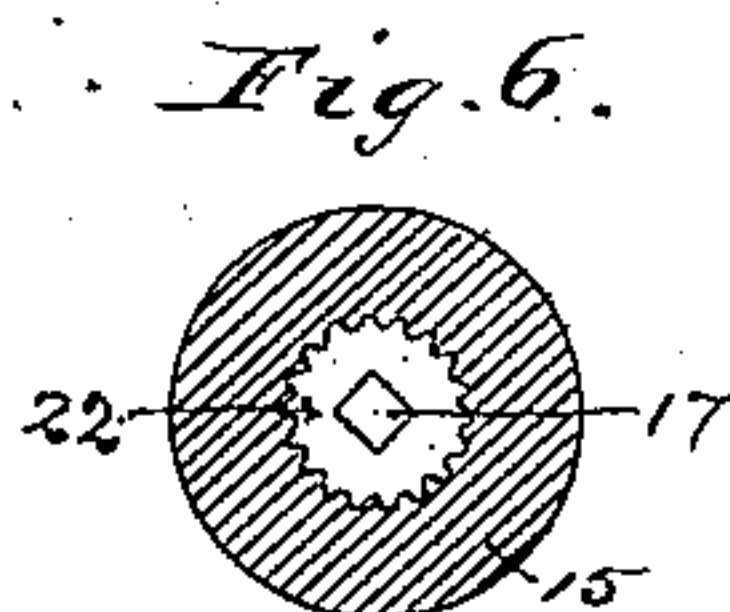
