

(No Model)

F. M. CARROLL.  
PERMUTATION PADLOCK.

No. 582,454.

Patented May 11, 1897.

Fig. 1

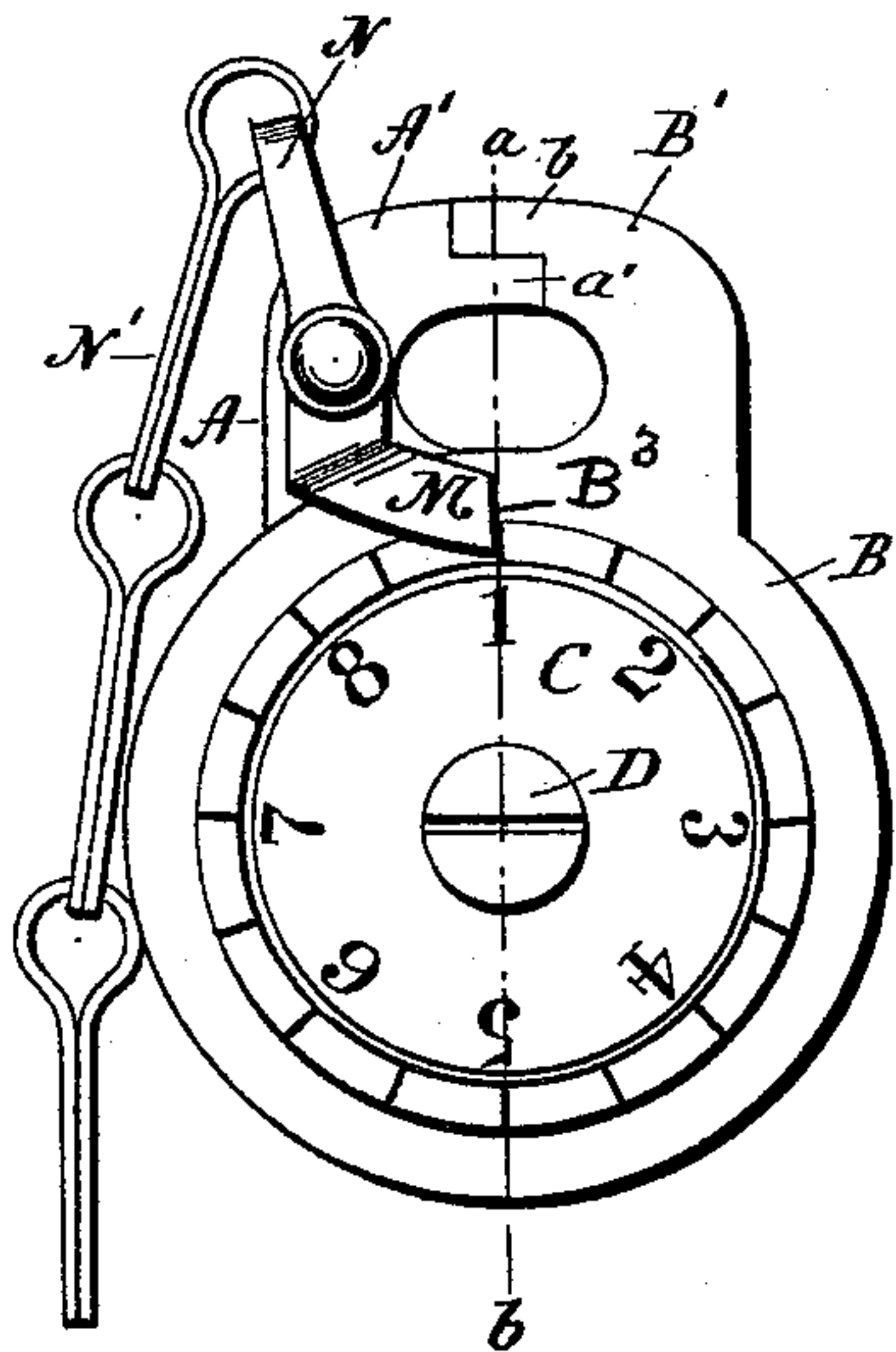


Fig. 2

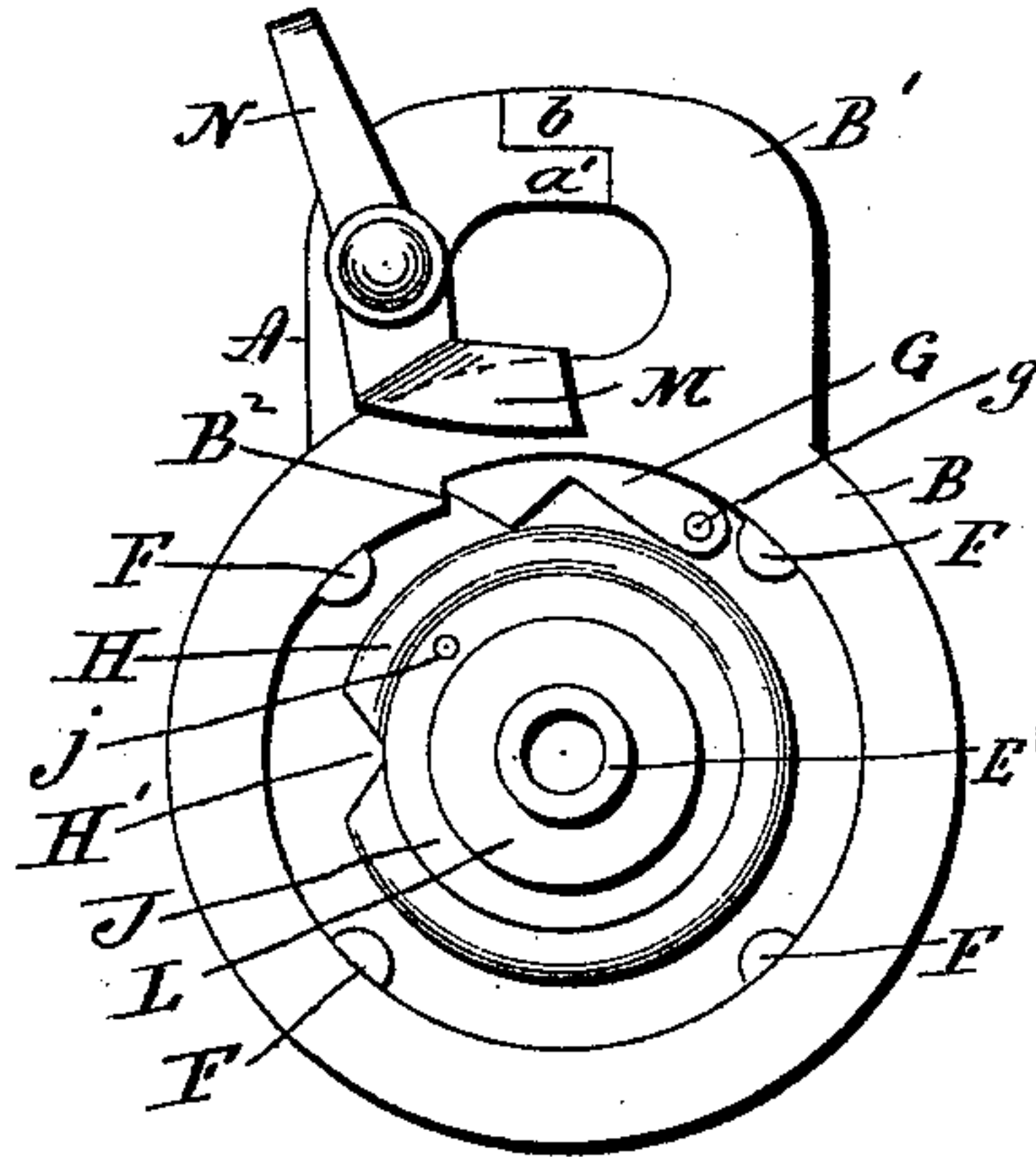


Fig. 3

