

A. E. GARDNER.
Combination Locks.

No. 151,870.

Patented June 9, 1874.

Fig. 4.

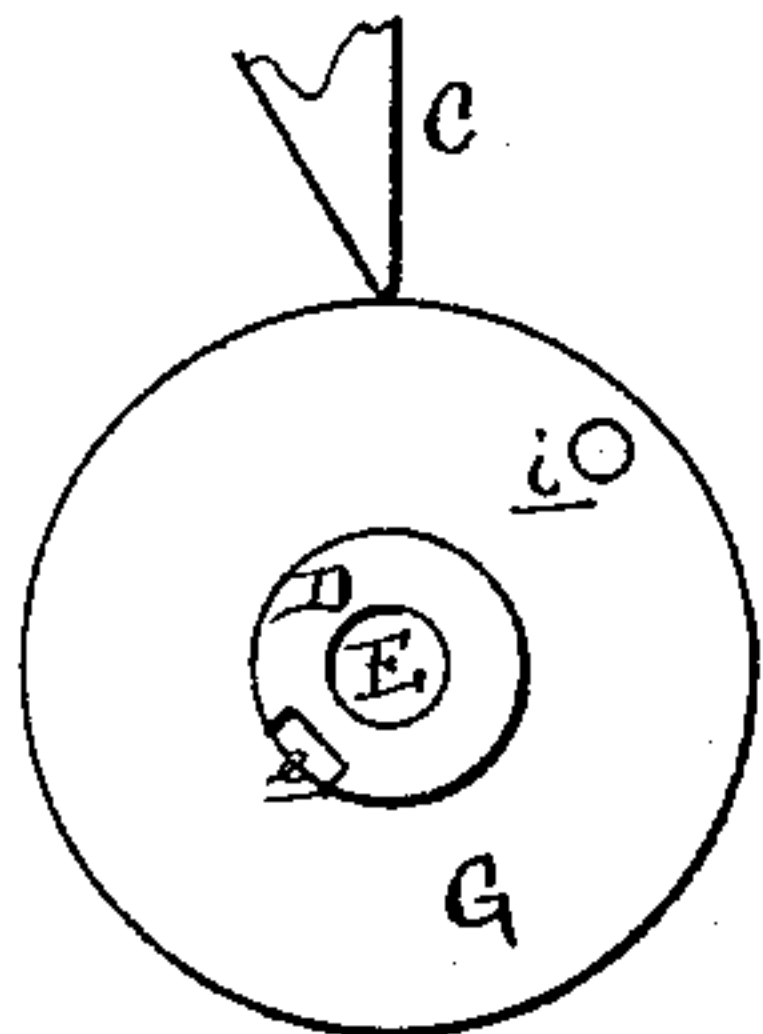


Fig. 5.

