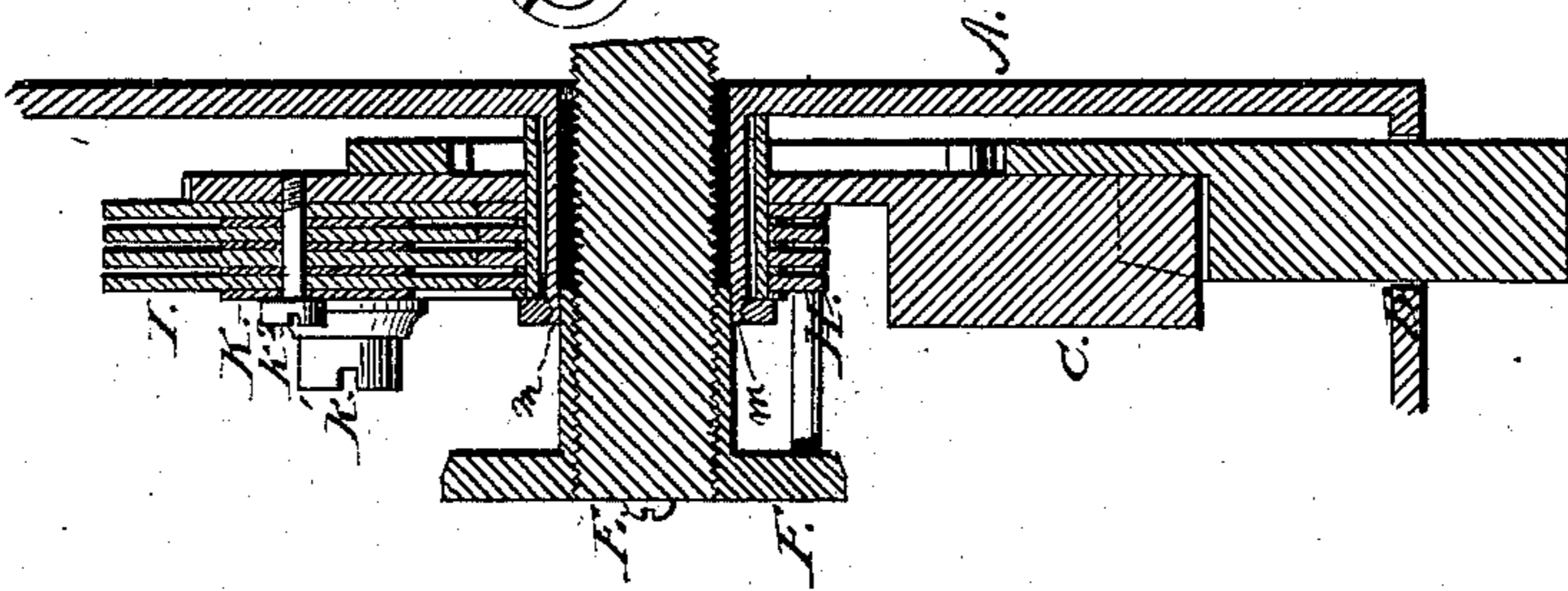
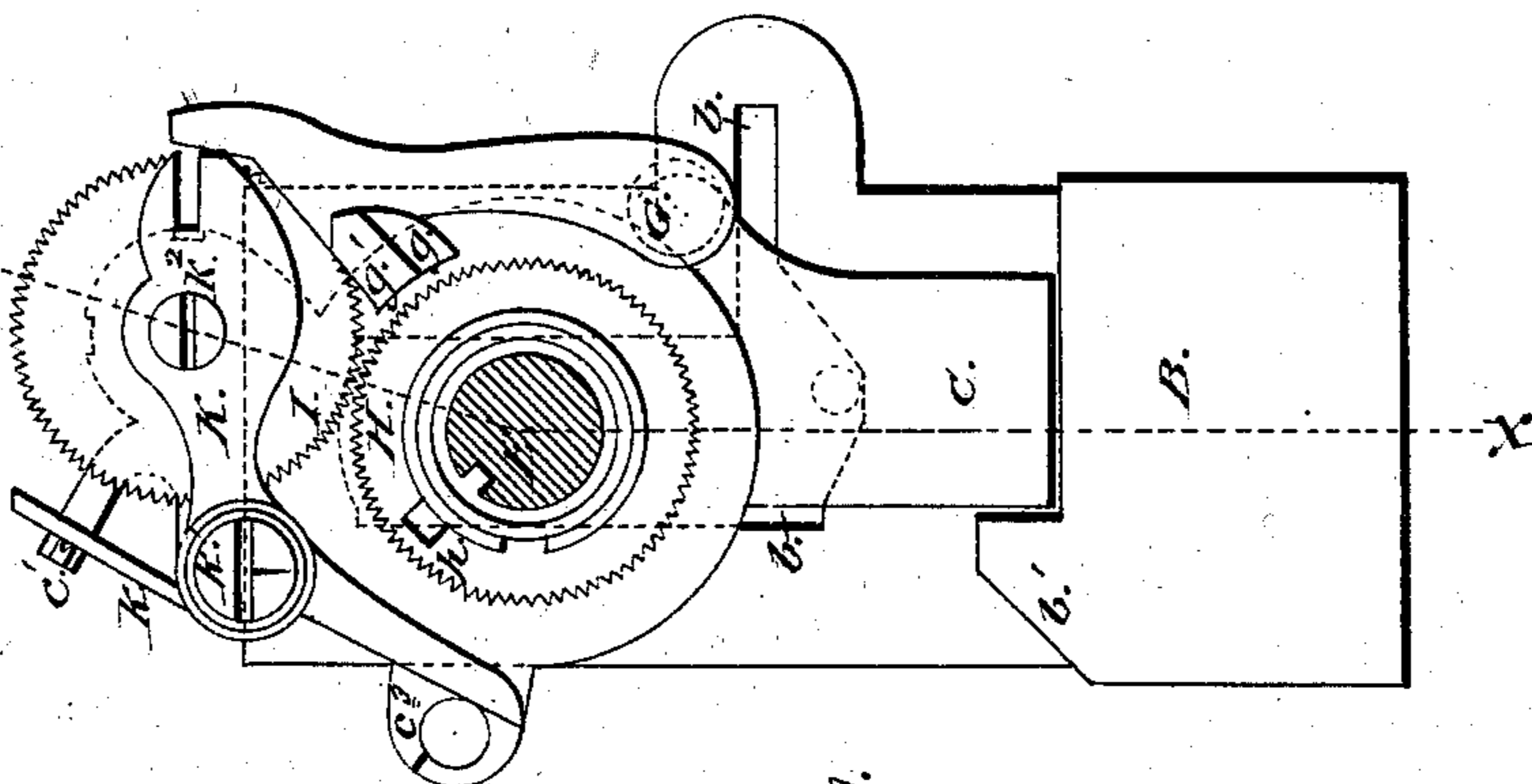
