

GEORGE L. DAMON.
Improvement in Permutation Locks.
 No. 125,180. Patented April 2, 1872.

Fig 1.

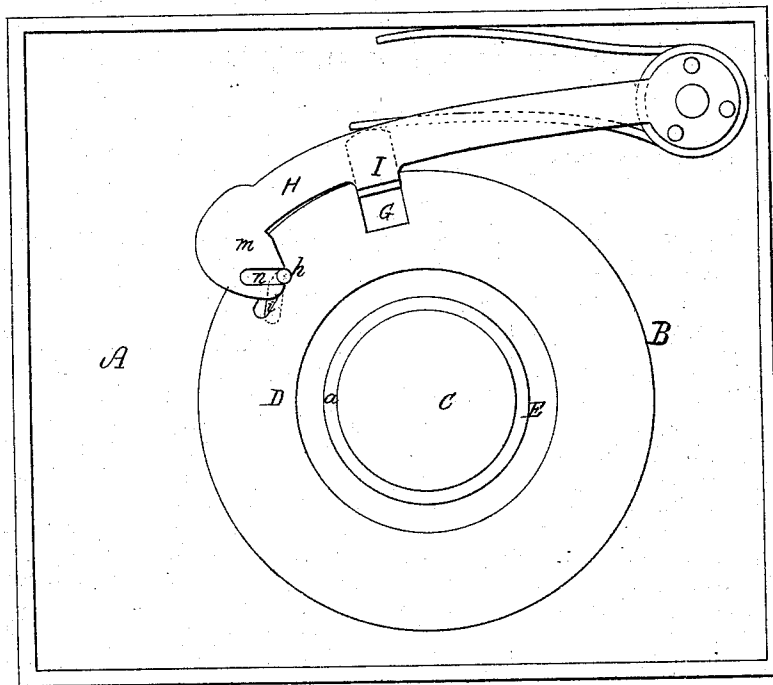


Fig. 3.

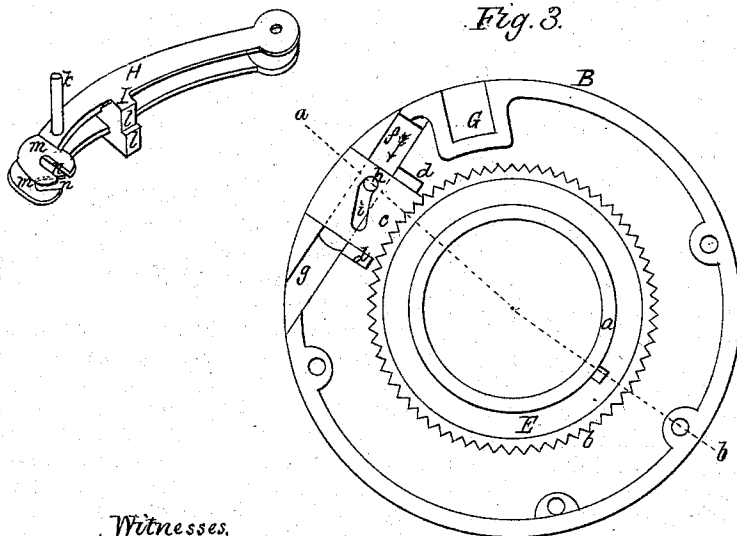
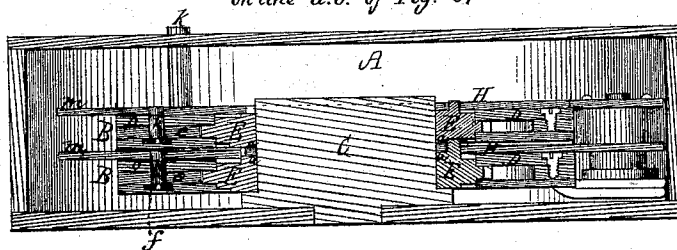


Fig. 2.

on line a.b. of Fig. 3.



Witnesses,
W. E. Boardman,
C. B. Nottingham.

George L. Damon,
by his Attorney,
Fred. Curtis.

UNITED STATES PATENT OFFICE.

GEORGE L. DAMON, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN PERMUTATION LOCKS.

Specification forming part of Letters Patent No. 125,180, dated April 2, 1872.