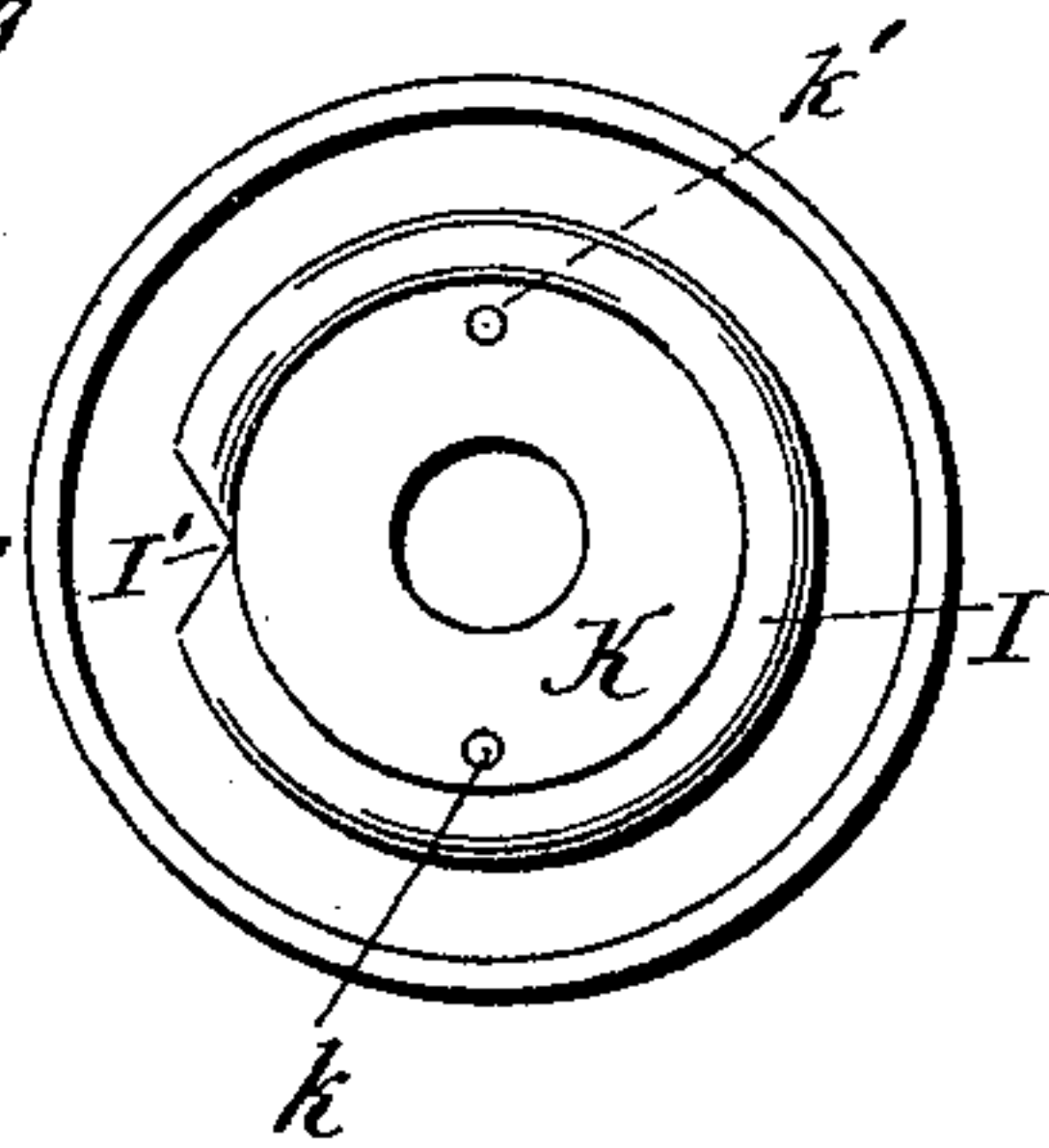


Fig. 4

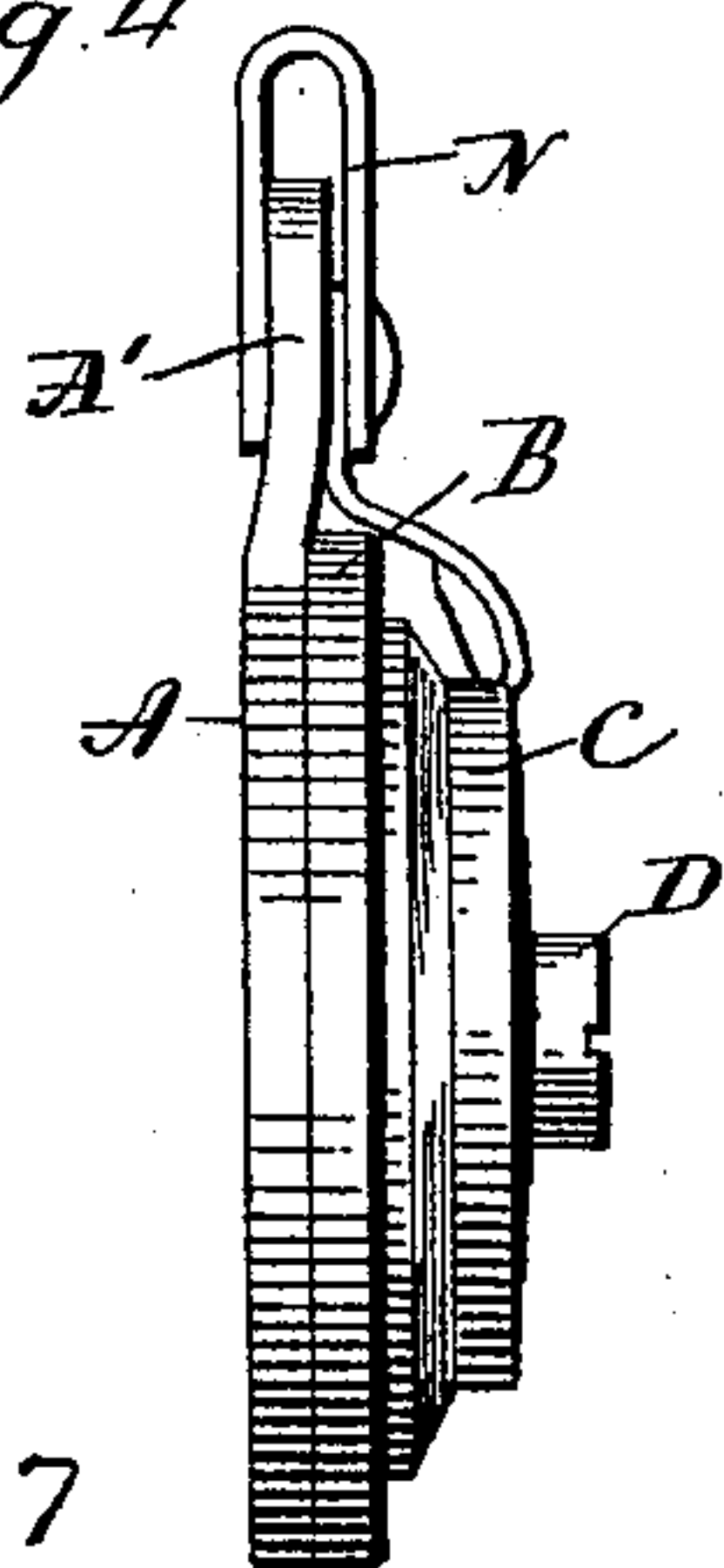


Fig. 5

