(No Model.)

2 Sheets—Sheet 1.

H. C. GRIFFIN.

COMBINATION LOCK.

No. 342,958. Patented June 1, 1886.

Fig: 1.

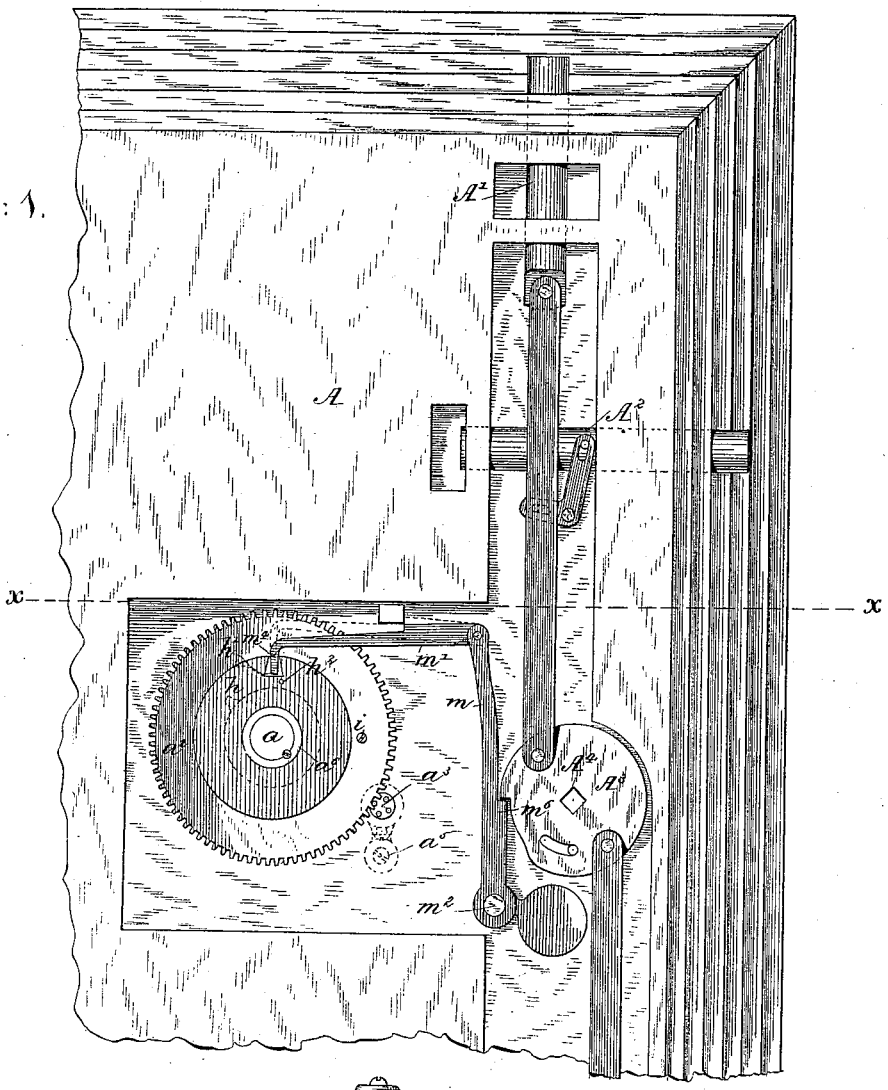
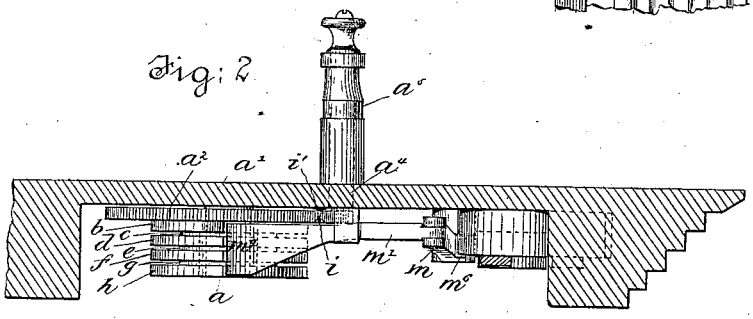


Fig: 2



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(No Model.) 2 Sheets—Sheet 2.

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COMBINATION LOCK.

No. 342,958. Patented June 1, 1886.

