No. 854,427.

PATENTED MAY 21, 1907.

J. J. MURPHY.

PERMUTATION LOCK.

APPLICATION FILED APR. 16, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

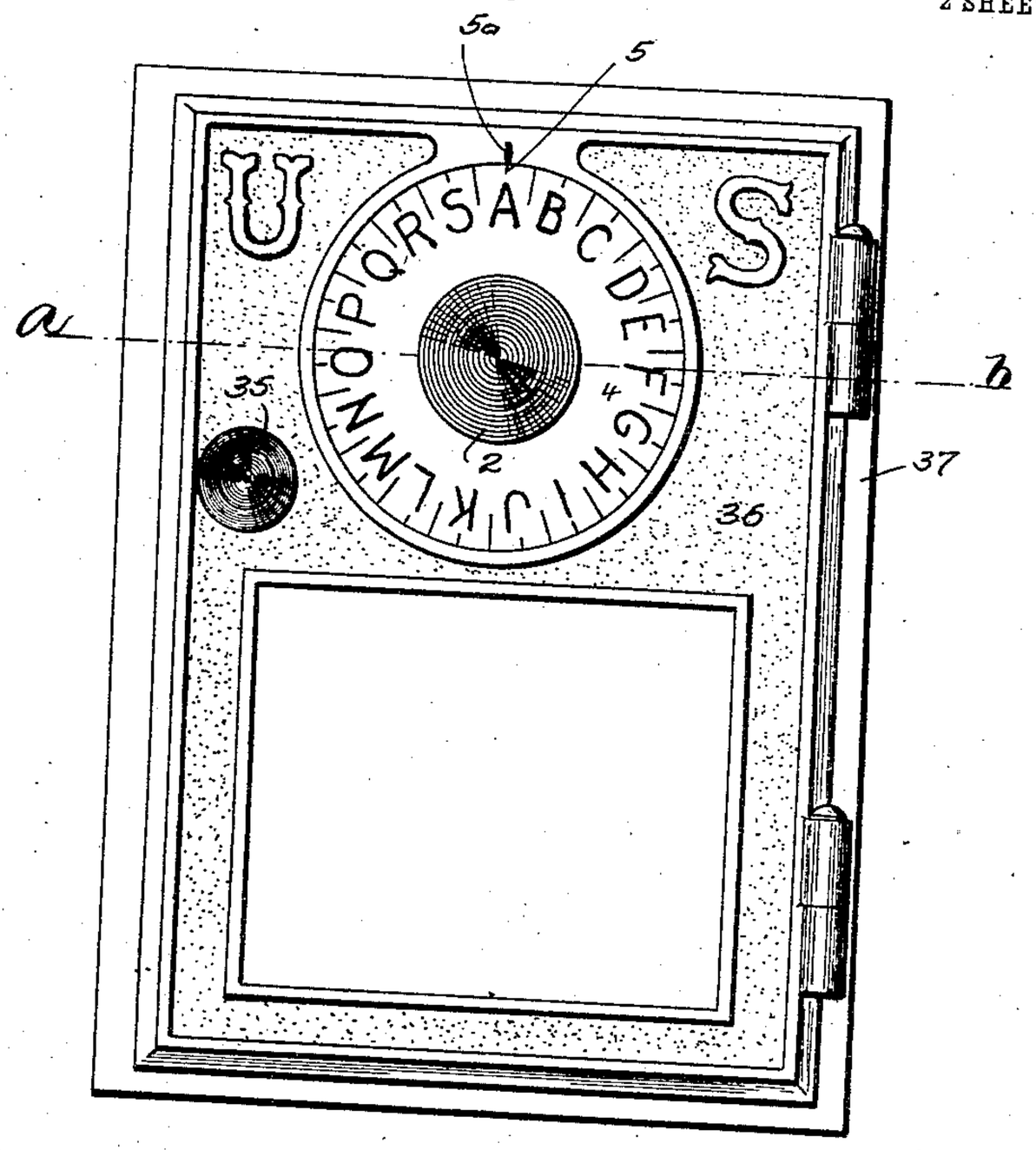
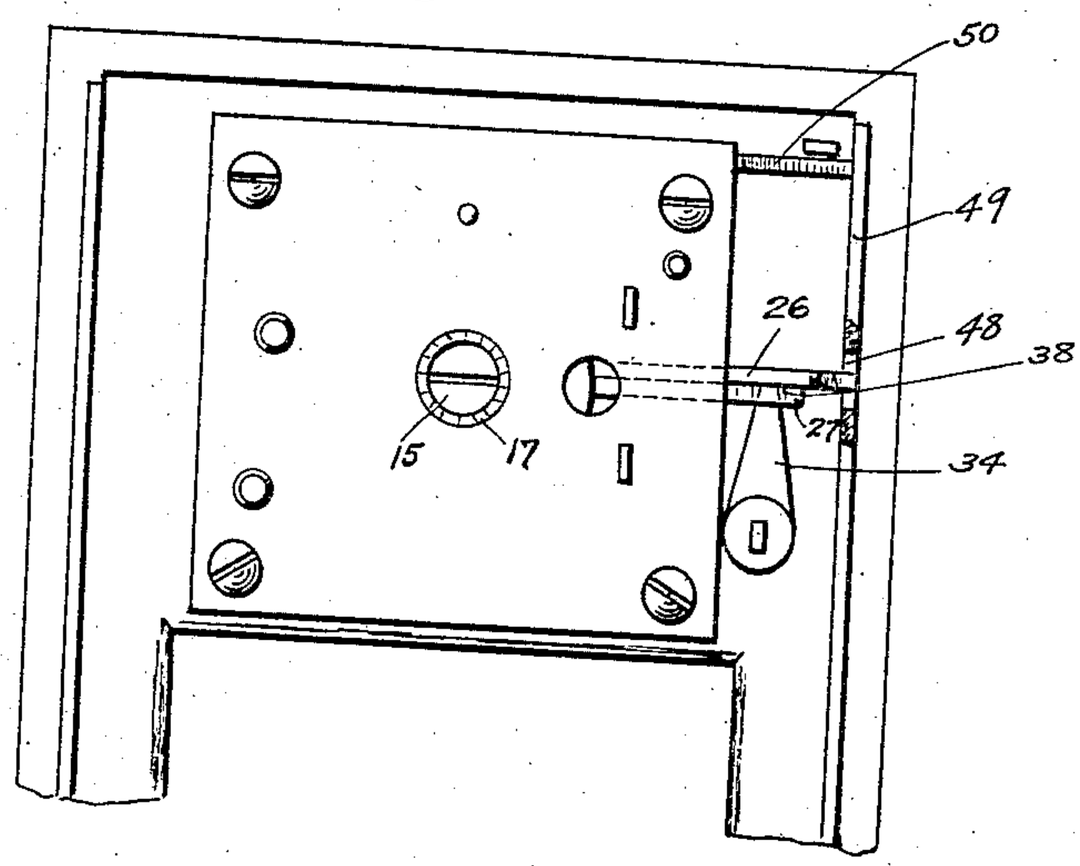