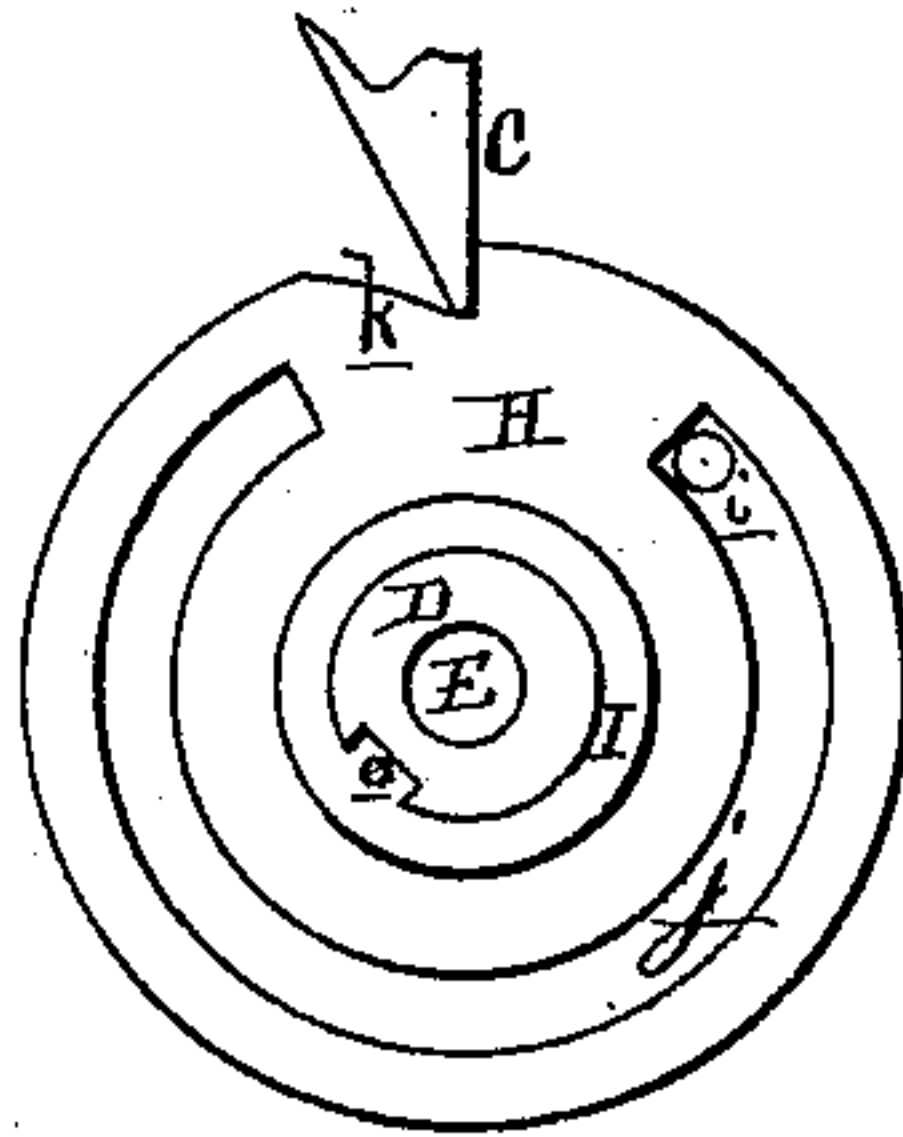


Fig. 6.

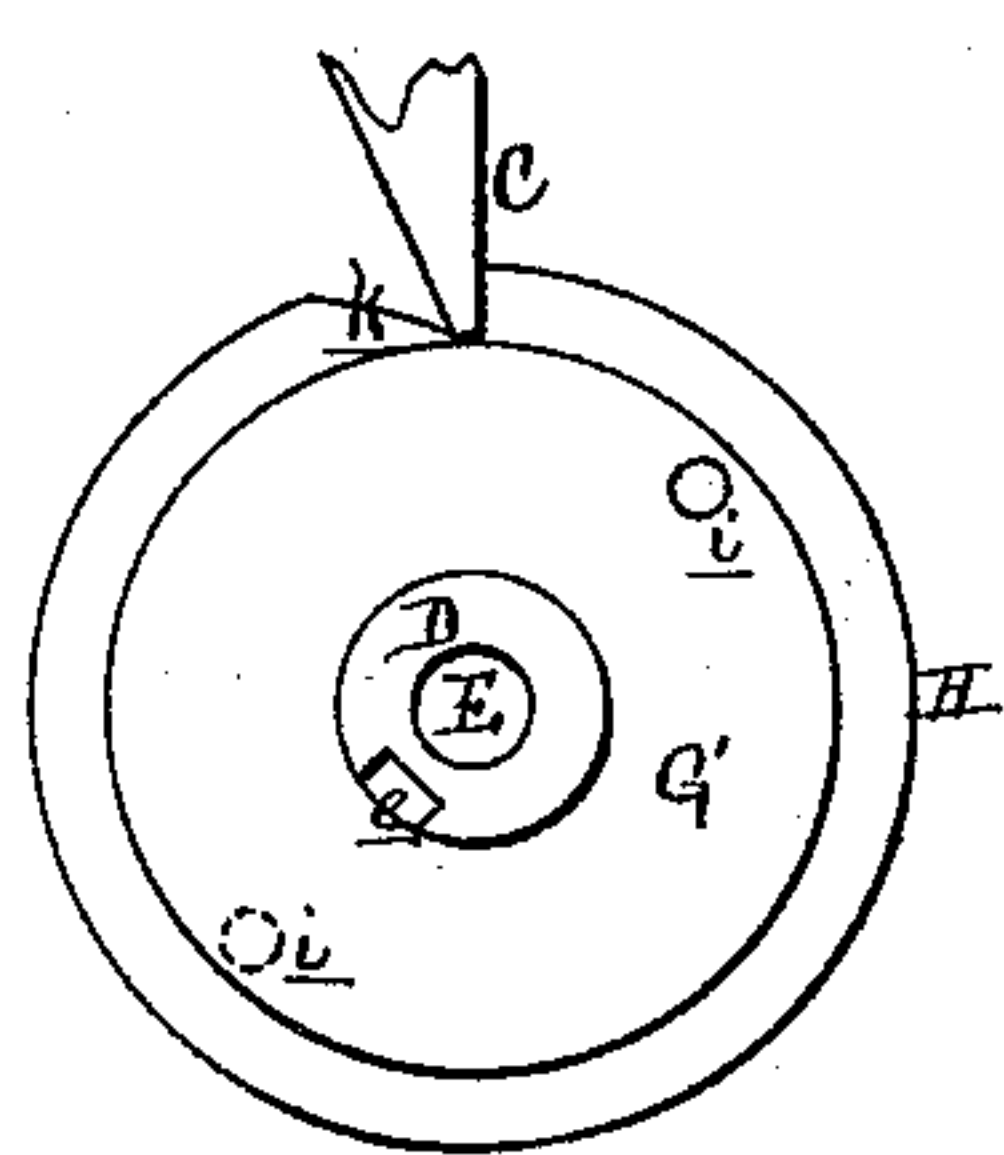


Fig. 7.

