

(No Model.)

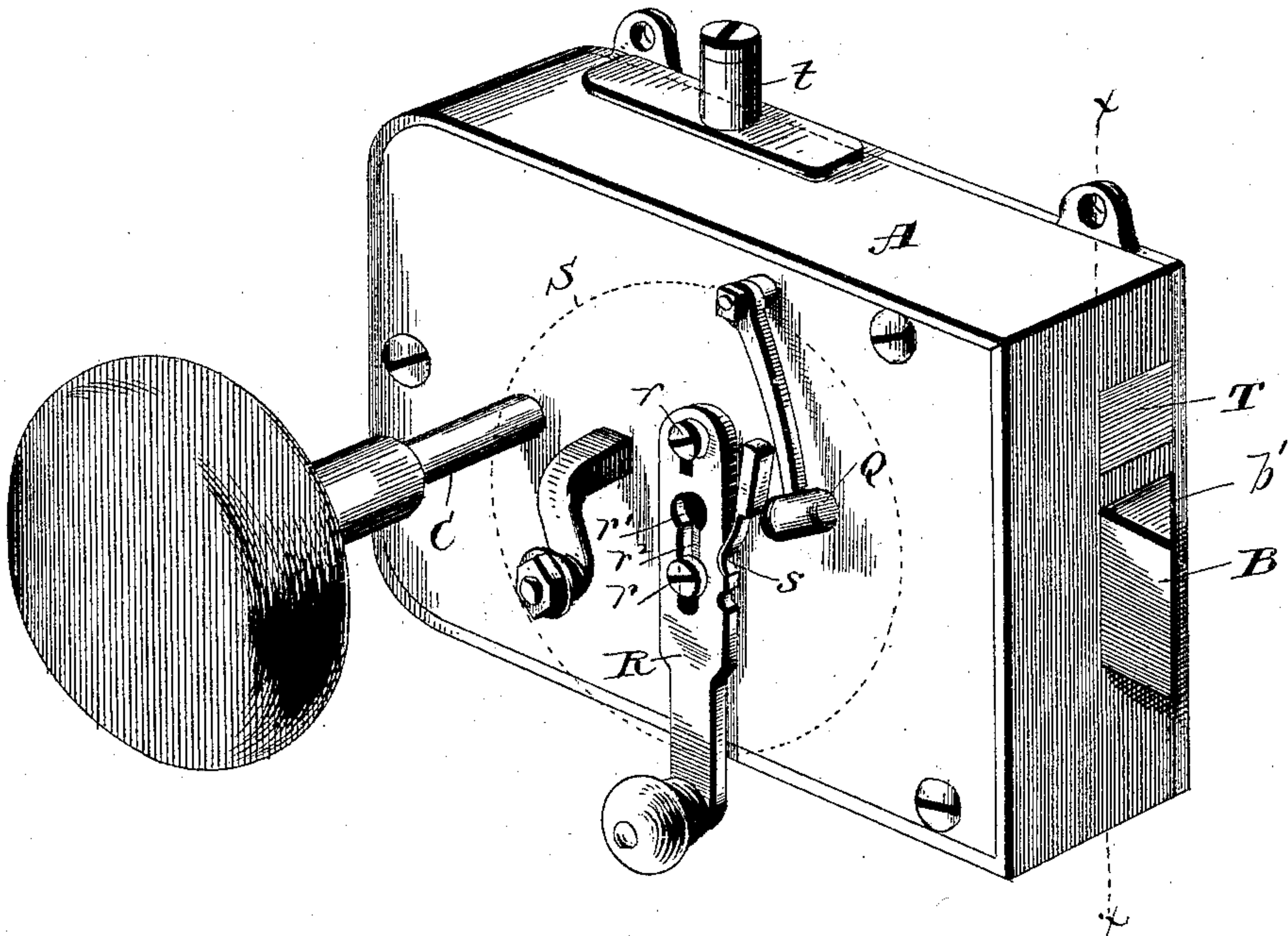
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L. E. SCHNEIDER.  
PERMUTATION LOCK.

