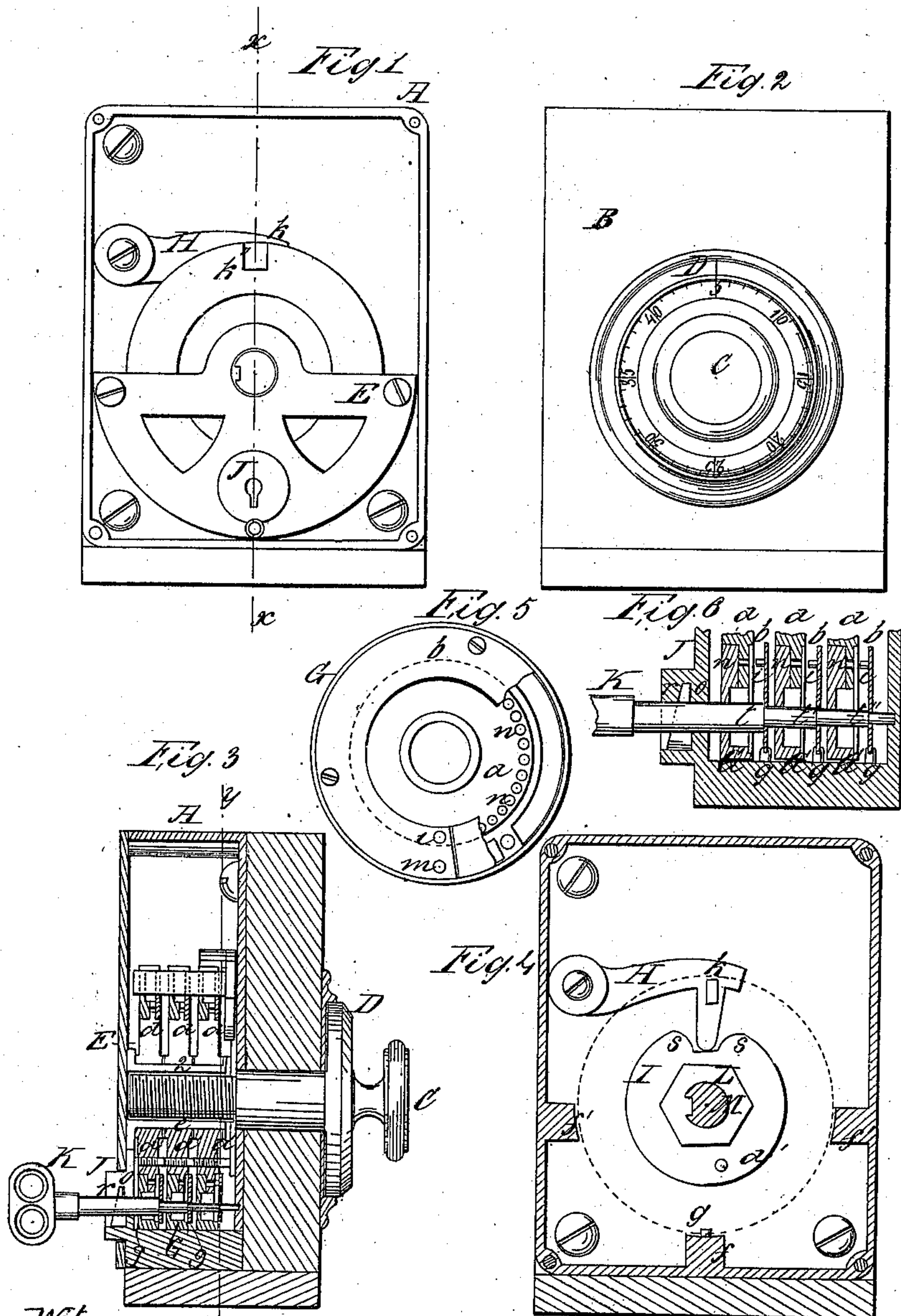


T. J. Sullivan,
Permutation Lock.
N^o 81,430. Patented Aug. 25, 1868.



Witnesses
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T. J. SULLIVAN, OF ALBANY, NEW YORK.

Letters Patent No. 81,430, dated August 25, 1868.

IMPROVEMENT IN PERMUTATION-LOCKS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, T. J. SULLIVAN, of Albany, in the county of Albany, and State of New York, have invented new and useful Improvements in Combination-Locks; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

Figure 1 is a back view of my lock, with the back plate removed, exhibiting the internal mechanism.

Figure 2 is a front view of the lock, showing the knob and graduated combination-circle.

Figure 3 is a vertical section of the lock through the line $x x'$, fig. 1.

Figure 4 is another section at right angles to that shown at fig. 3, and is taken through the line $y y'$ of that figure.

Figure 5 is a detail view of one of the improved combination-wheels.

Figure 6 is a detail view of the lower part of the section shown at fig. 3.

Similar letters of reference indicate corresponding parts.

This invention relates to improvements for setting the combination of any lock having indented wheels, actuated by a knob bearing a graduated circle, exterior to the lock, but is designed more particularly to improve a lock previously patented by me.