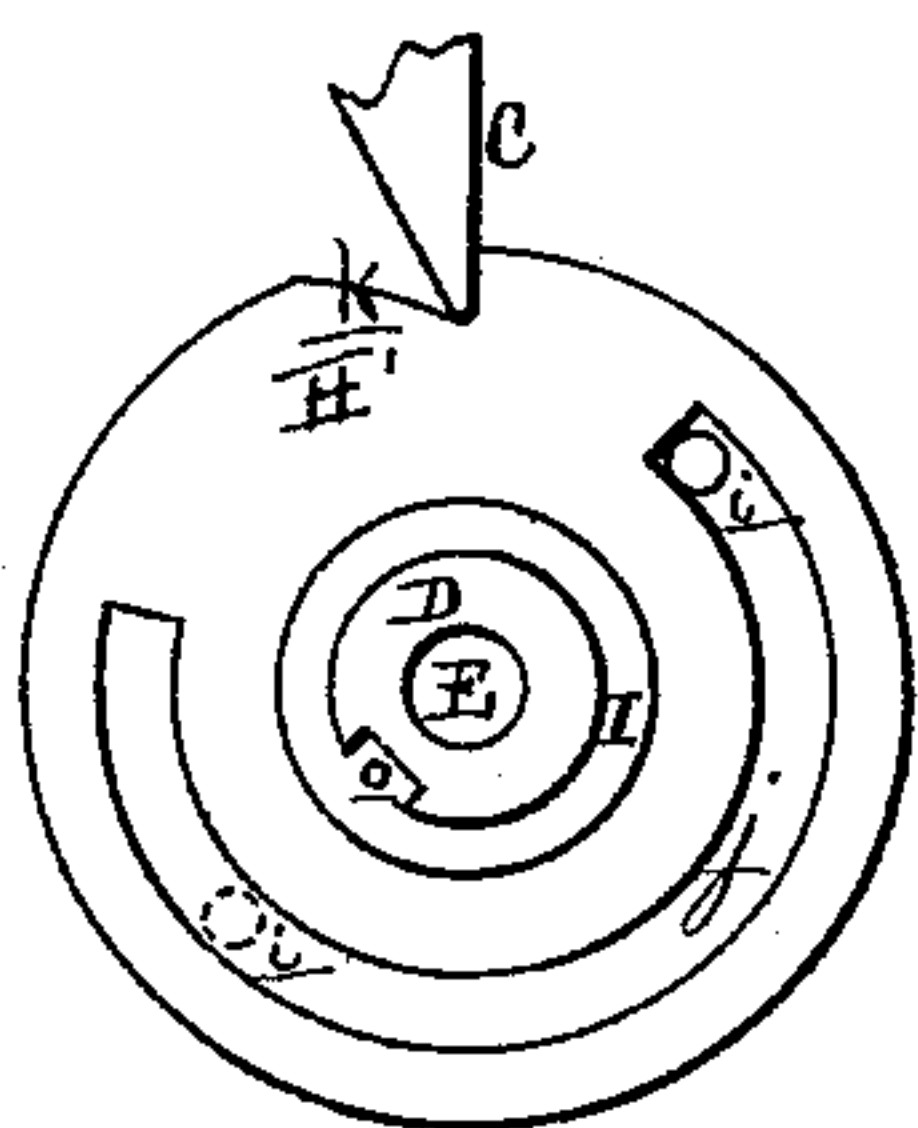


Fig. 8.