Fig. 2.



Witnesses
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J. F. Shumway.

James J. Murphy
Inventor
by Seymour & Earee
Attys

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2 SHEETS—SHEET 2.

Fig. 3

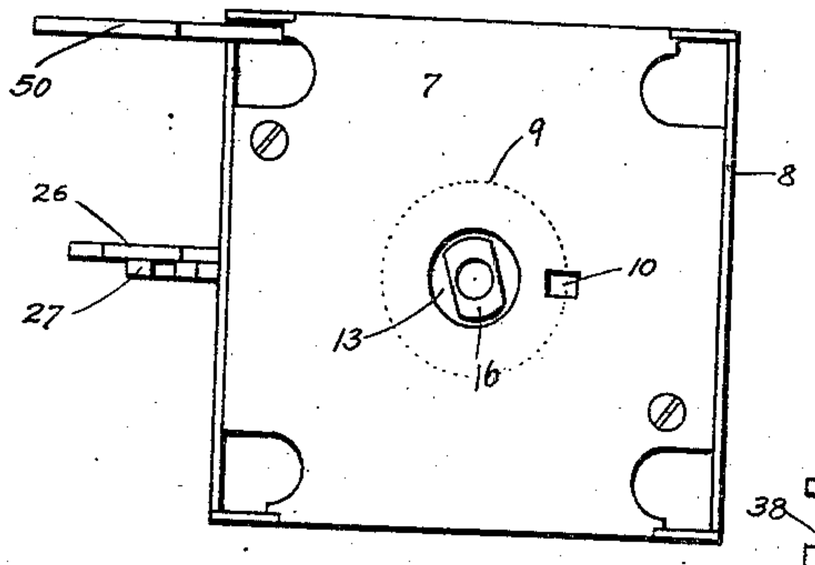


Fig. 4

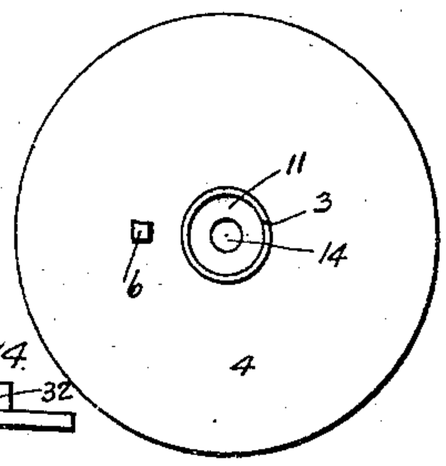
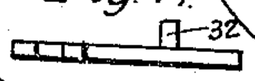


Fig. 14.



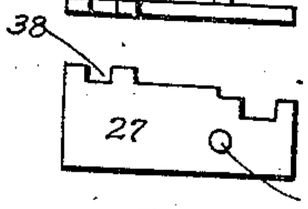


Fig. 13.

Fig. 5

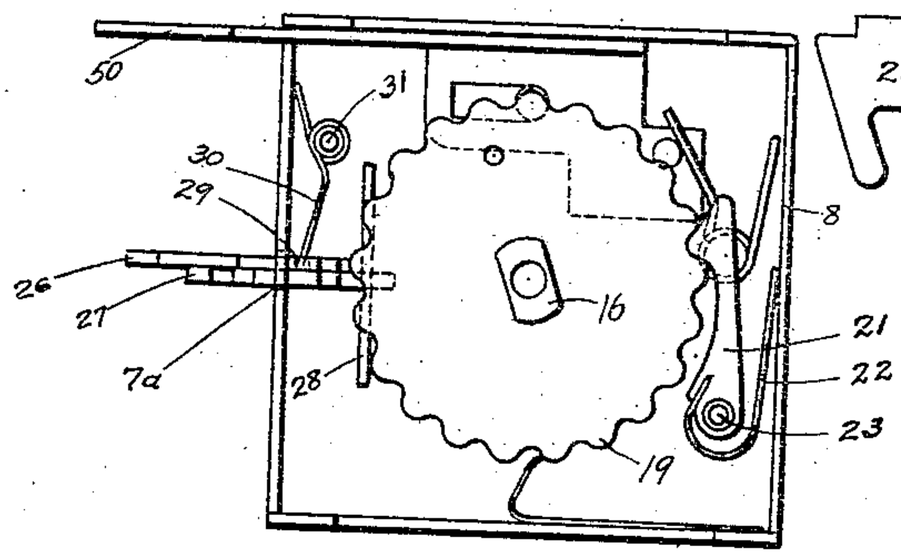


Fig. 12.

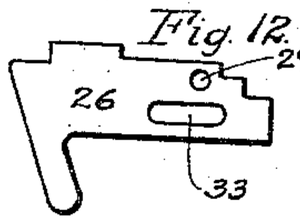


Fig. 17.

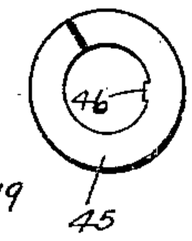


Fig. 6

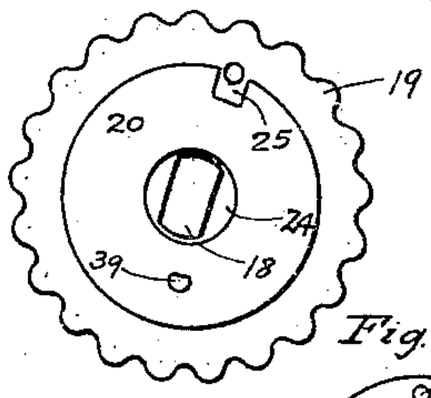


Fig. 10. Fig. 11.

