

W. F. FEISTNER.
PERMUTATION LOCK.

No. 429,192.

Patented June 3, 1890.

FIG. 1.

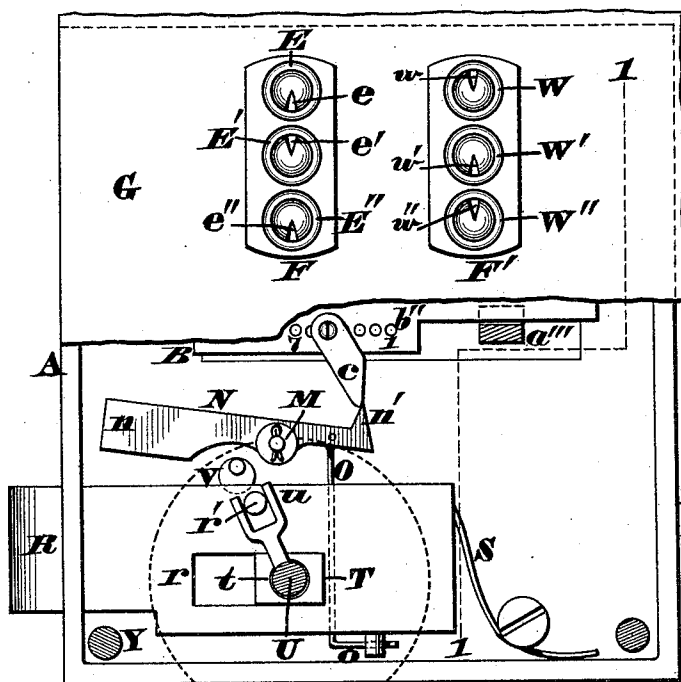
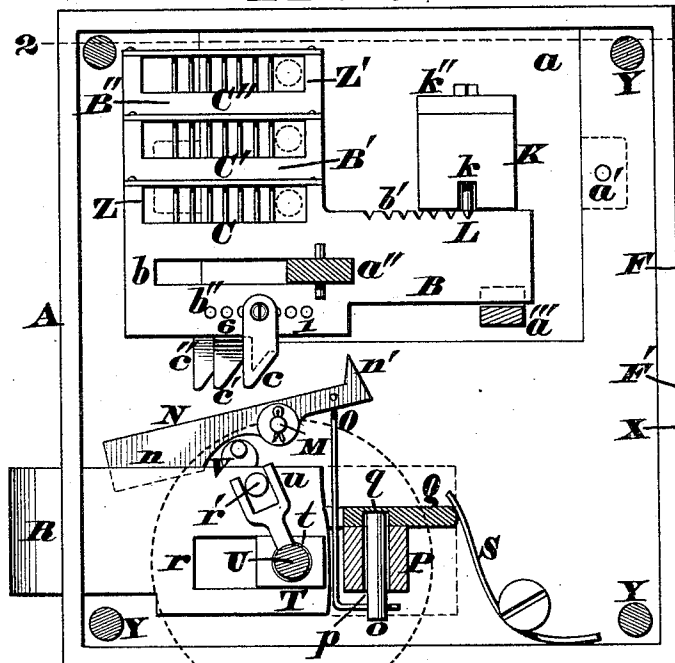


FIG. 2.



Attest.
J. W. Layman
James Moore

FIG. 3.

