H. Gross,

Lock.

No. 89,989. Patented May 11. 1869.

Fig. 1.

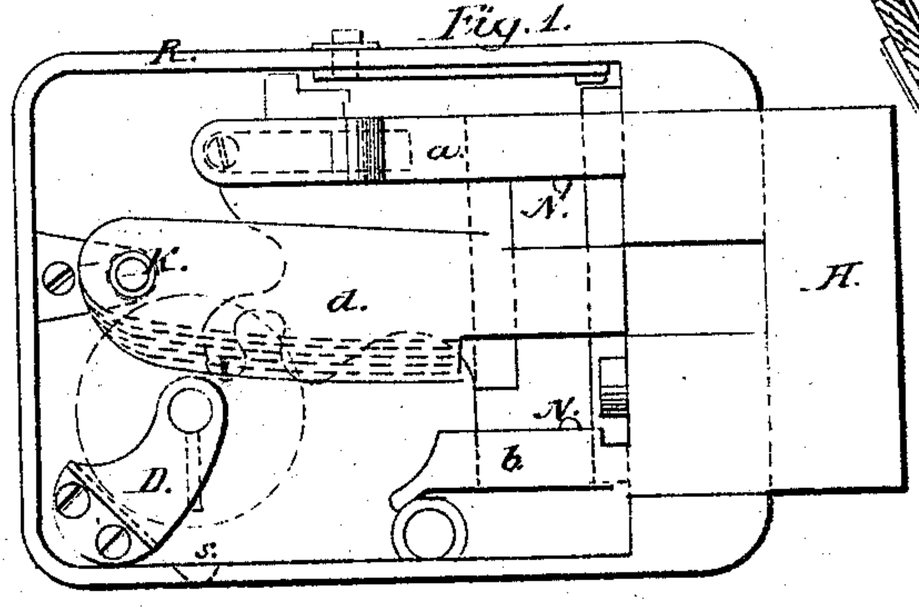


Fig. 2.

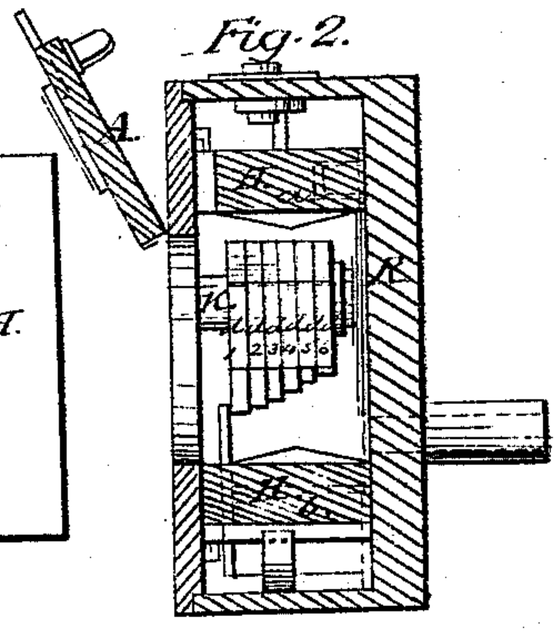


Fig. 3.

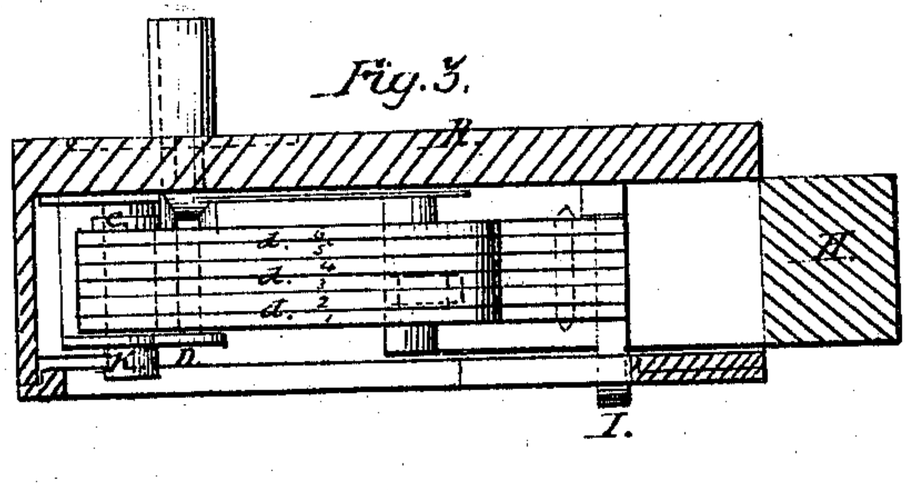


Fig. 7.

