(Model.)

J. C. SMITH.

PERMUTATION LOCK.

No. 374,712. Patented Dec. 13, 1887.

Fig. 1.

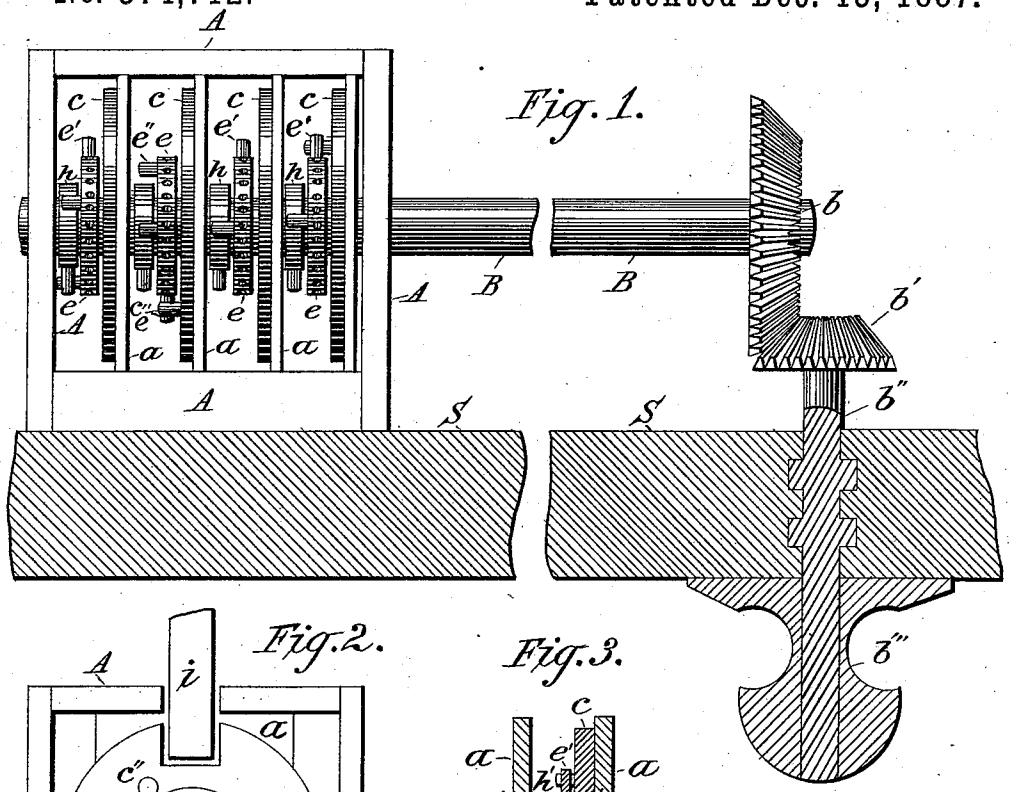


Fig. 2.

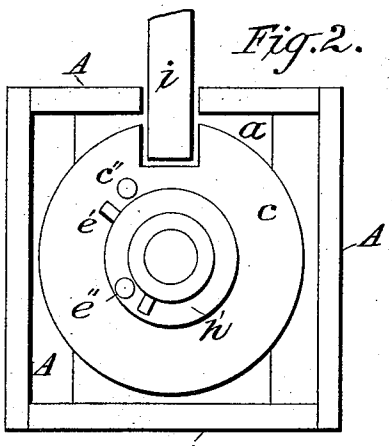


Fig. 3.

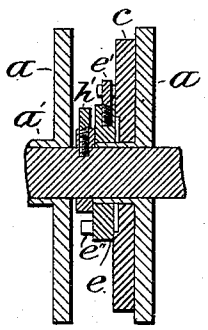


Fig. 7.

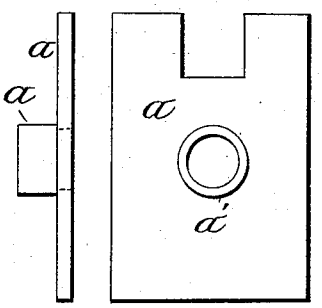


Fig. 4.

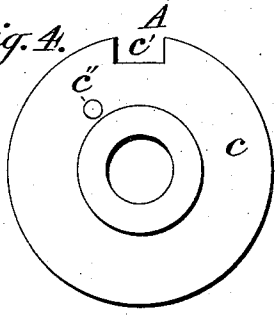


Fig. 5.

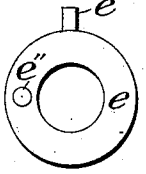


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN CHARLES SMITH, OF ELYRIA, OHIO.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 374,712, dated December 13, 1887.

Application filed February 21, 1887. Serial No. 228,444. (Model.)

To all whom it may concern:

Be it known that I, JOHN CHARLES SMITH, a citizen of the United States, residing at Elyria, in the county of Lorain and State of Ohio, have invented a new and useful Permutation-Lock, of which the following is a specification.