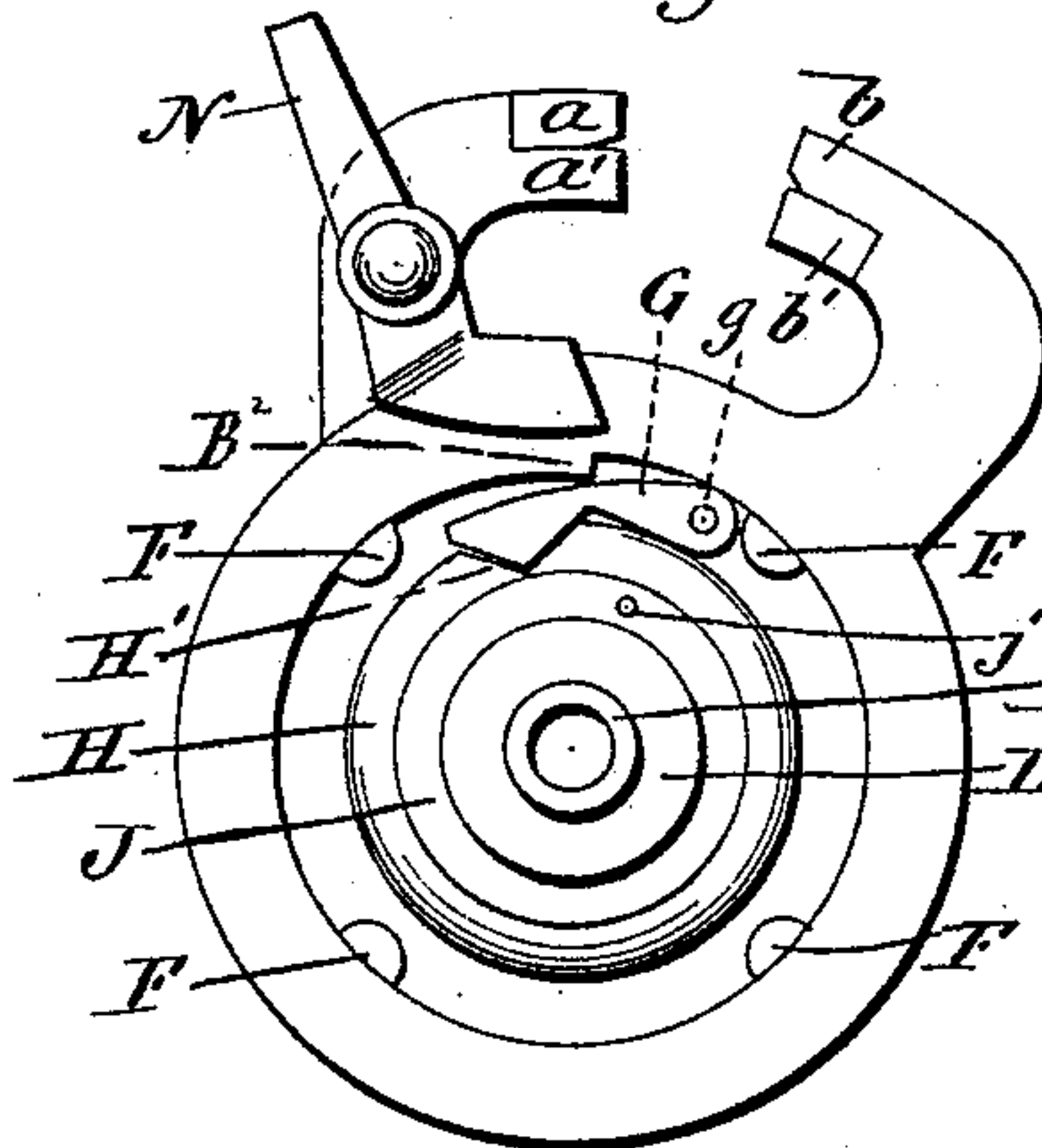


Fig. 6

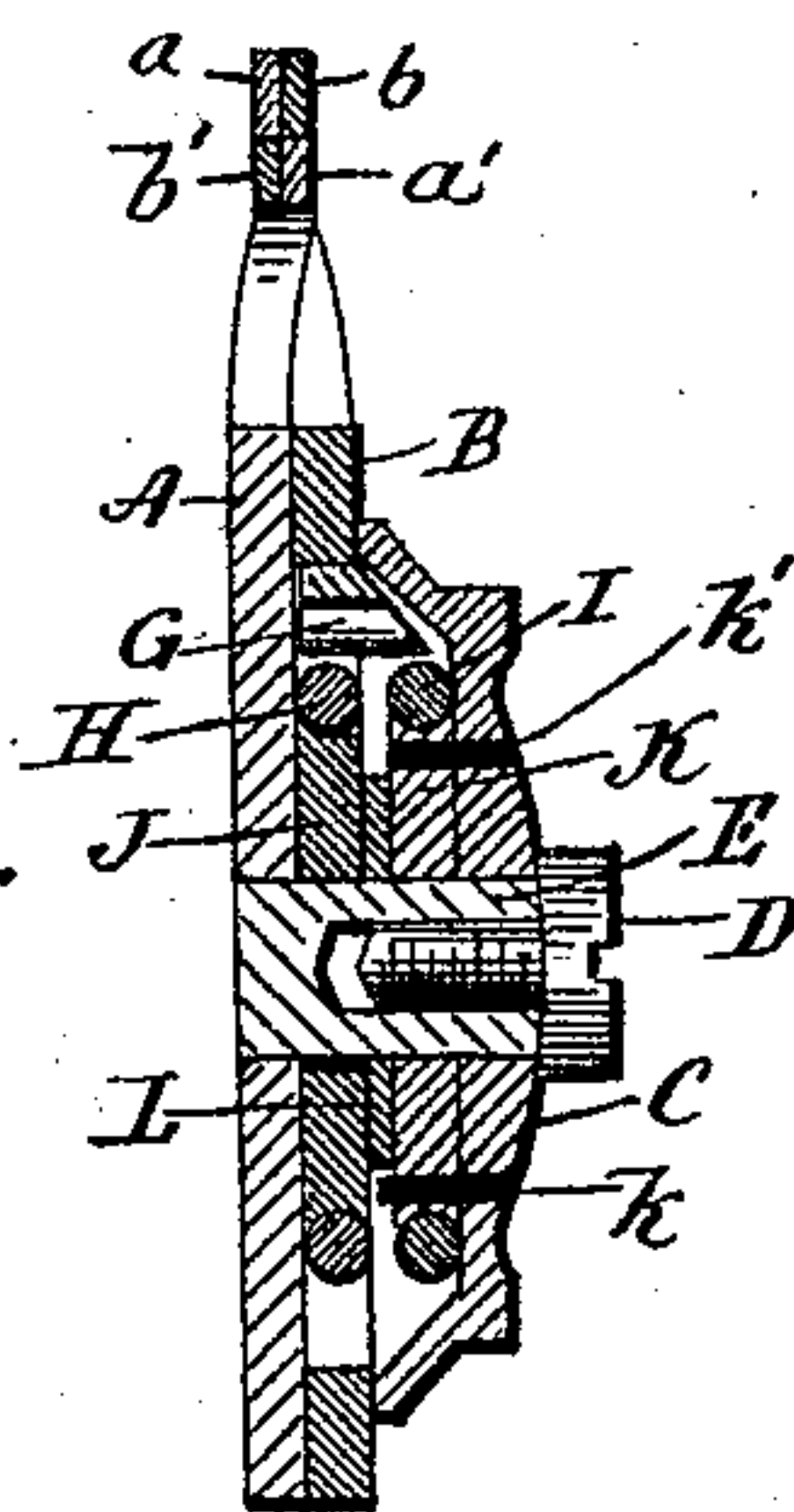