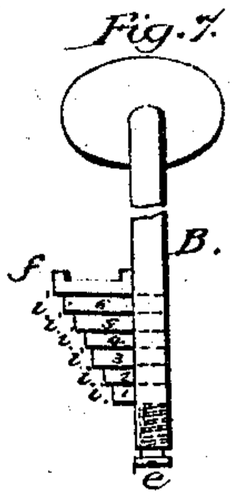


Fig. 4.

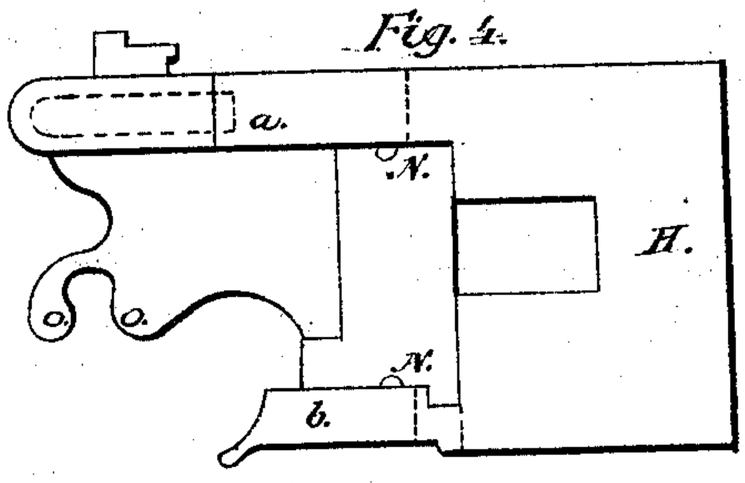


Fig. 5.

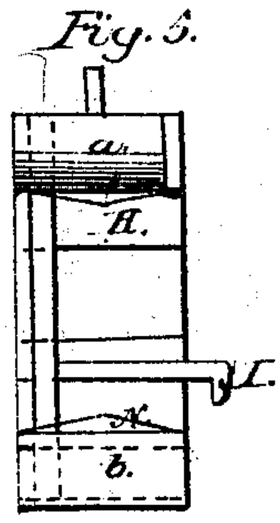
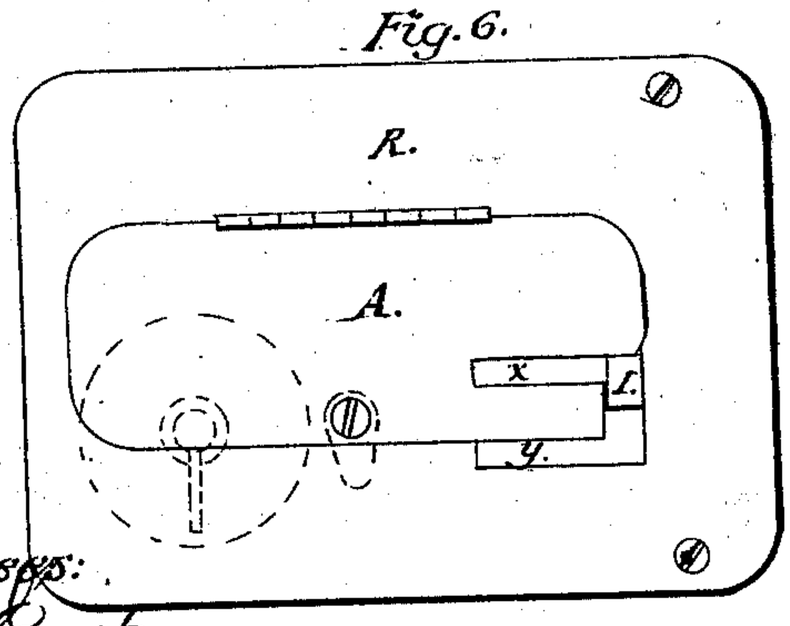


Fig. 6.



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HENRY GROSS, OF TIFFIN, OHIO.

Letters Patent No. 89,989, *dated May* 11, 1869.

IMPROVEMENT IN COMBINATION-LOCKS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, HENRY GROSS, of Tiffin, in the county of Seneca, and in the State of Ohio, have invented certain new and useful Improvements in Permutation-Key Locks; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in the construction and general arrangement of a "permutation-key lock," which will be hereinafter fully set forth.

In order to enable others skilled in the art to which my invention appertains, to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, which form a part of this specification, and in which—

Figure 1 is an inside view of the lock from the rear;

Figure 2 is a transverse vertical section;

Figure 3 is a longitudinal vertical section;

Figure 4 is a rear elevation of the bolt;

Figure 5 is a side view of the bolt;

Figure 6 is a view of the back plate; and

Figure 7 is a side view of the key.