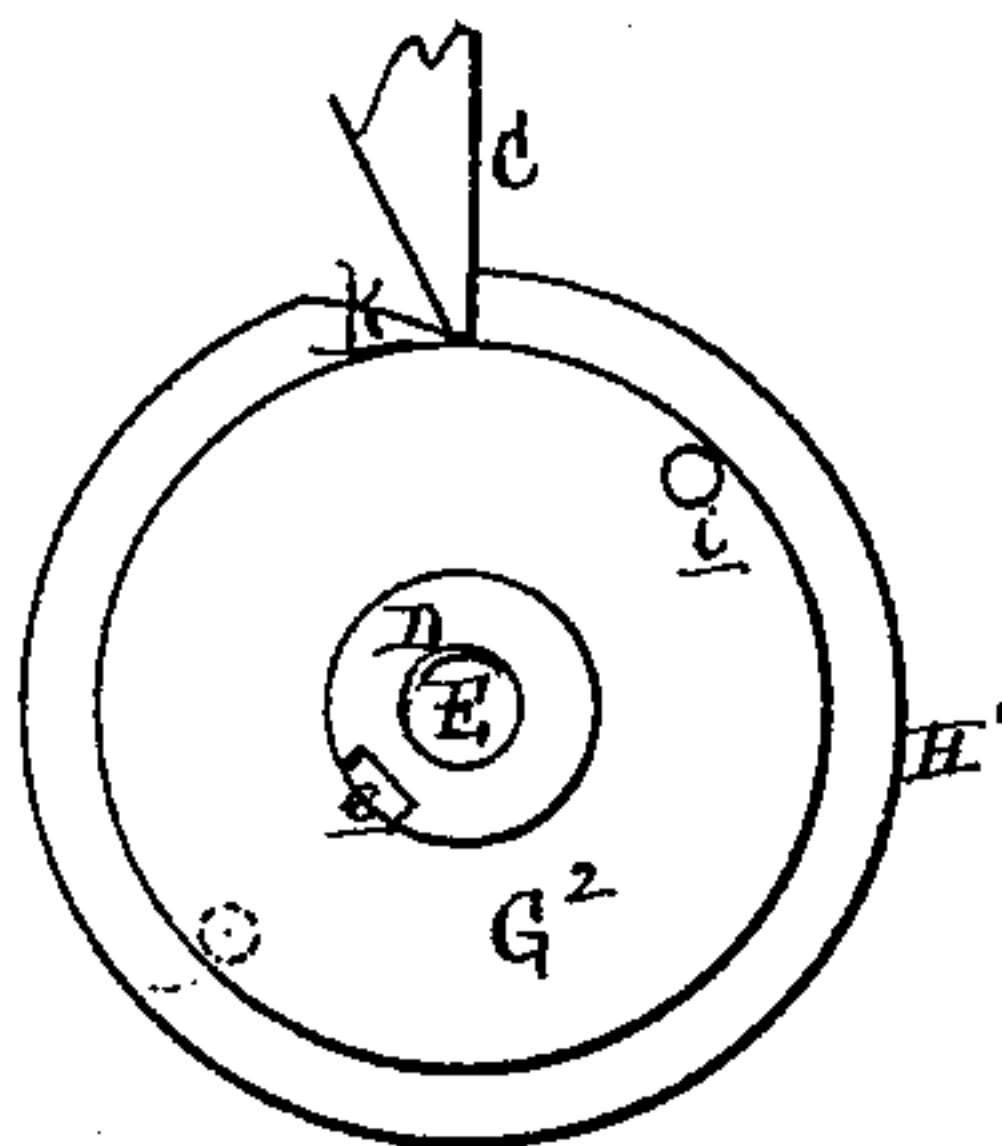


Fig. 9.

