W. T. BENHAM.

DIAL FOR COMBINATION LOCKS.

APPLICATION FILED JUNE 26, 1915.

1,166,883.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

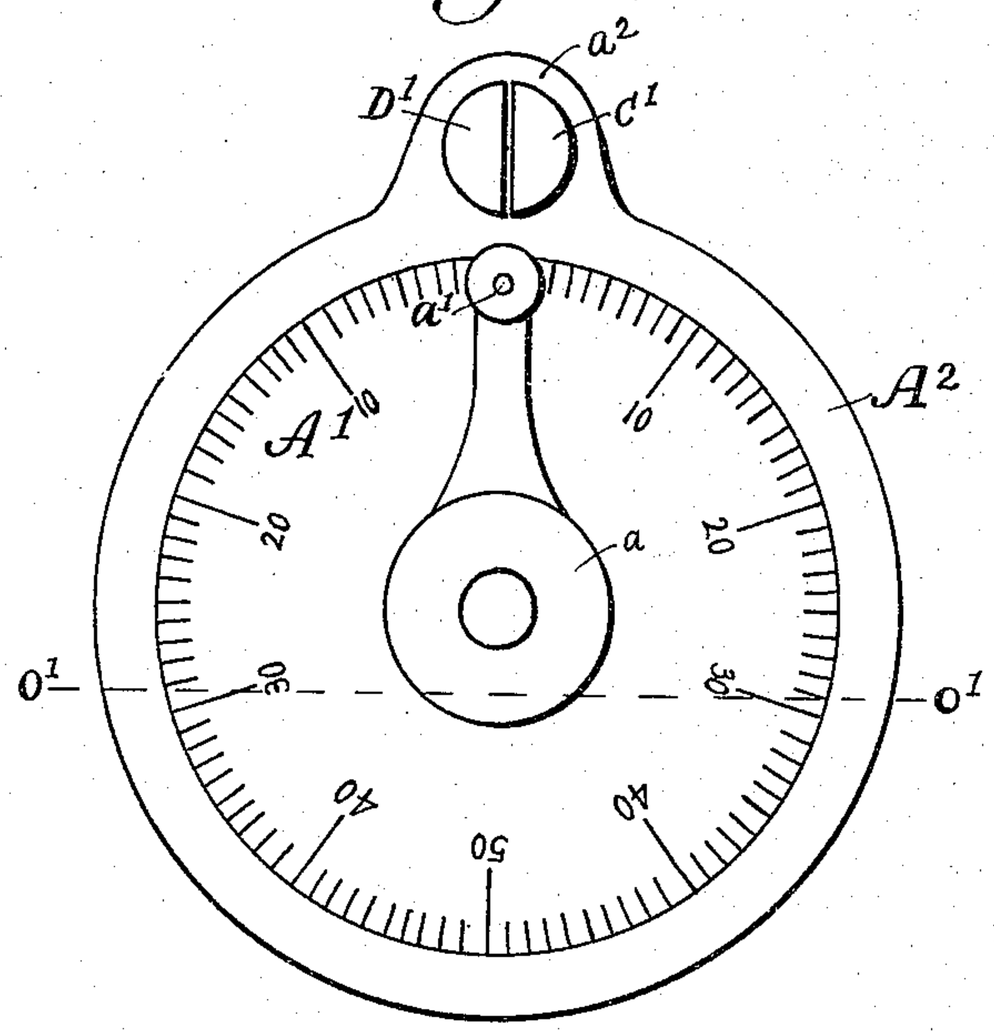

Fig. 2.