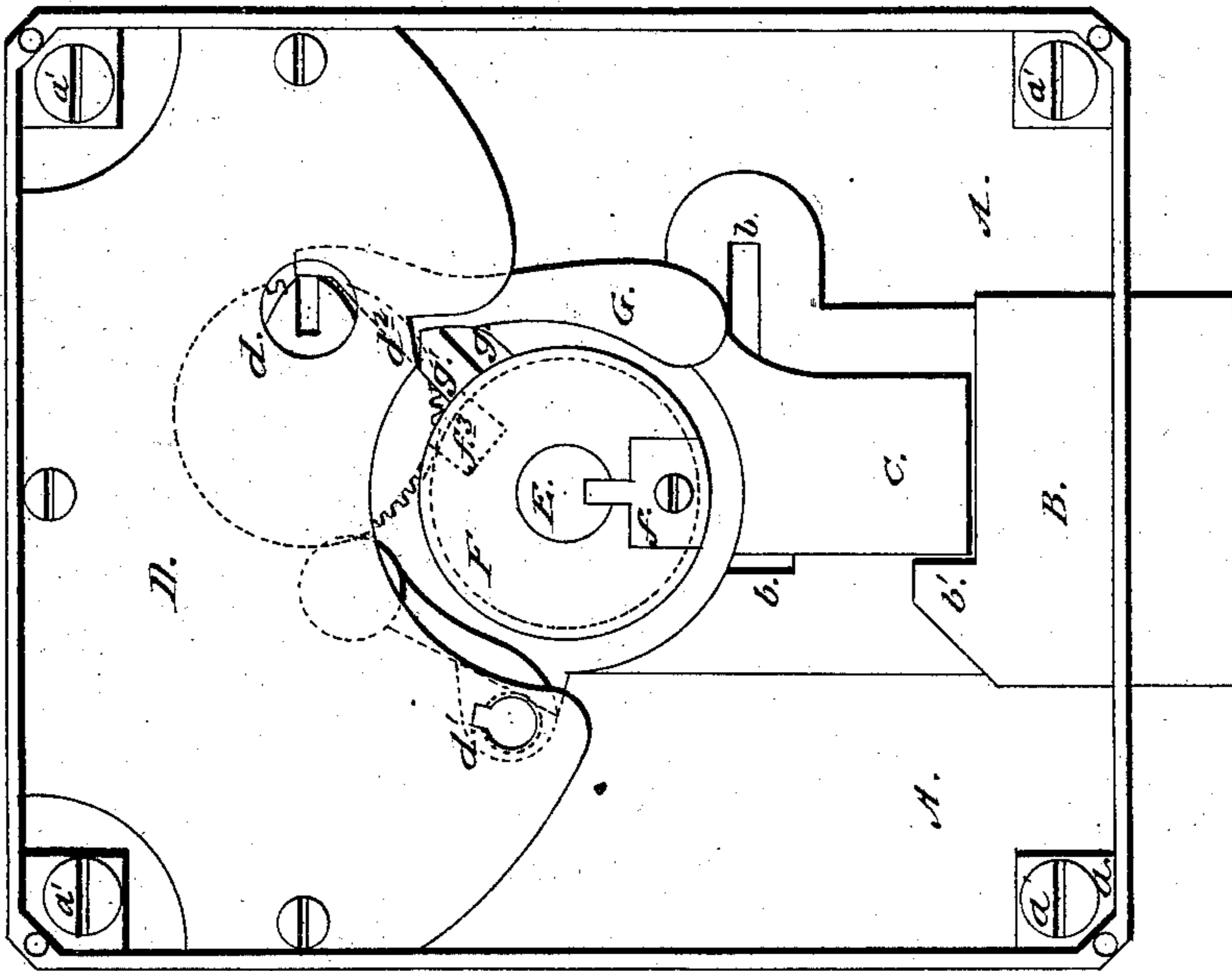