My invention relates to improvements in combination-locks in which a set or series of tumblers or disks are brought into a prescribed position by rotating a spindle according to a special combination before the bolt can be operated; and the object of my invention is to provide such a lock as cannot be picked by experts unacquainted with the combination on which it is set by reason of any sounds communicated by the lock or from sense of feeling. I attain these objects by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a four-section lock with the side of the frame removed, also showing the spindle extended and connected with the spindle of the knob to the door. Fig. 2 shows an end elevation of my lock with end of the frame removed. Fig. 3 represents a vertical sectional view of one section of my lock. Fig. 4 represents a plan view of a tumbler of one of the sections of my lock. Fig. 5 represents a plan view of one of the permutation-rings. Fig. 6 represents one of the actuating-ferrules. Fig. 7 represents a side and front elevation of the supporting-standard to each section.

Similar letters refer to similar parts throughout the several views.

My lock can be made of as many sections as desired, and as all of the sections work and operate independent of each other and all consist of the same number of parts, all that is necessary to describe or understand is one section to understand the whole.

A represents the frame to said lock.

a represents standards or divisions between the sections of said lock, in one part of which is cut out the notch shown in Fig. 7, for the purpose of allowing the bolt to pass into the slots in the tumblers hereinafter described. Said standard is also provided with the projecting thimble *a'*, which thimble is of sufficient inside diameter to allow the spindle to freely operate through same. Its length is sufficient to pass through the tumbler and the permutation-ring.

B represents a spindle passing through the center of the standard, thimble, and actuating-ferrule.

b represents a bevel gear-wheel on one end of the spindle. *b'* represents another bevel gear-wheel of one-half the size of *b* and operating same. It is rigidly attached to the spindle *b''*, connected to the knob *b'''*.

c represents a tumbler in the form of a disk with a notch, *c'*, in one side of sufficient size to admit of the entering of the bolt of the lock. On the front side of this tumbler is placed the stop *c''*. Through the center of this tumbler is a hole of sufficient size to admit of its turning on the thimble *a'*. The front side through the center is cut out a trifle to relieve it from contact with the permutation-ring and prevent friction between the two.

e represents permutation-rings of about one-half the diameter of the tumblers *c*, being small enough, so that when the bolt is thrown back into the notches in the side of the tumblers it will not strike their outer edges or projecting lugs. In the outer edges of these rings are formed a large number of holes extending around their entire circumference. Into one of these holes is securely inserted the projecting screw or pin *e'*, extending out far enough from the rim to strike the stop or lug *c''* on the face or side of the tumbler when revolved.

e'' represents side projections or lugs on the face of the permutation-rings. These are arranged in a measure to correspond to the number of sections in the lock, the ring belonging to the first section usually having one lug or projection and the balance two. Through the center of this ring is a hole of sufficient size to admit of turning freely on the thimble *a'*.

h represents a ferrule rigidly attached to the spindle B, which forms a bearing against the back of the standards on one side and the thimble *a'* on the other, preventing any end motion to the spindle B or pressing the permutation-ring, tumbler, and standards together or interfering in their working. On one side of this ferrule is the projecting lug *h'*, of sufficient height, when the spindle is rotated, to strike the lug *e''* on the side of the ring *e*.

i represents a broken section of a bolt to the

lock and the manner it enters into the notch c' of a tumbler.

S represents a broken section of a door to a safe to which the lock may be attached.

The operation of my invention in particular is subject to a great variety of variations by changing the location of the lugs on the various parts, also the location of the pin or screw e' on the permutation-ring, as every change makes a variation in working or operating the lock.

The general operation of my invention is as follows, to wit: The pins e' in the permutation-rings are first so arranged on each section that all the tumblers can be consecutively set one after another without disturbing those previously in place. The thimble a' being rigidly secured to the standard a, no motion is communicated to the tumbler by revolving the spindle, except it be by means of contact of the lug h' on the ferrule h striking the lug e'' and communicating motion to ring e, which by moving will strike the lug c'' and cause the tumbler to move. The several tumblers are set by revolving the spindle one way and the other an exact distance, which must previously be known by the operator, as is the case in ordinary permutation-locks.

To form a measure of the distance turned a dial and pointer may be used.

The spindle B can be made of any desired length, so that the lock can be placed at any point or place on the inside of the door where least liable to suffer injury from sudden blows or explosions from the outside of a safe. The lock will work equally well in a horizontal or perpendicular position. When in either position, the spindle B may be provided with a shoulder to form a bearing against the frame of the lock, and prevent any end motion to the spindle and relieve the ferrules h from same.

Having fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

In a permutation-lock, the combination, with two or more tumblers, c, of standards a, having thimbles a' formed thereon, adapted to support said tumblers, the spindle B, passing through and supported by said thimbles, and means upon the tumblers and spindle whereby the former are operated independently of each other by said spindle, substantially as and for the purpose set forth.

JOHN CHARLES SMITH.

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