W. GILFILLAN.

Combination-Lock.

No. 162 164. Patented April 20, 1875.

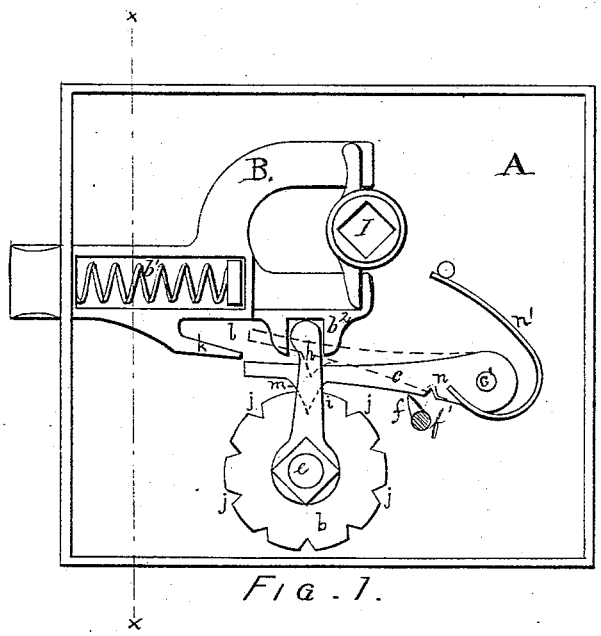


FIG. 1.

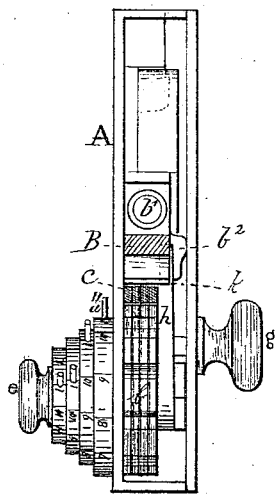


FIG. 2.

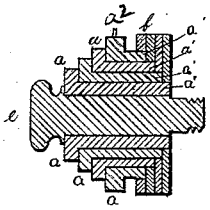


FIG. 3.

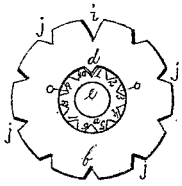


FIG. 4.

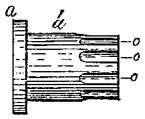
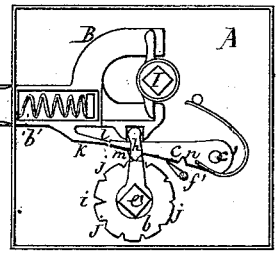


FIG. 5.

Fig. 6.



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WILLIAM GILFILLAN, OF SYRACUSE, NEW YORK.

IMPROVEMENT IN COMBINATION-LOCKS.

Specification forming part of Letters Patent No. **162,164**, dated April 20, 1875; application filed July 13, 1874.

To all whom it may concern:

Be it known that I, WILLIAM GILFILLAN, of Syracuse, county of Onondaga and State of New York, have invented certain Improvements in Permutation-Locks, of which the following is a specification:

Figure 1 is a rear view, with the side of the case removed, with the parts in such position that the bolt can be thrown back. Fig. 2 is a vertical transverse section taken through line *x x*, Fig. 1. Fig. 3 is a longitudinal section of the operating-spindle, with the tubular numerical disks and tumblers. Fig. 4 is a view of the same, taken from the inside of the lock. Fig. 5 is a detached view of one of the tubular numerical disks. Fig. 6 is a rear view, with the spur of the check-bar resting on the periphery of a tumbler.