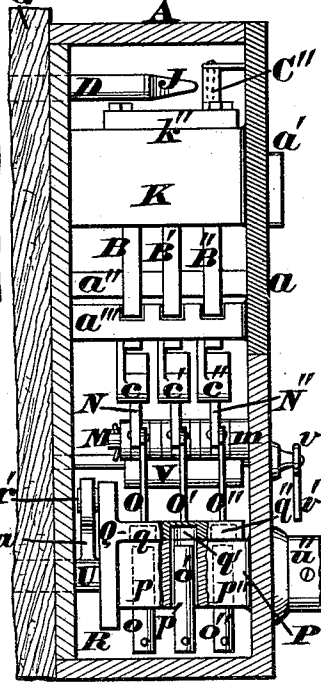
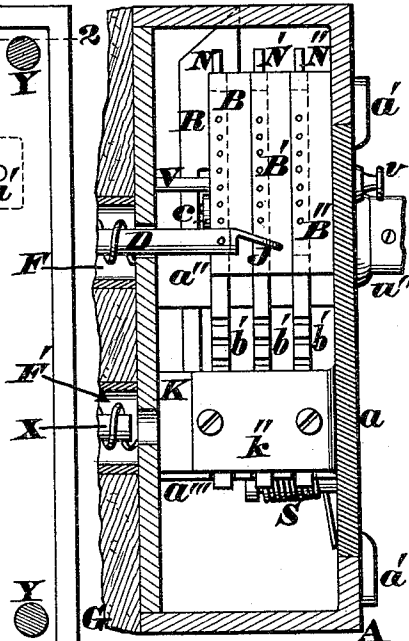


FIG. 4.



Inventor.
William F. Feistner
by James J. Layman
Atty.

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FIG. 5.

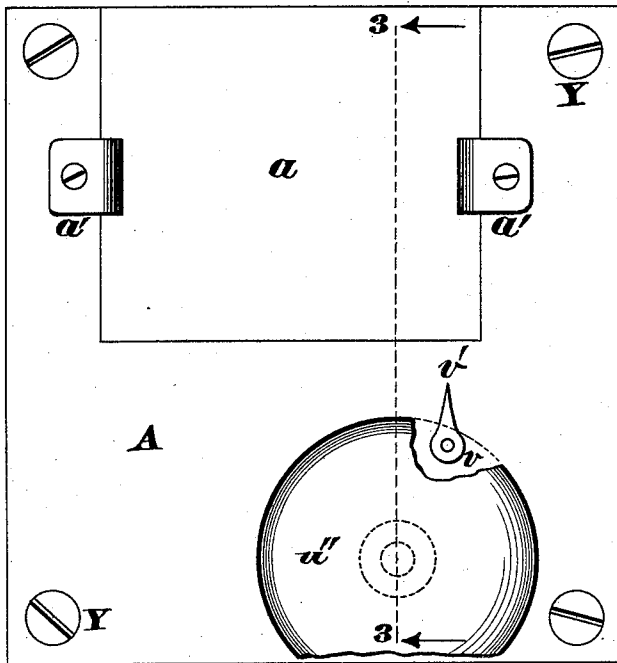


FIG. 7. FIG. 8.

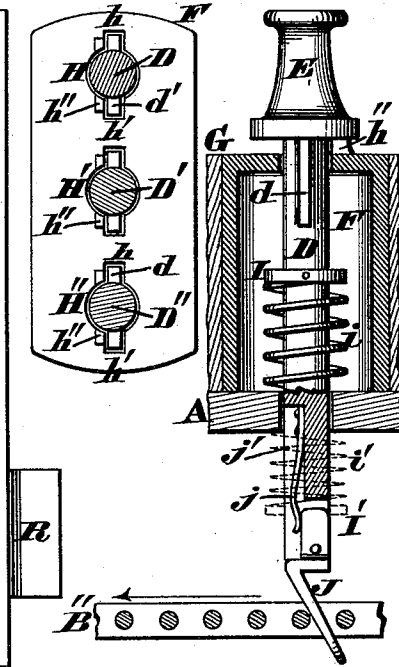


FIG. 6.

