J. McCASKEY.

Permutation-Lock.

No. 218,548. **Patented Aug. 12, 1879.**

Fig. 1

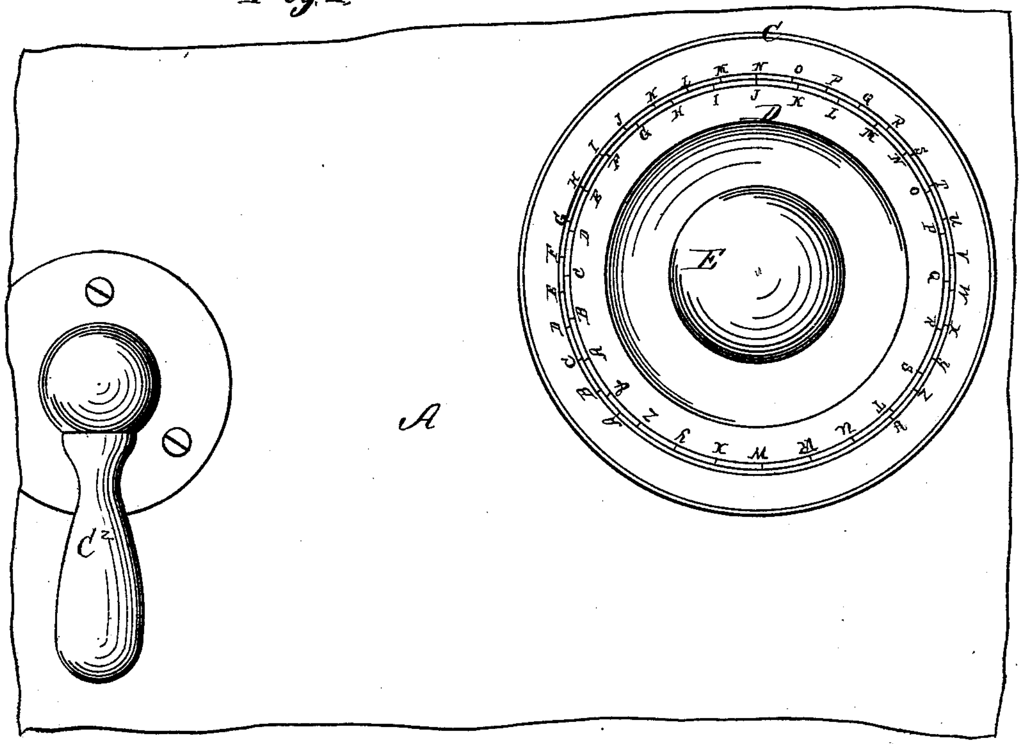
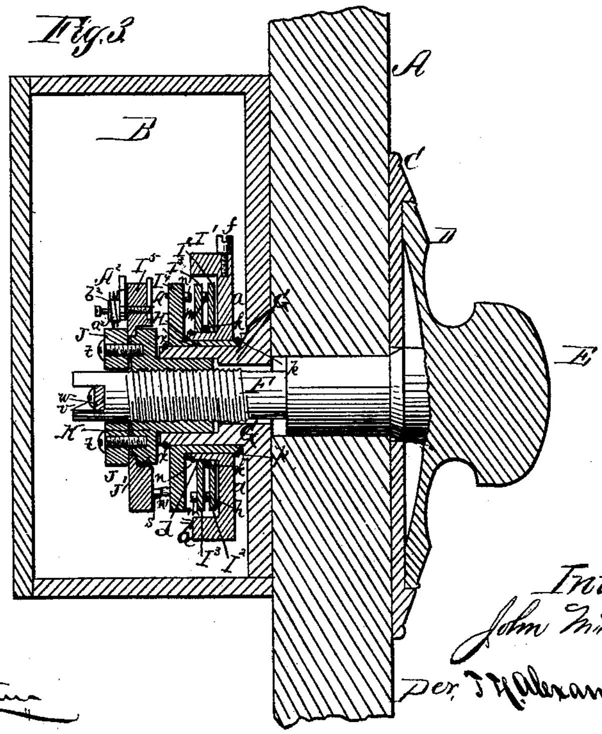


Fig. 3



Witnesses:
W. C. McArthur
John C. Rogers

Inventor:
John McCaskey
per T. H. Alexander & Elliott
Attorneys.

