L. DERBY.

COMBINATION LOCK.

No. 28,162. Patented May 8, 1860.

Fig 1

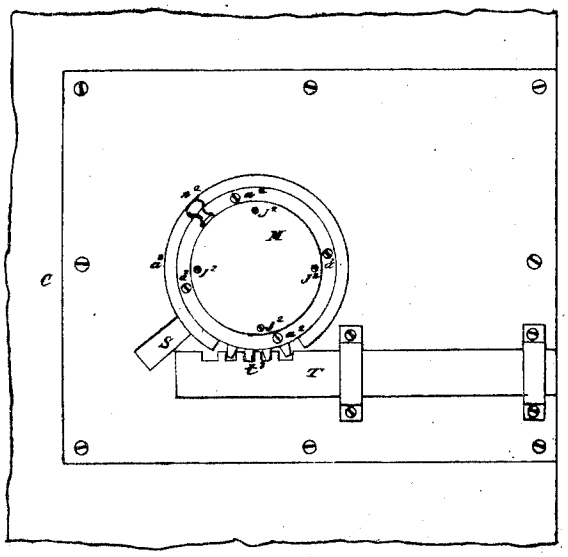


Fig 2

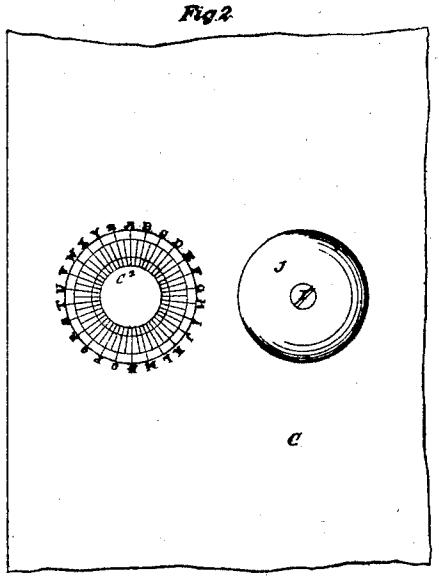


Fig 3.

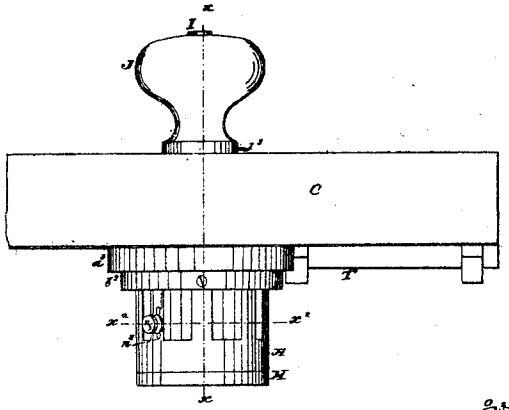


Fig 4.

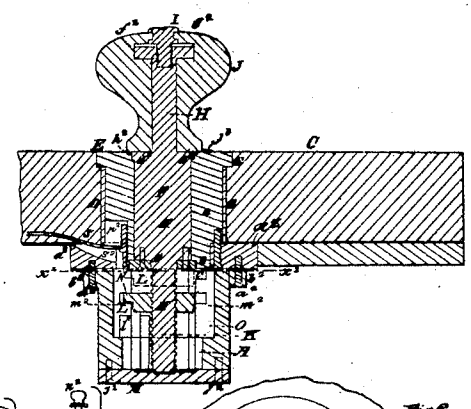


Fig 5

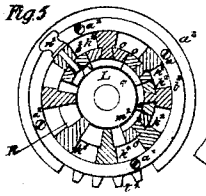


Fig 7.

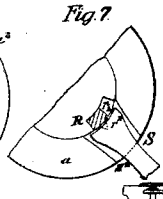


Fig 9

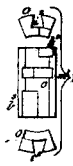


Fig 10.

Fig 8.

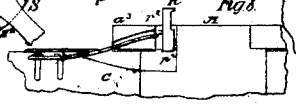
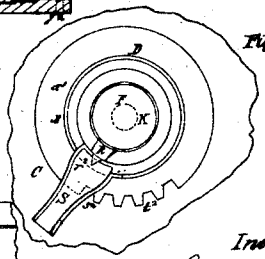


Fig 6



Witnesses

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UNITED STATES PATENT OFFICE.

