

(Model.)

2 Sheets—Sheet 1.

R. HILDWEIN.
COMBINATION LOCK.

No. 365,382.

Patented June 28, 1887.

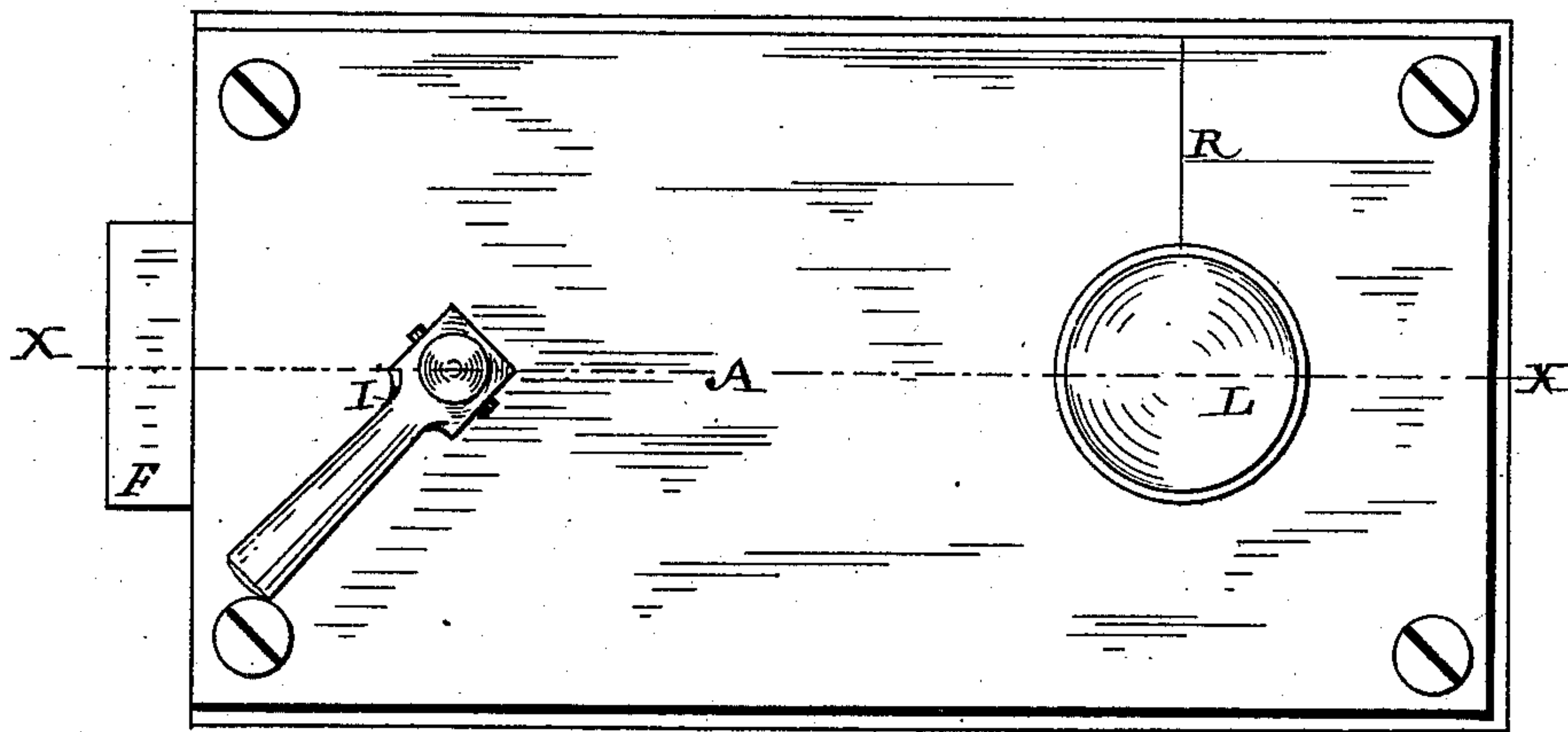


