C. O. YALE.

Combination-Lock.

No. 161,727. Patented April 6, 1875.

Fig. 1.

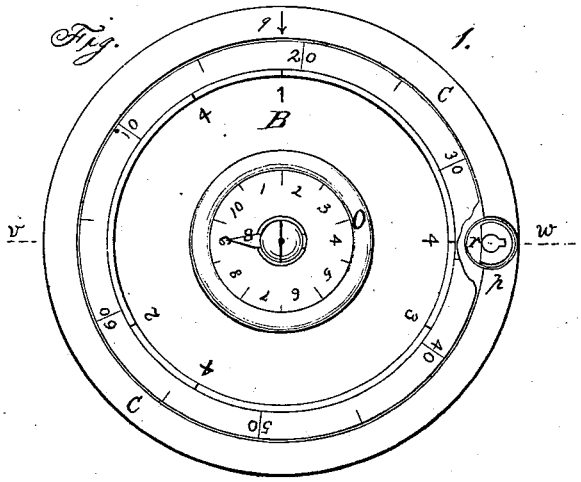


Fig. 2.

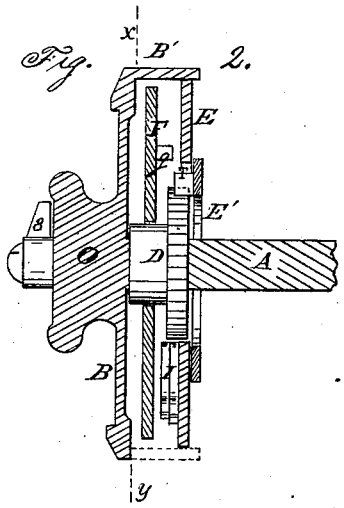


Fig. 3.

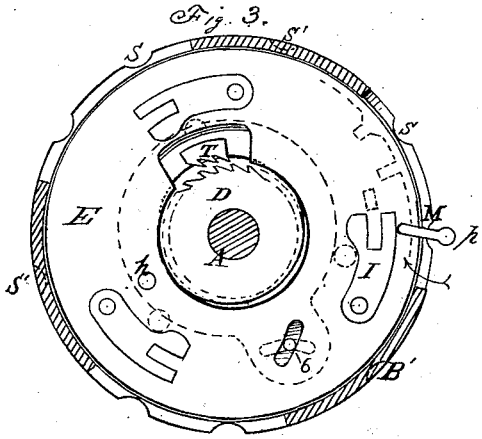
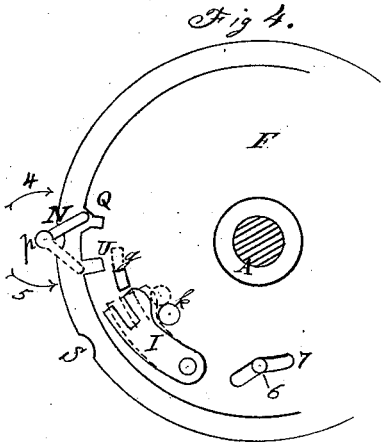
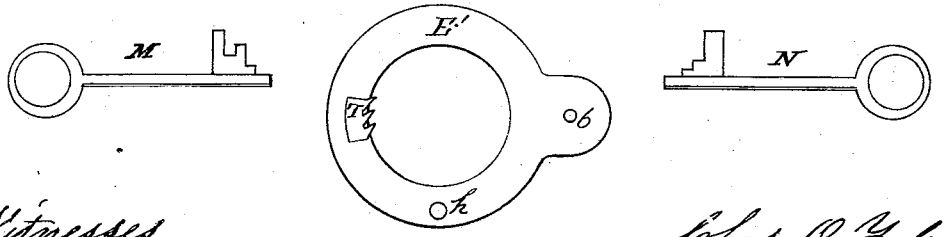


Fig 4.





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CHARLES O. YALE, OF NEW YORK, N. Y.

IMPROVEMENT IN COMBINATION-LOCKS.

Specification forming part of Letters Patent No. **161,727**, dated April 6, 1875; application filed December 1, 1874.

To all whom it may concern:

Be it known that I, CHARLES O. YALE, of the city, county, and State of New York, have invented a new and useful Bank-Lock Protector; and the following is a specification thereof:

My said invention is designed for application to bank-locks, for protection against their being unlocked by a bank-officer or other person under compulsion.

The general idea of my invention is that of a mechanism which requires several separate manipulations by as many different persons before the bolts of the lock can be acted on for unlocking. In carrying this idea into practice I employ one, two, or more sets of tumblers, independent of those of the lock arranged for connection with the ordinary medium for unlocking, (for instance, the dial or operating spindle of a rotary-tumbler lock,) which extra tumblers are required to be acted on and passed before the dial, spindle, or other unlocking instrument can be used for locking or unlocking purposes.

