

No. 712,830.

Patented Nov. 4, 1902.

M. B. MILLS.
PERMUTATION LOCK.

(Application filed Aug. 6, 1902.)

(No Model.)

Fig. 1.

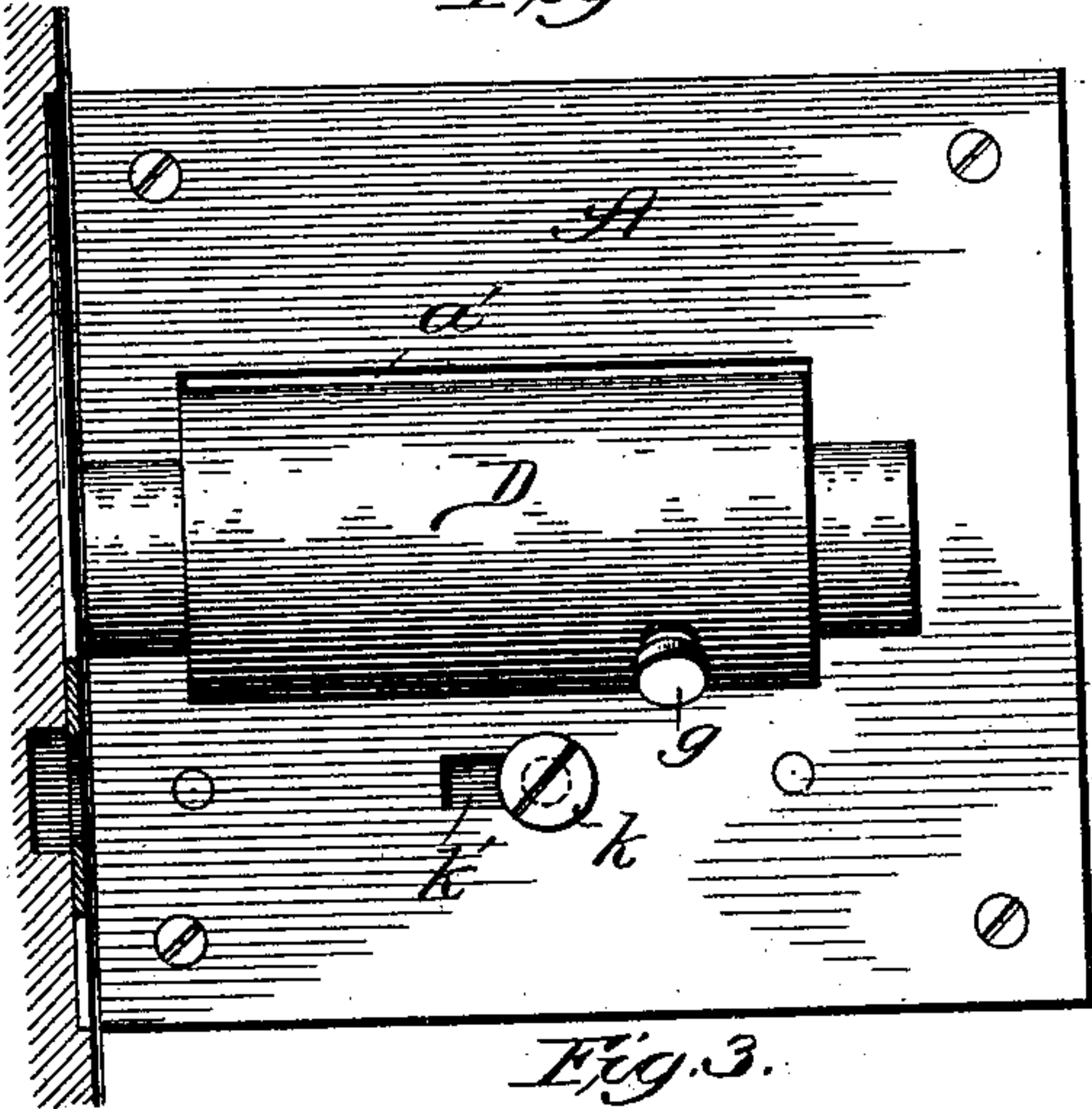


Fig. 2.