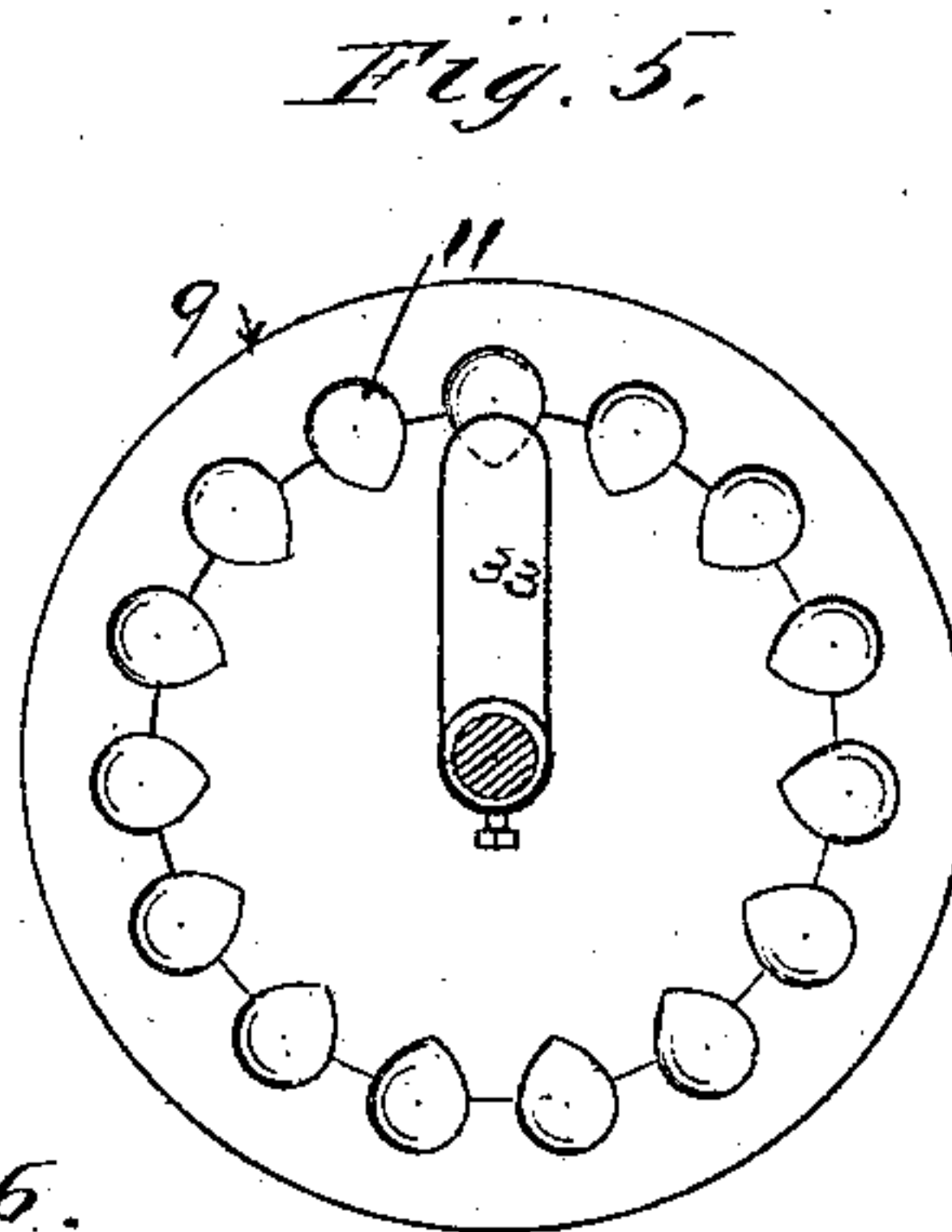