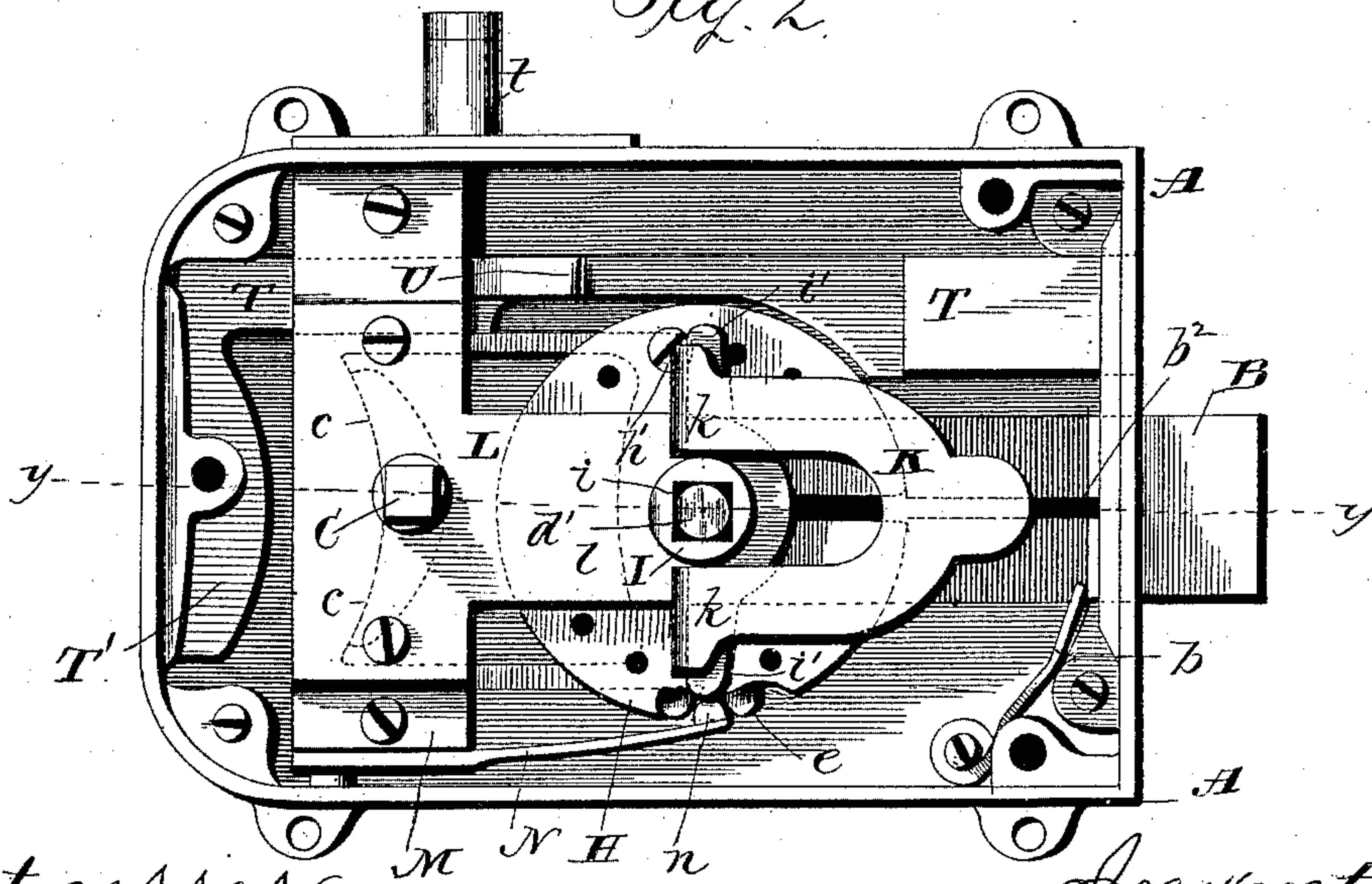
No. 473,786.

Patented Apr. 26, 1892.

*Fig. 1.*



*Fig. 2.*



Witnesses  
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Wm. R. Davis

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By Alexander Davis  
Atty

(No Model.)

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Fig. 3.