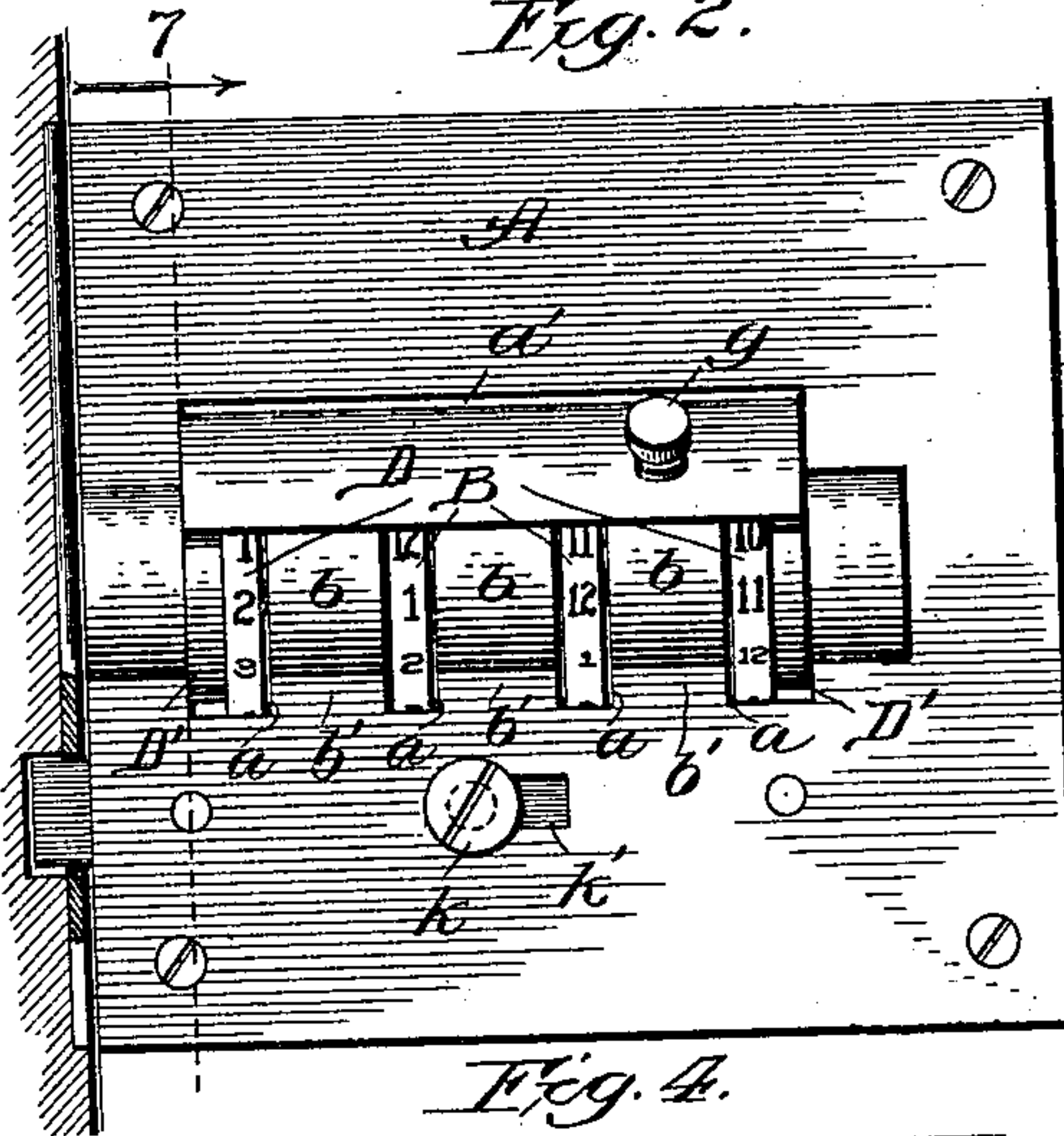


Fig. 3.