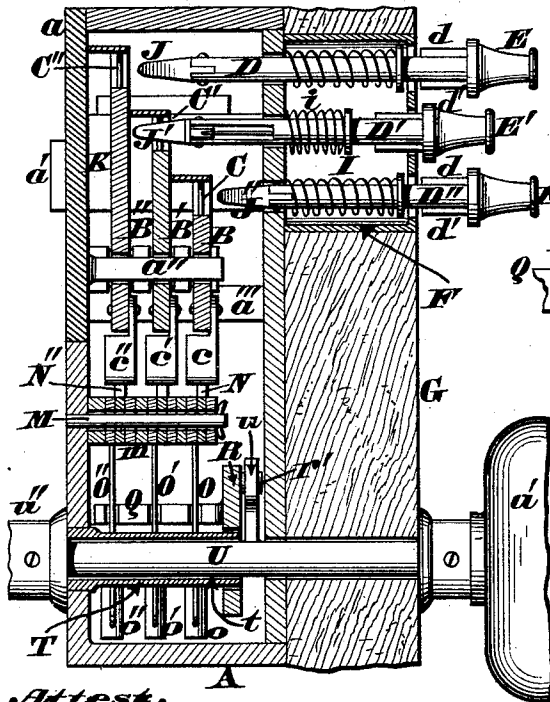


FIG. 9. P

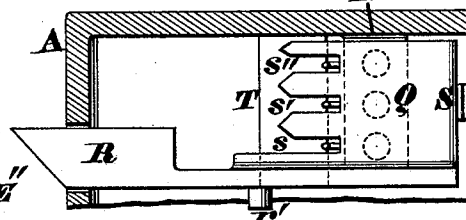


FIG. 10. q

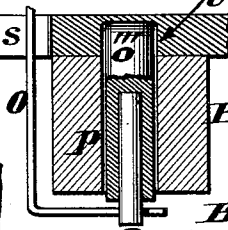


FIG. 11.

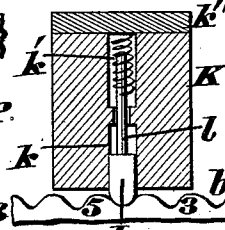


FIG. 12.



Attest.
James N. Layman
James Moore

Inventor.
William F. Feistner.
By James N. Layman
Att'y.

UNITED STATES PATENT OFFICE.

WILLIAM F. FEISTNER, OF CINCINNATI, OHIO.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 429,192, dated June 3, 1890.

Application filed January 20, 1890. Serial No. 337,434. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM F. FEISTNER, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the annexed drawings, which form a part of this specification.

My invention comprises a keyless lock having a series of reciprocating tumblers capable of being advanced and retracted by means of longitudinally-shiftable stems projecting through the door or drawer to which the lock is attached, as hereinafter more fully described.

In the annexed drawings, Figure 1 is an elevation of a portion of the exterior of a door to which my lock is attached, the lower part of the case being removed, the latch or bolt being released, and the position of the outer handle being indicated by a dotted circle. Fig. 2 is a section of the lock-case detached from the door, the latch or bolt being fastened. Fig. 3 is a vertical section of the lock, taken at the line 1 1 of Fig. 1. Fig. 4 is a horizontal section taken at the line 2 2 of Fig. 1. Fig. 5 is a rear elevation of the lock-case, portions of the inner handle being broken away. Fig. 6 is a vertical section of the lock, taken at the line 3 3 of the preceding illustration and looking in the direction indicated by the arrows. Fig. 7 is an enlarged transverse section of the various push-stems of the lock. Fig. 8 is an enlarged longitudinal section of one of said stems. Fig. 9 is a plan of the latch or bolt and some of its accessories. Fig. 10 is an enlarged vertical section of one of the pins that lock the bolt or latch. Fig. 11 is a similar section of one of the tumbler-stops. Fig. 12 is an elevation of one of the tumblers detached from the lock.

A represents the lock-case, and *a* is a detachable plate secured to the back of the same by suitable fasteners, as seen at *a'* *a'* in Fig. 5, said plate being provided with a pair of bearers or guides *a''* *a'''*, that carry the reciprocating tumblers, of which as many may be used as occasion requires, although but three are shown in the drawings. These tumblers are designated B B' B'', and as they are pre-

cisely alike, except the height of their rack portions, a description of one will answer for all. Each tumbler is slotted longitudinally at *b*, has a series of notches or corrugations *b'* along its upper edge, and a row of perforations *b''* near its lower edge, which perforations may be numbered or otherwise designated.