Fig. 1

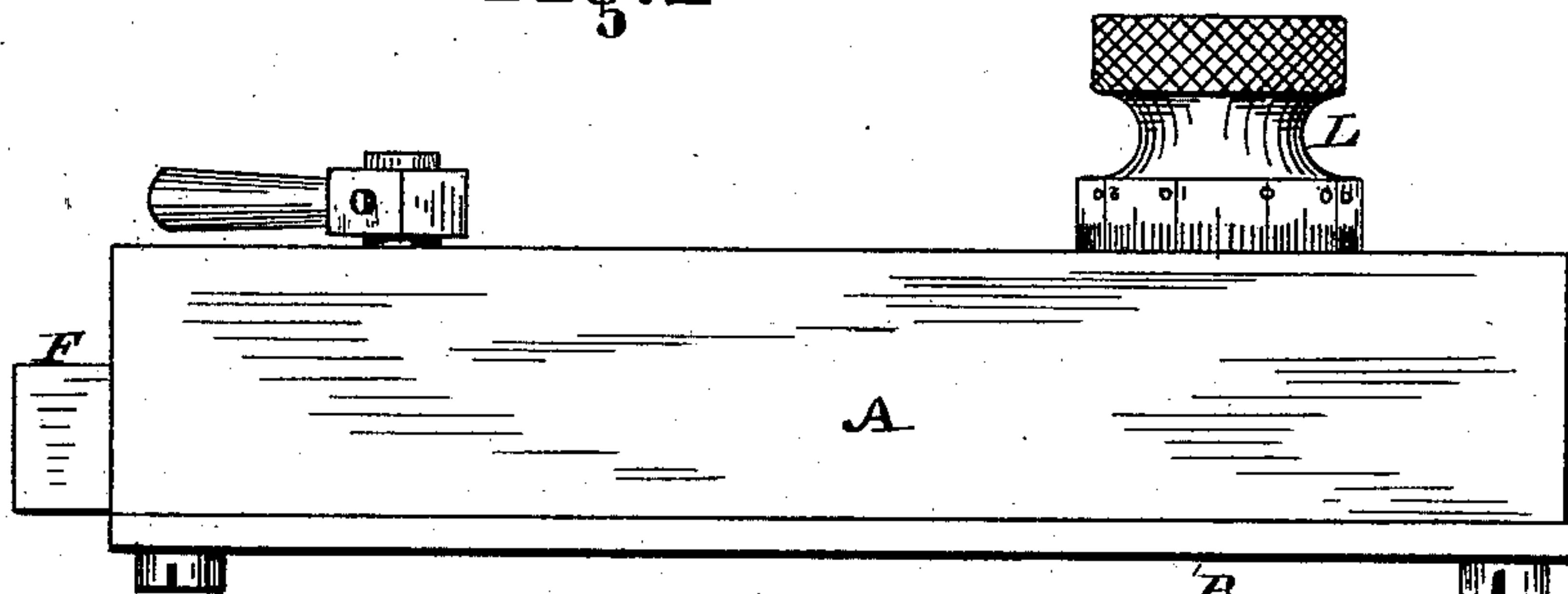


Fig. 2

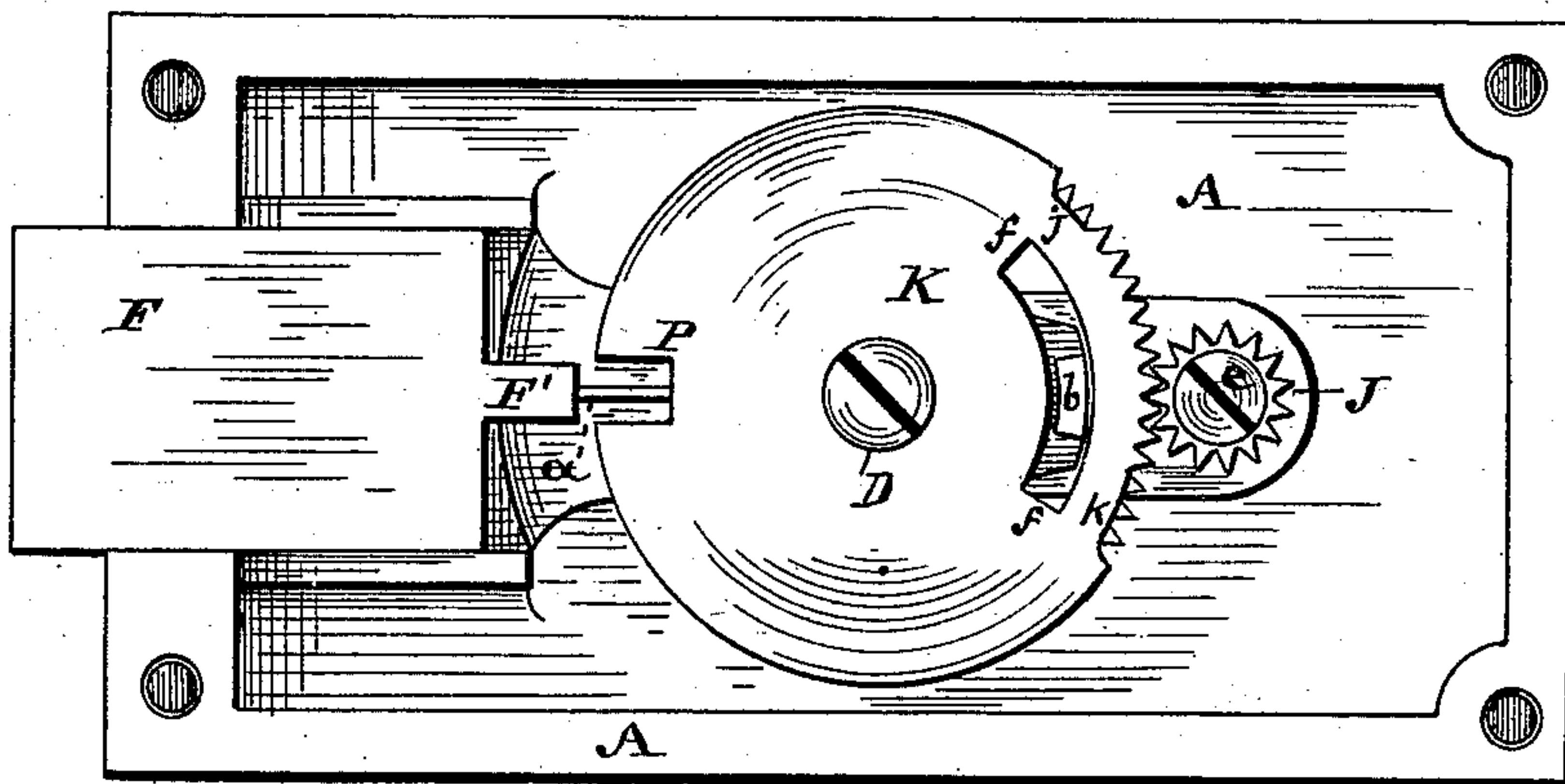


Fig. 3.