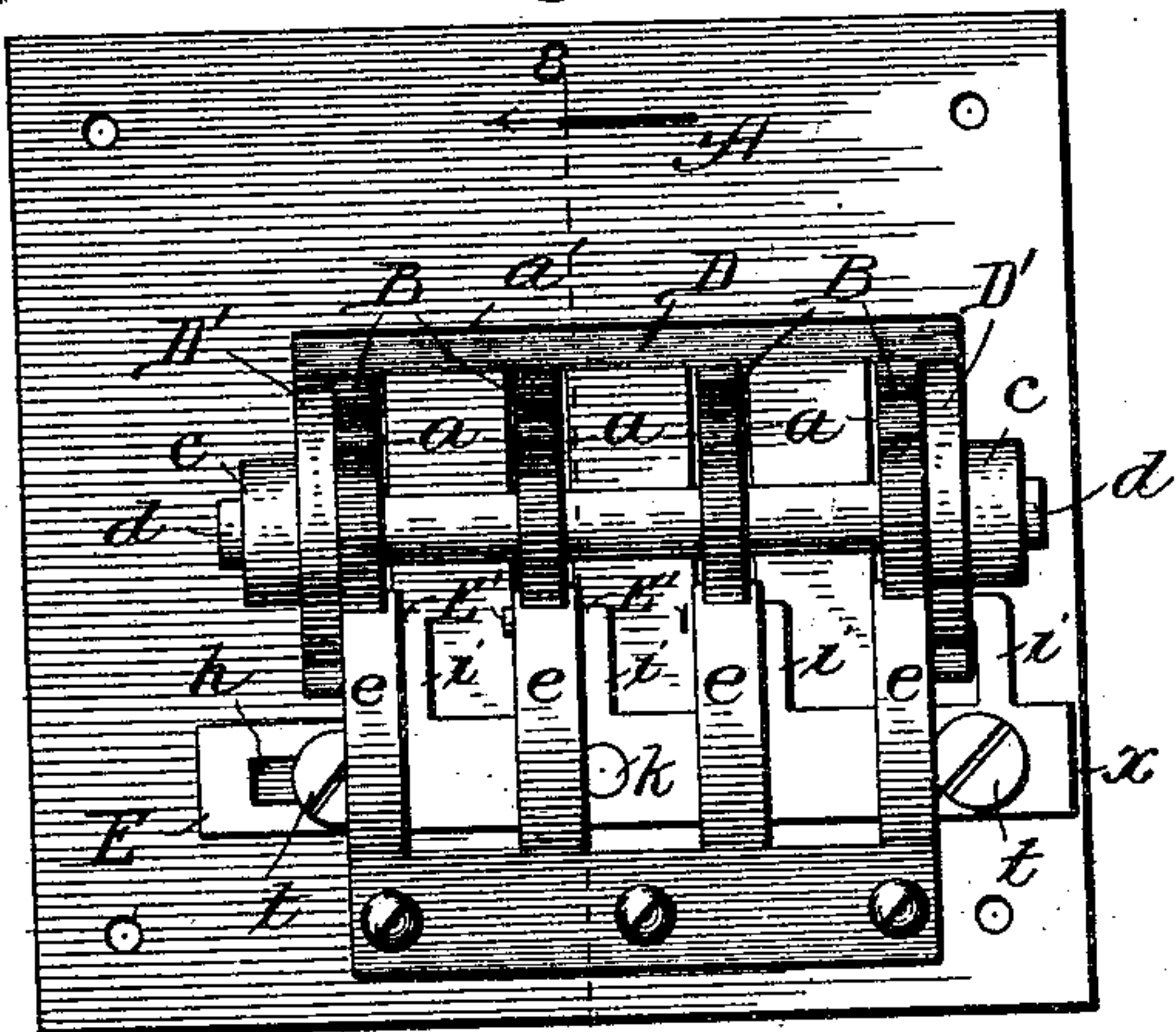


Fig. 4.