C C' C'' are racks near the upper part of each tumbler, and *c* *c'* *c''* are freely-swinging pawls depending from said tumblers, these racks being elevated above each other in the manner seen in Fig. 6, so as to allow the push-stems to operate without interference. These push-stems are designated D D' D'', one for each tumbler, and have at their outer ends knobs or buttons E E' E'', with suitable indications on them, notches or grooves *e* *e'* *e''* being preferably used for this purpose. Furthermore, the central portions of these stems are housed within a box F, attached to the lock-case A and projecting through the door or drawer front G, the face of said box being pierced at H H' H'', and each of said perforations has an upper slot *h*, a lower slot *h'*, and a pair of stops *h''* *h'''*, as seen in Fig. 7, said slots *h* *h'* being traversed by longitudinal splines or feathers *d* *d'* of the stems. Again, each stem has a fixed collar I, against which presses a coiled spring *i*, that maintains the stem in its normal or protruded position.

J J' J'' are pawls pivoted to the inner ends of the stems, which pawls are held in their normal positions by springs *j*, fitted within a longitudinal groove *j'* of said stems, as more clearly seen in Fig. 8. Back plate *a* has secured to it a cross-bar K, chambered out at *k*, as seen in Fig. 11, within which chamber is fitted a vertically-acting detent L, that engages with the notches *b'* of the tumbler, said detent being forced down by a spring *k'*, coiled around the detent-stem *l*. *k''* is a cap, the removal of which permits the application of these springs, it being understood that a separate detent and spring are employed for each tumbler in the lock.

M is a stud-shaft placed across the lock-case and carrying a series of rocking levers N N' N'', with washers *m* between them, each lever being loaded or made heavy at one end *n*, while its opposite end has an upturned spur *n'*, which spurs are adapted at the proper moment to be struck by the advancing pawls

$c\ c'\ c''$. The spurred ends of these levers have hook-shaped rods $O\ O'\ O''$ pendent therefrom, the horizontal extensions of said rods being engaged with short pins $o\ o'\ o''$, that play vertically within bores $p\ p'\ p''$ of a bar P , secured across the lock-case, as seen in Fig. 3. This bar P serves also as a bearing for a lateral flange Q at the inner end of the sliding bolt or latch R , the under side of this flange being provided with three sockets $q\ q'\ q''$, that admit the upper ends of pins $o\ o'\ o''$, when the latter are elevated, as seen in Figs. 2 and 10.

S is a spring, that bears against the rear end of flange Q , and thereby protrudes the bolt or latch, the front of said flange being slotted at $s\ s'\ s''$ to permit the passage of hooks $O\ O'\ O''$, as seen in Fig. 9. Bolt R is slotted longitudinally at r to ride upon a bearing T , secured to the back of the case, and has a stud r' , grasped by a forked lever u , projecting rigidly from the main spindle U , which spindle has an outer knob or handle u' and an inner handle u'' . Spindle U traverses and turns freely within a longitudinal bore t of bearing T .

Located above the bolt R is an eccentric V , having a turning knob v and pointer v' . (Seen in Figs. 3 and 5.)

$W\ W'\ W''$ are a series of secondary or false knobs or buttons, notched at $w\ w'\ w''$ and employed solely for misleading any person who is unfamiliar with the combinations of the lock, as the stems X of said knobs have no communication with the tumblers. (See Fig. 4.) These stems are fitted within a box F' , arranged precisely like the other box F .

Y are screws, wherewith the lock-case is attached to the inner side of the door G .

$Z\ Z'$ are wide spaces at the opposite ends of each rack.

My lock is fitted together and operated in the following manner: By referring to Figs. 2 and 12 it will be noticed that there are seven vertical bars or pins in the racks C of each tumbler, which pins are separated by uniform intervals; but larger intervals or spaces $Z\ Z'$ are arranged at the opposite ends of said racks. It will also be noticed that there are seven notches in the row b' , and these notches are the same distance apart as the bars in the racks. Furthermore, the perforations b'' are the same distance apart as said racks, but should not exceed the latter in number, said holes being numbered from right to left, so as to enable the proper arrangement of the combinations, and for the purpose of illustration I will suppose the combination has been determined to include 7, 6, and 4. The pawl c of the first tumbler B is accordingly suspended from the fourth hole of said tumbler, while the pawl of tumbler B' is engaged with the sixth hole of the latter, the pawl of the third tumbler B'' being hung from the seventh perforation of the same. Preferably the knobs $E\ E'\ E''$ are set as seen in Fig. 1, the notch e' of the central knob E' being in a reverse