LYMAN DERBY, OF NEW YORK, N. Y.

LOCK.

Specification of Letters Patent No. 28,162, dated May 8, 1860.

To all whom it may concern:

Be it known that I, LYMAN DERBY, of the city, county, and State of New York, have invented certain new and useful Improvements in Combination-Locks for Safes, Doors, and other Places and Purposes; and I do hereby declare the following to be a full description of the same.

The nature of my invention consists in making and operating a combination lock, by means of a screw and nut working in an inclosed case or barrel in which are arranged a series of longitudinal bars, on four of which are arranged independent sliding tumblers, having notched upper and lower opposite corners, and transversely of their inner faces a channel or groove, to correspond with a channel or groove in the face of an adjustable or combination tumbler also arranged on one of the longitudinal bars, so that a pin on the nut or key may traverse throughout the channel to enter a guide way to operate by the reversal of the screw on a self adjusting detent pin or stem, having a shoulder on it resting on the end of a detent spring for holding the barrel or lock from rotating to project the bolt out or back. But to describe my invention more particularly I will refer to the accompanying drawings forming a part of this specification the same letters of reference wherever they occur referring to like parts.

Figure 1, is a view of the lock as it appears on the inside of the door. Fig. 2 is the front of the door, showing the knob, and at the side of it a dial plate but not seen under the knob and therefore exhibited in red outline at the side of it. Fig. 3, is a view of the door as seen when the lock is attached thereto. Fig. 4, is a longitudinal cutsection of the door and knob, through the line x—x, Fig. 3. Fig. 5, is a transverse cutsection of the barrel of the lock and tumblers through the line x^2 x^2, Fig. 3. Fig. 6, is a plan-view of the lock through the line x^3, x^3, Fig. 4, for exhibiting the detent spring and stem for operating it. Fig. 7, is a detached plan view of the underside of the detent spring for exhibiting the recess into which it locks to hold the barrel from revolving to project the bolt, till released by the depression of the stem resting upon it. Fig. 8, is a vertical cutsection of a portion of the barrel, exposing a side view of the detent spring and stem for depressing it. Fig. 9, are detached face, and end views of the tumblers. Fig. 10, is a view of the combination tumbler.

Letter A, is the barrel of the lock, which may be made of brass or other metal and of any size desired. To the front or inner end of it, is attached by means of a flange b^2, and screws a^2, a hollow axle B, of sufficient length to extend through the door C, on which is secured a metallic box D, for it to work in.

Letter E, is a shoulder or flange formed on the outer end of the hollow axle B, which by means screws through the flange a^3, attached to the barrel A, (and extending beyond the edges of the box D,) unites or combines the hollow axle and barrel of the lock together, to hold them firmly in contact with the door, though permitting a slight rotatory motion in the box D, to project the bolt out and back again.

Letter C^2, are a series of letters like a dial, formed on the external face of the hollow axle B, for the purpose of registering the working of the tumblers to open the lock.

Letter F, is a cylindrical axis, though may be made slightly tapering if deemed most advisable for preventing the possibility of driving the axis through the door. On the outer end of it is a shoulder d^2, which fits into a recess in the inner edge of the hollow axle to prevent it from being forced through it by external violence. On the inner end of it is screwed a cap plate G by screws e^2, to prevent the withdrawal of the axis from the hollow axle or box B, though allowing it to have a rotatory motion.

Attached to the outer end of the axis F, is a stem H, on which is a square head f^2. In the end of the stem is cut a female screw, with which fits a thumb screw I, having a rim n flange g^2, under its head for the purpose of connecting it with the knob J, when fitted on the stem, so that as the screw is turned it will connect or disconnect the knob with or from the dial or hollow axle to rotate it. This knob is made in two parts. In each half are cut square recesses, so that when fitted together on the

stem they form a box in which fits the square head f^2. The depth of this recess is perhaps about the eighth of an inch greater than the thickness of the head f^2. The object of this is to allow the knob to draw back on the stem, to release it from the dial or hollow axle; but when it is desired to connect the knob, and lock together, the thumb screw is turned down so as to cause the teeth h^2, to engage with recesses in the dial, when the whole can be rotated together for the purpose of projecting the bolt.

