

G. Rosner Permutation Lock.

N^o 30,092.

Patented Sep. 18, 1860.

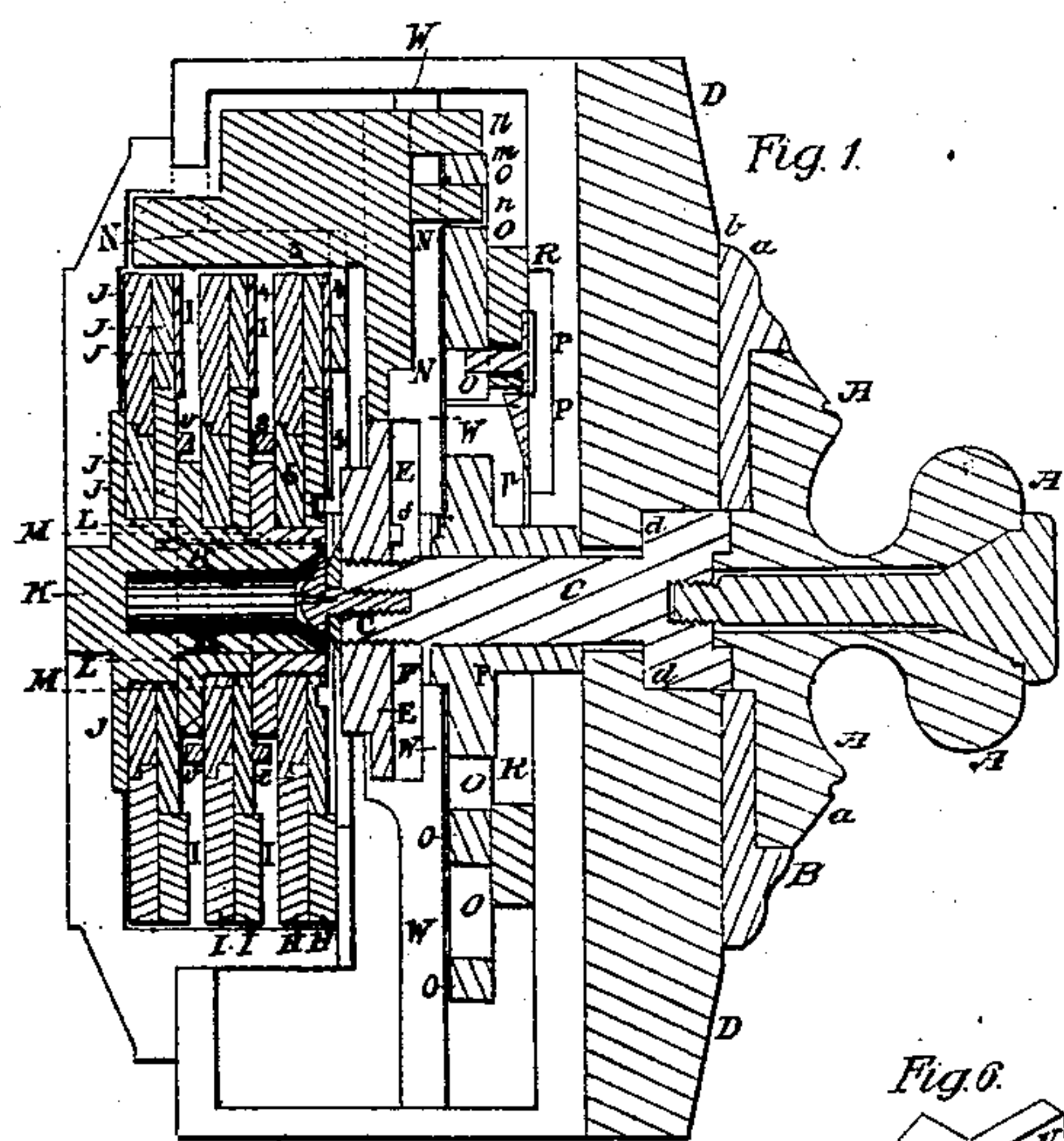


Fig. 1.