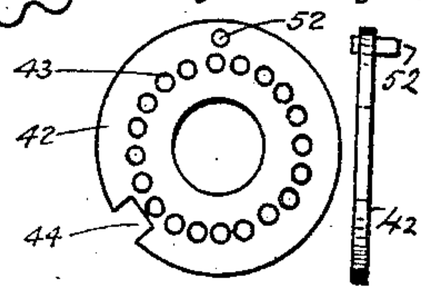


Fig. 7

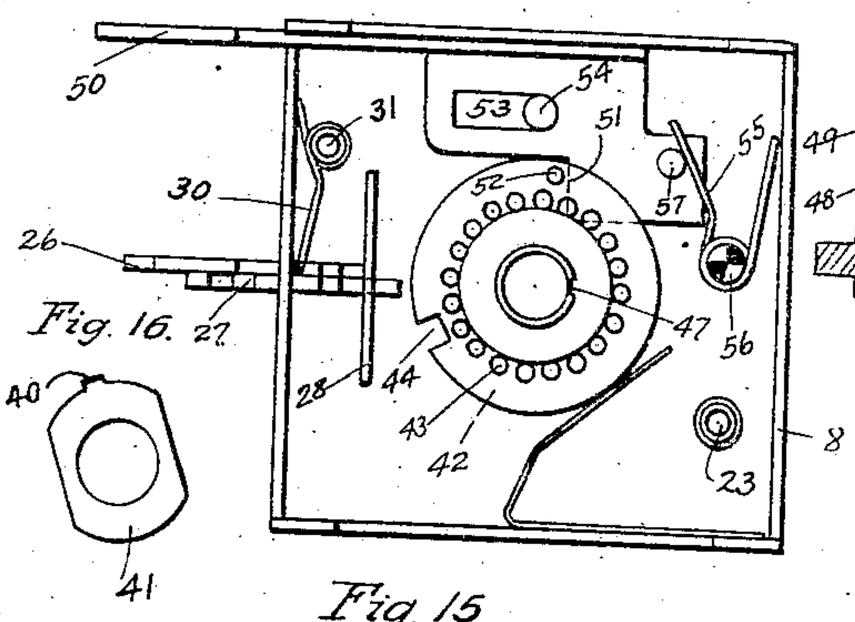


Fig. 16.

Fig. 15

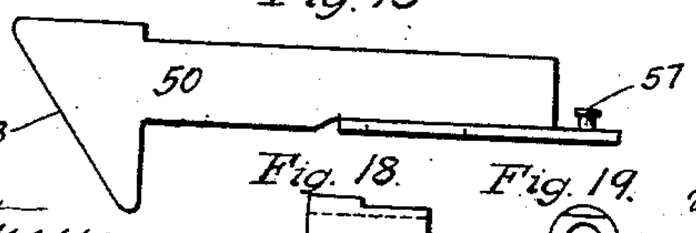


Fig. 18.

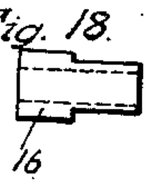


Fig. 19.

Fig. 9.

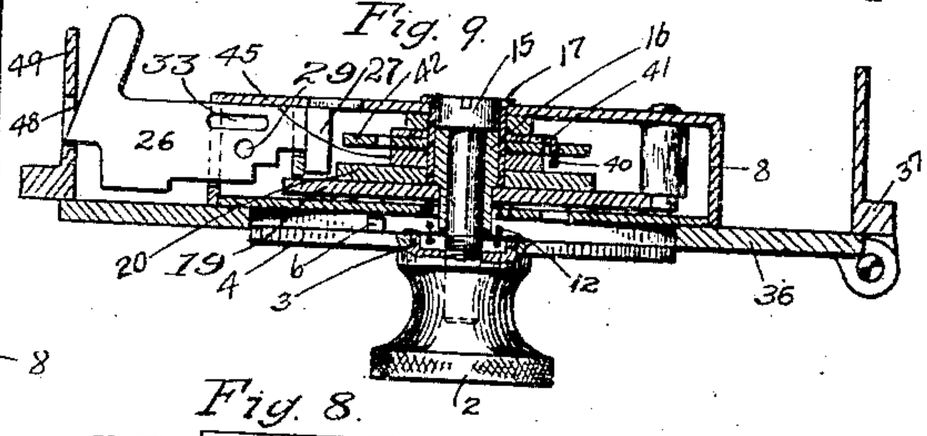
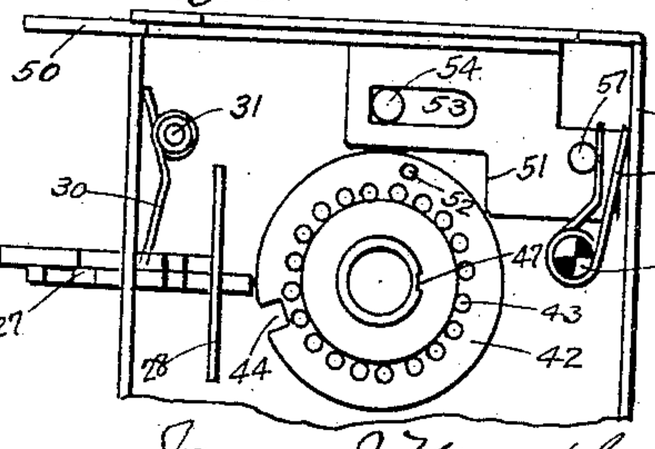