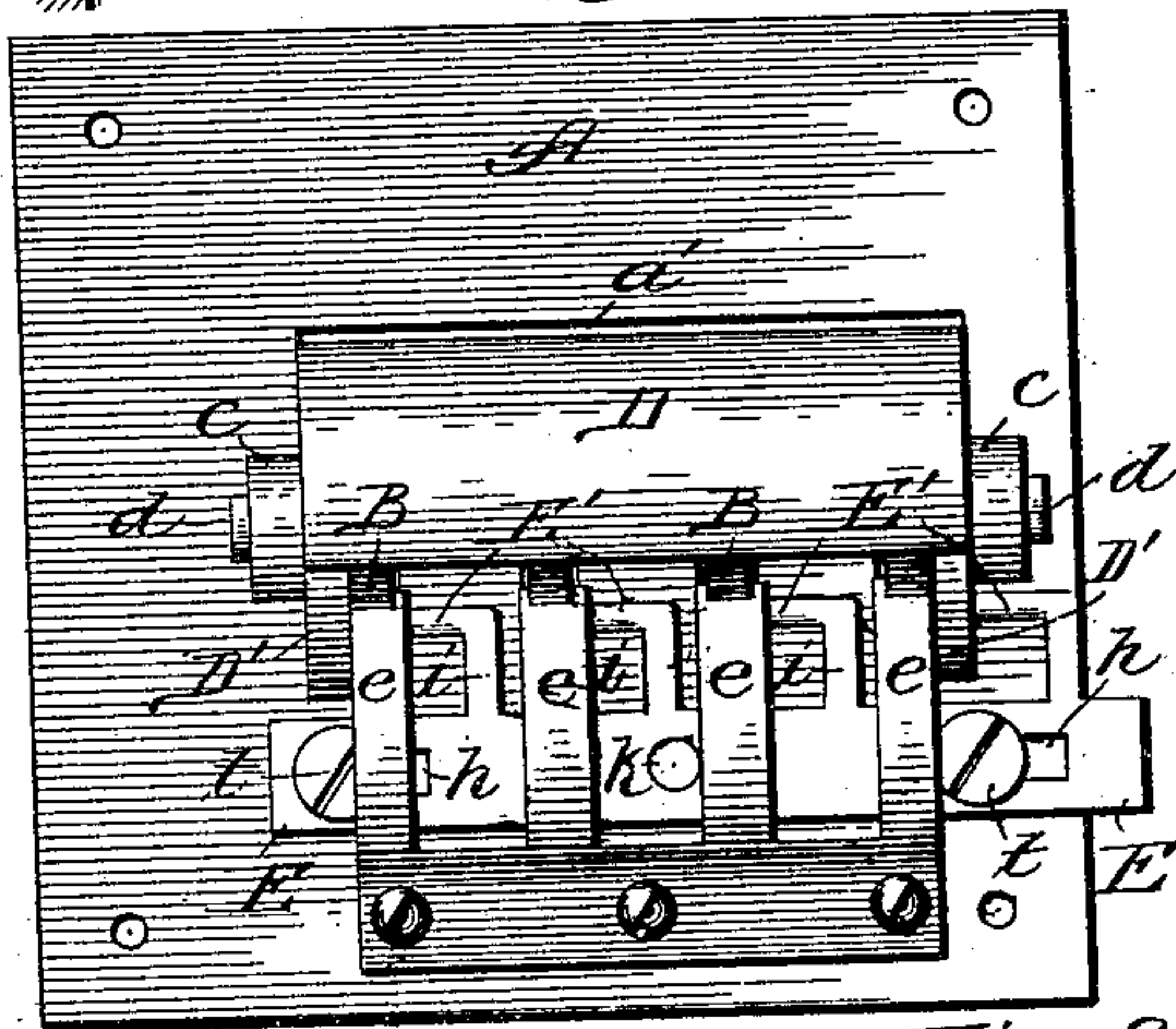


Fig. 5.