WITNESSES

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INVENTOR

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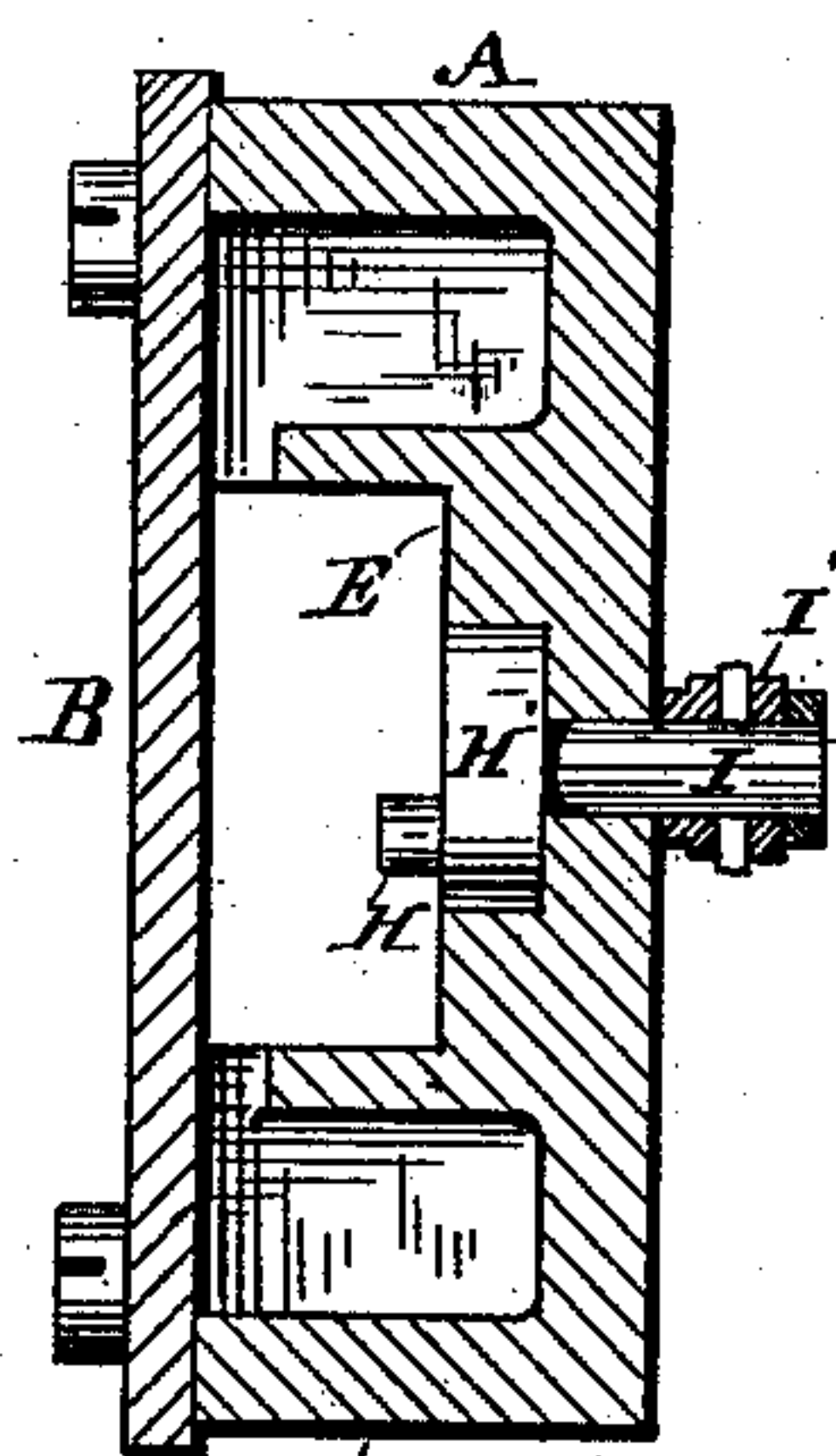


