

N. Macneale, Permutation Lock.

N^o 43,457.

Patented July 5, 1864.

Fig: 2.

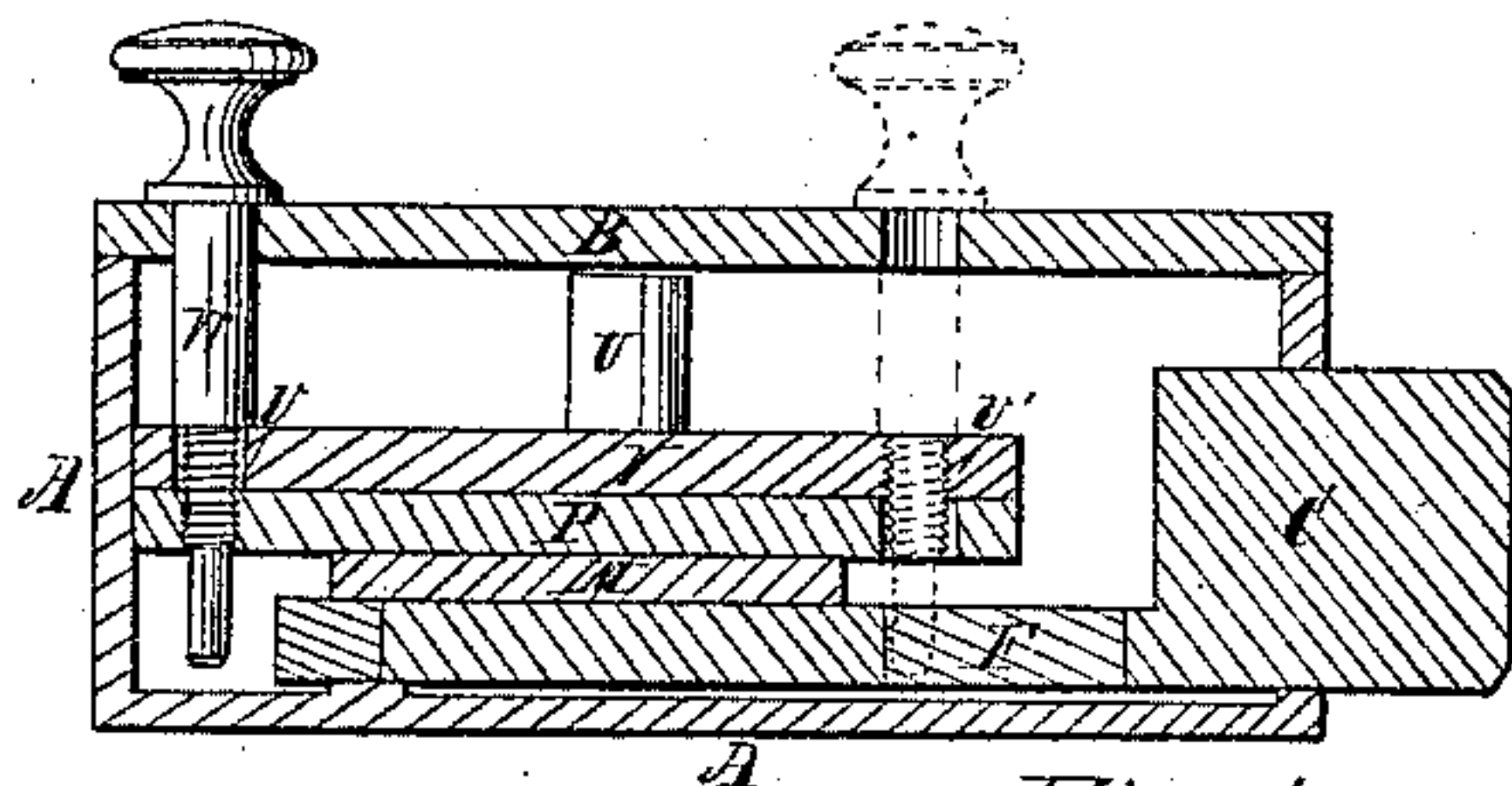


Fig: 6.

