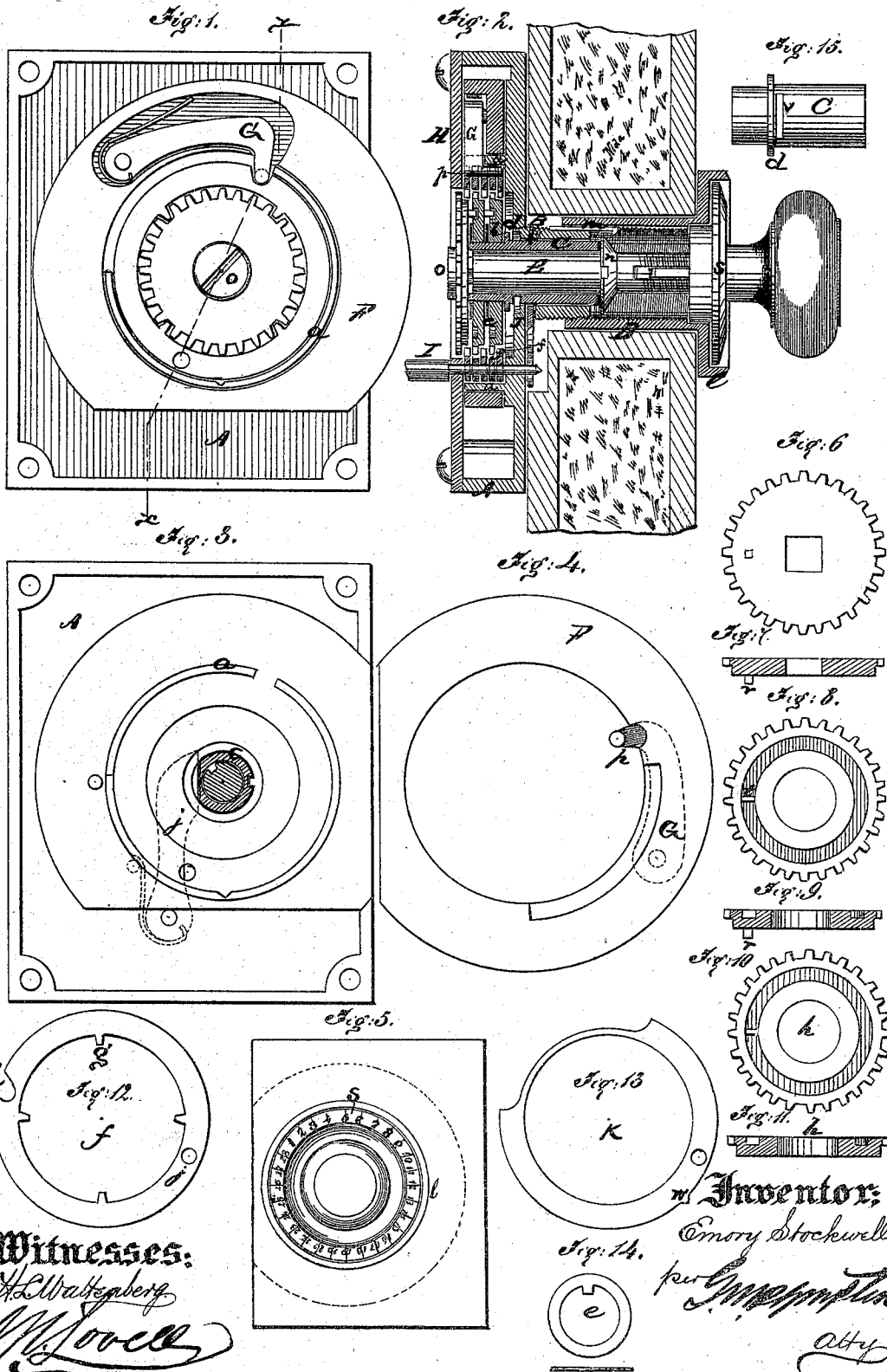


E. STOCKWELL.
Permutation Locks.

No. 142,529.

