

No. 541,502.

Patented June 25, 1895.

Fig. 1.

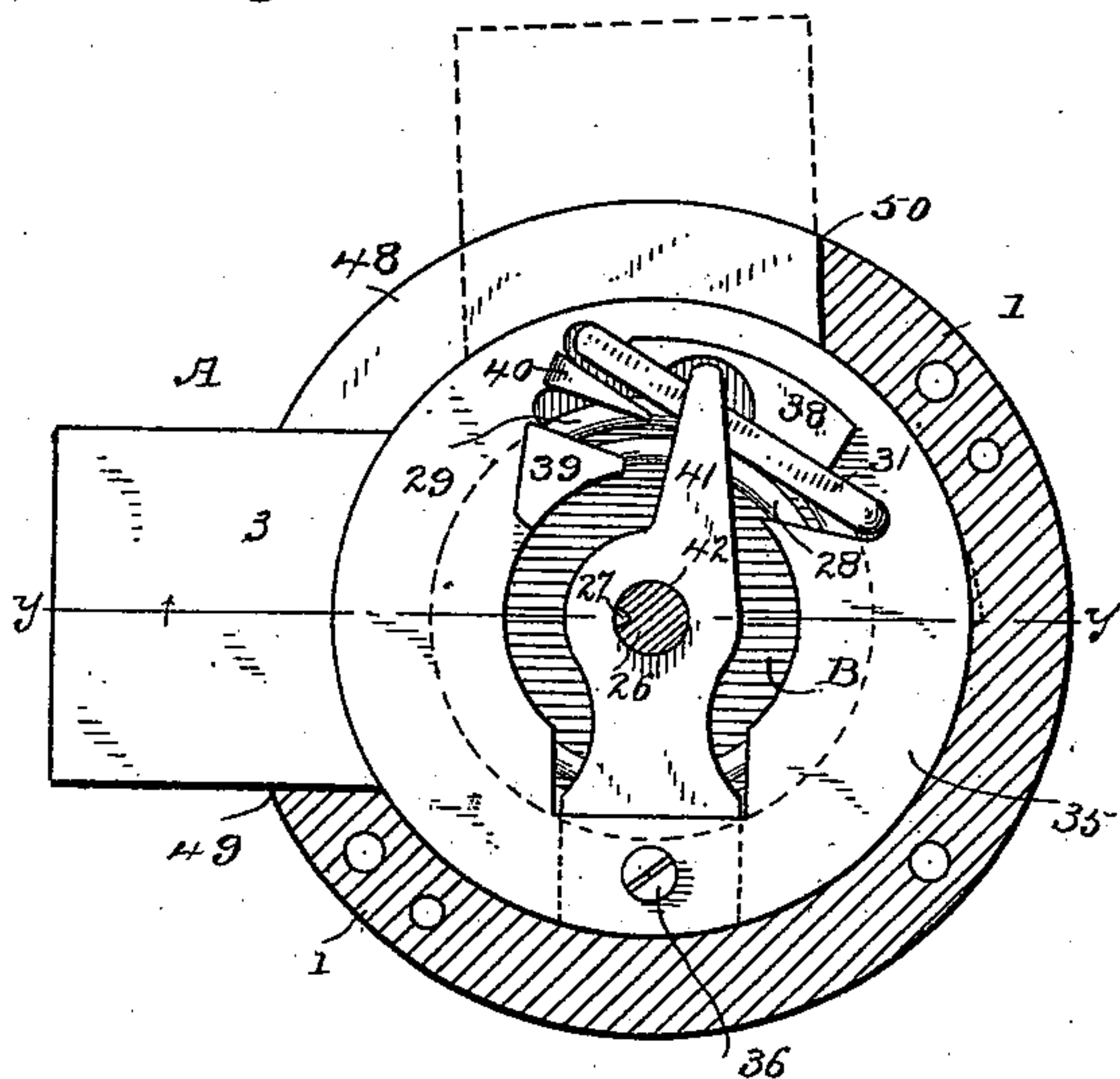


Fig. 2.