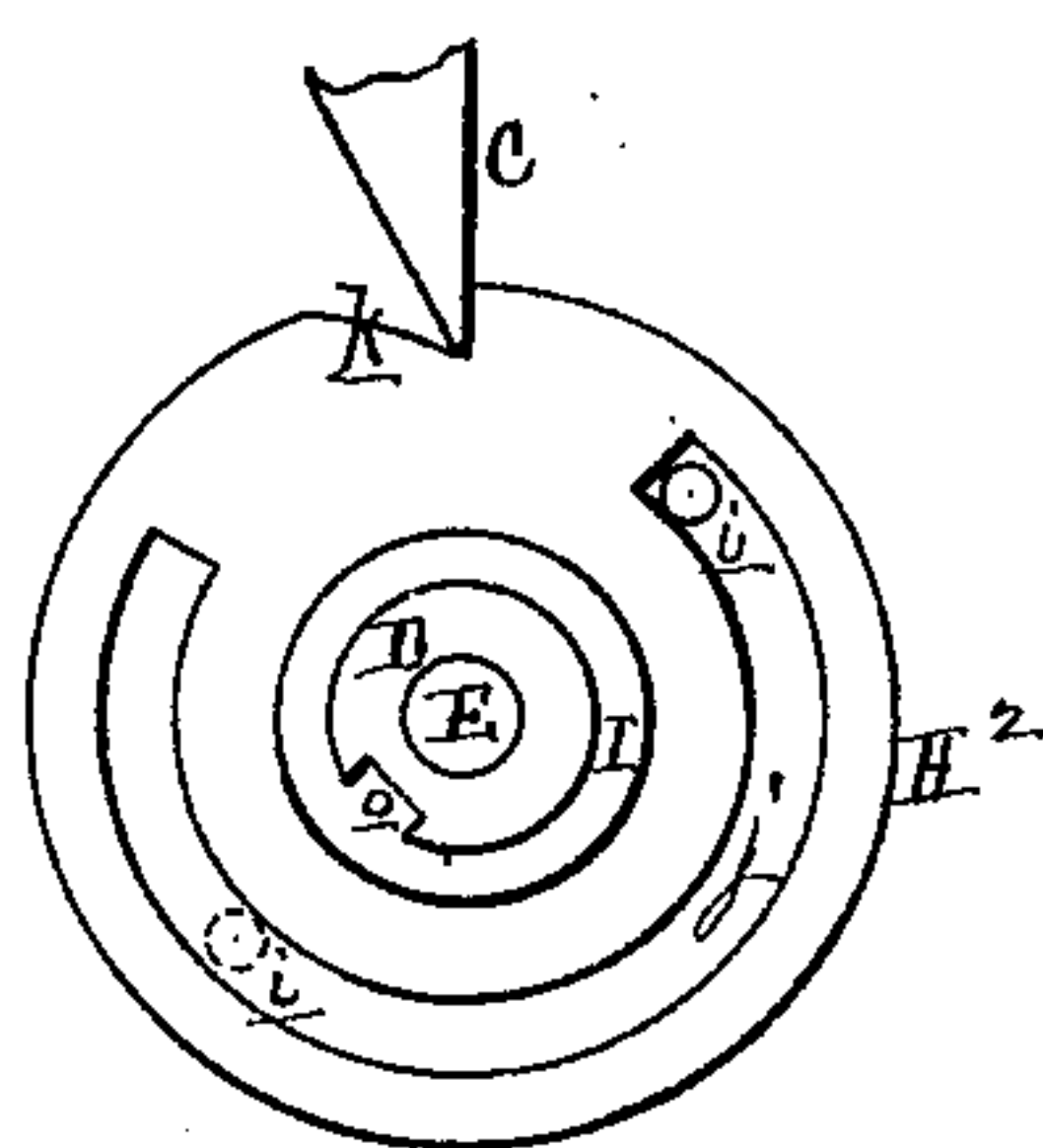


Fig. 10.

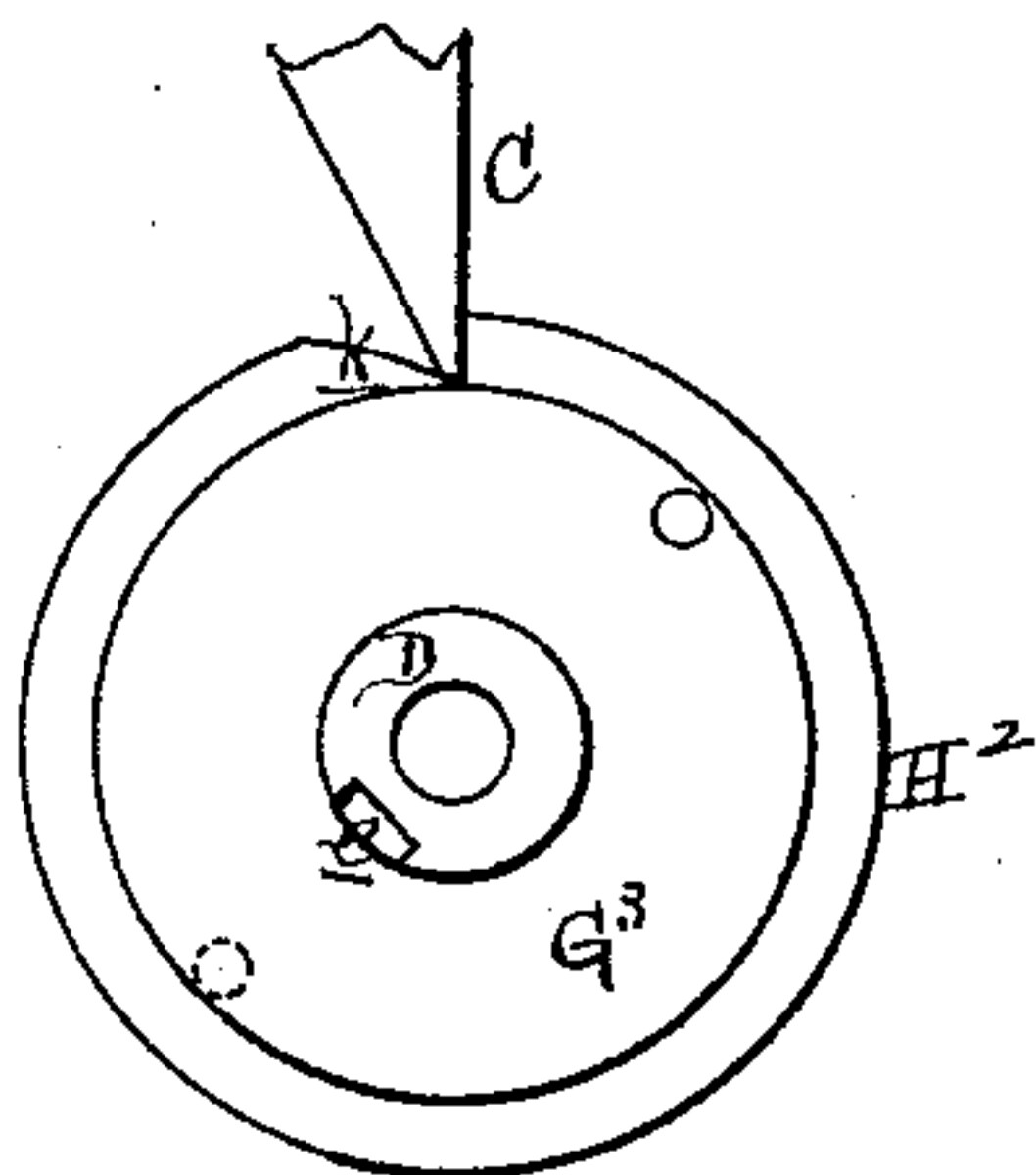


Fig. 11.

