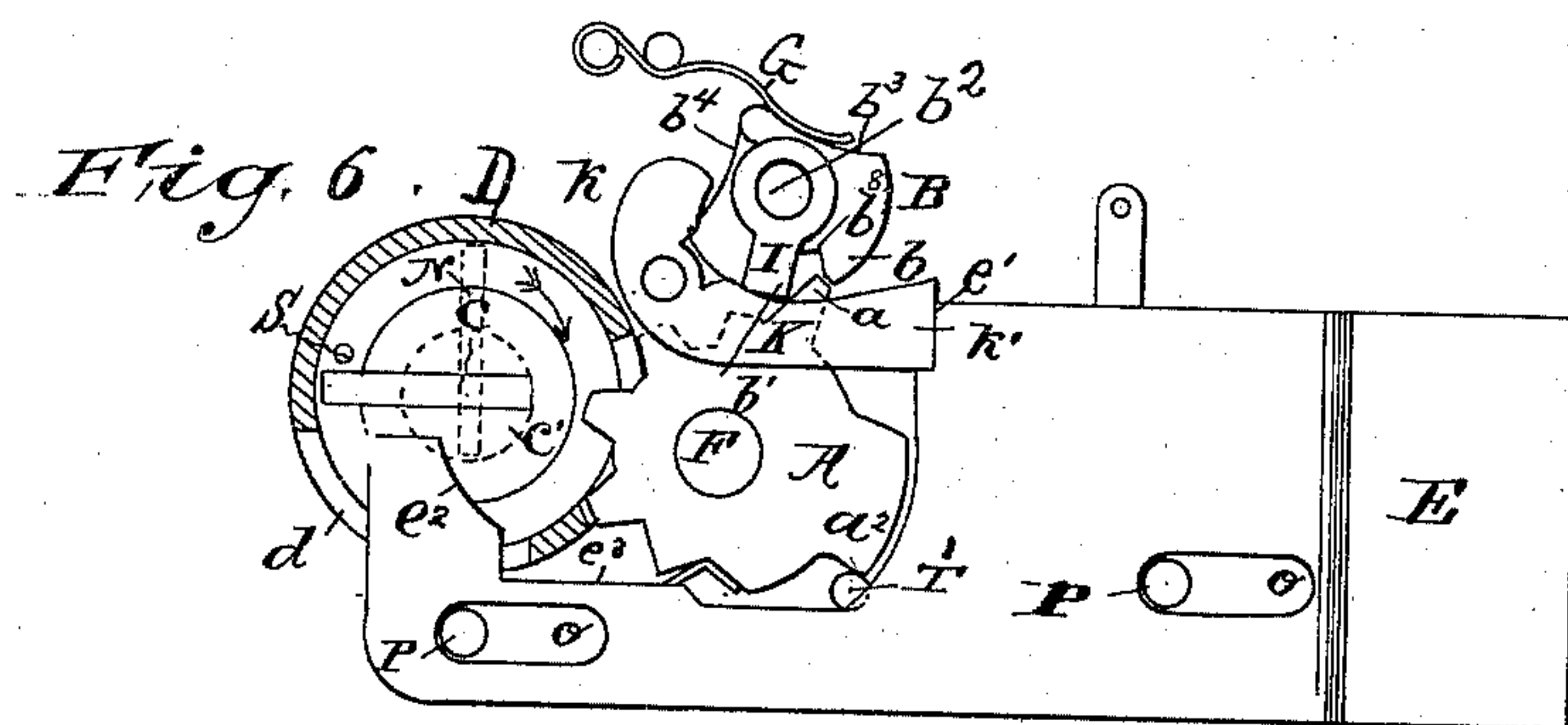
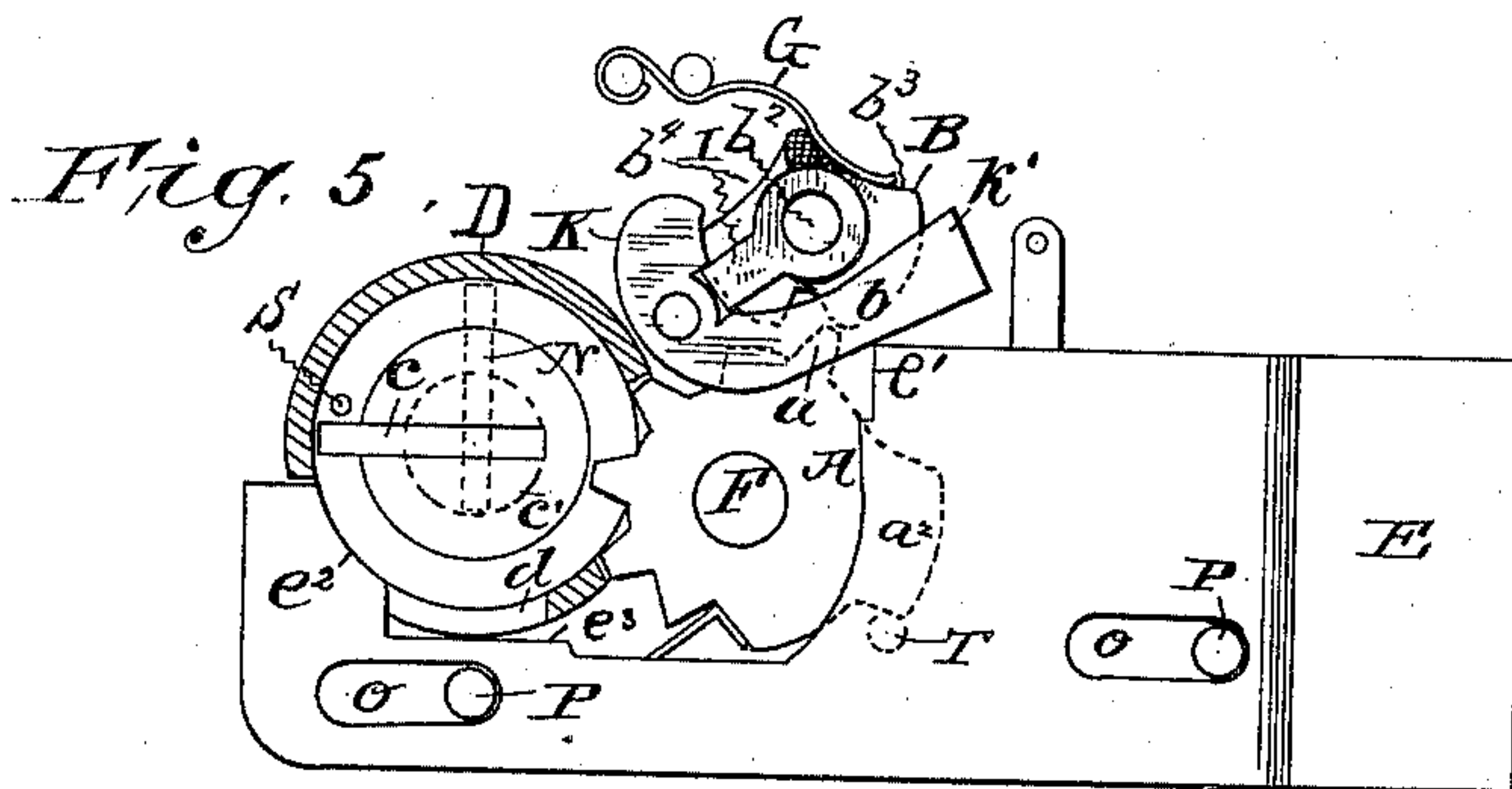
(Model.)

