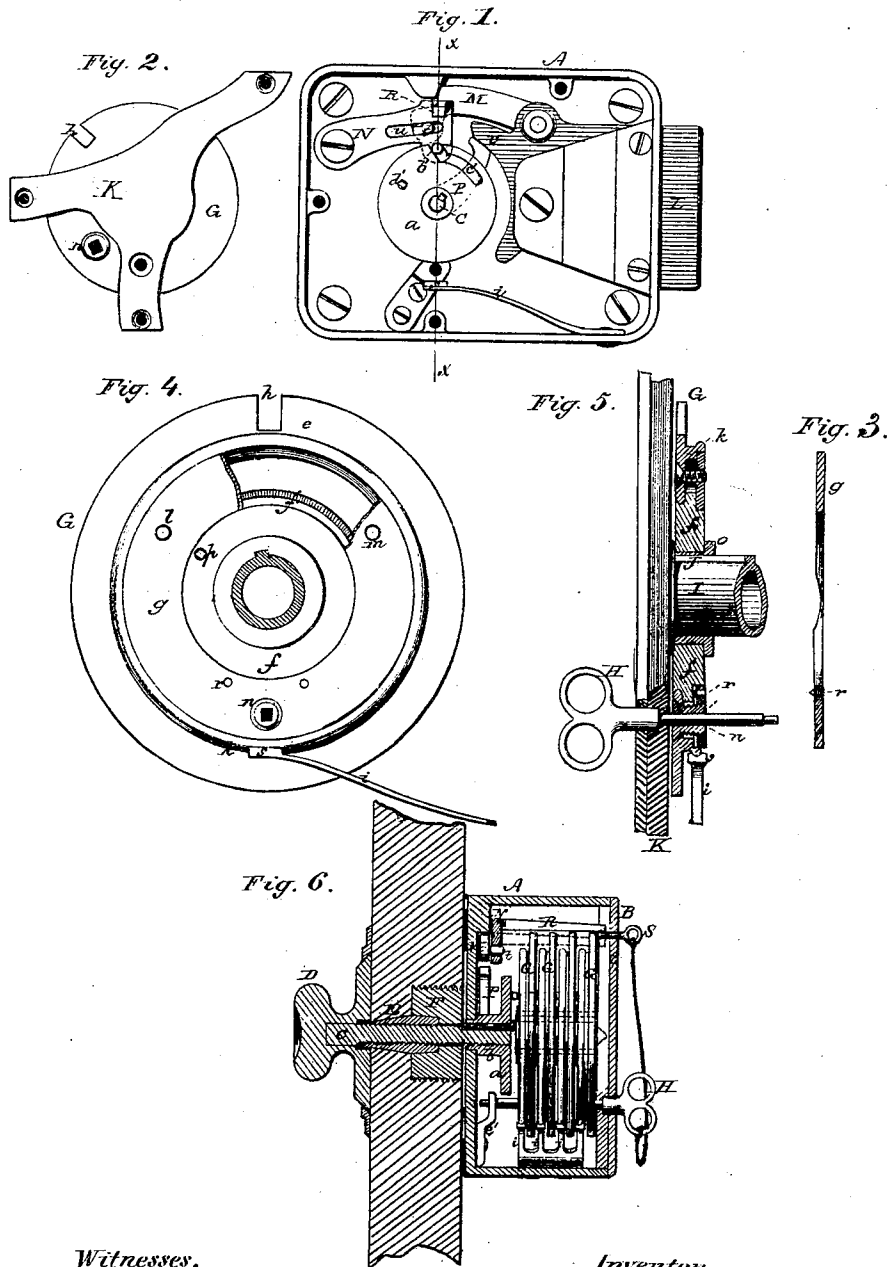


W. F. Kistler,

Permutation Lock.

No. 105091.

Patented July 5, 1870.



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United States Patent Office.

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Letters Patent No. 105,091, dated July 5, 1870.

IMPROVEMENT IN PERMUTATION LOCKS.

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

To all whom it may concern:

Be it known that I, WILLOUGHBY F. KISTLER, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Burglar-Proof and Combination Locks, of which the following is a specification, reference being had to the accompanying drawing.