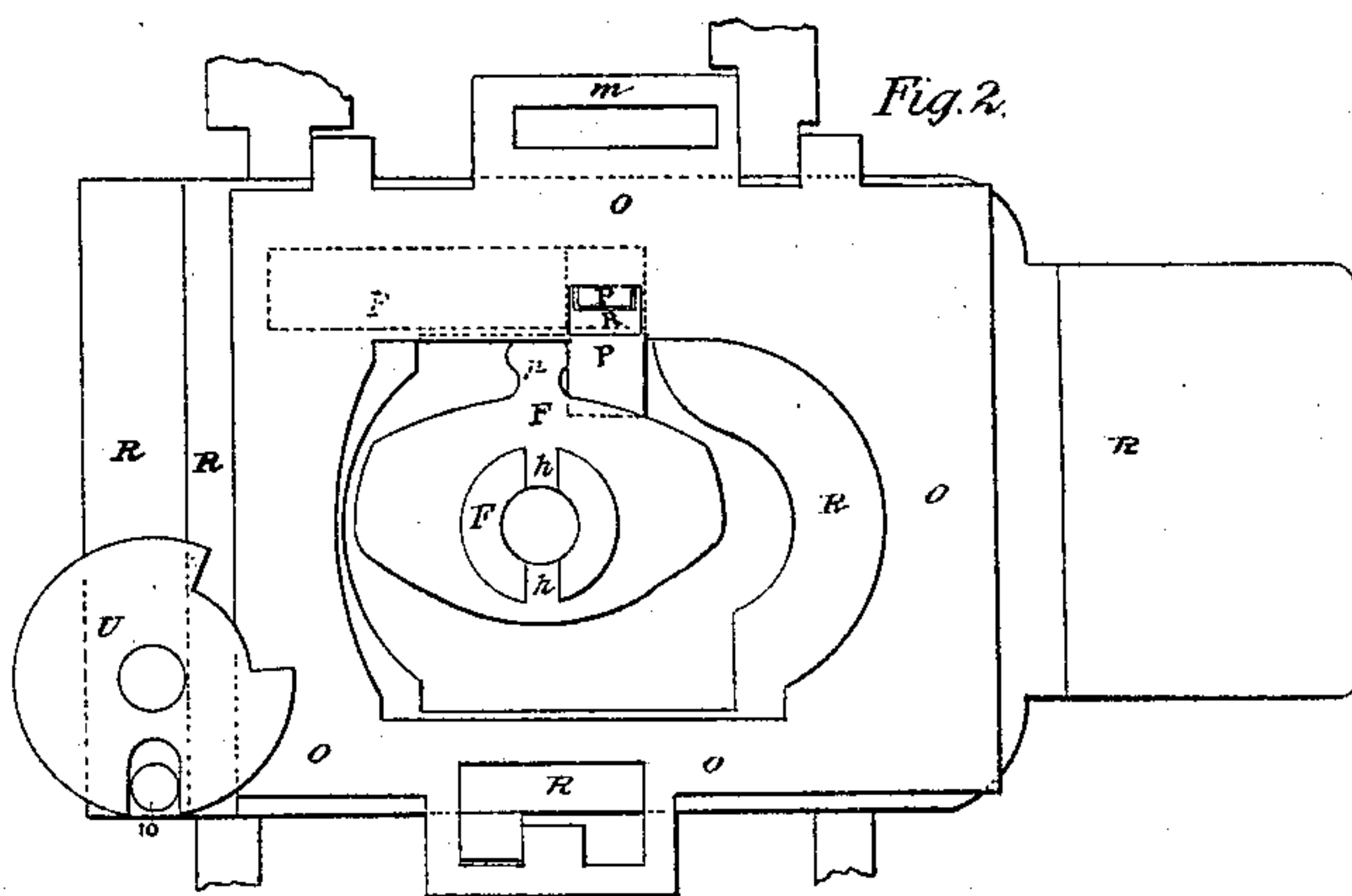


Fig. 2.

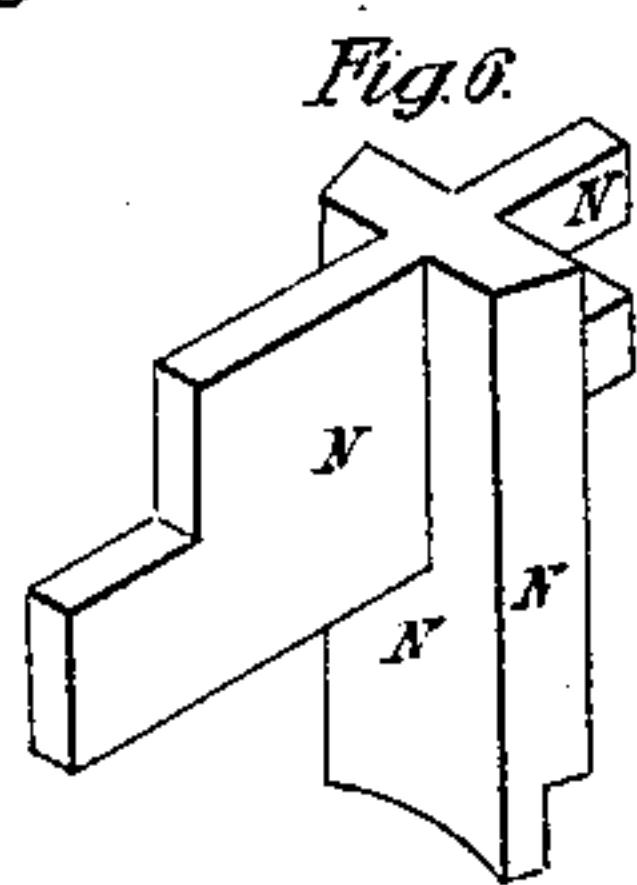


Fig. 3.