position with reference to the other notches e and e'' for the purpose of rendering it more difficult to discover the proper combination. In this normal position of the knobs all the pawls $J\ J'\ J''$ are presented in the direction of the pawl J , (seen in Fig. 4,) and then said knobs are pushed in at least seven times, which act retracts all the tumblers to the position seen in Fig. 2. This retraction is occasioned by the inclined faces of the pawls wedging or forcing against the various pins of the racks when said pawls advance; but when the knobs fly back by the action of springs i the springs j enable said pawls to yield sufficiently to prevent the tumblers being shifted in the wrong direction, which improper shifting of the tumblers is further guarded against by the engagement of the detents I with the notches b' . When all the tumblers are thus fully retracted, the push-stems $D\ D'\ D''$ occupy the position shown by the stem D in Fig. 4 and indicated by the dotted circles in Fig. 2. Consequently said stems may now be operated indefinitely without in the least affecting the tumblers, because the pawls simply play back and forth within the intervals Z' , which are made wide enough to prevent said pawls having any action on the locking mechanism. This retraction of the various tumblers relieves the rocking levers $N\ N'\ N''$ of any pressure, and then their weighted ends n cause said levers to assume the position seen in Fig. 2, thus elevating the pins $o\ o'\ o''$, and causing their upper ends to enter the sockets $q\ q'\ q''$, which act locks the bolt R immovably to the cross-bar P . The door is now securely fastened, and can be unlocked from the outside only by a proper restoration of the combination, but can be readily opened from the inside by simply turning the pointer v' up to the position seen in Fig. 5. By this procedure the eccentric V is turned, the weighted ends of the levers raised, their opposite ends depressed accordingly, and the pins $o\ o'\ o''$ pulled down from the sockets $q\ q'\ q''$, as seen in Fig. 3, thus liberating the bolt and allowing it to be operated by the handles in the usual manner; but to restore the combination from the outside of the door the upper knob E is first turned half-way round, so as to bring its notch e up, and thereby reverse the position of the pawl J at the inner end of the push-stem D , attached to said knob. The knob is then pressed back seven distinct times, and at each movement of it the inclined face of pawl J wedges against one of the bars of rack C and advances the tumbler B'' , as indicated by the arrow in Fig. 8. The instant the seventh push is made the tumbler will have been advanced so far as to cause its pendent pawl c'' to impinge against the spur n' of rocking lever N'' with sufficient force to depress this spurred end of said lever and pull the pin o'' down from the socket q'' . The central knob E' is then turned half-way around, so as to bring its notch e' down, and thereby reverse the position of pawl J'

at the inner end of push-stem D', attached to said knob. Six pushes of said knob are then all that is necessary to advance the tumbler B' a sufficient distance to cause its pawl c' to trip the central lever C' and pull the pin o' down from the socket q'. The lower knob E'' is then turned in the same manner as the upper knob is pushed in four times, so as to advance the tumbler B, trip the lever C, and pull the last pin o down from the socket q, which final act unlocks the bolt and allows it to be operated by either of the handles u' or u''. The position of all the parts when the bolt is liberated is seen in Figs. 1 and 3. If after the tumblers have been properly advanced the knobs should be accidentally operated more than the required number of times, it will have no effect on the locking mechanism, because the racks are so arranged as to bring their intervals Z in line with the push-stems as soon as said tumblers have reached the end of their stroke. Therefore the knobs may now be operated indefinitely without moving the tumblers; but the instant said knobs are turned back to their normal positions (seen in Fig. 1) and then operated said tumblers will be retracted. During this turning of the knobs back and forth the stops h'' arrest them in the proper place, while the splines d d' and grooves h h' so guide the push-stems as to cause their pawls to bear against the rack-bars in such a way as to either advance or retract the latter, as occasion requires. The door can be temporarily locked at any time from the outside by bringing either of the knobs to the position seen in Fig. 1, and then giving said knob a single push, the unlocking being effected by turning the knob back and then giving it another single push. When the eccentric V is so turned as to lift the levers N N' N'' and allow the pins o o' o'' to drop down from the sockets q q' q'', the bolt R may then be operated by either of the handles u' or u''. If preferred, the stems may be normally pulled back by a spring acting against a collar, as indicated by the dotted lines I' i' in Fig. 8, in which event the operator would draw said stems forward, instead of pushing them in, but the other parts of the lock would remain as above described. Finally, Fig. 10 shows the pin o fitting within the chamber of another pin o'', which latter engages with the bolt-flange, by which arrangement the smaller pin o can be readily filed off at its upper end to permit any necessary adjustment of these parts.