Fig. 5

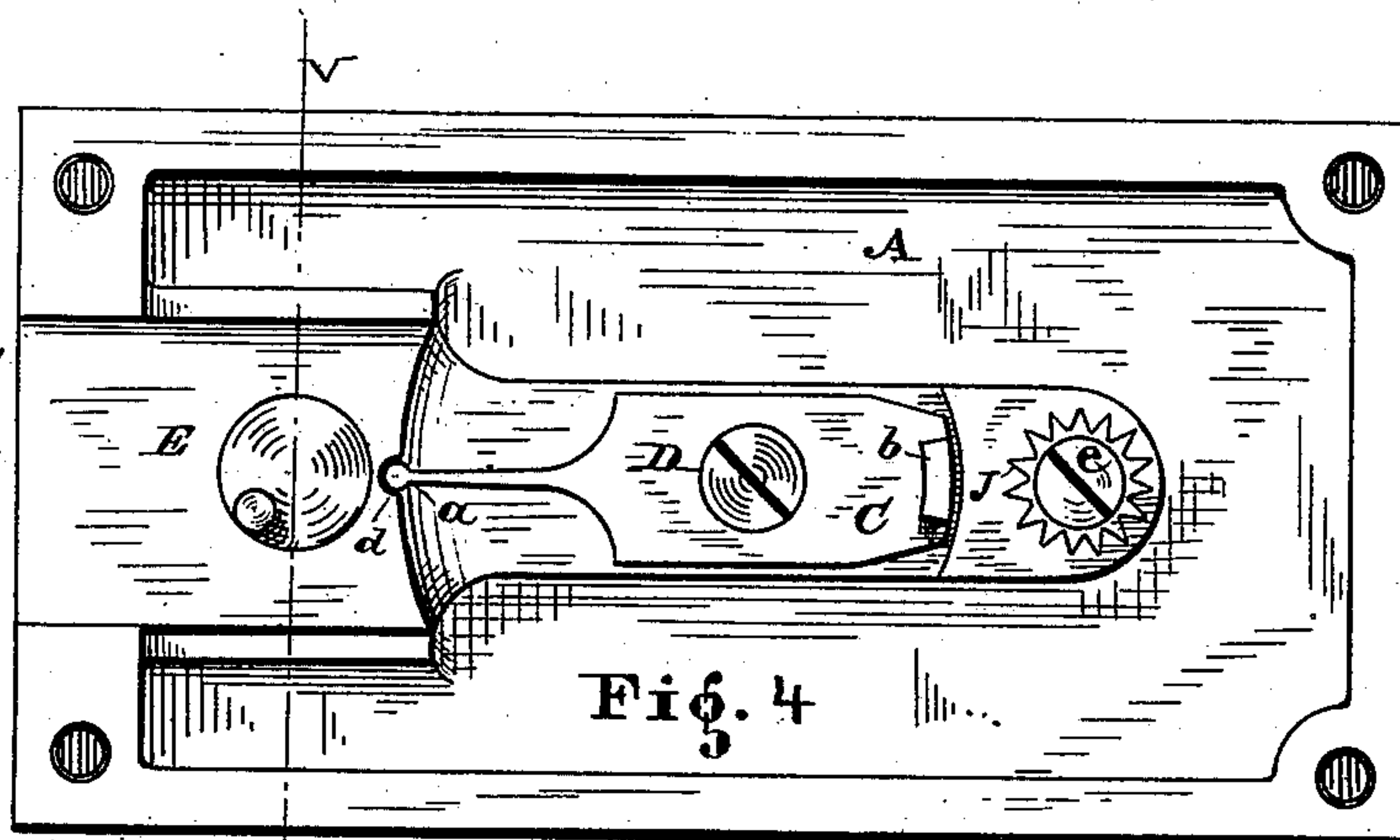
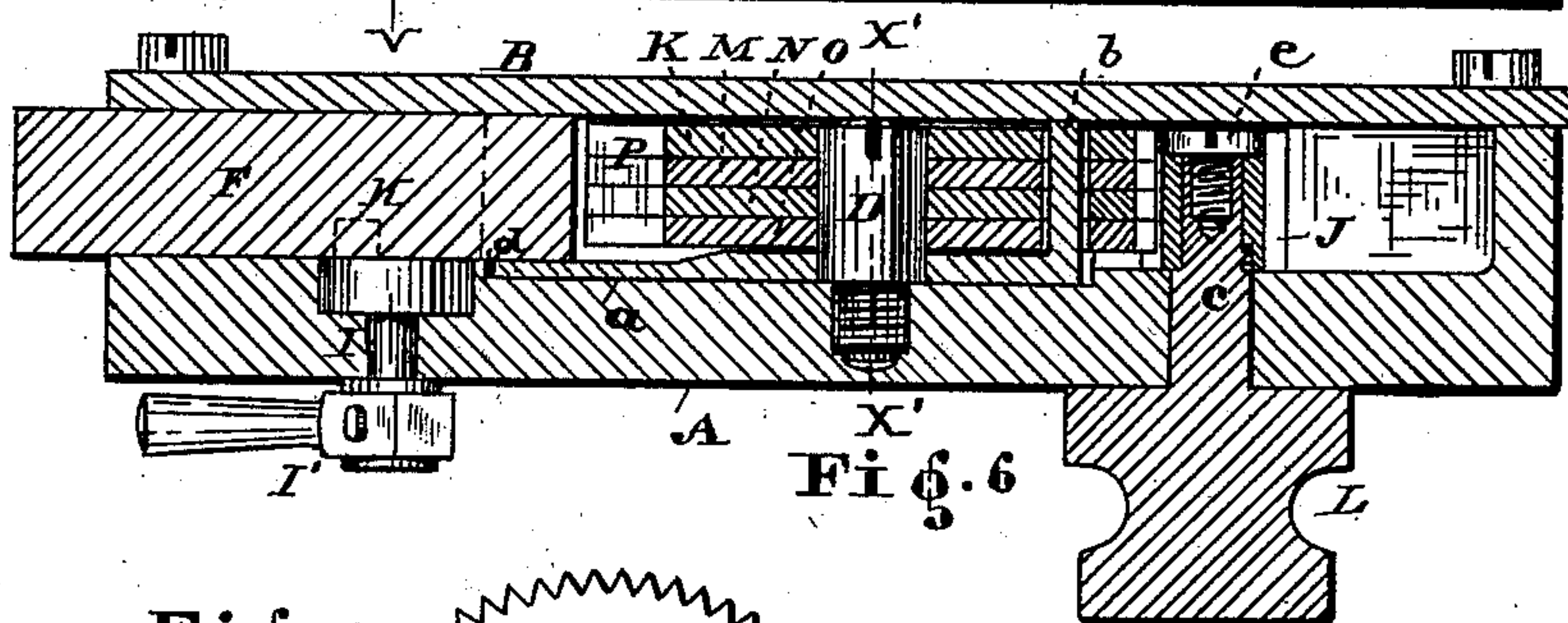