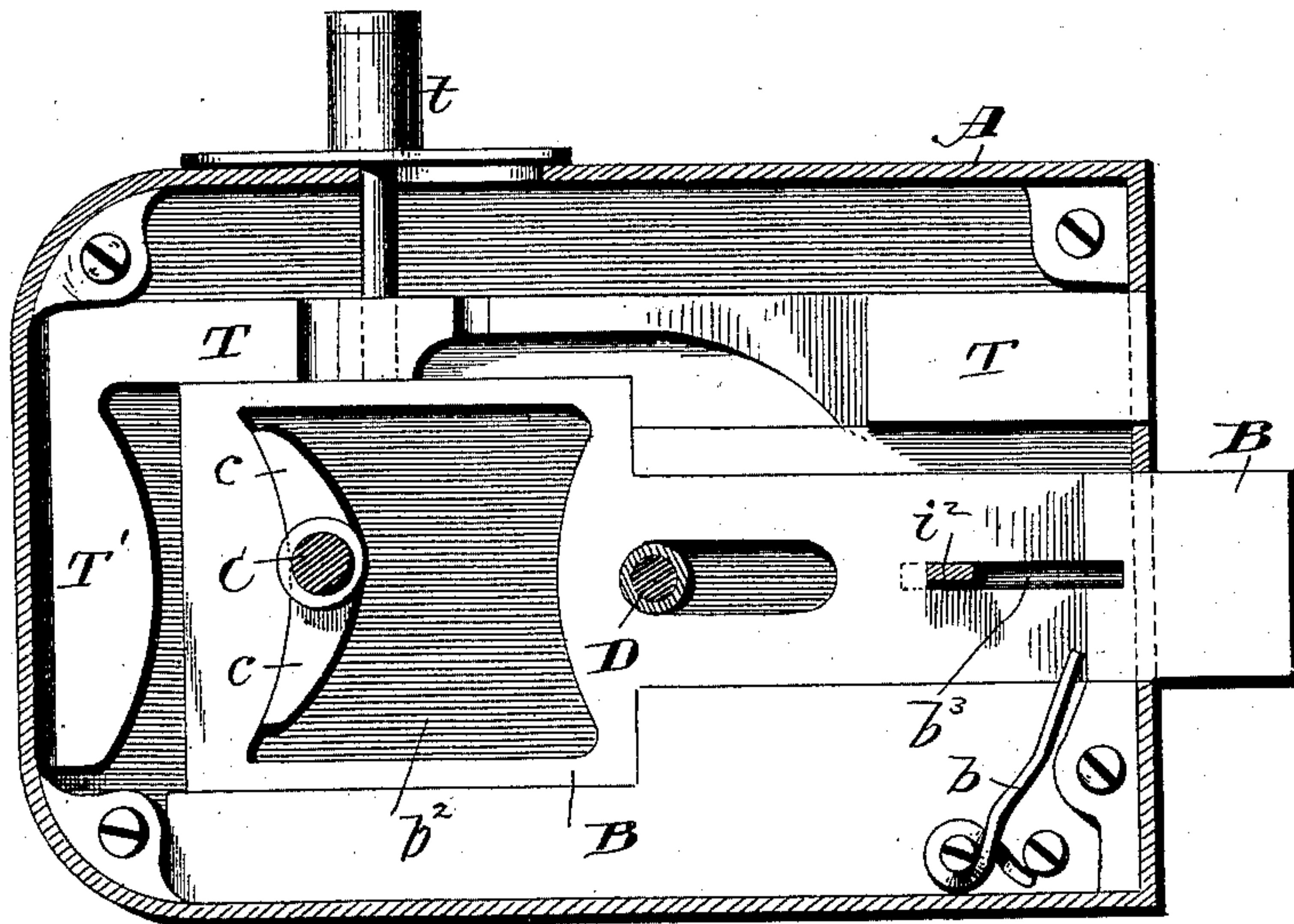
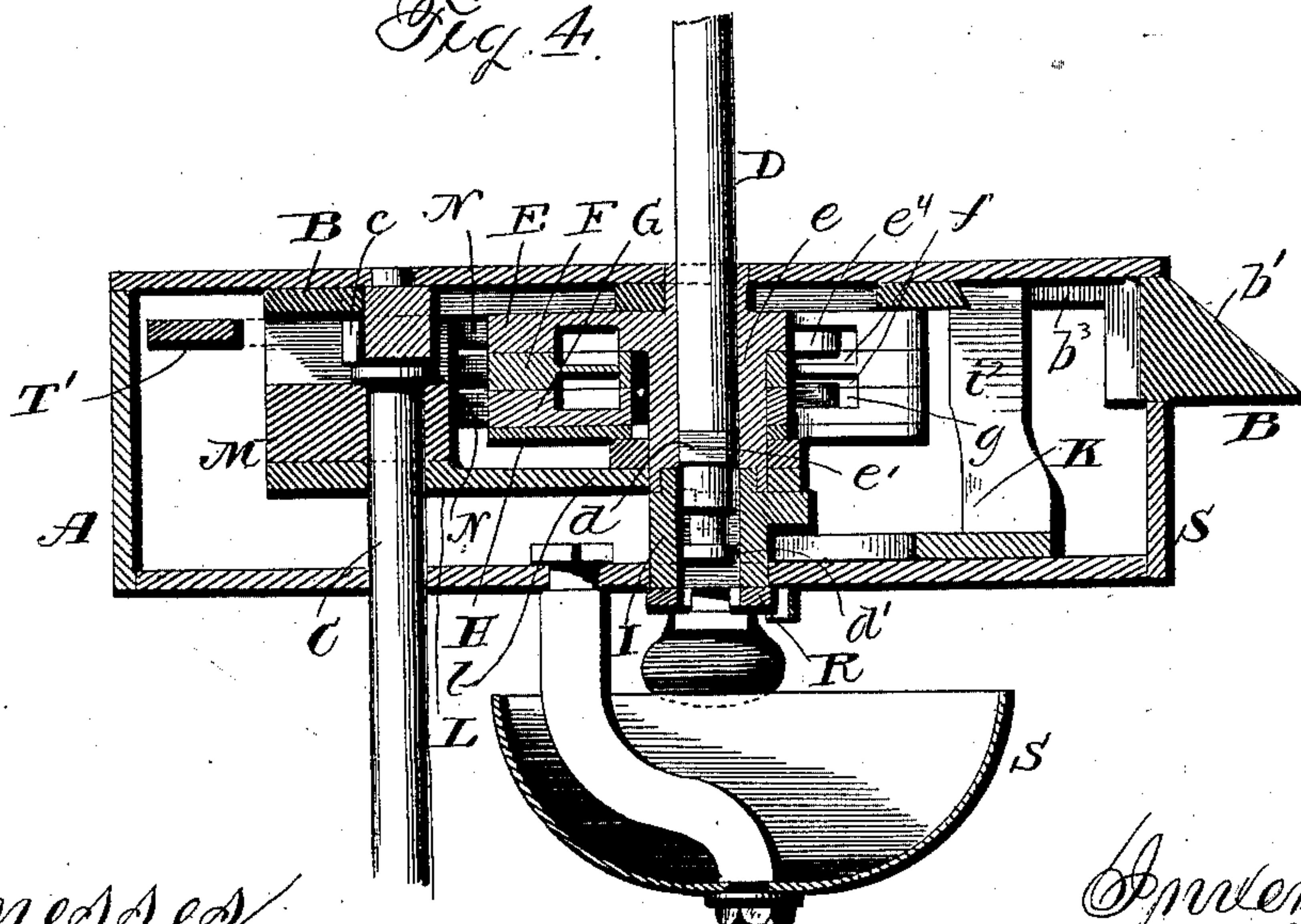


Fig. 4.



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Fig. 5.

