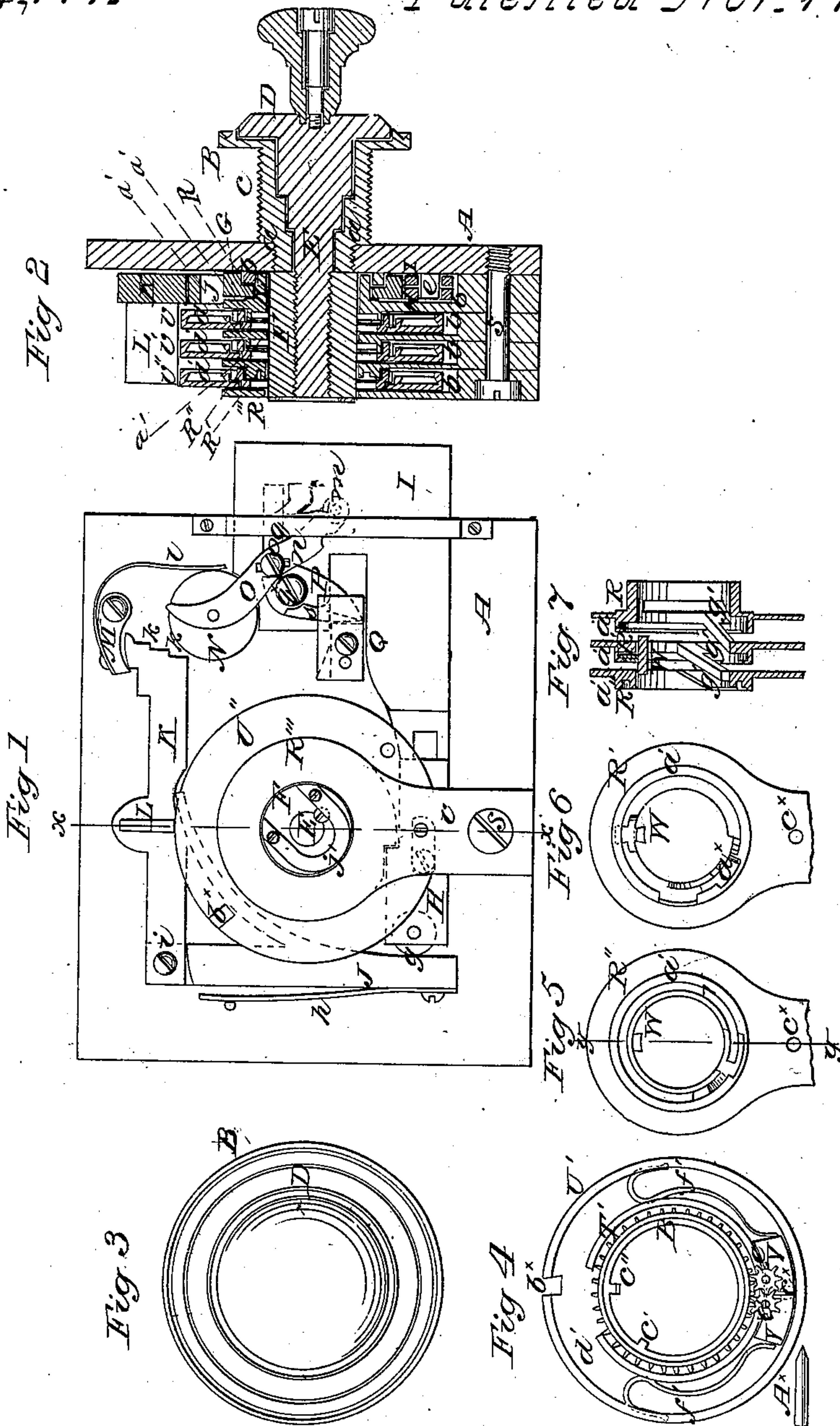


2 Sheets-Sheet 1.
N. F. Ensign,

Permutation Lock.

No 84,177.

Patented Nov. 17, 1868.



Witnesses:

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Wm A. Morgan

Inventor

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2 Sheets-Sheet 2.