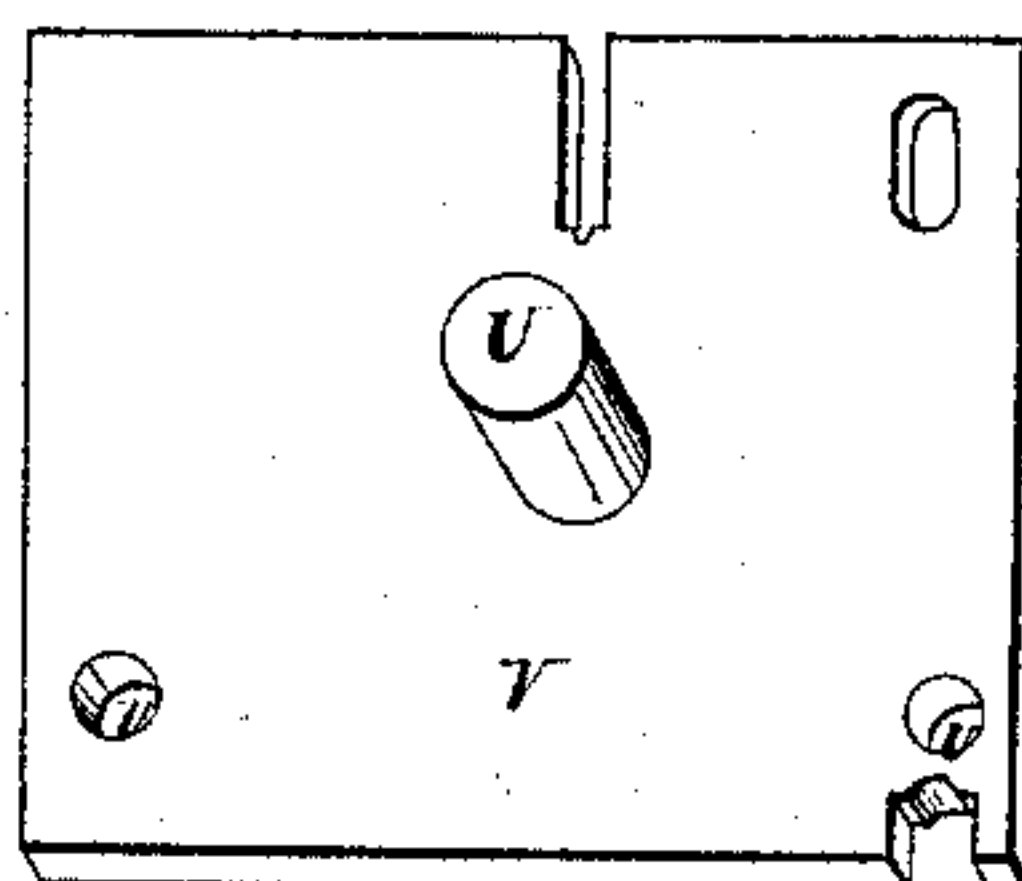


Fig: 3.

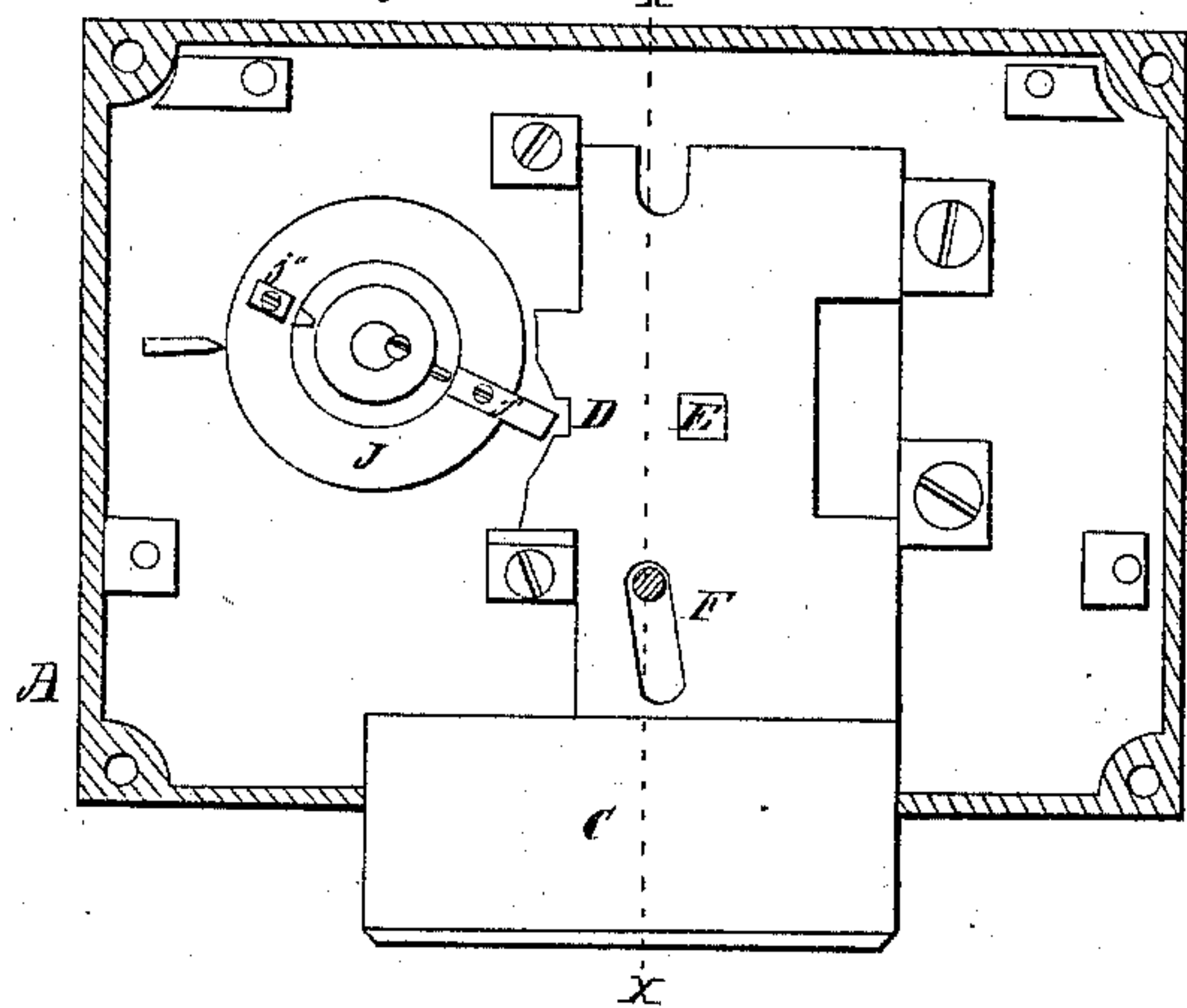


Fig: 4.

