H. CLARKE.
Permutation Lock.

No. 197,962. **Patented Dec. 11, 1877**

Fig. 1

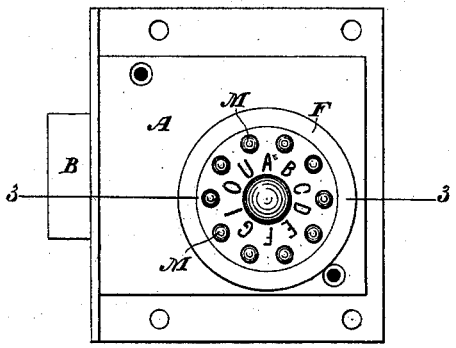


Fig. 2.

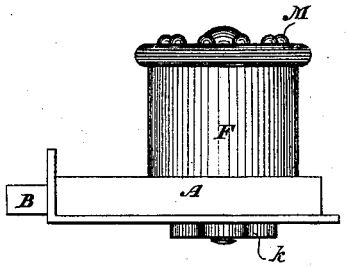


Fig. 3.

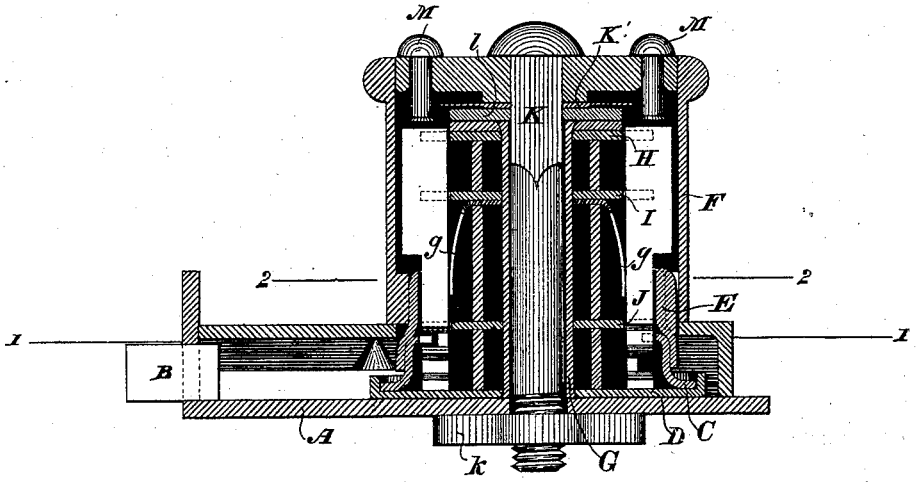


Fig. 8.

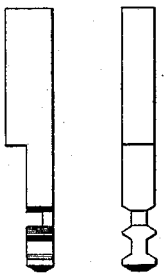
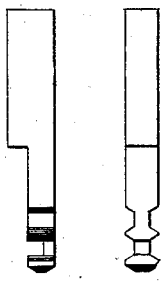


Fig. 9.