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3 Sheets—Sheet 2.

No. 476,086.

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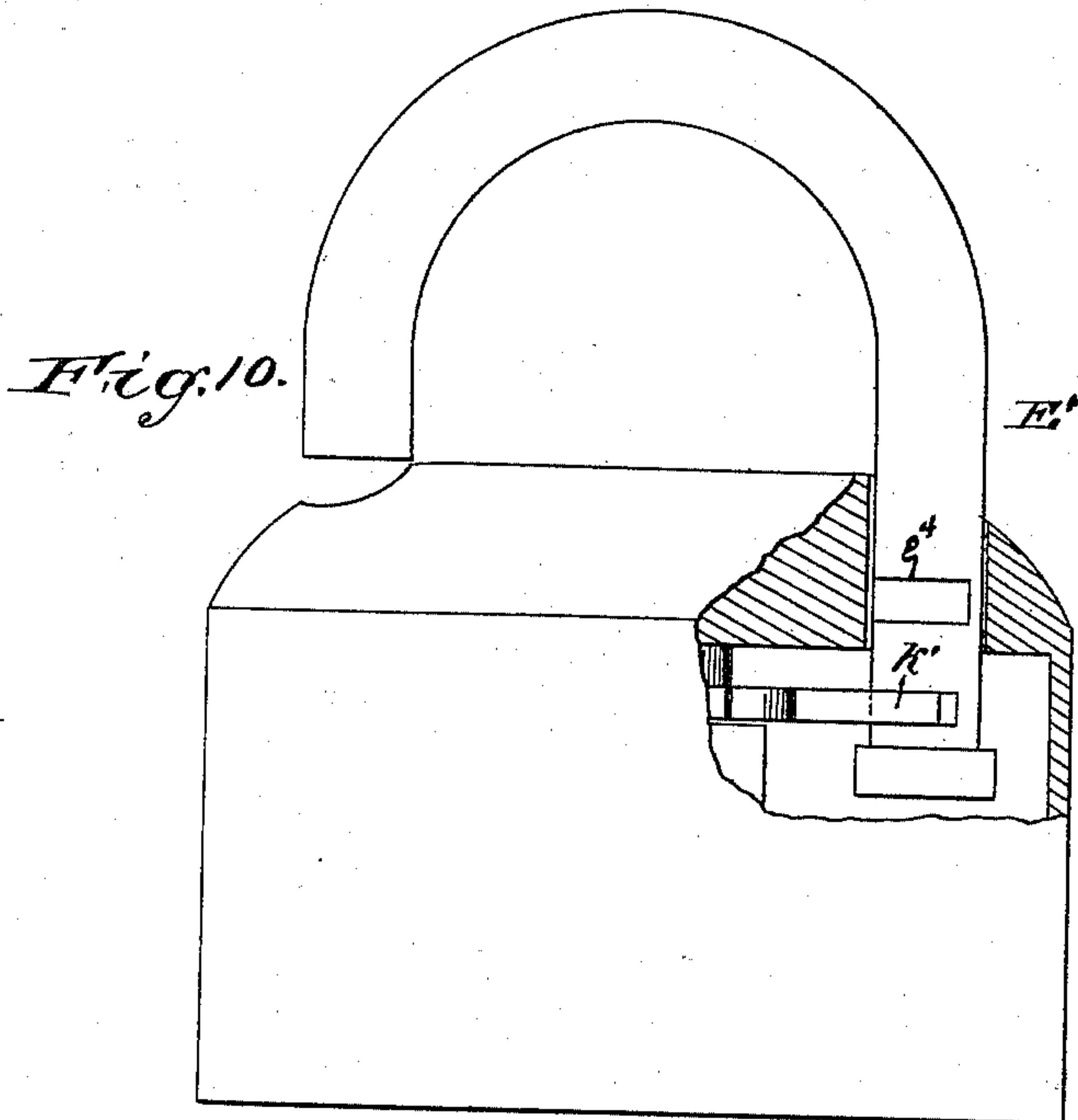
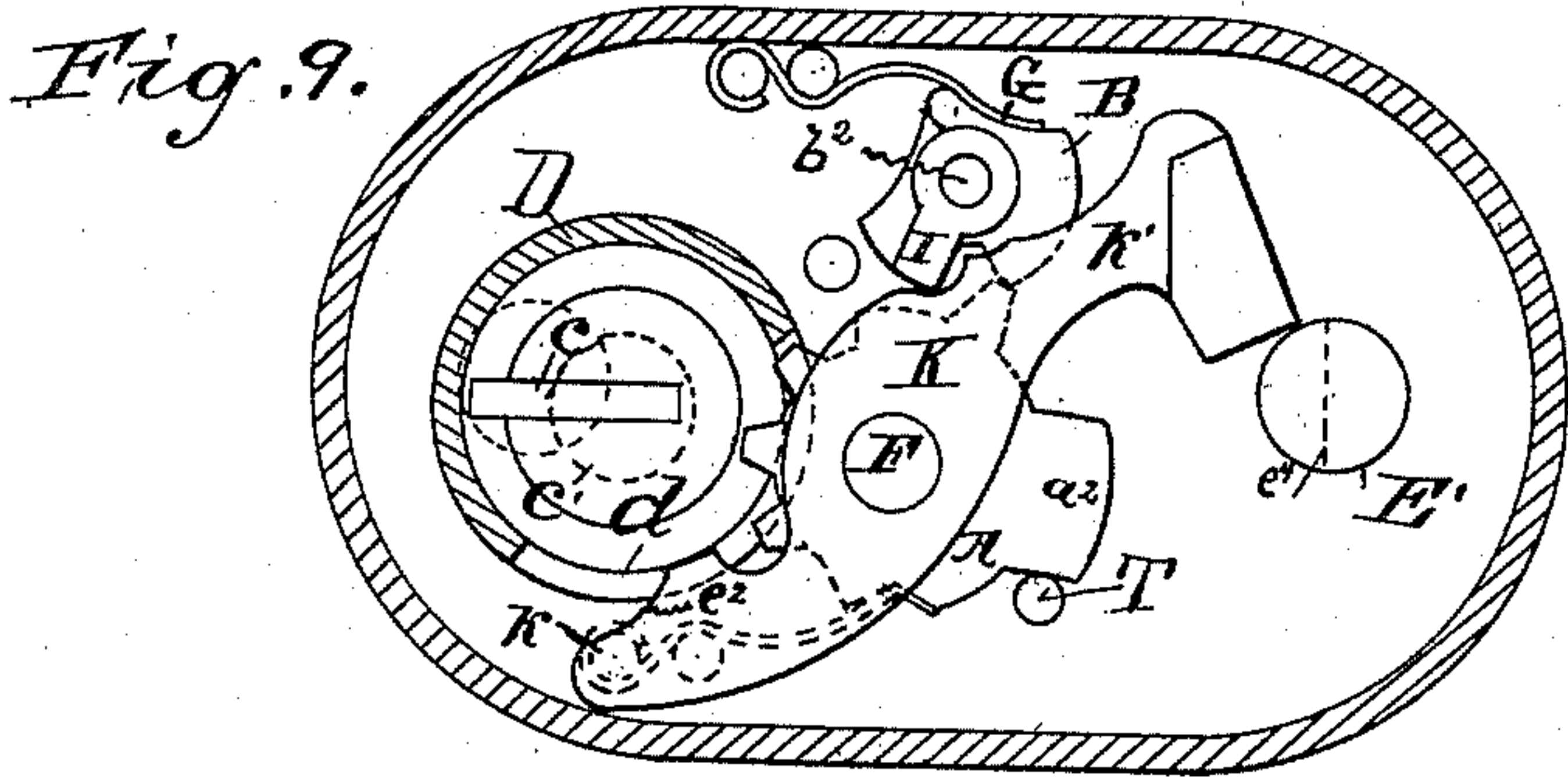
(Model.)