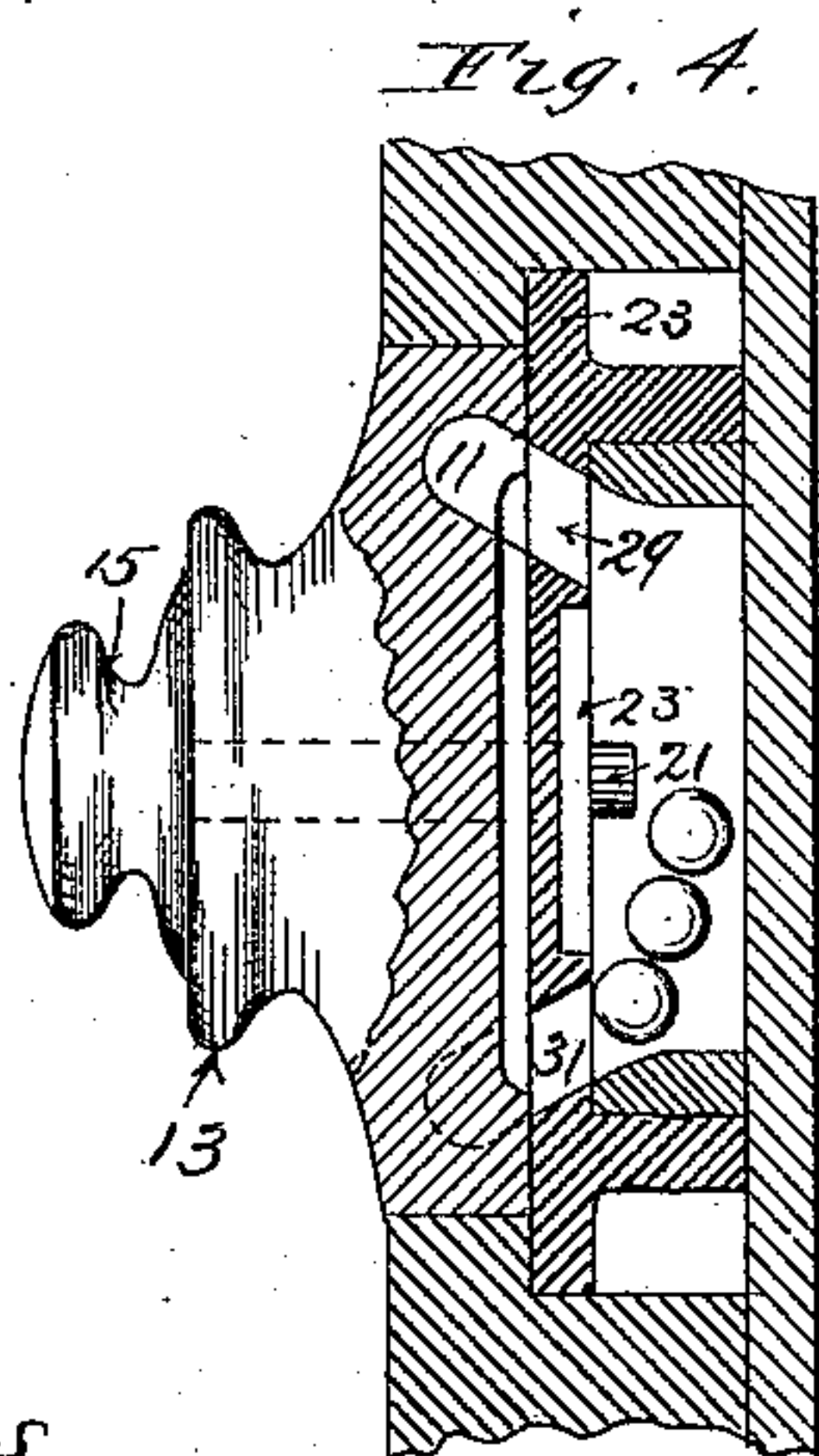
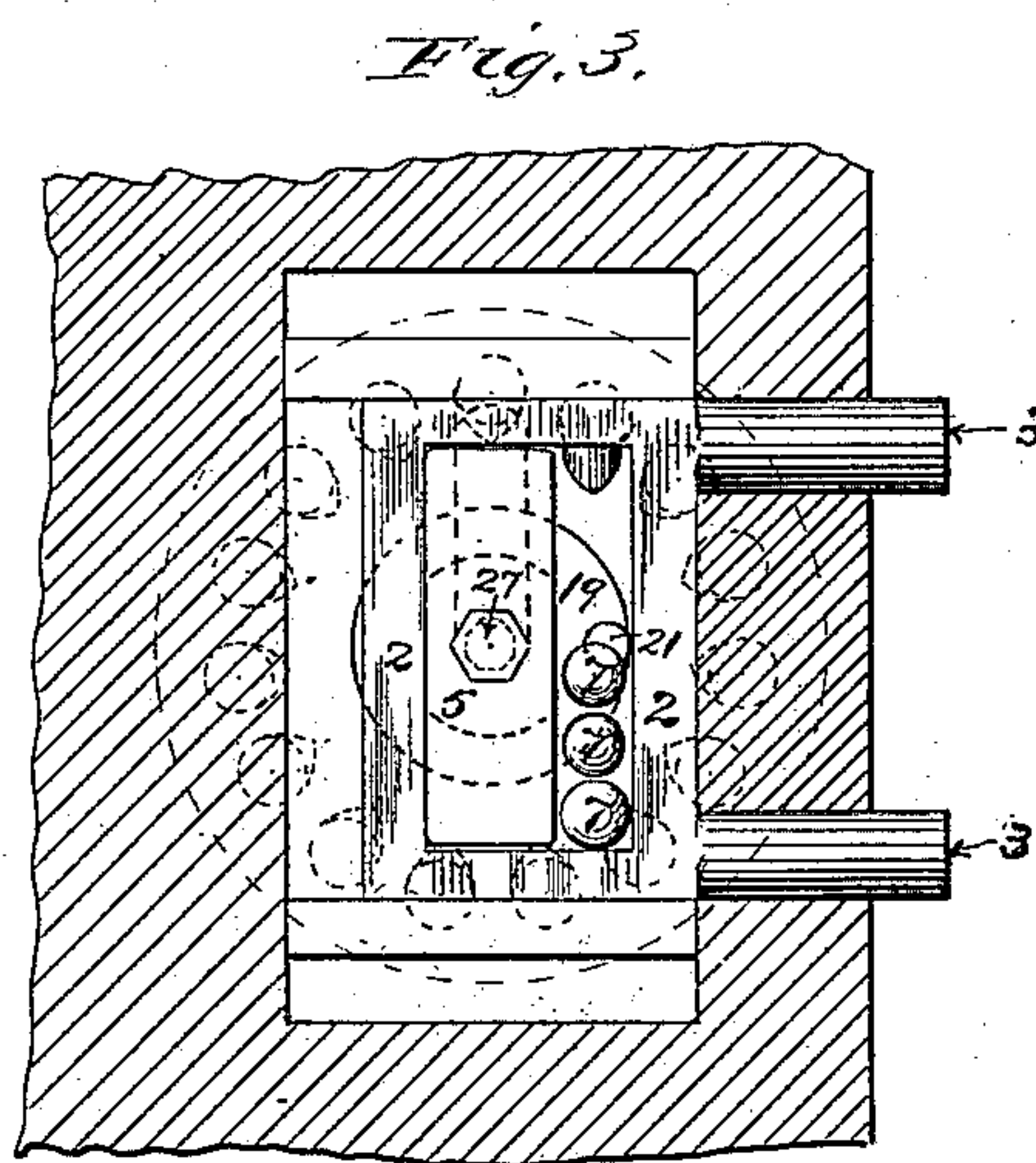