N. F. Ensign,

Permutation Lock.

N^o 84,177.

Patented Nov. 17, 1868.

Fig 9

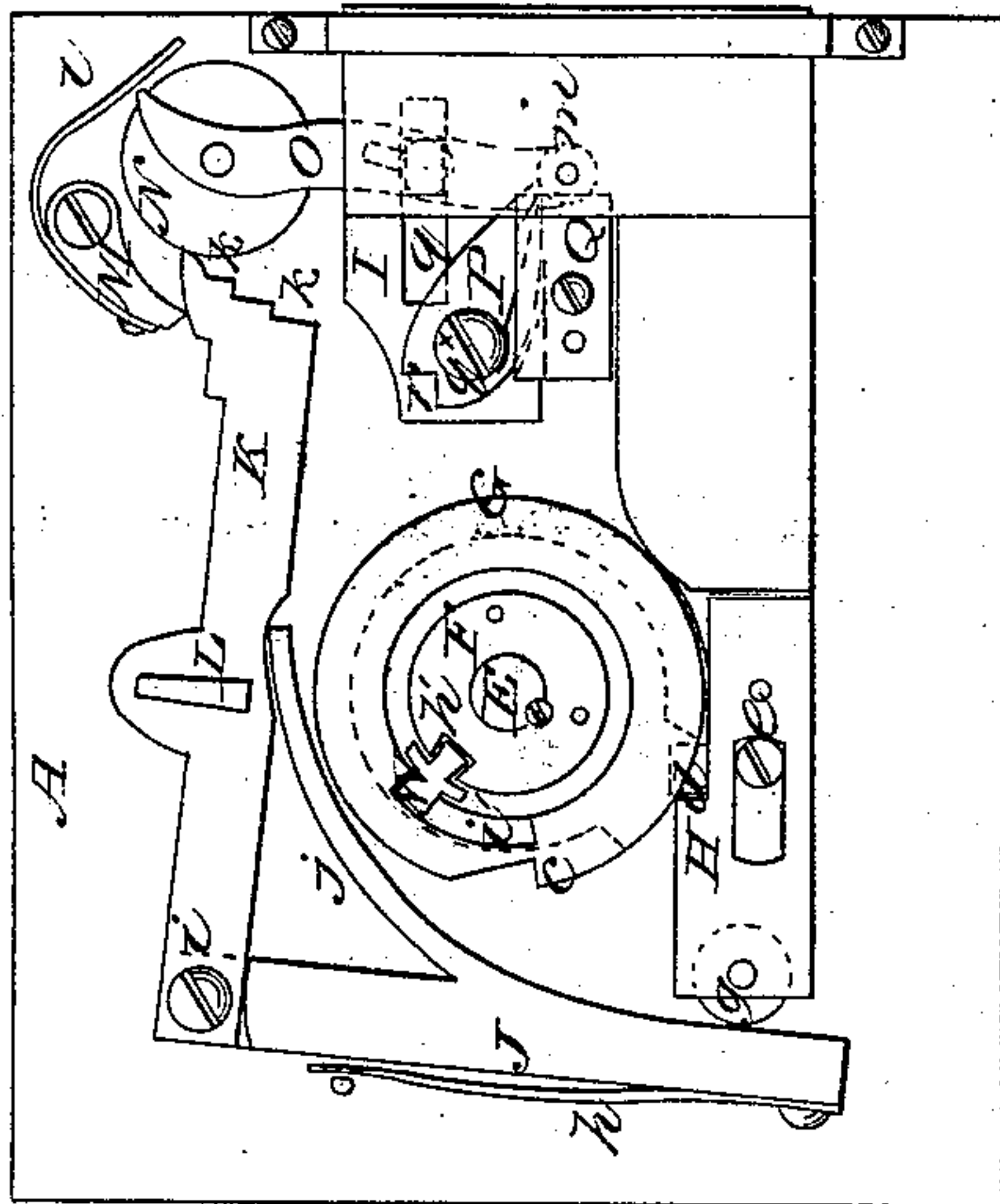


