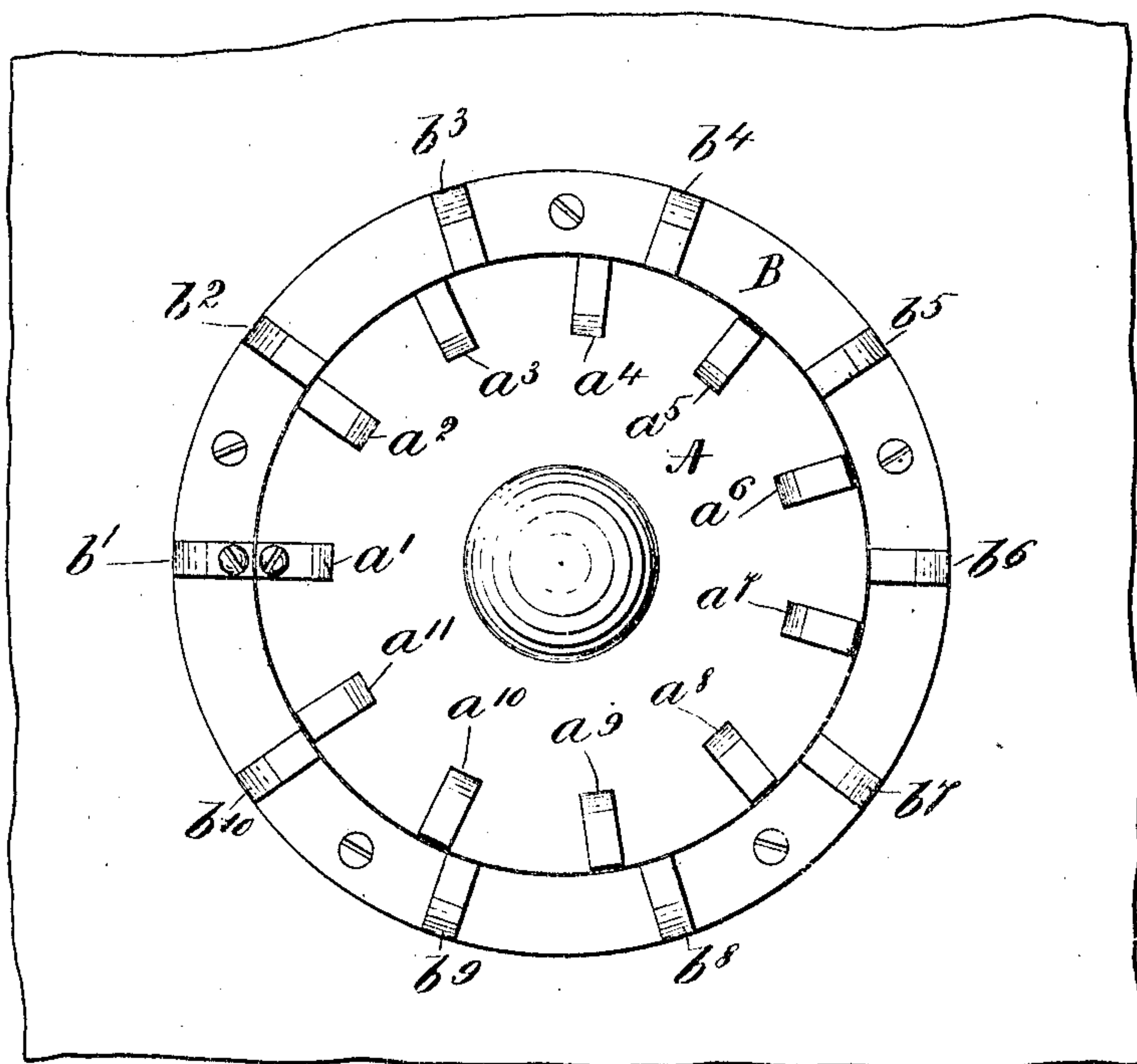


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J. W. RAYMOND.  
COMBINATION LOCK.  
APPLICATION FILED MAY 22, 1906.