Fig: 3.

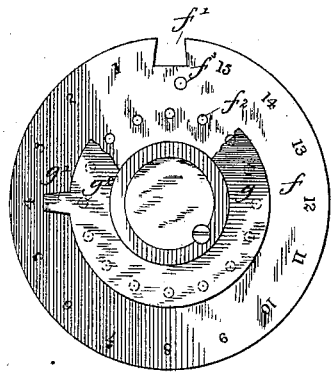


Fig: 4.

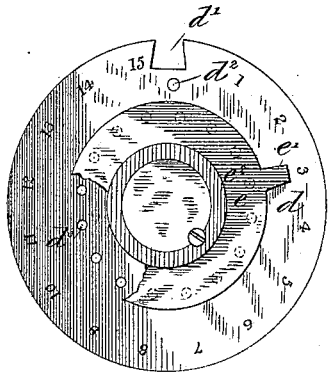
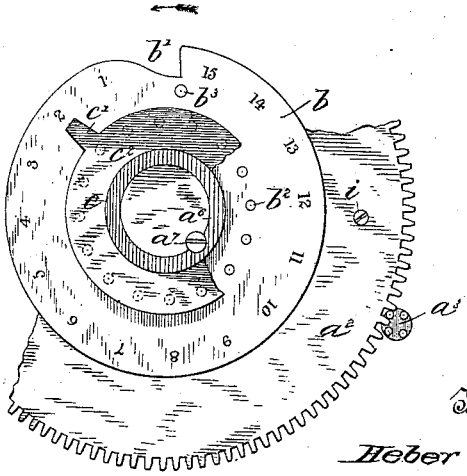


Fig: 5.



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UNITED STATES PATENT OFFICE.

HEBER C. GRIFFIN, OF FRANKLIN, NEW HAMPSHIRE.

COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 342,958, dated June 1, 1886.

Application filed February 11, 1886. Serial No. 191,552. (No model.)

To all whom it may concern:

Be it known that I, HEBER C. GRIFFIN, of Franklin, county of Merrimac, and State of New Hampshire, have invented an Improvement in Combination-Locks, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object the construction of a combination-lock, whereby the tumblers, of peculiar construction, are mounted upon a fixed shaft or stud and are arranged to move independently of each other, but interlocking with each other to register in a certain position to release the locking mechanism of the bolt-work after being rotated a predetermined distance in opposite directions, the means employed to rotate the said tumblers being such that the same may be operated without the aid of the sense of sight.

In accordance with this invention a dead-tumbler and toothed gear are mounted upon a fixed shaft or stud, and a pinion rotated by a crank from the outside of the door is supplied to rotate the toothed gear. The dead-tumbler is provided upon its face with a series of combination-holes and a disk having a projection upon its periphery is slipped upon the shaft, contiguous to the dead-tumbler, said disk having a fixed pin coinciding with its peripheral projection, which may enter one or another of the combination-holes, as desired. The dead-tumbler is notched at its periphery and is provided with a fixed pin adjacent to said notch. A series of live-tumblers and disks of similar dimensions and construction to the dead-tumbler and its contiguous disk are loosely mounted upon a sleeve splined to the fixed shaft or stud, and arranged alternately with relation to each other. The combination-holes in each tumbler are numbered in reverse order to the preceding tumbler, and the fixed pin of each disk enters the combination-holes upon the opposite side of the fixed pins of the preceding tumblers, so that the fixed pin of each next succeeding tumbler is permitted to play between the peripheral projection of the preceding disk and the fixed pin of the preceding tumbler as the tumblers are rotated in opposite directions; but by turning the dead-tumbler first in one and then in the opposite direction a predetermined distance, the several fixed pins will engage and move the tumblers so that the notched portions thereof will be brought into registering position one at a time until the entire series register. The mechanism controlling the movement of the bolt-work drops by gravity into the registered notched tumblers, thereby permitting the bolt-work to be operated.

The invention consists, essentially, in the combination of the various details of construction to be hereinafter more fully described.

Figure 1 shows a portion of the rear side of a safe-door with the plate concealing the operative parts of the lock removed; Fig. 2, a section of Fig. 1 taken on the dotted line *x x;* and Figs. 3, 4, and 5, details of the tumblers alone, to be referred to.

