

(Model.)

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PERMUTATION LOCK.

No. 347,618.

Patented Aug. 17, 1886.

Fig. 4.

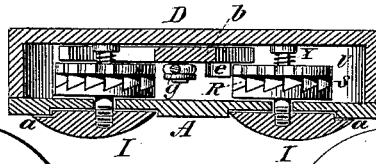


Fig. 1.

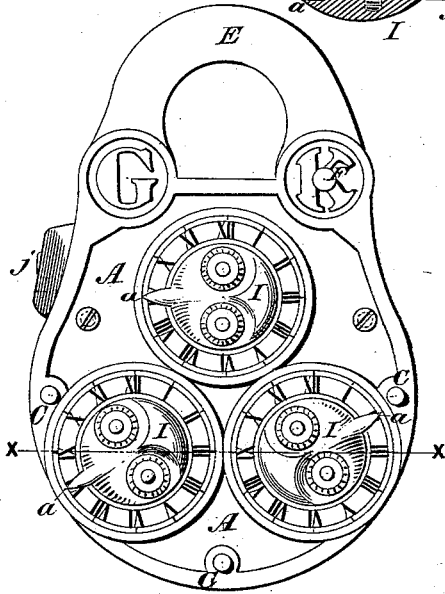


Fig. 2.

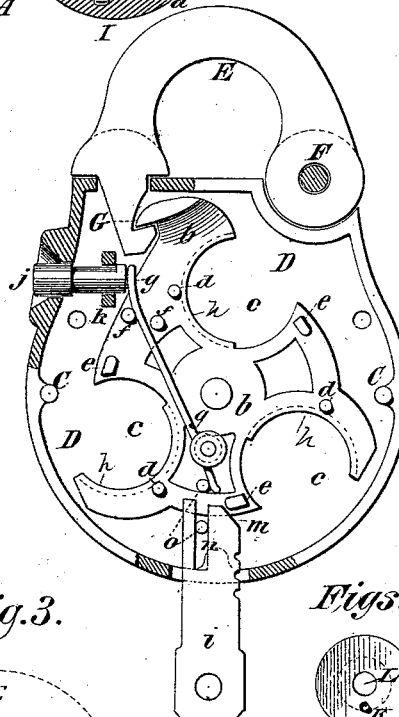
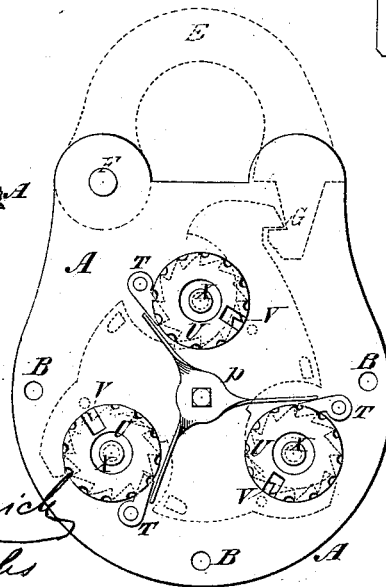


Fig. 3.



Figs.

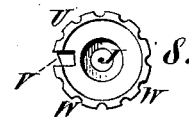
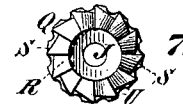
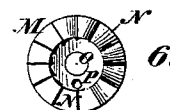
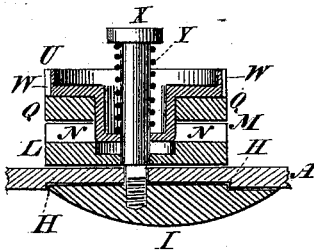


Fig. 9.



WITNESSES:

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PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 347,618, dated August 17, 1886.

Application filed October 22, 1883. Serial No. 109,752. (Model.)

To all whom it may concern:

Be it known that I, LEWIS G. KNOWLES, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Permutation-Locks, of which the following is a specification.

My invention relates to that class of locks known as "permutation-locks," having two or more combination wheels or disks, fully illustrated in Green's patent, No. 262,406, dated August 8, 1882.

The object of my invention is to promote security in the use of padlocks and other locks, and to render it unnecessary to take them apart in order to change the combination, to facilitate the operation of changing the combinations, and secure greater accuracy in doing the same, it being true of all this class of locks that the more or less difficult modes of changing the combinations involve detaching, opening, or taking apart the lock and use of tools. I attain these objects by the mechanism illustrated in accompanying drawings, in which similar letters refer to similar parts throughout the several views.

