2. Sheets. Sheet. 1.

L. H. Miller,

Permutation Lock.

No. 107.190. Patented Sep. 6. 1870.

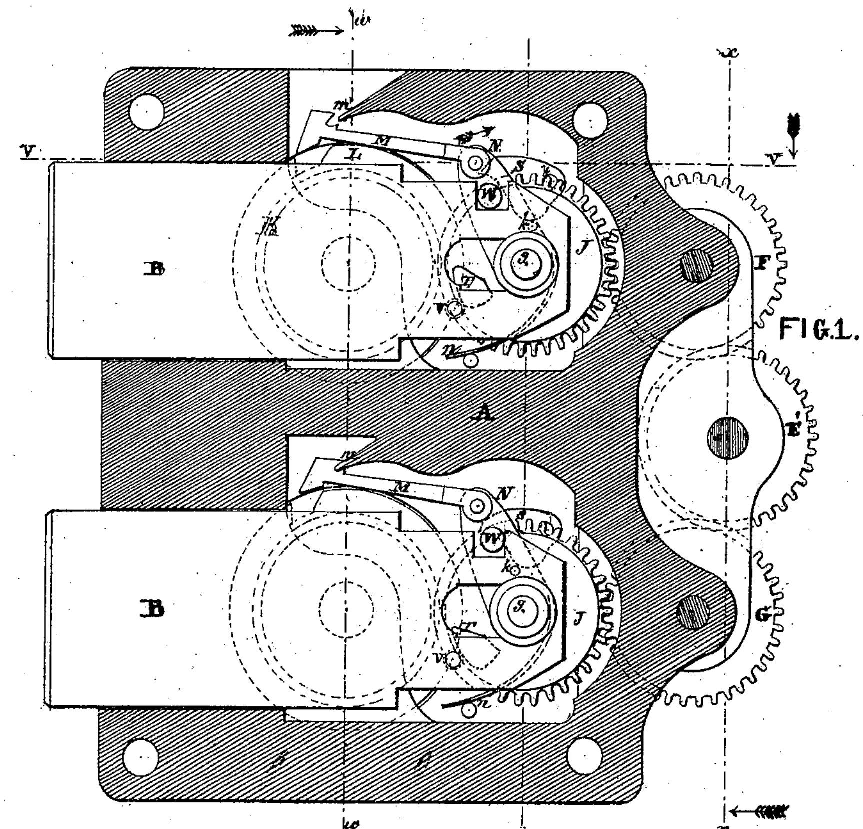

FIG. 1.

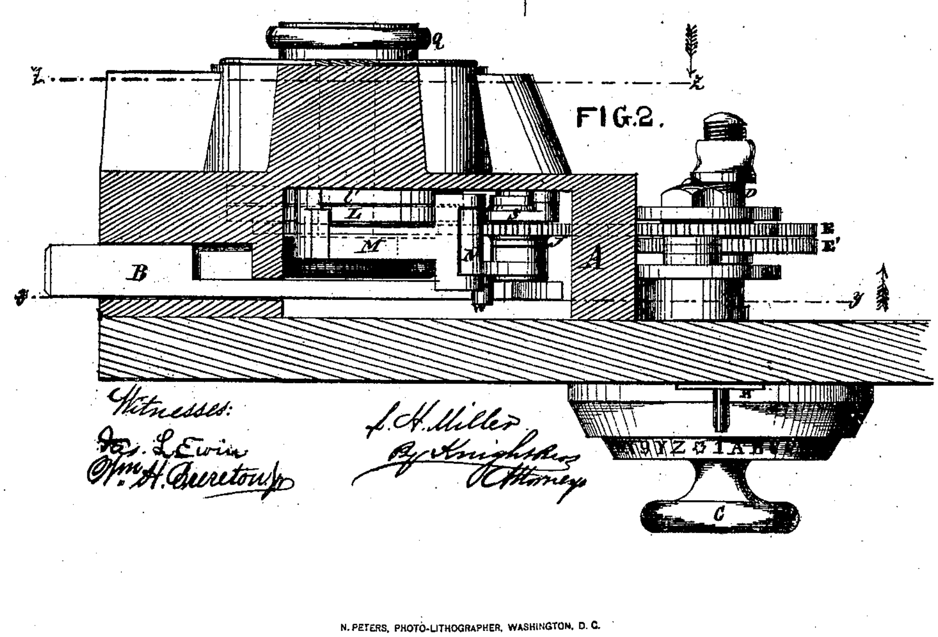

FIG. 2.