3 Sheets—Sheet 2.

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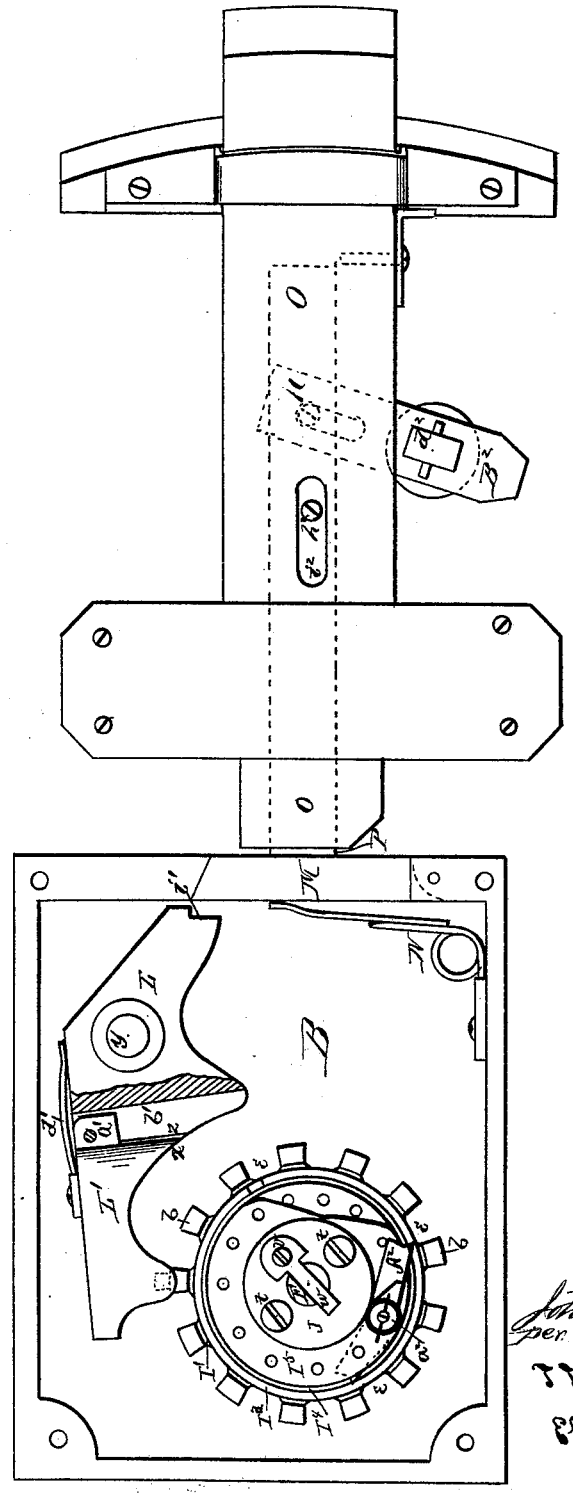

Fig. 2.

Witnesses:
W. C. McArthur
John C. Rogers

Inventor
John McCaskey
per
T. Y. Alexander
Elliott
Attorneys.

3 Sheets—Sheet 3.

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Fig. 4.

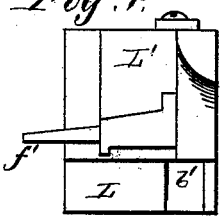


Fig 5

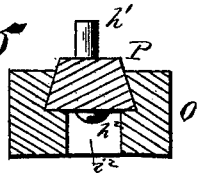


Fig. 6.