Fig. 7

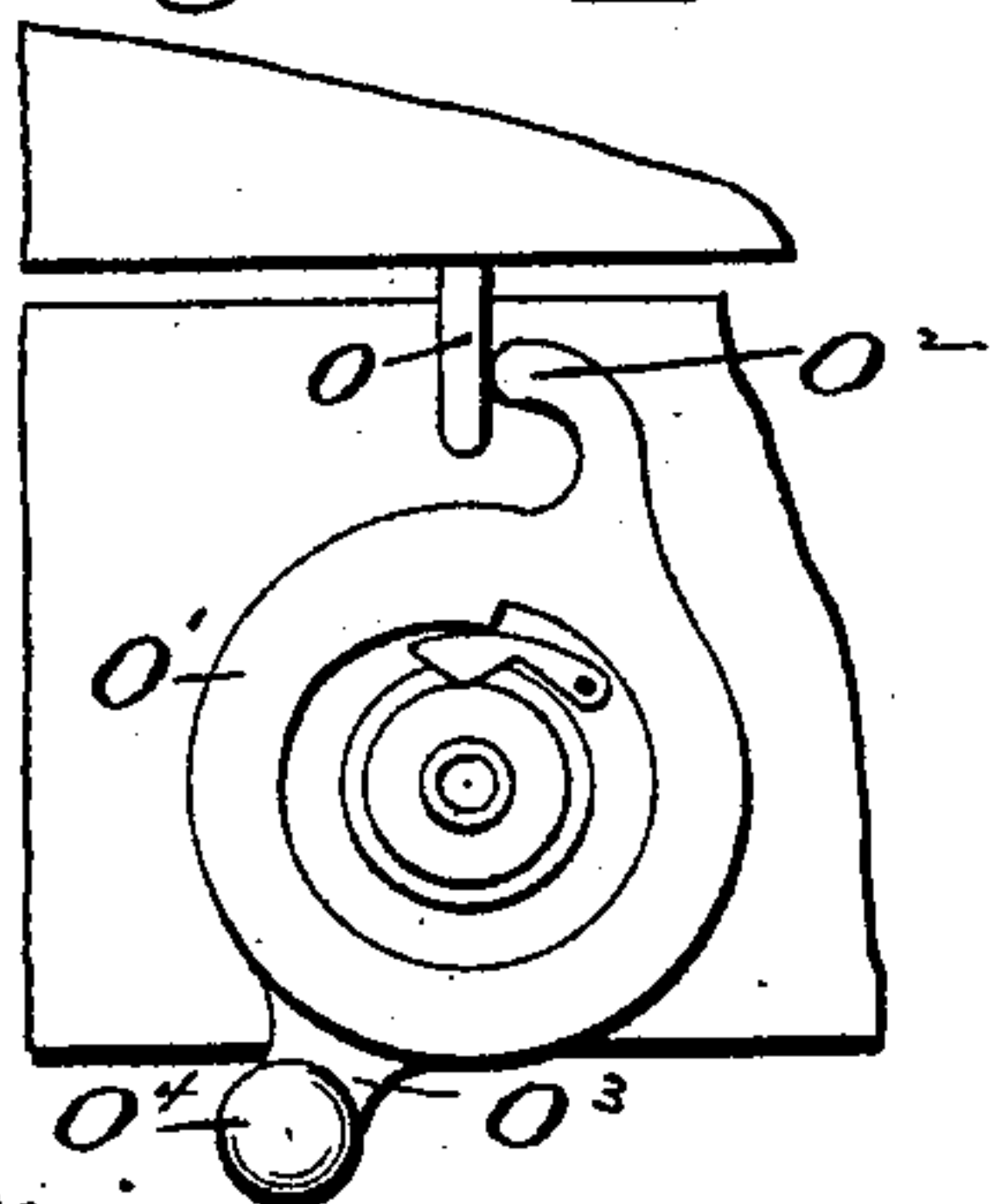


Fig. 8

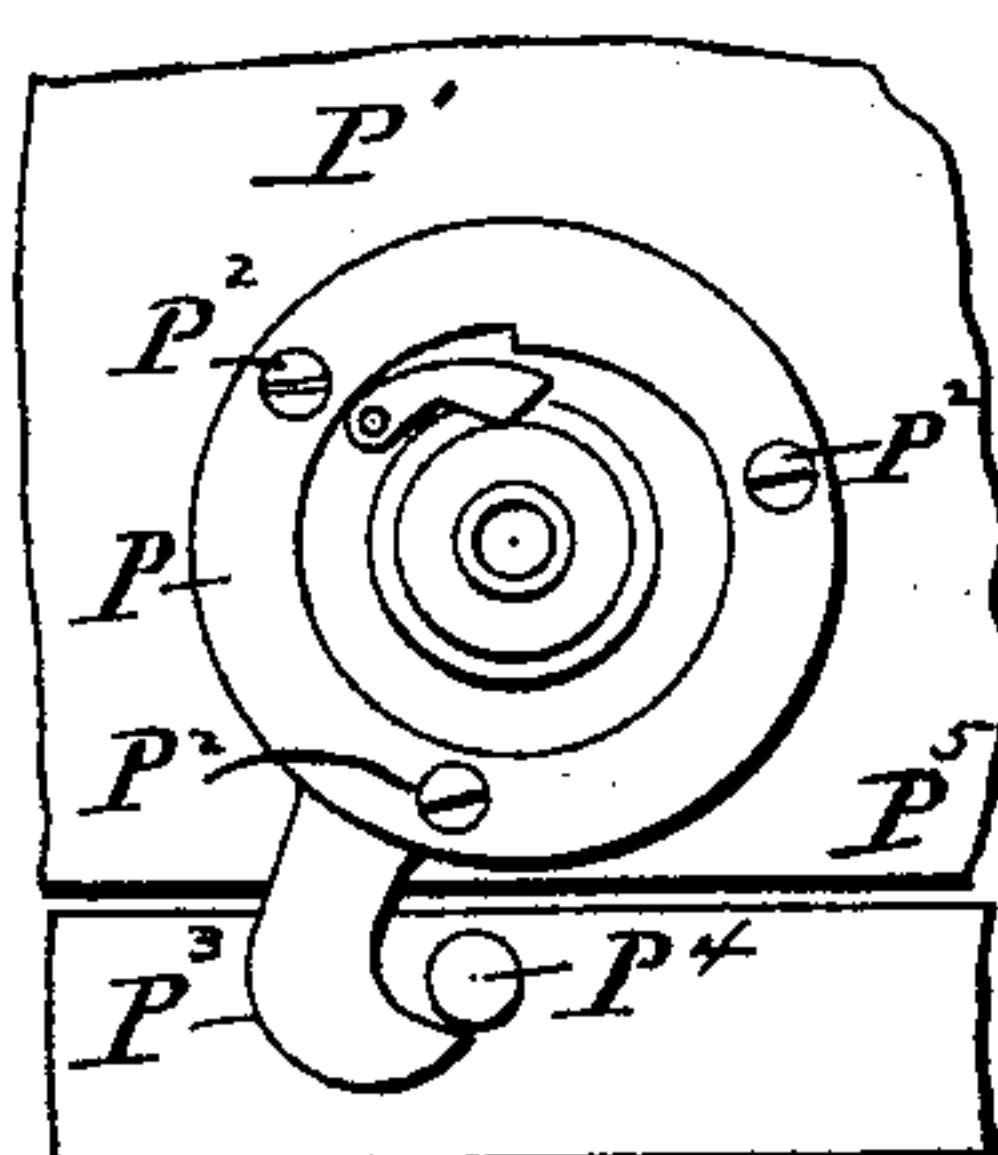