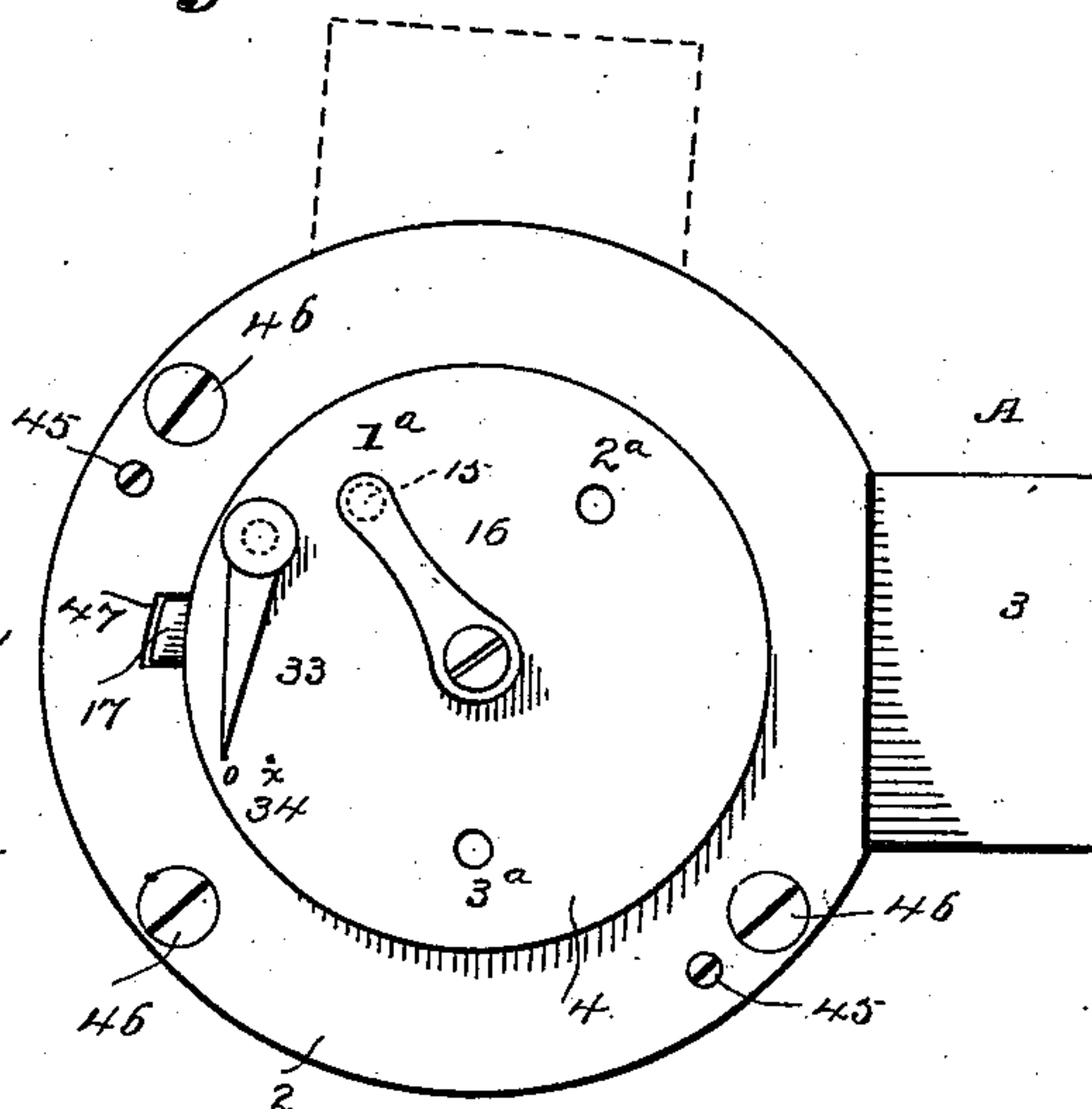


Fig. 3.