The lock herein to be described is shown in this instance as applied to an ordinary safe-door, A, having suitable bolts, A' A^2, and a revolving plate, A^3, fixed upon a knob-spindle, A^4, by means of which the bolts are operated, all in usual manner.

The lock consists of a shaft or stud, *a*, fixed in the frame-work a', said shaft having mounted upon it a toothed gear, a^2, while a pinion, a^3, fast upon a shaft, a^4, meshes with the toothed gear a^2, the said shaft a^4 being rotated by a crank, a^5, located upon the outside of the door A. A notched tumbler, *b*, herein termed a "dead-tumbler," (see Figs. 2 and 5,) is mounted upon the shaft *a* and secured to the toothed gear a^2, to thereby rotate in unison therewith, the notch b' of the said tumbler having an inclined and perpendicular wall. The dead-tumbler *b* is also provided with a series of combination-holes, b^2, (herein shown as sixteen in number,) arranged at equal distances apart around the shaft *a*, and a fixed pin, b^3, also protrudes from the side of the said dead-tumbler *b*, coinciding with the notch at b'. A sleeve, a^6, is splined to the shaft *a* by a screw-spline, a^7, the end of the sleeve abutting against the side or face of the dead-tumbler *b*. A disk, *c*, having a projection, c', upon its periphery, is mounted loosely upon the sleeve a^6, contiguous to the dead-tumbler *b*, said disk having a fixed pin, c^2, adjacent to the projection c', which enters one or another of the combination-holes b^2, to thereby turn in unison with the dead-tumbler. The disk *c* is of a thickness coinciding with the height of the

fixed pin b^3. A live-tumbler, d, is mounted loosely upon the sleeve a^6, contiguous to the disk c, said tumbler having a notch, d', a fixed pin, d^2, coinciding therewith, and a series of combination-holes, d^3, all similar to that shown upon the dead-tumbler b, above described, with the exception that the combination-holes are numbered in reverse order, as shown in Fig. 4, and the fixed pin d^2 protrudes from both sides or faces to enter the spaces between the projection c' and fixed pin b^3, so that as the dead-tumbler is rotated the said projection c' or pin b^3 will engage the pin d^2, and thereby move the tumbler d. A disk, e, having a projection, e', and a fixed pin, e^2, all similar to the disk c, is also mounted upon the sleeve a^6, contiguous to the live-tumbler d, the fixed pin entering one or another of the combination-holes d^3 of the tumbler d. A live-tumbler, f, (see Figs. 2 and 3,) having a notch, f', a series of combination-holes, f^2, and a fixed pin, f^3, extending through the tumbler and protruding from each side thereof, all similar to the tumbler d, with the exception that the combination-holes are numbered in reverse order, is mounted loosely upon the shaft a^6, contiguous to the disk e. A disk, g, having a projection, g', and fixed pin, g^2, is mounted loosely upon the sleeve a^6, contiguous to the tumbler f, the fixed pin g^2 entering one or another of the combination-holes f^2, and, lastly, a tumbler, h, (see Fig. 1,) having a notch, h', and fixed pin h^2, projecting from its rear side only, is mounted upon the sleeve a^6. It will thus be seen that by rotating the dead-tumbler continuously in one direction—as, for instance, in the direction of the arrow, (see Fig. 5)—the pin b^3 will strike the pin d^2 of the tumbler d, rotating the said tumbler d and its disk e in unison with the dead-tumbler, and the projection e' of the disk e will strike the pin f^3, rotating the tumbler f and its disk g in unison with the first two tumblers, and the pin f^3 will strike the pin h^2, thereby rotating all the tumblers in one direction, and by rotating the dead-tumbler b in the opposite direction the reverse of the operation just described will be true.

A pin, i, projecting from the rear side of the toothed gear, co-operates with a pin or projection, i', fixed to the frame-work and located in the path of movement of the pin i, to thus produce suitable friction to be felt by the operator rotating the shaft a^4 by the crank a^5, and thereby give him notice to commence to operate the combination, the point at which the friction device operates being termed the "starting-point."