Fig. 4



Fi 6

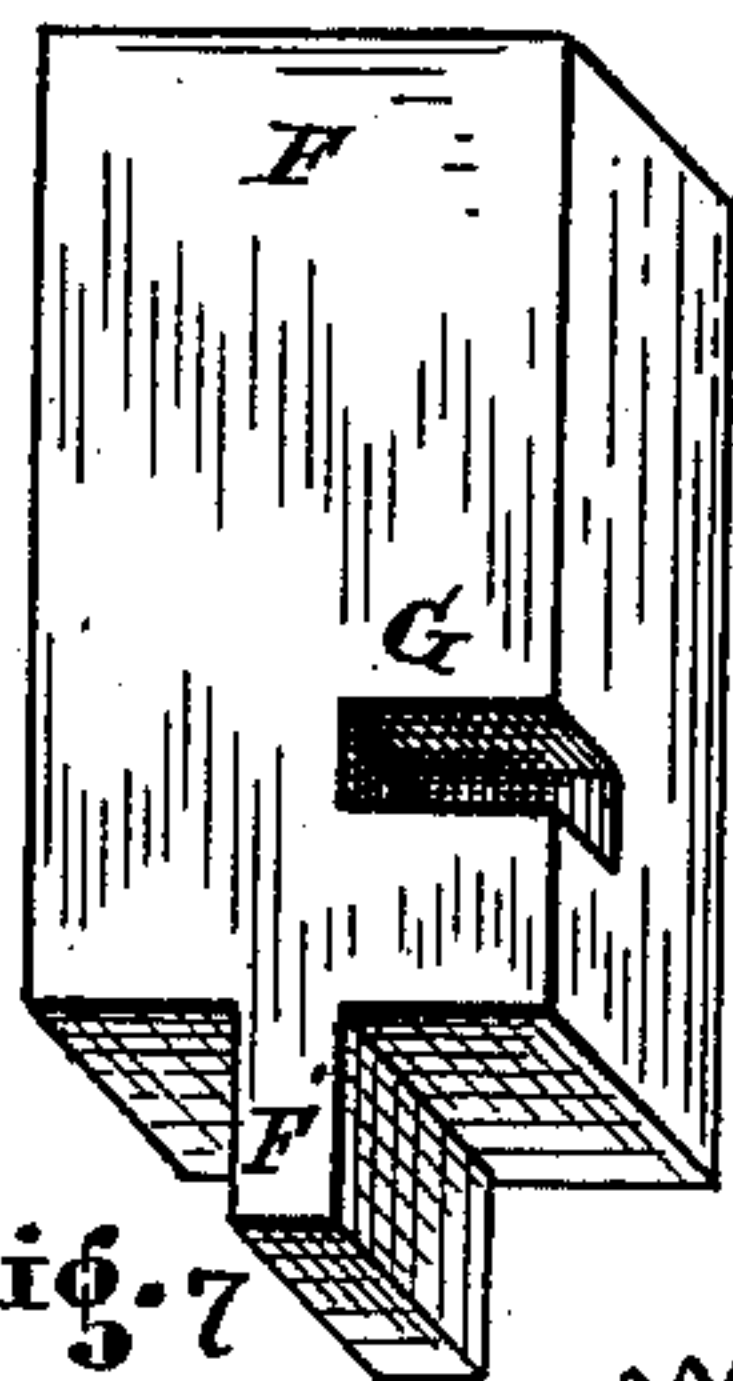


Fig. 7

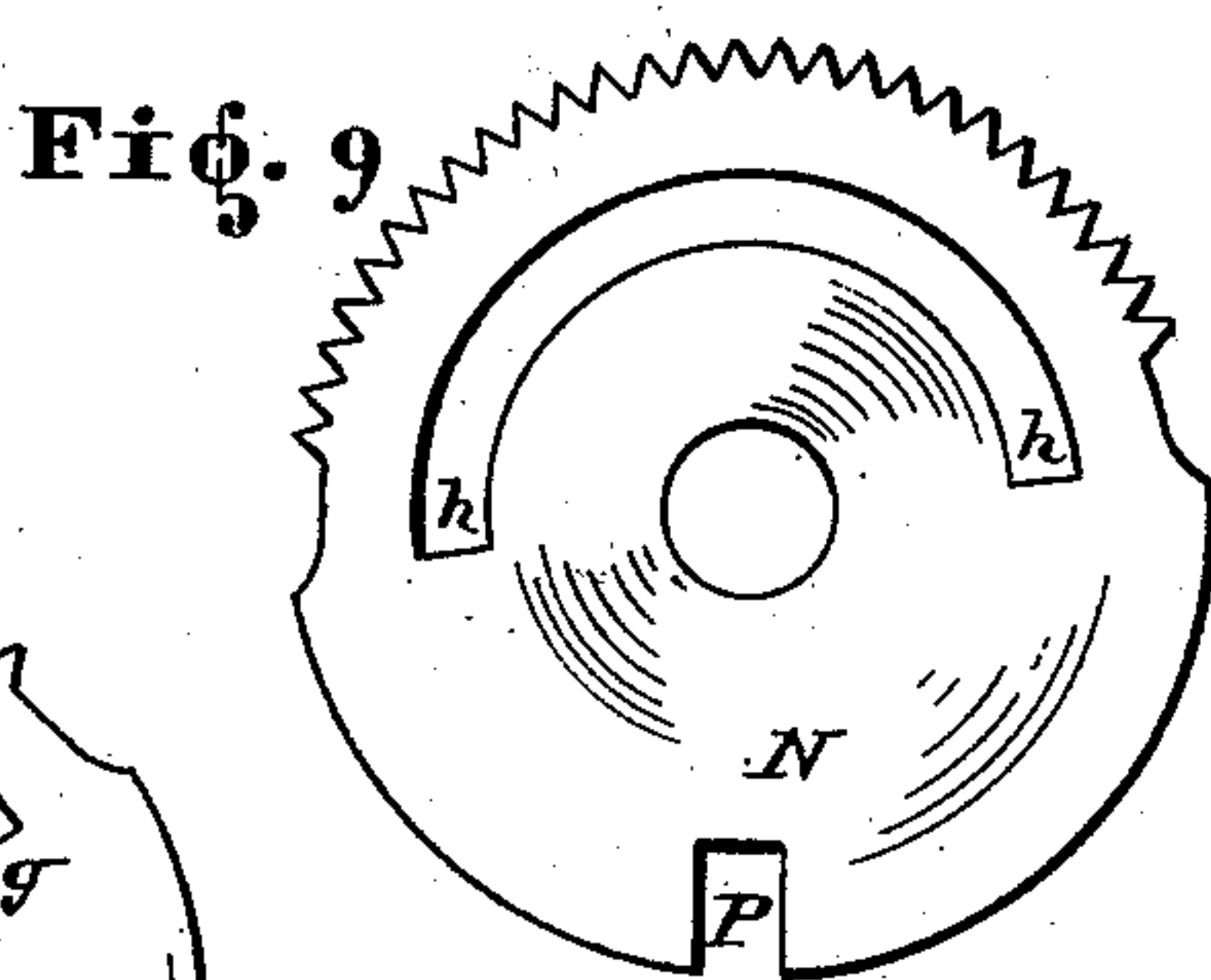