I claim as my invention—

1. The combination, in a lock, of a series of reciprocating tumblers, a series of bolt-releasing devices actuated by said tumblers, and a series of longitudinally-shiftable stems, which can be set in one position for the purpose of advancing said tumblers, and set in another position for the purpose of retracting the latter, substantially as herein described.

2. The combination, in a lock, of a series of

reciprocating tumblers provided with pawls and racks, a series of rocking levers actuated by said pawls, a series of fastening and releasing pins operated by said levers, and a series of longitudinally-shiftable stems having pawls, which stems can be set in one position for the purpose of causing their pawls to engage with said racks, so as to advance said tumblers, and set in another position for the purpose of causing said pawls to retract said tumblers, as set forth.

3. The combination, in a lock, of the reciprocating tumblers B B' B'', provided with pawls c c' c'' and racks C C' C'', the rocking levers N N' N'', having spurs n', actuated by said pawls, the pins o o' o'', operated by hooks O O' O'', coupled to said levers and adapted to enter sockets q q' q'' of the bolt R, and longitudinally-shiftable stems D D' D'', having at their inner ends pawls J J' J'', which stems can be set so as to engage said pawls with said racks in such a manner as to advance or retract the tumblers, as herein described.

4. The combination, in a lock, of a series of reciprocating tumblers provided with pawls, racks, and a number of perforations for the optional attachment of said pawls, a series of bolt-releasing rocking levers having spurs actuated by said pawls, and a set of longitudinally-shiftable push-stems that operate said tumblers, all as herein described.

5. The combination, in a lock, of a series of rocking levers, a series of bolt-fastening pins operated by said levers, and an eccentric that lifts the gravitating ends of said levers and withdraws said pins from the bolt-sockets, substantially as herein described.

6. The combination, in a lock, of a reciprocating tumbler having a rack operated by a pawl, a series of notches corresponding in number with the bars of said rack, and a dent that engages with said notches when said tumbler is advanced and retracted, for the purpose described.

7. The combination, in a lock, of a reciprocating tumbler B, having a uniformly-spaced rack C, with relatively wider spaces Z Z' at its opposite ends, a pawl c, that operates a bolt-releasing rocking lever, and a longitudinally-shiftable push-stem having at its inner end a pawl that engages with said rack, for the purpose described.

8. The combination, in a lock, of a series of reciprocating tumblers having racks and devices for operating the bolt-releasing appliances, a set of longitudinally-shiftable push-stems having at their inner ends pawls that engage with said racks, and a set of false push-stems having no connection with said racks, all as herein described.

9. The combination, in a lock, of the box F, having grooves h h' and stops h'' h'', and the push-stem D, having an external knob E e, collar I, spring i, and pivoted pawl J, which pawl is held in its normal position by a spring j, for the purpose described.

10. The combination, in a lock, of the bolt

R, having a flange Q, provided with sockets $q\ q'\ q''$, the bar P, provided with bores $p\ p'\ p''$, and the pins $o\ o'\ o''$, traversing said bores and operated by hooks $O\ O'\ O''$, coupled to the rocking levers $N\ N'\ N''$, as herein described.

11. The combination, in a lock, of bolt R, having a longitudinal slot r and pin r' , the bearing T, traversing said slot and having a bore t , and the spindle U, passing through said bore and having a forked lever u , engaged with said pin r' , for the purpose described.

12. The combination, in a lock, of the reciprocating tumbler B, having a series of notches b' , the bar K, having a chamber k , and the detent L, having a stem l and spring K' , for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM F. FEISTNER.

Witnesses:

JAMES H. LAYMAN,

FRANCIS M. BIDDLE.