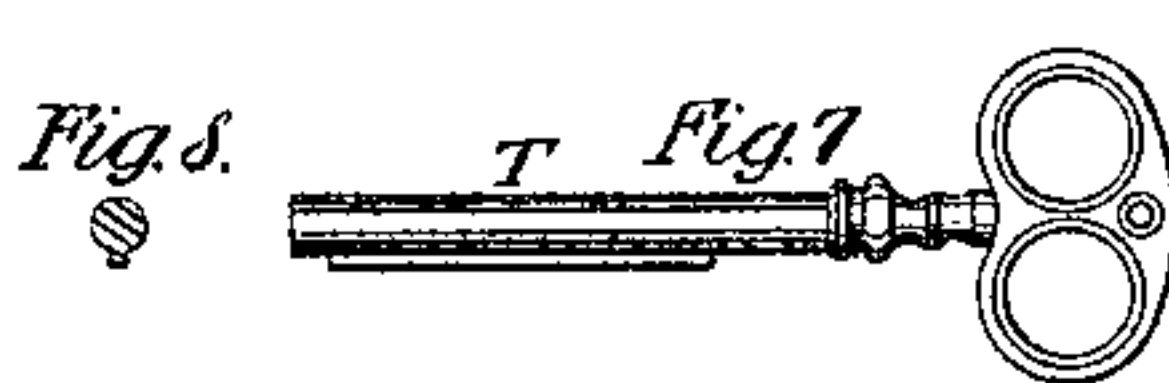


Fig. 4.

Fig. 7.

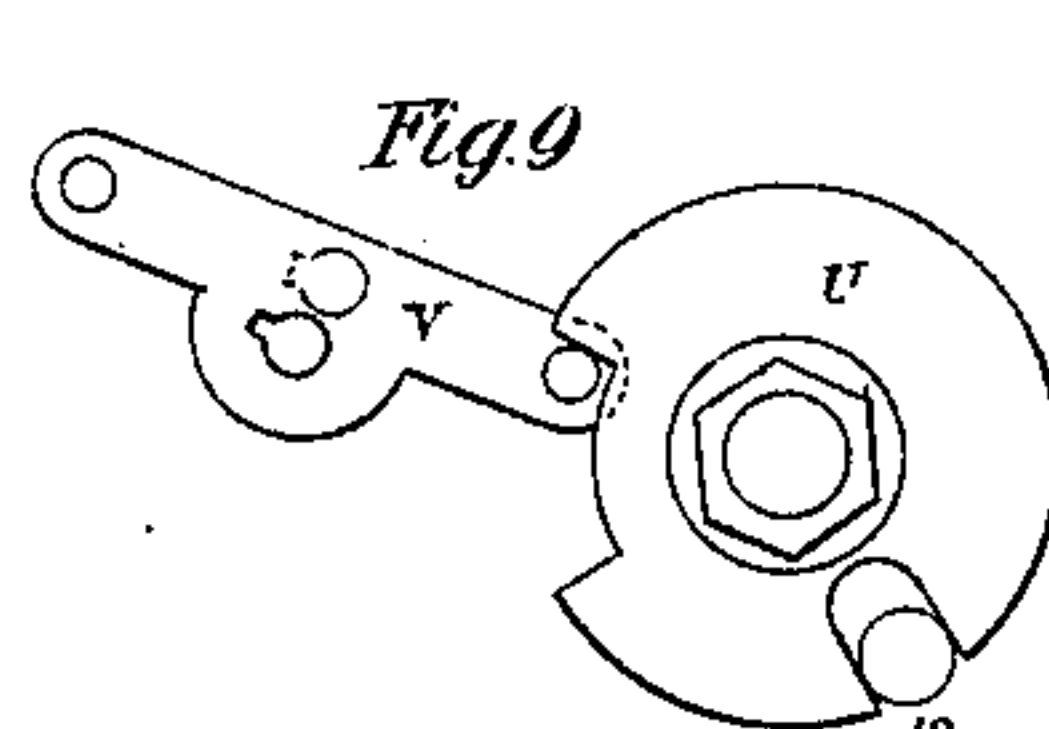


Fig. 5.

