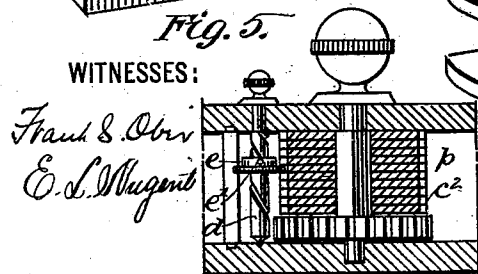
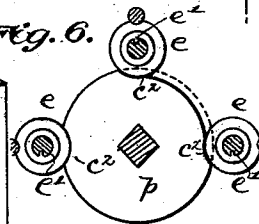
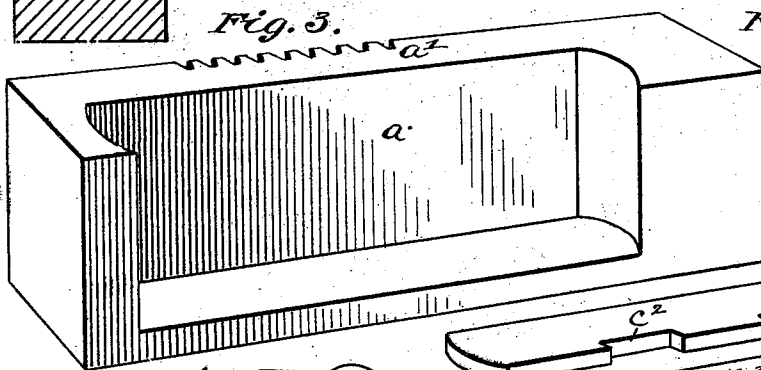
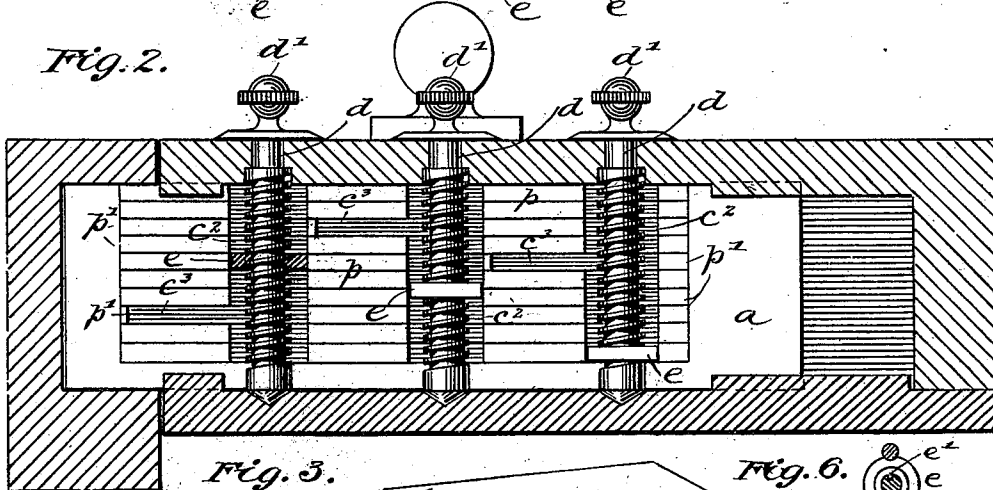
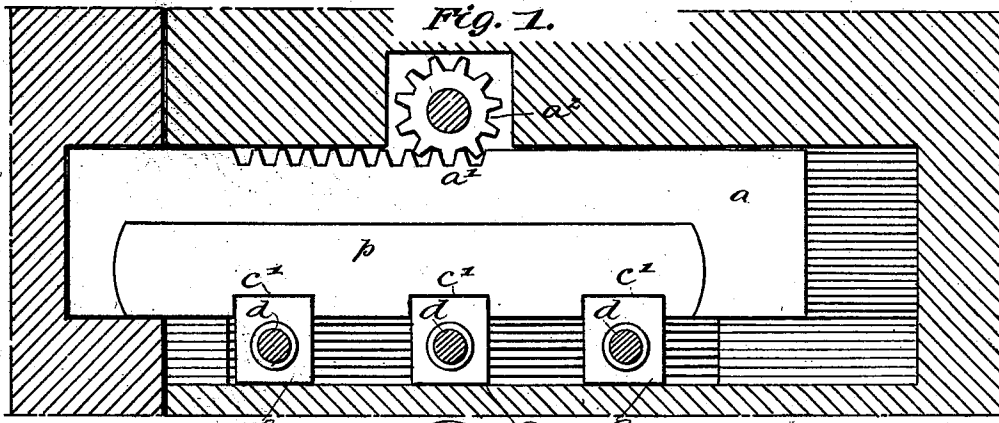


(No Model.)

