2 Sheets--Sheet 1.

W. BALDWIN.

Combination Lock.

No. 161,375. Patented March 30, 1875.

FIG. 1.

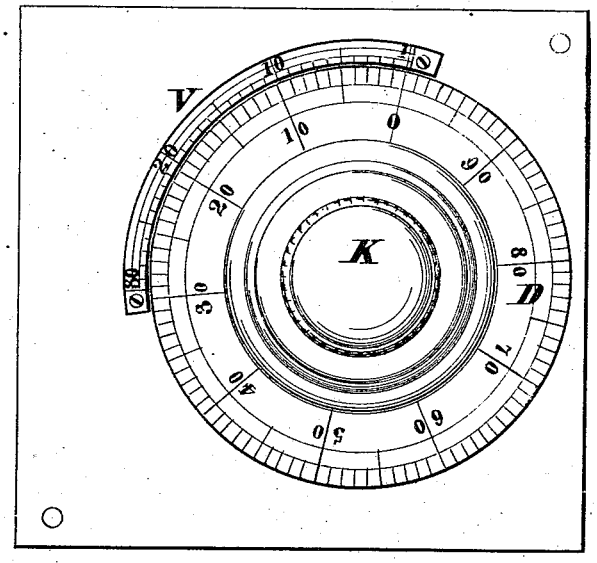


FIG. 2.

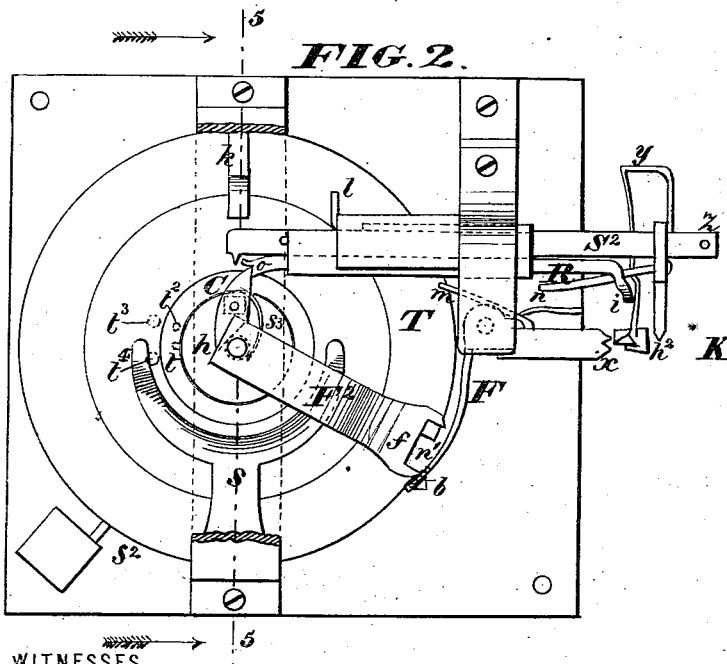
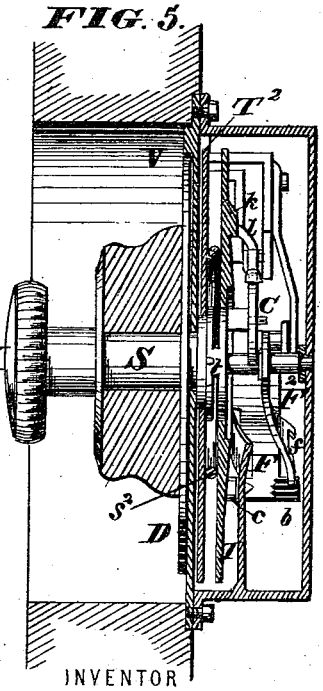


FIG. 5.



WITNESSES

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2 Sheets--Sheet 2.

W. BALDWIN.

Combination Lock.

No. 161,375. Patented March 30, 1875.

FIG. 3.