To all persons to whom these presents shall come:

Be it known that I, GEORGE L. DAMON, of Boston, in the county of Suffolk and State of Massachusetts, have made an invention of certain new and useful Improvements in Permutation Locks; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being had to the accompanying drawing making part of this specification, and in which—

Figure 1 is a plan or face view, and Fig. 2 a vertical section of the lock-case and tumblers of a permutation lock with my improvement applied thereto, Fig. 3 being a face view of one of the permutation wheels with its outer cap-plate removed.

The purpose of my present improvement is to enable the various permutation wheels or tumblers of a lock to be easily and expeditiously brought to the position which they must assume in order that the combination may be changed when it becomes desirable to adopt a new one.

The class of locks upon which these improvements are based, is that in which a series of compound wheels or tumblers are employed, each composed of a hollow annular rim, and an internal annular disk which protrudes through it, and through which the spindle passes that actuates the said disks or centers when a new combination is to be formed, the perimeters of the centers being serrated, and operating in connection with a sliding plate or bolt, the meeting face of which is also serrated for the purpose of securely locking the central disk to the outer rim, when the desired combination has been made, the said combination being effected by adjusting the relative position of said center and rim in such manner that the driving-pins projecting from the sides of the centers are changed in position with respect to the notches formed in the rims.

In the drawing, A represents the lock-case. B B are the series of permutation wheels or tumblers, and C the stud on which they rotate, each tumbler being composed of an outer annular hollow rim, D, and an internal disk, E, which is contained within such rim, a flange or hub, a, from the inner periphery of

the disk protruding through each side of the rim, as shown, and serves in connection with its neighbor, to separate the two adjacent wheels.

The periphery of the disk is serrated or toothed, as shown at *b*, and operating in connection with this serrated periphery is a sliding toothed bolt, C, which plays between suitable guides *d d*, in the rim D.

Rotation is imparted to the first wheel by its disk, and subsequently from one wheel to another in succession throughout the series by means of studs or pins applied to the side thereof, which coincide and abut during said rotation.

The arrangement of central disks, outer rims, sliding bolt, and interlocking teeth is substantially the same as has been employed heretofore, and so far as my present invention is concerned, forms no part thereof.

Below or in rear of the bolt *c* is a sliding bar, *f*, which plays at right angles to the path of said bolt and is received within a channel, *g*, cut in the rim, while projecting from this bar *f* is a pin, *h*, which passes through a diagonal slot, *i*, in the bolt *c* and protrudes through a slot in the side of the tumbler.

Pushing the slider *f* in the direction of its arrow (as shown in Fig. 3) by means of the pin *h* effects an outward movement of the bolt *c*, and by removing it from contact with the disk E unlocks the latter.

H in the drawing represents a swinging latch or lever which is pivoted to the back or bottom of the lock-case, and alongside of the tumblers a stud or arm, *k*, from this latch extending through the front or cover of the lock-case in order that it may be readily laid hold of. To the inside of the latch H, I affix a block or stop, I, which, when the series of notches G are in coincidence, enters them all, and by this means holds them in the proper position in which they should rest, while the combination is being changed. I form the inner face of the block or stop I, into a series of graduated steps, *ll*, so formed, as shown in the drawing, that in picking up the tumblers each longer step, will, when the tumblers are moving, enter the notch in its particular tumbler, (when the notch is brought opposite it,) and