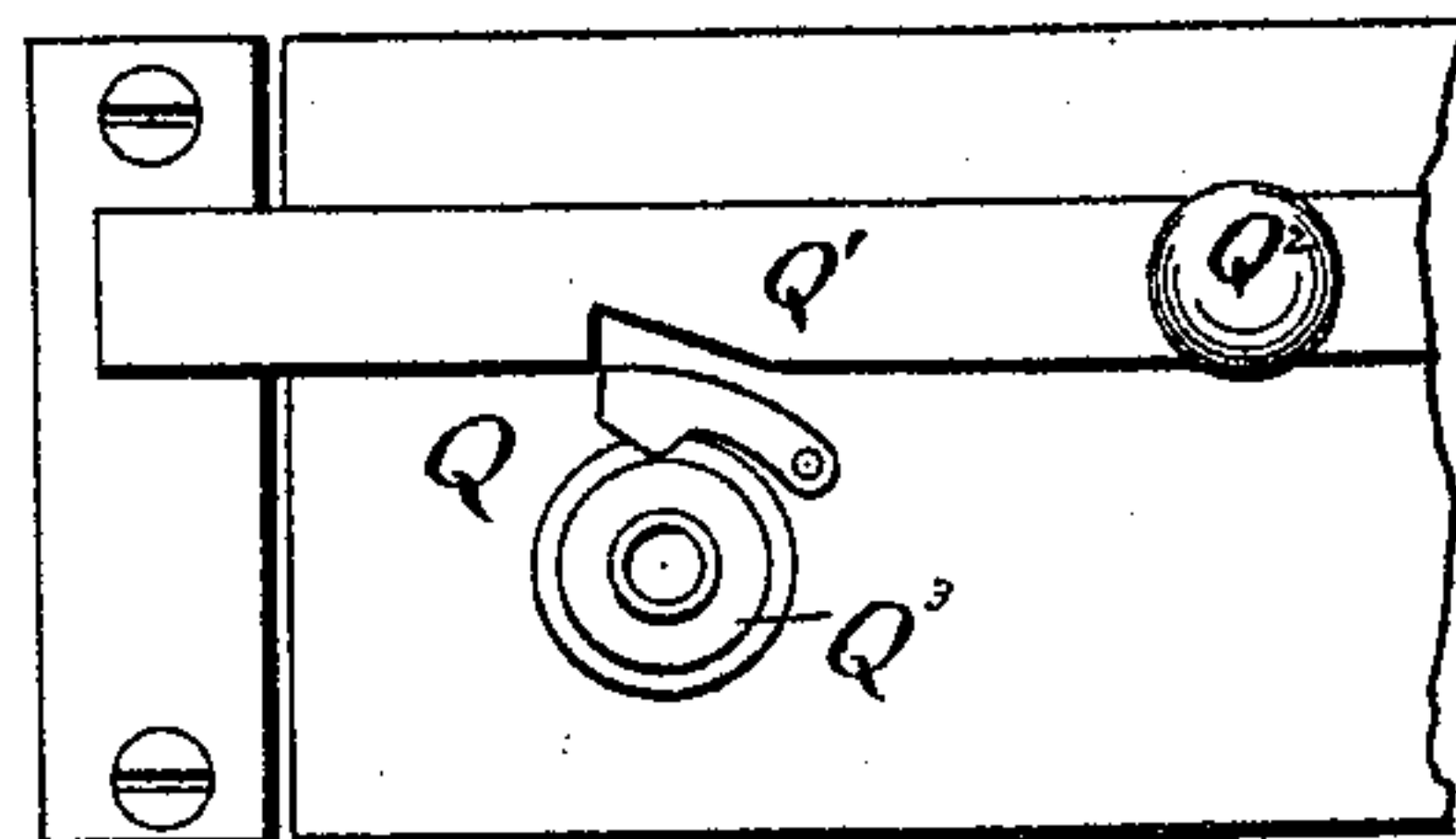


Fig. 9



Witnesses.  
J. H. Shumway,  
Lillian S. Kelley.