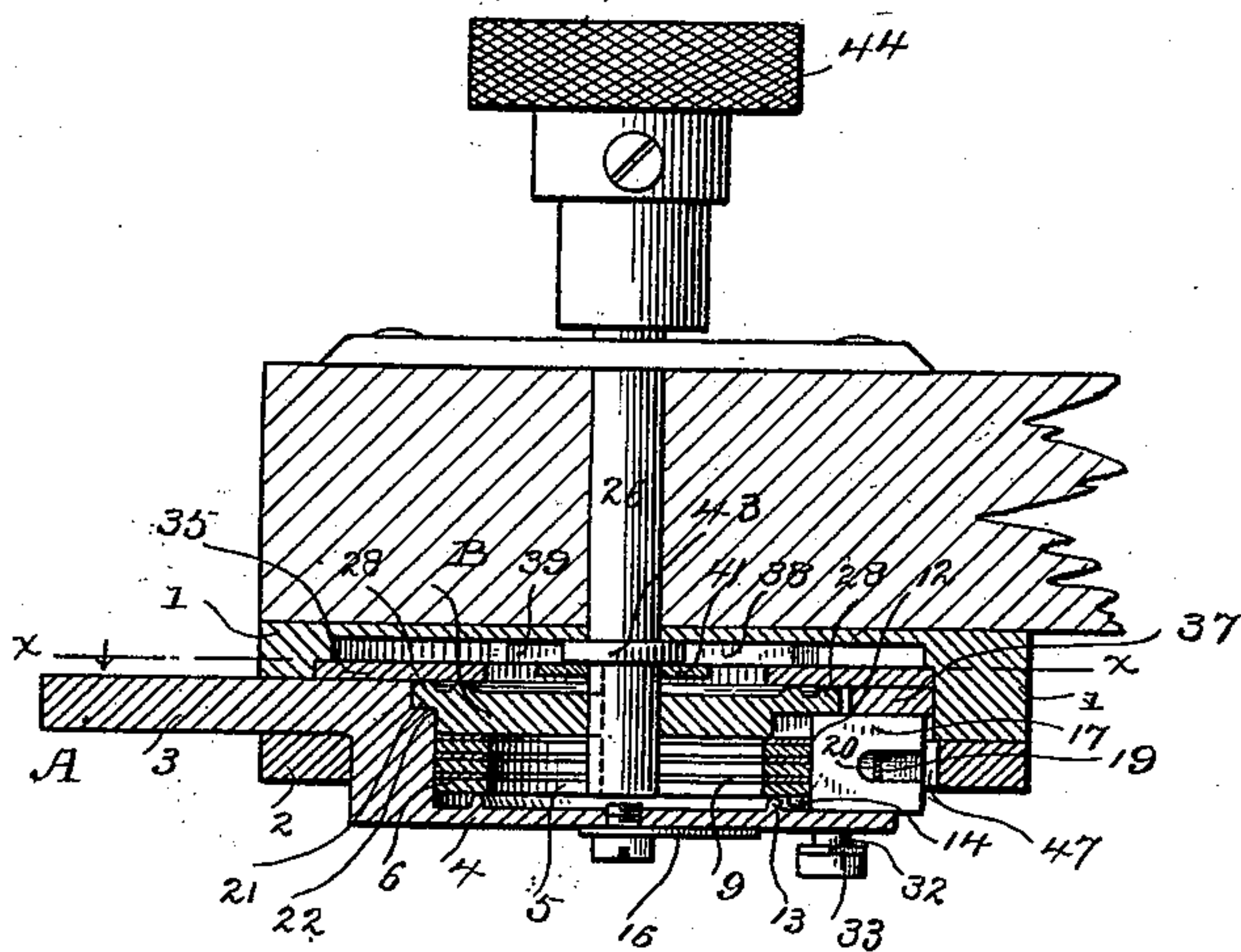