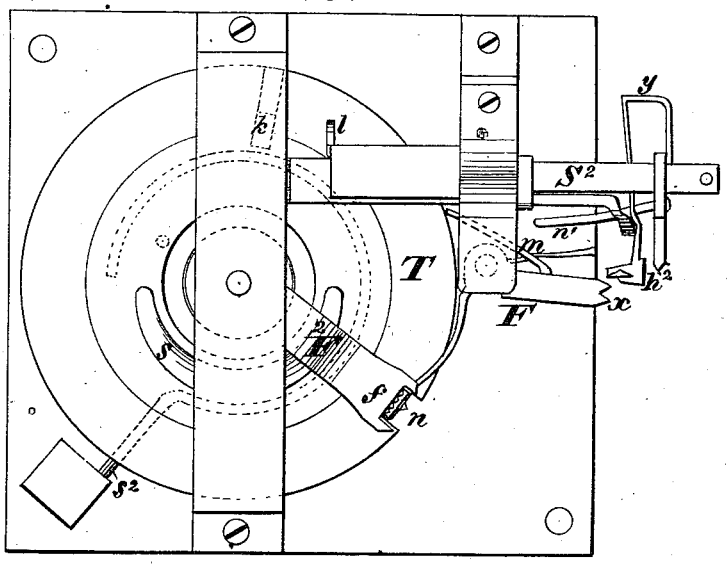


FIG. 4.

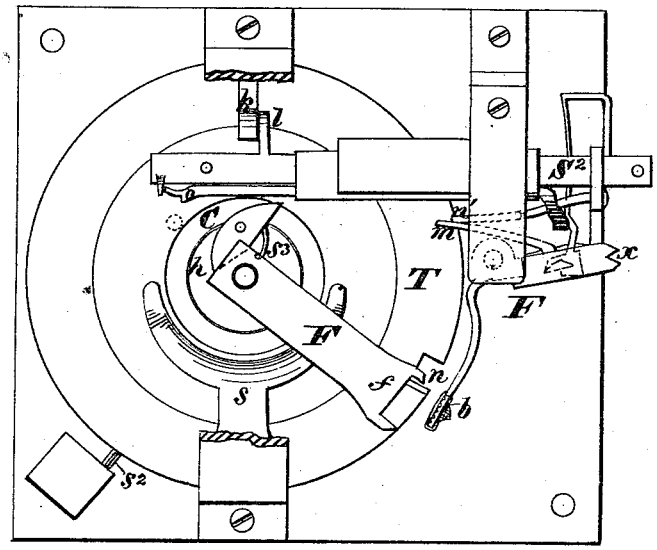
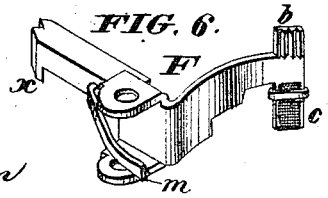


FIG. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM BALDWIN, OF TIOGA, PENNSYLVANIA.

IMPROVEMENT IN COMBINATION-LOCKS.

Specification forming part of Letters Patent No. **161,375**, dated March 30, 1875; application filed August 15, 1874.

CASE B.

To all whom it may concern:

Be it known that I, WILLIAM BALDWIN, of the town and county of Tioga, in the State of Pennsylvania, have invented an Improved Bank-Lock, of which the following is a specification:

This invention relates to locks of maximum security for the doors of bank-vaults, safes, &c.; and it relates primarily to those locks in which one or more rotary tumblers are set by means of an external knob, and a dial concentric therewith, the tumblers being adjusted by means of the dial in different combinations.

The general objects of this invention are to provide any desired number of combinations in a very simple lock, and to preclude picking the lock by hearing or feeling the contact of the fence with the tumblers, which is the mode of picking combination-locks most successfully practiced, and more feared than attempts to forcibly displace the spindle or other parts.

The present invention consists, first, in the employment or use of a forked arm carried by the rotary spindle, to arrest the fence temporarily and to engage with a clattering surface to disguise the contact of the fence with the tumblers, and to hold the spindle while the fence is in mesh with the tumbler-notches. The invention consists, secondly, in the employment or use of a fence-lever, provided with a notched or corrugated plate or surface to clatter with a point or points of the fork, or its equivalent, in letting down the fence, to disguise its contact. As a supplement to this, that part of the fence-lever which comes in contact with the tumblers may be covered with some soft substance, so that there shall be no metallic click, which is vastly more distinguishable than any other sound, and by avoiding which the efficiency of the clicking provision is rendered more absolutely reliable. The invention consists, thirdly, in peculiar devices for releasing the fence periodically and re-elevating the same, and for disarranging the tumblers in the act of retracting the bolt or bolts, as hereinafter set forth.