I have applied my said invention to use in a rotary-tumbler lock, which I make with a loose operating-spindle, and an indicator or dial fitted to rotate freely thereon; and such indicator, when the tumblers of the lock are to be operated, to be coupled to the spindle, so as to turn or revolve with it.

The mechanism I employ consists, primarily, of the following devices: An operating-spindle and a dial or indicator, both free to rotate independently of each other; engaging mechanism for coupling the indicator and spindle with each other; one or more sets or tumblers adapted for separate adjustment in connection with the engaging mechanism; a locking mechanism for locking the indicator to the spindle, while allowing of its free rotation thereon; a mechanical stop for preventing the rotation of the indicator while setting its tumblers; an index-finger (or sub-indicator) to show the relation of the spindle to the dial when engaged therewith.

The first part of my invention consists in the combination, with the operating-spindle and freely-revolving indicator, of a suitable engaging mechanism to couple the dial and spindle with each other, and one or more sets of tumblers to control and determine the action of the engaging mechanism; second, in the combination, with the free dial or indicator, of a mechanism, consisting essentially of what I term a dog-plate and catch-wheel, for so locking or attaching the dial to the spindle as to permit the free rotation of either while so attached; third, in arranging the tumblers on a plate affixed to the dial, so as to revolve with it; fourth, in arranging and combining, with the tumblers and engaging mechanism upon the fence-plate, of studs for throwing the tumblers out of place; fifth, in the combination of the engaging-dog, which engages the catch-wheel, with and operated by a motion of the fence-plate; sixth, in the peculiar form of the cam-stop for holding the dial from revolving when required; seventh, in an index-finger and dial to show the point of engagement of the engaging-dog with the catch-wheel on the spindle.

In the annexed drawing, Figure 1 is a front elevation of the dial or indicator. Fig. 2 is a longitudinal section of the operating-spindle, dial or indicator, fence-plate, and tumbler-plate, and showing the catch-wheel in side view. Fig. 3 shows the spindle in cross-section, and a front view of the catch-wheel and dog; also, the tumbler-plate and one of the series of sets of tumblers, with the dog-plate (in dotted lines) behind the tumbler-plate. Fig. 4 is a reverse view, as with the dog-plate and tumbler-plate removed, showing the fence-plate, and the relation of the studs or fences to or with a set of tumblers.

A is the ordinary spindle, by means of which the tumblers of a permutation-lock are set and operated according to an indicating-dial, B. The dial is surrounded by a frame, C, which should be made of malleable iron, case-hardened, or other metal impervious to the drill. Said dial, instead of being made fast to the spindle, is mounted to rotate freely thereon without turning it. Affixed to the spindle is a device, D, termed a catch-wheel, the office of which is to afford a medium to assist in forming a connection of the spindle with the dial, when required, so that both will turn in unison. At the perimeter of the dial B there is a projecting rim, B′, to which is affixed a plate, E, termed the tumbler-plate, in which

is an opening just large enough to allow the catch-wheel D to pass through, Figs. 2 and 3. On this plate E is pivoted an annular plate, E′, called a dog-plate, having its central opening of the same diameter as that in the tumbler-plate, and carrying a dog or catch consisting of teeth T, and which dog-plate, by vibrating on its pivot *h*, may engage the dog with the catch-wheel D, when the dial A and spindle B will rotate together as one. This catch-wheel and dog represent what I term engaging mechanism.

The dog-plate E′, both in the engaged and disengaged position of the dog T, locks behind one side or the other of the catch-wheel D affixed to the spindle A, and thus prevents the dial from being removed from the spindle, while leaving it free to rotate thereon. In this case the catch-wheel operates simply as a circular disk or rim, and the dog-plate as a latch or bolt, and in this connection the dog-plate and catch-wheel represent what I term locking mechanism.

The construction, arrangement, and operation of the several parts of the invention are to be such that the engagement of the spindle and dial or indicator cannot take place until several sets of tumblers, having relations with the dial, have been adjusted in position, such tumblers being arranged for separate operation by keys, or by means that may be controlled by keys, differing each from the other. The number, arrangement, and form of these dial-tumblers is of secondary importance.

The drawing shows a form and arrangement which I have tried with success. It consists of one or more sets of tumblers, of which I in Fig. 3 illustrates one of a number of sets, each set consisting of one or more tumblers, which are attached to and revolve with the tumbler-plate E.

Within the rim B′, around the dial, and between the dial and tumbler-plate is another plate, F, called the "fence-plate," the office of which is to carry studs *g* and *k*, of which there are one of each to every set of tumblers I, one of said studs *g* serving as the fence to the tumblers, passing into a slit therein when they have been adjusted, and the other of which, K, is used for disarranging them when the lock is to remain dormant.