In the drawings, A is the shell or casing of the lock. B is the bolt, which is thrust forward by the spiral spring b^1. I represents the spindle of a common knob for withdrawing the bolt. b^2 is a flange or lip projecting downward from one side of the bolt near its inner end, as shown in full lines in Fig. 1, and in full and dotted lines in Fig. 2. This lip is notched or recessed to receive an arm, *h*, (see Fig. 1,) as will be hereinafter fully explained. *k* is a stop-arm, projecting from and at a short distance below the lower edge of the bolt B. $a\ a^1\ a\ a^1$ are a series of concentric, tubular, numerical disks or dials, mounted upon the operating-spindle *e*, (see Figs. 2, 3, and 5,) each having upon the periphery of its flange a series of figures. In the drawings I have represented ten upon each, from 0 to 9, inclusive. Each of them has longitudinal grooves *o* upon the inner end of the tubular part *a'*, numbered to correspond with the numbers on the flange. (See Figs. 4 and 5.) *b* are tumblers, four in number, and each mounted upon one of the tubular dials, the dials being on the outside of the lock and the tumblers on the inside. (See Figs. 2 and 3.) Each tumbler has a spur, *d*, which may be made to engage at will with either one of the grooves *o* in the tubular dials, as is shown plainly in Fig. 4. Each tumbler is further provided upon its periphery with series of notches *i* and *j*, corresponding in number and position to the grooves in the tubular dial upon which it is to be mounted, as in Fig. 4. Each dial has a pin, a^2, Figs. 2 and 3, by means of which the dial can be conveniently rotated. *h* is an arm, secured to the inner end of spindle *e* by a nut, *e'*, the upper end of the arm entering the notch in the flange or lip b^2 of bolt B. *c*, Figs. 1 and 6, is a check-bar, pivoted at *c'*. There are four of these check-bars, and the free end of each is provided with a spur, *m*, which engages with the notches *i* and *j* in the tumblers. The length of these check-bars is such that when the bolt B is thrust forward the bars will, when vibrated about pivot *c'*, pass in close proximity to the rear end of stop-arm *k*. Each check-bar has a spring, *n'*, which serves to press the free end of the bar down upon the tumblers. *f'* is a shaft attached to knob *g*, and carries a lip, *f*, which, when turned into a nearly vertical position, so as to enter notch *n*, will lift the check-bars *c* above stop-arm *k*, as shown in dotted lines in Fig. 1. By an examination of Figs. 1 and 2 it will be seen the arm *h* serves to confine the check-bars in their proper position above the tumblers, and there is room for these bars to pass up behind the lip b^2. Therefore, when the check-bars are raised up into the position shown by dotted lines in Fig. 1, which can be done by turning the shaft *f'* until lip *f* enters notch *n*, the lock can be used as an ordinary latch-lock, the outer end of bolt B being beveled upon one side for that purpose.

In arranging or changing the combination, first remove the back plate and lift up the check-bars, as in dotted lines, Fig. 1, in which position they may be conveniently held by thrusting the stop-arm *k* under them. When preferred, the spiral spring b^1 may be taken out, so that the bolt will remain where placed. Next unscrew nut *e'* and take off the arm *h* and the tumblers. Having determined upon the formula of sequence of numbers upon which to set the lock—say 1874—place the first tumbler, with its spur *d*, in the groove of the tubular dial nearest 4, which groove will be found just to the left of that figure; put the next tumbler on the next dial, with its spur *d* in the groove marked 7, and so on; or, if preferred, the order or sequence may be reversed. It will be observed that the spur *d* is immediately below the notch *i*, which is

much deeper than any of the other notches, *j*, in the tumbler. It is so much deeper that when spur *m* on the check-bars *c* falls into the notches *i*, the free ends of these bars fall below arm *k*, as shown in Fig. 1, so that the bolt B can be thrust back, and it will be readily seen that when the dials are all turned so that the number 1874 in this order is uppermost toward spur *m*, the notches *i* will also be turned up; and the check-bars will fall so low that the bolt can be thrust back. The pins a^2 will facilitate the manipulation of the dials; in fact, this lock can be opened in the dark by any one familiar with the combination of numbers employed in locking it, as follows: Turn each dial until the pin a^2 is on top; then turn it (the dial) to either the right or left, as may be most convenient, counting the notches *j* as they pass spur *m* until the proper number is at the top, the pin a^2 being placed between the highest and the lowest figure of the series. When all of the spurs *m* have fallen into the notches *i*, the bolt may be thrown back by either the operating-spindle *e* and arm *h*, or by the spindle represented at I.

What I claim is—

1. The tubular dials *a* a^1, provided with numbers upon their outer flanges, and with the numbered grooves *o* upon their inner ends, in combination with the notched tumblers *b*, provided with spurs *d*, substantially as set forth.

2. The bolt B, provided with the stop-arm *k*, arranged to pass above the check-bars when spurs *m* enter the notches *i* in the tumblers, and to pass below the check-bars when they are raised, as in dotted lines in Fig. 1, substantially as set forth.

3. A check-bar, *c*, provided with spur *m* and notch *n*, in combination with the shaft *f'*, provided with lip *f*, substantially as set forth.

4. The combination of the arm *h*, the lip b^2, and the check-bars *c*, whereby the arm *h* serves sa a guide to insure that the check-bars shall enter behind flange b^2, substantially as set forth.

5. The combination of the shaft *f'*, provided with the lip *f*, the check-bars *c*, and the arm *k* on bolt B, whereby said check-bars may be lifted and suspended above arm *k*, so that bolt B may be operated as an ordinary latch-lock, substantially as set forth.

WILLIAM GILFILLAN.

Witnesses:
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