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2 Sheets, Sheet 2

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FIG. 3.

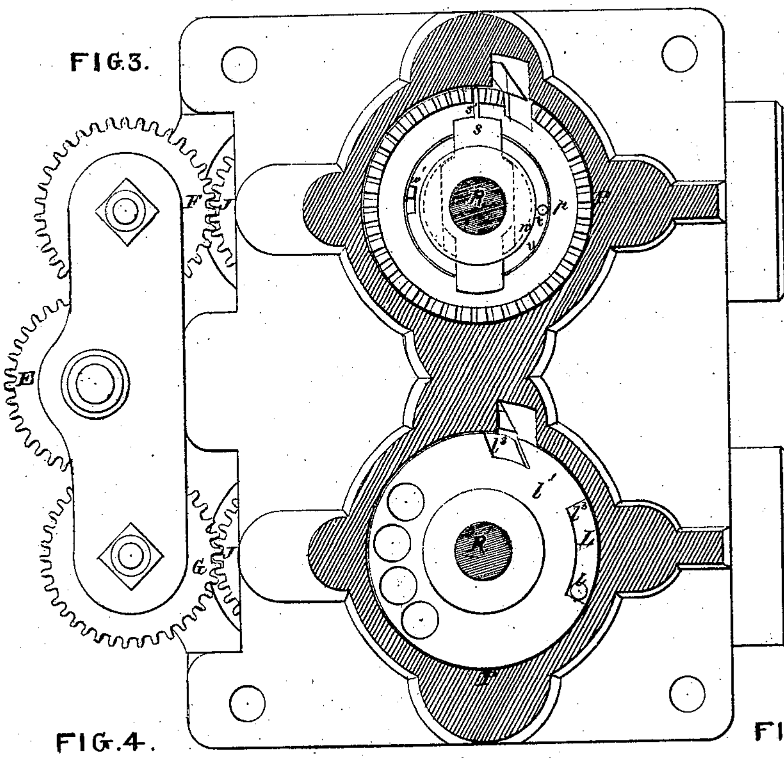


FIG. 4.

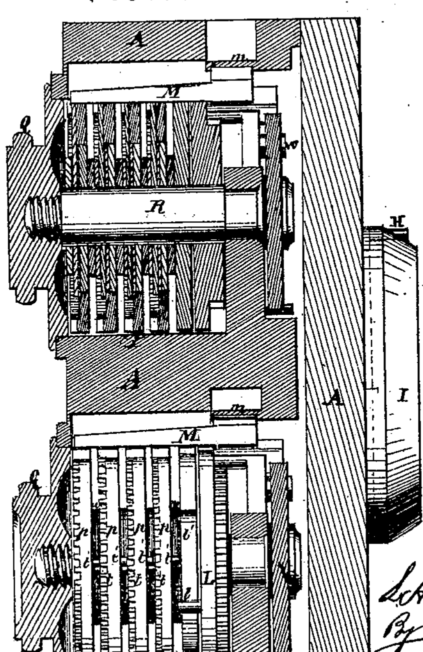
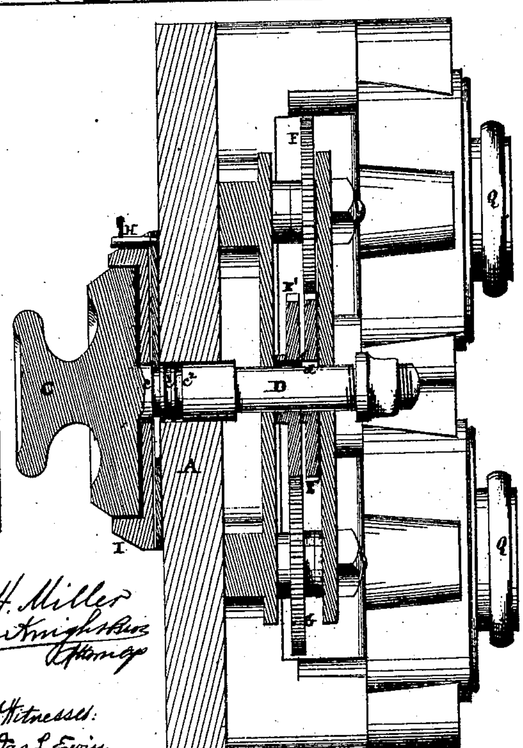


FIG. 5.