My invention relates to burglar-proof and combination locks, and consists in the novel construction of the spindle, in connection with a conical nut.

Also, in the employment or use of short pins for preventing the parts of the tumblers from sliding in the least upon one another.

Also, in providing the disk connected with the spindle in the interior of the lock with a peculiarly-shaped slot, for compelling the dog to drop into the tumblers, when gated, during a very short movement of the disk, as hereinafter explained.

In the drawing—

Figure 1 is a plan view of the interior of the lock, with the back part of its case, and with the brace or cross-piece supporting the arbor and tumblers thereon, removed.

Figure 2 is a view of a part detached.

Figure 3 is a cross-section of one of the annular plates detached from one of the tumblers.

Figure 4 is a side or face view of one of the tumblers, with a portion of its annular plate broken away, and with a friction-spring bearing against it.

Figure 5 is a cross-section of one of the tumblers mounted on the arbor, showing a portion of the arbor in perspective, the balance being broken off.

Figure 6 is a vertical cross-section of the lock, with all its parts in place, on the line $x\ x$ of fig. 1.

The case A of the lock is constructed in the usual manner, and of any form desired, its rear side, B, shown in fig. 6, being removable.

The spindle C is made small, and of uniform diameter, with a screw-thread extending, from its inner toward its front end, as far as desirable or necessary. This spindle may be inserted from either side.

If inserted from the front side, the knob and dial-plate D can be connected to it before it is inserted.

After being inserted, a double conical-shaped or tapered nut, E, covering a considerable portion of its length, is screwed upon it from the inside of the door on which the lock is placed, and this nut is held in place by another nut, F, screwed into a recess made for it in the inside of the door, and then on the inner end of the spindle, and within the case of the lock a disk, a, with a deep shoulder or body, b, is attached, all as clearly shown in fig. 6.

As the spindle C only requires to be strong enough to operate the lock, it can be made of small diameter, and, together with the nut B, which is long, tapering, and with a comparatively thin shell or body, can, with

the screw-threads on each, be thoroughly hardened. They are both made of the best steel, so that, when hardened, the spindle cannot be driven through the nut, or drilled or cut.

As is well known, burglars frequently enter locks by withdrawing the spindle, when it tapers toward the knob, or by breaking off the knob, and then driving the spindle in, when it tapers from the knob, or by drilling or cutting it out. The spindle constructed as herein described, with the nut attached, it will be seen, can neither be withdrawn or driven from its position, and it cannot be drilled or cut out, because it is so small and hard that no tools can be brought to bear effectively upon it.

The tumblers G of the lock are all constructed in a similar manner.

Each consists of three annular plates, $e\ f\ g$, constructed and arranged as clearly shown in figs. 4 and 5, so that the middle plate f may be held by the other two, e and g , which are fastened by screws.

The plate e is provided on its edge with a gate, h , and on a line with the bottom of this gate, and concentric with its periphery, it is made thicker, the edge of this enlargement being raised, so as to form a flange, k , with a curved surface, as a bearing for a friction-spring, i , as shown in fig. 4.

Below the flange k the plate is recessed, and in this recess is placed the middle plate f , constructed as shown in fig. 5, so as to have its central portion form a part of the face of the tumbler on each side, and so as to be held by the outside plates when the same are drawn together by the screws $l\ m$, and n , the latter having a square hole through it for the insertion of a key, H, as hereinafter explained.

The annular plate g is so constructed and arranged that, when held by the screws l and m alone, the screw n being loosened, it will release its hold on the plate f , and allow it to turn loosely and freely between the plates e and g , but, when the nut n is tightened, it is held fixed.

On this plate f are pins, p , which engage with corresponding pins on the next adjoining tumblers, and this plate is held immovably within the others by means of two hardened steel pins, r , rigidly attached to plates g . These pins r have sharp points, as seen in figs. 3 and 5, which, when the plates g and e are drawn tightly together by the nut n , bind them firmly together, so that they cannot move on one another.

The tumblers, thus constructed, are mounted on an arbor, I, having hubs J upon it, as shown in fig. 5, arranged so as not to turn on the arbor, the tumblers turning on the hubs.