E. W. BRETTELL.
Permutation Locks.

No. 136,963.

Patented March 18, 1873.



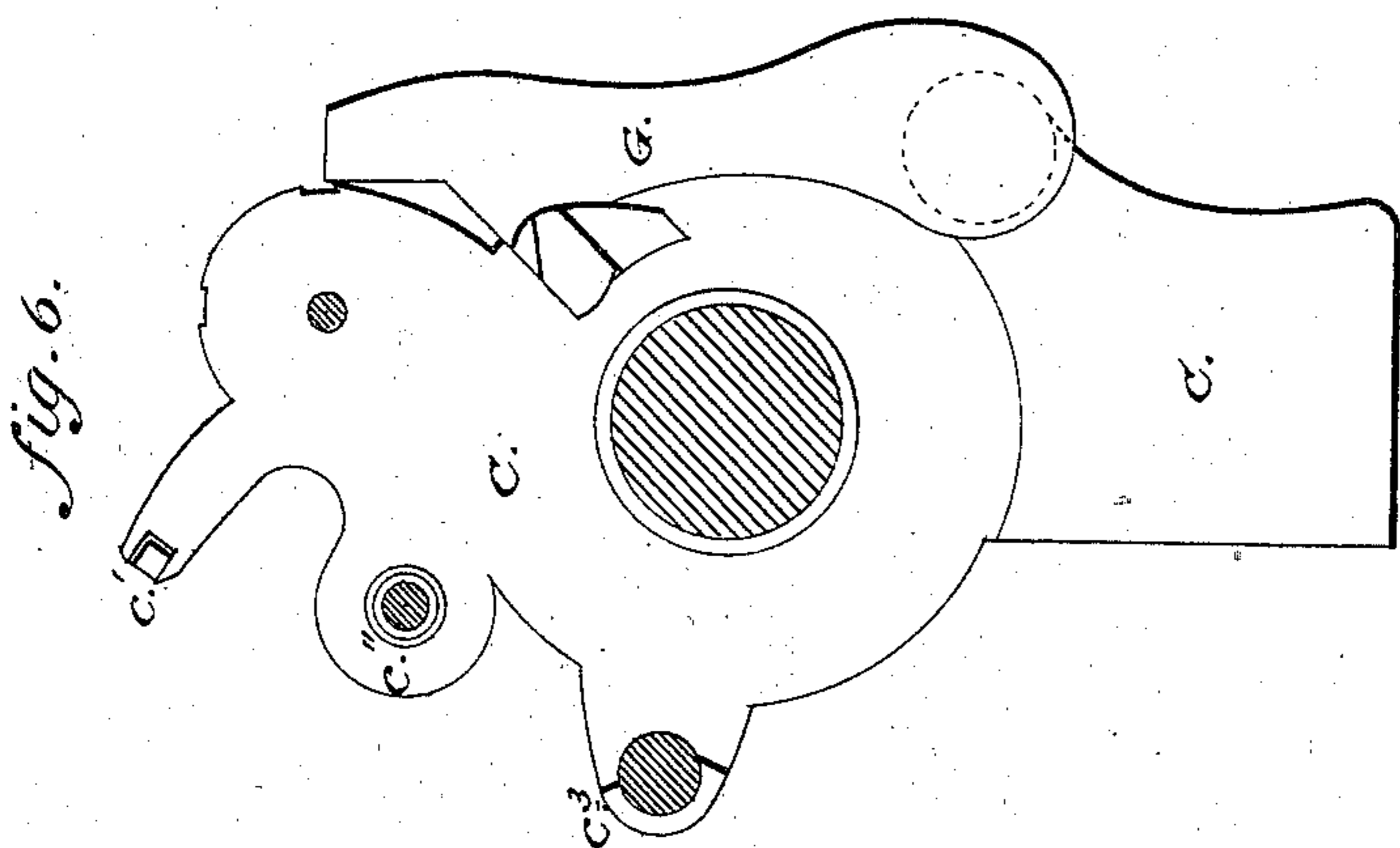