Figure 1 is a front elevation showing pointers and dials of my improvement. Fig. 2 is a plan view of the inner side of the back plate, showing the combination changing-tool in an entering position, the push-pin for unlocking, and the centrally-pivoted bolt with its appurtenances. Fig. 3 is a plan view of the inner side of front plate, showing the combination-wheels, the reverse side of the centrally-pivoted bolt overlying part of the wheels, and engaging the bow or shackle, also obversely shown, and the pointed spring acting upon the pawls. Fig. 4 is a sectional elevation taken through the lines *xx* of Fig. 1. Fig. 5 is a plan view of the inner side of one of the rotating disks, showing rabbet, screw-hole, and carrying-pins. Fig. 6 is a plan view of one of the wheels, showing vertical ratchet, screw-hole, and hole for carrying-pin. Fig. 7 is a plan view of one of the wheels, showing vertical ratchet and horizontal ratchet combined and central hole. Fig. 8 is a plan view of re-

verse side of Fig. 7, being cup-shaped wheel, having slot for unlocking and recesses to prevent the tracing by sense of touch the locking-point. Fig. 9 is a central section through one of the combinations, somewhat enlarged, giving a view of the several parts of the combination together, showing the screw that secures the disk and wheels together, and the spiral spring that operates the double-wheel part of the combination.

The body or case of the shell is made in two parts, of usual form, the front plate, A, having rivet-holes B, to receive rivets C of back plate, D, so that said plates A and D will be firmly riveted together. In the front plate, A, are formed two or more circular apertures, H, which are rabbeted to receive the rabbets of the disks I, around which are placed twelve numbers in form of a clock-dial. The back plate, D, is provided with the bow E, working on the pivot F in the usual manner, and has also the push-pin J, acting against the spring G, attached to said plate, which spring acts on bolt b, said bolt being centrally pivoted and provided with locking-pins d. The pins e, by which pawls T are held in position, are so constructed as to engage bow E in the notch G.

The disks I are constructed to turn with the fingers, having the pointers a to indicate the numbers upon which the combination may be set to unlock the lock, the obverse having the center screw-hole, L, and carrying-pin K.

The wheels M are provided with vertical ratchets N, of equal number with the dial-hole Q, for the screw X, and hole P, provided for the carrying-pin K.

Q U is a double wheel, provided with vertical ratchets R, the counterpart of ratchets N, having horizontal ratchets S, in which the pawls T work, and central hole, J, for the screw X, the opposite side, U, being a cup-shaped wheel, provided with slot V for unlocking, and recesses W, to prevent tracing by sense of touch the unlocking point or slot V. Screw X is provided with a shoulder to hold firmly wheels M and disks I together, and spiral spring Y, to operate the ratchets N and R thereon.

The complete combination, described in detail in the preceding four paragraphs, operates as follows: The disks I, with their rabbets fitting in rabbeted apertures H, with carrying-pin K, projecting beyond the inner side of plate A, engaging hole P of wheel M, said wheel bearing upon inner side of plate A, and being larger than the aperture H is held firmly in position by the shoulder of screw X
 10 screwed into disk I, yet free to revolve in said rabbeted aperture H. The vertical ratchets N are engaged by their counterpart R of wheel Q, said wheel Q held in position by spiral spring Y and screw X, upon which it
 15 freely moves. The pawls T engage the horizontal ratchets S, so that the turning of disks I to a right-hand direction by the clutching of ratchets N and R, carries the cup-wheel U around so that the slot V may be presented
 20 to any angle required. While turning the disks I leftward the pawls T secure the cup-wheel N, with slot V, in position, said disk I moving freely in said leftward direction from the action of ratchet N upon ratchet R. By
 25 the construction of the ratchets N, R, and S of wedge form the disks I may be operated in either direction. The locking-bolt *b*, centrally pivoted, is constructed to engage notch G in the bow E, and is provided with semicircular openings *e*, to admit of the action of
 30 ratchets N and R in the operation of changing the combinations, hereinafter described, having pins *e* for holding wheels Q U in position in the said operation of changing the
 35 combination, the pins *d* to engage the recesses W of wheel U thereby securing bolt *b* in the catch G of bow E, and releasing same when said pins *d* are admitted to the slots V, and
 40 pins *f f* for the bearings of spring *g*, hereinafter described. The said bolt *b* is so adjusted that the parts shown by dotted lines *h* are a resistance to the wheels Q U whenever effort is made to turn disk I leftward without the use of the key *i*, hereinafter described.