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United States Patent Office.

LUKE H. MILLER, OF BALTIMORE, MARYLAND.

Letters Patent No. 107,190, *dated September* 6, 1870.

IMPROVEMENT IN PERMUTATION-LOCKS.

The Schedule referred to in these Letters Patent and making part of the same.

I, LUKE H. MILLER, of Baltimore, in the State of Maryland, have invented a new and useful Improvement in Locks, of which the following is a specification.

Nature and Objects of the Invention.

One part of my improvement consists of an arrangement by which one key or shaft is made to operate either or all of two or more locks, separately or together.

Another part of my improvement consists of an arrangement by which the fence is operated and applied.

The fence is hinged to a moving arm, and suspended by its hook when the arm is pushed back, and is lowered into position to try the tumblers at certain times, not resting upon them all the time.

When the proper time arrives for the fence to drop, it is pushed forward by a dog, and falls into the gates of the tumblers. It then becomes the means of moving the bolt.

Description of the Accompanying Drawing.

Figure 1 is a vertical section on the line *y y*, fig. 2.

Figure 2 is a horizontal section on the line *v v*, fig. 1.

Figure 3 is a vertical section on the line *z z*, fig. 2.

Figure 4 is a section on the line *w w*, fig. 1.

Figure 5 is a section on the line *x x*, fig. 1.

The arrows in the vicinity of the section lines show the direction of vision.

General Description.

The illustration shows two locks, arranged to be operated singly or coincidentally by a single knob-spindle.

A A are the plates of the lock, and

B B are the bolts.

C is the knob, and

D, the spindle by which the bolts are operated.

On the spindle D is a short spline, feather, or tooth, *d*, which has a length equal to the thickness of one of the parallel wheels E E′.

Of these wheels the former E engages with the wheel F, which works the mechanism of the upper lock, and the latter E′ works the mechanism of the lower lock.

The spindle D has three adjustments. It is capable of being arranged to work the upper lock only, to work the lower lock only, or to work the two locks simultaneously.

I may here mention that the device which I am now describing may be extended to operate more than two locks, but I will continue to describe it as applicable to two, as it is within the skill of a workman to extend the arrangement to suit a greater number, and I desire to make the description as plain as possible.

To resume: The slide H is capable of vertical motion in a slot at the rear of the escutcheon I, and, when in working position, enters one or another of the circular grooves c c^1 c^2 in the periphery of the spindle D, (see fig. 5.)

When the slide-gate H is raised, the spindle D may be drawn out or pushed in to such an extent as to bring either of the three grooves c c^1 c^2 beneath the slide, and, the latter being dropped into the one desired, the spindle is held to a certain longitudinal adjustment thereby.

When the spindle is thrust in to the full extent, (as shown in fig. 5,) and the gate H dropped into the outer notch c, the tooth or short spline occupies a key-seat in the wheel E, and the last-mentioned wheel is operated by the motion of the knob C and spindle D. In this position of the spindle the upper lock only is actuated by the movement of the spindle.

When the gate H is lifted and the spindle D drawn outward to its full extent, the gate H may be dropped into the inmost of the three grooves, c^2, and then the tooth d will be entirely within the key-seat of the cog-wheel E′. In this position of the spindle D the wheel G is moved and the lower lock is actuated.

When the adjustment is varied, so that the gate H occupies the middle groove c^1 of the spindle, the tooth or spline d is partly within the key-ways of each of the wheels E E′, and the motion of the spindle is communicated, through the said wheels, to the wheels F and G, so as to operate the upper and lower locks simultaneously.