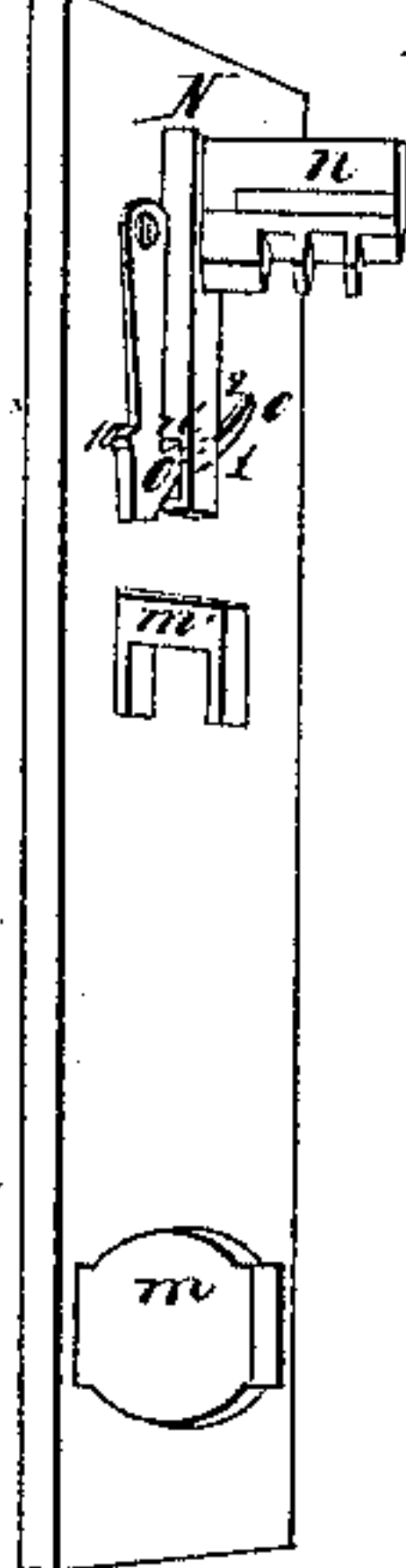


Fig: 5.

