

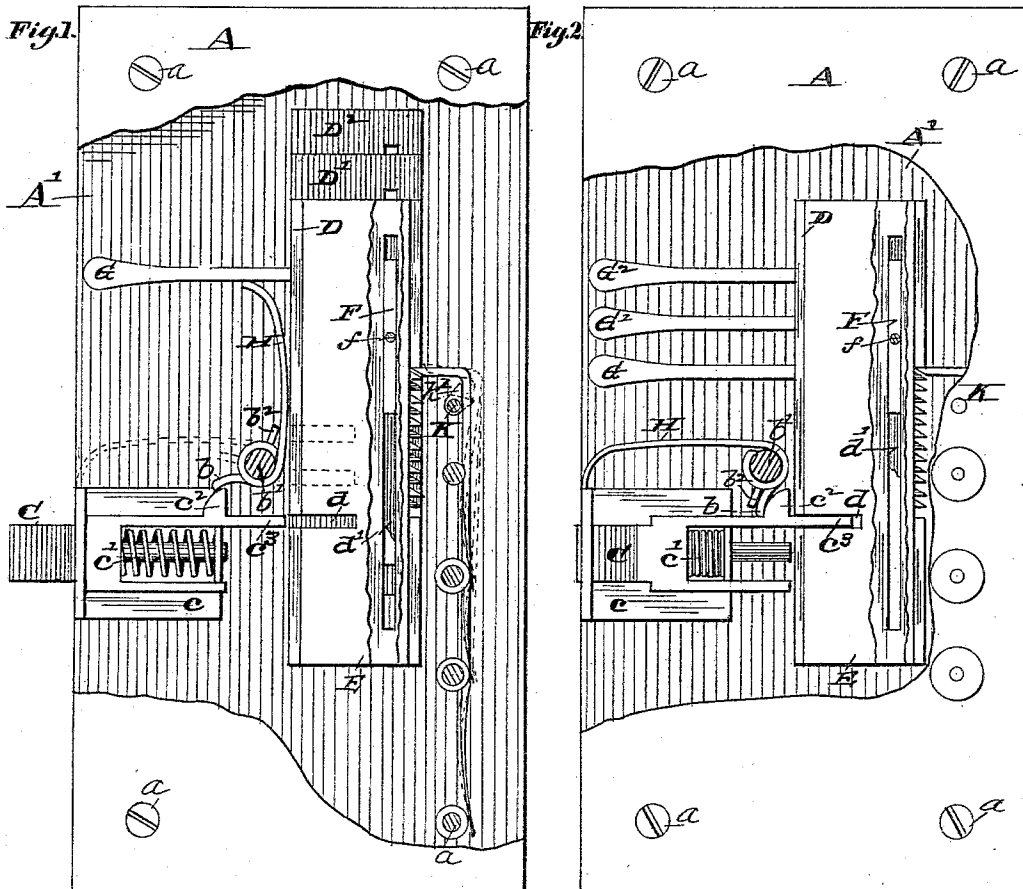
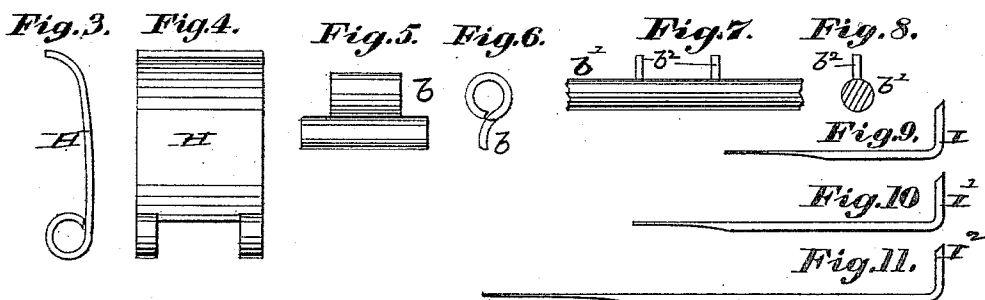
(Model.)

2 Sheets—Sheet 1.

J. R. BETTIS.
PERMUTATION LOCK.

No. 359,838.

Patented Mar. 22, 1887.



Witnesses:
J. W. Hoke,
W. B. Anderson.

Fig. 12 K
Inventor:
James R. Bettis
by C. D. Moody atty

(Model.)

2 Sheets—Sheet 2.

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Fig. 13.