Fred M. Carroll,  
Inventor.  
By atty. E. W. Seymour



# UNITED STATES PATENT OFFICE.

FRED M. CARROLL, OF ELMIRA, NEW YORK, ASSIGNOR TO EDWARD S. SWIFT, OF NEW HAVEN, CONNECTICUT.

## PERMUTATION-PADLOCK.

SPECIFICATION forming part of Letters Patent No. 582,454, dated May 11, 1897.

Application filed July 20, 1896. Serial No. 599,761. (No model.)

*To all whom it may concern:*

Be it known that I, FRED M. CARROLL, of Elmira, in the county of Chemung and State of New York, have invented a new Improvement in Permutation-Locks; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in front elevation of a padlock containing my invention; Fig. 2, a view thereof with the cap removed; Fig. 3, a view of the cap in inside elevation; Fig. 4, a view of the lock in side elevation; Fig. 5, a view of the lock shown in its open position with the cap removed; Fig. 6, a view of the lock in vertical central section on the line *a b* of Fig. 1; Figs. 7, 8, and 9, partial views of three modified forms which my improvement may assume.

My invention relates to an improvement in permutation-locks, the object being to produce a permutation-lock which shall without loss of range of change or loss of effectiveness be composed of comparatively few and simple elements.

With these ends in view my invention consists in a permutation-lock having certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

As shown in Figs. 1 to 6 of the accompanying drawings, my improvement is embodied in a padlock, although not limited to that embodiment, as will appear later on. The main elements of the padlock consist of a flat disk-shaped solid frame-plate A, formed with a hasp-hook A', a ring-shaped frame-plate B, formed with a hasp-hook B', and a rotatable operating-cap C, which is secured by means of a screw D to an internally-threaded hub E, rigidly secured to and projecting forward from the center of the solid plate A. The solid plate A and the ring-plate B correspond to each other in diameter, while the hasp-hooks A' and B' are complementary and extend in opposite directions, their ends being cut to form oppositely-pitched interlocking fingers *a a' b b'*, which interlock, as shown in

Figs. 1 and 2, when the hooks are brought together, to form the hasp of the padlock. The ring-plate B is centered upon the solid plate A, so as to be oscillated thereupon by means of four pins F, arranged quartering and having their outer faces curved in correspondence with the curvature of the inner periphery of the ring-plate, which turns upon the pins as upon a center. For locking the ring-plate in its closed position, in which its hasp-hook is interlocked with the hasp-hook of the solid plate, I employ a segmental or longitudinally-bowed pawl G, located within the circle of the ring-plate and hung upon a pin *g*, mounted in the solid plate A and projecting forwardly therefrom. In the locked position of this pawl it is lifted so as to engage with a locking-shoulder B<sup>2</sup>, formed in the inner periphery of the ring-plate B. When the pawl G is lifted into engagement with the shoulder B<sup>2</sup>, the ring-plate is locked against rotation and held with its hasp-hook B' interlocked with the hasp-hook A' of the solid plate. For lifting the pawl into its locked position and holding it there I employ two adjustable ring-tumblers H and I, the former having a notch H' and the latter having a notch I', the said notches being oppositely beveled and adapted to receive the pawl, which, when it drops into them, is cleared from the locking-shoulder B<sup>2</sup> of the ring-plate B. It will be noted that the pawl is arranged externally to the said ring-tumblers and so that it will ride upon the external periphery of one or both of them. As herein shown, the ring-tumblers H and I are formed of wire and circular in cross-section, though the form of their cross-section is not imperative.

The ring-tumbler H is mounted upon a collet J, which in turn is mounted upon the hub E so as to freely rotate thereupon. The periphery of this collet is grooved for the reception of the ring-tumbler, which is seated in the groove and clasps the collet so tightly that it is normally held against movement thereon by friction, but for changing the combination of the lock the said ring-tumbler may be shifted on the collet against the force of its friction-grip thereupon. The ring-tumbler I is seated in a groove formed in the periphery of a collet K, which is secured by pins *k k* to



the inner face of the cap C. Normally the ring-tumbler I is stationary upon the collet K, upon which, however, it may be moved against the force of its friction-grip for changing the combination of the lock. The notch H' of the ring-tumbler H is brought into line with the pawl G and carried out of line with the said pawl by the rotation of the cap C in one direction or the other, the pin  $k'$  projecting sufficiently inward from the face of the fixed collet K to engage with a pin  $j$  in the collet J. When the cap is rotated in one direction, the pin  $k'$  will engage with one side of the pin  $j$  and turn the collet J, and hence the ring-tumbler H, in that direction, while when the cap is turned in the opposite direction the pin  $k'$  will engage with the opposite side of the pin  $j$  and turn the said collet and tumbler in the opposite direction.

For the reduction of friction between the collets I by preference employ a washer L, centered upon the hub E. The outer face of the cap C is provided with a series of numerals and graduated, the number and arrangement of the numerals and the extent of the graduations being varied as desired and in accordance with the character and use of the lock.

An index-mark  $B^3$  in the ring-plate B may be called the "unit of position," as it is the point to which the graduations of the cap must be brought in operating the lock. As herein shown, a spring-detent M, secured to the solid plate A, is arranged to extend downward over the edge of the cap and engage with the graduation-notches thereof for holding the same against accidental rotation and displacement. The detent also serves as an audible monitor for operating the lock in the dark, the notches in the cap coacting with the detent to click as each notch passes under the detent, which, however, is not necessarily employed. A clip N, riveted to the hasp-hook A' of the solid plate A, provides for the attachment of the padlock-chain N'.