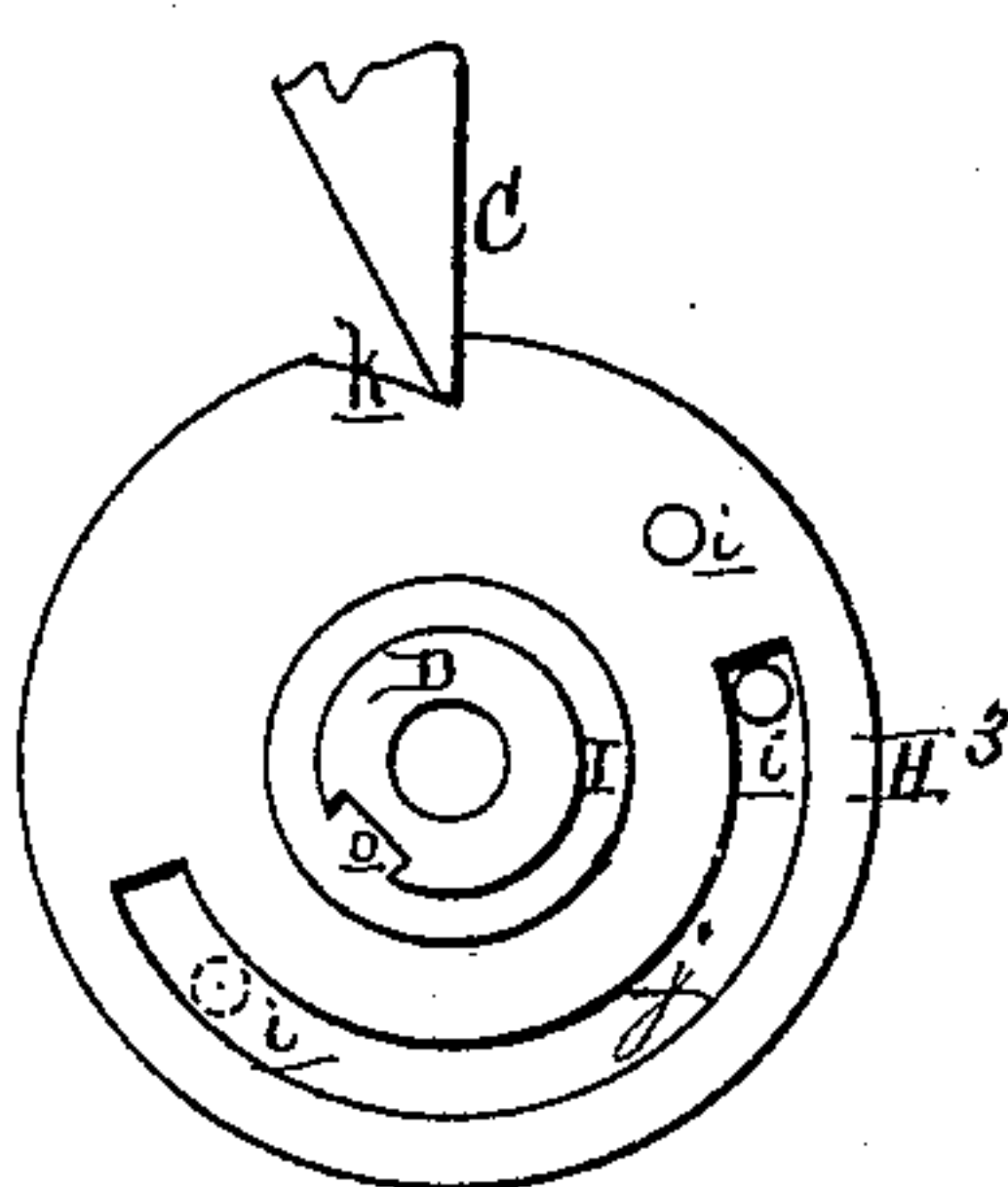
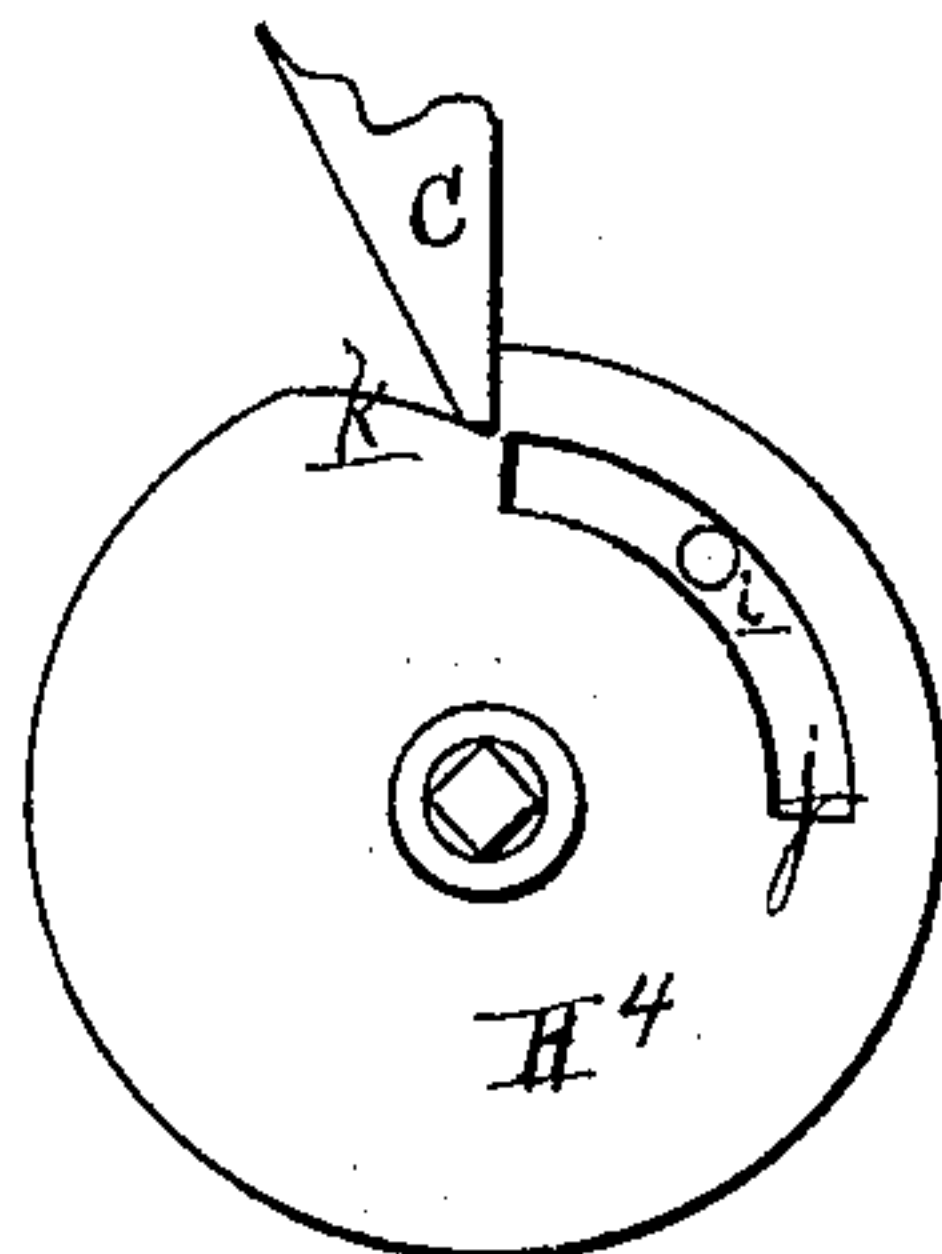