Fig 8

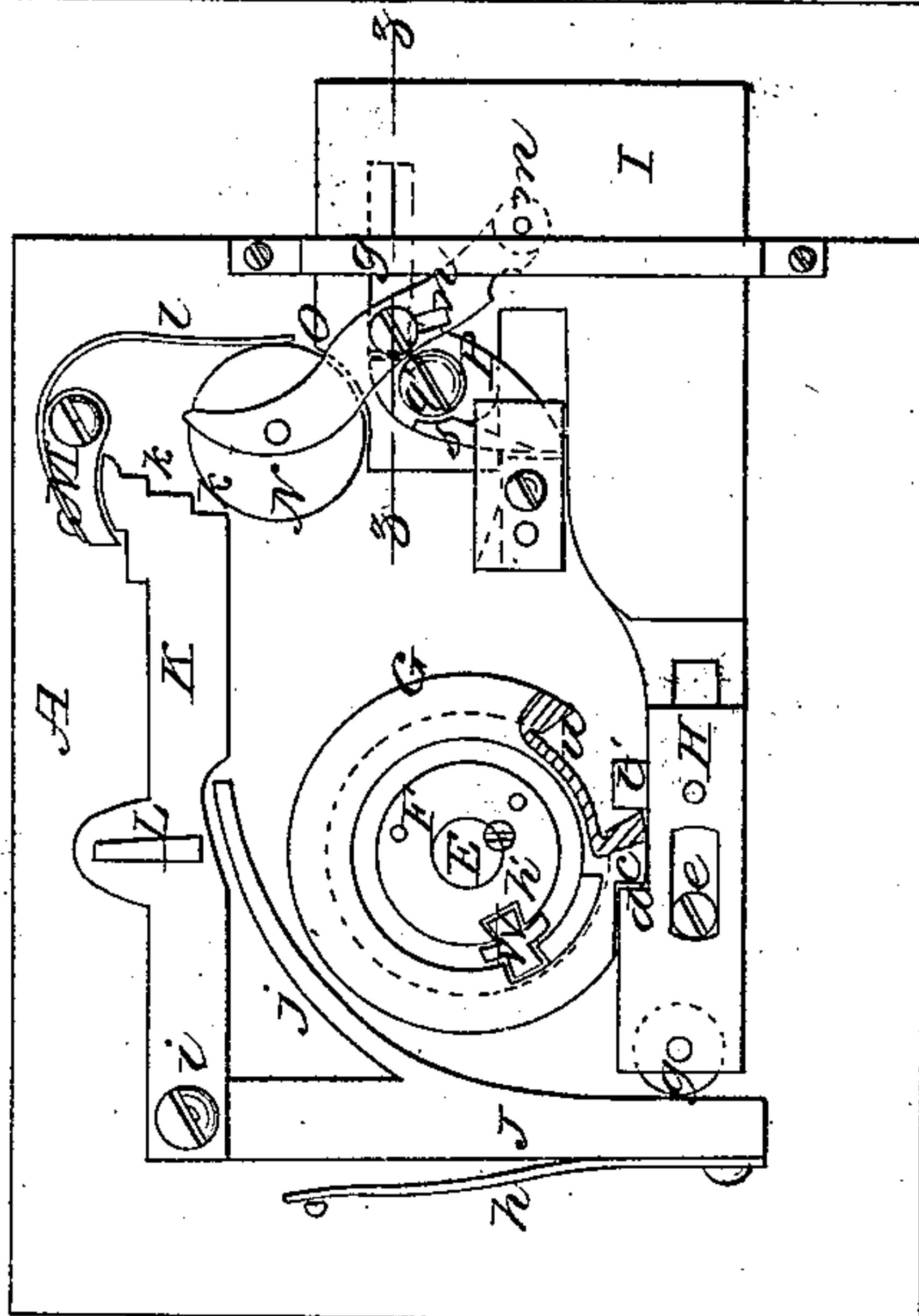
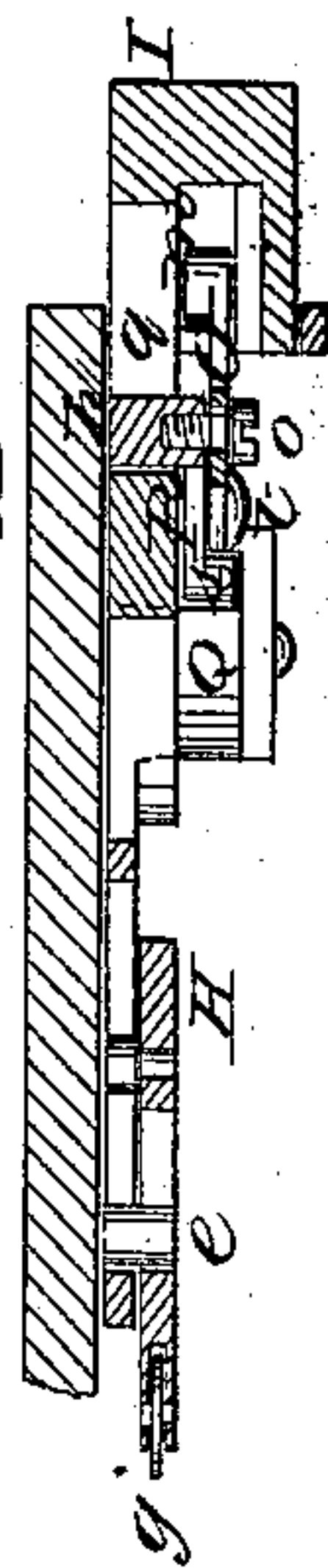