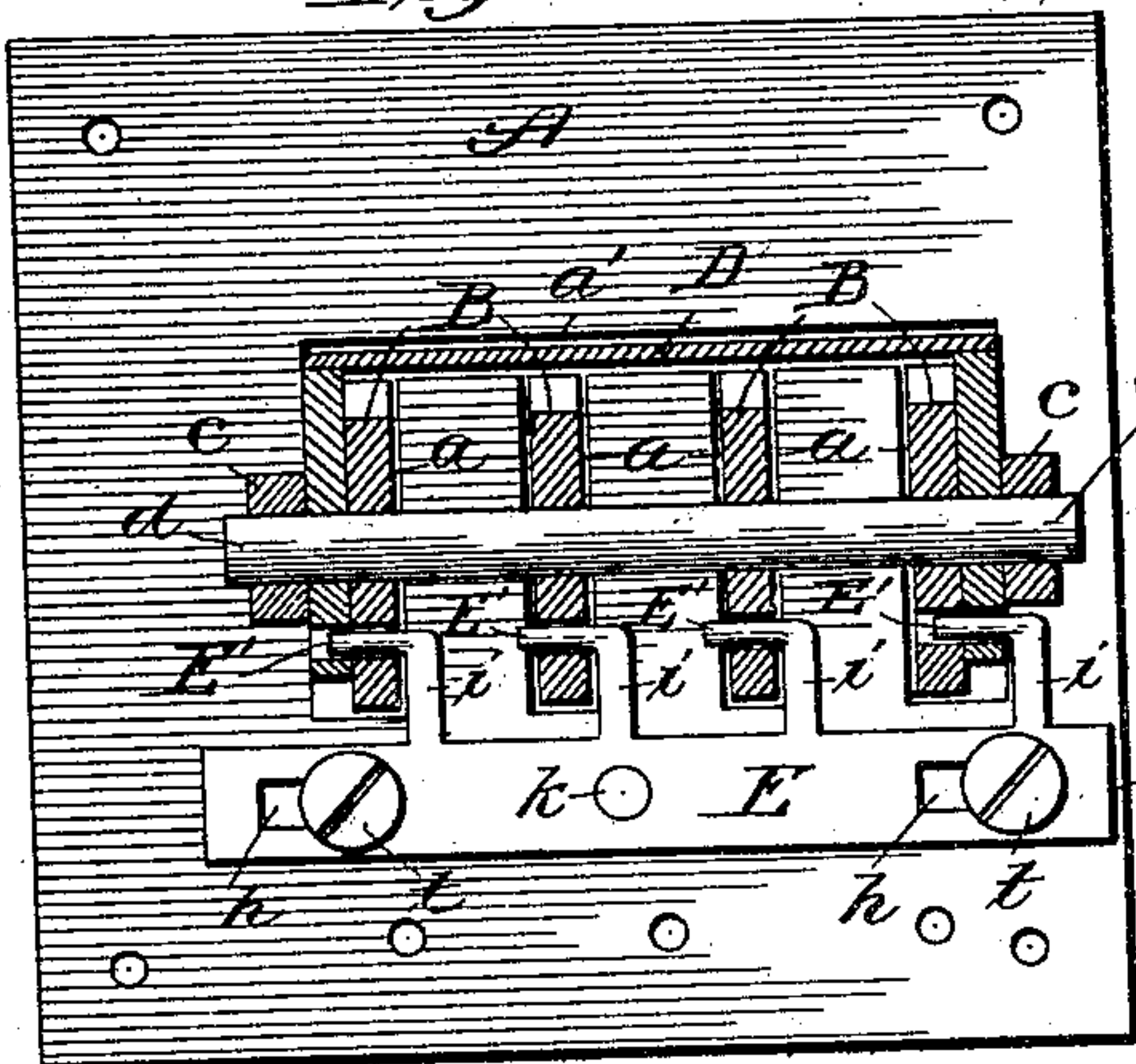


Fig. 6.