Fig. 12.



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UNITED STATES PATENT OFFICE.

ADDISON E. GARDNER, OF MILAN, MICHIGAN, ASSIGNOR TO HIMSELF AND
WILLIAM W. McLANAHAN, OF SAME PLACE.

IMPROVEMENT IN COMBINATION-LOCKS.

Specification forming part of Letters Patent No. **151,870**, dated June 9, 1874; application filed
March 24, 1874.

CASE A.

To all whom it may concern:

Be it known that I, ADDISON E. GARDNER, of Milan, in the county of Monroe and State of Michigan, have invented an Improvement in Permutation-Locks, of which the following is a specification:

The nature of this invention relates to an improvement in that class of permutation-locks wherein a series of tumbler-disks are mounted on a dial-spindle, each tumbler having a notch in its periphery, which notches are brought successively in line by the rotation of the spindle to allow a dog pivoted on the bolt to drop into them before the bolt can be thrown. The object of the invention is to so construct, arrange, and operate the tumblers as that even if the picklock shall have become possessed of the proper number to bring the notch of the first tumbler in line with the dog, the dog will be kept out of contact with the remaining tumblers, so that their notches cannot be felt or picked up by the micrometer; and to introduce a new factor in the combination or permutation—to wit, every time that the locking-combination is changed the number of revolutions to give the spindle in bringing the successive tumbler-notches into line is also changed, thereby preventing the combination from being worked out mathematically.