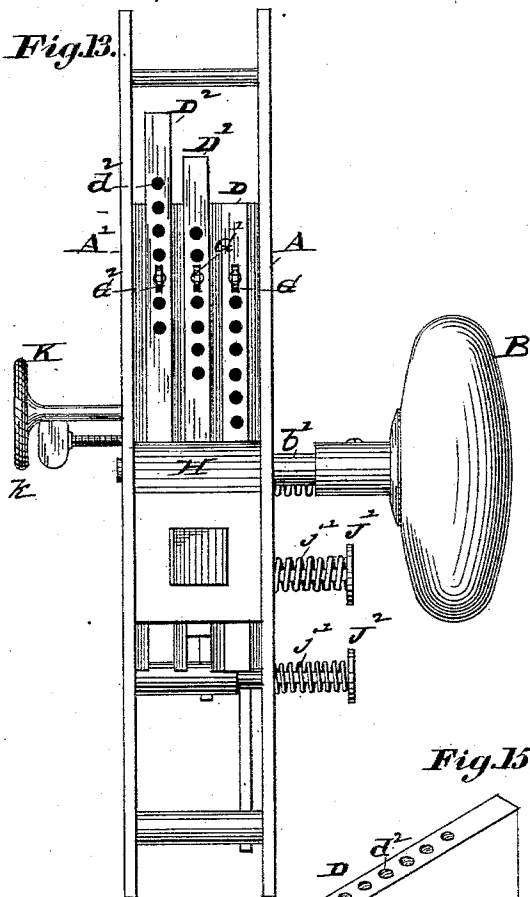


Fig. 14.

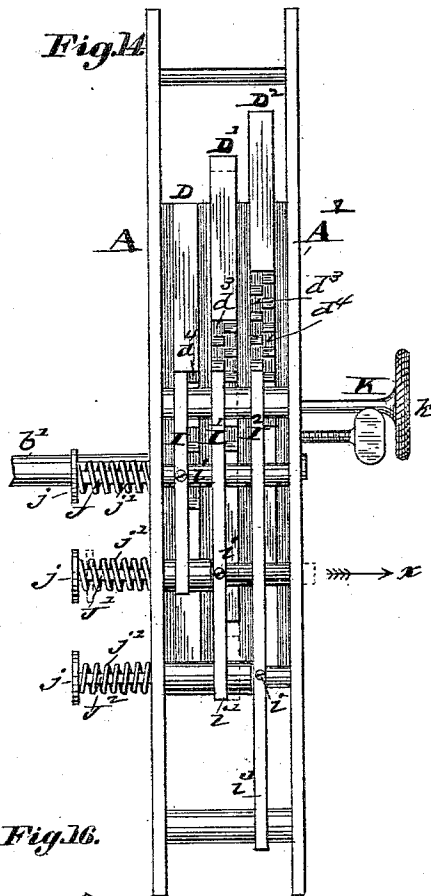


Fig. 15.

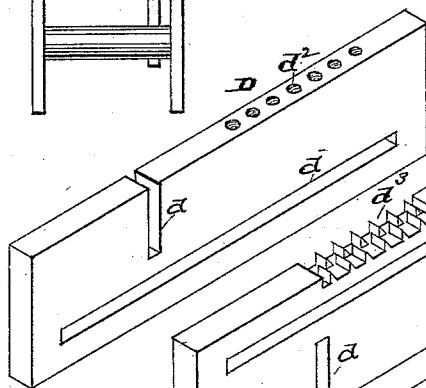


Fig. 16.

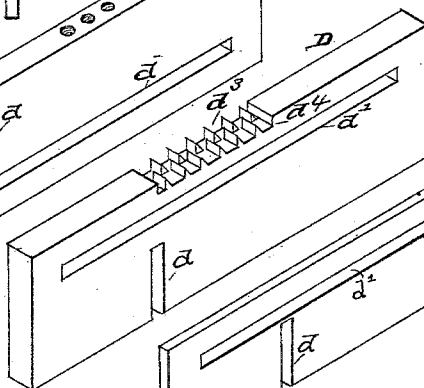
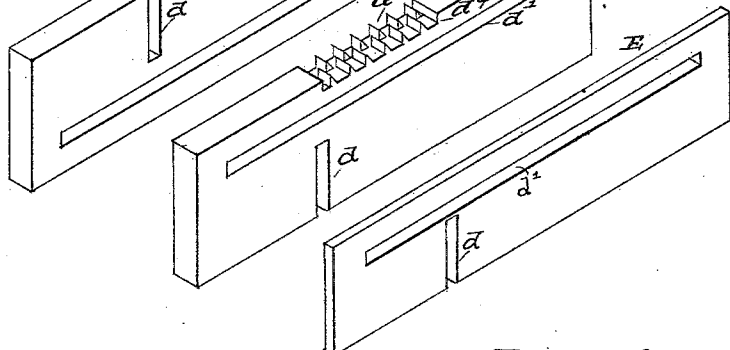


Fig. 17.



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W. B. Anderson.

Inventor:
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UNITED STATES PATENT OFFICE.