J. RICHARDSON.
COMBINATION LOCK.

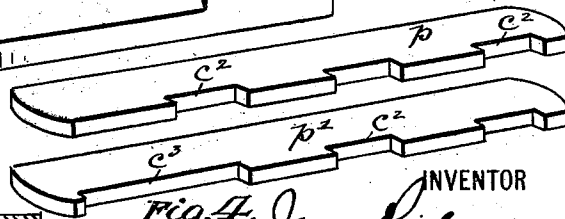
No. 568,795.

Patented Oct. 6, 1896.



WITNESSES:

Frank S. O'Brien
E. L. Nugent



INVENTOR
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BY
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ATTORNEY

UNITED STATES PATENT OFFICE.

JAMES RICHARDSON, OF NEW YORK, N. Y.

COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 568,795, dated October 6, 1896.

Application filed December 23, 1895. Serial No. 572,995. (No model.)

To all whom it may concern:

Be it known that I, JAMES RICHARDSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Combination-Locks, of which the following is a full, clear, and exact description.

The object of this invention is to provide a simple and cheap combination-lock which will defy the skill of experts to throw the bolt without the knowledge of the combination. In most combination-locks heretofore devised there has been something in the construction or the method of operation by which an expert in attempting to pick the lock might know when the tumblers were in position to release the bolt. This is sometimes accomplished by the senses of hearing or feeling and sometimes by subjecting the lock to a jarring or tapping operation which causes certain unbalanced and pivoted portions of the lock mechanism to gradually work into the release position or to form a position from which the release position might be calculated or ascertained.

In my invention I have striven to produce a lock that gives no signal or indication whatever externally as to the position of the parts inside, and thus to render it practically impossible to throw the bolt unless the combination is known or the lock destroyed.

My invention consists of the construction hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 represents a section through the lock-casing, showing the bolt in side elevation. Fig. 2 is a similar view showing the bolt in plan. Fig. 3 is a perspective view of the bolt. Fig. 4 is a perspective view of one of the combination-plates. Figs. 5 and 6 illustrate a modification of my invention.

The bolt is represented by *a*. It may be provided with a rack *a'*, with which a pinion *a²* may be arranged to engage for the purpose of throwing the bolt, the pinion being on the shaft of any suitable knob or crank exposed in a position to be grasped by the hand. In one side of the bolt an elongated rectangular

cavity is formed. This cavity is to be filled with a series or battery of plates *p p*, &c., which fit into it one on top of the other, they being loosely disposed therein and all being of the same general shape. I have shown ten plates. Each of them is provided with three rectangular notches *c'*, similarly located, so that when the plates are in position the notches will be in line with each other and form three grooves *c²* on the side or face of the bolt. Three of these plates *p' p' p'* will have one of their notches extended lengthwise a distance about equal to the throw of the bolt, as indicated at *c³*, the location of the extended notch in each plate being such as to provide one for each groove *c²*. Directly in front of the grooves *c²* and parallel to them is a shaft *d*, having bearings at its extremities in any suitable part of the casing of the lock, in which it is free to turn, and provided with a screw-thread extending through the portion covered by the groove *c²*. On these shafts will be placed nuts *e* of such shape and size as to project and fit into the respective grooves *c²*, by which they are prevented from rotating. Each shaft projects through the lock-casing and carries a knob *d'*, by which it may be rotated. The knob may carry a pointer or index to move around a dial to indicate the number of rotations and position of the shaft. By rotating these knobs it will be observed that the nuts will move longitudinally along the shafts and may be caused to assume any position thereon. The thickness of the nuts is a trifle less than that of the plates. Any of the three nuts will detain the bolt unless it is opposite one of the plates *p'* whose extended notch is presented to the nut. Therefore it becomes necessary that the shafts *d* be rotated to bring all of the nuts opposite their respective extended notches before the bolt can be thrown.