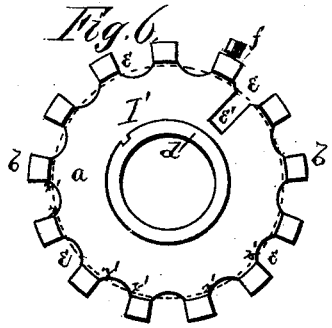


Fig. 7.

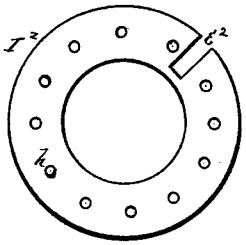


Fig. 11.

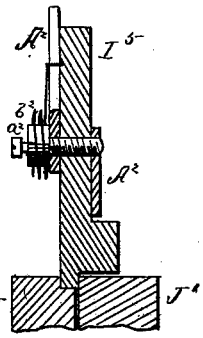


Fig. 8.

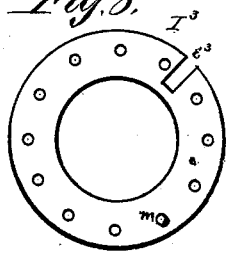


Fig. 9.

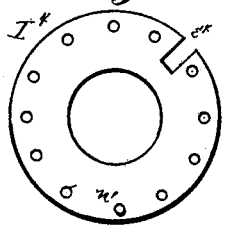
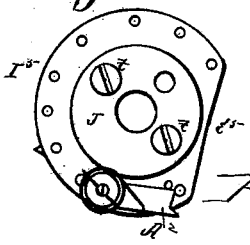


Fig. 10.



Witnesses:
W. C. McArthur
John C. Rogers

Inventor
John McCaskey
per J. Alexander Elliott
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN McCASKEY, OF NEW CASTLE, PENNSYLVANIA.

IMPROVEMENT IN PERMUTATION-LOCKS.

Specification forming part of Letters Patent No. **218,548**, dated August 12, 1879; application filed May 22, 1879.

To all whom it may concern:

Be it known that I, JOHN MCCASKEY, of New Castle, in the county of Lawrence and State of Pennsylvania, have invented certain new and useful Improvements in Permutation-Locks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to permutation-locks, and its peculiarities will be fully set forth in the claims.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a front view of part of a safe-door. Fig. 2 is an inside view of the lock. Fig. 3 is a vertical section through the lock mechanism. Fig. 4 is an end view of the pivoted dog. Fig. 5 is a section through the bolt. Figs. 6, 7, 8, 9, and 10 show the tumblers. Fig. 11 is a section of the tumbler I^5.

A represents a part of a safe-door, to the inner side of which the lock-case B is secured. On the front of the door A is secured the stationary dial C, on the rim of which are seen the letters of the alphabet or any series of figures or characters.

D represents the movable dial, formed with the knob E and spindle F, and having upon its rim a corresponding series of letters, figures, or characters.

Within the lock-case B is secured the tube or hollow hub G, through which the spindle F is passed. On this hub is placed a series of five tumblers, I^1 I^2 I^3 I^4 I^5, in the following manner: The first tumbler, I^1, I call a "friction-tumbler," and it is made in the form of a circular disk or plate of suitable thickness to form in it an annular disk, *a*, which leaves an outside rim, *b*, and a central tube or hub, *d*, having its inside diameter larger than the outside diameter of the hub G in the lock-case. In the rim *b* of the tumbler I^1 is made a series of equidistant notches, *e*, and one notch, e^1, which latter is cut down a suitable distance into the body of the tumbler. The bottom of each notch *e* is made rounded concavely, while at each side is an incline, x'. *f* is a pin which is screwed into the rim of the tumbler in one of the projections between the notches.

The second tumbler, I^2, is in the form of an annular plate or flat ring fitting in the recess *a* around the hub *d* of the first tumbler, I^1. In the edge of this tumbler I^2 is a notch, e^2, corresponding with the notch e^1 of the tumbler I^1, and there is also a series of holes arranged in a circle, and in any one of these holes is screwed a pin, *h*. An open ring, *k*, is then placed around the hub G, to separate the tumbler I^2 from the next tumbler, I^3, one end of said open ring being turned inward into a slot in the hub to prevent the ring from turning.