Fig. 8.



Witnesses.
Clara L. Weed.
J. F. Shumway.

James J. Murphy Inventor
by Seymour & Earle Attys

UNITED STATES PATENT OFFICE.

JAMES J. MURPHY, OF TERRYVILLE, CONNECTICUT, ASSIGNOR TO EAGLE LOCK CO., OF TERRYVILLE, CONNECTICUT, A CORPORATION.

PERMUTATION-LOCK.

No. 854,427. Specification of Letters Patent. Patented May 21, 1907.

Application filed April 16, 1906. Serial No. 311,912.

To all whom it may concern:

Be it known that I, JAMES J. MURPHY, a citizen of the United States, residing at Terryville, in the county of Litchfield and State of Connecticut, have invented a new and useful Improvement in Permutation-Locks; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification and represent, in—

Figure 1 a view in front elevation of a permutation lock constructed in accordance with my invention and shown as applied to the "front," so called, of a United States post office lock-box. Fig. 2 a rear view thereof with the lower portion of the "front" broken away. Fig. 3 a detached front view of the lock-mechanism. Fig. 4 a detached view in rear elevation of the dial showing also the inner end of the knob as well as the finder-pin which is mounted in the inner face of the dial. Fig. 5 a view corresponding to Fig. 3 with the cover of the lock-case removed. Fig. 6 a detached view of the click-wheel and the outer tumbler fixed to it. Fig. 7 a view corresponding to Fig. 5 with the click-wheel and outer-tumbler removed. Fig. 8 a view corresponding to Fig. 5 but showing the throw-off slide in its retired position, the lower portion of the lock-case being broken away. Fig. 9 a view of the lock in transverse section on the line *a*—*b* of Fig. 1. Fig. 10 a detached plan view of the inner wheel-tumbler. Fig. 11 an edge view thereof. Fig. 12 a detached view in side elevation of the latch-bolt. Fig. 13 a corresponding view of the slide-bolt. Fig. 14 a plan view of the slide-bolt. Fig. 15 a detached view in side elevation of the throw-off slide. Fig. 16 a detached plan view of the permutation-washer. Fig. 17 a detached plan view of the spacing washer. Fig. 18 a detached view in side elevation of the stem. Fig. 19 an end view thereof.

My invention relates to an improvement in that class of permutation locks which are constructed so that they may be operated by audible, as well as by visual guidance, that is to say, by "clicks" as well as by letters so that they may be unlocked by night as well as by day, the object of the present invention being to produce a simple, compact and effective lock constructed with particular reference to having the tumblers automatically thrown out of registration when the door to which the lock is applied is opened so that when the door is again closed it cannot be opened except by the use of the combination to which the lock is set.

With these ends in view, my invention consists in a permutation lock having certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

For the illustration of my invention I have shown it as applied to the "front" of a U. S. post office lock-box, but this is not necessary as it may be used in other situations, though it was primarily designed for such use.

As herein shown, the knob 2 has its stem formed with a shoulder 3 for the attachment of a dial 4 which bears upon its outer face the letters A to S inclusive, and twice as many degree marks 5 regularly arranged so that each letter may be said to have two positions, as, for instance, A and A 1/2. Upon its inner face the dial 4 has a finder-pin 6 which normally rides upon the outer face of the cover 7 of the lock-case 8 in the circular path indicated by the dotted line 9 in Fig. 3. In this path 9 I form in the cover 7 a hole 10 large enough to freely receive the finder-pin 6 when the same is brought into registration with it, the said pin and hole being arranged with reference to the letters on the dial 4 so that in case the knob 2 and hence the dial 4, are crowded inward as they are being revolved, the pin 6 will enter the hole 10 just as the letter A is brought into registration with the mark 5^a on the door 36 as shown in Fig. 1, the said mark being the starting point from which the dial 4 is turned in one direction or the other in opening the lock, whether the same is to be opened by visual or audible guidance.

