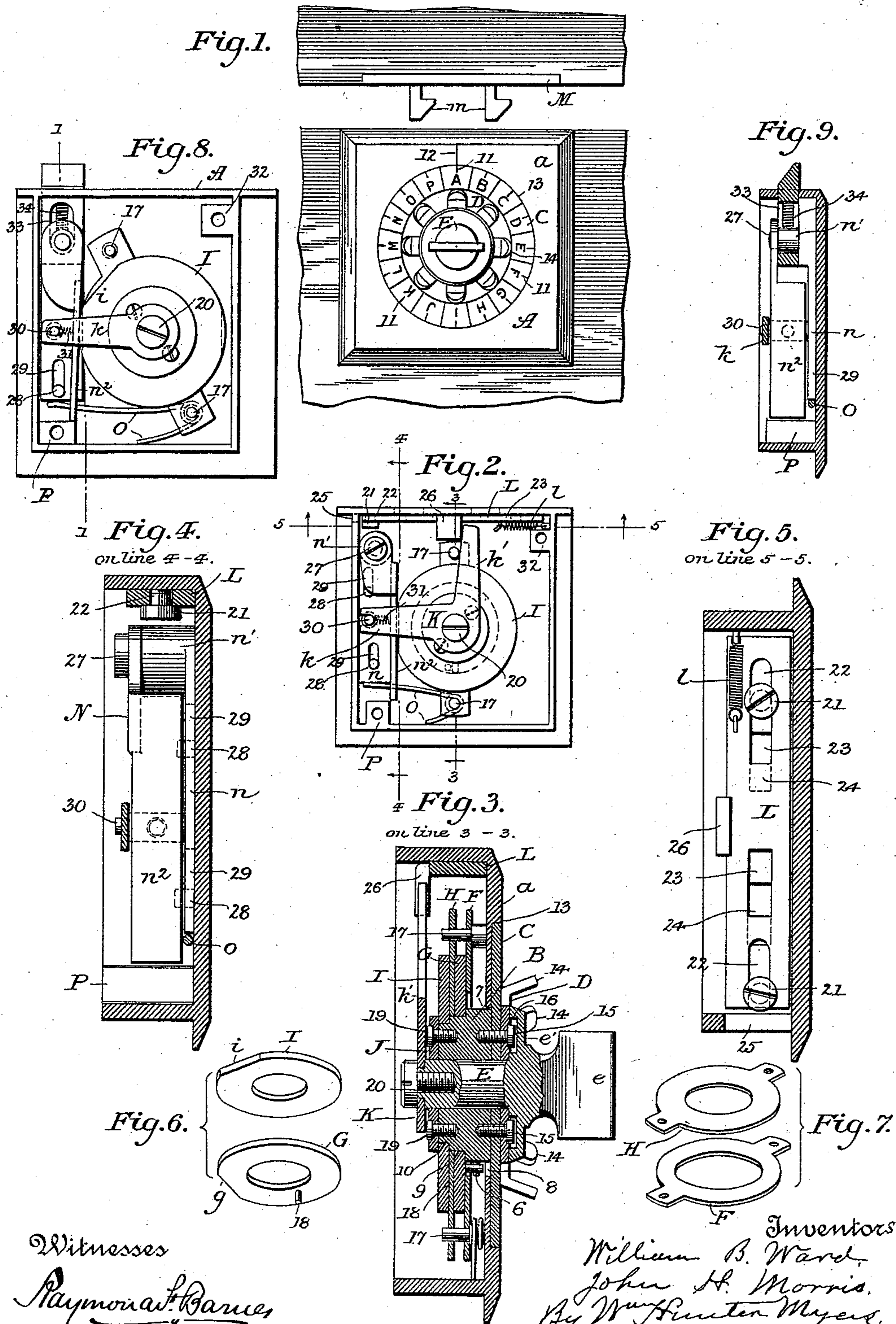


(No Model.)

W. B. WARD & J. H. MORRIS.
PERMUTATION LOCK.

No. 525,299.

Patented Aug. 28, 1894.



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PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 525,299, dated August 28, 1894.

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To all whom it may concern:

Be it known that we, WILLIAM B. WARD, residing at Seward, in the county of Seward, and JOHN H. MORRIS, residing at Lincoln, in the county of Lancaster, State of Nebraska, citizens of the United States, have invented certain new and useful Improvements in Permutation-Locks, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to permutation-locks; and it has for its object to simplify the construction of the lock, and to so form and arrange the tumblers as to avoid the clicking incident to notched-tumbler locks, thereby avoiding the danger of any person unfamiliar with the combination of learning the same.

The invention consists in the details of construction and combination of parts, which will be described in connection with the accompanying drawings, and then pointed out in the claims.