The toothed gear a^2 contains a sufficient number of teeth that the dead-tumbler will be moved a distance from one hole, b^2, to the next during one rotation of the crank a^5, and the starting-point is arranged to give notice to the operator when the notch b' of the tumbler b arrives in correct position, so that the operator may then commence to count the rotations of the crank a^5, to thereby rotate the toothed gear a^2 and dead-tumbler fixed thereto, first in one and then in the opposite direction a determined number of rotations, the number depending upon the combination set up in the lock, which latter is determined by the particular holes in which the fixed pins of the several disks are placed. For instance, the combination being such as shown in Figs. 3, 4, and 5, the combination-holes 4, 3, and 2 are employed by the different tumblers, two of which rotate to the left and one to the right. The crank a^5 is then rotated until the starting-point is reached, when the operator commences to count the rotations, and with the combination as set up he first rotates the said shaft to the right six revolutions, which is the sum of all the tumblers rotating to the left. He then rotates the said shaft to the left back to the starting-point, which will be six revolutions, and on for three revolutions, which latter is the sum of all the tumblers rotating to the right, thus making nine revolutions to the left. He then rotates the shaft to the right back again to the starting-point, which will be three revolutions, and on for two revolutions, which latter is the sum of all the tumblers rotating to the left, less those previously reckoned. He then rotates the shaft to the left to the starting-point, which will be two revolutions, when it will be found that the several notches in the tumblers will register, the combination thus carried out being six thousand nine hundred and fifty-two after the starting-point has been first reached.

It will be seen that the combination may be easily changed by placing the fixed pins of the several disks in the different holes in the tumblers, and the combination may be multiplied by adding more tumblers and disks upon the sleeve a^6. When the notches are brought to register with each other, the engaging end m^4 of the two-armed lever $m\ m'$, pivoted at m^2, will drop into the notches, the shoulder m^6 thereby releasing the plate A^3 of the bolt-work.

By employing a crank, as herein described, the operator can easily count the number of revolutions in the dark, and by the friction device due notice is given when to commence counting.

The lock herein described may be applied to any ordinary door for household purposes, &c., the two-armed lever being modified somewhat to withdraw the usual bolt; and, if desired, for such purpose, a suitable knob turning a cam may be employed to move the two-armed lever from the inside of the door.

If desired, the sleeve a^6 may be omitted and the live-tumblers and disks mounted directly upon the shaft or stud a.

I claim—

1. In a combination-lock, the fixed shaft or stud and dead-tumbler mounted thereon and toothed gear fixed to said dead-tumbler, and pinion and crank for rotating it, combined with a series of disks having pins and a projection, as described, and a series of notched live-tumblers mounted upon the said shaft,

and arranged alternately with relation to each other, the notches of the live-tumblers having inclined and perpendicular walls, all substantially as described.

2. In a combination-lock, the fixed shaft or stud and dead-tumbler thereon having one or more holes, b^2, a disk mounted loosely upon the shaft, and a fixed pin, c^2, to enter the holes b^2, combined with a toothed gear fixed to said dead-tumbler, and a pinion meshing with the toothed gear and a crank to rotate the pinion, all substantially as described.

3. In a combination-lock, the fixed shaft or stud and notched dead-tumbler thereon having one or more holes, b^2, and fixed pin, b^3, and a disk, c, having a fixed pin, c^2, and a projection, c', combined with the notched live-tumbler d, mounted loosely upon the shaft and having the fixed pin d^2, to follow between the projection c' and the fixed pin b^3, all substantially as described.

4. In a combination-lock, the fixed shaft or stud and notched dead-tumbler thereon having one or more holes, b^2, and fixed pin b^3, and a disk, c, having the fixed pin c^2, and the projection c', combined with the notched live-tumbler d, mounted loosely upon the shaft having the fixed pin d^2, and one or more holes, d^3, numbered in reverse order to the holes in the preceding tumbler in which the fixed pin of the succeeding disk enters, all as set forth.

5. In a combination-lock, the shaft or stud and notched dead-tumbler thereon having one or more holes, b^2, one or more live-tumblers mounted loosely upon the said shaft, each live-tumbler having one or more holes to correspond with the holes b^2, but numbered in reverse order to each other, combined with disks having a projection and fixed pins, as described, located between the said tumblers for interlocking them with each other, and yet permitting them to be moved independently of each other sufficiently that the notched portions of the tumblers may register as the dead-tumbler is rotated in opposite directions, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HEBER C. GRIFFIN.

Witnesses:
GEORGE W. GRIFFIN,
GEORGE H. QUAID.