By means of this arrangement either one of the locks may be used and the other disused, or they may be locked separately, on different combinations, and opened separately, by different parties, who may each be unaware of the other combination, or they may be operated together on one combination.

I may mention that the lock illustrated is specifically intended for a check-lock, but may be used for operating a safe or other door-bolt, if desired. By check-lock I mean one which is so applied to the door as to hold the door-bolts.

The bolts of the check-lock do not themselves hold the door, but are the means of detaining the bolts that do.

This arrangement may be utilized in such a manner that the unlocking of either of two locks will release the door-bolt, so that, if one lock should get out of order, the withdrawal of the bolt of the other will allow the door-bolt to be retracted.

By my invention either of the locks is moved by the same knob and spindle, avoiding the duplication of the parts which penetrate the door-casing.

I have referred to the action of the spindle upon the wheels F G, either separately or simultaneously, and I will describe the mode in which the said wheels are made effective in operating the respective locks. As the action of the wheel F, in operating the upper lock, is exactly similar to that of the wheel G in operating the lower lock, the description of one will suffice for the two.

The wheel G acts upon a cog-wheel, J, on a stem, *g*, and the last-mentioned wheel acts upon another one, K, shown by dotted lines in fig. 1.

This wheel K is fast to a circular-gated plate, L, and rotates the latter.

The rotation of the plate L, when the fence M falls into the gate, is the means whereby the bolt is moved in unlocking.

The fence M falls by gravitation, when free to do so, and is raised by the contact of the circular plate L.

It is pivoted to the end of the arm N, which is thrown upward, in the direction of the arrow, by means of the spring *n*, so that the back-hook of the fence M shall hook onto the prong *m* of the plate A.

In the boxes P P is a set of gated tumblers, *p p p p*, which slip upon the stem R, and are actuated in the way usual in permutation-locks.

The gated plate L has a stud, *l*, which protrudes through a guard-plate, l^1, and reaches to a pin on the adjacent side of the first tumbler-wheel *p*.

On the other side of the tumbler-wheel is another pin, which acts upon the next tumbler-wheel in series, and so on.

Q is the cap-plate, which covers in the chamber.

Between the adjacent tumbler-wheels are washers, to preserve relative distance.

The edges of the nests of tumblers are shown in fig. 4. In this view the tumblers of the upper lock are shown in section, and in the lower lock are shown in elevation.

In fig. 3 the tumbler *p* is shown in broadside view.

In the box P of the lower lock the guard-plate l^1 is shown in broadside view, the gate l^2 and a long notch, l^3, being visible.

The gate is to be occupied by the fence M. The longer notch is to allow a certain play of the pin *l* in operating the guard-plate, as will be more specially described when speaking of the operation.

S is a dog, pivoted to plate A, and operated by a pin, *k*, on the cog-wheel J, to push forward the fence M, so as to free it from the prong *m*, once at each revolution of the wheel L, in order to try whether the gates of the wheel L and of the tumblers *p p p p* are in position to receive the fence.

T is a cam on the wheel J. Its purpose is to shoot the bolt B by pressure against the pin V.

W is a pin on the arm N. Its duty is to communicate the motion of the fence M and arm N to the bolt B in opening. For this purpose it occupies a notch in the said bolt.

The tumblers *p* have a peculiar arrangement for giving them their set by the series of numbers, so that the lock may be locked on a systematic series, which must be regarded in the act of unlocking, or the fence cannot fall into the gates of the tumblers, a failure which would prevent the unlocking.

As usual in gated-tumbler locks, it is necessary that each tumbler should be exactly adjusted, so that the gates should range in line to receive the fence.

The tumbler *p* has on its face a series of cogs, the spaces between which are numbered, as shown in fig. 3. There are, say, one hundred interdental spaces on this face-wheel.

s is a sliding-plate in the hub of the tumbler, having a tooth, *s'*, which is capable of being engaged in any one of the interdental spaces, according to the choice of the party who determines the permutation arrangement.

The slide-plate *s* incloses the stem R, and may be slipped back for a change in the arrangement when it is removed from the stem, but the latter prevents its shifting when it is in working position on the stem.