In the accompanying drawing, Figure 1 is a front elevation of a bank-lock illustrating this invention. Fig. 2 is a rear elevation of the same, with the case and portions of the frame removed, representing the parts in the relative positions which they occupy when the bolt-slide is locked, and illustrating the operation of the fence-releasing and clattering devices. Fig. 3 is a full back view, representing the parts in the relative positions which they occupy when the bolt-slide is unlocked, but still projected. Fig. 4 is a rear elevation, partly in section, representing the parts in the relative positions which they occupy after the bolt or bolts are retracted. Fig. 5 is a section on the line 5 5, Fig. 2. Fig. 6 is a perspective view of the fence-lever in a partially-inverted position.

The external parts of this lock are a knob, K, by which to rotate the spindle; a dial, D, which, in the illustration, is attached to the spindle and knob, and one or more verniers, V, to co-operate with the dial for multiplying the combinations by providing any given number of fractional adjusting lines or spaces. The dial D is ordinary, and may be divided, as usual, into one hundred circumferential spaces or periods. By means of a single vernier, reading to thirty places, in combination with a dial of one hundred divisions, I am enabled to obtain nine million changes with two tumblers. With a vernier reading to sixty the possibility of thirty-six million changes could be secured; but in this lock provision for one million changes is considered amply sufficient, while the provision for multiplying the combinations indefinitely, or even to the extent above named, as in the illustration, in proportion to the number of tumblers, renders two tumblers sufficient for a first-class lock, and the employment of any greater number of tumblers is not contemplated in this invention.

Two tumblers, T T^2, are applied to the spindle within the lock-case, the same being of the form known as frictional tumblers, which are held in the positions to which they are set by means of friction-springs s s^2, and are carried by the spindle through the medium of tappet projections t t^2 t^3 t^4, (shown in dotted lines in Fig. 2,) the first of which is mounted on a hub or enlargement on the spindle S, which forms the bearing of the tumblers, as shown in Fig. 5, and rotates freely therein, except when the tappet projections are in contact. Attached

to the back of the hub *h* by means of a pivot is a cam or tappet-arm, C, which, by means of its pivot and a spring, s^3, is rendered flexible in one direction. When the spindle is turned in the opposite direction the tappet-arm or cam is supported rigidly by the engagement of its inner end with the spindle, and the spring s^3 tends to hold it in this position. This tappet-arm or cam engages with a notch or projection, *o*, at one end of a sliding rod, which is carried by and forms a part of a compound horizontal slide, S^2, to which the bolt or bolts are attached at its outer end *z*. The movement of the sliding rod R, imparted by the tappet-arm or cam C, retracts or forces back a spring-detent, *y*, by means of a projection, *i*. The detent *y* terminates in a head, h^2, having a V-shaped lug to engage with a notched head, *x*, on a fence-lever, F, the latter carrying a fence composed of an arm or projection to engage with notches *n'* in the peripheries of the tumblers T T^2. The fence is thus dropped or allowed to fall against or toward the tumblers once in each revolution of the spindle in a given direction, as to the right in the illustration. The movement of the knob and spindle in the opposite direction does not affect the fence, and this is utilized in taking up and arranging the tumblers. When rejected by the tumblers, the fence is re-elevated at the next impulse of the sliding rod R by the engagement of an incline on the back of the projection of the head h^2, with a corresponding incline on the back of the notched head *x* of the fence-lever. Behind the tumblers T T^2 within the case the spindle S carries a forked arm, F^2, which moves therewith at all times, and carries the fork *f* at its extremity. In the path of the fork *f* the fence-lever F is provided with a projection, *d*, the face of which, opposed to the fork-arm F^2, is serrated, notched, or otherwise roughened, and the projections of the fork are adapted to engage therewith, so as to produce a clattering sound when the fence is dropped by the action of the cam C. The fence-arm *c* is, by preference, covered with oiled silk or other suitable soft material, as represented, in order that its contact with the peripheries of the tumblers may be muffled, and thus rendered less distinct; but the loud clattering sound produced in letting down the fence, as above described, effectually precludes the detection by sound or feeling of such contact, and thus precludes picking the lock in this way. This part of the operation of the lock is illustrated in Fig. 2, the parts being represented as at the beginning of the operation. When the notches are brought into register with the fence-arm *c* simultaneously with the release of the fence-lever by means of the cam C, the fence-lever drops or falls, and the fence-arm *c* enters the notches, as illustrated in Fig. 3, and the fork-arm F^2 now operates to receive the projection or notch-plate *b*, and, by meshing therewith, to prevent the displacement of the tumblers by accidental movement of the spindle. The bolt-slide S^2 is now released, having previously been secured in projected position by the notched head *x* of the fence-lever engaging with the head h^2 of the detent *y* carried by the bolt-slide. The bolts are retracted by a separate knob, and in this act the slide S^2 is forced back, and arms or projections *n* and *l* carried thereby engage simultaneously with a lever-arm, *m*, on the fence-lever, and with a projection, *k*, on the rear tumbler T, respectively.