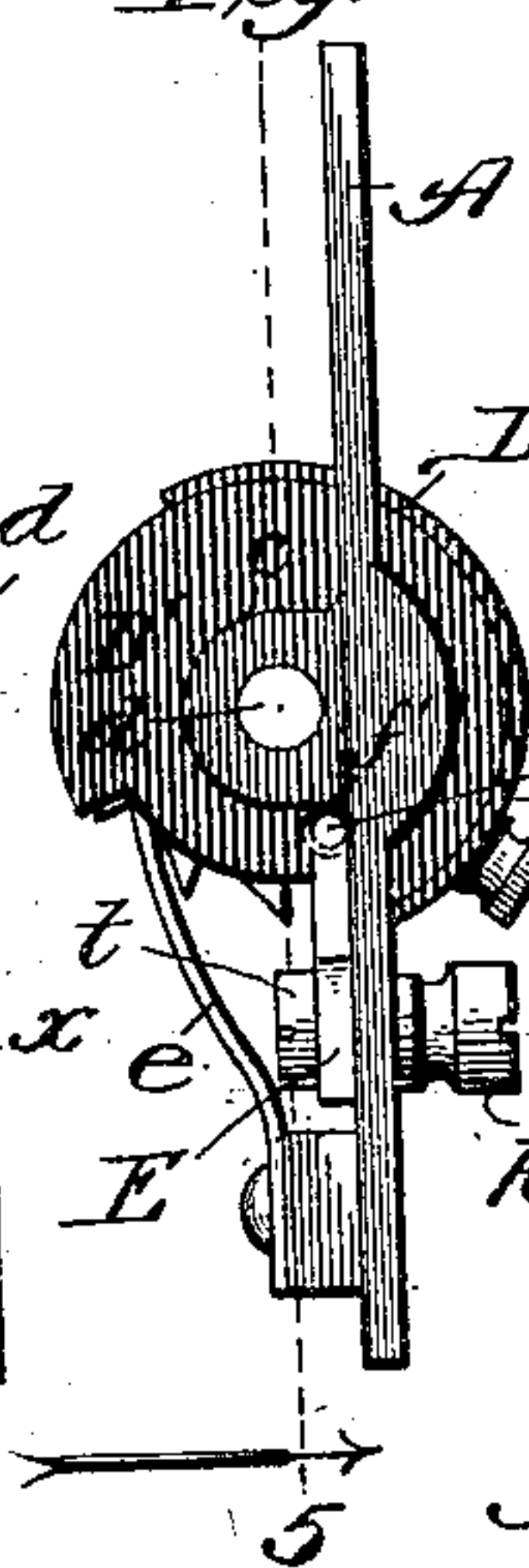
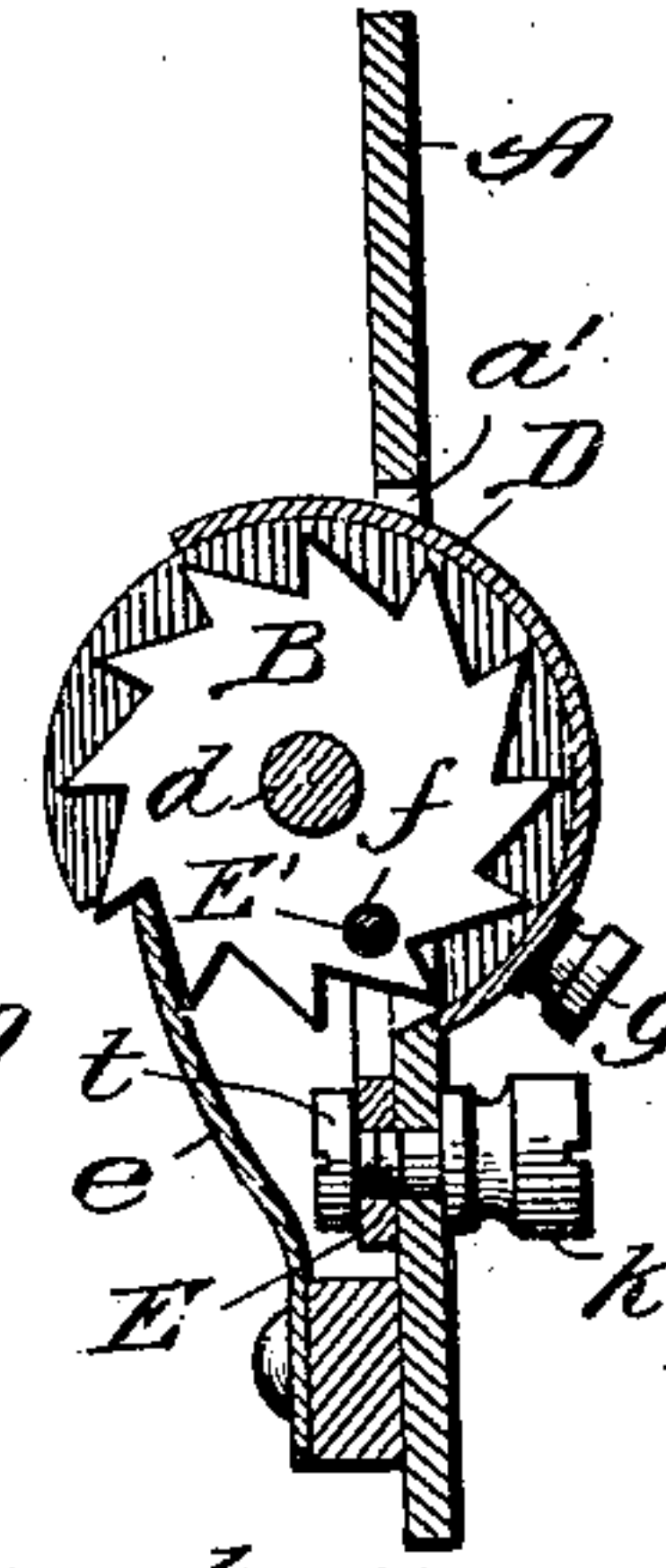


Fig. 7.



Fig. 8.



Witnesses:

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UNITED STATES PATENT OFFICE.

MORTIMER B. MILLS, OF CHICAGO, ILLINOIS.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 712,830, dated November 4, 1902.

Application filed August 6, 1902. Serial No. 118,597. (No model.)

To all whom it may concern:

Be it known that I, MORTIMER B. MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Permutation-Locks, of which the following is a specification.

My invention relates to an improvement in the class of permutation-locks in which a plurality of rotary tumblers are employed requiring a certain registration to enable the bolt to be actuated.

Permutation-locks of the class referred to require such a refinement in the construction of their mechanism as to render them expensive to manufacture. This refinement of construction is deemed necessary to prevent unauthorized picking of the lock by experts, whose skill tends to enable them to detect by hearing or feeling, or both, which tumbler or tumblers may be out of registration, and therefore obstruct movement of the bolt, and upon ascertaining this they need manipulate under guidance of one or both of the senses referred to only the non-registering tumbler or tumblers to bring the same into registration.