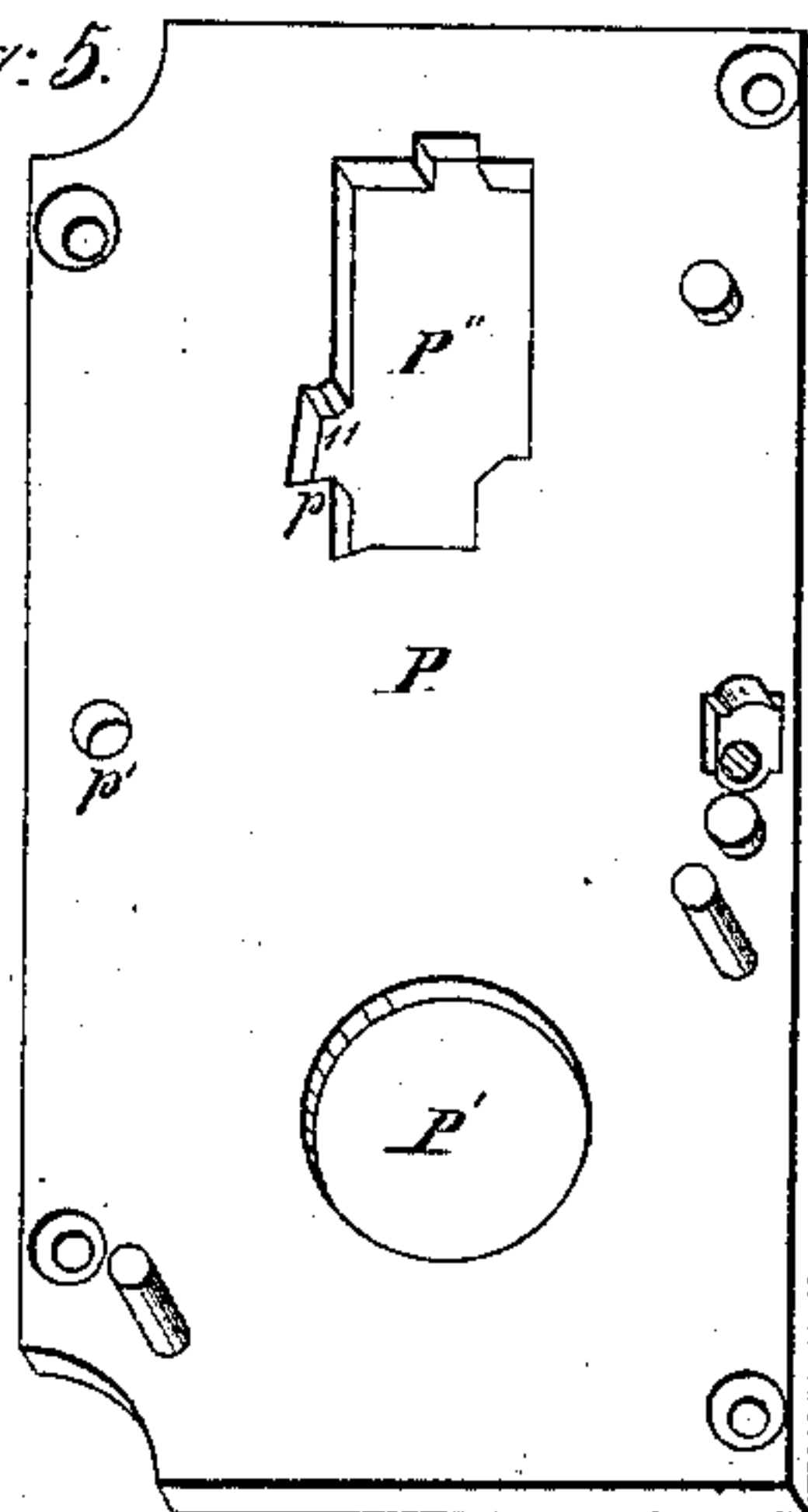


Fig: 7.

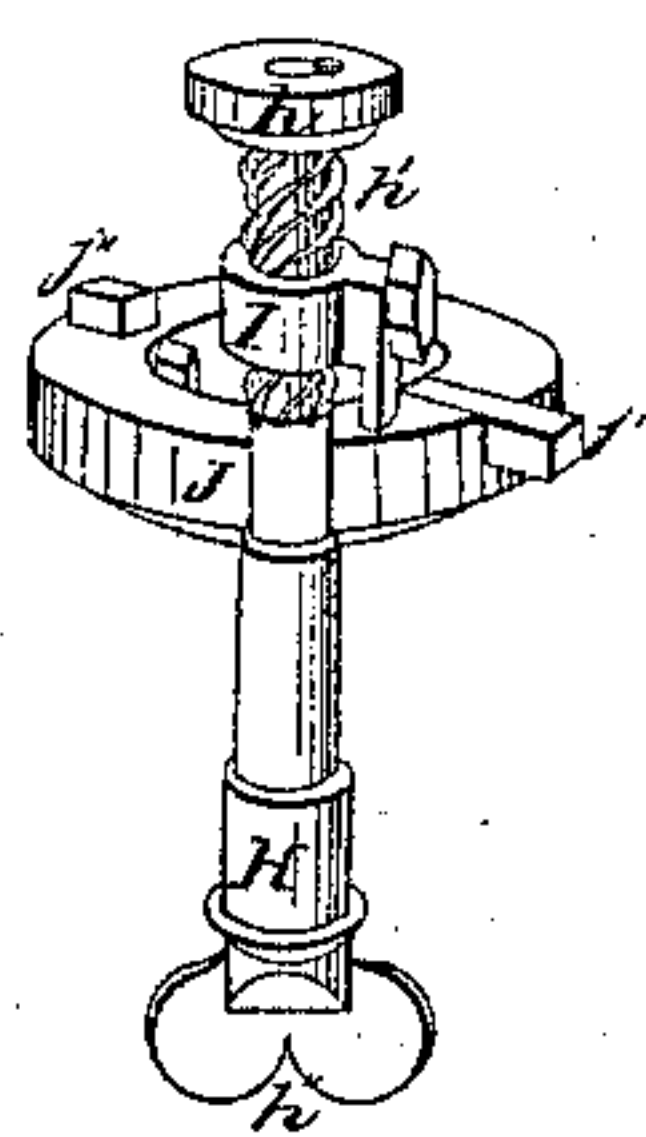


Fig: 1.