The arm *n*, engaging with the lever-arm *m*, lifts the fence-lever to its elevated position. The arm or projection *l*, engaging with the projection *k* on the tumbler T, moves said tumbler sufficiently to effectually disarrange the notches relatively to each other. The relative positions of the parts in this condition of the lock are represented in Fig. 4. When the bolt or bolts are again thrown and the bolt-slide S^2 thus projected, the incline on the back of the projection of the head h^2 of the detent *y* engages with the corresponding incline on the back of the notched head *x* of the fence-lever F, and lifts the latter, and the two thus interlock automatically. The lock has now resumed the general condition illustrated in Fig. 2.

This lock is of very simple construction, owing to the small number of the tumblers, and this is not accomplished at the sacrifice of security, but the utmost security is obtained by the masking operation of the clattering devices, and a multitudinous combination is effected by the vernier attachment.

The vernier attachment as an independent part of this invention is disclaimed.

The furcated point of the fork-arm is not essential with reference to the clattering operation of this lock, but its sole function is to so engage with the fence-lever as to stop or prevent any rotation of the spindle while the fence-arm is in the tumbler-notches.

The combination of the lock is changed in ordinary manner by holding the rotary friction-tumblers, successively, with notches in register, by means of a pin or key introduced in perforations, while the new combination is made up on the dial by turning the knob.

The following is claimed as new in this invention, namely:

1. The fork-arm F^2, carried by the spindle within the lock, in combination with a fence-lever, F, having an arm or projection, *b*, to engage therewith, substantially as herein described.

2. The fence-lever F, provided with a notched or corrugated plate, *b*, to clatter with a point or points in letting down the fence, substantially as herein specified.

3. The combination of the yielding cam C on the spindle, the sliding rod R, carrying projections *o i*, the detent *y*, having a beveled head, h^2, and the fence-lever F, having a notched and beveled head, *x*, arranged and operating substantially as described, to periodically drop and to re-elevate and support the fence in the manner set forth.

4. The combination of the notched rotary tumblers T T^2, the fence-lever F, having the plate *b*, or its equivalent, and the fork-arm F^2 *f*, for securing the tumblers against accidental displacement while the bolt-slide is unlocked and not yet retracted, in the manner specified.

5. The bolt-slide S^2, carrying the projection *l*, in combination with the projection *k* on one of the tumblers for disarranging the tumbler-notches relatively to each other in the act of retracting the bolt or bolts.

6. The bolt-slide S^2, carrying the projections *l n* and detent *y*, in combination with the fence-lever F, having an arm, *m*, and notched head *x*, and the projection *k* on one of the tumblers for successively disengaging the fence and disarranging the tumbler-notches during the retraction of the bolt or bolts, as herein set forth.

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Witnesses:
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G. W. FOSTER.