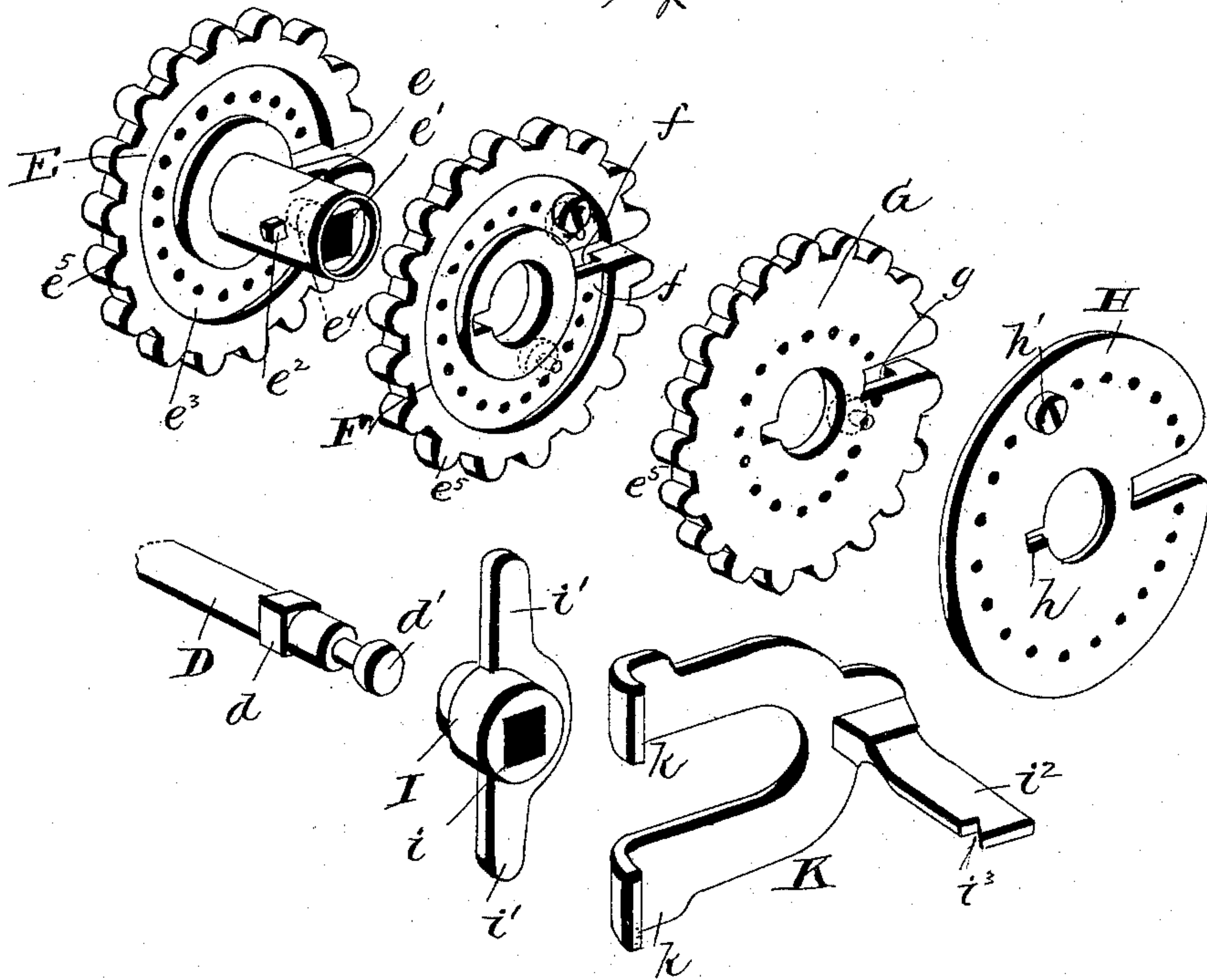


Fig. 6.

