

UNITED STATES PATENT OFFICE.

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PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 453,238, dated June 2, 1891.

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To all whom it may concern:

Be it known that we, MARQUIS L. HALL and WILLIAM H. ELDRIDGE, citizens of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Permutation-Locks; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters of reference marked thereon.

The present invention relates to permutation-locks, and has for its object to improve locks of this description, to this end consisting in the lock and in the construction and combination of parts, as hereinafter specified and claimed.

In the accompanying drawings, Figure 1 shows a rear elevation of our improved lock, portions being in section and broken away to more clearly illustrate its parts. Figs. 2 and 3 are respectively vertical and horizontal section views on the lines $z z$ and $y y$ of Fig. 1. Fig. 4 is a front view showing the operating-knob and index device with portions of the parts to be locked; and Figs. 5, 6, 7, 8, and 9 are detail views showing two forms of operating disks or wheels.

A in the drawings designates a shaft or spindle having at its outer end an operating-knob a , by which it may be revolved, and at its inner end a disk or wheel B, adapted to be secured to said shaft, so as to rotate with it. The mode of connecting these parts is by reducing the end of the shaft and providing an opening in the center of the disk to fit over said reduced portion, and by means of a nut a' , engaging suitable thread on the latter, clamping said disk against the shoulder which is formed on the shaft by its reduction. This shaft is in part journaled in a short sleeve C and in the wall d of a suitable casing, in which it can freely turn. Journaled on said sleeve at its inner end, adjacent to the disk B, (which we shall hereinafter term the "fixed" disk,) so as to be able to revolve freely upon said sleeve, is a second disk or wheel E, of equal diameter with the disk B, which second disk, for the sake of distinguishing it from the other, we shall term the "loose" disk. Upon the periphery of each disk is a short radially-ex-

tending slot e , which slots are adapted to be brought into coincidence with each other and with a stump or lug f on a sliding bolt F, to permit the latter to be moved out of engagement with a latch G to allow opening of the part to which the lock may be applied. Said lug when said slots are out of alignment with it and each other if it be attempted to slide the bolt will engage the peripheries of the disks and prevent movement of the bolt.

The bolt F consists of a plate having a recess or elongated slot f' , into which projects a portion of the spindle journaling-sleeve, which sleeve on its upper and lower sides is cut away to form flat surfaces c , with which the upper and lower walls of said slot can engage. These surfaces thus form guides for the bolt in its reciprocations and support the same. At one end the bolt is provided with a projection portion f^2 , to engage with the latch G, while at its opposite end it is connected to the center of a spring H, which tends to project the bolt normally in the direction of the said latch. The spring at its opposite ends is connected to or bears against studs or pins $h h$, attached to the casing. A pin or button f^3 , passing through an elongated slot in the casing-wall, constitutes means for moving the bolt to disengage it from the latch G.

As will be apparent, before the bolt can be operated the slots e in the two disks must coincide with each other and with the stump f on the bolt F, which is to be accomplished by rotation of the disks. This is preferably done by providing the fixed disk with an eccentric pin or stud b , that projects from the side adjacent to the loose disk, which stud is designed when said fixed disk is turned by the rotation of the spindle to engage with a lug e' , that projects from the face of the loose disk, and to turn the latter through a predetermined space, to be ascertained by reference to a lettered dial I, mounted on the operating shaft or spindle, so as to turn therewith, and to an index-mark i , placed on the lock-casing. The lug e' on the loose disk has a fixed position relative to the notch e ; but that the combination may be varied the pin b is made adjustable, for which purpose a series of elongated slots b' is provided in the disk near its periphery, in any of which said pin may be

placed, or, when placed in one, be adjusted therein, which provision for adjustment, either by moving it in a slot of the series or moving it from one slot to the other, will enable its position relative to the slot *e* in said disk to be changed. This construction is shown in Figs. 7, 8, and 9.