WITNESSES

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Fig 4

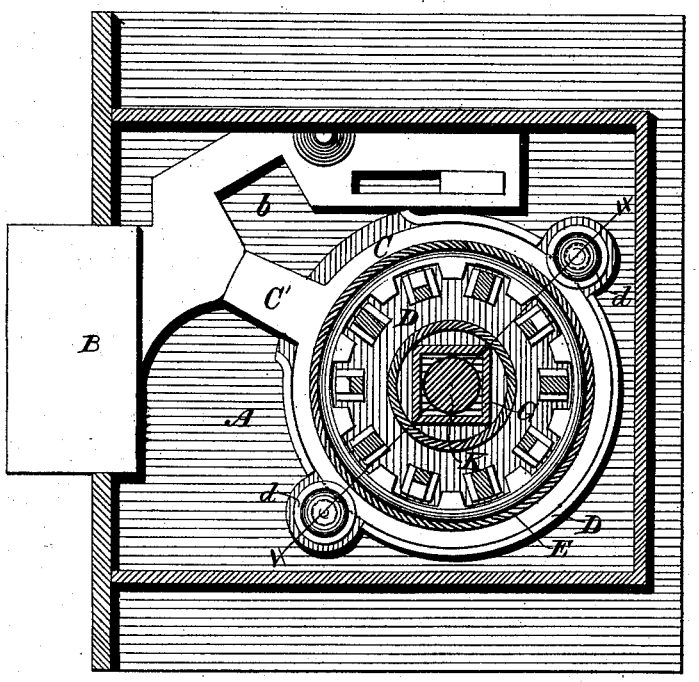


Fig 6

Fig 7

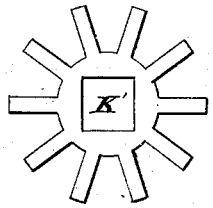


Fig 5

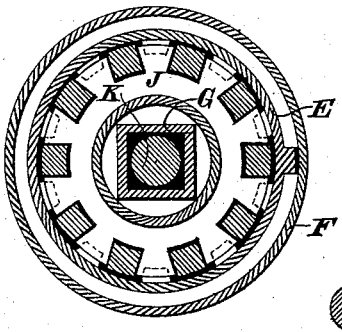


Fig 10

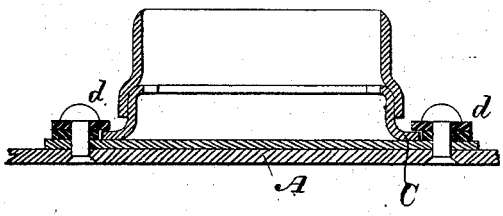
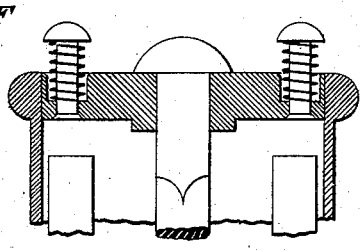


Fig 11



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UNITED STATES PATENT OFFICE.

HENRY CLARKE, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE CLARKE COMBINATION LOCK COMPANY, OF SAME PLACE.

IMPROVEMENT IN PERMUTATION-LOCKS.

[Specification forming part of Letters Patent No. **197,962**, dated December 11, 1877; application filed June 28, 1877.

To all whom it may concern:

Be it known that I, HENRY CLARKE, of Baltimore city, in the State of Maryland, have invented certain new and useful Improvements in Combination-Locks, of which the following is a specification:

My invention relates to a keyless combination-lock, in which tumblers are arranged around and movable endwise in lines substantially parallel with a central spindle, and constitutes an improvement upon the lock shown in Letters Patent of the United States granted to me, respectively numbered and dated as follows, to wit: No. 109,386, dated November 22, 1870; No. 135,528, dated February 4, 1873; and No. 164,522, dated June 15, 1875.

The object of the first part of my invention is to prevent the picking of the lock by "feeling" the tumblers. This could be done in the lock constructed in accordance with the Letters Patent above mentioned, as the tumblers are always exposed unless covered by a seal.

To carry out the object of my invention, I adjust the endwise-moving tumblers by means of pushing-pins projecting through the face-plate of the lock, which pins are separate from the tumblers, whereby the necessity of projecting the ends of the tumblers proper through the face-plate is avoided, and they remain entirely inclosed within the casing.

I further combine with the tumblers and pushing-pins a spring, which tends to press the tumblers away from their pins, with inclines or cams on the tumblers, actuated by the locking-plate, to press the tumblers against the spring and hold them solidly, to prevent their being tampered with or felt by means of the pins.

The object of the next part of my invention is to insure a uniform relation of the locking-plate and the base-plate, upon which latter the ends of the tumblers rest when in their innermost position; to which end I construct the base-plate with a flanged rim, in which the locking-plate fits, so as to prevent lateral movement of the locking-plate, while leaving it free to turn, the two plates being also held from separation endwise by washers or other suitable devices.

In the accompanying drawings, which show all my improvements as embodied in one lock in the best way now known to me, Figure 1 is a plan view of the lock; Fig. 2, a side elevation thereof; Fig. 3, a vertical section therethrough on the line *z z* of Fig. 1; Fig. 4, a horizontal section therethrough on the line 1 1 of Fig. 3; Fig. 5, a similar section on the line 2 2 of Fig. 3. Figs. 6 and 7 represent details of the springs which hold the tumblers in place. Figs. 8 and 9 show the details of the tumblers. Fig. 10 represents a vertical section on the line 4 4 of Fig. 4, showing the mode of connecting the base-plate with the turning-plate; and Fig. 11 represents a view of a modification of my invention.

The construction and operation of the lock being fully described in the Letters Patent hereinbefore referred to, it is deemed unnecessary here to recapitulate their description, except so far as is necessary to a proper understanding of the subject-matter herein claimed.

The lock-case A is provided with a sliding bolt, B, in a recess, *b*, of which a tongue, C′, projecting from a turning toothed locking-plate, C, is adapted to engage to throw or retract the bolt. This locking-plate C fits within a flanged base-plate, D, secured in the lock-casing, and the two plates are held together by means of washers *d*, or other equivalent device.

By this means the uniform relation of the locking-plate and base-plate is insured, the flanged rim preventing lateral movement, and the washers, or other device, preventing endwise movement of the locking-plate while leaving it free to turn. This turning movement of the locking-plate is limited by its tongue coming in contact with the ends of the flanged rim of the base-plate, which is cut away for this purpose.

A sleeve, E, firmly secured to or forming part of the locking-plate, projects through the outer plate of the lock. An ornamental band, F, fits and moves endwise upon this sleeve E,

but is prevented from turning independently of it by means of a feather on the sleeve working in a groove in the band.