Patented September 2, 1873.



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UNITED STATES PATENT OFFICE

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IMPROVEMENT IN PERMUTATION-LOCKS.

Specification forming part of Letters Patent No. **142,529**, dated September 2, 1873; application filed November 18, 1872.

To all whom it may concern:

Be it known that I, EMORY STOCKWELL, of Stamford, in the county of Fairfield and State of Connecticut, have invented a new and Improved Permutation-Lock; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked thereon, making a part of this specification.

This invention is in the nature of an improved permutation-lock; and the invention relates, principally, to the manner of adjusting the tumblers when arranging or changing the combinations. This is effected by means of an arbor carrying the permutation-wheels, and adjustable by means of the spindle, in the manner hereinafter described.

In the accompanying sheet of drawings, Figure 1 represents a plan view of my lock with the back plate removed, showing bolt, tumbler, and fence-lever; Fig. 2, a section of same taken in the line *x x*; Fig. 3, a plan view of lock-case with tumblers removed, showing spring-latch; Fig. 4, a plan view of the under side of the bolt, showing stop-groove, fence-lever, and fence; Fig. 5, a plan view of dial and disk; Fig. 6, a plan view of inner wheel of third tumbler; Fig. 7, cross-section of same; Fig. 8, plan view of inner wheel of second tumbler; Fig. 9, cross-section of same; Fig. 10, plan view of inner wheel of first tumbler; Fig. 11, cross-section of same; Fig. 12, plan view of outer wheel of tumblers; Fig. 13, plan view of furring for outer wheels of tumblers; Fig. 14, plan view of furring for inner wheels of tumblers; and Fig. 15, side view of tumbler-arbor.

Similar letters of reference indicate like parts in the several figures.

A represents a lock-case of any desired size and material. Cast within this case is a curb, *a*, and on the outer face of said lock-case is cast a stump or projection, B, with screw-threads cut on the same. Through the center of the stump B and case A is drilled a hole. Entering into this hole and fitting therein is an arbor, C, the outer end of which projects slightly beyond the outer end of the stump B, and the inner end projects within the curb *a*. This arbor C is held in position by a shoulder,

d, formed thereon, and by a pin, *y*, which enters into a groove cut into the side thereof, and finally by a spring-latch, J, secured to the outer face of the lock-case. This spring-latch enters a slight distance within the stump B, holding the arbor C firmly in position by entering into a notch formed in the side of said arbor for that purpose. The arbor being in position, as just described, the inner wheel *h* of the first tumbler, which is annular, and has a series of teeth formed around its periphery, is placed within the curb *a*, so that the arbor C will pass through the center of the same. Onto this inner wheel is now placed an annular furring, *e*. An outer ring, *f*, fitting within the curb *a*, is next placed within the same. This outer wheel has formed within its annular space four or more teeth, *g*, which mesh into the teeth around the periphery of the inner wheel *h*, so that when the inner and outer wheels are in position they are concentric, and on the same plane. In the periphery of the outer ring *f* is formed a notch or gating, *i*, and through the ring is formed a hole, *j*. The outer and inner rings, as just described, when in position, form one tumbler. The first tumbler being in place, an annular furring, *k*, is now placed within the curb *a*, resting upon the outer ring of the first tumbler. This furring is held in position by a small tooth, *w*, which enters into a groove in the side of the curb *a*, and then a second tumbler, composed of an outer and inner ring of precisely the same construction as the tumbler just described, is placed in position in the same manner, and above the first-mentioned tumbler, with furrings *e* and *k* between them; and in this way tumblers may be added, one above the other, until the number of tumblers it is designed the lock shall have are all in position, the series of tumblers thus placed forming what is known as a "stack" of tumblers. Onto the stump B is then screwed a cylinder or sleeve, D, the upper end of this sleeve having cast upon it a disk, *l*, with a countersunk face. The cylinder or sleeve D, after being screwed upon the stump B the required distance, (which will depend upon the thickness of the safe or other door to which the lock is affixed,) is held firmly in this position by a key or spline, *m*, which enters into a groove