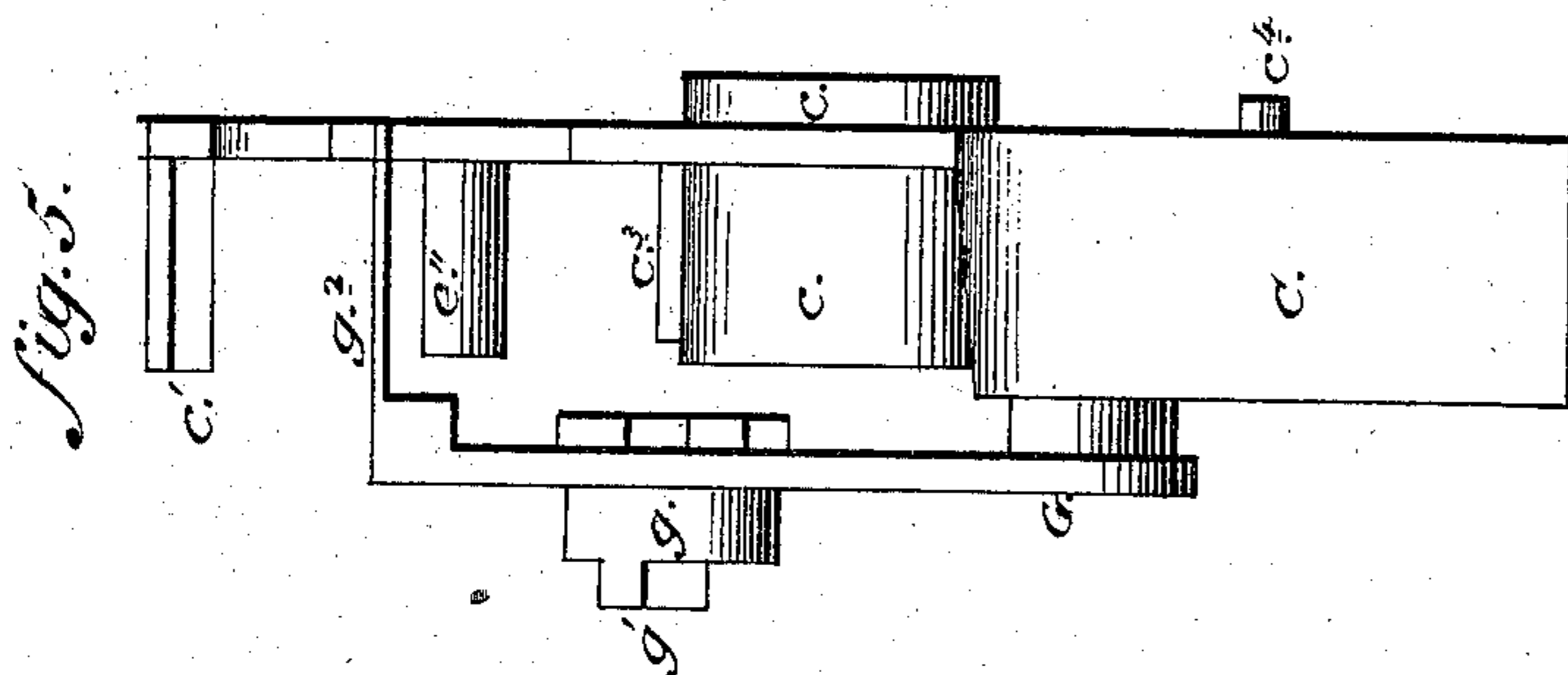
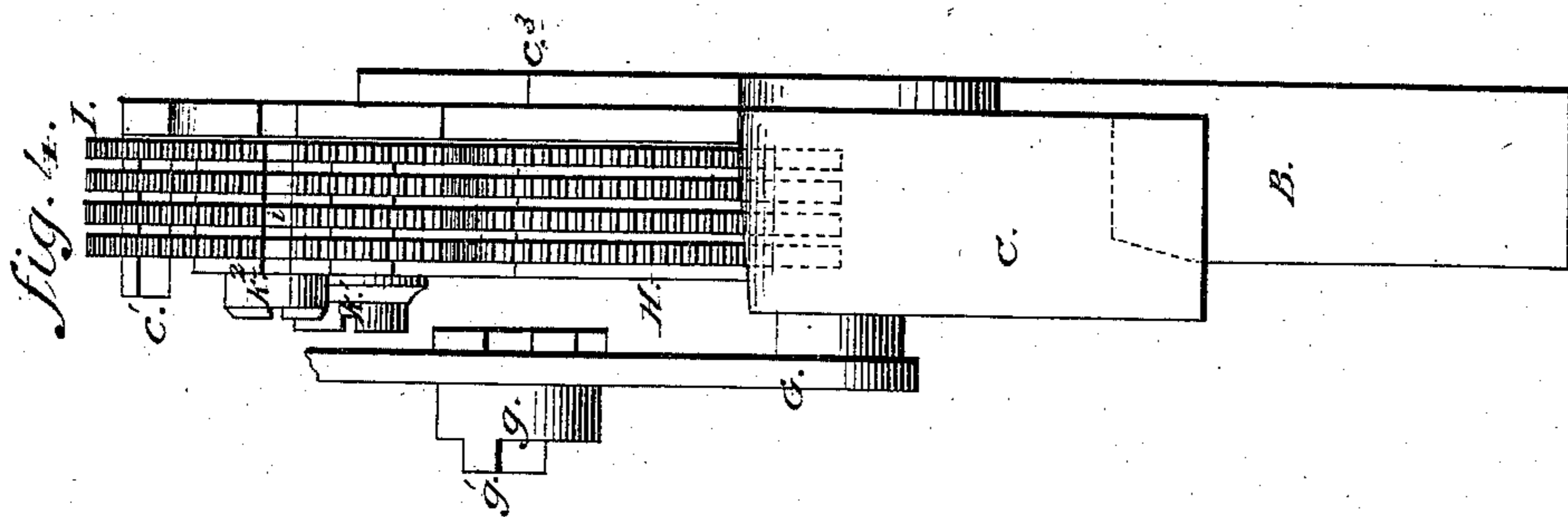
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