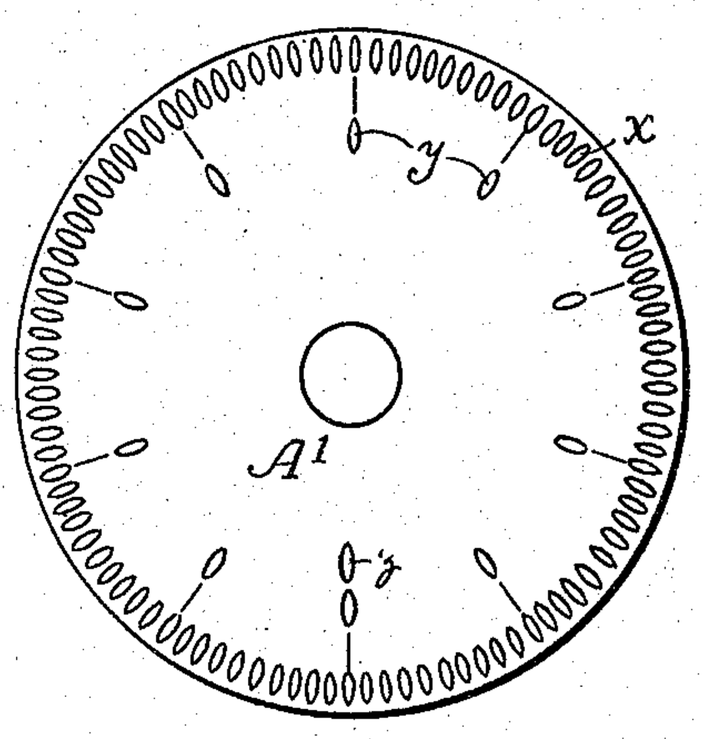

Fig. 3.

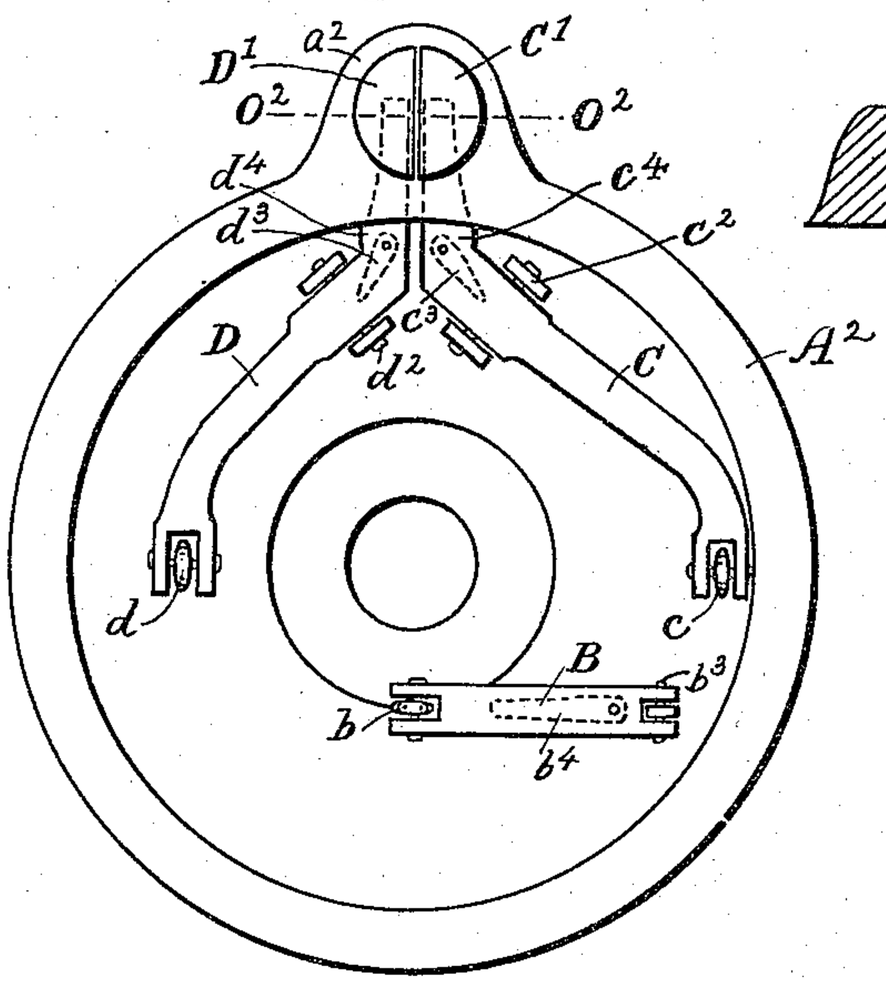

Fig. 4.

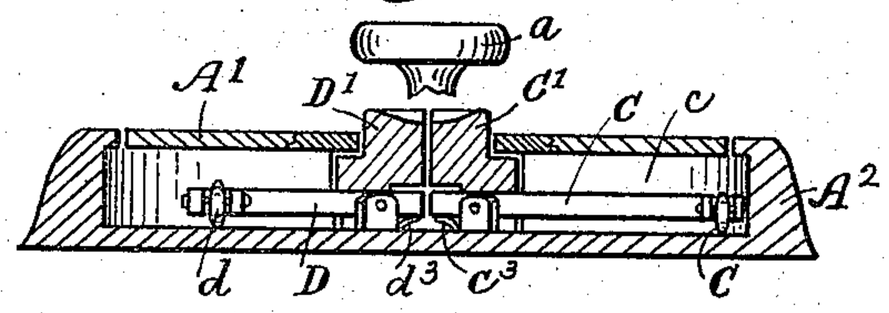

Fig. 5.