The third tumbler, I^3, is exactly like the tumbler I^2, with a slot, e^3, and a series of holes in which are screwed two pins, *m m*, projecting one on each side of the tumbler. An open ring, *n*, is then sprung into a circumferential groove on the hub G for holding the tumbler I^3 to place.

The tumblers I^2 and I^3 are both within the recess *a* of the first tumbler, I^1.

The fourth tumbler, I^4, is also in the form of an annular plate or flat ring, with notch e^4 and a series of holes, in two of which are screwed the pins n' n', projecting one on each side. This tumbler is formed or provided with a central tube, H, which is inserted through the hub *d* of the first tumbler, I^1, and projects sufficiently far beyond said tumbler I^1 to receive an open ring, *p*, in a groove around its end, thus confining the first four tumblers together. These tumblers thus connected are placed on the stationary hub G in the lock-case, and an open ring, *x*, placed on the end of said hub to hold them thereon.

The fifth tumbler, I^5, is of similar construction as the tumblers I^1 I^2 I^3 I^4, with a series of holes, in one of which is screwed a pin, *s*, projecting inward. This tumbler I^5 has a large cut-out, e^5, with curved or beveled sides, as shown.

At a suitable point on each side of the tumbler I^5 is a dog or pawl, A^2. One of these pawls is made fast to the pivot a^2, while the other turns loosely thereon, and a spring, b^2, is arranged to throw said pawls in opposite directions against suitable stops. These stops

may be formed by making a recess in each side of the tumbler just large enough for the pawl to work, or by the insertion of pins when no such recesses are made. In either case the points of the two pawls, when they are at rest, should project a trifle beyond the edge of the tumbler.

The tumbler I^5 is secured by two screws, *t t*, between two annular plates or disks, J J′, which form a clamp for holding the tumbler. The inner one of these disks is formed with a projecting hub, K, which has interior threads and fits in the stationary hub G of the lock-case.

The spindle F is formed with threads to screw into the hub K, after which it is locked by means of a plate, *w*, fitting in a slot in the end of the spindle, and fastened to the outer clamp, J, by a screw, *v*.

In the lock-case B is a stud, *y*, upon which is hung a dog made in two parts, L and L′. The inner end of the dog is made heavier, so that the tendency of said inner end will be to drop down and raise the other end.

L′ is the extreme inner end of the dog, provided with a tenon, a^1, which is pivoted in a slot, b^1, in the part L, the two parts forming shoulders *z z* in contact with each other, and a spring, d^1, on top of the dog holds the parts in this position. From the inner end of the part L′ of the dog projects a pin, *f′*, which normally bears against the circumference of the first tumbler, I^1, and drops into any one of the notches *e*. When the tumblers are set in proper position the inner end of the dog drops down with the pin *f′* in the notches e^1 e^2 e^3 e^4 e^5 of said tumblers. The outer end of the dog forms a shoulder, as shown at i^1. This end of the dog lies close to the end of the lock-case, in which is a gate or wicket, M, hinged at its lower end and held closed by means of a spring, N. These parts are arranged in such relative position that when the pin *f′* of the dog rests in any one of the notches *e* in the rim of the first tumbler, I^1, the wicket can be pressed inward only as far as the outer end of the dog, and thereby turn the dog sufficiently on its stud to raise the pin *f′* out of the notch, the edge of the wicket then bearing against the shoulder i^1 of the dog; but when the pin *f′* has dropped into the main notches e^1, &c., of the tumblers, the outer end of the dog is raised above the wicket and admits of the same being opened to admit the bolt.

O represents the bolt, the inner end of which lies against the outer side of the wicket M when the safe is closed and locked. This bolt is placed in suitable guides or keepers, and has a dovetailed groove running longitudinally for a suitable distance. In this groove is located an auxiliary bolt, P, which has a pin or stem, h^1, projecting from it. It has also a pin or screw, h^2, projecting into a slot, i^2, in the main bolt, so that said auxiliary bolt can be moved a certain distance independent of the main bolt.