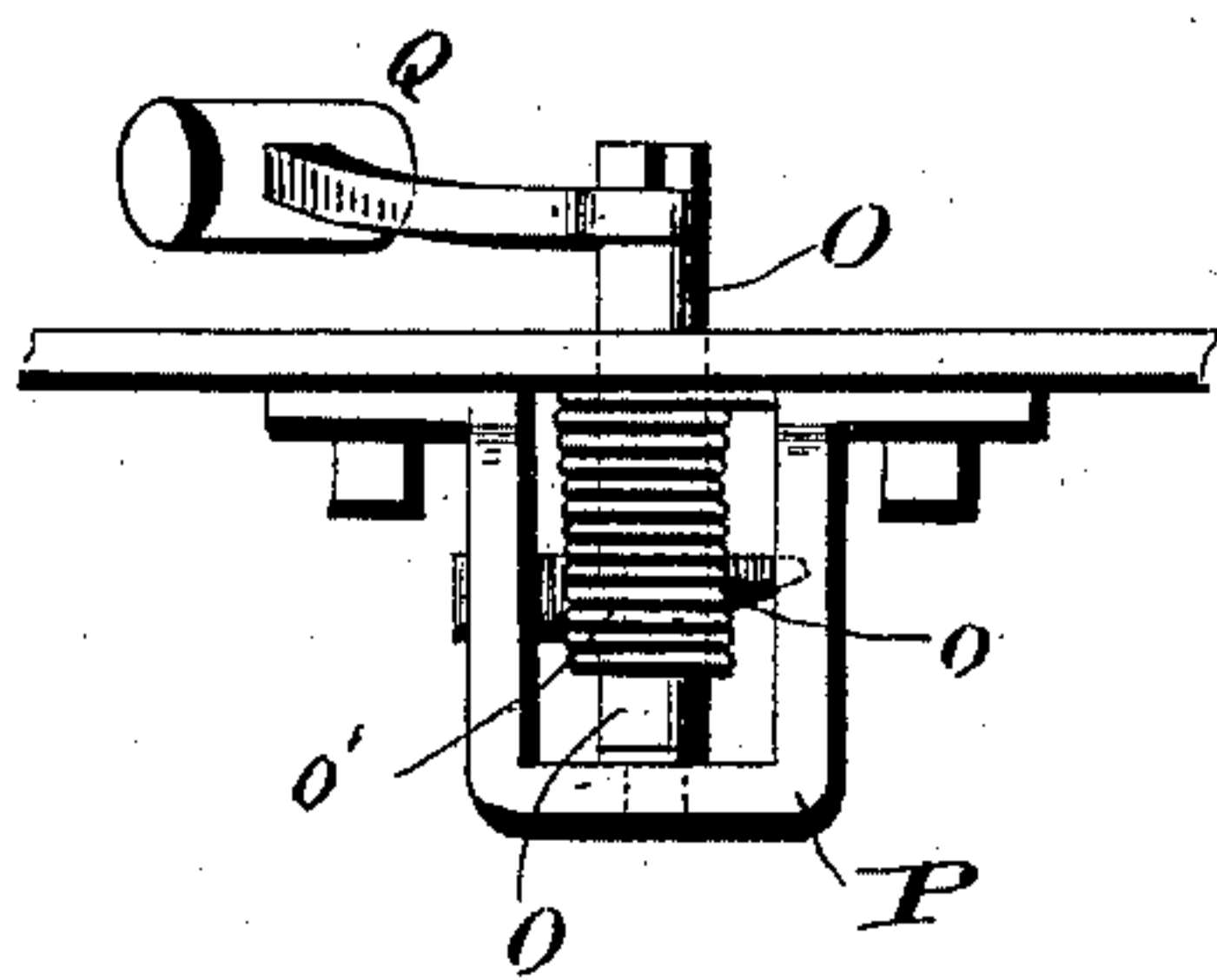
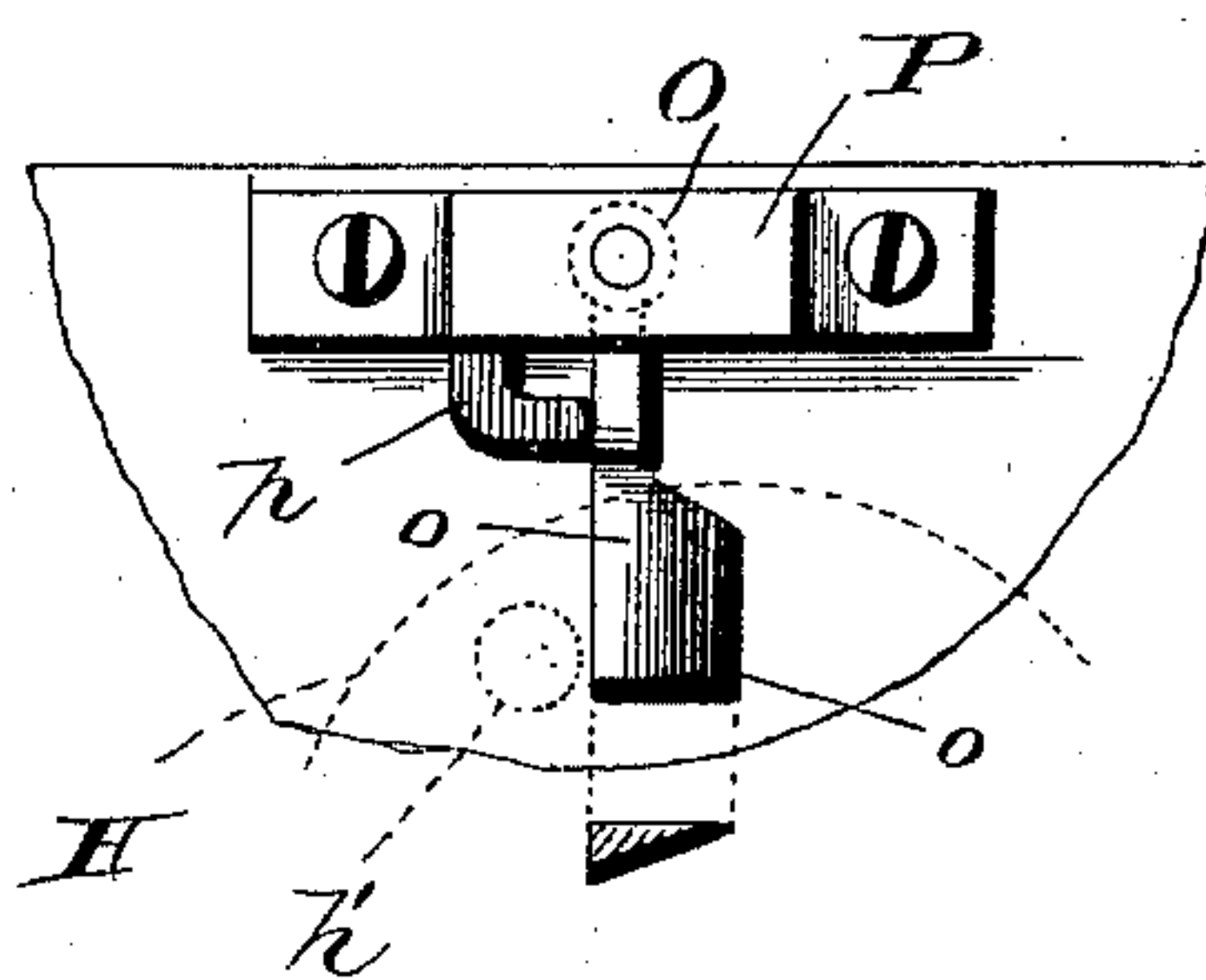


Fig. 7.