Fig 10 A



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United States Patent Office.

WILLIAM F. ENSIGN, OF NEW YORK, N. Y.

Letters Patent No. 84,177, dated November 17, 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, WILLIAM F. ENSIGN, of the city, county, and State of New York, have invented a new and improved Burglar-Proof Lock; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a new and improved lock of that class which is provided with a series of circular tumblers, having notches or gate-ways in their peripheries, to receive a stump, and admit of the bolt being thrown back.

The invention consists in a novel arrangement of toothed set-wheels, and locking-gear connected therewith, and also in a traveller, connected with the hub, and a series of annular guides for the traveller, all arranged with the circular tumblers in such a manner that the tumblers may be adjusted in a proper relative position with the stump, in order to unlock the lock, and the set-wheels rendered capable of being adjusted separately, in order to effect the different changes, as required.

The invention also consists in a novel mechanism connected with the bolt, whereby a pressure of the stump on the peripheries of the circular tumblers is effectually prevented when the lock is in a locked state, and a knowledge of the position of the notches or gate-ways in said tumblers rendered impossible.

In the accompanying sheet of drawings—

Figure 1, Sheet No. 1, is an inner side view of my invention.

Figure 2, a transverse vertical section of the same, taken in the line *z z*, fig. 1.

Figure 3, a detached front view of the knob-dial, and rim encompassing the same.

Figures 4, 5, 6, 7, detached views of parts pertaining to the lock.

Figure 8, Sheet No. 2, an inner side view of the lock, with the tumblers, and other parts intimately connected therewith, detached.

Figure 9 is the same view as fig. 8, showing the lock-bolt in a different position, in an unlocked state, it being shown in a locked state in fig. 8.

Figure 10, a section of fig. 8, taken in the line *z z*.

Similar letters of reference indicate corresponding parts.

The lock represented in the accompanying drawings is what is commonly termed a slab-lock, all the works being attached to a metal plate, A, and the internal parts, when the lock is attached to a door, being encompassed by a suitable covering.

B represents a rim, which encompasses a dial, and is on the outer end of a shaft, C, the latter having a screw-thread cut on its exterior surface, and also having a shoulder, *a*, to bear against the plate A, the shaft

being screwed into the plate, and the other portion of the screw working in an internal thread in the exterior plate or plates of the door to which the lock is applied.

The dial D is on the outer end of a shaft, E, which passes longitudinally through the shaft C, and has a screw-thread cut on its inner part, within the lock, on which a cylindrical hub, F, is screwed, (see fig. 2,) the inner end of the hub F bearing against the inner side of the plate A.