formed in the side of the stump and the inner surface of the sleeve for that purpose. Passing through this cylinder or sleeve D, and through the stump B and arbor C, is the spindle E, which has affixed to its outer end the knob by which it is turned, and the dial *s*, having numbers on its face, by which the combination is set. On the shank of the spindle E is also formed a collar, *n*, which, when the spindle is in place, rests upon the outer end of the arbor C. The spindle, projecting through the sleeve D and stump B, as before mentioned, passes into and through the arbor C (wherein it snugly fits) into the lock, the collar *n* on the spindle resting on the outer end of the arbor C, and the inner end of the spindle being firmly secured to the last tumbler of the stack by a screw, *o*, which enters into the end of the spindle, thus holding it firmly in position. The tumblers and spindle being now properly placed within the lock-case, the bolt F, which is annular in form, but which has a portion of its periphery cut away, as shown in Fig. 4, and which has attached to it a fence-lever, G, as shown in Fig. 1, is next placed within the lock-case A in such manner as will admit of its surrounding and turning freely on the curb *a*, by the turning of the spindle E, whenever the fence *p*, which is secured to the hooked end of the fence-lever G, enters into the notches or gatings *i* of the outer rings of the tumblers, before described. The interior mechanism of the lock being now in place, it is protected by a back plate, H, which is screwed thereon.

My lock being constructed substantially as above described, its operation is as follows: The spindle E being turned, it revolves through the arbor C, and causes the last tumbler to revolve with it. This tumbler in its revolution brings a driving-pin, *r*, in contact with a stop, *t*, on the tumbler next above, and so on until all the tumblers revolve as the spindle is turned, the inner wheels in their revolution carrying the outer wheels of the tumblers with them, since the teeth of the periphery of the one are meshed with the teeth *g* of the other. In this way the outer wheels of the tumblers are turned until the notches or gatings *i*, formed in each of them, are brought in line, which will enable the fence *p* to enter into the gatings *i*, as the gatings are brought to it by the revolutions of the tumblers. When the fence has entered these gatings, and the spindle E is turned to the right, the curved part of the bolt F, by the action of the fence-lever G, is thrown in the case A of the lock, and in this position the door to which the lock is attached is unlocked; and when the spindle is turned to the left, the curved part of the bolt is thrown out of the case, and the cut-off part of the bolt is brought within the case, and when in this position, which is the locked position, it prevents the opening of the door. The door being locked in the manner above mentioned, and the spindle again turned to the left, the fence *p* is thrown out of the gat-

ings *i* and the tumblers revolved, which brings the gatings out of line, so that the lock cannot be again unlocked until the gatings are again coincident by being moved up to the combination on which the lock is set.

The revolving of the tumblers to a given combination, so that the lock may be operated as just described, being common in many permutation-locks, it is not described here as being particularly novel, but only mentioned in connection with the other mechanism of my lock.