E. C. SMITH.
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3 Sheets—Sheet 3.

No. 476,086.

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his attorney.

UNITED STATES PATENT OFFICE.

EUGENE C. SMITH, OF NEW YORK, N. Y., ASSIGNOR TO THE UNIVERSAL LOCK COMPANY, OF SAME PLACE.

LOCK.

SPECIFICATION forming part of Letters Patent No. 476,086, dated May 31, 1892.

Application filed May 29, 1891. Serial No. 394,599. (Model.)

To all whom it may concern:

Be it known that I, EUGENE C. SMITH, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Locks, of which the following is a specification.

My invention relates to improvements in locks, and particularly to improvements in that class of locks which have a locking-bar that is engaged by a projection on each of the tumblers and that holds the locked and unlocked tumblers in their several positions until the locked tumblers have been returned to their unlocked positions by the proper key. A lock of the kind just specified was patented to me by Letters Patent of the United States No. 414,261, bearing date the 13th day of October, 1889, and it is especially the purpose of this improvement to adapt the tumblers and locking-bar described in said Patent No. 414,261 to locks wherein the bolt is not shot forward by the key, but by other independent or automatic means, as by knobs or springs, or by strike-levers, which are operated by closing the door, and such adaptation is effected by causing the said locking-bar to throw down a piece behind the bolt when said bolt is shot forward by any device which may be used for the purpose, which said piece will then prevent the return of the bolt until the locked tumblers have been acted on by the proper key.