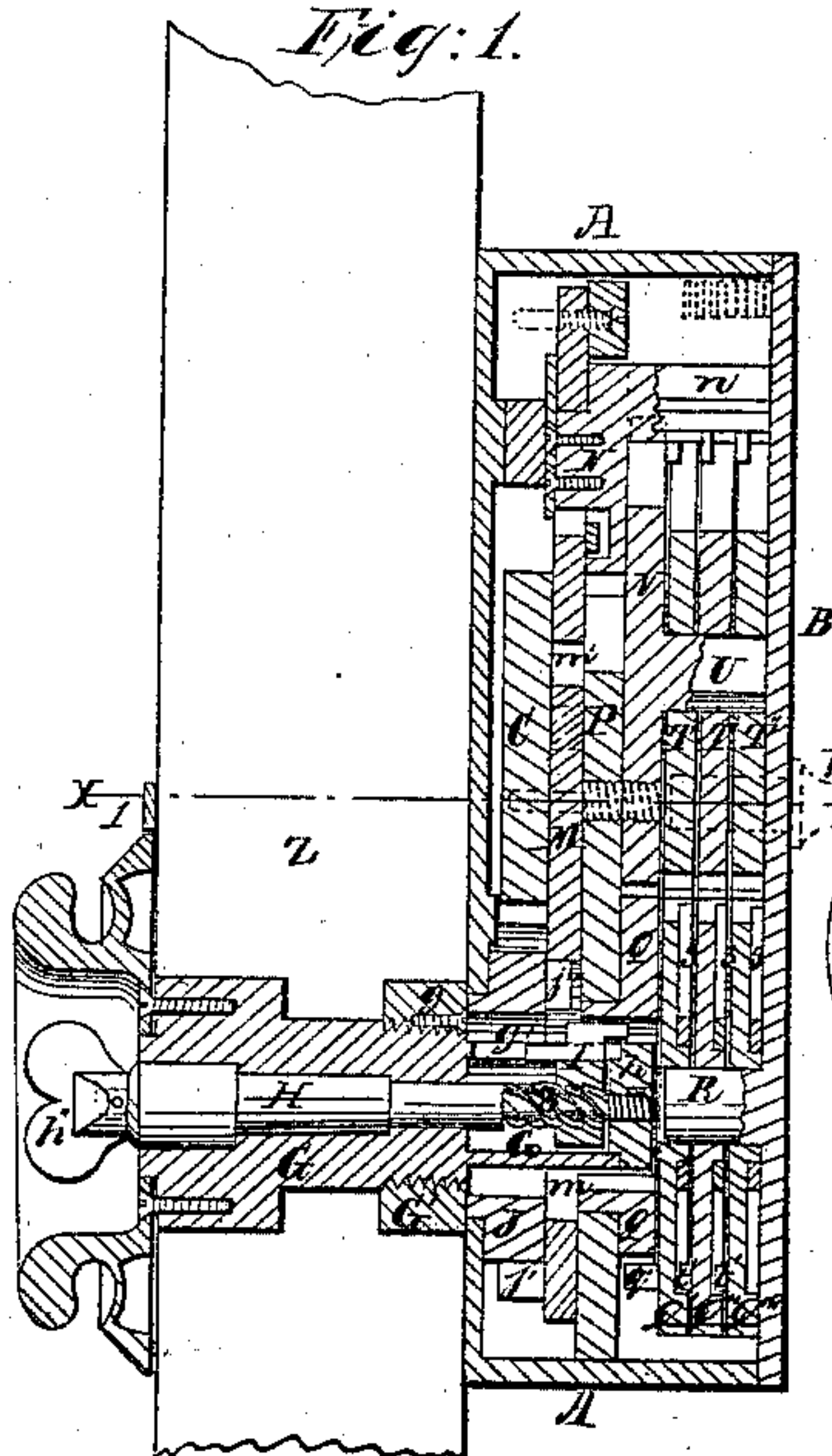


Fig: 11.

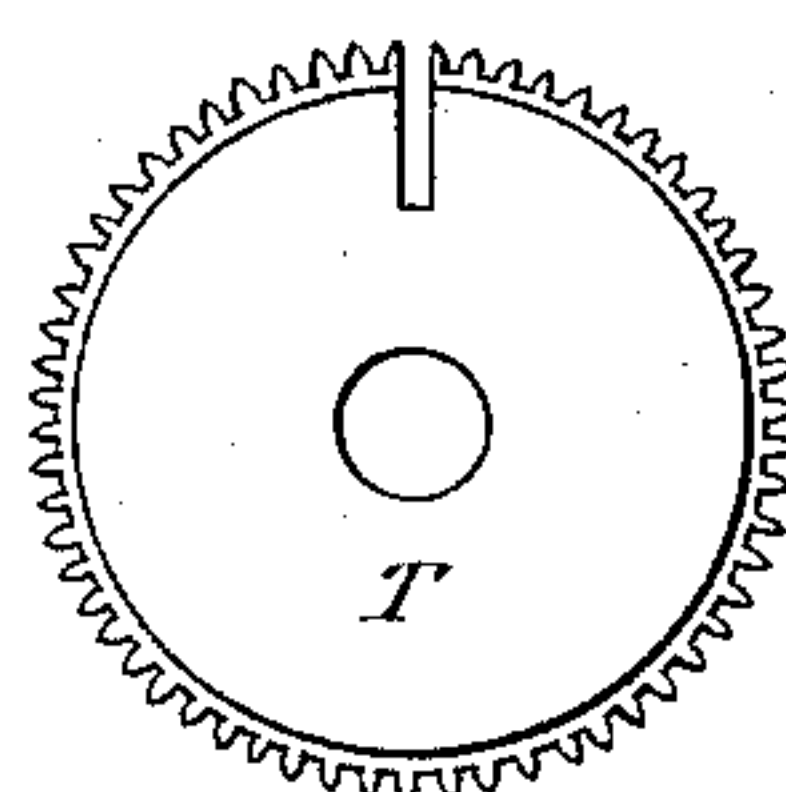


Fig: 9.