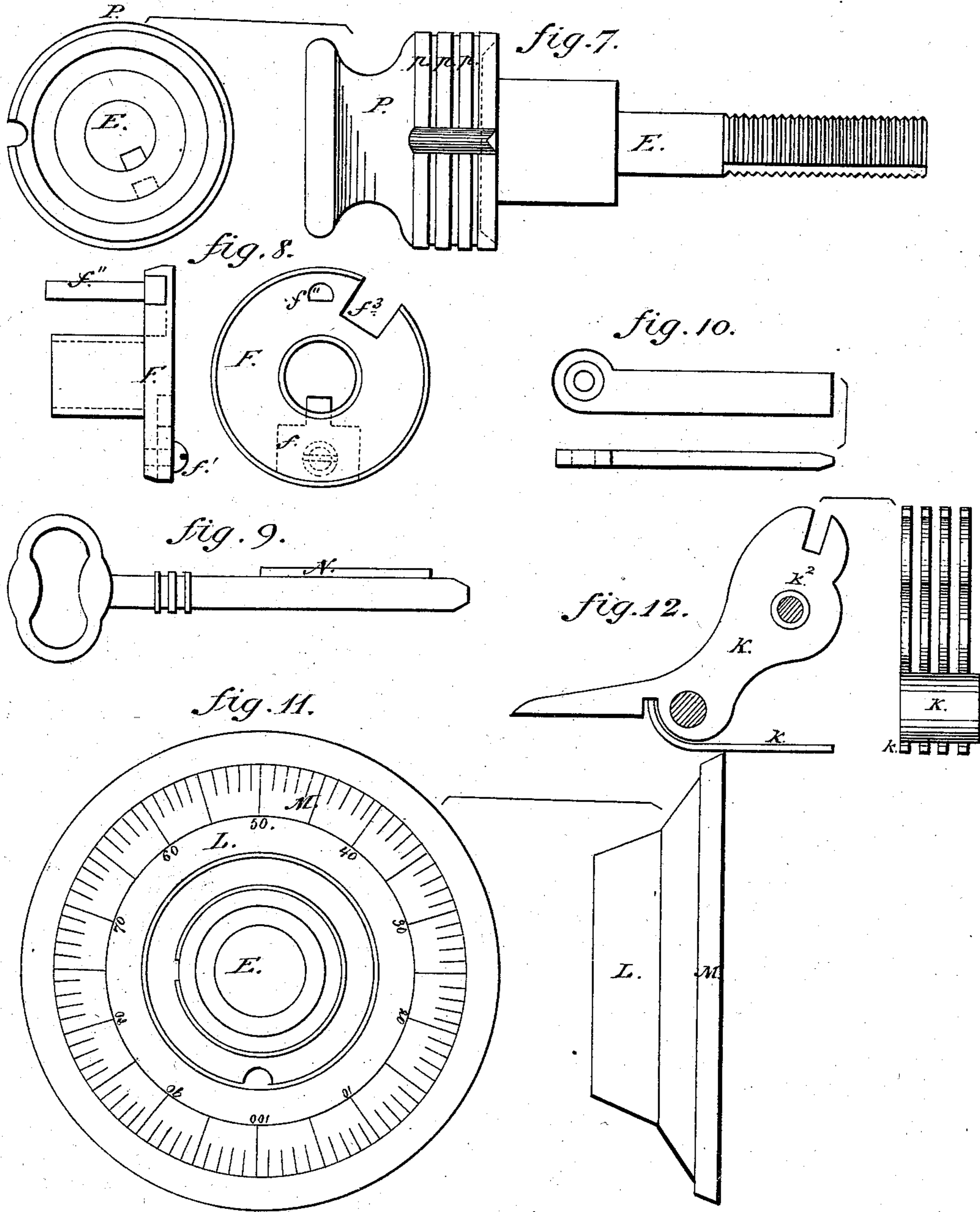
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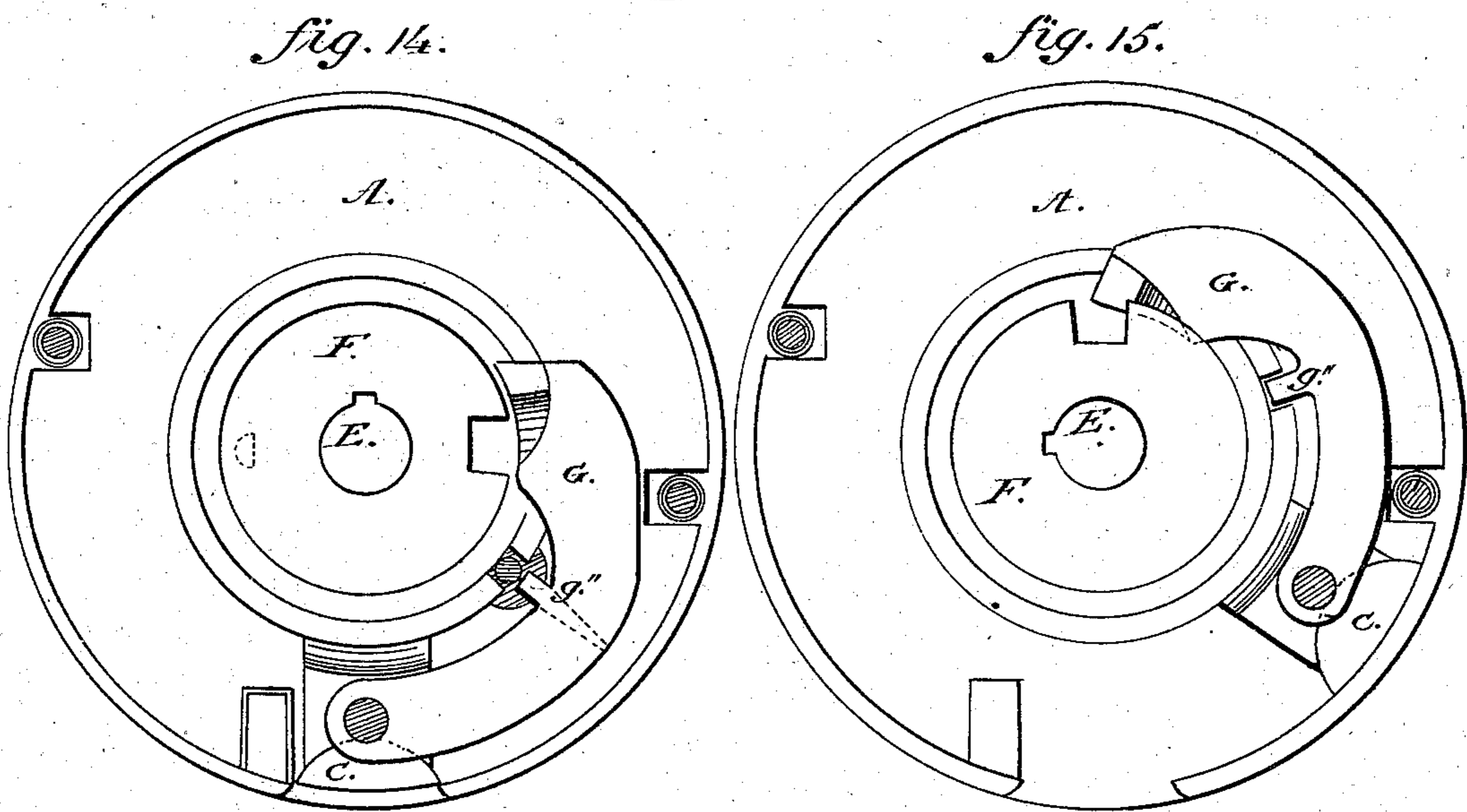