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# UNITED STATES PATENT OFFICE.

LEOPOLD E. SCHNEIDER, OF GALENA, ILLINOIS.

## PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 473,786, dated April 26, 1892.

Application filed October 16, 1891. Serial No. 408,929. (No model.)

*To all whom it may concern:*

Be it known that I, LEOPOLD E. SCHNEIDER, a citizen of the United States, residing at Galena, in the county of Jo Daviess and State of Illinois, have invented certain new and useful Improvements in Permutation Door-Locks, of which the following is a specification, reference being had therein to the accompanying drawings.

The object of my invention is to provide a permutation or combination lock adapted for use especially upon house-doors, the room-doors of hotels, &c.

With this object in view my invention consists in the lock having its parts constructed and combined as hereinafter specified.

In the drawings, Figure 1 is a perspective view of my lock. Fig. 2 is a plan view with one of the side plates of the case and parts attached thereto removed. Fig. 3 is a section on the line  $x x$  of Fig. 1. Fig. 4 is a horizontal section on the line  $y y$  of Fig. 2. Fig. 5 is a perspective view of some of the parts removed from the case, and Figs. 6 and 7 are detail views of the bell or alarm-ringing device.

The lock, as shown, is designed to be secured to the inner face of the door, and its casing A may be of any suitable construction. At or near its vertical center is the latch-bolt B, projected normally outward by a spring  $b$  and having, as usual, a beveled face  $b'$  to enable it to be cammed inward when forced against the usual keeper. At its inner end said latch-bolt is expanded in width, where is provided a substantially rectangular slot or recess  $b^2$ , one of whose end walls is adapted to be engaged by either of two oppositely-extending arms  $c c$  on a knob-spindle C, whereby the bolt may be moved against the stress of the spring  $b$  to disengage the bolt from the keeper. The knob-spindle C does not pass through the lock out both sides, but projects on one side only into the room on whose door the lock is placed and is the one designed to enable the operation of the lock from the inside. The two arms  $c c$  are provided to enable the latch to be shifted whichever may be the direction the knob may be turned, and preferably the wall engaged by said arms is a convex surface. The latch-bolt may at all times be shifted from within the compartment

by simply turning the knob-spindle C. A second knob-spindle D projects from within the lock outwardly and is designed for use on the outside. This spindle D is in the same horizontal plane, but not in a line axially with the inner spindle C, and adapted to be operated by it is the series of circular tumblers or disks E, F, G, and H, four in number, and provided each with a radial slot. The first-named E has a cylindrical hub  $e$ , upon which the others are placed, and is actuated directly by the spindle D for this purpose, being at the end of the hub away from the disk provided with an angular cavity  $e'$ , with which a similar angular formation  $d$  on the knob-spindle can engage. The disks F and G are journaled loosely upon the hub  $e$ , so as to be capable of rotation thereon independently of each other and so that there may be an independent rotation of the disk E. The disk H, which is the outer one of the series, is fixed upon the disk-hub  $e$ , so as to rotate only when the same is rotated by means of a short radial pin  $e^2$ , engaging a notch  $h$  in the disk. The other disks E, F, and G are the lock-tumblers proper, while the disk H has a special function, which will be hereinafter referred to.

In the face of the disk E adjacent to the disk F is an annular cavity  $e^3$ , in whose bottom is an annular series of holes, in any one of which may be placed a pin or screw  $e^4$ , and a similar annular cavity  $f$  is provided in each face of the disk F, and one  $g$  in the face of the disk G, next the disk F. In each of these cavities are provided pins or screws adapted to be placed in certain positions relative to the radial slots in the tumblers to effect, by engagement with each other in the well-known way, the placing of the slots in alignment with each other, and a reciprocable piece or stump connected with the sliding bolt or latch, whereby the latter is enabled to be actuated.

Journaled axially in line with the spindle D is a sleeve I, the journaling means being at one end the lock-casing side or wall and at the other an annular cavity in the end of the hub  $e$  of the tumbler E, into which a reduced portion of said sleeve extends. The opening  $i$  in said sleeve is angular in cross-section, conforming to the angular portion  $d$  on the spindle D, and is designed to be en-



gaged by the latter, which for this purpose is susceptible of a longitudinal movement.

The sleeve I is provided with two diametrically-extending arms  $i' i'$ , with which the two arms  $k k'$  of a sliding U-shaped piece K are adapted to engage, said arms having intumed or hook-shaped portions for this purpose. The piece K is movable by the rotation of the sleeve I when the knob spindle D is turned, and its movement is imparted to the latch-bolt by means of an arm  $i^2$ , attached thereto and extending from it to the bolt in a line parallel with the knob-spindle. The free end of the arm  $i^2$  engages with one end of a slot  $b^3$  in the bolt B, and preferably the engaging part is in the form of an under-cut notch  $i^3$  in the arm. The provision of the two arms  $i'$  on the sleeve is to enable the latch-bolt to be thrown whether the door-knob be turned one way or the other.