R represents the lock-shell or box, of any suitable dimensions, inside of which the bolt H moves.

The outer end of the bolt H is solid, and is provided with an upper arm, *a*, and a lower arm, *b*, extending inward into the lock, and between these arms is secured a plate, having a catch, O, on which the key takes hold to turn the bolt.

The solid portion of the bolt H has, at its inner end, a slot or groove of suitable length, as seen in fig. 4.

Inside of the lock-box R, opposite the key-hole, is a plate, D, of suitable construction, as a guide for the key, said plate having a hole, as seen in fig. 1, in which the end of the key is inserted.

At a suitable point near the inner end of the box, is placed a pin, or rod, K, as a fixed centre for the tumblers of the lock.

On the centre K is placed a movable tube, *c*, flanged at its inner end, which serves as a movable centre for the tumblers.

On this tube are placed the tumblers *d d*, which may be of any number desired, although I have represented the lock as containing six, marked 1 to 6, respectively, from the back to the front of the lock, as seen in fig. 2.

These tumblers are of the same length, and their front ends of the same width, corresponding with the size of the slot or groove in the solid portion of the bolt H.

The balance or rear portion of the tumblers are unequal in width, No. 1, nearest the back, being the widest, and then gradually diminishing in width till the last, or No. 6, which is the narrowest.

The tumblers are, however, so constructed that if their rear portions are level, the front ends will also be level, while the difference in width will be noticed on the under side of the rear portion.

When the bolt is moved out of the lock, the tumblers *d d*, or rather the outer or front ends of the tumblers fall down on the arm *b*, when it will be seen the lock cannot be unlocked unless the tumblers are raised evenly, so that their front ends will be exactly oppo site the slot in the bolt, when it is operated by the key.

For this purpose I construct the key B as seen in fig. 7, in the following manner:

At a suitable point on the key, is secured a tooth, or bar, *f*, which will engage in the catch O, to turn the bolt.

The outer end of the key is slotted, and in this slot are inserted six bars, *i i*, of unequal length, marked, respectively, 6 to 1; the bar *i*, marked 6, being the longest, and placed nearest the bar *f*, and corresponds with the narrowest tumbler *d*, also marked 6.

The bars *i i* then decrease in size in the same proportion as the tumblers increase, so that the tumblers are all acted upon at the same time, raising them up level on the upper side.

As soon as the tumblers have been raised opposite to the slot in the bolt H, the bar *f* catches in catch O, and moves the bolt back, the front ends of the tumblers entering the slot mentioned.

The bars *i i* are held in the key by means of a screw, *e*, in the end of the same.

The tumblers *d d* can be changed in any manner desired, as they can be all removed at once, by lifting off the movable centre *c*, in which case the bars *i i*, in the key, will be changed to correspond.

In the bolt H is a thumb-slide, I, which projects through the back of the lock, for the purpose of locking or unlocking on the inside without the use of a key.

The slide I, passing under the front ends of the tumblers, raises them up even, and a slot, *x*, in the back of the lock, allows the slide to move the bolt inward, when the tumblers are so raised.

Another slot, *y*, leaves room for the slide I to move inward, when the lock is turned by the key from the outside.

On the under side of the arm *a*, and also on the upper side of the arm *b*, is a curved projection, N, which throws the tumblers out of line when pressed up or down, thus preventing a burglar from determining the exact position of the points of the tumblers.

In the bottom of the lock-box R, directly under the key-hole, is a slot, S, for a powder-escape, if powder should be introduced into the lock.

The back of the lock is provided with a door, A, opened by means of a thumb-catch, by which access is had to the inside of the lock to change the combination.

Having thus fully described my invention,

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

1. The combination of the movable tumblers *d d*, movable centre *c*, and stationary centre K, all constructed and arranged substantially as and for the purposes herein set forth.

2. The arrangement of the horizontal slots *x* and *y* with a vertical connecting-slot, in the back of the lock-box R, for the purpose of moving the slide I, substantially as herein set forth.

3. The curved projections N N, constructed and arranged to operate substantially as and for the purposes herein set forth.

4. The movable tumblers *d d*, movable centre *c*, fixed centre K, slide I, and curved projections N N, in combination with the bolt H, all constructed and arranged as a whole, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing, I have hereunto set my hand, this 6th day of March, 1869.

HENRY GROSS.

Witnesses:

ROBERT LYSLE,

E. H. OSBORN.