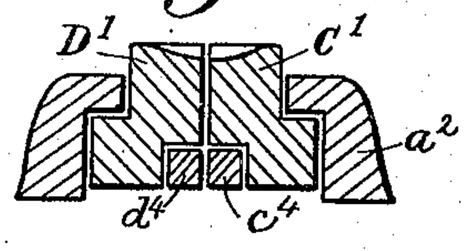

Fig. 6.

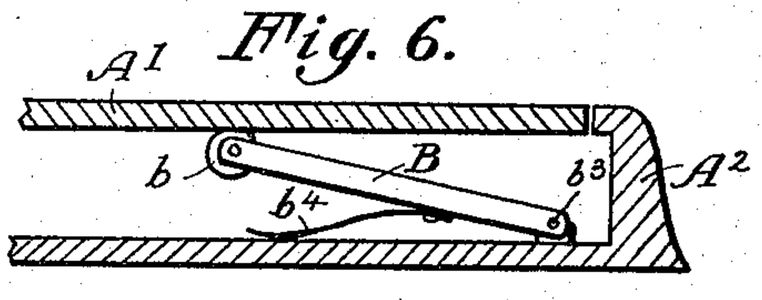

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Fig. 7.

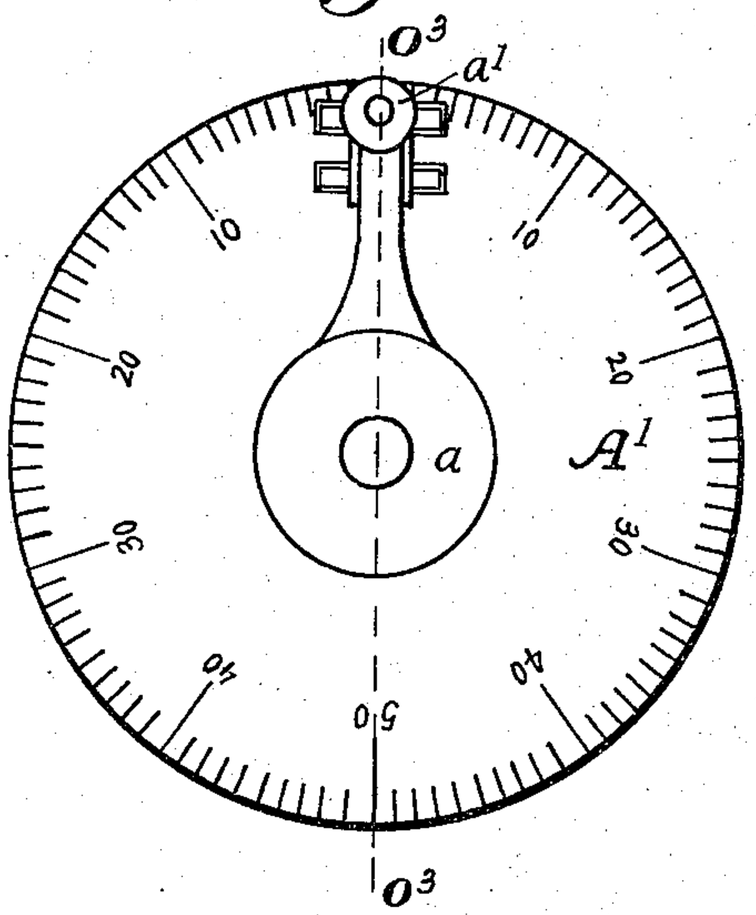


Fig. 8.