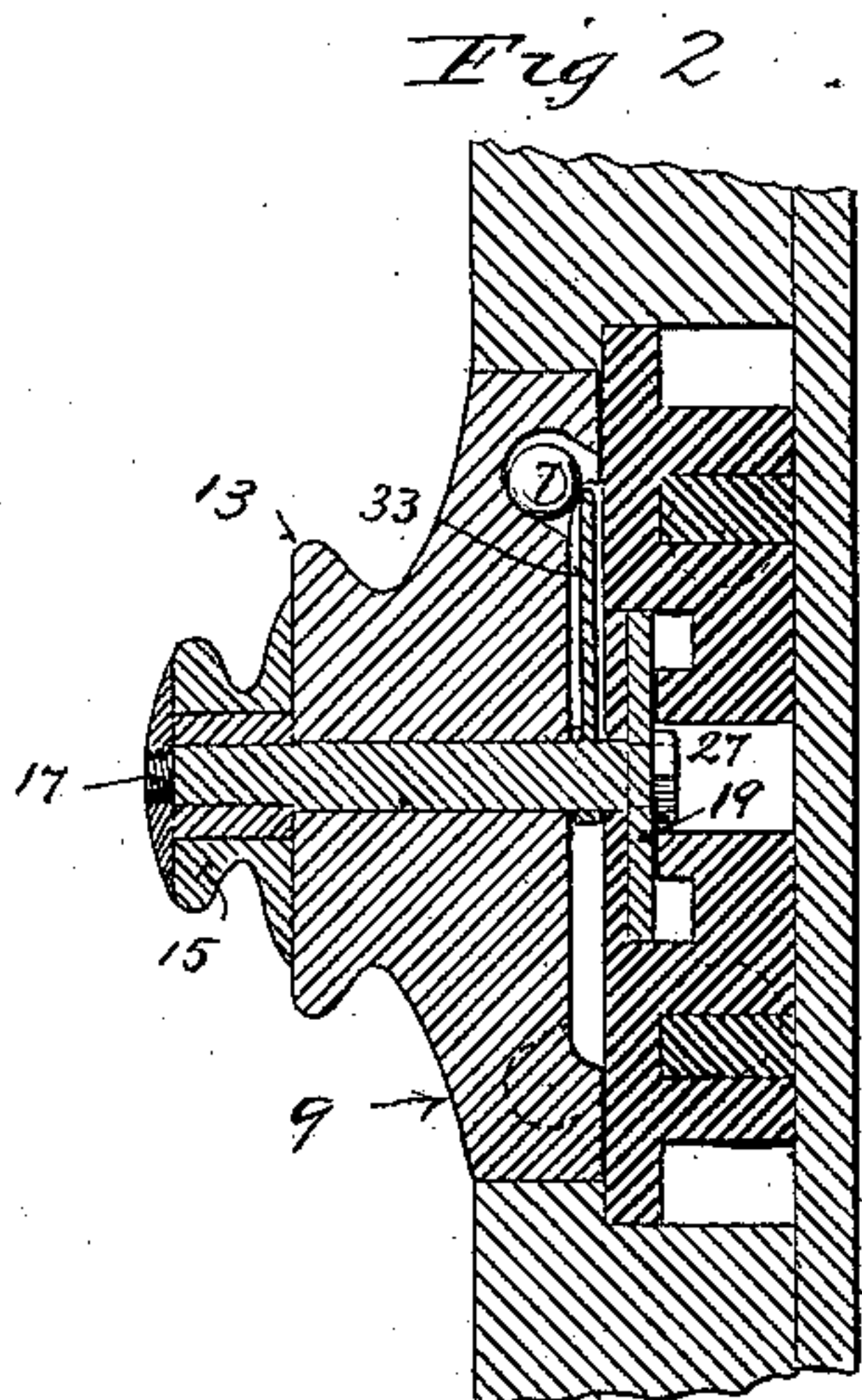