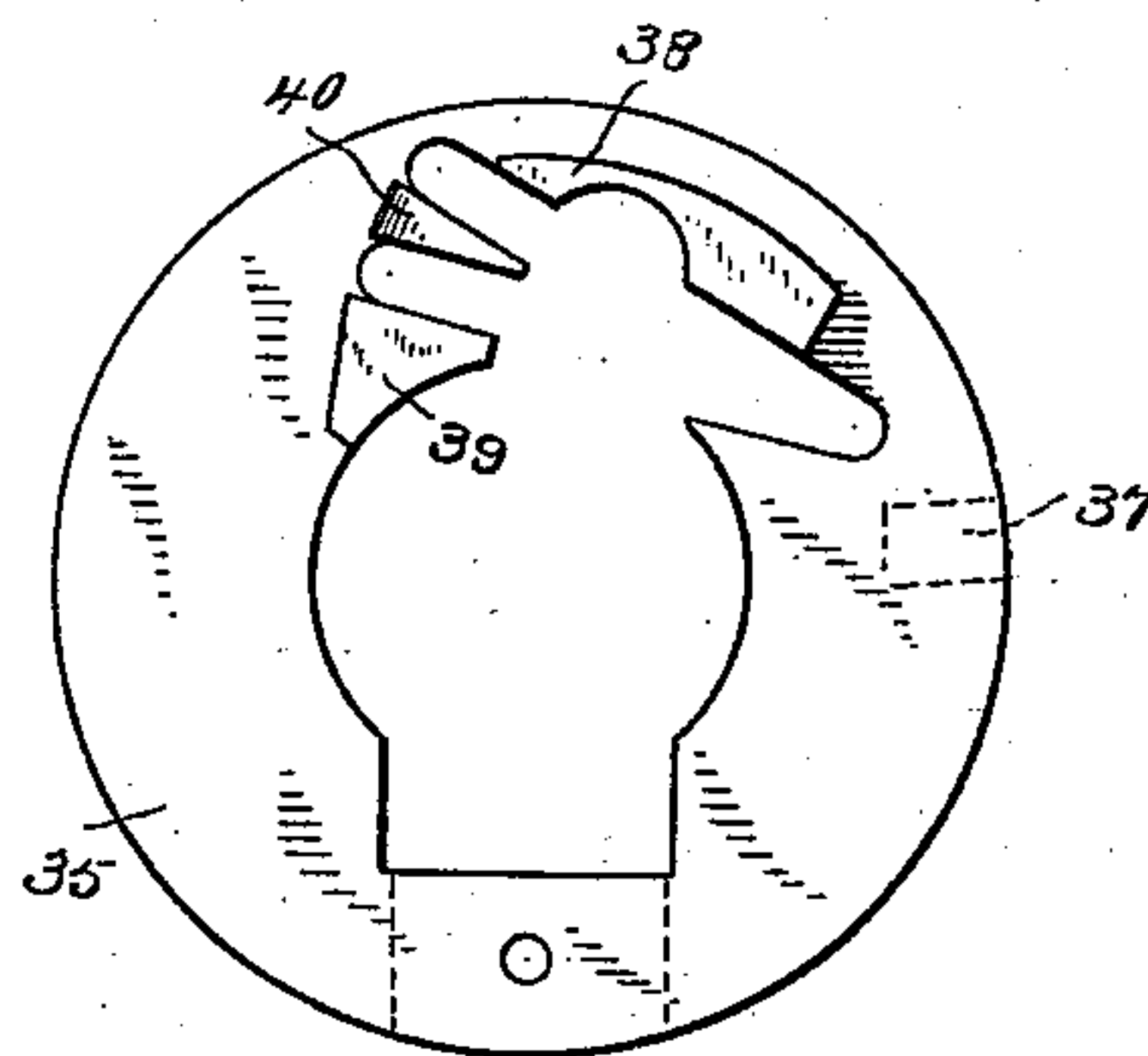