Figure 1 is a front elevation of the lock, showing a portion of a lid carrying the locking-catches raised from engagement with the locking-bar. Fig. 2 is a rear elevation of the lock with the rear plate removed, and showing the tumblers in position to permit the lock to be opened. Fig. 3 is an enlarged sectional view, partly in elevation, on the line 3 3, Fig. 2, omitting the abutment and locking-dog. Fig. 4 is an enlarged sectional view on the line 4 4, Fig. 2. Fig. 5 is an enlarged sectional view on the line 5 5, Fig. 2. Fig. 6 is a perspective view of the upper and lower tumblers, respectively, detached. Fig. 7 is a perspective view of the upper and lower washers, respectively, detached. Fig. 8 is a plan view of a modification of our lock with the rear plate removed, and showing the tumblers in a position to prevent the dog being moved. Fig. 9 is a sectional view on the line 1 1, Fig. 8.

Referring to the drawings, A represents the lock-casing, preferably of rectangular form, and adapted to fit in a mortise in a chest or box to which the lock is to be applied.

B is the hub, in the periphery of which is fixed a pin 6. This hub is put into the casing through an opening 7 in the face-plate *a*, there being a slot 8 radiating from opening 7 to permit the passage of pin 6. On the pe-

riphery of the hub are formed two shoulders 9 and 10.

C represents the dial-plate, which is preferably marked with the letters of the alphabet, there being above each letter a short line 11, which is designed to register with a vertical line 12 marked on the face-plate when any given letter serving as a part of the combination is used. The dial-plate is made to fit flush in the face-plate, there being a recess 13 in the latter for that purpose.

D is the operating-plate, which is provided with a series of projections 14, serving as a hand-hold, and is secured by screws 15, passing through it and the dial, to the hub, all as clearly shown in Fig. 3.

E is the arbor, which passes centrally through the operating-plate, the dial, and the hub, it being provided at its outer end with a knob *e*, and also with a flange *e'*, the latter being recessed at 16 so as to cover the screws 15.

F represents the outer washer, which fits loosely over the hub and is held in place by two shouldered studs 17 rigidly fixed in the casing.

G represents the outer tumbler, which is fitted loosely over the hub and rests against the shoulder 9. On the outer side of this tumbler there is fixed a pin 18, which passes through washer F and lies in the path of pin 6 on the hub.

H is the intermediate washer, which likewise fits loosely over the hub and is held in place by the studs 17.

I is the inner tumbler, which fits over the hub, resting against shoulder 10. Both this tumbler and tumbler G are circular in form, having unbroken peripheries, with the exception of a short flattened surface *i* and *g* on each, respectively.

J is the bearing-plate, which passes over the arbor and bears on tumbler I, it being secured to the hub by screws 19, and thereby serves to hold tumbler I fixedly on the hub, so that it may rotate therewith.

K is a bell-crank, comprising a lateral arm *k* and a vertical arm *k'*, which is carried on the inner end of the arbor, a screw 20 in the end of the arbor serving to hold the bell-crank rigidly thereto.

L is the locking-bar, which is movably secured to the upper portion of the casing by means of screws 21, or other similar devices, which pass through slots 22 in said bar and take into the casing. In line with these slots are one or more rectangular openings 23, which, when the locking-bar is in its normal position, partially register with corresponding openings 24 in the casing; and in order to permit the bar to be moved so that the openings in it and in the casing will fully register, a slot 25 is formed in the side of the casing, which the end of the locking-bar enters. The bar is held in normal position by a spring *l* attached to the casing and to the bar. Projecting inwardly from the locking-bar is a lug 26, with which one arm of the bell-crank K engages.

M is a catch-plate secured to the lid of the chest or other article. This plate carries one or more beveled and shouldered catches *m*, which are adapted, when the lid is let down, to enter the opening or openings 24 in the casing and the corresponding openings 23 in the locking-bar, these catches in their descent forcing said bar forward against the stress of spring *l* until all the openings 23 and 24 fully register, and thus permit the shouldered portion of the catch or catches to fall below the locking-bar, when spring *l* will draw said bar back until the shoulders on the catches engage with it, and thus lock the lid, to unlock which requires, of course, that the locking-bar be moved forward until its openings 23 fully register with the openings 24 in the casing, which can be done only by a person acquainted with the combination on which the lock is set.

N is a locking-dog, which is located at a right angle to the locking-bar. This dog comprises a plate *n*, which has at one end a hub *n'*, and a spring-arm *n*², standing at a right angle to plate *n*, and pivotally secured thereto by a screw 27 passed through it and taking into the hub *n'*; said plate *n* being adapted to slide longitudinally on pins 28 projecting from the casing, which pass through slots 29 in the plate. A spring O coiled around one of the studs 17, which secure the washers in place, and bearing against the casing and the dog, serves to keep the latter in its normal position, said spring passing under the spring-arm *n*² or through a slot therein. To the plate *n* is secured a lateral pin 30, with the upper end of which the arm *k* of the bell-crank K engages. To this pin, below the bell-crank, is secured one end of a coil spring 31, the free end of which bears against the spring-arm *n*², serving to throw the latter outward away from engagement with an abutment P fixed in the casing when the flattened portions of the tumblers are brought into alignment, as shown in Fig. 2, in which position the knob can be turned and the box unlocked, it being understood that when either one or both of the tumblers are so turned that their flattened portions are not opposite the spring-arm the

latter will be forced inward so that its free end will bear against the abutment and prevent the dog from being moved, as seen in Fig. 8.