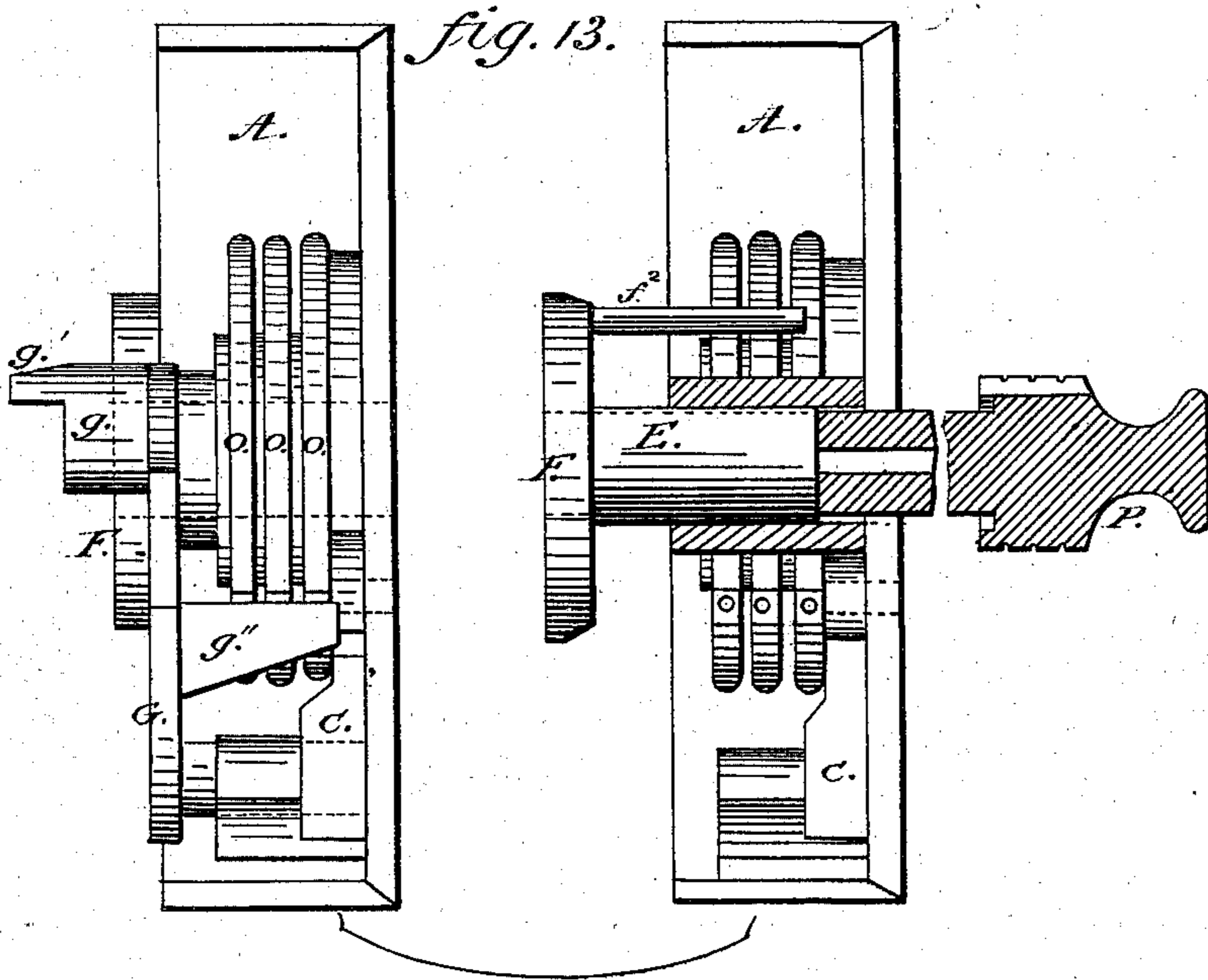
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UNITED STATES PATENT OFFICE.