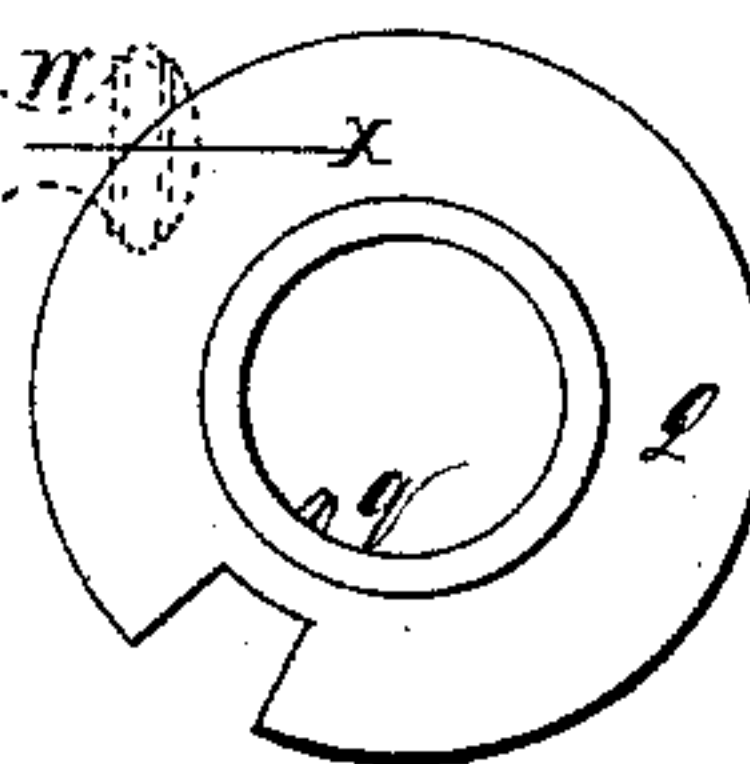


Fig: 10.

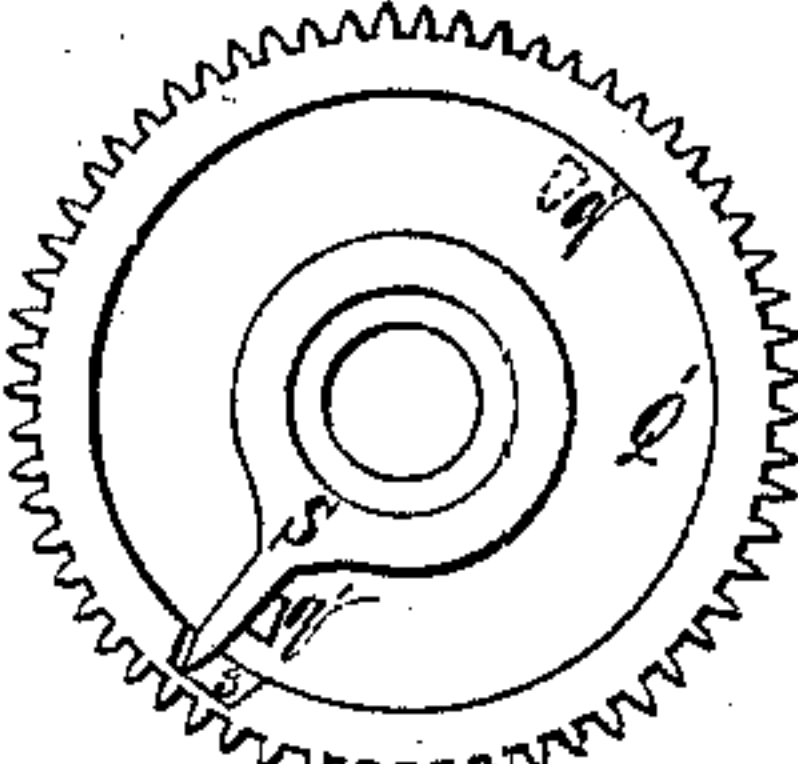
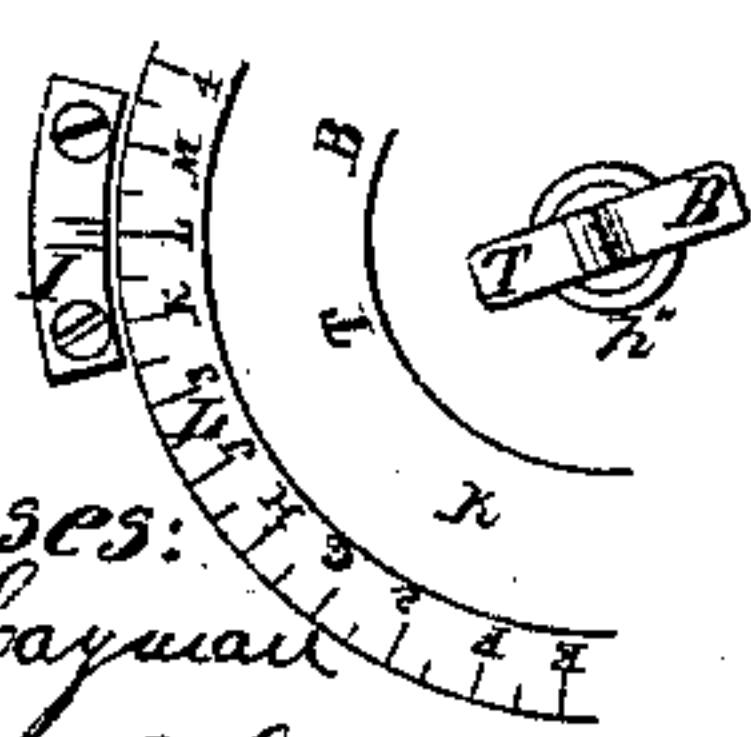


Fig: 8.