JAMES R. BETTIS, OF LITTLE ROCK, ARKANSAS.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 359,838, dated March 22, 1887.

Application filed August 30, 1886. Serial No. 212,172. (Model.)

To all whom it may concern:

Be it known that I, JAMES R. BETTIS, of Little Rock, Arkansas, have made a new and useful Improvement in Permutation-Locks, of which the following is a full, clear, and exact description.

This improved lock may be classified with those designed to be operated in the dark, as that part of the mechanism used in manipulating the lock does not require to be visualized.

The improvement relates to the mechanism as a whole, and also to certain of its unitary portions, substantially as is hereinafter described and claimed.

In the annexed drawings, making part of this specification, and exhibiting a desirable mode of carrying out the improvement, Figure 1 is a front side elevation of the lock, the near plate and also the nearest tumbler being partly broken away to exhibit the mechanism beyond. Fig. 2 is a view analogous to that of Fig. 1, but showing the tumblers down and the bolt thrust back. Figs. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 are details. Fig. 13 is the front edge elevation of the lock, the front plate being removed and the tumblers being up. Fig. 14 is the rear edge elevation of the lock, the rear edge plate being removed and the tumblers being in the same position as in Fig. 13. Fig. 15 is a view in perspective, looking toward its front edge, of one of the tumblers. Fig. 16 is a view, looking toward its rear edge, of the tumbler; and Fig. 17 is a view of one of the plates or strips used in spacing the tumblers apart.

The same letters of reference denote the same parts.

The frame-work of the lock in the present instance consists, mainly, of the front and rear side plates, A and A', which are connected by suitable bolts, a, and so as to inclose the principal portion of the movable parts of the lock and to supply the bearings for the various bolts, pins, and shafts of the mechanism.

B represents the knob used in withdrawing the bolt C, and also in raising the tumblers D D' D². The bolt C is adapted to be moved longitudinally in the bearing c, being moved outward by means of the spring c', Figs. 1, 2, and inward by means of an arm, b, Figs. 1, 2, 5, 6, which is fastened to the knob-shaft b', and

whose outer end, when the knob is turned to withdraw the bolt, encounters a shoulder, c², upon said bolt, and thereby moves the same inwardly into the position shown in Fig. 2, unlocking the lock. The bolt, however, is operated in connection with the series of tumblers D D', &c., the extension c² upon the inner end of the bolt entering slots d in all the tumblers as a condition of the movement of the bolt.

The tumbler series may consist of any desired number of tumblers. In the construction exhibited three, D D' D², are used. They are arranged vertically between the side plates, A A', and are separated by the spacing-plates E from each other and from the side plates, and are adapted to be raised and lowered, as presently described, in which vertical movement they are guided in the edge-wise direction of the lock by the guide-plate F, which, by means of the pins f, Figs. 1, 2, one of which is fixed in each side, and each having a screw-threaded end, is adapted to be, by nuts thereon, secured to the side plates, A A', and passes through the vertically-extended slot d' in the tumblers and in the spacing-plates. This last-named slot d' is sufficiently extended to permit of the desired movement of the tumblers. In the front edge of each tumbler is a series of perforations, d², Figs. 13, 15.

G represents a pin adapted to be inserted in any one of the perforations d² of the tumbler D. A similar pin, G', can be similarly inserted in the perforations d² of the tumbler D', and pins G² in the perforations of the tumbler D². These pins, in conjunction with the lever H, Figs. 1, 2, 3, 4, 13, that is pivoted on the knob-shaft, are employed in lifting the tumblers. The knob-shaft b' is provided with a projection or projections, b², which, when the knob is turned in the opposite direction to that when withdrawing the bolt C, encounter and upturn the lever H from the position of Fig. 2 into the position of Fig. 1, and in so doing cause the lever to press upward against the pins G G' G², and thereby raise the tumblers from their down position, Fig. 2, into their up position, Figs. 1, 13, 14. The distance the tumbler is lifted depends upon the position of its pin. If the pin is in the uppermost of the perforations d², as in the case of the pin G in

the tumbler D, Fig. 13, that tumbler D is not lifted by the distance of two perforations, as far as the tumbler D', whose pin G' is inserted in the third perforation, d^2 , from the top, or two perforations lower than the pin G in the tumbler D; and if, as illustrated in Fig. 13, the pin G² is in the fifth perforation from the top in the tumbler D², that last-named tumbler will be lifted two perforations higher than the tumbler D' and four perforations higher than the tumbler D. Hence, to form any desired combination, the pins G G' G² are inserted accordingly in the perforations d^2 in their respective tumblers.