Instead of the above-described arrangement of disks, the loose disk may, as shown in Figs. 1, 2, 3, 5, and 6, be provided with a slot *e*² near its periphery extending from near one side of the radial slot entirely around the disk to the other side of said slot, into which a lug *b*³ on the fixed disk projects, said loose disk being moved in this construction by the engagement of said lug with the ends of the slots. Changes in the combination are effected by loosening the nut, turning the disk until the desired relative position of the lug on its face is obtained, and then clamping said disk in place by tightening the nut.

With a view to causing the combination to be automatically broken, thus rendering the device self-locking, after the combination has been made and the bolt *F* slipped, we place on the latter a spring *L*, having an arm *l* adapted to co-operate with a projection *e*³ on the face of the loose disk opposite that next to the periphery of said disk and near the radial slot, having an inclined face and an abrupt face, the latter being farthest from said slot. The operation of this device will be apparent. When the radial slots of both disks are coincident with each other and the stump *f* of the bolt, the arm *l* of the spring *L*, as shown in Fig. 1, will be just in advance of the lug. If now the bolt be slid to pass the stump into the slots in the disks, said arm *l* will be carried thereby and ride over the inclined face of said lug and fall behind its abrupt face. On permitting the bolt to be thrown by the spring *H*, said arm *l* will engage with the abrupt face, and in consequence give the disk a turn, which will throw its slot out of alignment with the other slot and the stump or lug, which latter of course in the meantime will have passed out of said slots.

The lock, as thus described, is adapted for use in all places where permutation-locks are desirable to be used, and we wish the scope of our invention to be so understood. For some special uses—such, for instance, as post-office letter-boxes—we propose to use with our lock a special form of latch, such as the one shown, which, should the combination be forgotten or should there be other occasion, will enable the locked door to be opened, as in the instance mentioned, from the inner side. Said latch consists of a spring-actuated vertically-movable bar arranged in

a suitable casing *M*, through a slot in which projects a pin or stud *g*, by which said latch may be moved and disengaged from the bolt *F* and thus permit the door of the letter-box to be opened. Said latch has a beveled face over which the portion *f* of the bolt *F* will ride to depress said latch when the door is being closed, and an abrupt face which will engage with said portion when said door is fully closed.

As the description of the operation which has been given in describing the parts of our lock is thought to be sufficient to enable its operation to be readily understood, no further recitation of it will be given.

Our lock is simple in its construction and its operation is certain and readily apprehended.

What we claim is—

1. In a permutation-lock, the combination of a series of radially-slotted tumblers or disks, means for rotating them, and a locking-bolt having a part to engage with one of said tumblers or disks to rotate it to destroy the coincidence of its radial slot with the other radial slots when said locking-bolt is projected, substantially as and for the purpose set forth.

2. In a permutation-lock, in combination, a shaft or spindle, a fixed radially-slotted wheel, a loose radially-slotted wheel, means to transmit motion to the latter from the former, a lug on the loose wheel having an inclined and an abrupt face, a sliding bolt, and a spring-arm on the latter to co-operate with said lug to rotate said disk when said bolt reciprocates in one direction, substantially as and for the purposes specified.

3. In combination with a shaft or spindle-carrying index devices and a fixed radially-slotted wheel, a sleeve journaling said shaft and carrying a loose radially-slotted wheel, the engaging lugs, one on each disk, a spring-actuated reciprocable bolt having a recess, the plane guiding-surfaces on said sleeve, with which the walls of said recess engage, the stump or lug on the bolt to co-operate with the slots in the disk, the device carried by the bolt to rotate the loose disk to break the alignment of its radial slot, and suitable means for moving said bolt against the stress of its spring, substantially as and for the purpose described.

In testimony that we claim the above we have hereunto subscribed our names in the presence of two witnesses.

MARQUIS L. HALL.
WILLIAM H. ELDRIDGE.

Witnesses:

W. R. ROBERTS,
F. TEMPLETON.