To arrange or change the combination on which the tumblers are set, and herein lies one of the principal features of my invention, the bolt of the lock is thrown out, and a steel wire, I, with a pointed end, is inserted through a hole in the back plate of the lock, and through the holes *j* in the outer rings of the tumblers, and through the face-plate of the lock, until it comes in contact with the upper surface of the spring-latch J, which it forces back and out of the notch V in the arbor C. The arbor C being now free to move slightly inward, the spindle is pushed inward, the collar *n* on the spindle forcing the arbor C into the lock a distance just sufficient to force the inner wheels of the tumblers clear and out of the teeth *g* in the outer rings, which remain in position. The inner wheels of the tumblers, being thus disengaged, may be revolved freely in any direction by means of the spindle, and set to any combination desired, in the same manner as in other permutation-locks. When the desired combination is attained the wire I is withdrawn and the spindle pulled outward until the spring-latch J again enters into the notch V of the arbor C, when the tumblers are again locked in the desired position and to the desired combination. It will thus be seen that the combination is easily and quickly adjusted and securely locked, without danger of the same being disarranged by accident. When the lock is attached to a safe or other door an opening is made sufficiently large to admit the cylinder or sleeve D, which is then screwed onto the stump B until the disk *l* is brought in contact with the face of the door. The sleeve is then held to the stump by the key *m*, in the manner before mentioned. By this means, as will be seen, the disk *l*, within which the dial *s* turns, can be readily adjusted and secured to a door of any thickness without trouble, and, what is still more important, the disk *l* must at all times be exactly parallel with the face of the door and dial, for the reason that the screw-thread on the stump B, on which the sleeve D of the dial-ring screws, is of the same size, or number of threads to the inch, as the threads on the end of the spindle on which the dial is screwed, so that in adjusting the dial on the spindle it will require the same number of revolutions to bring the dial-face flush with the dial-ring, as was necessary to adjust the dial-ring to the thickness of the safe-door. It will thus be seen that the threads on the stump and spindle bear a proportionate relation to each other

as to number. In this way all danger of the dial's binding within the dial-ring is obviated, and this has heretofore been one of the chief difficulties encountered when affixing dial-locks to safe-doors, so that all danger of the dial's binding within the disk is obviated.

Heretofore the dial-disks have generally been attached to safe-doors by drilling holes into the safe-door and affixing the disks by means of screws. This adjustment is accomplished by having the key-seats in the stump B and the sleeve D, to which the dial-ring is attached, so that whenever they are coincident or ready for the key *m* to hold them together the zero-mark on the dial-ring will be exactly in line with the gatings of the tumblers when said gatings are brought together by the combination on which the lock is set. This advantage must be apparent, for, if the zero-mark on the dial-ring should be to the right or left of the gatings in the tumblers when they are brought together, the fence or dog would not enter into said gatings when operating the lock.

The advantage to be derived from this method of attaching the disk directly to the lock, instead of to the safe, is that, no matter how much the lock or safe may be jarred when moving the same, the relative position of the disk and dial cannot be disturbed, the adjustment remaining in all cases as originally made, and all possibility of jamming the dial into the disk avoided.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a permutation-lock, an arbor carrying the permutation-wheels, and adjustable by means of the spindle in changing the combination, substantially as described.

2. The combination of the adjustable arbor, carrying the permutation-wheels, a spring-

latch for retaining it in position, and means for releasing said catch, substantially as described.

3. The combination of the inner permutation-wheels, outer rings, and inner and outer furrings with an adjustable arbor carrying the inner wheels, and with a spring-latch and means for holding said latch and the outer rings and furrings in position while changing the combination, substantially as set forth.

4. The combination of the revolving bolt, carrying the fence-lever, with the arbor, adjustable by means of the spindle, and with the permutation-wheels, all arranged and operating substantially as described.

5. The combination of the spindle, arbor, spring-latch, permutation-wheels, revolving bolt, and fence-lever, and a case provided with an interior curb and an external stump or boss adapted for the attachment and adjustment of the dial-disk and sleeve, the arbor being adjustable by means of the spindle, and all the parts arranged and operating substantially as specified.

6. In a permutation-lock, the stump on which the sleeve of the dial-ring screws and the threaded spindle on which the dial is screwed, having a proportionate number of threads to the inch thereon and provided with key-seats, substantially as and for the purpose described.

7. In a permutation-lock, the zero-mark on the dial-ring, adjusted to coincide with the gatings of the lock-tumblers, when said tumblers are set in accordance with the combination, by means of the arranging of the key-seats in the stump and dial-sleeve to receive the key *m*, substantially as described.

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