Broadly considered, my present invention consists in the application at a point between the locking-bar and the bolt of a flexible connection—as a spring, for example—on which the locking-bar puts tension or compression when said locking-bar is in the locked position and before the bolt is shot forward. Then when the bolt is shot forward the energy stored in said flexible connection forces down a piece behind the bolt, (or in a variation of my invention said flexible connection acts directly on the bolt,) so that the lock cannot be opened until the proper key has acted on the tumblers. Whether the said flexible connection is on the locking-bar or is on the

bolt or is on a member separate from both locking bar and bolt is not material, the essence of the invention consisting in storing energy at any point between the locking-bar and the bolt by which a piece will be acted on and which said piece will prevent opening the lock until a key has returned the tumblers to the unlocked position.

Referring to the drawings which accompany the specification to aid in the description, Figure 1 is a plan view of a lock wherein the flexible connection is in a lever between the locking-bar and the bolt. The tumblers are shown locked, but the bolt is drawn back. One side of the lock-case is removed to show the mechanism. Fig. 2 is a view of the same lock as shown in Fig. 1. The tumblers are locked, but the bolt is shot forward. Fig. 3 is a view of the same lock as shown in Fig. 1, but the tumblers are represented unlocked and the bolt drawn back. Fig. 4 is a perspective view of the locking-bar and its cam. Fig. 5 is a plan view of a modification of the mechanism, the case being removed, wherein the flexible connection is in the locking-bar. The tumblers and locking-bar are represented in the same position as in Fig. 1. Fig. 6 is a plan view of the same lock as shown in Fig. 5, but the tumblers and locking-bar are in the same position as in Fig. 2. Fig. 7 is a plan view of the same lock as shown in Fig. 5, but the tumblers and locking-bar are in the same position as in Fig. 3. Fig. 8 is a longitudinal sectional view of the locking-bar, showing the arrangement of the spring. Fig. 11 is a perspective view of the locking-bar and its cam and spring. Fig. 9 is a plan view of a lock with one side of the case removed, wherein the cam on the locking-bar acts directly on the bolt. The tumblers and locking-bar are shown locked, but the bolt is drawn back. Fig. 10 is a broken side elevation of the same lock as in Fig. 9.

As hereinbefore stated, my improvement is especially intended to be applied to locks wherein a series of tumblers A shift on an axis F, each tumbler having a projection *a*, which engages the arms *b b'* of the locking-

bar B, Figs. 2, 4, and 11, so as to rotate said locking-bar B on its axis b^2 as the tumblers A shift to their several positions.

C is the key-cylinder, which rotates in the ordinary manner and has the usual key-slit c to receive a key.

D is a shield around the key-cylinder C to prevent the detecting of the combinations of tumblers from the keyhole and also to prevent moving the locking-bar B from the keyhole. Said shield D is slotted at d to allow the bolt-tail e to move to and fro, as shown in the figures, and the key-cylinder C is also notched, as indicated by the dotted circle c' , by a circumferential slot to admit of the movement of the said bolt-tail e . There is a number of said tumblers A placed contiguously with a washer between each pair of tumblers on the axial pin F, so that each tumbler is free to move independently of the other tumblers, and the aforesaid projection a on each tumbler will engage with the locking-bar B as the tumblers A shift to their several positions. By such engagement of the tumbler projections a with one or the other of the aforesaid arms b or b' the locking-bar B is rotated to the several positions shown in Figs. 1 and 3 or in Figs. 5 and 7.

G is a spring, which presses on one or the other of the two surfaces b^3 b^4 of the locking-bar B to accelerate and intensify its movement.

H is a spring of any ordinary description for the purpose of accelerating and intensifying the motion of the tumblers A, and H' is a spring for actuating the bolt E in case the said bolt is to be actuated by a spring instead of by knobs, strike-levers, or other means, for it is to be understood that the bolt E is not necessarily dependent on a spring H' for its motion, but may be actuated by other means. The aforesaid tumblers A, locking-bar B, key-cylinder C, shield D, and their springs have all been fully described and claimed in my said patent, No. 414,261, and therefore I will confine my description in this specification to the improvement herein claimed.