The shank of the knob 2 is formed at its inner end with a concentric recess 11 for the reception of the outer end of a small helical spring 12 (Fig. 9) the inner end of which enters a complementary circular opening 13 in the center of the cover 7. Normally this spring keeps the dial 4 pushed outward sufficiently to keep the finder-pin 6 clear of the hole 10 so that in the ordinary operation of the dial the pin will ride over the hole. In

case, however, the knob 2 is pressed inward the tension of the spring 12 will be overcome and then the pin 6 will enter the hole 10 as soon as it is brought into registration therewith. In this way the pin 6 enables the user of the lock to find, in the dark, the point from which to start counting the clicks in opening the lock. The user of the lock then "lets up" on inward pressure on the knob and thus has a starting point, as explained, from which to count the "clicks," the number of clicks counted corresponding, of course, to the number of letters which the user would have to turn past the starting mark 5[a] if he were manipulating the lock by visual guidance.

The shank of the knob 2 is formed with a threaded axial screw-hole 14 for the reception of the threaded end of a connecting-screw 15 passing from rear to front through a short stem or coupling-piece 16 located within a center tube or hub 17 having its outer end flanged for being mounted in the back of the lock-case 8 into which it extends. The forward end of the said stem 16 is flattened for entrance into an oblong opening 18 in the click-wheel 19 (Fig. 6) which, upon its inner face, carries the outer wheel-tumbler 20 which thus partakes of the rotation of the click-wheel. The screw 15 draws the end of the stem against the bottom of the recess 11 and thus frictionally couples the knob and dial and the click-wheel and outer wheel-tumbler together. However, in case the lock should become deranged, the end of the stem will slip on the bottom of the recess and so prevent the injury of the mechanism. In this connection I may explain that for the reason that the screw 15 draws the end of the stem 16 against the bottom of the recess 11, the knob, dial, stem and screw become virtually one piece and as such are pushed outwardly by the spring 12 the outer end of which bears against the bottom of the recess 11, while its inner end bears against the outer face of the click-wheel 19. When the user of the lock presses inward upon the knob, the tension of the spring will be overcome, permitting the knob 2, dial 4, stem 16 and screw 15 to move inward as one piece, whereby the finder-pin 6 is brought into play for entrance into the hole 10 in the cover 7 of the lock-case 8.

The click-wheel 19 has its periphery formed with as many scallops (I use that term for want of a better) as there are letters upon the dial 4, these scallops coacting with a click-pawl 21 having a spring 22 and mounted upon a stud 23 in the lock-case 7. Moreover, the said click-wheel, and hence the outer wheel-tumbler 20, are centered and held in place against lateral movement by the formation in the tumbler of a concentric opening 24 which receives the extreme outer end of the center tube or hub 17. The said outer tumbler 20 is formed in its edge with a notch 25 for the reception of the inner end of a latch-bolt 26 (Fig. 12) which is combined with a slide-bolt 27 (Figs. 13 and 14) the said latch-bolt and slide-bolt passing through an opening 7[a] in the right hand side wall of the lock-case 8 and having their inner ends passed through a parallel cheek or guide-plate 28 secured to the bottom of the case. The latch-bolt 26 has a hole 29 for the reception of one end of a bolt-spring 30 coiled upon a stud 31. The latch-bolt and the slide-bolt are coupled together by a coupling-stud 32 carried by the slide-bolt and entering a slot 33 in the latch-bolt. By the engagement of this stud with the inner end of the said slot, the slide-bolt retracts the latch-bolt when the slide-bolt is thrown inward by the manual operation of a lever 34 secured to the inner end of the shank of a button 35 mounted in the door 36 which is hinged in the frame 37, the said door and frame constituting the "front" of a U. S. post office box. The lever 34 aforesaid enters a notch 38 in the inner edge of the outer end of the slide-bolt 27. The said outer wheel-tumbler 20 carries a pin 39 located almost opposite its notch 25 and arranged to coact with the projecting outer end of the finger 40 of a permutation or change-washer 41 arranged to turn freely upon the center tube or hub 17, and located below the inner wheel-tumbler 42 (the permutation tumbler) which is also mounted upon the hub 17 so as to turn freely thereupon and formed with a circular series of holes 43 for the reception of the finger 40 aforesaid. The said pin 39 engages with the finger 40 and, as it were, picks up the inner wheel-tumbler for the rotation of the same in one direction or the other so as to bring the notch 44 thereof into registration with the slide bolt 27, it being a condition precedent to the opening of the lock that the notches 25 and 44 of the two tumblers must be registered with each other for the simultaneous reception of the inner ends of the latch-bolt and slide-bolt respectively.