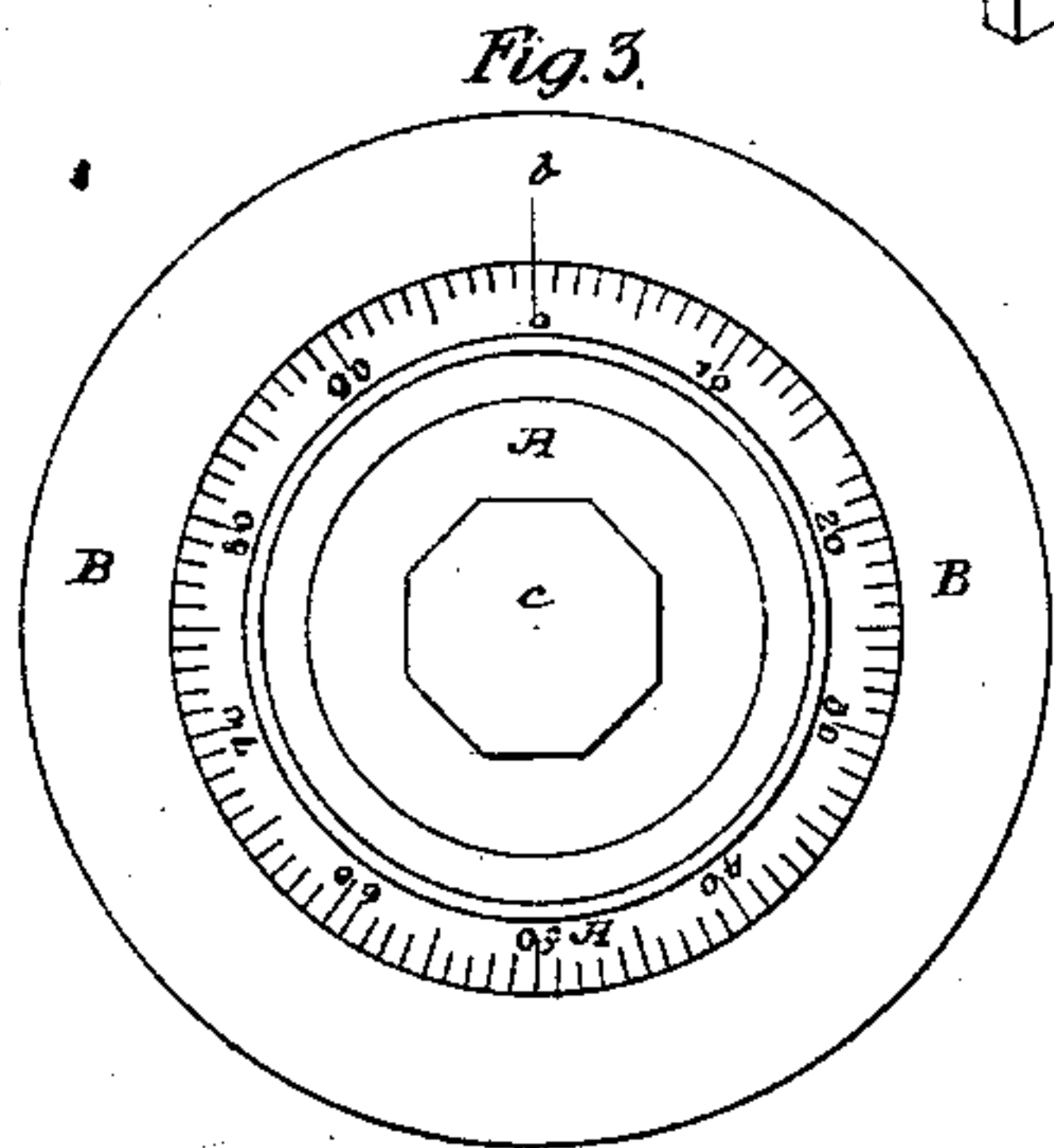


Fig. 6.