hold this tumbler fast without interfering with the free rotation of the other tumblers which have not yet been picked up. The free end of the latch *H* is fashioned into a series of forked or notched heads, *m m*, such heads corresponding in number with the pins *h* of each sliding bar *f*, in order that when pushed inward, the orifice or notch *n*, of the head shall embrace and actuate the said pin, and through it the bolt *c*, the spaces intervening between each tumbler being of sufficient width to easily receive the head, the distance between the inner end of such notch *n*, and the block *I* being equal to the space between the pin *h* and notch *G* of the rim *D*, when the bolt *c* is withdrawn. The notch *n* is not concentric with the pivot of the latch *H*, but is tangential thereto, in order that when, after seizing hold of the pin *h*, the latch is pushed inward, the action of the slot upon the pin shall be such as to push the slider *f* laterally in its channel *g*, and through such slider retract the bolt *c*, and unlock it from the disk *E*. It will be seen by reference to the drawing, that the block *I* only slightly enters the notch *G* before the notch *n* embraces the pin *h*, this being in order that the correct position of the tumblers shall be ascertained and insured before the inner disks are unlocked, as otherwise the combination could not be changed. The character, extent, and disposition of the notches *G* and *n*, oblique slot *i* and pin *h*, with the respective parts to which they belong, are such that when the block *I* has fully entered the said notches *G* so as to hold the tumblers the notch *n*, has unlocked the plate *c*, leaving the disks in a condition to change the combination. Beginning with the lowermost or rear-most one, each tumbler is in turn "picked up" by the rotation of the spindle, the latch being pressed inward until its graduated steps *l* on block *I* slightly enter, one by one, in gradual succession, the notch *G* of each tumbler as it is brought opposite its own step. Each tumbler is thus held by the block *I* until all are secured. The moment the block *I* coincides with and begins to enter the notch of the outermost or last tumbler, the slot *n* of each forked head *m* reaches the pin *h* opposite it, when a continued advance of the latch by the hand of the operator, or otherwise, causes the block *I* to entirely enter and fill the notches *G* of the entire series of tumblers, and at the same time compels the notch *n* of the head *m* to deflect the pin *h* and slider *f*, in the lateral direction indicated by the arrow, which lateral movement of the slider by means of the oblique slot *i* effects a radial outward movement of the bolt *c*, and unlocks it from the central toothed disk *E*, thus leaving each disk through the series free to be turned to a new position in forming a new combination. The new combination having been determined upon, and set by the index and spindle of the lock, all that remains to be done is to withdraw the latch

entirely from connection with the tumblers, which act reverses the movement of the slider *f* and bolt *c*, locks the rim *D* to the central disk *E*, and releases the tumblers, the various positions of which are then varied in the usual manner. As a matter of convenience the latch *H* should be forced inward toward the tumblers by a suitable spring, and should be provided with a suitable catch or lock to retain it in a position isolated from such tumblers, both the latch and its catch being operated from the outside of the lock-case, preferably. When supplied with my invention a lock may be changed in its combinations by an inexperienced person, in a very short space of time, the only manipulation required being to release the latch and turn the spindle, the locking of the tumblers, and unlocking of the toothed disks resulting without care or mental effort on the part of the attendant, the release of the latch, and of the tumblers, and the locking of the disk and rim, in the new combination, being effected by the said withdrawal of the latch.

I have represented the latch *a* swinging on a pivot, and this arrangement I prefer to employ. But the same result may be attained by arranging the latch or bar which carries the locking steps and devices for operating the sliders, to move or slide toward and away from the tumblers in any suitable path. It is also apparent that the devices for picking up the tumblers, and those for operating the sliding bolts, need not be placed necessarily on one and the same latch.

What I claim as my invention in a permutation lock of the character herein referred to, is—

1. The combination, with the tumblers, of a latch or bar arranged to move toward and away from the tumblers, and carrying a series of graduated steps operating to pick up the tumblers in succession without interference with the continued movement of those tumblers not picked up, substantially as shown and described.

2. The combination, with a tumbler constructed as described, and its toothed locking bolt, of a slider for actuating said bolt, and a latch operating in connection with said slider, substantially as herein shown and set forth.

3. The combination, with the tumblers, of the latch arranged upon the periphery of the tumblers, and provided with means substantially such as described for both picking up the tumblers, and unlocking the two parts of each tumbler, operating substantially as set forth, so that when the latch has been moved to pick up the tumblers its further movement in the same direction will cause the unlocking of the parts of each tumbler, and when the latch releases the tumblers, it shall be caused at the same time to effect the interlocking of the parts of each of said tumblers, as shown and set forth.

4. The special mechanism herein shown and described for operating on the tumblers, consisting of the hinged latch H, with its graduated step-block I, and notched head *m*, in combination with the sliders *f*, arranged on the rim portions of the tumblers to slide at angles to the path of movement of the toothed bolts

c, the sliders being provided with pins *h* engaging in diagonal slots *i* in the bolts, or vice versa, substantially as set forth.

GEORGE L. DAMON.

Witnesses:

FRED. CURTIS,
W. E. BOARDMAN.