A spacing washer 45 (Fig. 17) resting upon the inner wheel-tumbler 42 is formed with an inwardly projecting rib 46 for entrance into a groove 47 in the center tube 17, whereby the said washer 45 is prevented from rotating. This washer 45 forms a bearing for the outer wheel-tumbler 20 the inner face of which rides upon it. To change the permutation of the lock, the same must be taken sufficiently apart to permit the inner wheel-tumbler 42 to be shifted with respect to and re-engaged with the finger 40 of the permutation-washer 41 the range of change being limited only by the number of holes 43 in the inner tumbler the notch 44 of which is virtually changed in position with regard to the finger 40, by resetting the said washer and tumbler as described.

By turning the outer wheel-tumbler 20 from left to right, its pin 39 will engage with the left hand side of the projecting end of the finger 40, whereby the inner wheel-tumbler 42 will be "picked up," so to speak, by the tumbler 20 and rotated therewith from left to right. On the other hand, when the tumbler 20 is turned from right to left, its pin 39 will engage with the right hand side of the projecting end of the finger 40 and turn the inner tumbler 42 from right to left. By thus indirectly turning the inner tumbler 42 in one direction or the other as may be required, its notch 44 will be brought into alinement with the inner end of the slide-bolt 27 after which the outer tumbler 20 will be turned, also under the guidance of the letters on the dial or under the guidance of the "clicks," to bring its notch 25 into registration with the inner end of the latch-bolt 26. The said notches having been brought into registration the button 35 in the door 36 is operated for withdrawing the latch-bolt 26 from a hole 48 formed for its reception in the flange 49 of the door-frame 37.

Now to prevent the door from being closed with the notches still registered which would render it liable to be surreptitiously opened without the use of the combination of the lock, I provide for automatically throwing the notches out of registration the moment the door 36 is opened. For this purpose I employ a throw-off, or, as it might be called, a de-registering slide 50 (Fig. 15) located in the case 8 and having a shoulder 51 coacting with a throw-off pin 52 carried by the inner wheel-tumbler and located therein in such position with respect to the notch 44 thereof that when the same is registered with the slide-bolt 27 the pin is standing close to the shoulder 51 of the slide as shown by Fig. 7. I particularly wish to point out that the slide 50 is made and operates independently of the latch-bolt 26 and the slide-bolt 27, these two parts taken together forming, as it were, the bolt of the lock. The slide 50 is formed with a longitudinal slot 53 receiving a guide-pin 54 which engages with the ends of the slot to limit the sliding movement of the slide.

A spring 55 mounted upon a spring-stud 56 engages with a pin 57 carried by the slide and exerts a constant effort to push the slide outward. The outer end of the slide is formed with a bevel 58 which engages with the left hand side of the frame 37 when the door is nearly closed and crowds the slide inward against the tension of the spring 55, whereby the shoulder 51 is moved inward entirely out of range with the pin 52 leaving the inner tumbler free to be rotated in either direction. Just as soon, however, as the door or other part to which the lock is applied is opened, the throw-off slide does its work and disarranges the tumblers, the spring 55 acting to shoot the slide 50 from right to left, whereby the shoulder 51 engages with the pin 52 and turns or swirls the tumbler 42 so as to carry its notch 44 out of registration with the notch 25 in the tumbler 20. The possibility of closing the door with the notches in registration is thus precluded. When the door is closed the throw-off slide 50 is forced back into its retired position so as not to interfere with the operation of the tumblers, as already described. If the wheel tumbler 42 should be rotated from left to right when the door is open, (this will, of course, take place when anyone fumbles or plays with the lock), the pin 52 will engage with the shoulder 51 and push the slide 50 back and then release it as the pin rides over the point of the shoulder, this being a merely idle movement of the slide 50. On the other hand, if the tumbler 42 is turned from right to left, the pin 52 will engage with the lower edge of the slide 50 and block the further turning of the inner tumbler. It is to be noted that the described "throwing off" of the inner tumbler is done entirely independently of the knob and dial.