EDWARD W. BRETTELL, OF NEW HAVEN, CONNECTICUT.

IMPROVEMENT IN PERMUTATION LOCKS.

Specification forming part of Letters Patent No. 136,963, dated March 18, 1873.

To all whom it may concern:

Be it known that I, EDWARD WILLIAM BRETTELL, of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Permutation Locks; and I do hereby declare that the following is a full, clear, and exact description thereof, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 represents an internal view of my improved lock, the rear covering-plate having been removed. Fig. 2 is a similar view with both covering and guard plates removed. Fig. 3 is a sectional view on the line *x x* of Fig. 2. Fig. 4 is a top view of the locking-bolt, oscillating check-tumbler, and revolving tumblers. Fig. 5 represents a top view of the oscillating check-tumbler and fence-lever. Fig. 6 is a side view of the same. Fig. 7 is a side and end view of the operating knob or handle and its shaft. Fig. 8 is a face and sectional view of the rotating carrier-wheel and its engaging-pin. Fig. 9 shows a side view of the disconnecting-key. Fig. 10 is a side and edge view of the setting-key. Fig. 11 is a side and front view of the dial-plate and collar. Fig. 12 represents a side and end view of the disconnecting tumbler lever made in one piece. Figs. 13, 14, and 15 represent a modification of my invention, the rotary tumblers being arranged on the sleeve of the oscillating tumbler and the gear-wheels dispensed with. This is intended for a cheaper class of locks.

This invention relates to an improvement in that class of locks commonly called combination or permutation locks; and it consists principally in placing the operative mechanism of the lock upon an oscillating tumbler, so that it partially rotates with said tumbler in locking and unlocking. Also, in providing the operating shaft or spindle with a carrier-wheel at its inner end, which has an unbroken periphery around its inner face, a recess for the reception of a projection on the fence-lever, and a pin that enters into an orifice in, and acts upon, the gear-wheels, thus giving motion to the moving parts of the lock.

A represents the case or shell of the lock,

and may be of cast or wrought metal, as desired. It is formed with inwardly-projecting lugs *a*, through which the securing-screws *a'* pass into the door or part to which the lock is attached. It is also provided with a suitable aperture for the passage of the knob-shaft, and surrounding which is a tubular stud, *m*, upon which the operating parts of the lock oscillate. A bolt, *B*, passes through a mortise in the side of the case, and is perforated by an aperture partly shown at *b*, Fig. 2, and continued by dotted lines. This opening allows the stud *m* and sleeve *c* of the oscillating tumbler to pass through it, which stud and sleeve act as a guide for the rear end of the bolt. The opening also forms a path in which the pin *c'*, attached to the oscillating check-tumbler, travels in operating the bolt. The front of this oscillating tumbler *C* is formed with a large and heavy end, which, when the bolt *B* is thrown out or locked, falls into a receptacle formed in the same, and rests upon a projection, *b*, as shown in Figs. 1 and 2. It is also provided with a sleeve, *c*, through which the tubular stud *m* attached to the case and shaft *E* of the knob passes, and at its rear extremity has a projection, *c'*, against which the springs *k* rest; and also upon its lower side are two studs, one of which, *c''*, acts as a fulcrum or support for the disconnecting-lever *K*, and the other stud, *c'*, forms a base against which its lower extremity rests. The stud *c'* is provided with a suitable opening for the reception of the disconnecting-key, (Fig. 9), by means of which key the tumblers *I* are moved out of contact with the gear-wheels *H* when it is desired to change the combination. *G* is a lever, one end of which is pivoted to the tumbler *C*, and near the middle it is provided with a riding-lug, *g*, which latter is also provided with a projection, *g'*; the rear portion of the lever forms a fence, *g''*, which, when the rotating tumblers *I* are in the proper position, falls into a recess in their peripheries and allows the projection *g'* to engage in a recess in the carrier-wheel *F*. A disconnecting-lever, *K*, is adjustably attached to the tumbler *C* by being slipped upon the stud *c''* and secured by screw *k'*. One end of this lever rests against the stud *c'*, and the other is provided with a slot for the reception of the fence *g''*.