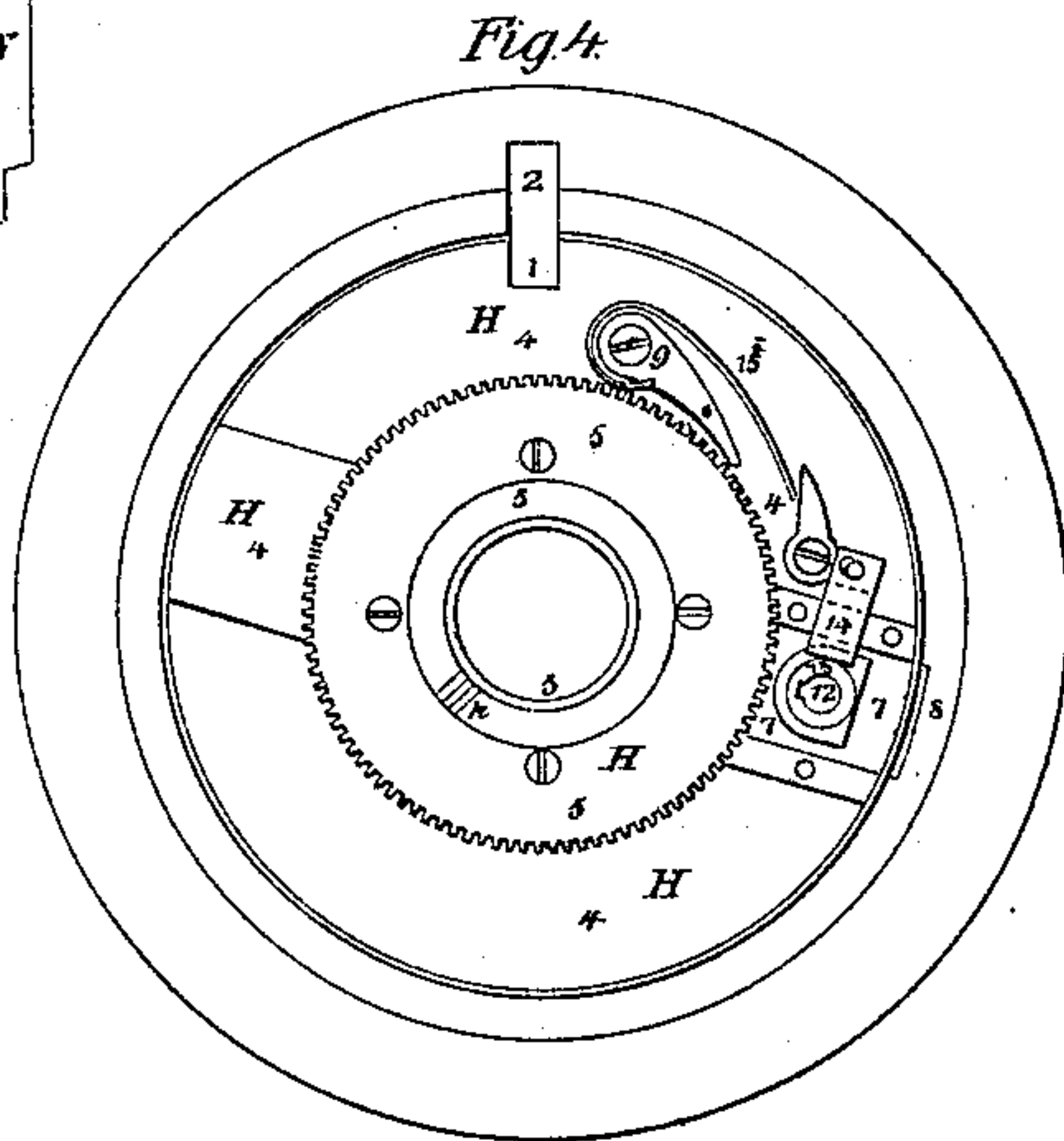


Fig. 7.

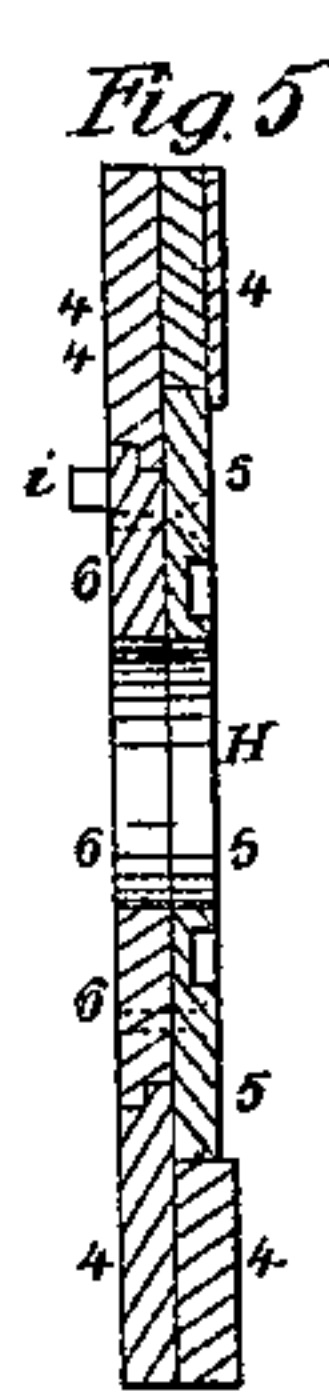


Fig. 8.

Witnesses

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LOCK.

Specification forming part of Letters Patent No. 30,092, dated September 18, 1860; Reissued July 25, 1871, No. 4,488.

To all whom it may concern:

Be it known that I, GEORGE ROSNER, of the city of Rochester, county of Monroe, and State of New York, have invented certain
5 new and useful Improvements in the Method of Constructing Locks; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being
10 had to the annexed drawings, forming a part of this specification.

The nature of my invention consists, as applied to that class of locks, known as "combination locks", where the bolt can be
15 moved only when one or more wheels connected with the lock occupy each a certain position, (which position of the wheels depends upon the "combination" to which they have been set)—each wheel being com-
20 posed of two or more parts, the relative position of which to each other determines the "combination" to which that particular wheel has been set.

Hitherto, to change the "combination", requisite to move the bolt, it has been neces-
25 sary to remove these wheels from the lock, rearrange the relative position of the different parts of one or more of the wheels, and replace them in the lock.

30 The object of the first part of my invention is to obviate the necessity for this removal of the wheels, and I effect the desired result by attaching to each of the wheels a secondary lock, so arranged upon each wheel,
35 that when the lock is in "combination", or in such a condition that the bolt can be moved, the key-holes to the "secondary-locks" of the different wheels shall be opposite each other, and also opposite an opening
40 in the back of the lock, so that in this position it is possible to insert, through the opening in the back of the lock, the key into the series of "secondary locks". By turning this key to the "secondary-locks", that
45 portion of each wheel, the definite relative position of which to the lock is necessary to the possibility of moving the bolt, is fixed in the required "definite relative position"; while freedom of motion is given to that
50 other portion of each wheel, the relative position of which to the first portion (now fixed and immovable) determines the "combination" to which that wheel it set. The

now freely moving portions of the wheels being arranged in new "combinations", by
55 moving the handle or key to the lock proper, the key to the series of "secondary locks" is turned back—the (temporarily) movable portions of each wheel are thus rendered fixed with reference to each other—while the
60 (temporarily) immovable portion of the wheel is freed, giving freedom of motion to the wheel as a whole, and the lock is ready for use under its new "combination."