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# UNITED STATES PATENT OFFICE.

JOHN W. RAYMOND, OF BEVERLY, MASSACHUSETTS.

## COMBINATION-LOCK.

No. 843,865.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed May 22, 1906. Serial No. 318,274.

*To all whom it may concern:*

Be it known that I, JOHN W. RAYMOND, a citizen of the United States, and a resident of Beverly, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Combination-Locks, of which the following is a specification.

My invention relates to combination-locks, and consists in improvements in the external operating devices for such locks, my object being to provide a dial or analogous operating device which may be worked easily and accurately by the sense of touch and which will therefore be easily operated in the dark as in the light. By my improvements also I am enabled with comparatively few divisional points upon the relatively movable members of the lock-operating device to obtain the effect of much finer subdivisions than are usually found upon the dial of a combination-lock.

In the drawing hereto annexed there is shown an embodiment of my invention specifically expressed as a rotatable dial concentrically mounted inside a ring-plate. Other relatively movable parts may be substituted for the specific dial and ring-plate construction without, however, departing from my invention herein described.

As my invention does not relate to the interior parts of a combination-lock, these are not shown. They may be any of the well-known and adopted forms which are susceptible of being operated by a spindle or equivalent connection from a movable dial.

A represents the dial, which is externally mounted upon the door of a safe or other locking inclosure, and B is a ring-plate secured to the safe-door or analogous object and concentric with the dial A. Upon the ring-plate B and preferably integral therewith there are placed teeth or projections  $b'$   $b^2$   $b^3$ , &c., these being preferably evenly spaced around the ring-plate B. In the specific instance shown in the drawing ten of these projections are placed upon the ring-plate. The dial A is provided with similar projections  $a'$   $a^2$   $a^3$ , &c., these projections being likewise evenly spaced and extending out to the circumference of the dial. For the sake of accuracy in manipulation, as will presently be shown, I make these projections  $a'$   $a^2$   $a^3$ , &c.  $b'$   $b^2$   $b^3$ , &c., of substantially the same dimensions and space them so that when a projection on the ring-plate comes opposite a projection on the dial the two pro-

jections shall approach each other closely and be of the same size at their respectively most nearly contiguous portions.

I have shown the dial A in the specific instance illustrated by the drawing as having one more projection than the ring-plate B—namely, 11—so that the dial is circumferentially divided by these projections into eleven equal arcs, while the ring-plate is circumferentially divided by its projections into ten equal arcs. As the arcs between the circumferential division-points of the dial and ring-plate represent different fractional divisions of the entire circumference, their spacing is reciprocally differential. An equivalent reciprocal spacing differential may be obtained by having one more division-point in the ring-plate than there is on the dial instead of the reverse arrangement specifically shown for illustration in the drawing. By having one more projection upon one of the members than there is upon the other I am enabled to obtain by means of the differential between them very closely-measured arcs of movement of the dial within the plate. Upon one of the projections on the ring-plate, as  $b'$ , I place a differentiating mark, projection, or depression, shown in the drawing as a small screw, and upon one of the projections on the dial I place also a differentiating feature, shown as the small screw upon the projection  $a'$ . Thus the projection  $b'$  may be considered the master-point upon the ring-plate and the differentiating feature on the projection  $a'$  may be considered as the zero-point or point of origin of the dial. These differentiating features may be of any character, preferably such as renders them tactually perceptible and differentiable from the other projections if the finger of the operator be placed upon the projection  $a'$ , which can thus easily be found by touch, and then if he rotates the dial in either direction, keeping his finger upon the said projection  $a'$ , he will be made aware by the sense of touch of the passing of this projection  $a'$  by each of the projections on the dial-plate B in succession and in the illustrative instance here shown will know that each time his finger touches a projection on the ring-plate he has moved the dial one-tenth of a complete rotation since touching the last preceding projection on the ring-plate B, or if starting with the master projections  $b'$  and  $a'$  in conjunction the operator moves successive projections on the dial into conjunction with the master projection  $b'$  he