It is also provided with slots for the reception of the tumblers I, which rotate upon a pin or screw, k'' , and a spring, K, which keeps them in gear with the wheels H. This disconnecting-lever may be formed of a single piece of metal, as shown in Fig. 12, or of several pieces united by a screw passing through them all. D, Fig. 1, is a guard-plate, secured by screws to projections within the case A, and provided with suitable apertures, d and d^1 , for the passage of the setting and disconnecting keys. It is also provided with a shoulder, d^2 , against which the projection g' , on the fence-lever G, abuts to hold the oscillating tumbler in the locked position. The rotating tumblers I are, in the present instance, four in number, and provided with one hundred teeth each; but their number, as well as the number of gear-wheels H, may be increased or diminished at will. They are each provided with a recess, i , for the admission of the fence g'' when their rotation has placed them in the proper position to admit its entrance therein. The gear-wheels H are similarly constructed; but, instead of the recess in their periphery, they have an aperture, h , which receives the engaging pin f'' of the carrier-wheel. They are also fitted so as to turn freely upon the sleeve c of the oscillating tumbler. The operating shaft or spindle E is provided at its outer end with a peculiarly-formed knob, P, which has a series of small grooves, $p p p$, formed in a portion of its periphery, which act as guides to determine the position of the engaging-pin f'' in operating the lock. It is further provided with a longitudinal groove in which fits a tongue in the collar L, which serves to communicate the rotating motion of the knob to the collar L and dial-plate M. The inner end of the shaft or spindle E is furnished with a screw-thread upon which the carrier-wheel F is screwed and firmly secured in its proper position by a key, f , which is secured to the carrier F by a screw, f' . One end of this key enters a slot in the shaft, and effectually prevents any movement of the carrier-wheel thereon. The spindle E is allowed a longitudinal movement equal to the thickness of all the gear-wheels and their washers. The periphery of this carrier-wheel is of slightly-conical form, which allows it to pass beneath the riding lug g upon the fence-lever G, thus slightly raising the said lever and preventing all contact of the fence with the teeth of the tumblers I while they are being rotated. A recess, f^3 , is formed in the carrier-wheel, which, when in the proper position, allows the projection g' upon the riding lug to fall into it, and when in this position the rotation of the operating knob and spindle will raise the weighted end of the tumbler C out of the recess in the bolt B, and the movement being continued, the pin c^4 , operating in the slot b , carries the bolt backward in the operation of unlocking.

It will be seen that the recess f^3 does not pass entirely through the carrier-wheel, thus leaving the inner line of its periphery unbroken,

so that it forms a continuous support to the projection g' of the fence-lever, except when exactly in the position required for unlocking.

An engaging-pin, f'' , is attached to the carrier-wheel near its periphery, which, in operating the lock, enters the apertures h in the wheels H, imparting its own motion to them, and through them to the tumblers I. The dial M is provided with a projecting collar, L, as shown in Fig. 11, which receives that portion of the knob P which is provided with the grooves p ; but this collar may be dispensed with and the grooved portion of the knob allowed to enter directly into a recess in the dial-plate. The key shown in Fig. 10 is used in setting the lock, and is passed through the aperture d in the guard-plate, and the tumblers I rotated so that it will enter the recess i in each, thus securing them all in one position. In order to allow the gear-wheels H to be turned without moving the tumblers I, a disconnecting-key, Fig. 9, is inserted in the opening d^1 in the guard-plate, its lower end entering a socket in the stud c^3 , and upon turning the key a rib, N, presses against and elevates the lower end of the lever K, thus carrying the tumblers I out of gear with the wheels H.

The operation of unlocking and locking is as follows: First, in unlocking, supposing the combination upon which the lock is set to be the numbers 10, 20, 30, and 40, withdraw the knob and turn it at the same time to the left until all the wheels H are picked up by the engaging-pin, and continue the rotating movement until the figure 10 upon the revolving dial is opposite the mark upon its case, which indicates that the first or outer tumbler is in position, then push the knob in until the first groove upon its periphery is in line with the edge of the dial, when the rotation is continued to the left until the figure 20 is opposite the mark which sets the next tumbler, when the knob is again pushed in and again turned, as before, until the figure 30 is opposite the mark. The same process is repeated until all the tumblers are properly set. This completes the combination. The knob is then pushed fully in and rotated to the right, when the fence drops into the recesses i in the tumblers I, thus allowing the projection g' to enter the recess in the carrier-wheel, when a continuation of the movement raises the front end of the oscillating tumbler C and withdraws the bolt.

To perform the operation of locking the knob is turned to the left, which throws out the bolt and drops the front end of the oscillating tumbler upon the projection b' of the bolt B; then draw out the knob, at the same time turning it to the left, when the engaging-pin upon the carrier-wheel will take up the wheels H as before and disarrange the combination. To set the lock upon any other combination than the one above named, bring the parts into the position for unlocking, as above described, then insert the setting-key in the recesses i of the rotating tumblers and

apply the disconnecting-key to throw them out of gear with the wheels H, when the operations above described for unlocking are repeated, with this exception, that, instead of dropping the wheels at the figures there indicated, any other four numbers upon the dial may be used from which to form the combination. The disconnecting-key is then withdrawn and after it the setting-key, which completes the operation.

Figures 13, 14, and 15 represent a modification of my improved lock, in which the movement and construction are much simplified, enabling me to construct a lock which possesses some of the advantages herein described, and at the same time can be sold at a low price.

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

1. The carrier-wheel F, having an unbroken periphery around its inner face and the recess f^3 and pin f'' , in combination with the projection g' on the fence-lever and shaft or spindle E, having a longitudinal and rotating movement as set forth.

2. The fence-lever G, provided with the

riding-lug g and projection g' , in combination with the carrier-wheel F having recess f^3 , and arranged on a spindle having a longitudinal movement, the parts being constructed and operating substantially as described.

3. The oscillating tumbler C, carrying the rotating tumblers I, wheels H, and disconnecting-lever K, or its equivalent, substantially as and for the purpose specified.

4. The combination of the oscillating tumbler C, rotating tumblers I, wheels H, fence-lever G, and disconnecting-lever K, the whole being arranged to oscillate upon the stud m in the manner described.

5. The elements of the preceding clause, in combination with the bolt B, as and for the purpose specified.

6. The fence-lever G, provided with lug g , projection g' , and fence g'' , as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand.

E. W. BRETTELL.

Witnesses:

M. K. CHANDLER,
C. D. IRELAN.