As stated, my said improvement consists in interposing a flexible connection between the locking-bar B and the bolt E in such a manner as to prevent the drawing back of the bolt E once the tumblers A are locked and the bolt E shot forward until the proper key has returned the tumblers A to their unlocked position. In Figs. 1 to 4 I show a lock wherein said flexible connection is inserted in a locking-lever. In these figures there is fixed on one end of the locking-bar B a radial arm or cam I, as clearly shown in Fig. 4. Pivoted to the lock-case M, adjacent to the locking-bar B and so as to rotate in the same plane as said locking-bar B, is the locking-lever K. This lever K is a bent lever and has an arm k so shaped as to be engaged by the

said cam I when the locking-bar B is turning to the unlocked position of Fig. 3. The other arm k' of lever K is cut away so that said cam I can sweep around without touching said arm k' and also so as to leave space between the cam I and arm k' for a spring L, as seen in Fig. 1. Said spring L is preferably a straight elastic strip, having one end fixed into the end k' of the lever K and having the other end free. Of course the said spring L might be fixed in the other arm k of said lever K instead of in the arm k' , and if said spring L be of considerable length both of its ends may be fastened into the lever K, or one of its ends might be fastened into said lever K and the other end fixed to a pin in the lock-case M; but the arrangement shown in Figs. 1, 2, and 3 is very convenient. Said spring L is so shaped that normally, when not compressed, its free part stands quite widely out from the lever K, as in Fig. 2, and so as to be acted on by the aforesaid cam I on the locking-bar B. The bolt E has a shoulder e' so placed as to just allow the arm k' of the lever K to descend behind said shoulder e' when the bolt is shot forward into the position of Fig. 2, and in the bolt-tail e of said bolt E is a talon e^2 to be engaged by a key for the purpose of drawing back the bolt E; but as said bolt E will be shot forward independently of the key the front talon is cut away, as shown at e^3 , so that the key can sweep forward without touching the said bolt-tail e . Said bolt E is guided in any ordinary manner, as by pins P P, sliding in slots $o o$. Each of the tumblers A have a shoulder a^2 , which by coming in contact with a stop T limits the motion of said tumblers A.

The operation is as follows, supposing the bolt to be pushed back and the tumblers and locking-bar to be in the locked position of Fig. 1. In said position the cam I compresses the spring L, putting a considerable tension thereon, and thereby tending to throw down the lever K; but said lever K cannot go down, because it is resting on the bolt E or bolt-tail e . Now the bolt E is shot forward into the position of Fig. 2 by the spring H' or by other means. The tension on the spring L immediately causes the lever K to fall behind the shoulder e' of the bolt E, thereby preventing the forcing back of the bolt E until the tumblers and locking-bar have been turned to the unlocked position of Fig. 3 by means of the proper key. Now to open the lock the proper key is inserted through the keyhole (indicated by dotted rectangle N) into the key-cylinder C, which it is to be understood will then be turned, so that the slit in the key-cylinder will correspond with the keyhole N, and the key is turned in the direction of the arrow in Fig. 2. Thus the tumblers A and a locking-bar B are rotated to the position of Fig. 3. While turning to that position, the cam I on the locking-bar B has engaged the arm k of lever K, thereby raising the arm k' clear of

the bolt E. Now the key continuing to turn in the same direction its bit engages the talon e^2 in the bolt-tail e and draws back the bolt to the position shown in Figs. 1 and 3; but the key cannot continue turning in that direction back to the keyhole N by reason of the stop S, which prevents the key so turning. Consequently to take the key out of the lock it is necessary to turn the key in the reverse direction, as indicated by the arrow in Fig. 3. Now while so turning the key will set a certain combination of tumblers and the locking-bar B back into the locked position of Fig. 1. The key is then turned clear back to the keyhole N and taken out, and the lock is ready for another operation of shooting and drawing back the bolt.

In Figs. 5, 6, 7, 8, and 11 are shown a modification of a lock, wherein the flexible connection is a spring L in the locking-bar B.