The slide is capable of longitudinal adjustment in the hub, and its purpose is to secure the pins *t t'* on each side of the hub, in any determinate position at which they may be placed, so as to have the proper action in the process of setting the tumblers according to a given permutation arrangement.

The hub *w*, when the tooth *s'* is withdrawn from engagement with the cogs of the tumbler-wheel, is capable of being slipped around inside of the web of the wheel *p*, and, when the desired circular position is attained, the plate *s* is slipped so that the tooth *s'* enters between two of the cogs, and, the wheel being placed on the stem R, the adjustment is secure.

The pin *t'* is fixed on one side of the hub, and receives the impulse of a pin on the face of the next previous tumbler in the series.

The pin *t* is on an annular plate, *u*, on the face of the tumbler, and has a certain degree of play in a circular path, limited by the pin *w'*. This is to allow it to slip a little on one side or the other, in case the tumblers are set in consecutive numbers, which brings all the pins *t'* into line, and therefore renders it necessary that the pins *t* shall give way a little.

Operation.

I will now describe the operation of opening one lock. The two (or more) locks being similar in construction and coincidently operatable, if desired, a description of the operation upon one will answer for each, or, in fact, for all.

Suppose the bolt to be shot in locked position; the person in possession of the arrangement of letters upon which the tumblers are arranged takes hold of the knob and turns it to the right and left alternately, so as to arrange the tumblers in order, in the manner familiar to those acquainted with this branch of mechanism. This having been done, the knob C is turned back a little, in order to bring the notch in the guard-plate into position for the fence to fall into it, the rotation of the knob being continued. A pin, *k*, on the wheel J comes beneath the dog S and lifts it, so that it pushes against the hub of the fence M, thereby moving back the arm N and releasing the fence from its engagement with the point *m*. The fence now falls into the gates of the plate L and the tumblers *p*. The rotation of the knob is still continued, the guard-plate L being moved by the intervention of the gear-wheels. The fence is now in the gate, and the motion of the wheel L is communicated by the fence M to the arm N, whose stud W acts in a notch of the bolt and pushes back the latter. This completes the unlocking, and the parts rest in this position till it is to be locked.

To shoot the bolt, the knob is turned in the reverse direction, when the cam T on the wheel J presses against the pin V on the bolt B, and pushes out the latter. The pin *k* now comes beneath the dog S, and the latter pushes forward the fence. The motion of the knob being continued, the slanting side of the gate comes beneath the nose of the dog and lifts it out of the gate. The nose of the dog now rides upon the rim of the plate L, and, as soon as the pin *k* has passed the dog, the spring *n* comes into effect, and the fence is drawn back into the position shown in the lower lock, fig. 1. The knob is now rotated a few times, to destroy the arrangement of the tumblers, and the device is considered locked.

It is probable that the lock will be most frequently made as a combined lock, two or more sets of works in one box.

I do not limit myself to any particular application of the device, whether the locks being combined in one box or placed in separate cases.

I am aware that locks have been made with multiple bolts, which are shot simultaneously by a single motion of the key, but in these cases the mechanism by which the bolts are retained is common to all. I do not call such "double locks," because the locking-part is single, and the multiple feature only belongs to the bolts. I therefore use the term double lock to mean two locks in one case, each having its own arrangement of devices for holding the bolt in position. The expression "two (or more) locks" signifies that the locks are separated, that is, not in one case.

Claims.

What I claim as new is—

1. A combination of two or more locks, or a double lock, whose bolts are operated simultaneously by a single motion of a common spindle.

2. A combination of a single spindle, or dial and spindle, and two or more locks, or a double lock, operated thereby unitedly or either separately.

3. The fence M, hinged to a moving arm, and so arranged as to be held aloft by a stationary hook from the guard-plate or tumblers during the greater portion of the time, and lowered once in each revolution of the said plate, to try whether the gates are ready to receive it.

4. The fence M, arm N, and spring *n*, in combination with the guard-plate L, and a periodical tripping or actuating device, to wit, the pin *k* and dog S, or equivalent device.

5. The spindle D, with a longitudinal adjustment, the spline-wheels E E′, and upper and lower wheels F G, forming an arrangement by which either of the locks may be operated at will.

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