By this arrangement the shafts C E cannot be driven in or withdrawn from the plate A, and the illegitimate opening of the lock by this means effectually prevented.

The outer surface of the rim B and dial D, I have browned by the application of suitable acids, and the letters, figures, or other characters thereon, made in white, engraved or stamped therein, and filled in with a white metal or suitable cement.

By this means the lock may be unlocked without difficulty in the usually poor light of a bank-vault.

G represents a bolt-shover, which is constructed of a ring fitted on an annular guide, *b*, attached to the inner side of the plate A.

The exterior of this ring or bolt-shover is provided with a shoulder, *c*, which acts against a shoulder, *d*, on a slide, H, fitted on the bolt I of the lock, and working on a stump or guide, *e*, which passes through oblong slots, *f*, in the slide and bolt.

This slide H has a movement independent of the bolt I, and a friction-roller, *g*, is inserted in its rear end, against which the lower end of a vertical bar, J, is made to bear by means of a spring, *h*, the upper end of J being secured by a pivot-bolt, *i*, to plate A.

The bar J is formed or provided with a curved arm, *j*, which supports a bar, K, one end of which is secured to the plate A by the same pivot-bolt, *i*, which secures the bar J to said plate. (See figs. 1, 8, and 9.)

To the bar K a stump, L, is attached, and extends therefrom at right angles, and the free or disengaged end of the bar K is formed with a series of step-like projections, *k*, the use of which will be presently explained.

M is an arm, pivoted to the plate A, and extending over the free or disengaged end of the bar K, said arm having a spring, *l*, attached, which extends down, and bears against the periphery of a wheel, N, which is attached to a bar, O, the lower end of the latter being pivoted to the bolt I, as shown at *m*.

This bar O has an oblong slot, *n*, made through it, to admit of a screw, *o*, passing into a slide, *p*, which is fitted in a horizontal groove, *q*, made in the bolt I, said screw, *o*, connecting the slide *p* with the bar O.

P is a small bolt, which is attached by a pivot, *q*, to the bolt I, and has a right-angular notch, *r*, made in its upper end to receive the slide *p*, when the bolt I is shoved out, and the lock in a locked state. (See figs. 1 and 8.)

The lower part of the bolt P works within a lug, Q, attached to plate A, the bolt P having a flange, s, attached, in front of which a lip, t, on the lug projects. (See fig. 10.)

The operation of these last-described parts is as follows:

When the bolt I is shoved out, and the lock in a locked state, as shown in figs. 1 and 8, the bolt I is prevented from being shoved back, in consequence of the slide p being in the notch r of the pivoted bolt P, and the lower part of P bearing against the rear side of the recess in lug Q, as shown by the dotted lines in figs. 1 and 8; and in order to admit of the bolt I being thrown back, the bolt-shover G must be turned, in order to shove the slide H backward, said movement of the slide throwing backward or outward the lower end of the bar J, which admits of the spring l throwing down the arm M on the free or disengaged end of the bar K, causing the step-like projections k to act against the wheel N, and actuate the bar O, (throw it outward and upward,) so as to move the slide p out from the notch r of the pivoted bolt P, when the bolt I may be readily shoved back, and which is done by having an upright projection, t', on the bolt I, fit into a recess, u, in the bolt-shover G, one end of said recess coming in contact with t' immediately after the movement of the slide H, which causes the liberation of the bolt I, as previously explained; the bolt I being shoved by the opposite end of the recess u coming in contact with the projection t' when the bolt-shover G is turned in the opposite direction.

The step-like projections k are an important feature of the invention, as they insure a proper movement of the bar O.

A smooth bevelled surface at the end of K would not answer the purpose, as it would be liable to bind or wedge against the wheel N.

It will be seen, therefore, from the above description, that in order to unlock the lock, the bar K must first be allowed to descend, in order that the bolt I may be liberated, and this result can be obtained only through the medium of circular tumblers adjusted in a precise position, as I will now proceed to explain.

R R' R'' R''' represent annular plates, provided each with a pendent shank, v, the lower parts of which are all secured to the plate A by a screw, S. (See fig. 2.)