The object of my invention is to provide a novel construction of permutation-lock which shall render it proof against picking in the manner stated, whereby I am enabled to employ coarse mechanism in the construction, and thus render it very cheap in comparison. To this end I provide an adjustable headed cover for the rotary tumblers, which must be closed before the bolt can be moved to unlock it even when the tumblers are in registration otherwise to permit unlocking, the head on the cover forming the abutment obstruction, which takes the impact in manipulating the lock in any attempt to open it, thereby preventing such impact against any tumbler.

In the accompanying drawings, Figure 1 shows my improved lock by a view in front elevation with the tumbler-shielding cover closed. Fig. 2 is a similar view of the lock with the cover raised; Fig. 3, a view of the lock in rear elevation with the cover in the condition represented in Fig. 1; Fig. 4, a similar view with the cover in the condition represented in Fig. 2; Fig. 5, a section taken at

the line 5 on Fig. 6 and viewed in the direction of the arrow; Fig. 6, an end view of the lock; Fig. 7, a section taken at the line 7 on Fig. 2 and viewed in the direction of the arrow, and Fig. 8 a section taken at the line 8 on Fig. 3 and viewed in the direction of the arrow.

A is a metal plate, shown of rectangular form, with a series of transverse slots *a* crossing its longitudinal center and opening at one end into a longitudinal slot *a'* in the plate. On the tongues *b'*, between the slots *a* and also on the plate at opposite ends of the series of transverse slots, are fastened the arc-shaped spacing-bosses *b*. Perforated ears *c* project in alinement with each other from the rear face of the plate A at opposite ends of the series of transverse slots *a* and afford the bearings for the ends of a non-rotary shaft *d*, carrying at intervals, to project through the slots *a*, the rotary tumblers B, shown in the form of toothed-wheels or disks, each of which is provided on the backs of its ratchet-teeth with a series of characters represented as a succession of numerals. The number of tumblers shown to be provided is four, each having twelve teeth, numbered in succession from "1" to "12;" but of course the number of the tumblers may be greater or less, as also may be the number of teeth on each tumbler. Backward rotation of the tumblers is prevented by a series of spring-pawls *e*, fastened on the rear face of the plate, to engage with the tumbler-teeth, one for each tumbler. In each disk B, near one edge thereof—that is, eccentrically—is formed through it an opening *f*, these holes through the several tumblers being in such position therein as to adapt them to be brought into alining registration.

D is a cover, preferably arc-shaped in cross-section or of semicylindrical form, as shown, having a disk-shaped head *D'* preferably at each end, the cover being loosely journaled at the centers of these heads on the shaft *d* at the inner sides of the bearings *c* to enable the cover to be turned through the slot *a'* to uncover and cover the tumblers, according to the direction of turning it, a handle *g* being provided on the cover by which to turn it. An opening *f'* like the holes *f* is pro-

vided in each head D' in position to adapt it to be brought into registration with the series of openings through the tumblers.

E is the bolt, fastened through longitudinal slots h in it by screws t to the rear face of the plate A to adapt it to have a limited longitudinal movement for protruding it at one end x beyond the adjacent edge of the plate and to be retracted in the opposite direction. At intervals on the inner edge of the bolt are provided, to extend at a right angle thereto, the arms i , terminating in finger-like dogs E' , extending parallel with the said edge of the bolt, one such dog being provided for each cover-head and tumbler in position to enter the hole therein when the series of holes are brought into registration in alinement with the dogs. For moving the bolt it is provided with a handle k , protruding through an elongated slot k' in the plate A .

As will be seen, when all the holes f in the tumblers E and the holes f' in the heads D' are caused to register the bolt E may be shot for unlocking it, since these holes then aline with the dogs E' , which may enter them, thus permitting the bolt to be retracted. In that condition of the bolt, however, wherein the tumblers are hidden from view by the cover D the latter obviously cannot be raised or opened without previously shooting the bolt to project at its end x beyond the plate. When the bolt is thus shot, on raising the cover the bolt cannot be retracted, because the dog E' , adjacent to the outer side of a head D' , will in any attempt to retract the bolt abut against that head, since the hole f' in the head will be out of alinement with the dog owing to the open position of the cover. To lock the bolt against retraction, one or more of the tumblers E are turned to any desired extent by the operator applying his fingers to the teeth to rotate the wheels on the shaft d . In this way the openings f through the tumblers are turned out of registration, so that the dog E' for each tumbler so turned cannot enter the respective opening therein. However, were it not for the interposition between the dog nearest the bolt end x and the next adjacent tumbler E of a cover-head D' the respective dogs for said turned tumbler would abut against its side, and with the cover raised, as stated, disclosing the tumblers to view, any one manipulating the bolt in the direction to retract it could see the jar of each tumbler against which a dog would thus be caused to impinge and would thus be able to determine which tumbler or tumblers had been turned, so that it would only be necessary for him to tamper with and thus direct his attention to it or them in the attempt to restore the tumbler-openings f to registration. This would be a comparatively simple operation, for the fact of a tumbler-opening having been brought into proper position for registration would be ascertained by failure of the tumbler to jar under impact in the at-