Fig. 9

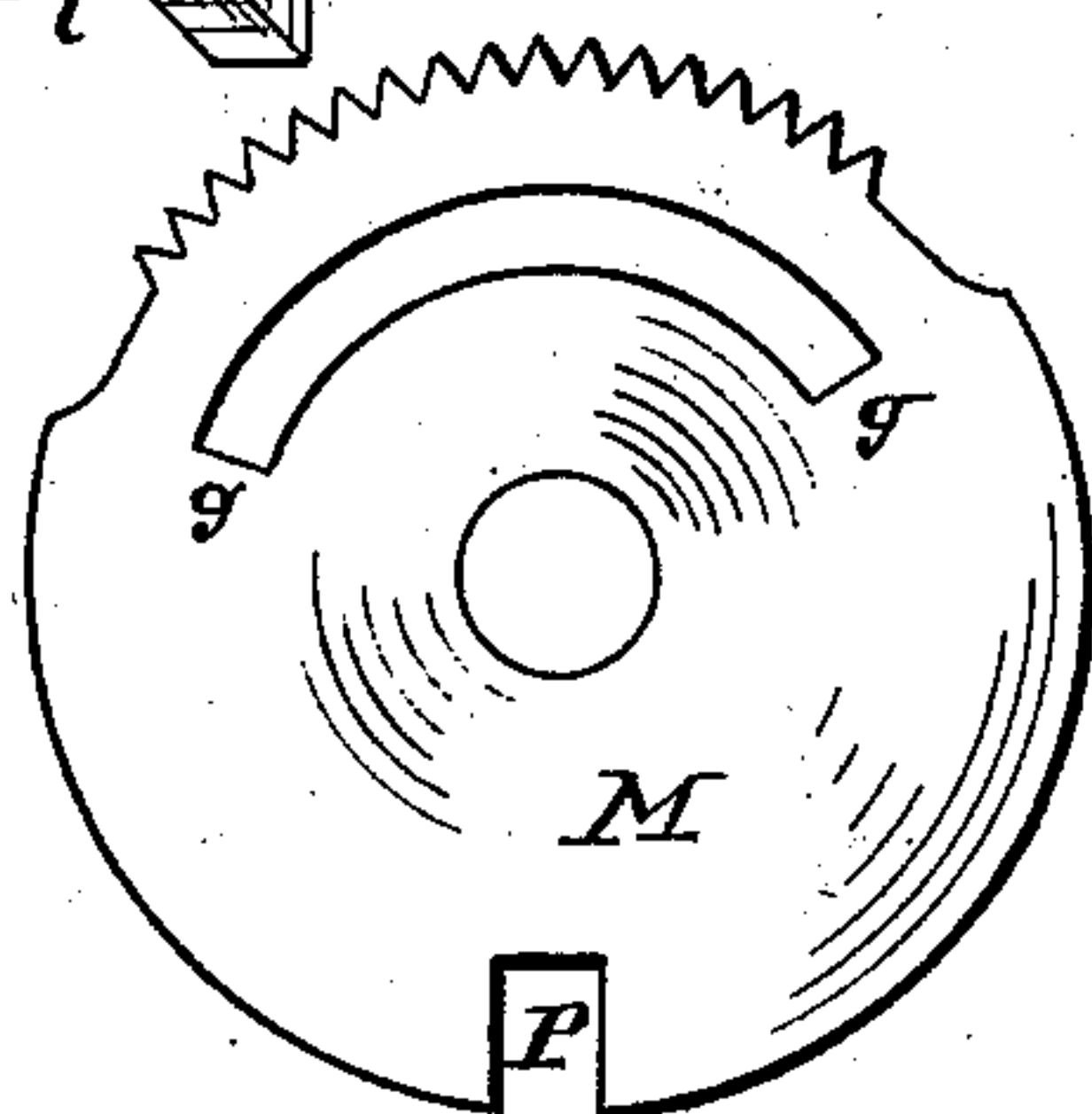
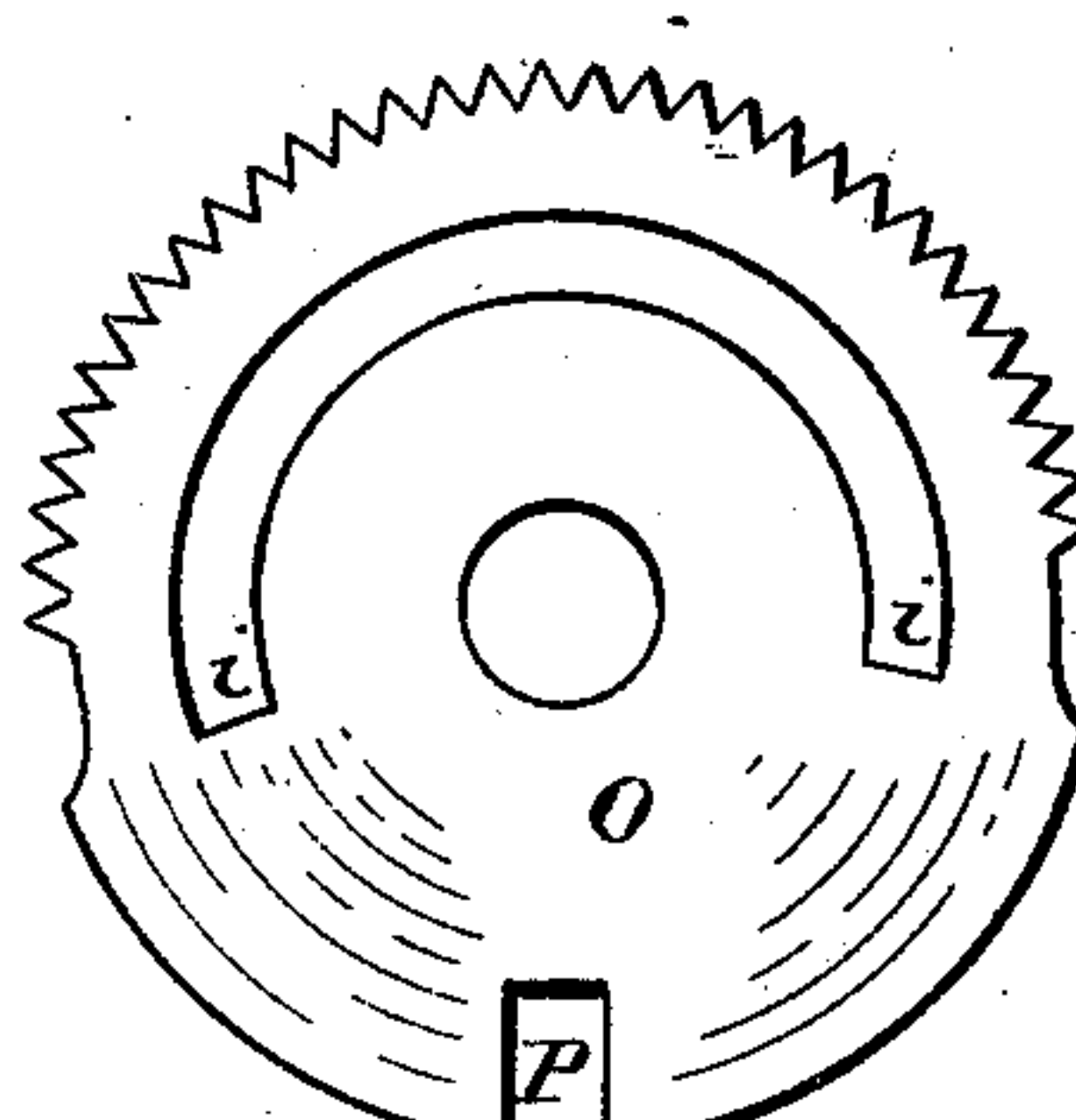


Fig. 8



Fi 10.