The pitch of the threads on shaft *d* will have to be calculated so that a certain number of turns or a fraction of a turn will cause the nuts to travel past one plate. The thread may be such as to carry the nut from one end of its groove *c²* to the other in a single rotation of the shaft, or it may require ten rotations, or any other number, as may be desired.

able. In setting the mechanism for a given combination the various positions of the plates are given a number or letter, say beginning from "1" to "10." Then the three plates p' are placed in the series to make a given combination. For instance, for the combination "8 3 5" a plate p' with its extended notch located at the left end would be placed in the eighth position from the top, another plate p' with its extended notch in the middle would be placed in the third position, and the third plate p' with its extended notch at the right-hand end would be placed in the fifth position. To release the bolt on this combination, the shaft d to the left would first be rotated to carry its nut to one extremity or the other of its groove c^2 . Then reversing the rotation of the shaft it is given the proper number of turns or fractions thereof to carry its nut to the eighth position, any fraction of a turn being indicated by the dial, when the nut will stand ready to pass into the extended portion of the notch in the eighth plate. The middle shaft and the shaft to the right are manipulated in the same way to bring the nuts which they carry respectively opposite the extended portion of the notch in the third and fifth plates. The bolt is released and may be thrown by means of the knob acting through pinion a^2 and rack a' . To change the combination, it is only necessary to change the positions of the three plates p' in the series. With three shafts and a series of ten plates a very large number of combinations may be made. For simpler locks fewer plates p and p' and one or more shafts may be used. To confuse any one who might attempt to open the lock without authority, one or more shafts may be "blank," that is, without a nut.

40 In the modification of the invention shown in Figs. 5 and 6 the invention is applied to the shaft of the knob K , that is used to throw the bolt, instead of to the bolt. The plates p are here in the form of disks with a square hole in the center through which the square shaft k of the knob passes. The nut e (shown here as circular) carries a pin e' , which projects into a spiral groove formed in shaft d . This takes the place of the threads in the form first described.

There may be one or more shafts d , and the knobs d' , by which they are manipulated, stand around the base of the main knob. The notches are formed in the edges of the disks, they being curved to fit the circular nuts e , and the extended notches c^3 run around the periphery a short distance. When all of the nuts e have been properly placed in front of their respective extended notches, the knob 55 can be turned, but not otherwise. The gear-wheel f , carried by the shaft k , is supposed to engage with a rack on the bolt.

It will be observed that no external indication whatever is given when a nut arrives in 65 front of an extended notch. There is no click

to be heard, and no change of friction on the shaft to be felt. The nuts are always balanced and cannot be thrown to any particular position by jarring. Hence it would be extremely difficult to throw the bolt without 70 knowledge of the combination.

Having fully explained my invention, I claim—

1. In a lock, the combination of a bolt or device moving therewith, one or more grooves or guides in said bolt or device, a traveling detent in each of said grooves or guides, the grooves or guides each having an opening adjustable in position through which its detent may pass when the bolt or device is moved. 80

2. In a lock, the combination of a bolt or device moving therewith, a series of plates each provided with an abutting shoulder one or more other plates distributed through said series of plates and without an abutting 85 shoulder, a traveling detent adapted to move past said plates and to engage with said shoulders to detain the bolt, and means for moving the detent to a plate without a shoulder to release the bolt. 90

3. In a lock, the combination of the bolt, a series of plates moving therewith and arranged in a tier, each plate carrying a number of abutting shoulders, the shoulders of each plate being respectively in rows with 95 each other; a number of other plates interspersed between the plates of said series in the tier but without abutting shoulders, a number of detents equal to the number of rows of shoulders and corresponding respectively thereto, said detents being adapted to 100 impinge against said shoulders to detain the bolt, and means for moving said detents to positions opposite the plates having no shoulders thereby releasing the bolt, substantially 105 as described.

4. In a lock, the combination of the bolt a series of plates moving therewith and arranged in a tier, each plate carrying a number of abutting shoulders, the shoulders of 110 each plate being respectively in rows with each other; a number of plates interspersed between the plates of said series in the tier and interchangeable in position therewith but without abutting shoulders, a number of 115 detents equal to the number of rows of shoulders and corresponding respectively thereto, said detents being adapted to impinge against said shoulders to detain the bolt, and means for moving said detents to positions opposite 120 the plates having no shoulders thereby releasing the bolt, substantially as described.

5. In a lock, a series of plates each provided with a notch in its edge, the plate being placed to bring the notches in line to form 125 a groove, the notch in one plate being longer than those in the other plates, in combination with a detent occupying said groove and means for moving it therein to bring it to the extended notch for the purpose set forth. 130

6. In a lock a series of plates moving with the bolt a plurality of grooves being formed across the edges of said plates by similarly-shaped notches in each plate registering with one another, a traveling detent in each groove preventing the movement of the plates and bolt one or more of the plates having a notch extended to form a cavity adapted to receive the detent when the plates are moved in a lateral direction with respect to the grooves. 10

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

JAMES RICHARDSON.

Witnesses:

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E. L. NUGENT.