45 The spring *g*, attached to plate D, is constructed and so applied as to serve three purposes—first, acting upon the outer of pins *f f*, thereby holding bolt *b* in locking position and yielding to admit of unlocking; second, by
 50 action against the inner of pins *f f* and point of push-pin *j* restores bolt *b* to locking position when acted upon by key *i* in the operation of changing the combination; third, undue pressure upon the push-pin *j* when the
 55 lock is locked springs the spring *g* so as to allow the shoulder of said push-pin *j* to come against the bearing *k*, thereby saving the pins *d* and wheels U from injury.

The push-pin *j* is constructed to operate the
 60 bolt *b* in unlocking by action upon the spring *g*, said push-pin being provided with a shoulder, for the purpose above described.

The combination changing-tool *i* is flat, and of thin metal, constructed with slot *n* and
 65 beveled point *m*, so that said slot *n* engages

steady-pins *o o*, thereby moving bolt *b* by bevel *m* acting against one of pins *e*. Spring
p is made of thin metal, with central square hole, riveted upon stud in the center of inside of plate A, the points of the same being
 70 turned vertically, presenting a flat and spring surface to the pawls T, upon which they act. The pawls T, of simple form, are pivoted on studs in the inner side of plate A, and work in ratchets S, and are acted upon by spring *p*. 75

The operation of my improvement is as follows: Upon the placing of pointers *a* at the numbers at which the lock may be unlocked—for illustration, New York time, one o'clock; Paris, two; London, three—pressure upon the
 80 push-pin *j* causes the pins *d* to enter the slots V, thereby disengaging bolt *b* from notch G, thus unlocking the lock. Now, upon re-engaging the bolt E, the turning of one or more of the disks I in the right-hand direction, the
 85 slot V is thereby removed from the lines of the pins *d*, and the recesses W of the cup-wheel U presented, whereby the lock is locked. The pawls T, acting in ratchets S, prevent the turning of wheels Q U leftward at any time. 90
 The turning of disks I and wheel M leftward is prevented by the resistance of the parts *h* of the bolt *b* against the face of wheels U, said resistance being caused by the ratchets N and R. In the operation of changing the combination, which may be done only when the lock
 95 is unlocked, the bow E is disengaged and the combination changing-tool *i* introduced with the marked side upward, the slot *n* engaging steady-pins *o o*, the bevel-point *m* acting against
 100 one of the pins *e*, thereby revolving bolt *b*, so that the parts *h* of same no longer offer resistance to wheels U, and the semicircular openings *e* are beneath said wheels U, whereupon
 105 the disks I may be turned leftward, so as to point to any dial-number, while the slot V remains in the line of the locking-pins *d*, and at this time the pins *e* are pressed against the
 110 pawls T, preventing the turning of disks I rightward, thus preventing the loss of the combination, for the number to which the pointer is turned when the key is removed certainly indicates the new combination, or the number at which the lock may be locked
 115 and unlocked.

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

1. In a permutation-lock, the combination, with a bolt, *b*, and spring *g* acting thereon, of a stop, *k*, between said spring and an opening
 120 in the lock-case, and a push-pin, *j*, movable in said opening to act on said spring, and having a shoulder to abut against said stop, substantially as described.

2. In a permutation-lock, the bolt *b*, having semicircular openings *e*, and pins *e*, combined with spring *g*, and a lock-plate, D, having an opening for the passage of a key to act
 125 on pins *e* to change the lock's combination, substantially as described. 130

3. In a permutation-lock, the disk I, wheel M, having vertical ratchet-teeth N, wheels Q U, having vertical ratchet-teeth R, and horizontal ratchet-teeth S, combined with spring Y, and screw X, securing the disk I and wheel M together, and furnishing a bearing for the wheels Q U, substantially as set forth.
- 5 4. The combination changing-tool *i*, provided with the slot *n*, and bevel point *m*, substantially as set forth.

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Witnesses:

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