The said dial-tumblers, in the modification of my invention which I am describing, are set by tumbler-keys M, applied at the periphery of the dial, as illustrated at *p* in Figs. 3 and 4, a portion of the rim B′ being cut away to permit the keys to enter. The dial in Fig. 1 is numbered 1 2 3, for keys of three sets of tumblers, the number on the dial corresponding to the key to be used, being set opposite the arrow 9 when the key is applied. After the tumblers have been set or adjusted, the tumbler-plate E is rotated by the dial-knob, so as to bring one of the numbers 4 on the main dial opposite the arrow 9, which will place a key-notch, Q, in the fence-plate F in position near the point *p*, Fig. 4.

Another key, N, termed the "engagement-key," is now applied at *p*, adapted to engage said key-notch, for the purpose of moving the fence-plate with respect to the tumbler-plate. While these keys are being used, the tumbler-plate E is prevented from moving by a mechanical stop, in this instance consisting of a cam, *r*, in form of a cylinder, placed so as to intersect the peripheral line of the dial or tumbler-plate, and fitted to turn on its axis, and enter an indentation, *s*, in the edge of the dial-rim B′ when used, but having a portion of one side cut out in the line of the dial-rim to allow the dial to turn. It is operated, for simplicity, by means of the keys aforesaid.

A revolution of the engagement-key in the direction of the arrow 4, while the tumbler-plate and dial are held at rest by the cam-stop *r*, rotates the fence-plate F, carrying the fences *g* into slits in the tumblers. At the same time a cam-slot, 7, in the fence-plate F by the same motion thereof, operates on a pin, 6, in the dog-plate, carrying the dog toward and engaging it with the catch-wheel. This effects the coupling of the dial with the operating-spindle, and the operation of adjusting or setting the tumblers may now be proceeded with in the ordinary way of setting the tumblers of locks wherein the dial and spindle are permanently united, using the numbers 10, 20, 30, &c., on the dial.

A smaller dial on the face of the knob O, and an index-finger, 8, affixed to the spindle, shows what part of the circumference of the catch-wheel the dog is engaged in, and hence the relation of the dial or indicator B to the catch-wheel on the spindle.

When the lock-tumblers have been adjusted, and the lock-bolts released to open the door, the dial B may be uncoupled from the spindle A by inserting the coupling-key N, and turning it in the reverse direction, as indicated by the arrow 5, Fig. 4; and in this connection the full lines of key N show it as in the act of passing out of the key-notch Q, leaving the parts in the condition seen in Fig. 3; and when such uncoupling is effected, the dial-tumblers may be disarranged, so as to prevent recoupling of the dial and spindle by continuing the rotation of the coupling-key about a half-turn farther in the same (reverse) direction, causing it to engage in the key-notch U, and to move the plate F onward until the studs *k* on the fence-plate are brought up behind the swell seen on the back of the tumblers, the effect of which is to disarrange or throw them out of place, as indicated in full lines I in Fig. 4, so that the fence-studs *g* cannot again enter them, and the key N is then turned the half-turn forward, as illustrated by the dotted key in Fig. 4, which shows this key as having made its disarranging motion in the direction of the arrow 5, and as now passing out of the key-notch U in the direction of the arrow 4, leaving the tumblers disarranged, as aforesaid, but again restoring the other parts to the position of Fig. 3.

I have thus described and represented the modification of my invention, which I have tried with success; but I do not wish to be understood as limiting myself thereto, as the invention is susceptible of many other modifications, and among which I name the following: The dog for engaging or coupling to the catch-wheel may move in a right line instead of a curve. The dial-tumblers, instead of vibrating, may be of the wheel class, and, instead of revolving with the dial, and being operated upon from a point in the dial-frame, may be arranged in such dial-frame around the dial, and be operated from a point in the dial, the engaging mechanism being modified to suit, and the dial-stop may be a sliding bolt, operated by hand independently of the key.

I claim as my invention—

1. The combination, with an operating-spindle and freely-revolving dial or indicator, of suitable engaging mechanism, and one or more sets of tumblers to control and determine the action of the engaging mechanism.

2. The dog-plate attached to the dial, and the catch-wheel on the spindle, for locking the dial to the spindle and preventing its removal therefrom while free to rotate thereon.

3. Arranging and combining the tumblers on and pivoted to a plate affixed to the dial, so as to revolve with it.

4. In combination, the engaging mechanism, the tumblers, and the displacing-studs on the fence-plate for disarranging or displacing the tumblers.

5. The combination, with the catch-wheel, of the engaging-dog and dog-plate, operated by a motion of the fence-plate in coupling the dial to the spindle.

6. The special form of cam-stop described, in combination with the dial or indicator adapted thereto, as set forth.

7. The combination, with the engaging-dog, spindle, and catch-wheel, of an index-pointer, to show the relation of the dial or indicator B to the catch-wheel.

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