tempt to retract the bolt. If the manipulator tries to overcome the difficulty by closing the cover D , thus bringing the opening f' in a head D' into alinement with the respective dog E' , his purpose will also be frustrated, since though the dogs in any attempt to retract the bolt will impinge against the sides of the respective tumblers which have been turned out of registration, and thus jar them, the effect of the impingement against the tumblers cannot be seen, owing to their being covered, nor can the non-registering tumbler be determined by listening through the cover.

While I have illustrated and described my improvements in connection with a particular construction of permutation-lock, the principle of the invention is adaptable to a variety of constructions of such locks. Hence I do not limit my invention to the particular embodiment thereof nor the construction of permutation-lock shown and described.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a permutation-lock, the combination with the tumblers and a bolt provided with dogs, of an adjustable cover for the tumblers provided with a head adapted to register with said tumblers and dogs, substantially as and for the purpose set forth.

2. In a permutation-lock, the combination with rotary tumblers and a bolt provided with dogs, of a rotary cover for the tumblers provided with a head adapted to register with said tumblers and dogs, substantially as and for the purpose set forth.

3. In a permutation-lock, the combination of tumblers comprising a series of rotatably-supported disks containing openings adapted to register with each other, a bolt provided with dogs, and an adjustable cover for the tumblers provided with a head having an opening adapted to register with said tumbler-openings and dogs, substantially as and for the purpose set forth.

4. In a permutation-lock, the combination of tumblers comprising a series of rotatably-supported toothed disks containing eccentric openings adapted to register with each other, a longitudinally-reciprocable bolt provided with dogs, and a rotary cover for the tumblers provided with a head having an opening adapted to register with said tumbler-openings and dogs, substantially as and for the purpose set forth.

5. In a permutation-lock, the combination of tumblers comprising a series of rotatably-supported disks containing eccentric openings adapted to register with each other, a longitudinally-reciprocable bolt provided with dogs, and a cover for the tumblers provided with heads at opposite ends at which it is journaled, said heads having openings adapted to register with said tumbler-openings and dogs, substantially as and for the purpose set forth.

6. In a permutation-lock, the combination of a plate having transverse slots opening into a longitudinal slot in the plate, a shaft supported on said plate, tumblers comprising disks journaled on said shaft and provided with openings adapted to register with each other, pawls engaging with said disks, a bolt provided with dogs, and an adjustable cover for the tumblers provided with a head having an opening adapted to register with said tumbler-openings and dogs, substantially as and for the purpose set forth.

7. In a permutation-lock, the combination of a plate having transverse slots opening into a longitudinal slot in the plate, a shaft supported on said plate, tumblers comprising toothed disks journaled on said shaft and provided eccentrically with openings adapted to register with each other, pawls engaging with the teeth on said disks, a longitudinally-reciprocable bolt on said plate provided with dogs, and a cover for the tumblers provided with heads at its opposite ends at which it is rotatably mounted on said shaft, said heads having openings adapted to register with said

tumbler-openings and dogs, substantially as and for the purpose set forth.

8. A permutation-lock comprising, in combination, a plate having transverse slots opening into a longitudinal slot in the plate and forming between them tongues, spacing-bosses on said tongues, a shaft supported on said plate, toothed disks journaled on said shaft to protrude through said transverse slots and provided eccentrically with openings adapted to register with each other, spring-pawls engaging with the teeth on said disks, a bolt secured on said plate to be reciprocated longitudinally and having arms at one edge terminating in dogs extending parallel with said edge, and a cover for said disks provided with disk-heads at its opposite ends at which it is rotatably mounted on said shaft, said heads having openings adapted to register with said disk-openings and dogs, substantially as and for the purpose set forth.

MORTIMER B. MILLS.

In presence of—

ALBERT D. BACCI,
JOHN H. LEE.