For convenience of description I have
65 spoken of my invention as applicable only to locks in which wheels are used, but it is evident that the same principle may be applied to locks in which wheels are not used. The idea embodied in the first part of my
70 invention being this—where the possibility of moving the bolt depends upon the definite relative position to the lock of a movable portion of it—where this "movable portion" is composed of two or more parts, rigidly
75 attached to each other, but so attached as to admit of a definite number of changes in the relative position of the parts—where the relative position of the handle or key, neces-
80 sary to the "definite relative position" of the "movable portion" of the lock depends on the "relative position of the parts" composing the "movable portion" of the lock—where these conditions all obtain, the idea embodied in the first part of my invention is
85 this—the introduction of one or more "secondary locks", by means of which the "movable portion" of the lock may be held (temporarily) stationary in that "definite rela-
90 tive position" necessary to "the possibility of moving the bolt", while the different "parts" of the "movable portion" are rendered (temporarily) free to assume new
"relative positions" according to the "combination" selected by the operator. The
95 new "combination" once selected; the freedom of motion between the "different parts" of the "movable portion" is ended, by means of the "secondary-locks",—the "movable portion" is no longer held stationary, but is
100 free to move as a whole—and the lock can be operated only by using the "combination" to which it was last set.

In this specification wherever the "sec-
ondary-lock" is referred to—in every case
105 the word "secondary" is connected with it;

where the word "lock" is used without the word "secondary", the lock proper is alluded to.

In case of the employment of a series of 5 wheels in a lock, as previously described, where any portion of one wheel rubs against any portion of another wheel, they are liable to adhere to each other and move, when it is not intended that they should move—
10 thereby giving to the wheels different positions from those desired.

The nature of the second part of my invention is to prevent such unintentional motion—by providing a peculiar form of 15 independent bearings for the different wheels.

Some forms of "combination locks" have an opening at the back, through which, when accessible, it is possible to determine the 20 "combination" upon which the lock is set.

The nature of the third part of my invention is to provide a cover to such opening, so arranged that the opening shall be closed and inaccessible when the bolt is in 25 (*i. e.* when the lock is in the condition it would naturally assume, when the door to which it is attached is open and accessible). To gain access to the opening it is necessary, not merely to open the door, but also after-
30 ward to throw the bolt out.

When the "tumbler" of a lock rests continuously upon a movable portion of the lock, which "movable portion" the "tumbler" is to enter when the "combination" is 35 right; it is possible for one experienced to detect by feeling and sound the required "combination."

The nature of the fourth part of my invention consists in so arranging the "tumbler" as that it never rests on the "movable 40 portion" of the lock, which it "is to enter when the combination is right," while that "movable portion" is in motion. The same arrangement also renders it impossible to 45 wrench the lock, when the bolt is out, by turning the handle in either direction.

As applied to that form of lock, designated in the drawing accompanying and forming a part of this specification, its 50 operation is as follows: When the handle is pulled forward, the spindle attached to it gears into the eccentric which moves the bolt—but un gears from the wheels, which determine the "combination." The eccentric can move the bolt however only when 55 the "combination" is correctly set, so that the "tumbler" can fall into the slot in the wheels. In this position the "tumbler" rests upon the "movable portion" (*i. e.* 60 wheels) of the lock, but they are incapable of being moved. When the handle and spindle are pushed in, a disk attached to the spindle, having a slightly coned edge, lifts the tumbler from the wheels, and at the 65 same time the spindle gears into the wheels

and un gears from the "eccentric." So long as the spindle is geared into the wheels, the "coned disk" renders it impossible for the "tumbler" to rest upon or enter the wheels, even though the latter are set to the right 70 "combination." After the wheels are set to the right "combination," it is necessary to pull out the spindle—removing the coned disk from under the tumbler—before the tumbler can descend—which descent is a 75 necessary antecedent to the motion of the bolt.

The novelty of my invention which effects this consists in giving to the "tumbler" two independent bearings—one on the coned 80 disk, to be used when the spindle is geared into the movable wheels—the other on the "movable wheels," to be used when they are at rest and the spindle is geared into the eccentric, which moves the bolt. Also to 85 this novel effect is necessary the construction of the tumbler in two parts—one part (which rests on the coned disk) capable of motion in one direction (as vertical)—the other part (which moves with the bolt) 90 capable of motion in two directions (as vertical and horizontal)—the second part sliding (horizontally) through a projection from the first part.

Where an eccentric is used to throw the 95 bolt—if the tumbler rests upon any delicate portion of the lock, (as the movable wheels) it rises and falls several times for each revolution of the eccentric, thus "hammering" this delicate portion of the lock. 100

The nature of the fifth part of my invention consists in providing a spring to hold up the tumbler independent of the two supports for it, described in the "fourth part" 105 above. A lateral projection from the eccentric presses this spring in and allows the tumbler to fall upon the wheels (and if the combination is right, to catch the eccentric) once in each revolution of the eccentric. From this position it is immediately raised 110 by another portion of the eccentric, and restored to its position of rest upon the spring. Thus for each revolution of the eccentric, the tumbler drops but once from the spring, resting upon the spring during most of the 115 revolution.