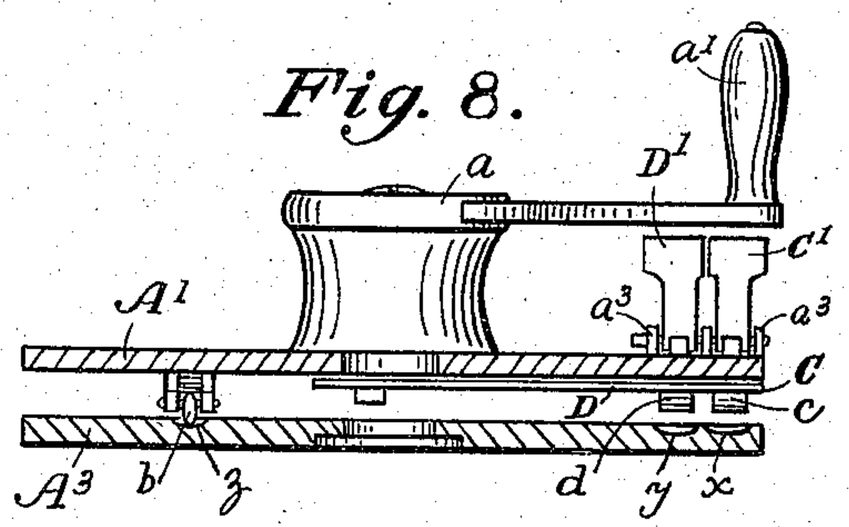


Fig. 9.

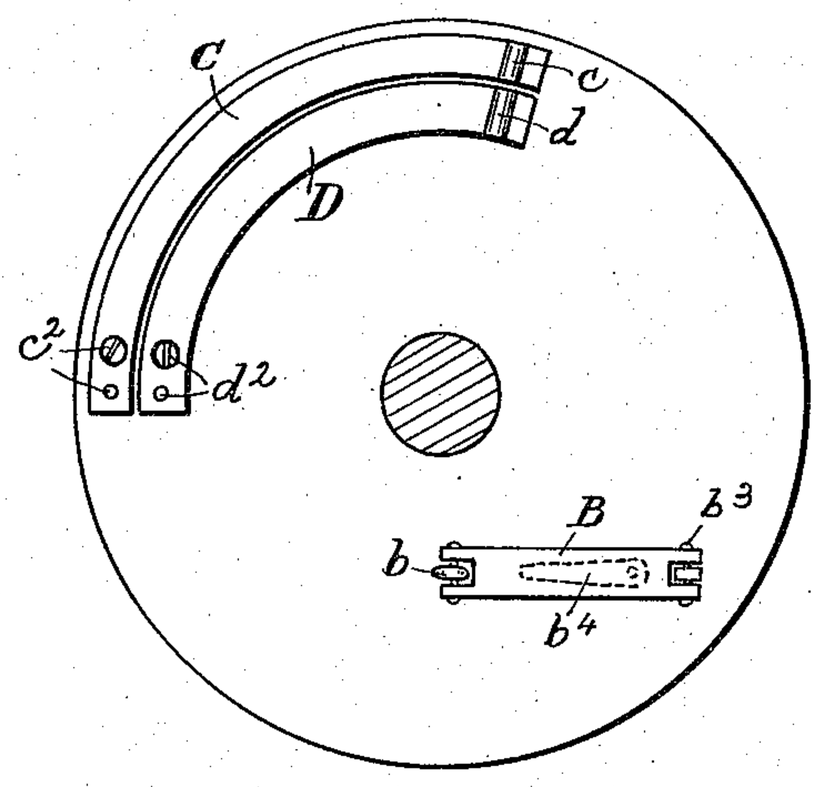
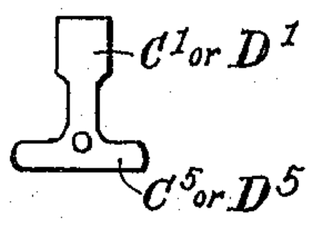


Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM T. BENHAM, OF NORWOOD, OHIO.

DIAL FOR COMBINATION-LOCKS.

1,166,883. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed June 26, 1915. Serial No. 36,549.

To all whom it may concern:

Be it known that I, WILLIAM T. BENHAM, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented new and useful Improvements in Dials for Combination-Locks, of which the following is a specification.

My improvements relate to dials for combination locks, such as are used on safes, cabinets and the like; and may be employed with such dials already in use; and any combination lock so equipped can easily be run, in dim light or absolute darkness, by one who knows the combination. The additional cost will be moderate, and the scope of use for combination locks with their manifest advantages, will be greatly extended,—as for example, to doors of garages, store-rooms, file-rooms, etc.

My invention, when made in the form I prefer, will have the appearance of an ordinary combination lock dial, except that at one point the dial rim will be extended laterally to receive the ends of indicator levers and the buttons used in operating same. When the two buttons are semi-circular in form and placed together in a circular opening, they have the appearance of a screw head. In this form, the rest of the indicator-operating mechanism is underneath the dial and hidden from sight, and out of the way of dirt and meddlesome persons. The device may be made in a number of forms, and can be varied so as to present great difference in appearance, so I do not limit myself to any particular form to carry my invention into use; however, I show one alternative form in this application.