The back-plate of the lock (not shown) is secured in place by screws taking into the abutment P and into a projecting lip 32 on the casing.

So far the description applies to a lock suitable for a chest or other article having a hinged lid; but the lock may be varied in form without departing from my invention so as to adapt it for use on postoffice boxes and in other similar situations. The one modification herein shown consists simply in attaching a locking-bar to one end of the dog, and using but a single operating-arm, and that to move the dog, as plainly shown in Fig. 8. The locking-bar in this instance is necessarily a short one, passing through an opening in the casing; and in order to automatically project it into the keeper to lock the box, we form a slot 33, in which we locate a coil-spring 34, one end of which is attached to the hub of the dog and the other end bears against the inner wall of the slot in the bolt.

In operating our lock to open a chest or box, we will assume that the combination is set on A and F. Then by turning the operating-plate D, and through it the dial and the hub, to the right until the letter A is brought in line with the vertical line 12 on the face-plate, the flattened portion of tumbler G is brought in front of the spring-arm *n*². Then on moving the dial and the hub to the left until the letter F is in line with the line 12 on the face-plate, the flattened portion of the tumbler I will likewise be brought in front of the spring-arm *n*², when said arm will be free to spring outward so as to clear the abutment P, when, by turning the arbor E, the bell-crank will operate the locking-bar and dog; or the dog and its attached bar will be operated by the single arm *k*. It will be noticed that as the tumblers are smooth on their peripheries with the exception of the flattened surfaces there can be no clicking when the letters of the combination are brought into proper position, as would be the case with notched tumblers, for the spring-arm on the dog cannot fly outward against the flattened portion of the tumbler or tumblers with a click, but leaves its position in line with the abutment gradually and noiselessly.

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

1. In a permutation-lock, the combination, with a casing having an abutment therein, of a hub, a dial secured thereto, means for turning the dial and hub, a plurality of circular tumblers on the hub, each having a portion of its otherwise unbroken periphery flattened, one of said tumblers having full movement with the hub and one having but partial movement therewith, a sliding locking-dog

having a spring-arm normally in contact with the abutment, and an arm secured on the arbor and engaging with the dog, whereby when the flattened portions of the respective tumblers register in front of the spring-arm the latter will move out of contact with the abutment and permit the arbor to be turned.

2. In a permutation-lock, the combination, with the casing having an abutment therein, of a hub carrying a fixed radial pin, a dial secured to the hub, means for turning the dial and hub, an arbor on which the latter is loosely mounted, a plurality of circular tumblers on the hub, each having a portion of its otherwise unbroken periphery flattened, one of said tumblers being rigidly secured to the hub and another loosely mounted thereon and provided with a pin projecting in the path of the said radial pin, a sliding locking-dog having a spring-arm normally in contact with the abutment, and an arm secured to the arbor and engaging with the dog, substantially as described and for the purposes stated.

3. In a permutation-lock, the combination, with the casing having one or more catch-openings and an abutment within said casing, of a hub, a dial secured thereto, means for turning the dial and hub, an arbor passed loosely through said dial and hub, a plurality of circular tumblers on the hub, each having a portion of its otherwise unbroken periphery flattened, one of said tumblers having full movement with the hub and one having but partial movement therewith, a sliding locking-dog having a spring-arm normally in contact with the abutment, a spring-held locking-bar having one or more catch-openings which, when said bar is in its normal posi-

tion, partly register with the like opening or openings in the casing, and a bell-crank secured to the arbor, the two arms of said bell-crank engaging respectively with the dog and locking-bar.

4. In a permutation-lock, the combination, with the casing having an opening in its top wall and an abutment within the casing, of a hub, a dial secured thereto, means for turning the dial and hub, an arbor passed loosely through the dial and hub, a plurality of circular tumblers on the hub, each having a portion of its otherwise unbroken periphery flattened, one of said tumblers having full movement with the hub and one having but partial movement therewith, a sliding spring pressed locking-dog having a spring-arm normally in contact with the abutment, a spring-pressed locking-bar carried by said dog and projecting in the opening in the casing, and an arm secured to the arbor and in engagement with the dog.

5. In a permutation-lock, the combination, with the casing, of a hub therein, a dial flush with the outer face of the casing, an operating-plate secured to the dial and hub, and an arbor passed loosely through said plate, dial, and hub, said arbor being provided with a knob and having a flange partly covering the operating-plate and concealing the fastening devices.

In testimony whereof we affix our signatures in presence of two witnesses.

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Witnesses:

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