It is apparent that in carrying out my invention, some changes from the construction herein shown and described may be made. I would therefore have it understood that I do not limit myself thereto but hold myself at liberty to make such departures therefrom as fairly fall within the spirit and scope of my invention.

I claim:—

1. In a permutation lock, the combination with a bolt, of a dial, a wheel-tumbler rotatable independently of the said dial, and an automatic throw-off made and operating independently of the said bolt to "throw off" the said tumbler without rotating the dial and released for that purpose when the door or part to which the lock is applied is opened.

2. In a permutation lock, the combination with a bolt, of a dial, a wheel-tumbler rotatable independently of the said dial, and an automatic throw-off slide made and operating independently of the said bolt and coacting with the said tumbler and having a projecting outer end which normally holds it in its retired position, whereby when the door or part to which the lock is applied is opened, the slide is released and automatically operated to "throw off" the tumbler without rotating the dial.

3. In a permutation lock, the combination with a bolt, of a dial, two wheel-tumblers one of which is rotatable independently of the dial, and an automatic throw-off made and operating independently of the said bolt and coacting with the said independently rotatable wheel-tumbler which it "throws off" without rotating the dial.

4. In a permutation lock, the combination with a bolt, of a dial, an inner wheel-tum-

bler rotatable independently of the said dial, an outer wheel-tumbler rotatable therewith, and an automatic throw-off made and operating independently of the said bolt and coacting with the said inner wheel-tumbler to "throw off" the same without rotating the dial when the door or part to which the lock is applied is opened.

5. In a permutation lock, the combination with a bolt, of a dial, a wheel-tumbler rotatable independently of the dial and having a notch and a throw-off pin, and an automatic throw-off slide made and operating independently of the said bolt and coacting with the said pin to turn and so "throw off" the tumbler when the door or part to which the lock is applied is opened, the pin being in operative relation with respect to the slide when the notch is registered with the bolt.

6. In a permutation lock, the combination with a bolt, of a dial, a wheel-tumbler rotatable independently of the said dial and having a notch and a throw-off pin, an automatic throw-off slide made and operating independently of the said bolt and having a shoulder coacting with the said pin which is arranged with respect to the notch so that when the notch is in its unlocking position, the pin is in its operating position with respect to the shoulder on the slide, and means for resetting the said tumbler to secure different permutations for the lock.

7. In a permutation lock, the combination with a bolt, of a dial, two wheel-tumblers one of which is rotatable independently of the said dial and each having notches brought into registration for the opening of the lock, and a throw-off slide made and operating independently of the said bolt and released when the door or part to which the lock is applied is opened and then automatically operating to turn the tumbler rotatable independently of the dial so as to throw the notches of the said tumblers out of registration.

8. In a permutation lock, the combination with a dial, of two wheel-tumblers having notches brought into registration for the opening of the lock, one of the said tumblers carrying a throw-off pin and being rotatable independently of the said dial, an automatic throw-off slide having a shoulder for engaging with the said pin and having a projecting end by which it is held in its retired position, and a spring exerting a constant effort to operate the slide, whereby when the door or part to which the lock is applied is opened, the slide is automatically operated with the effect of moving the tumbler rotatable independently of the dial so as to throw the notches of the tumblers out of registration.

9. In a permutation lock, the combination with a bolt, of a knob and a dial, an outer wheel-tumbler fixed to rotate with the said knob and dial, an inner-wheel tumbler rotatable independently of the said outer tumbler but adapted to be picked up and set thereby and provided with a throw-off pin, the two tumblers being respectively formed with notches which are brought into registration for the opening of the lock, and a throw-off slide made and operating independently of the said bolt and coacting with the said pin for turning the inner tumbler, without rotating the said dial, to automatically throw its notch out of registration with the notch in the outer tumbler when the door or part to which the lock is applied is opened.

10. In a permutation lock adapted to be operated by audible as well as by visual guidance, the combination with a lock-case and cover, of a knob, a dial, a finder-pin carried by the dial and arranged to enter a hole in the said cover, and a spring interposed between the dial and cover and normally keeping the dial pushed away from the cover so that the pin will clear the said hole, whereby when the knob and dial are pushed inward to overcome the spring, the pin enters the hole and establishes a starting point for manipulating the lock by audible guidance.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

JAMES J. MURPHY.

Witnesses:
OTIS B. HOUGH,
HARRY C. CLOW.