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UNITED STATES PATENT OFFICE.

NEIL MACNEALE, OF CINCINNATI, OHIO, ASSIGNOR TO HIMSELF AND WILLIAM B. DODDS.

IMPROVEMENT IN LOCKS.

Specification forming part of Letters Patent No. 43,157, dated July 5, 1864.

To all whom it may concern:

Be it known that I, NEIL MACNEALE, of Cincinnati, Hamilton county, Ohio, have invented a new and useful Improvement in Permutation-Locks; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My improvement relates to the class of locks which contain a series of notched and circular detents, operated in connection with a series of change-wheels and an exterior index; and my invention consists in first and chiefly, a device whereby the motion of the operating handle is communicated at option to either the permutating and detaining mechanism ("tumblers") or to the main bolt through the medium of a longitudinally stationary arbor occupying a single opening in the door; secondly, a provision for the automatic liberation of the permutating-wheels for a rearrangement of the signs; thirdly, an improved auxiliary tumbler or detent for the prevention of picking by feeling, commonly called the "tentative process."

Figure 1 is a vertical section in the plane of the arbor. Fig. 2 is a horizontal section at the line *x x*. Fig. 3 is an inside view of the lock without the permutating and detaining mechanism. Fig. 4 shows the tumbler detached. Fig. 5 represents the bridge-plate. Fig. 6 represents the shifting arbor-plate. Fig. 7 represents the spindle and the traveling bit detached. Fig. 8 is a front view of a portion of the index and handles. Figs. 9 and 10 are face views of the primary and one of the secondary change-wheels. Fig. 11 is a face view of one of the gated wheels.

A represents the lock-case, and B its cap. Z shows a part of the door. The main bolt C, in addition to the customary talon D and stump E, has an oblique slot, F, for a purpose below explained. Communication with the interior of the lock is effected wholly by means of a peculiarly-constructed arbor, which occupies the sole opening in the safe-door. This arbor and its accessories I will now proceed to describe.

G is a hub journaled within the door, to which it is secured by means of a nut, G', and screw-key *g*. Rotation of the hub G is effected

by a knob, K, which projects outside of the door, and possesses a beveled base, marked with an alphabetical or other customary dial, L, which rotates in contact with a stationary mark, *l*, upon the door. A portion of the hub G extends within the lock-case and forms a cylindrical chamber, G'', having on one side of it a slot, *g'*, for a purpose presently explained. The hub G has, coincident with its axis, a spindle, H, held in place by a keyed nut, *h*, which, while forbidding any longitudinal displacement of the spindle, permits of its rotation within the hub. That part of the spindle H which occupies the chamber G'' is armed with a spiral thread, *h'*, for a correspondingly-threaded piece, I, which I style the "traveling bit."

A thumb-head, *h''*, outside of the door, enables the spindle H to be turned either to the right or to the left, so as to advance or to retract the traveling bit I, and by that means to bring it into gear either with the locking mechanism or with the permutating and detaining mechanism at the will of the operator. Thus, by bringing the letter B on the thumb-head opposite to the letter B on the knob the traveling bit I is retracted so as to communicate with the bolt, while by turning the spindle back so as to bring the letter T on the spindle opposite to the letter T on the knob the traveling-bit I is advanced so as to communicate with the permutating mechanism. The traveling bit I communicates with the main bolt C through the medium of a thimble, J, whose inner tusk, *j*, engages with the traveling bit, while its outer tusk, *j'*, entering the talon D of the main bolt, enables the latter to be shot and unshot by a partial rotation of the knob K. A lateral projection, *j''*, on the thimble J, occupying an oval slot, *m*, in the tumbler M, causes the said tumbler to descend just before shooting and unshooting the main bolt, so as to permit the stump E to traverse the U-shaped slot or gate *m'* in said tumbler, and the same projection, *j''*, acts, after the bolt has been thrown, to elevate the tumbler M, so as to confine the stump E in one of the limbs of the U-shaped gate *m'* and prevent a movement of the bolt.

N is the racking stump, having a projection or tongue, *n*. Pivoted to the tumbler M is an auxiliary tumbler or vibrating detent, O, whose

oblique hook *o*, with its two oblique edges, 1 2, occupies a notch or gain, *n'*, in the racking stump N.

Whenever in any attempt to pick the lock, the racking stump N, following the movements of tumbler M, is arrested in its movement by the ungated portions of the gated wheels, the detent O, by reason of the inclined edge 1 of its hook coming in contact with the racking stump at the lower end of the notch *n'* thereof, will be pushed outward until its projecting portion 10 is forced back into the recess 11, formed on one side of the mortise P'' in the bridge-plate P, which separates the bolt and its accessories from the permutating mechanism. By this arrangement the racking stump, and consequently the wheels T, are entirely relieved from pressure by any force that may be applied externally, the whole strain coming upon the detent and the bridge-plate; and on reversing the motion of the knob the tumbler M is forced upward to its former position, which movement causes the projection 10 of the detent to be drawn out of recess 11 by reason of the inclined edge 2 of the hook coming in contact with the racking stump at the upper end of the notch *n'*.