Having now described my improved lock, I will proceed to set forth the mode of its operation. Suppose, for instance, that it is desired to open the lock on the combination of "4" and " $2\frac{1}{2}$ ". To carry this plan out, the ring-tumbler H is set so that the bringing of the numeral "4" on the cap into registration with the index-mark in the ring-plate will be preceded by the engagement of the pins  $k'$  and  $j$  and the rotation of the collet J and the ring-tumbler H, so as to bring the notch H' under the pawl G. The ring-tumbler I will also be set upon the stationary collet K, so that when the point on the cap represented by " $2\frac{1}{2}$ " is brought into registration with the index-mark on the ring-plate the notch I' will be brought under the pawl, which will then be permitted to drop into both notches and clear the locking-shoulder  $B^2$  of the ring-plate B, which may then be rotated, so as to separate its hasp-hook from the hasp-hook A' of the solid plate A. To lock the lock, it is only neces-

sary to rotate the ring-plate and interlock the two hasp-hooks, and then turn the cap sufficiently to cause the bevels of the notch I' of the ring-tumbler I to lift the pawl back into its locked position, in which it is held by the peripheries of one or both of the ring-tumblers, as the case may be, and according to the extent to which the cap is turned in one direction or the other. Of course if the cap is turned through one full revolution the ring-tumbler H will be moved so as to clear its notch from a position under the pawl.

In Fig. 7 of the drawings I have shown my improved lock modified so as to adapt it to be used in conjunction with a staple O. In this construction the ring-plate O' is furnished with a hook  $O^2$  and with an arm  $O^3$  and operating-knob  $O^4$ . The solid plate, which is not shown, is not provided with a hook, but constitutes the stationary part or member of the lock and is rigidly secured in place. Otherwise than as specified the lock may be the same in construction as the padlock before described. It is represented with its cap removed.

In Fig. 8 I have shown my invention as embodied in a desk-lock, the ring-plate P being fixed to the lid P' of the desk by means of screws  $P^2$ . In this construction the back plate is oscillated for the engagement of its hook  $P^3$  with a pin  $P^4$ , located below the plate  $P^5$ , set into the body of the desk. Only the hook of the back plate is shown; but it will be understood that it is substantially like the back plate of the construction shown by Figs. 1 to 6, inclusive. It is oscillated by preference by means of a central knob mounted in its hub and taking the place of the screw D.

In the modified construction shown by Fig. 9 the back plate and ring-plate are dispensed with, the pawl Q being engaged with a bolt Q', which is shot back and forth by means of a knob  $Q^2$ , the pawl being lifted for engagement with the bolt or dropped away from the same through the medium of two ring-tumblers  $Q^3$ , only one of which is shown, but which are substantially the same in construction and operation as the ring-tumblers shown by the preceding figures.

In view of the modifications suggested and of others which may obviously be made I would have it understood that I do not limit myself to the exact construction herein shown, but hold myself at liberty to make such changes as fairly fall within the spirit and scope of my invention. Thus instead of employing two ring-tumblers I might increase that number, adding to the complexity of the lock somewhat, perhaps, but also increasing its security.

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

1. In a permutation-lock, the combination with two collets, of two notched, frictionally-held ring-tumblers respectively encircling the collets and shiftable in position thereupon



for varying the combination of the lock, of a pawl arranged externally to and coacting with the said tumblers, and dropping into their notches when the same are registered.

5 2. In a permutation-lock, the combination with two collets, one of which is rotatable independently of the other, of two notched ring-tumblers encircling the peripheries thereof and frictioned thereupon so as to be shiftable  
10 for changing the combination of the lock, a pawl coacting with the said tumblers, and dropping into their notches when the same are registered, a graduated cap having one  
15 collet connected with it, and means for temporarily coupling the rotatable collet with the cap, whereby the ring-tumbler carried by it is shifted with reference to the pawl.

3. In a permutation-lock, the combination with two notched ring-tumblers which are  
20 shiftable for changing the position of their notches, of a pawl coacting with the said tumblers, and a ring-plate containing a shoulder coacting with the pawl.

4. In a lock, the combination with a fixed  
25 plate and a ring-plate, one of which is formed with a hook, and one of which is movable, and the ring-plate being formed with a locking-shoulder, of a pawl to coact with the said  
30 shoulder, two notched ring-tumblers coacting with the pawl, two collets upon which the said tumblers are frictionally mounted, and upon which they are shiftable for changing the combination of the lock, and means for operating the said collets.

35 5. In a permutation-lock, the combination with a solid plate provided with a hasp-hook, of an oscillating ring-plate formed with a corresponding hasp-hook forming the complement of the hasp-hook of the solid plate, and  
40 with a locking-shoulder, of a pawl pivotally

hung from the solid plate and coacting with the said shoulder, a hub connected with the solid plate and extending forward therefrom, a collet loosely mounted upon the said hub, a notched ring-tumbler encircling the periph- 45  
ery of the said collet and shiftable thereupon, a rotatable cap mounted upon the said hub, a notched ring-tumbler frictionally secured within the cap and shiftable in position, and means for temporarily coupling the cap and 50  
rotatable collet the notch of which is thus brought into and carried out of range with the pawl, substantially as set forth.

6. In a permutation-lock, the combination with a collet having its periphery grooved, of 55  
a notched ring-tumbler made of wire and round in cross-section and mounted upon the said collet in the groove of which it is seated and frictionally held, and a pawl coacting with the said tumbler. 60

7. In a permutation-lock, the combination with a solid plate provided with a hasp-hook, of an oscillating ring-plate made with a corresponding hasp-hook forming a complement 65  
of the hasp-hook of the solid plate, locking mechanism assembled with the said plates, a rotatable cap provided with numerals and graduation-notches, and connected with the locking mechanism, and a spring-detent secured to the hasp-hook of the solid plate and 70  
arranged externally to the cap and engaging with the graduation-notches thereof for holding the same against accidental rotation.

In testimony whereof I have signed this specification in the presence of two subscrib- 75  
ing witnesses.

FRED M. CARROLL.

Witnesses:

SOLOMON HART,  
B. S. CHAMBERLIN.