There is a hub for each tumbler, and it is provided with a flange, o , as shown in the same figure, to keep the tumblers apart, so that they may move independent of each other.

The arbor I is attached to a cross-piece, K, made triangular, as shown in fig. 2, or in any other suitable shape, and this cross-piece is attached to the case within its back plate, as shown in fig. 6, so that the center of the arbor will be in line with the center of the spindle.

To the inner lower side of the case A is attached a series of spring-arms, *i*, with a grooved friction-plate, *s*, on their ends, so arranged that the end of each spring will bear against the corresponding or opposite flange *k* of each tumbler, as shown in fig. 6, so that the tumblers can only be moved by the application of some direct, positive means, and thus preventing their movement by shaking or jarring, when such means are tried for gating them. Friction-springs may be used in some other form, but I have found the form above described effective.

To the bolt L of the lock is pivoted an arm, M, having its free end provided with a pin, *t*, which enters a slot, *u*, in an arm, N, pivoted to the case A, as shown in fig. 1.

The free end of the arm M is turned down at right angles with its length, so as to form a catch or bearing for an arm, P, attached to the disk *a*, to engage with, in order to withdraw the bolt, the arm P afterward carrying the bolt forward by bearing against a shoulder, *v*, on its near side, as shown in the same figure.

The free end of the arm N has a pin, *b*, projecting from its side, below the slot *u*, which, when the tumblers are gated, enters a slot, *c*, shaped as clearly shown in said fig. 1, and, in entering it, a dog, R, attached to and projecting from the same arm, enters into the gates of the tumblers, as shown in fig. 6. The slot *c* in the disk *a* enters it first at an angle, and then runs concentric with the edge of the disk, and the pin *b* only falls or passes into this slot when the gates of the tumblers are in a line, so as to allow the dog R to drop into them. The length of this slot is determined by, or determines the length of the movement of the bolt.

When the tumblers are not gated, the pin *b* is held up from the periphery of the disk *a* by the dog R, which rests on the edges of the tumblers, and which also holds up the arm M and N, so that the arm P may pass freely under without touching them.

In operating the lock, the combination being known, it is only necessary to gate the tumblers, which is done by turning the disk *a*, by means of the knob D,

a pin, *d*, on the disk engaging with a corresponding pin on the tumblers next to it, and so on, for the purpose. At the moment the tumblers are gated the pin *b* enters the slot in the disk, and the dog R enters the gates in the tumblers, thus allowing the arms M and N to drop down, when, by a continued movement of the disk *a*, its arm P engages with the arm M pivoted to the bolt, and withdraws the bolt.

When for any reason it is desired to change the combination of the tumblers, a pin, *s*, is placed in a hole made in the rear side of the case, so as to pass under the end of the dog R, and hold it and its connections, the arms M and N, up free from the disk *a* and tumblers G; then the key H is inserted through the rear of the case, and, as the tumblers are now supposed to be gated, on through the nuts *n* in the tumblers, until its extreme end, which is round, enters a bearing, *e*. The key H is then turned, and with it, of course, the nuts *n* in the tumblers, which releases the middle plate of the tumblers, upon which are the engaging-pins, so that the whole are free for being set on a new combination, as desired, and, when so set, it is only necessary to turn the key H to lock them, the middle plates, in their new position. In this way, it will be seen, a new combination can be made without taking out any portion of the lock.

Having thus described my invention,

What I claim is—

1. In a burglar-proof lock, a hardened steel spindle, C, of uniform size, in combination with a conical-shaped nut, E, made of steel and hardened, constructed and arranged substantially as and for the purpose set forth.

2. In combination with the plates of the tumblers G, the steel pins *r*, constructed and arranged substantially as and for the purpose set forth.

3. In connection with a spindle, arranged independent of the arbor upon which the tumblers are mounted, a disk, *a*, having a slot, *c*, of uniform width, entering its periphery at an angle, and then running concentric with the periphery, when constructed and arranged so that the pin *b* and the arm R, both of the arm N, shall enter the slot *c* and the gates of the tumblers respectively at the same time, in the manner substantially as herein shown and described, and for the purpose set forth.

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Witnesses:

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