Where a lock is constructed with a spindle passing into the lock from the handle or key, it is possible for an evil disposed person to damage the lock, by driving in the spindle 120 with a sledge.

The nature of the sixth part of my invention consists in providing the spindle with a shoulder to butt against some more solid support, (than the lock itself), which 125 may receive the force of the blow and thereby prevent it from injuring the lock itself.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation. 130

Figure 1 represents a vertical sectional elevation through the center of the lock. Fig. 2 represents an elevation of the eccentric, which moves the bolt, the bolt itself, and other portions of the lock which move with the bolt. Fig. 3 represents an elevation of the handle and external portions of the lock. Fig. 4 represents a front elevation of one of the movable wheels of the lock, showing its connection with one of the "secondary locks." Fig. 5 represents a side elevation of the same. Fig. 6 represents an isometric of that portion of the tumbler which has but a single motion (vertical). Fig. 7 represents a plan of the key to the "secondary-lock." Fig. 8 represents a cross section of the key to the "secondary-lock." Fig. 9 represents a method of closing the opening in the back of the lock, left for the insertion of the key or for any other purpose.

Similar characters represent the same part, as seen in different figures.

A, represents the handle; the outer edge of the base (*a*), of which is subdivided into any number of parts, (say 100) each subdivision being designated in any convenient way, as by numbers. This handle fits into and turns in a socket B, upon which is a single mark *b*. When any number on the subdivisions of the handle is opposite the mark *b*, the handle is said to be set to that number.

C, represents a spindle, to which the handle A is rigidly attached by the screw *c*. A projection from the handle (not shown in the drawing) enters a hole in the spindle C, preventing any slipping between the handle and the spindle.

d, represents a shoulder on the spindle to prevent it from being driven through the lock to its damage.

D, represents a wooden covering to the lock; when however the lock is applied to a door, this wooden covering is removed, (its thickness corresponding to the thickness of the door) and a steel plate, attached to the door, affords a firm rest for the shoulder to butt against.

E, represents a "coned disk" rigidly attached to the spindle C. The handle A, spindle C, and disk E are capable of revolving together, and are also capable of a lateral motion.

F, represents the eccentric which moves the bolt R. When the lock is in the position shown in the drawing, (*i. e.* with the handle pushed in as far as possible) this eccentric rests freely upon the spindle C, but does not revolve with it. When the handle is pulled out, the spindle moves with it, and a projection *f*, from the coned disk E, enters a slot *h*, in the eccentric F; thus gearing into the eccentric which now partakes of the rotary motion of the spindle and handle.

H, I, and J, represent three movable

wheels. When the spindle is in the position shown in the drawing, a projection *i*, from the coned disk, striking against a projection *k*, from the wheel H; prevents the handle from making a complete revolution without moving the wheel H. After the projections *i*, and *k*, rest against each other, the wheel H and spindle C, move together until the motion of the spindle is reversed. Similarly a projection *s*, from the back of the wheel H, striking a projection *t*, from the front of the wheel I, compels the two wheels to move together, after one revolution of the wheel H, and similarly projections *u*, and *v*, from I, and J, compel J, to move with I, after one revolution of I,—these simultaneous motions ceasing when a change is made in the direction of rotation, until a single revolution has been made in the opposite direction, when they recommence. Hence after one revolution of the spindle, H must revolve with the handle A; after two revolutions of the spindle, H, and I, must revolve with the handle A; and after three revolutions of the spindle, H, I, and J, must all revolve with the handle A. When the spindle is drawn out, so as to gear in with the eccentric, in the manner already described, the projections *i*, and *k*, can no longer strike against each other, and the spindle becomes ungear- ed from the wheels, as it gears into the eccentric. Thus the spindle can never at the same time be in gear with both the wheels and the eccentric. The wheels however always remain in gear to each other.

K, L, and M, represent the "independent bearings" to the wheels H, I, and J. Their construction and mode of action is as follows: K, is screwed to the back of the lock; then the wheel J, is placed in position; then the bearing L, is slipped on to K; then the wheel I, is placed in position; then the bearing M, is slipped on to K, and lastly the wheel H, is placed in position. A screw, shown dotted at *l*, holds L, and M, rigid. Thus the wheels come in contact only by means of the projections alluded to, and move freely over these "independent bearings."

N, represents that portion of the "tumbler" which has but one motion, (as vertical) sliding in grooves in the frame W of the lock.

(3,) represents an arm of N, which enters the slots in the wheels, when the combination is right, and allows the whole "tumbler" to descend. The lower portion of N always rests on the coned disk E, when the spindle is in gear with the wheels H, I, and J. The method in which N, acts in combination with the wheels, and with the coned disk has been already sufficiently described.