In operating the tumblers, the knob is disengaged from the dial or hollow axle—by which operation the knob is only in connection with the axis F, and screw K, attached to its inner end. This screw extends down into the barrel A, of the lock, for the purpose of operating the tumblers by means of a screw nut D, working thereon. This nut is prevented from working off the screw, by means of a cap plate M, secured by screws j^2 on the back end of the barrel A. On the side of the nut is a pin or shoulder N, the object of which is to operate a series of tumblers O, and a detent for preventing the bolt of the lock or door from being projected out or back. These tumblers are oblong blocks (though this precise form is not absolutely necessary) of unequal lengths. In their backs are grooves i^2, to fit on slides k^2, attached to the inside of the barrel. On their faces, the upper and lower opposite corners are cut out l^2 and l^3 and transversely of their faces is cut a channel or groove m^2, to match a corresponding channel or groove cut in the face of a fixed or combination tumbler O^2. This combination tumbler is adjusted by means of a set screw N^2, working through a slot N^3, in the side of the barrel, so as to admit of the changing of the combination.

The tumblers O, are independent of any fixed adjustment, other than what is given to them by the action of the nut, and screw, working out the combination, that is adjusting all the tumblers so as to make the channels M^2, match throughout to permit the pin on the nut to pass through it. When the pin passes through the channel it comes in contact with a false guide k^5, attached to the inside of the barrel, but not extending to the ends of it, so that the pin on the nut will always pass under or over its ends, and can only come in contact with it through the channel M^2, to guide the pin on the nut, up against the end of a latch bar R, working in a recess p^2, in the side of the hollow axle. On the face of the latch bar, is a shoulder r^2, which resting on the end of a detent spring s, (secured at its back and to the door of the safe) depresses it, as the nut is drawn up to relieve it from a recess S^2, cut in the inner face of the flange a^3, to allow the barrel or lock to rotate to project the bolt T, out or back, in consequence of the teeth t^3, on the edge of the flange a^3, engaging into corresponding teeth on the edge of the bolt.

In the act of depressing the latch bar to release the detent spring, the pin on the nut passes off the end of the bar, and over the end of the false guide to another guide k^4, extending throughout the length of the barrel. The object of this is to prevent the nut from being carried around, but to compel the operator to come back to A, or zero on the dial, as will be indicated by the pointer j^3, on the base of the knob J, at every start to work the combination of the tumblers.

The operation of my invention is as follows: When the tumblers are all up to the head of the barrel, I lock the knob, and barrel together by the thumb screw, and project the bolt outward as when locking the door. I next set the combination tumbler O^2, at zero, or point nearest the upper end of the barrel, (as an illustration of the operation of the lock, it being understood of course that any other point may be selected to make other combinations.) This will require the adjustment of all the other tumblers by the screw and nut to match the channels M^2 to permit the pin on the nut to pass through it to get to the false guide leading to the latch bar, and operating of the detent spring, to allow the bolt being shot back. I next liberate the knob, from its connection with the barrel of the lock, by means of the thumb screw. The knob and screw is then turned till the pin on the nut is stopped against the guide k^4 when the pointer j^3, on the knob, will indicate "A" on the dial. The screw will now have to be turned from right to left once around and plus to "G," to lift or adjust the first tumbler, which for convenience of making the combinations originally, the barrel is made in skeleton, and match marks cut in the back of the tumblers for inspection. The screw is then reversed to the starting point "A," when as the first tumbler has been raised or matched with the combination tumbler, the pin on the nut will pass over the end of it to engage in the notch l^2, in the corner of the second tumbler to operate it. This will require the screw being turned from right to left once around and plus to "C," to lift or adjust the second tumbler. The screw is then reversed to the starting point as before, when as the second tumbler having been matched, the pin on the nut will pass over it, to operate in the like manner on the third tumbler. This will require the screw being turned twice around and plus to "X," to elevate the third tumbler. As before the screw is reversed to the starting point, and as the third tumbler has been matched, the