The tumblers or disks are confined in place by means of an arm or extension  $l$  of a plate L, attached to a block or piece M, arranged near one side of the lock. An opening in said arm  $l$  journals one end of the disk-hub  $e$ , while a cylindrical boss or projection on the disk has a bearing in the lock-casing wall. The block M serves in part to journal or furnish bearing for the spindle C, which passes through the same, and said block is recessed to accommodate the arms  $c$  on said spindle and the contiguous portion of the latch-bolt. The periphery of each tumbler E, F, and G is formed into a series of teeth  $e$ , convex in shape, between which is a slight space, and for each tumbler is provided a flat spring N, secured to one end of the block M, which at its free end carries a tooth or lug  $n$  to engage said teeth. The latter in passing over the lug  $n$  will cause a distinct sound or click and constitutes the means for working the combination, which is done by counting the previously-determined number of clicks upon turning the knob-spindle in the previously-determined direction. The spring, too, insures that when the tumbler has reached its proper position it will be securely held thereat against accidental movement likely from the friction of the adjacent moving parts.

To indicate the point at which it is necessary to begin to count the number of clicks or sounds to work the combination, I provide an alarm mechanism operated by the disk H hereinbefore described. Said disk has upon its outer face a projecting pin or stud  $h'$ , adapted when the disk is turned in the proper direction the required degree to engage with and trip an arm  $o$ , depending from a rock-shaft O, that is journaled in a bracket P, which is secured to the side wall of the lock-case and in an opening in the said wall, through which it extends a short distance to the outside of the case. On such outer end the shaft carries a hammer Q, adapted when the shaft is rocked by the disk H to be struck against a bell S by a coiled spring  $o'$ , mounted on the shaft O, said spring being placed un-

der tension by the rocking of the shaft. If the disk H be turned reversely to its proper direction, the pin  $h'$  will engage the face of the arm  $o$ , which is beveled, and cam it and its shaft to one side in the direction of the length of the shaft, which latter is made longitudinally movable, and the bell therefore will not be rung. A lug  $p$ , depending from the bracket P, serves to limit the movement of the trip-arm after engagement by the pin  $h$  on its return under the power of the spring to ring the bell. The bell is supported from an arm that is suitably secured to and projects from the lock-case.

To enable the lock to be used from the outside without the necessity of operating the combination device, the inner end of the knob-spindle D is reduced in diameter to form an annular flange  $d'$ , which when the spindle is pushed to the inner limit of its motion is adapted to be engaged and held by a vertically-movable bar or plate R, held to the outer side of the lock-casing by two screws  $r r$ , which pass through elongated slots in the plate. In the latter is an opening having an upper portion  $r'$ , circular and of a diameter to permit the passage of the flange  $d'$  on the spindle, and an elongated portion  $r^2$ , narrower than the flange, so that when said plate is moved upward the flange will be engaged by its walls or edges and the spindle locked against longitudinal movement. When the spindle is moved inward, as above stated, its angular portion passes out of engagement with the angular cavity in the disk-hub  $e$  and into the angular opening in the sleeve. A suitable knob is attached to the plate R, by which to move it and to hold it against accidental displacement in its lowered position with its circular opening in line with the spindle, and in its raised spindle-locking position it is provided on one of its edges with two depressions adapted each to be engaged by a flat spring  $s$ , attached to the casing-plate.

I provide my device with a bolt or dead-lock T, arranged to slide in the case just above and parallel with the latch, which is adapted to be thrown outward by a thumb-piece  $t$ , arranged to connect with the bolt from the top of the lock-case, on the outside thereof, by means of a long screw, whose inner end passes into the bolt. On its rear end the latter has a downwardly-extended arm  $T'$ , which when the bolt is thrown outward into locking position is adapted to be engaged by the arms  $c c$  on the spindle C and moved inward simultaneously with the latch-bolt. The parts of the two bolts engaged by the arms  $c c$  of course are disposed in different planes. It may be remarked that the dead-lock or bolt T is operative only from within the door and is not movable by the combination-spindle. When either in or out, said bolt is locked yieldingly by a flat spring U, which engages either of two notches in its face.

The operation of my lock is as follows:



From within it is necessary simply to turn the knob, as with locks of ordinary construction, to shift the spring-actuated latch-bolt B, movement of the latter independent of and without affecting the permutation mechanism being possible by the provision of the slot  $b^3$  in the bolt where the arm  $i^2$  of said mechanism engages the bolt. To operate the bolt from the outside, the permutation-spindle D is turned, say, to the right until the alarm-bell is struck through the trip device operated by the disk H, and then from this as a starting-point the spindle is turned the predetermined number of clicks or sounds and in the proper direction until the several radial slots are in alignment with each other and the arm or stump  $i^2$  of the latch-bolt-moving device. When this is accomplished, the spindle is slid inward, so that its angular portion is removed out of the angular portion of the hub of the disk or tumbler E, thereby leaving the tumblers in such position and into the angular opening in the sleeve. Then by turning the spindle either to the right or left the latch-bolt will be drawn as the arm  $i^2$  of the permutation mechanism will pass into the radial slots. To lock said bolt against movement, it is necessary simply to draw the spindle D outward to its former position and turn it sufficiently to destroy the coincidence of the radial slots of the disks.

The combination can be varied as desired simply by shifting the positions of the pins or screws in the tumblers, all of which, including the bell-ringing disk, being alike capable of being differently located for this end.

My lock is entirely adapted for use on doors particularly, in view of the use of sound as an indicating means, instead of employing a dial, which necessitates light. The door is never locked to one on the inside and it can very readily be arranged so that resort need not be had to the combination to open from the outside.