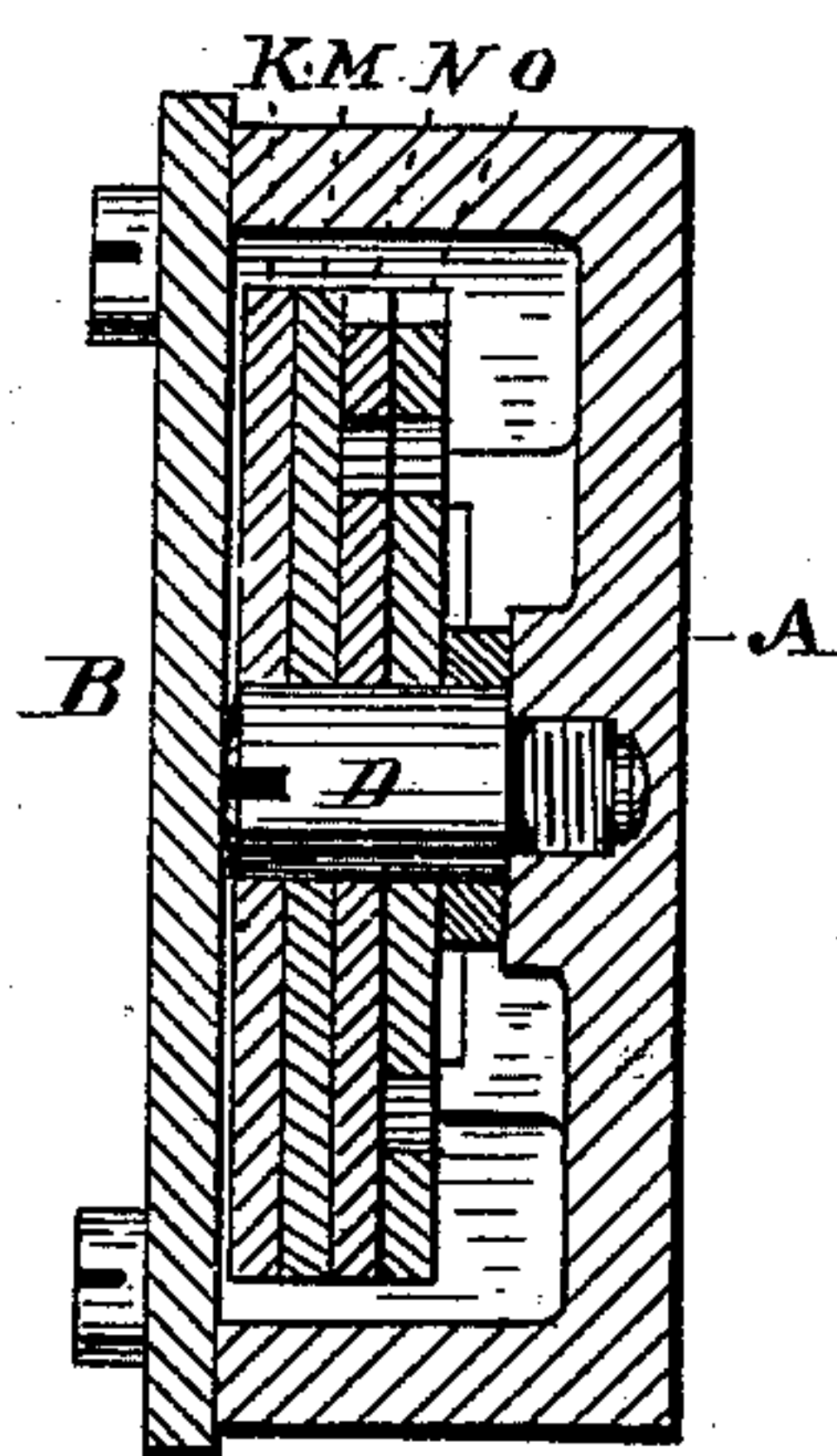


Fig. 11.

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UNITED STATES PATENT OFFICE.

ROBERT HILDWEIN, OF CLEVELAND, OHIO.

COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 365,382, dated June 28, 1887.

Application filed January 31, 1887. Serial No. 225,948. (Model.)

To all whom it may concern:

Be it known that I, ROBERT HILDWEIN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and Improved Combination-Lock; and I do hereby declare that the following is a full, clear, and complete description thereof.

My invention is an improvement in combination-locks; and the object of the same is to secure a simple and effective construction.

In the drawings I have shown a lock embodying the principle of my invention, and such invention is fully disclosed in the following specification and claims.

In the drawings, Figure 1 is an exterior side view of the lock. Fig. 2 is an edge view of the same. Fig. 3 is a view from the side opposite that shown in Fig. 1, with the side of the casing removed. Fig. 4 is a view from the same side, with the bolt and gear-disks removed. Fig. 5 is a transverse section on line *v v*, Fig. 4. Fig. 6 is a longitudinal sectional view on line *x x*, Fig. 1. Fig. 7 is a detached view of the bolt. Figs. 8, 9, and 10 are detached views of three of the disk-gears. Fig. 11 is a transverse section on line *x x*, Fig. 6.