If desired, the main bolt may be made hollow, and the auxiliary bolt work within the same. The pin or stem h^1 of the auxiliary bolt P is inserted in a slotted arm, B^2, attached to the spindle d^2 of the bolt knob or handle C^2 of the safe, so that by turning said handle the auxiliary bolt will first be moved inwardly, and then when the pin h^2 reaches the end of the slot i^2 in the main bolt said main bolt will also be moved.

The operation of my lock is as follows, and to illustrate the same I will give one example of combination: The safe being locked, the pin *f′* of the dog rests in one of the notches *e* in the rim of the first tumbler, I^1, or if not in one of said notches it will drop therein as soon as the knob E is turned ever so slightly in either direction.

When it is desired to open the safe the bolt knob or handle C^2 is first turned sufficiently far to move the auxiliary bolt P inwardly such a distance as to press the wicket M against the outer end of the dog and thereby raise the pin *f′* out of the notch, and is held there with one hand, while with the other hand the combination-knob E is turned to the left four times until the letter O on the rotating dial is opposite the letter M on the stationary dial. This leaves the pin *f* of the tumbler I^1 against the pin *f′* of the dog, and the slot e^1 in said tumbler at a distance away from the said pin *f′*. The pressure on the bolt-handle is then removed, and the spring N closes the wicket M and pushes the auxiliary bolt P back to its former position. The knob E is then turned to the right three times until the letters F L on the rotating and stationary dials, respectively, coincide, which leaves the second tumbler, I^2, so that its notch e^2 will coincide with the notch e^1 of the first tumbler. Again the knob E is turned to the left twice until the letters O L coincide, when the third tumbler, I^3, will be left with its notch e^3 corresponding with the notches of the other two tumblers, I^1 and I^2. The bolt-handle is then again turned to cause the auxiliary bolt P and wicket M to raise the pin *f′* of the dog out of the notch in the first tumbler, I^1, and while thus held the knob E is turned twice to the right until the letter B on the rotating dial comes opposite the letter M on the stationary dial, which will leave the first four tumblers I^1 I^2 I^3 I^4, with their notches e^1 e^2 e^3 e^4, directly beneath the pin *f′* of the dog.

By now turning the knob E once to the left until the letters I M coincide, the tumbler I^5 will be turned, with its notch e^5, under the pin *f′*, and the pressure being now removed from the bolt-handle C^2, the wicket closes and the inner end of the dog drops of its own gravity, so that the pin *f′* enters all the five notches e^1 e^2 e^3 e^4 e^5 of the tumblers. The bolt-knob can now be turned and the bolts turn down the wicket, their inner ends entering a suitable distance to allow the safe-door to be opened.

It will readily be understood that the motion of the knob E is through the spindle F imparted to the tumbler I^5, and from this tum-

bler by means of the varying pins to the tumblers I^4 I^3 I^2; but to the tumbler I^1 the motion is communicated by friction from the hub of the tumbler I^4, the spring-rings *kn* holding said tumblers sufficiently tight for that purpose.

The tumbler I^5 always turns with the knob, and for each revolution of said tumbler, whether to the right or left, one of the pawls A^2 catches on the pin *f'* of the dog and raises the inner end of the dog, the pawl turning over until it passes beyond the pin, when the pawl falls down again by the action of the spring b^2. The object of this is to prevent any click or noise at the time when the notch of either tumbler passes under the pin, which might indicate to an expert where such notches are located.

The particular shape of the notches *e* in the first or friction tumbler, I^1, is also of importance. The bottoms of these notches are a trifle below the periphery of the second tumbler, I^2, so that the pin will rest on said second tumbler when in either of said notches; but as any one or more of the tumblers are being turned the tumbler I^1 will crowd the pin *f'* up one of the inclines *x'*, and hence there can be no sound whatever made when the notch e^2 of the second tumbler passes under said pin.