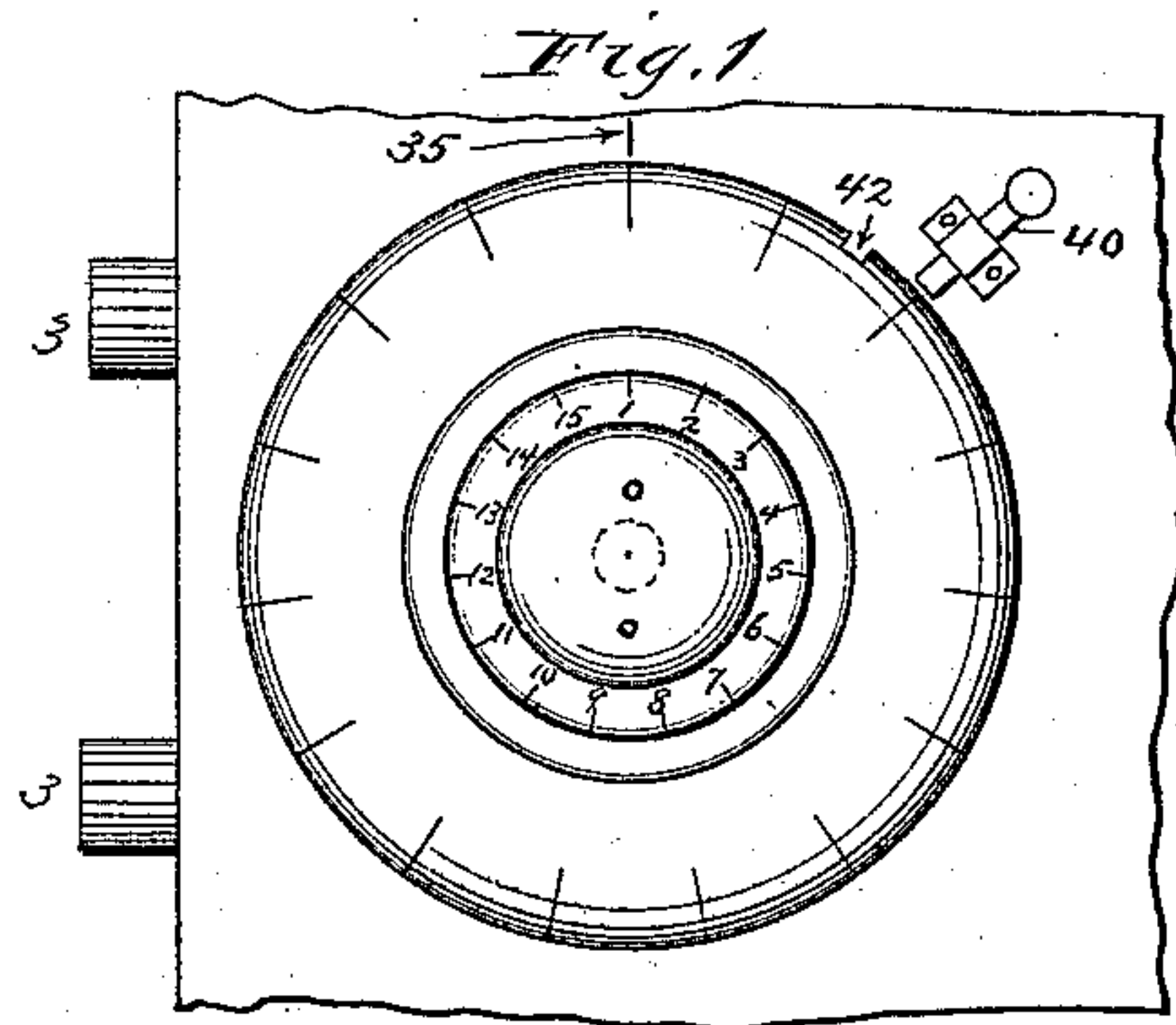