The general form and shape of the lock is shown in Figs. 1, 2, and 3.

The casing is composed of two parts, A and B, the latter being a cap-plate closing and forming one side of the casing. The main part A of the casing is provided with a guideway, E, for the bolt, within and adjacent to the end of the said part A, which has an opening therethrough for the passage of the bolt. The bolt F is shown in Fig. 5, and is provided with the notch G in its side and on its end with a narrow projection or stem, F'.

To the inner side of the part A of the casing is attached the stud D, and upon this stud are pivoted the lever C and the gear-disks K, M, N, and O. The lever C is provided at one end with the laterally-projecting lug or stop *b*, and the opposite end is reduced to form a spring, *a*, the outer end of which engages and is retained within a notch, *d*, in the casing, as best seen in Fig. 4, for a purpose which will hereinafter be explained.

The lock is provided with an index-knob of usual construction, the stem *c* of which extends through the casing A. Such stem has,

within the casing, a pinion, J, fitted thereon in any usual manner, so as to turn therewith, and the retaining screw *e* secures the pinion J and the knob together and in operative position. The pinion J is of such length as to engage the gear-teeth of all the disks in the lock.

To effect the movement of the bolt F, I pivot the stem I in the casing and provide the same on the outside of the lock with a handle, I', and on the inside of the casing with the crank H', the pin H of which engages the slot G in the bolt.

The gear-disks K M N O are of such size that when mounted on the stud D the unbroken parts of the peripheries of the same will be just in the rear of the stem F' of the bolt F, when the latter is in its most advanced position. Each of said disks is provided on one side with a notch, P, of a size to receive the stem F' of the bolt when it is brought opposite the same or in line therewith. On the side opposite the notch P, each disk is provided with a certain number of gear-teeth and a curved or segmental slot which is concentric with the periphery of the disk. These slots are designated in the drawings by the reference-letters *f*, *g*, *h*, and *i*, (see Figs. 3, 8, 9, and 10,) and when the disks are in operative position they engage the lug *b* of the lever C, said lug being of such length as to pass through the slots of all of the disks that can be employed in the lock. Each disk has a different number of gear-teeth, and at each end of the gear-teeth I provide a blank reduced portion or space, *j* and *k*. The spaces *j* and *k* and the segmental slot of each disk are so arranged in reference to each other that, as the pinion J is turned so as to bring either of such spaces against the pinion, the end of the slot will engage lug *b* of the lever C while the pinion is acting on the gear-tooth of the disk nearest such space, and when the pinion leaves such tooth the spring of the lever C will force the lug *b* against the end of the slot with sufficient force to throw the disk far enough in the opposite direction to that in which it has been moved by the pinion to enable the pinion, on a reverse movement, to re-engage the teeth of the disk. It will be seen that on turning the pinion J, through the means of the index-knob L, as soon as a disk has been turned far enough to bring one of the spaces *j k* opposite

the pinion the disk will not be moved by the further turning of the pinion, but will remain stationary. The other disks in engagement will continue to turn until one of the spaces, j or k , of each disk is brought opposite the pinion. The further turning of the pinion will not effect any movement of the disks; but on reversing the movement of the pinion the pinion will, by reason of the action of the lever C and its lug b , heretofore explained, engage the teeth of all the disks and move them in the opposite direction until all of the opposite blank spaces of the disks are brought into line. Thus by turning the index-knob the disks can be moved first in one direction and then in the reverse direction in respect to each other. This enables the disks to be operated so as to secure the alignment of the notches P and to place the disks in such position that the bolt F can be retracted.

As an example of the movement of the parts necessary to open the lock, suppose the disks to be in the same relative positions as in the model furnished. By turning the index-knob three times to the left the spaces k will be brought into alignment. Then, without reversing, bring the 0 mark on the index-knob to the line R on the face of the lock. Then turn the knob twice around to the right and bring S5 against the line R. This will align the notches in the two upper disks, or the two with the greater number of gear-teeth. Then reverse the pinion and turn it to the left and bring 33 against the line. This will bring the notch of the disk having the next greater number of teeth into alignment with the other two. Then reverse the pinion and bring 41 against the line, which will complete the alignment of all of the notches of the disks. Then, by turning the index-knob until S4 is brought against the line R, the bolt can be retracted and the lock opened. The lock is closed by throwing the bolt outward by the handle I', and then giving the pinion one, two, or more turns in either direction.

The combination can at any time be changed by changing the order of the disks in the lock, or by changing one or more of the disks.

What I claim, and desire to secure by Letters Patent, is—

1. In a combination-lock, two or more revoluble gear-disks having segmental gears on their peripheries, the gear of each disk being of a different length from that of the other disk or disks and having a reduced portion or space at each end of said gear, in combination with the pinion on the index-knob engaging with the gears of all the disks, and a spring-lever engaging said disks, substantially as described.

2. In a combination-lock, two or more revoluble gear-disks having variant segmental gears upon the peripheries thereof, and in each a segmental slot in corresponding relation with the arc of the segmental gear and concentric therewith, each of said disks being so constructed that a certain point of the periphery thereof is to be brought into alignment with a part of the bolt, in combination with the lever C, having a spring at one end and a lug or stop at the other, and a pinion connected with the index-knob, substantially as described, and for the purpose set forth.

3. Two or more gear-disks of the same size pivoted upon the same axis and provided with variant segmental gears upon the peripheries thereof, notches P, and segmental slots concentric with the arc of said gears, a pinion attached to the index-knob and gearing with said disks, in combination with the pivoted lever C, provided with a spring at one end, and at the other with a stop or lug extending through the said slots, and bolt F, having the stem F', as and for the purpose set forth.

4. In a combination-lock, the bolt F, having notch G and stem F', a crank having a crank-pin engaging notch G, and an exterior operating-handle for said crank, in combination with the described gear-disks, pinion J, and lever C, provided with a spring, a , and lug or stop b , extending through the slots of the gear-disks, substantially as and for the purposes set forth.

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

ROBERT HILDWEIN.

Witnesses:

B. F. EIBLER,
W. H. BURRIDGE.