My improvements embody fundamentally a rotatable dial having suitable gage notches (which may be either on the front or the back of the dial, or on the back wall of the dial-casing), an indicator adapted to contact with the zero-notch at each revolution of the dial in either direction; an indicator normally out of contact with the units gage notches, but adapted to be pressed into contact therewith; a corresponding indicator normally out of contact with the group gage notches (as of tens of units), but adapted to be pressed into contact therewith; and separate means for pressing either the units or group gage indicators into position to contact with its gage, at the will of the operator. I prefer to so place these means that the operator may slide his finger or thumb from one to the other, or merely rock his finger to one side or the other, making it practically impossible for any one to watch him while running the combination and so learn the combination.

The function of the improvements being to enable the operator to read the gage by the sense of touch or hearing, the combination may be made and used without resort to the sense of sight, if desired.

If the dial is visibly numbered at all, I prefer to number the gage marks each way from zero, as set forth in Letters Patent No. 1,113,865, issued to me October 13, 1914, as this is the method of counting and running any given combination used with my improvements.

Elevations or "ribs," instead of depressions, may be used as gage marks.

My invention is illustrated in the accompanying drawings, the preferred form being shown in Figures 1 to 6, inclusive, and an alternative form in Figs. 7 to 10 inclusive. Fig. 1 is a plan or face view of the dial structure, in which all the special mechanism of my invention except the buttons the operator presses on, is located under the rotating dial and hid from view. Fig. 2 is a plan or face view of the underside of the rotating dial plate removed; Fig. 3 is a face view, corresponding with Fig. 1, of the dial casing with the dial plate removed, showing the pivoted levers in position to act upon the underside of the dial plate; Fig. 4 is a cross section, shown in elevation, of the dial structure, including the dial plate and casing, taken on the dotted line o^1, o^1, of Fig. 1, with part of the dial knob, dial stem, dial and dial rim broken away to show the buttons in position. Fig. 5, a detail, is a section through the dial rim on the line o^2, o^2, of Fig. 3, showing the buttons and ends of the indicator levers in position. Fig. 6, a detail, is an elevation of the zero indicator in position contacting with the under side of the rotating dial. Fig. 7 is a plan or face view of an alternative form of the dial structure, in which all the special mechanism of my invention except the buttons the operator presses on, is located under the rotating dial and hid from view. Fig. 8 is a cross section, shown in elevation, of the dial structure, including the dial plate and gage plate taken on the dotted line o^3, o^3, of Fig. 7.

Fig. 9 is a plan or face view of the underside of the rotating dial plate removed. Fig. 10, a detail, is the button C^1 or D^1 of the alternative form.

Referring now to the drawings, A^1 is a rotatable lock-dial with the usual knob *a;* and a handle a^1 to facilitate accurate rotation; and A^2 designates its fixed casing, usually called the dial rim. The visible gage of the dial for sight reading is of the usual type, except that it is numbered each way from zero upward, as already indicated. The casing of rim A^2 has a projection a^2 with a circular opening through the rim, undercut and enlarged below to receive and hold in position the buttons hereafter described.

The underside of the dial A^1 has three separate series of gage notches concentrically arranged in circles one within the other. The outer one of these, *x*, indicates single units; those in the next circle, *y*, indicate groups of tens of units; and the inner one is a single notch *z*, which indicates zero, or the starting point in the count; but, because of the placing of the indicator intended to contact with it below the center of the dial, said notch *z* is placed on the same radius extended as the unit indication 50 on the face of the dial.

The zero indicator comprises a small wheel *b* journaled in the fork of the lever B which is pivoted to the bottom of the dial casing at b^3. The wheel end of the lever B is held outward so as to constantly contact with the underside of the dial by the spring b^4, and the lever B is located in such a position that the wheel *b* contacts with the dial, on the inner gage circle *z*, in which the zero depression *z* is formed.

The units indicator comprises a small wheel *c* journaled in the forks of the curved lever C which is pivoted at c^2 to the dial seat. The wheel end of the lever C is held inward normally out of contact with the underside of the dial by the spring c^3. The opposite end c^4 of the lever C (Figs. 3 and 5) is extended outwardly under the projection a^2 of the dial casing or rim, so as to pass under and in contact with the button C^1, so that downward pressure on said button will shift said lever C, depressing its end c^4, and throwing the wheel *c* outward against the under surface of the dial A^1. The lever C is pivoted to the bottom of the dial-casing in such a position as to make the wheel *c* contact with the under surface of the dial on the outer circle in which the units notches *x* are cut.