Fig. 4.



WITNESSES

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(No Model.)

2 Sheets—Sheet 2.

C. F. RAYMOND.
COMBINATION LOCK.

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Fig. 5.

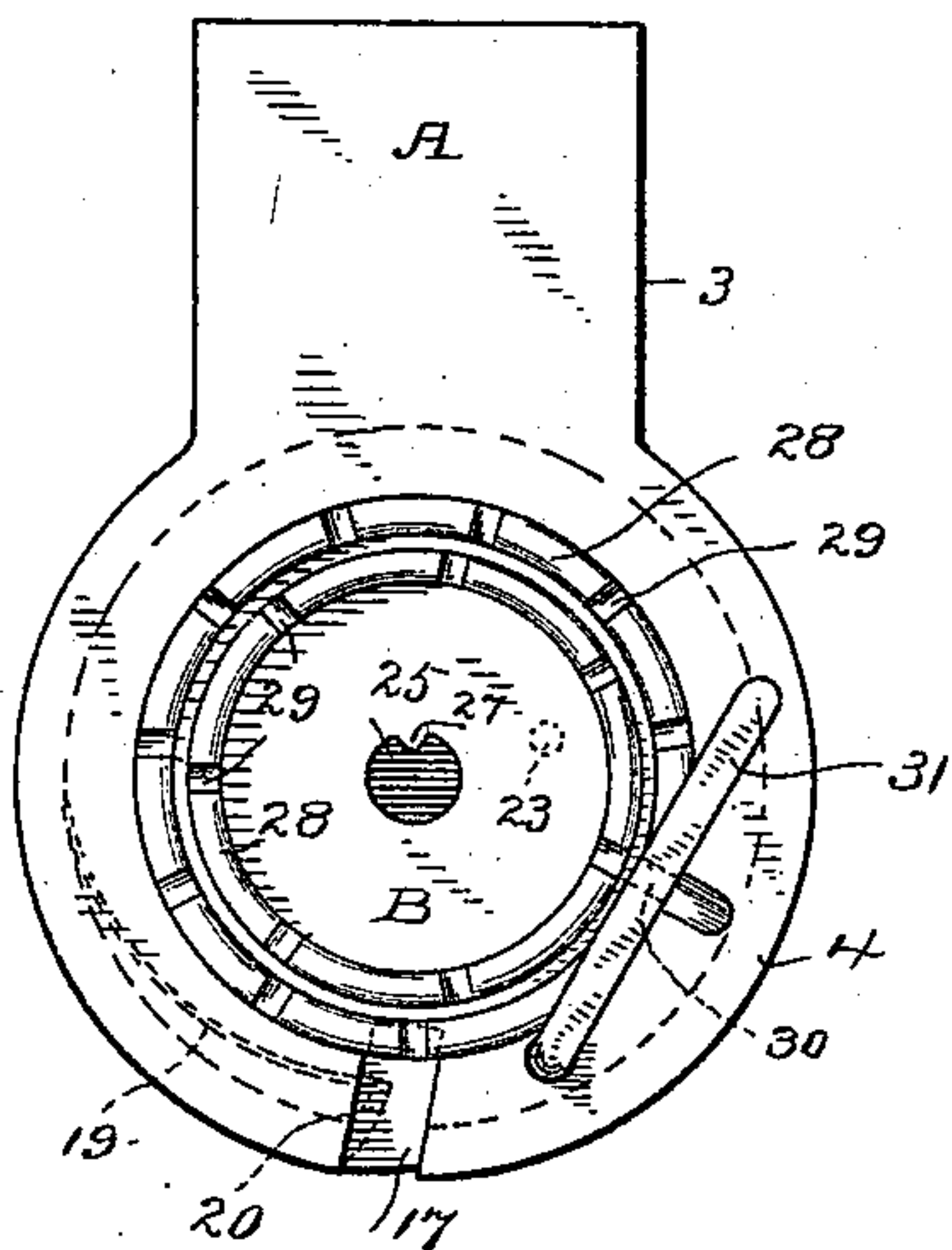


Fig. 7.