In its most advanced position the traveling bit I engages with a spur, *q*, upon the first of a series of change-wheels, Q Q' Q'' Q''', of which the wheel Q is centered concentric with the hub G in the aperture P' of the bridge-plate P, the other change-wheels, Q' Q'' Q''', being centered upon a stud, R, which projects from the cap B. The said change-wheels are set by being shifted alternately to the right and to the left, according to a prearranged secret formula, which is read off upon the index in the customary manner with locks of this class. Motion is transmitted from each wheel to its successor by means of studs *q*, which act on tongues S, whose points occupy notches *s* in the wheels, said notches being sufficiently roomy to afford an amount of play to said tongues equivalent to the thickness of each respective stud, so as to permit each wheel to be rotated one entire revolution to the right or left without moving its successor, and thus to enable a repetition of the same letter consecutively in the formula. This arrangement has, over the compensating arrangement described in the patent of W. B. Dodds and Macneale of November 11, 1862, the marked advantage of leaving the operator perfectly at liberty to commence the permutating operation by turning indifferently to the right or left, whereas in my former contrivance, the compensation being provided wholly in the first member of the series, the operator was required to tax his memory with a certain order of commencement.

The peripheries of the wheels Q' Q'' Q''' mesh with those of the gated wheels T T' T'', which wheels are centered upon a stud, U, which projects from the shifting stud-plate V. This plate V, when it is desired to hold the lock to some particular formula, is secured im-

movably to the bridge P by means of a pin, W, which, having been inserted through an aperture, *v*, in the shifting stud-plate, is screwed fast to the bridge-plate P at *p'*.

To change the combination, the main bolt is shot, and the pin W, being unscrewed from the bridge P, is screwed through a hole, *v'*, in the shifting plate V, so as for its point to occupy the oblique slot F in the main bolt. The main bolt being then unshot, its retraction acts to raise the entire suite of gated wheels out of mesh with the change-wheels, while the tongue *n*, on the racking stump N, sinking to the bottoms of the gatings, acts to hold the gated wheels in range until again brought into mesh with the change-wheels. The latter, being now entirely at liberty, may be shifted to any combination desired, which having been effected, the main bolt is again shot, which restores the two sets of wheels to mesh, and the pin W, being now returned to its original position, the lock becomes fixed on the new formula.

The chamber G'' may be slotted opposite to the slot *g'* to receive a tongue from the rear side of the traveling bit I, so as to give the hub G a broader grasp of the said bit and to prevent lateral strain.

All parts of the arbor within the door or lock are of cast-steel, and are so formed that they can neither be driven into nor drawn out of the lock. While you are operating the permutating mechanism you cannot operate the bolt, and consequently you cannot operate the said mechanism with one hand and feel the bolt with the other hand.

The operation of locking is as follows:

Turn the small thumb-screw or spindle H at the center of the steel knob K, so that the letter T stamped on the thumb-screw will be opposite the letter T stamped on the knob.

Supposing the lock to have been set on the combination of A B C, turn the dial to the right or left, at your option, more than three entire revolutions, and stop when A is at the index-point. The first change-wheel, Q, is now set in its proper position. Reverse the motion of the dial, and cause the letter A to pass the index-point twice, and then stop when B reaches the index-point. The second change-wheel, Q', is now set in its proper position. Reverse again. Let B pass the point once and stop when C on the dial reaches said point. All the change-wheels Q Q' Q'' are now in position, and, in order to shoot the bolt, turn the thumb-screw H so that the letter B on it will be opposite to the letter B on the knob. The bolt is then shot by turning the dial as far as it will go toward the right hand.

To fasten the bolt and complete the operation of locking, you must now turn the thumb-screw so that the letter T on it will be opposite to T on the knob, and then give the dial three or four turns either way, in order to "scatter" the wheels.

In ordinary use the pin W is retained in

the back hole, *v*, of the shifting stud-plate V; but should it be desired to set the lock on a new formula the pin W must be shifted to the hole *v'*, as before explained. The pin W should always be in one or other of the holes when operating the lock.

I claim herein as new and of my invention—

1. The provision of the traveling bit I, which is brought in connection either with the locking or with the detaining parts, so as to throw the bolt or adjust the gated wheels by means of the spiral spindle H, journaled in a slotted hub, G, confined permanently within the door, substantially as set forth.

2. The arrangement of obliquely-slotted main bolt C F, shifting stud-plate U V *v v'*, gated wheels T T' T'', and shiftable pin W, substantially as set forth.

3. The vibrating anti-picking detent O, hav-

ing the double inclined hook *o* and projection 10, for the automatic engagement and disengagement of said detent with a stationary part of the lock or lock-case, in the manner set forth.

4. The provision, in a series of change-wheels, Q Q' Q'' Q''', of the shifting tongues S, each of which occupies a notch, *s*, in its appropriate wheel so much wider than the tongue as to compensate for the thickness of each respective impelling-stud *q* on the wheel below, as and for the object explained.

In testimony of which invention I hereunto set my hand.

N. MACNEALE.

Witnesses:

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JAMES H. LAYMAN.