The invention consists in attaching circular springs to the disks containing the combination-wheels, said springs being each provided with a detent-pin for detaining the combination-wheels at any desired point, by fitting into the indentures of the same, as will be hereinafter more fully set forth.

In the drawings, A is the casing of the lock, B the door of the safe, C the knob, D its revolving graduated circle. Each combination-wheel, a , is enclosed in a disk, G, as shown at fig. 5, and the said wheel revolves on a thimble, e , forming part of the segment E, and projecting horizontally from the same. The wheels a are each provided with lateral holes, n , or indentures near their peripheries, as shown, and into any one of these holes a detent-pin, i , catches, and thus holds the wheel from revolving. The spring b , in which this pin is set, is shown more enlarged at figs. 5 and 6. Each spring is secured to a disk, G, as shown at fig. 5, a part of the spring being broken away, to exhibit the holes in the wheel a , which latter is beneath the spring, and the holes are beneath the pin i of the spring. m is the hole for the key, used in setting the combination, and will be hereinafter described.

The combination-wheel a thus revolves upon the thimble e as an axis, and also within the disk G, with slight friction. Within the key-chamber J is a helical surface, r , which has for its object the forcing in of the key K against the springs b on the disks G, whereby the springs thus forced, back withdraw the pins i from the holes n , and leave the wheels a free to be turned and set to a new combination, which turning is accomplished by turning the knob C to the right or left once or more, according to the precept specified for setting the combination, which, in my lock, is to turn to the right three or more times, then to the left twice, and lastly, to the right once.

The turning of the combination-wheels is accomplished by means of the projecting pins a' , one of which is shown on the plate I, fig. 4. This turns with the knob C, as the plate I and washer L are both mounted firmly on the spindle M of the knob. When the knob is turned, the plate I revolves, and with it the projection a' , which in one revolution impinges on the similar pin in the next combination-wheel, and so on till all are set; for, in three or more revolutions, the rear wheel is set on a certain number of the graduated circle, then two reverse revolutions set the next wheel on any number chosen, then one reverse revolution sets the wheel next the knob. Each wheel can be set on a different number, in which case there will be a partial revolution in excess of the number just specified for each wheel.

There is a projection, o , on the key, of length sufficient to enter the key-hole, and when the key is turned to bear against the helical surface r . When the key is revolved, said helical surface then actuates the key inward, as the same is turned by means of the said projection o . The key is also reduced abruptly in three places, thus forming circular shoulders $t t' t''$, as shown. Each of these shoulders abuts against a spring on

one of the disks, in the manner shown at figs. 3 and 6, for the key-hole in the rear disk is made large enough to admit the shoulder *t* to come in contact with the spring on that disk, which spring has its key-hole just large enough to admit the reduced portion of the key, constituting the shoulder *t'*, which shoulder passes through the next disk, and encounters the spring of the same, the key-hole of which second spring is just large enough to admit the reduced part forming the shoulder *t''*. This shoulder passes through the hole in the last disk, and encounters the spring of the same, a reduced terminal point passing through the last spring, as shown.

Now, when the key, after being entered, is turned so that its projection *o* encounters the helical surface within the key-chamber, the said surface causes the key to thrust forward as it is turned, and thus the several springs of the disks are forced back simultaneously, and their respective pins *i* withdrawn from the holes in the combination-wheels, leaving the latter free to be turned and set in any other combination, by turning the knob C according to whatever precepts govern the setting of the lock.

The catch H is lifted by the revolution of the plate I, which causes the surfaces S to throw the catch up, and the bar *k*, forming part of the catch, from out the slots *k''*, in the disks of the combination-wheels. The end of the latch is thus raised and presented to the end of the safe-bolt, and prevents its being withdrawn. When the slots *k''* on the disks are brought to coincide with each other, and the notch *s*, in the plate I, and the whole brought to the top, the bar *k* will descend into the said slots, and thus allow the safe-bolt to pass over and by the latch, and be withdrawn to permit the opening of the safe. This operation is more fully described in the subject-matter of my Letters Patent for the other parts of the lock, of which this is an improvement.

At the bottom of the casing of the lock is a block, *f*, which, with the lateral blocks *f'*, is cast on the casing, for the purpose of guides, to steady the disks. In the block *f* are the stud-pins *g g g*, which project upwards a short distance between the disks, as shown, and act as guides to steady the same, when the key is actuating the springs in the manner before described. The combination must be set while the key is in place, and when set the key is withdrawn. The key-hole is on the inside of the safe, and is not accessible till the safe is opened.

The devices heretofore used to accomplish the changing of the combination of these locks were more or less complicated, and liable to derangement. My improvement supplies a device that is at once simple, efficient, and easily applicable to combination-locks of the above-described character.

I claim as new, and desire to secure by Letters Patent—

The tumblers, constructed as described, of the perforated annular plate *a*, grooved disk G, and divided annular spring *b*, having the pin *i*, all arranged and operated as described for the purpose specified.

The above specification of my invention signed by me, this 4th day of November, 1867.

T. J. SULLIVAN.

Witnesses:

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