The tumblers A, locking-bar B, key-cylinder C, shield D, bolt E, and their several springs are all as hereinbefore described and explained; but the cam I is not now fixed on the end of the locking-bar B, but is movably secured thereto in the following manner: Said locking-bar B has the usual axial perforation b^5 , Fig. 8, to receive the pin b^2 on which the said locking-bar B rotates and said opening b^5 is enlarged within the locking-bar B at b^6 , as shown in Fig. 8, to receive a coiled spring L. One end of this spring L is fixed in the locking-bar B, being passed through a slit b^7 in said locking-bar B or otherwise secured to said locking-bar, and the other end of the said spring L is fixed in the cam I. The head k' of said cam I is perforated, as at i' , for the pin b^2 on which the locking-bar B rotates, and said cam I has a cylindrical collar i^2 , which fits with an easy-working fit in the hole b^6 of the locking-bar B, and the end of the locking-bar B is cut away on one side, so as to form a shoulder b^8 , which will limit the motion of the cam I in that direction and also serve to move the cams in the manner hereinafter described. When the cam I is in the locking-bar B, it takes a radial position across the end of said locking-bar B, as seen in Figs. 5, 6, and 7. The said spring L is set up with a tension to revolve the cam I downward and to the right in Fig. 5. Pivoted adjacent to the cam I, and so as to be engaged by said cam and to rotate in the same plane as the locking-bar B, is a bent lever K, which is so fashioned in this modification of the lock that both its arms k and k' will be acted on by said cam I. The bolt E is formed with the shoulder e' , the talon e^2 , and the cut-away part e^3 , as hereinbefore described, and may have the spring H' , also as hereinbefore described.

The operation is as follows: Suppose the locking-bar B and tumblers A to be in the locked position of Fig. 5 and the bolt to be drawn back. Now, as before said, the spring

L is exerting a tension on the cam I, tending to force said cam I downward, thereby pushing the lever K down; but said lever K cannot descend because it is resting on the bolt E or bolt-tail e . Consequently the cam I cannot descend, but is held by the lever K in the position of Fig. 5. Now suppose the bolt E to be shot forward by any means to the position of Fig. 6, then the tension of spring L or cam I will turn said cam into the position of Fig. 6, and in so turning cam I will have pushed the end k' of lever K behind the shoulder e' of bolt E, thereby preventing the return of said bolt. To open the lock, the proper key is inserted into the key-cylinder C and turned in the direction of the arrow in Fig. 6. The tumblers A and locking-bar B will turn to the position of Fig. 7, but in so turning the shoulder b^8 on the end of the locking-bar B will have lifted the cam I to the position shown in Fig. 7 and the said cam I will have raised the lever K to the position shown in the same figure. The key, continuing to turn, draws back the bolt E, but cannot turn back in the same direction to the keyhole, because of the stop S. To take the key out of the lock, its motion is reversed, thus again shifting the tumblers A and locking-bar B to the position of Fig. 5. The key is then turned clear back to the keyhole N and taken out of the lock.

In Figs. 9 and 10 are shown a modification of the lock, wherein the lever K acts as the bolt. The locking-bar and cam I are the same as in Figs. 5, 6, 7, 8, and 11. Fig. 9 shows the tumblers A and locking-bar B locked, but the lever K in the unlocked position and supported against the full part of the shackle E' . Now it is evident from what has been hereinbefore said that there is tension on the cam I, tending to move the said cam I to the right, and thereby move the head k' of the bolt K downward; but the bolt K cannot move because of the shackle E' . Now suppose the shackle E' be pushed farther into the lock until the notch e^4 comes in line with the head k' of lever K. Then the tension on cam I will immediately force the head k' of said lever K into the notch e^4 and lock the shackle E' . To free the shackle E' , the lock must be opened by proper key in the manner hereinbefore described. It will be understood that lever K is pivoted at F and that e^2 is a talon by which said lever K is acted on by a key for the purpose of lifting the head k' clear of the notch e^4 in the shackle E' . It will also be evident that the arrangement of spring L in lever K (shown in Figs. 1, 2, and 3) might be employed, with the lever K acting as a bolt, in the manner of Figs. 9 and 10.

Having thus described my invention, I claim—

1. In a lock, the combination, with tumblers, of a locking-bar actuated by the tumblers, a bolt, and a flexible connection be-

tween the bolt and the locking-bar, by means of which the motion of the locking-bar imparts motion to the bolt, as described.

2. In a lock, and in combination with tumblers, a locking-bar actuated by the tumblers, an arm movably attached to the locking-bar by a spring, and a locking-lever adapted to be engaged by said arm, as described.

3. In a lock, the combination of a locking-bar having an internal chamber, and a spring in said chamber, having one end fixed to the

locking-bar and the other end fixed to an arm which is movably attached to the locking-bar, as described.

Signed at New York, in the county of New York and State of New York, this 28th day of February, A. D. 1891.

EUGENE C. SMITH.

Witnesses:

JOHN C. WALL,
LOUIS M. FULTON.