(Model.)

C. LAUNER.
COMBINATION LOCK.

No. 370,878.

Patented Oct. 4, 1887.



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES LAUNER, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF
TO JOHN A. CARR, OF SAME PLACE.

COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 370,878, dated October 4, 1887.

Application filed May 23, 1887. Serial No. 239,074. (Model.)

To all whom it may concern:

Be it known that I, CHARLES LAUNER, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Combination-Locks, of which the following is a specification.

The object of this invention is to provide an inexpensive lock that may be applied to doors, safes, trunks, boxes, drawers, or other receptacles; and the invention consists, generally, in providing a lock having a rotatable disk in which there are a series of cavities, with a series of balls adapted to be received in said cavities and arranged in reference to the sliding bolt of the lock, so that when the bolt is thrown out one or more of the balls may be allowed to pass behind the bolt, from which position they cannot be removed except by persons familiar with the combination.

The invention consists, further, in the construction and combination hereinafter described, and pointed out in the claims.

In the accompanying drawings, forming a part of this specification, Figure 1 is a front elevation of a lock embodying my invention. Fig. 2 is a vertical section of the same. Fig. 3 is a transverse section through the lock, showing the bolts in elevation. Fig. 4 is a vertical section taken through the plane of the recess, and showing several of the balls in position. Fig. 5 is a rear view of the rotatable disk, showing the cavities or recesses therein, and showing also the stop-plate, which is brought over the passage from the disk to the recess back of the bolt when the device is to be unlocked. Fig. 6 is a detail of the device for changing the combination.

In the drawings, 2 represents the bolt-frame of the lock. This frame may be of any suitable construction, size, and shape, and the bolts 3, which are secured to and move with it, may be of any suitable size, shape, or style. The bolts that I have here shown are of the kind adapted for locking a door; but it will be understood that I may use instead bolts that are adapted for use in trunk-locks, drawer-locks, &c. The frame 2, as here shown, is of rectangular shape, and arranged within this frame is a stationary plate or bar, 5. This

plate does not entirely fill the opening within the frame 2; but when the bolts are thrown out, as shown in Fig. 3, there is a narrow opening equal in width to the throw of the bolts between the edge of the plate 5 and the inner edge of the frame 2. It is evident that if any incompressible material be placed between the stationary plate 5 and the frame 2 the bolts cannot be withdrawn until this substance is removed. I have shown in Fig. 3 a number of metal balls, 7, that are placed in the space between the bolt-frame and the stationary plate 5 to prevent withdrawal of the bolts.

I will now describe the means by which the lock may be operated to place these balls in this space or remove them therefrom.

A disk, 9, having a series of cavities, 11, on its inner surface, is arranged to form the front of the lock, the front side of the disk being exposed and provided with a suitable knob, 13, by means of which it may be grasped by the operator and turned upon its axis. Outside of this knob 13 is a knob, 15, on a spindle, 17, which passes centrally through the disk 9. This disk is provided upon its inner end with a plate, 19, in which is a pin, 21, or other projection, adapted to engage the bolt-frame and move the bolts in or out.

A plate, 23, is arranged between the bolt-frame and the disk 9. This plate may be provided with suitable guides holding the bolt-frame in position, and also with a recess which receives the plate 19 on the spindle 17. The plate 19 is preferably arranged on the inside of the plate 23, and secured to the spindle 17 by the nut 27 or other suitable means. In the plate 23 are two openings, 29 and 31, preferably oblique, as shown in Fig. 4, and arranged near the top and bottom of the bolt-frame. When the bolts are thrown out, as shown in Fig. 3, these openings register with the space between the inner edge of the bolt-frame and the plate 5. They are also located in relation to the disk 9, so that as that disk is turned on its axis any one of the cavities therein may be made to register with either of the openings 29 or 31. The direction of the cavities 11 is slightly oblique, as shown in Fig. 4, and they are all inclined on radial lines, so that the

cavities that are at the top of the disk form with the inclined opening 29 a downwardly-inclined passage from the disk into the space between the bolt-frame and the plate 5, and the cavity that registers with the opening 31 forms with that opening a downwardly-inclined passage leading from the bottom of this space. The balls 7, hereinbefore referred to, are arranged in the cavities in the disk 9, and as that disk is turned on its axis the balls run out of the cavities through the opening 29 into the space within the bolt-frame. When the first balls enter this space after the bolts have been thrown out, the cavities at the bottom of the disk are all occupied and the balls cannot therefore escape. When the cavity from which the first ball has dropped has been brought around opposite the hole 31, the lowest ball will pass into it, but at the same time another ball will enter the space from the top through the opening 29, and this operation will be continued, so that as often as a ball is taken out at the bottom of this space another will enter at the top, and as long as there are any balls within the bolt-frame it will be impossible to retract the bolts. In order, then, that the bolts may be withdrawn when it is desired to unlock the safe or other receptacle to which the lock is applied, it becomes necessary to provide means by which the balls may all be removed from this space within the bolt-frame. Any suitable device may be used for this purpose. I prefer to provide the spindle 17 with a plate, 33, that may be turned across the opening 29 and prevent the balls from passing through this opening. When this plate has been brought into proper position to cover the opening 29, the disk may be revolved and the balls allowed to successively pass from the space within the bolt-frame and to the cavities in the disk. When all of the balls have been removed from this space, the spindle may be turned and thereby retract the bolt.