pin on the nut will pass over its end to operate in like manner on the fourth tumbler. This will require the screw being turned twice around and plus to "U," to elevate it, when as before the screw is reversed to carry the nut back to the starting point, and as the fourth tumbler has been matched, the pin on the nut will pass over its end to the opposite side of guide k^4 extending the entire length of the barrel, when it will require four turns and plus to "M" of the screw from the starting point A, to elevate the pin on the nut on a line with the channel m^2. The screw is now reversed from "M," three times, and plus to G, when the nut meeting with no obstruction, is carried with it through the channel, till the pin on it comes in contact with the false guide k^5. This obstruction causes the nut to traverse up the screw, and the pin on the nut coming in contact with the head of the latch bar R depresses it, and with it the detent spring S, till it is forced from the recess in the flange a^3, so as to allow the barrel to rotate. When in this position and before the latch bar has been released, the knob, is locked to the barrel by means of the thumb screw I, in which position the whole may be rotated in the box D, some ten degrees, or sufficient space to cause the teeth in the edge of the flange a^3, engaging in corresponding teeth in a bolt to project it back far enough to unlock the door. When not designed for applying the combination, the door may now be bolted or unbolted like a common lock bolt. When intending to lock the door by the combination the door is first shut, and the bolt shot forward. The knob is now released from the barrel by means of the thumb screw which permits the independent action of the screw again, and by turning it a few degrees the pin on the nut will slip off the end of the false guide to the guide k^4, or starting point, "A," on the dial as indicated by the pointer j^3, when the detent spring being relieved instantly flies back into the recess in the underside of the flange a^3, to lock the bolt. By this action the latch bar is raised, and as the middle part of it is cut away, the pin on the nut may be carried past it, but cannot touch it or again get access to the latch bar to release the detent spring unless by the passing the pin on the nut over the ends of the four tumblers till it comes in contact with the guide k^4, when it will be carried up to a line with the channel m^2, requiring four turns of the screw from the starting point "A" and plus to M. The screw is then reversed from "M," three times, and plus to G, to carry the pin through the channel to the false guide, up which it follows to the head of the latch bar to release the detent spring for operating the bolt as before described. This operation is resorted to for dispatch in opening the lock during business hours without disarrangement of the tumblers. But when designed to give the greatest security to the lock, one or more of the tumblers are unmatched with the combination tumbler o^2. This is done as follows. The screw is turned from right to left till the pin on the nut comes in contact with the guide k^4, down which it is carried to the end of the screw, but off of which it can not get on account of the cap plate. When the nut is down the screw is reversed. This causes the pin on the nut to engage in the notch l^3, of the lower end of the fourth tumbler, and by continuing to turn the screw draws it up to the head of the barrel when the screw can get no farther. The screw is then turned forward and the nut carried back to the guide k^4 again, down which it runs in consequence of the turning of the screw till it comes off. The screw is then reversed to cause the nut to act upon the third tumbler to elevate it. The screw is then turned forward to carry the nut to the guide k^4, again down which it runs to repeat the operation of elevating the second tumbler, and the like operation is repeated to elevate the first tumbler. The screw is now turned forward till the nut comes in contact with the guide k^4, again, down which it is carried to the end of the screw. And as all the tumblers have been elevated, the pin on the nut on the reversal of the screw passes under them till it comes in contact with the opposite lower end of the guide k^4, up which it is carried to the starting point "A," as indicated on the dial by the pointer to commence the operation as before described for adjusting the tumblers with the combination.

Having now described my invention and its operation I will proceed to set forth what I claim and desire to secure by Letters Patent of the United States.

1. I claim the use of the screw K, and nut L, having a pin or shoulder N, on the side of it, in combination substantially as described, and for the purposes hereinbefore set forth.

2. I also claim the use of the axis F, having a shoulder d^2, on its outer end, and an adjustable capplate G, on its inner end, in combination substantially, and for the purposes hereinbefore set forth.

3. I also claim the use of the stem H, thumb screw I, and knob J, or equivalents, in combination, substantially as described and for the purposes hereinbefore set forth.

4. I also claim the use of the hollow axis B, in combination with the axis F, and knob J, substantially as described, and for the purposes hereinbefore set forth.

5. I also claim the use of the tumbler barrel or case A, in combination with the hollow axis B, and screw K, substantially as described and for the purposes hereinbefore set forth.

6. I also claim the use of the tumblers O, and O^2, made substantially as described, in combination with the screw K, and nut L for the purposes hereinbefore set forth.

7. I also claim the use of the reversal guides on the interior of the barrel A, in combination with the tumblers and nut L, substantially as described, and for the purposes hereinbefore set forth.

8. I also claim the use of the latch pin R, and detent spring S, or equivalents, in combination with the barrel or case A, and nut L, substantially as described and for the purposes hereinbefore set forth.

LYMON DERBY.

Witnesses:
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