These plates are concentric with the hub F, the latter passing through all of them, and the plates R R' R'' have each an annular flange, a', on which toothed rims, T T' T'', are fitted loosely, one on each, said rims having an inwardly-projecting flange, b', the rims T T' having two projections, c' c'', attached, one longer than the other, (see fig. 4,) and the rim T'' having one long projection, c'', only.

U U' U'' are the circular tumblers, which are fitted loosely on the flanges b' of the toothed rims T T' T'', and have an annular concentric groove, d', in one side.

In these grooves d' two plates, V V, of segment-form, are fitted, each plate having a pinion, e', attached, which pinions are retained in gear with each other by springs, f', bearing against the plates V V.

The pinions e' also gear into the toothed rims T T' T'', and serve as a lock for the same, connecting them with the tumblers U U' U''. (See fig. 4.)

The interior of the annular plates R R' R'' R''', when connected together, forms a series of annular grooves, communicating with each other by angular passages g'. (See fig. 7.)

These passages admit of a traveller, W, passing from within one plate to the other, and through the toothed rims T T' T'', so as to turn the rims, and the tumblers attached thereto, by acting against the projections c' c''.

This traveller is fitted in a longitudinal dovetail groove, h', in the hub F, and besides moving the tumbler, turns the bolt-shover G, by passing into a recess, i', therein, after all the tumblers are properly adjusted.

At the end of the hub F there is attached a spring, j', (see fig. 1,) which throws the traveller into the passage g' of the plate R'', when the traveller is brought opposite to or in line with said passage.

In unlocking the lock, the hub F is turned to the right continuously, until the traveller W reaches the toothed rim T'', which, with the tumbler U'', is set by turning the hub F to the left, W coming in contact with the projection c''.

The traveller then, on its return movement, acts against the short projection c' of the rim T', turning said rim to the left, until the traveller passes through an opening, a'', in its flange a', when the hub is turned to the right, and the traveller brought in contact with the long projection c'', and the tumbler U' adjusted in proper position.

The tumbler U is then adjusted in a similar manner, and the traveller, at the termination of its movement, enters the recess i' in the bolt-shover G, and the latter is turned to throw back the bolt.

The object or necessity in moving the tumblers U U' U'', is to bring notches or gate-ways b'', in the peripheries of said tumblers, in line with each other, and with the stump L of bar K, to admit of the latter dropping to free the bolt I, as previously described.

In order to effect the changes, it is necessary to disconnect the toothed rims T T' T'' from the tumblers U U' U'', and this is effected by shoving the plates V V apart, in order to throw the pinions e' out of gear with each other, which is done by passing a rod, A'', through the several tumblers, holes, c'', being made in the tumblers and shanks v of the plates R R' R'' R''', and lock-plate A, for this purpose, said rod passing between the plates V V of each tumbler, and having a wedge-shaped end. (See fig. 4.)

By thus throwing the pinions e' out of gear with each other, the rims T T' T'' may be moved and adjusted independently of the tumblers, and the necessary changes effected.

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

1. The slide H, bars J K, with stump L attached to the latter, in connection with the bolt-locking mechanism, composed of the bar O, wheel N, pivoted bolt P, arm M, and spring l, all arranged to operate in connection with bolt I, in the manner substantially as and for the purpose set forth.

2. The step-like projections k, at the free or disengaged end of bar K, when used in connection with the wheel N, for the purpose specified.

3. The annular plates R R' R'' R''', provided with the internal annular grooves, connected by passages g', in connection with the traveller W, all arranged for operating the tumblers, substantially as set forth.

4. The toothed rims T T' T'', in connection with the pinions e' e', attached to the slides V V, having springs f' bearing against them, all arranged in connection with the tumblers U U' U'', substantially as and for the purpose specified.

5. The combination of the tumblers U U' U'', toothed rims T T' T'', plates R R' R'' R''', traveller W, and hub F, all arranged to operate in the manner substantially as and for the purpose set forth.

WM. F. ENSIGN.

Witnesses:

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ALEX. F. ROBERTS.