In order that the operator may know into what position to turn the spindle when it is desired to close the opening 29, I prefer to provide the knob 15 with a series of figures or other characters, as shown in Fig. 1. I also arrange a mark, 35, upon a stationary plate, or upon the door or other device to which the lock is applied. The plate 33 is arranged opposite one of the marks on the knob 15. The persons who are to have access to the safe or other receptacle to which the lock is applied will know which one of the marks should be brought opposite the mark 35 in order that the opening 29 may be closed by the plate 23. Either the knob 15 or the plate 23, or both, should be adjustable on the spindle 17, in order that the combination may be changed, and the plate 33 may be arranged opposite any one of the numbers on the knob 15.

In Figs. 2 and 6 I have shown a fluted collar, 22, upon the spindle 17, the knob 15 being correspondingly fluted, in order that it

may be adjusted upon said collar, so that any one of the numbers upon the knob may be made to register with the mark 35 to indicate the closing of the opening 29. By this means as many different combinations may be effected as there are numbers or characters upon the knob.

Fig. 5 shows the plate 33 provided with a sleeve and a set-screw, by means of which it may be adjusted on the spindle. The outer edge of the disk 9 is preferably provided with a series of radial marks, as shown in Fig. 1, which are opposite the cavities on the other side of the disk.

As the mark 35 is in line with the opening 29, the operator can tell when the cavities register with the opening 29. By turning the disk so that the mark 35 is opposite a point on the disk that is about half-way between two of the radial marks, which point may be indicated by a dot or short line, if desired, it will be known that none of the cavities register with the opening 29, and that none of the balls can pass from the cavities in the disk to the space in the lock. The disk 9 may be secured, when in this position, by any suitable means, when it will be evident that the device may be used as an ordinary lock.

In the drawings I have shown a slide, 40, attached to the door or other article upon which the lock is used, adapted to engage with a slot, 42, in the edge of the disk 9, thus preventing the revolution of the same.

The operation of the lock will be readily understood. The bolt being thrown out, the spindle 17 is turned so that the opening 29 is uncovered, and the disk 9 is then rotated and one or more of the balls allowed to drop into the space behind the bar of the bolt-frame. As the disk is turned in either direction, other balls will drop into this space, and it will be impossible to retract the bolt until the opening 29 has first been closed to prevent any more balls from entering this space. After this has been done, by rotating the disk 9 the unoccupied cavities as they move past the opening 31 will each receive a ball until all of the balls have been taken up by the disk. Then by turning the spindle 17 the bolts may be retracted.

I do not confine myself to the exact construction and arrangement of bolt-frame herein shown, nor to the arrangement of the parts forming the space in which the balls are received. This space may be of any suitable size and shape, so long as one wall of it is formed by a part that moves with the bolts, so that when any of the balls are in this space it will be impossible to retract the bolts.

I claim as my invention—

1. The combination, in a lock, with the bolts 3 and bolt-frame 2, of the stationary plate 5, means for moving said bolt-frame and bolts, the plate 23, provided with the openings 29 and 31, and the rotatable disk 9, having a series of cavities and the balls 7, substantially as described.

2. The combination, in a lock having a movable bolt-frame, of a rotatable disk having a series of cavities and a series of balls arranged in said cavities and adapted to pass behind said movable bolt-frame, and a movable spindle provided with a cut-off plate arranged to be moved across the opening into said space behind said movable bolt-frame, substantially as described.
- 10 3. The combination, with the movable bolt and means for moving said bolt, of the rotatable disk 9, having a series of cavities, 11, the series of balls 7, the movable spindle 17, provided with the cut-off 33, and the adjustable knob 15, provided with the series of marks, 15 substantially as described, and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 17th day of May, 1887.

CHARLES LAUNER.

In presence of—

J. C. HAYNES,
JOHN A. CARR.