The perforations d^2 are similarly arranged in the three tumblers, and the slot d in each tumbler is the same distance from the perforations d^2 , and hence, if the tumblers are lifted, as described, unequally, the slots d in the respective tumblers will be at different elevations above the level of the bolt-extension c^2 ; and, to bring the three slots d into line horizontally at the level of the bolt-extension, the tumblers must be lowered, respectively, according to the distances to which they have previously been raised by the rotation of the knob-shaft and the upturning of the lever H. The tumblers, after being lifted, as described, are upheld by means of the dogs I I' I², respectively, as follows: Each tumbler, at its back edge, is provided with or is constructed to form projections or teeth in the form of a double row, $d^3 d^4$, the teeth d^3 in one row being respectively opposite the spaces between the teeth d^4 in the other row. The distances, vertically, between the teeth in the row d^3 and also in the row d^4 , respectively, correspond to the distances between the perforations d^2 . The dogs are fastened, respectively, at i to the thrust-pins J J' J², which pass transversely through the plates A A', and are adapted, when pressure is applied to the heads j of the pins, to be moved endwise in the direction of the arrow x , Fig. 14, and, when released, to be moved backward by means of the springs j' . When a thrust-pin is thus pushed in the direction of the arrow, its dog, which has been engaged with the teeth d^3 , is moved laterally into engagement with the teeth d^4 , and when moved in the opposite direction the dog is moved laterally backward into engagement with the teeth d^3 again, during and by reason of which movement of the dog the tumbler drops the distance of one tooth downward.

By repeating the operation, the tumbler is lowered another tooth, and so on. The other tumblers are similarly lowered by means of their respective thrust-pins and dogs. The dogs are extended at i' to bear upon some part of the construction and, preferably, as shown in Fig. 14, where the extended end rests upon the thrust-pin below and the next upon the thrust-pin below its point of attachment, and so on until finally the outer or last extension will rest upon the bolt which unites the two plates of the locks together; or a special bar

may be provided for the purpose, if desired, thereby to more securely keep the point of the dog in engagement with the teeth.

The operation of the improved lock is as follows: The pins G G' G² are first adjusted in the perforations d^2 in the tumblers, respectively, to set the lock at the combination agreed upon. The combination illustrated is 0-2-4, the pin G being in the uppermost perforation in the tumbler D, the pin G' in the third perforation from the top in the tumbler D', and the pin G² in the fifth perforation from the top in the tumbler D². The knob is rotated to raise the three tumblers to their highest limit, and the support of the pins G G' G² is then withdrawn. The thrust-pin J does not require to be operated, as the tumbler D is already at the proper level, and its slot d is opposite the bolt-extension. The thrust-pin J' is moved twice, causing its tumbler D' to drop two spaces and thus bring its slot d opposite the bolt-extension. The thrust-pin J² is moved four times, lowering its tumbler D² four spaces and bringing its slot d in line with the slots d . Then, by rotating the knob and causing the arm b to bear against the shoulder c^2 , the bolt-extension enters the three slots $d d d$ in the three tumblers, respectively, and the lock is opened. All of the tumblers can be dropped simultaneously, say, by means of the shaft K, Figs. 1, 12, 13, 14. This shaft is journaled in the plates A A', and is provided at the inner side of the lock with the handle k and between the plates A A' with the projection k' , which, when the shaft is rotated, comes against the dogs and, by springing the dogs backward, disengages them from the tumblers.

I desire not to be limited to straight tumblers moving vertically, for the tumblers may be made of any desired shape without in any degree departing from the essential novelty above described.

I claim—

1. The combination of the bolt having the extension with the series of tumblers and spacing-plates between, both slotted to admit said extension, as and for the purpose described.

2. The combination of the knob, the knob-shaft, the projection on the knob-shaft, the tumblers, the pivoted lever for raising said tumblers, the pins inserted in or upon the tumblers, and means for maintaining said tumblers in their raised position, substantially as described.

3. The tumblers having the adjustable pins, and also being slotted to admit an extension or part of the locking-bolt, in combination with a lever for raising said tumblers, and means for maintaining such tumblers in their raised position, as described.

4. The combination, with the side plates, the slotted tumblers, and spacing-plates having slots therein, of the guide-plate having a screw-threaded pin in each side, as described.

5. The vertically-arranged tumblers, each having a double row of teeth on its back edge,

the teeth in one row being opposite the spaces of the other row, in combination with the laterally-movable dogs and thrust-pins, substantially as described.

5 6. The combination, with the tumblers having the pins and teeth and the lever for moving the tumblers, of the thrust-pins and movable dogs for lowering said tumblers, substantially as described.

10 7. The combination, with the tumblers pro-

vided with teeth and the dogs, of the shaft provided with the projection for disengaging the dogs from the teeth of the tumblers, as described.

Witness my hand.

JAMES R. BETTIS.

Witnesses:

EDWARD E. SQUIRES,
WILLIAM MITCHELL.