The tens indicator, with its wheel *d*, curved lever D pivoted at d^2 to the bottom of the dial-casing, its spring d^3, opposite lever end d^4, and button D^1 are all similar to like parts on the units indicator mechanism arranged for the opposite semi-circle of the dial; but the lever itself is so shaped and placed as to make the indicator wheel *d* contact with the under surface of the dial on the intermediate circle in which the tens notches *y*, are cut.

The buttons C^1 and D^1 are so formed as together to loosely fill the undercut circular opening, in the projection a^2 of the rim, and have their outer surfaces hollowed so the finger or thumb can be easily slid from one to the other or the finger rocked back and forth, first pressing inwardly on one, then on the other as found convenient in making the count. The spring c^3 holds the lever end c^4 and the button C^1 in their outward position and spring d^3 operates in like manner on lever end d^4 and button D^1. Upon rotation of the dial under these conditions, the "click" and slight jump of the wheel as it passes over the notches indicates each one to the ear and touch without the aid of sight; thus enabling the operator to "run the combination" with ease and certainty; while the "click" and jump of the zero indicator always independently indicates when the beginning mark is reached or passed. The indicators *b*, *c* and *d* may be made of rawhide or fiber to prevent clicking if the sense of touch only is to be relied upon. The indicator wheels may be replaced by metal points if it is desired to make the clicks louder and sharper.

The mode of operation is simple and will further illustrate the functional advantages of the invention. Entire revolutions may be made in the usual way by using the central knob *a*, exactitude being indicated by the slight check of movement and the sound produced by the indicator B; but the handle a^1 may be employed to assist in rotating the dial because its vertical position, which coincides with the indicator sound and check of movement, renders the aid of sight quite unnecessary.

In the alternative form, the gage notches, *x*, *y* and *z* are not cut in the under surface of the dial, but in the dial casing A^3 or a plate fastened thereto. Its position in relation to the rotatable dial is shown in Fig. 8. The indicators *b*, *c* and *d* are fastened to the under surface of the dial instead of to the dial casing. The zero indicator is the same in this form as the other shown in Figs. 1 to 6 inclusive. Units indicator *c* (shown as a metal point instead of wheel) is secured to the lever C, which is a spring plate normally fitting close to the under side of the dial, to which it is fastened at c^2. In like manner, the tens indicator *d* is secured to the lever D, a similar spring plate fastened to A^1 at d^2. The lever C is depressed so as to cause the indicator *c* to contact with the *x* notches by tilting the button C^1 either way; and in like manner the lever D is depressed so as to cause the in-

dicator *d* to contact with the *y* notches by tilting the button D^1 either way. The buttons C^1 and D^1 are pivoted to lugs a^3 on the dial A^1 and have flat lower ends c^5, d^5, to press against the spring plate levers C and D respectively.

I claim as my invention and desire to secure by Letters Patent of the United States:

1. In a combination lock, a rotatable dial having gage notches arranged in concentric circles, representing respectively, single units, uniform groups of units, and the starting point at each revolution of the dial in either direction; an indicator for the starting point notch, constantly in contact with the circle on which said notch is; an indicator normally out of contact with the units gage notch circle; an indicator normally out of contact with the group gage notch circle; and a separate lever and operating button for each of said two last mentioned indicators for pressing said indicators into position to contact with their respective notches.

2. In a combination lock, a rotatable dial having gage notches arranged in concentric circles, representing, respectively, single units, uniform groups of units, and the starting point at each revolution of the dial in either direction; an indicator for the starting point notch, constantly in contact with the circle on which said notch is; an indicator normally out of contact with the units gage notch circle; an indicator normally out of contact with the group gage notch circle, and a separate lever for the units indicator and the group indicator, with an operating button for each of said levers placed in close proximity to each other, for pressing either the units or group indicators into position to contact with their respective notches at the will of the operator.

3. In a combination lock, a chambered dial-casing, a rotatable dial constituting a face plate for the casing chamber, a gage having notches arranged in concentric circles, representing respectively, single units, uniform groups of units, and the starting point at each revolution of the dial in either direction; an indicator within the dial chamber for the starting point notch, constantly capable of contacting with said notch; separate indicators within said dial chamber for the units and group notches, respectively, normally out of contact therewith, but each capable by manipulation of its button of being brought into contact with the circle on which its notches are, and a button for manipulating each of said two last named indicators.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM T. BENHAM.

Witnesses:
A. L. TILDESLEY,
HENRY B. STRIEL.