O, represents that portion of the tumbler which has two motions (as vertical and horizontal). In making the horizontal motion,

the part *m*, slides through the projecting prongs *n*, of *N*. These prongs *n*, prevent *O*, from descending without *N*, and while they form a connection with *O*, do not interfere with its horizontal motion.

P, represents the spring which holds up the tumbler *O*, except when it (*P*,) is pressed in by the projection *p*, of the eccentric *F*, as already described.

R, represents the bolt, and the movable frame attached to it, in which the "tumbler" *O* slides up and down.

Figs. 4 and 5, indicate the position, mode of attachment, and action of the "secondary-locks"—also the structure of the movable wheels. The wheel *H*, is here shown in the position it occupies when set to the right combination; the slot (1,) being under the slot (2,) in which the arm (3,) of the "tumbler" *N*, rests. The wheel *H*, is composed of three parts—the part (4,) being already alluded to as that part "the definite relative position of which to the lock is necessary to the possibility of moving the bolt," *i. e.*, however the other parts of the wheel are situated, this part (4,) must occupy the position here shown, before the tumbler can fall and the bolt move. (5,) and (6,) are the two remaining parts of the wheel, screwed together in such a way as to allow them to move as a single piece, revolving (when free to revolve) concentrically with (4). Upon the edge of (5,) teeth are arranged, corresponding in number with the subdivisions on the handle. As the spindle gears into the part (5,) of the wheel, and not into the part (4,); it is evident that as the relative fixed position of (5,) to (4,) varies, so will vary the position necessary to give to the handle, to bring the slot (1,) opposite the slot (2,). The wheels *I*, and *J*, are constructed essentially similar to *H*; the projections which gear into each other must however be attached to the internal part of each wheel, and not to the external disk, corresponding to (4). The wheels being all in the position of *H*, (Fig. 4,); the key-holes (12,) to the "secondary locks" come opposite to each other, and opposite to an opening in the back of the lock; and the key *T*, may be inserted from the back of the lock. This key (*T*,) being turned, the bolts (7,) to the "secondary locks" enter the slot (8,) in the edge of the box made to receive the wheels. The act of throwing forward this bolt to the "secondary locks" fixes the outer disks, corresponding to (4,), firmly, and allows the inner disks, corresponding to (5,) and (6,) to assume new relative positions with reference to the outer disks, according to the choice of the operator.

When a new combination has been made by the handle *A*, then the key *T* is turned back—the parts corresponding to (4), (5) and (6) are fixed with reference to each

other, the teeth on the bolt (7) gearing into the teeth on the edge of the disk (5); the key *T* is withdrawn; the wheels are free to revolve as a whole; and the lock can be operated only by using the new combination, to which it is set. The click (9,) is used to stop the motion of the wheels opposite a given number, and not half way between two numbers. It is only applied to the wheel *H*. The "secondary lock" consists of a cam or eccentric (13) into which the key *T*, enters and which turns with the key. The tumbler (14) acted upon by the spring (15) holds the cam (13) when the latter has made half a revolution; this prevents any accidental motion to the bolt (7) except that given by the key *T*. It is not essential that the bolt (7) when it is thrown forward should enter the slot (8) as already described, because the presence of the key *T* in the "secondary locks" is itself sufficient to hold the disks, corresponding to (4), firmly; as a matter of convenience and precaution I prefer however the form of construction here described. The bolt (7) moves with the eccentric (13).

U, represents a disk attached to the back part of the lock, which is partly rotated by the motion of the bolt *R*. At the latter end of the motion of the bolt *R*, the pin (10), attached to *R*, suddenly moves the disk *U* forward or back, thereby moving the lever *V*, and opening or closing the key-hole to the "secondary locks," shown dotted at (11).

Fig. 9, shows the position of the parts, when the bolt is in and the key-hole (11) closed.

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

1. The attachment to a lock of one or more "secondary locks" for the objects substantially as set forth.

2. The construction of the "secondary lock", and its attachment to the movable portion of the primary lock; substantially as herein described.

3. The independent bearings *K*, *L*, and *M*, to the wheels *H*, *I*, and *J*, constructed substantially as herein described.

4. In case of locks requiring an opening in the back; the attachment of a cover to some movable portion of the lock, which cover shall close the opening, except when the bolt of the lock is out, for the object substantially as set forth.

5. The construction of the "tumbler" with two independent bearings—one on a disk (as *E*) revolving with the handle of the lock—the other on the movable wheels *H*, *I*, &c. substantially as herein described.

6. The construction of the "tumbler" in two parts—the first part capable of motion in a single direction—the second part capable of motion in the same direction as the first part, and also in a direction at an angle (as a right angle) to the motion of the

first part, for the object and in the manner substantially as herein described.

5 7. The combination of the spring P, tumbler O, and projecting cam *p*, of the eccentric F, for the purpose of supporting the "tumbler" during the greater part of the revolution of the handle of the lock, substantially as herein described.

8. The construction of the spindle of the lock with a shoulder, for the object substantially as herein set forth. 10

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Witnesses:

JOS. W. SPRAGUE,

GEO. ARNOLDT.