A tubular shaft or spindle, G, extending from the base-plate, projects centrally through the sleeve E, and carries, at suitable distances apart, notched disks or plates H I J—three in number in the present instance—which disks guide and support a series of transversely-notched endwise-moving tumblers, arranged concentrically around the spindle and inside of the turning sleeve E, against which they are pressed by springs *g*.

The tumblers are of two classes, active and passive, and are provided with true and false notches, as in my aforesaid Letters Patent.

A locking rod or bolt, K, carrying a perforated disk at its outer end, passes through the central tubular spindle and lock-case, and is secured at its rear end by a screw-nut, *k*. The perforated disk fits within and closes the mouth of the enveloping band, and constitutes the face-plate of the lock. In rear of this face-plate, and abutting against a raised portion thereof, is mounted a spring, K′, which is held in place upon the rod K by a suitable washer, *l*.

In the locks constructed in accordance with the Letters Patent Nos. 135,528 and 164,522, hereinbefore referred to, when the enveloping-band is drawn out the tumblers are protruded through the perforated face-plate of the lock, and when the band is shoved in the tumblers are left thus protruding through the disk, in which position the notches of the passive tumblers are brought into line with the teeth of the locking-plate, and those of the active tumblers are brought into the same line by pushing them inward to their original position. The enveloping-band is then turned, carrying with it the locking-plate to retract the bolt.

This exposal of the tumblers enables a skillful person by feeling the tumblers to pick the lock, as he is enabled by the sense of touch to tell which of the tumblers have their notches in line with the locking-plate, and which have not.

To avoid protruding the tumblers through the face-plate I limit their outward movement by a spring-plate, K′, and reset them by means of pushing-pins M, working endwise in the face-plate, and corresponding in number with the tumblers, which pins are protruded by the ends of the tumblers striking against them when drawn out by the enveloping-band. By pushing inward the pins of the active tumblers the tumblers are returned to their original position, with their notches in line with the locking-plate, to permit of the retraction of the bolt.

By this method of operating the lock the tumblers always remain inclosed, being entirely enveloped by the endwise-moving turning band; and as the pushing-pins are separate from the tumblers proper, the latter cannot be tampered with.

To insure to a still greater degree the safety of the lock, I provide the true and false notches of the tumblers with cams or inclined edges, in such manner that when the tumblers are in their innermost position, the true notches of the active tumblers and the false notches of the passive tumblers are almost in line with the teeth of the locking-plate, whereby, when said plate is turned, in tampering with the lock, its teeth ride upon the inclines or cams, and hold the tumblers rigidly down in position, and when said tumblers are pulled out by the enveloping-band, the true notches of the passive and false notches of the active tumblers are almost in line with the teeth of the locking-plate, whereby, when said plate is turned, in a similar attempt to tamper with the lock, its teeth ride under the inclines or cams of the true and false notches, and force the tumblers against the spring K^1, by which means they are held firmly, and render all attempts to feel the tumblers through the pushing-pins futile.

An attempt to feel the tumblers when drawn out without turning the locking-plate only results in forcing them inward beyond the reach of the pins.

In Fig. 11 I have shown a modification of my invention, the pushing-pins being provided with springs, which hold them normally thrust outward through the face-plate of the lock, so that when the tumblers are drawn outward the pins necessary to be shoved in to resist the active tumblers are, when released, immediately returned to their original position, whereby the combination of the tumblers, owing to the pins being uniformly thrust outward, is hid, or, rather, is not indicated by a portion of the pins being thrust out and the rest being pushed in, as is the case when the pins are used without the springs, in which latter instance, to prevent the position of the tumblers or combination being indicated, the enveloping-band has to be drawn out to bring all the pins in line, or the pins of the passive tumblers shoved in to conform with the pins of the active tumblers already set.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, in a keyless combination-lock, of the central shaft or spindle, a perforated face-plate, pins moving endwise through the face-plate, and independent adjustable endwise moving tumblers, corresponding with said pins, arranged around the spindle.

2. The combination, substantially as hereinbefore set forth, of the turning locking-plate, the notched endwise-moving tumblers, provided with cams or inclines, and the holding-spring, whereby the tumblers are wedged by the plate against the spring, and thus firmly held to prevent their being tampered with.

3. The combination, substantially as herein-

before set forth, of the central shaft or spindle, the perforated face-plate disk, the pins working therethrough, the independent adjustable endwise-moving tumblers, corresponding with said pins, and the endwise-moving turning band, surrounding the disk and tumblers, and completely inclosing the latter.

4. The combination, substantially as hereinbefore set forth, of the flanged base-plate and the turning locking-plate fitting therein, the two plates being held together by means of suitable washers or their equivalent, as described.

In testimony whereof I have hereunto subscribed my name.

HENRY CLARKE.

Witnesses:
JOHN W. TAYLOR,
WM. A. DIXON.