Figure 1 is a perspective view of the lock, looking at it from the rear. Fig. 2 is a side elevation. Fig. 3 is a perspective view of the stationary tumbler-sleeve, and showing the inner end of the spindle. Fig. 4, Sheet 2, shows the first pin-wheel placed on the sleeve. Fig. 5 shows the first tumbler and washer, as added to Fig. 4. Fig. 6 shows the second pin-wheel, as added to Fig. 5. Fig. 7 shows the second tumbler and washer, as added to Fig. 6. Fig. 8 shows the third pin-wheel and a washer, as added to Fig. 7. Fig. 9 shows the third tumbler and a washer, as added to Fig. 8. Fig. 10 shows the fourth pin-wheel, as added to Fig. 9. Fig. 11 shows the fourth tumbler and washer, as added to Fig. 10. Fig. 12 shows the inner tumbler, as added to Fig. 11, which, being larger in diameter, hides the other tumblers.

A represents a safe or vault door, to the inner face of which a sliding bolt, B, is secured by screws *a* passing through its slots *b b*. This bolt does not enter directly the door-jambs of the safe or vault, but simply locks the bolt-work of the door. At the back end of the bolt is a stud, *c*, on which is pivoted a T-headed dog, C. D is a sleeve having a flanged base, *d*, which is secured to the inner face of the door. In one side is cut a longitudinal groove, *e*. E is a spindle, which revolves in the sleeve, passing through an opening in the door, and having a dial-knob, F, secured to the outer end, rotating inside of an annular guide-ring on the door. The inner projecting end of the spindle is squared, as at *f*, and terminates in a screw, *g*, to receive a nut, *h*, which secures the tumblers on the sleeve. G is a wheel with a pin, *i*, near the periphery, which is slipped over the sleeve, and rests against the flange. H is a disk-tumbler having a segment-slot, *j*, and a notch, *k*. The latter is cut in its periphery with one angle at a radial line, and the other on a chord. This tumbler is then slipped on the sleeve against the pin-wheel G, whose pin *i* enters the slot *j* a little way. An annular washer, I, with an internal projection, *o*, is next slipped on the sleeve, the stud *o* entering the groove *e* to prevent the washer from turning. G¹ is a second pin-wheel, which is now slipped upon the sleeve, being like the first wheel, except that it has two pins, *i*, at opposite sides projecting from opposite faces of the wheel. The inner pin projects into the slot of the tumbler H, but not far enough to strike the pin of the first pin-wheel, while the outer pin projects into the slot of a tumbler, H¹, which is next slipped on the sleeve. Another washer, I, is slipped on the sleeve. Next, a third pin-wheel, G², is slipped on the sleeve with two pins, the inner of which projects into the segment-slot of the tumbler H¹, while the outer one enters the slot of a third tumbler, H², which is then slipped over the sleeve, with a washer interposed between it and the fourth pin-wheel G³, whose inner pin projects part way into the slot of the tumbler H², while the outer pin enters the seg-

ment-slot of fourth tumbler H^3 , which follows it on the sleeve, which tumbler is in turn followed by a washer, I, which is flush with the end of the sleeve. The fifth and last tumbler, H^4 , is not loose upon the sleeve like the others, but has a square hole in its center, which is slipped on the square f of the spindle, and is secured thereon by the nut h . The outer pin i' in the tumbler H^3 is received in the segment-slot of the tumbler H^4 . The tumbler H^4 is a little larger in diameter than the rest, so that the point of the dog will rest upon its periphery without touching the others, except when the notch comes under the dog, whereupon the dog will be supported by one or more of the other tumblers. The segment-slots of the various tumblers differ in length, and all the tumblers, except H^4 and H^3 , are interchangeable on the sleeve. The tumblers, when so turned as to bring all the notches in line under the dog, allow the latter to drop, when the bolt may be thrown by revolving the spindle to the right.

As before stated, the tumbler H^4 is rotated by the spindle, the next, H^3 , is rotated by its pin i' catching against the end of the slot in tumbler H^4 , and by means of the pin-wheel G^3 motion is given the next tumbler, and so on throughout the series, the spindle being alternately rotated to the right and left for bringing the notches of the tumblers successively into line.

The combination is changed by transposing the tumblers on the sleeve. Unlike other dial-

locks, every change of combination compels a change of the number and order of rotations of the spindle to the right and left, to bring the notches of the tumblers into line. This brings a new and ever-changing factor into the permutation problem, which cannot be solved by any known rule of mathematics.

The unlocking-number of the tumbler H^4 may be determined by getting the position of its slot by means of a micrometer applied to the knob, or by any other sensitive instrument, or by sound, or the sense of feeling; but the moment the spindle is turned to pick up the next number of the combination, the dog is lifted off the peripheries of the other tumblers, which cuts off any chances in that direction.

In the present case I have described and shown five tumblers. A lesser number may be employed.

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

The combination, with the bolt B and dog C, of the pin-wheels G G^1 G^2 G^3 , and interchangeable notched tumblers H H^1 H^2 H^3 , having segmental slots of varying length and rotating upon the stationary sleeve D, and the tumbler H^4 secured to the spindle E, substantially as and for the purpose set forth.

ADDISON E. GARDNER.

Witnesses:

H. F. EBERTS,
H. S. SPRAGUE.