will know that the dial is moved each time one-eleventh of a total rotation. Further, if the two master projections  $a'$  and  $b'$  are placed in conjunction and then the next pair of projections  $a^2$   $b^2$  are brought into opposition of conjunction, he will then have moved the dial one one hundred and tenth part of a revolution. If it be desired to move the dial only one-half of one one hundred and tenth of a revolution, the operator places his thumb and finger over two adjacent projections, as  $b'$   $b^2$ , and brings the opposed projections, as  $a'$   $a^2$ , leaving the overlap of the projections  $b'$   $b^2$  about even as regards the approximately opposed projections  $a'$   $a^2$ .

The numbers of any given combination may be selected arbitrarily—as, for instance, the number “34.” To bring the dial and ring-plate into the relation represented by this number “34,” the dial will be started with the two master projections  $a'$   $b'$  in opposition and the master projection  $a'$  then moved so as to pass  $b^2$   $b^3$  and to come to rest opposite  $b^4$ . The exact opposition of  $a'$  and  $b^4$  is easily secured by the sense of feeling. Then  $a^2$  will be nearly opposite  $b^5$ , and the operator passes to  $a^2$  and lines it up with  $b^5$ , then lines up  $a^3$  with  $b^6$ , and then  $a^4$  with  $b^7$ , then  $a^5$  with  $b^8$ . By this means the master projection  $a'$  has been moved beyond the projection  $b^4$  four one hundred and tenths of a revolution. If the number arbitrarily selected were “34½,” after lining up  $a^5$  with  $b^8$  the operator will place his finger over  $a^5$  and  $b^8$  and his thumb over  $a^6$  and  $b^9$  and even up the projections of  $b^8$  and  $b^9$  over  $a^5$  and  $a^6$ , thus placing the master projections  $a'$  four and one-half one hundred and tenths or nine two hundred and twentieths beyond the projection  $b^4$ .

A dial and ring-plate such as above described may be substituted for the ordinary dial and ring-plate, which are provided with a single master-point upon the plate and one hundred even subdivisions of the circumference of the dial, for the reason that from the more minute subdivision made possible by my improvements above described a sufficiently close approximation may be made to any one of the strictly decimal divisions of the ordinary dial to line up the interior disks of the combination-lock.

The specific differentiation between the tactually perceptible divisions of the dial and ring-plate or equivalent relatively movable members may be varied to suit different situations without departing from the invention

above described, and for the specific form of stationary ring-plate and concentric rotating dial other relatively movable members may be substituted and provided with differentially-spaced and tactually-perceptible divisions and at the same time embody this invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of a dial and ring-plate, the dial and ring-plate provided respectively with circumferential tactually-perceptible division-points, there being one more point on one of said members than on the other.

2. The combination of a dial and ring-plate, the dial and ring-plate provided respectively with evenly-spaced circumferential tactually-perceptible division-points, there being one more point on one of said members than on the other.

3. The combination of a dial and ring-plate, the dial and ring-plate provided respectively with circumferential tactually-perceptible division-points, reciprocally differential in their spacing, one of said points on each of said members being tactually distinguishable from the others.

4. The combination of a dial and ring-plate, provided respectively with circumferential tactually-perceptible division-points, reciprocally differential in their spacing, arranged close to the line of separation between the dial and plate.

5. The combination of a dial and ring-plate provided respectively with evenly-spaced circumferential tactually-perceptible division-points there being one more point on one of said members than on the other, said points arranged close to the line of separation between the dial and ring-plate.

6. The combination of a dial and ring-plate, provided respectively with circumferential division-teeth arranged close to the line of separation between the disk and plate, there being one more tooth on one of said members than on the other, said teeth being of the same dimensions on each member where they approach the nearest to each other.

Signed by me, at Boston, Massachusetts, this 17th day of May, 1906.

JOHN W. RAYMOND.

Witnesses:

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CASPAR ROGERS.