The bell may be used as a call-bell and will always give notice that the lock is being manipulated.

I claim—

1. The combination, in a permutation-lock, of a casing, a locking-bolt therein, a spindle D, journaled in the casing and provided with a knob, a sleeve e, journaled on the spindle and carrying rigidly a toothed tumbler-disk, one or more toothed tumbler-disks journaled loosely thereon, all the disks being provided with shifting-pins on their adjacent faces and radial slots, clicking springs engaging the teeth on the disks, an arm engaging the sliding locking-bolt and adapted to enter the radial slots in the disks, and means for operating this arm to withdraw the bolt, as and for the purposes described.

2. In a permutation door-lock, the combination of a casing, a sliding bolt therein, a longitudinally-movable spindle journaled in the casing and having an angular formation at a suitable point in its length, a sleeve jour-

naled on the spindle and carrying a series of tumblers, a sleeve surrounding the spindle and journaled axially in line with the tumbler-carrying sleeve, the two sleeves having the openings in their adjacent ends formed angular to receive the angular formation on the spindle, and means connecting the latter sleeve to the sliding bolt, as and for the purposes described.

3. In a permutation door-lock, the combination of a casing, a sliding bolt therein, a longitudinally-movable spindle journaled in the casing and having an angular formation at a suitable point in its length, a sleeve journaled on the spindle and carrying a series of tumblers, a sleeve surrounding the spindle and journaled axially in line with the tumbler-carrying sleeve, the two sleeves having the openings in their adjacent ends formed angular to receive the angular formation on the spindle, the latter sleeve being provided with oppositely-projecting arms, a sliding U-shaped part K, having its arms in engagement with said oppositely-projecting arms, and provided with an arm  $i^2$ , engaging a slot in the bolt, substantially as described.

4. In a permutation-lock, the combination of a casing, a slotted sliding bolt B therein, a longitudinally-movable spindle having one end journaled in the casing and its outer end provided with a knob, a sleeve on the spindle carrying radially-slotted tumbler-disks, an independent sleeve embracing the end of the spindle and adapted to be rotated thereby, a sliding part adapted to be moved by the rotation of this sleeve, this sliding part being provided with an arm engaging the bolt and adapted to enter the radial slots in the disks, and an independent spindle C, having one of its ends journaled in the casing and provided with a part engaging the sliding bolt and its other or outer end carrying an operating-knob, substantially as described.

5. In a permutation-lock, the combination of a casing, a sliding bolt and means for operating the same, a spindle journaled in the casing and carrying a series of radially-slotted disks, the inner disk being provided with a pin  $h'$ , a rock-shaft O, journaled in the casing and provided with a trip-arm adapted to engage said pin  $h'$ , and a bell-hammer and a gong or bell attached to the lock, substantially as described.

6. In a permutation-lock, the combination of a casing, a sliding bolt and means for operating it, a spindle journaled in the casing and carrying a series of tumbler-disks, one of said disks being provided with projection  $h'$ , a longitudinally-movable rock-shaft O, journaled in the casing and actuated by a spring, said rock-shaft being provided at one end with a beveled arm, adapted to be engaged by the pin  $h$  and at its other end with a bell-hammer, and a bell or gong, substantially as described.

7. In a permutation-lock, the combination of a casing, a sliding bolt therein, a longi-



- itudinally-movable spindle having one of its ends journaled therein and provided with a flange, permutation devices on the spindle, a bolt-shifting device adapted to be operated by the spindle, an adjustable plate on the casing, this plate being slotted to engage the flange on the spindle and thereby lock the spindle in engagement with the bolt-shifting devices, substantially as described.
8. The combination of a casing, an independent outside spindle D, having its inner end journaled therein and carrying a series of slotted tumbler-disks, means for operating and controlling these disks, a sliding locking-bolt B, provided with slots  $b^2$   $b^3$  on opposite sides of the spindle, an arm  $i^2$ , loosely engaging the slot  $b^3$ , means on the spindle for operating this arm in withdrawing the bolt B, an independent inside spindle C, having its outer end journaled in the casing alongside the spindle D, said inner end being provided with an arm  $c$ , working in and engaging the slot  $b^2$  in the bolt B, whereby the latter may be withdrawn independently of the permutation devices, and a sliding dead-lock bolt T in the casing, this bolt being provided with an arm T', engaging the sliding bolt B, substantially as and for the purpose specified.
9. In a permutation-lock, in combination, a locking-bolt, permutation devices, a bolt-shift-

ing device, a spindle for operating the latter and the permutation devices, and an independent device to hold said spindle out of engagement with the permutation devices and lock it in engagement with the bolt-shifting device, and means for holding said device in its locked position, substantially as described.

10. In a permutation-lock, in combination, a suitable bolt, permutation devices, a bolt-shifting device, a longitudinally-movable spindle for operating both these, and an independent sliding plate for engaging the spindle to lock it in engagement with the bolt-shifting device.

11. In a lock, in combination, a locking-bolt, a series of radially-slotted rotary tumblers, the spindle for operating them, the armed sleeve journaled axially in line with the spindle, the movable piece engaging the sleeve-arms, the arm extending from said piece to co-operate with the slots of the tumblers and having a loose connection with the locking-bolt, and the second spindle engaging the latter, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LEOPOLD E. SCHNEIDER.

Witnesses:

JAMES M. SHEEAN,  
FRANK J. MELLER.