My lock is simple and practical, and is yet easily operated by the combination. It is positive proof against burglars by picking, either by manipulation or by the use of any instrument for that purpose. It is positive proof against a lock-out when in a locked condition, as no part of the lock can become disarranged so as to affect the opening of the same. The combination cannot be picked up either by the sense of hearing or by the use of a micrometer.

A micrometer cannot be used because the dog L L' is always disconnected at one end. When the pin *f'* of the dog is in contact with the tumblers the other end of the dog is not in contact with the wicket, and when the wicket is pressed inward in contact with the dog the pin *f'* is raised up from the tumblers.

The dog L L' being made in two parts, hinged together, and held in place by a spring, admits of the safe-door being closed without locking during the day, if desired. For instance, after the lock is opened, the wicket being pressed in, the slightest movement of the knob E will raise the part L' of the dog without interfering with the part L. It will then not be necessary, for the purpose of locking, to set the combination again; simply turn the bolts outward and the wicket closes itself, the part L of the dog being pressed out of the way by the wicket, and the dog at once assumes its proper position.

The combination may be changed indefinitely. The simplest and easiest way is to loosen the screws of the clamp J J', then turn the tumbler I^5, and then fasten again. This can be done without taking the lock apart. It can also be done by changing any one or more of the various pins in different holes in their respective tumblers, as well as by changing the pin *f* to different positions in the rim of the first tumbler, I^1.

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

1. The friction-tumbler I^1, formed with the rim *b*, having a series of notches, *e*, and one main notch, e^1, the pin *f*, and annular recess *a*, substantially as and for the purposes herein set forth.

2. The combination of the dog L L', having pin *f'*, the tumbler I^1, provided with a series of notches, *e*, each notch having a concave bottom and an incline, *x'*, on each side thereof, and the tumbler I^2, of such diameter as to project slightly beyond the concave bottoms of the notches *e*, whereby clicking is prevented, substantially as and for the purposes herein set forth.

3. The combination of the annularly-recessed tumbler I^1, having hub *d*, the tumblers I^2 I^3, placed in the recess around the hub, and the tumbler I^4, provided with the tube or hub H, substantially as and for the purposes herein set forth.

4. The combination, with the tumblers I^1 I^2 I^3 I^4, constructed and connected together as described, of the tumbler I^5, clamp J J', with threaded hub K, and the screw-spindle F, substantially as and for the purposes herein set forth.

5. The combination of the slotted spindle F, tumbler I^5, clamp J J', with hub K, and the plate *w*, substantially as and for the purposes herein set forth.

6. The pivoted dog L L', made in two parts, hinged together, and held in proper position by a spring, in combination with friction-tumbler I^1, hinged wicket M, and bolt O, substantially as and for the purposes herein set forth.

7. The combination, in a permutation-lock, of the pivoted dog L L', friction-tumbler I^1, bolt O, and hinged wicket M, all constructed and arranged to operate substantially as and for the purposes herein set forth.

8. In a permutation-lock, a rotating tumbler provided with pivoted pawls on opposite sides and operating in opposite directions, substantially as herein set forth.

9. The combination of the tumbler I^5, pawls A^2 A^2, and the pivoted dog L L', substantially as and for the purposes herein set forth.

10. In a permutation-lock having the bolt-works separate from the mechanism of the combination, a hinged gate or wicket in the end of the case, for the purposes set forth.

11. The combination of the hinged wicket and the pivoted dog, for the purposes herein set forth.

12. The combination of the series of tumblers, as described, the pivoted dog, and the hinged wicket, substantially as and for the purposes herein set forth.

13. The combination of the main bolt, aux-

iliary bolt, and hinged wicket, substantially as and for the purposes herein set forth.

14. The combination of the main bolt, auxiliary bolt, hinged wicket, and pivoted dog, substantially as and for the purposes herein set forth.

15. The combination of the main bolt, auxiliary bolt, hinged wicket, pivoted dog, and the series of tumblers, all constructed and arranged to operate substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN McCASKEY.

Witnesses:
JOHN B. BROWN,
JOHN PLATT.