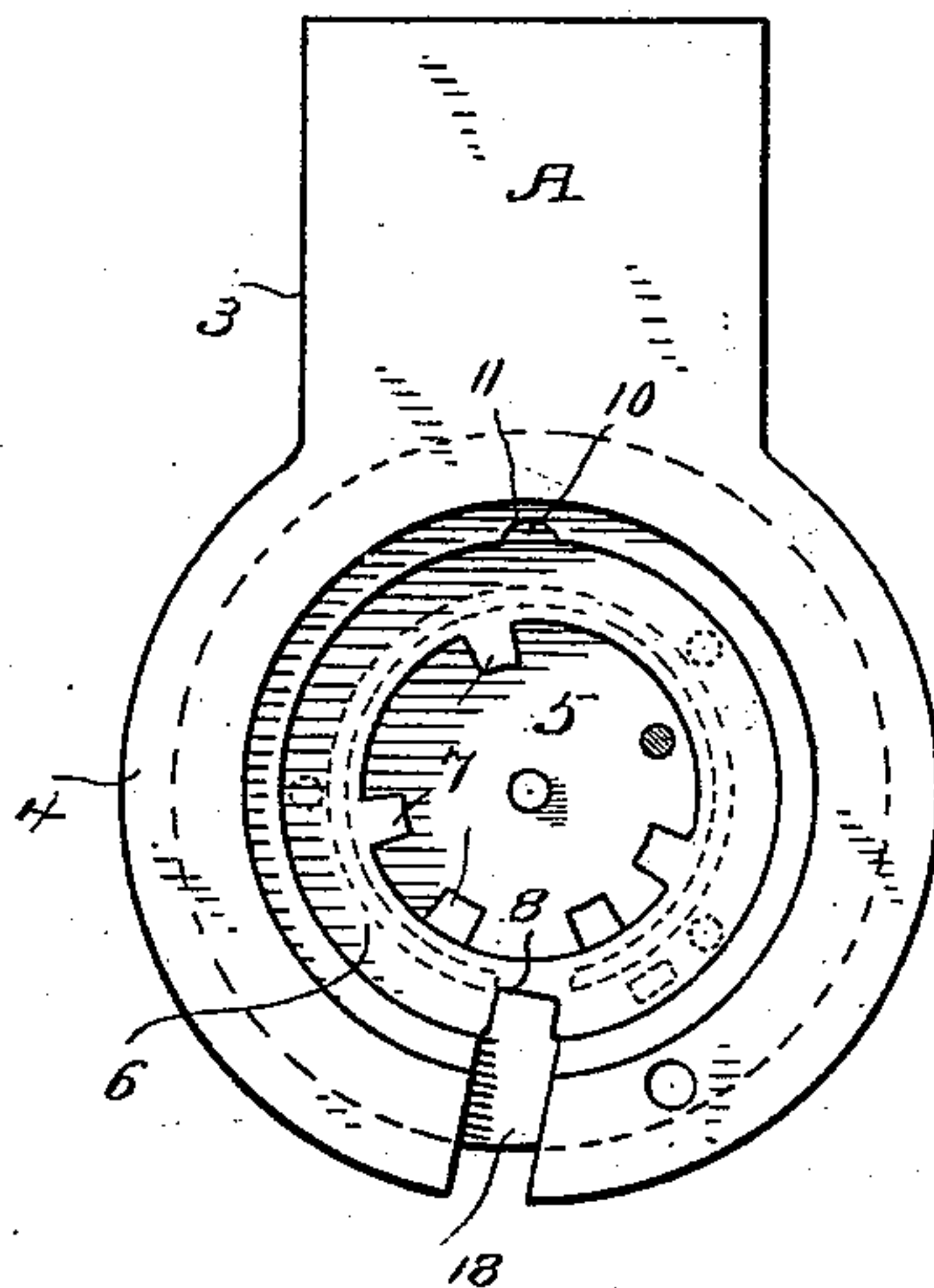


Fig. 8.

Fig. 6.

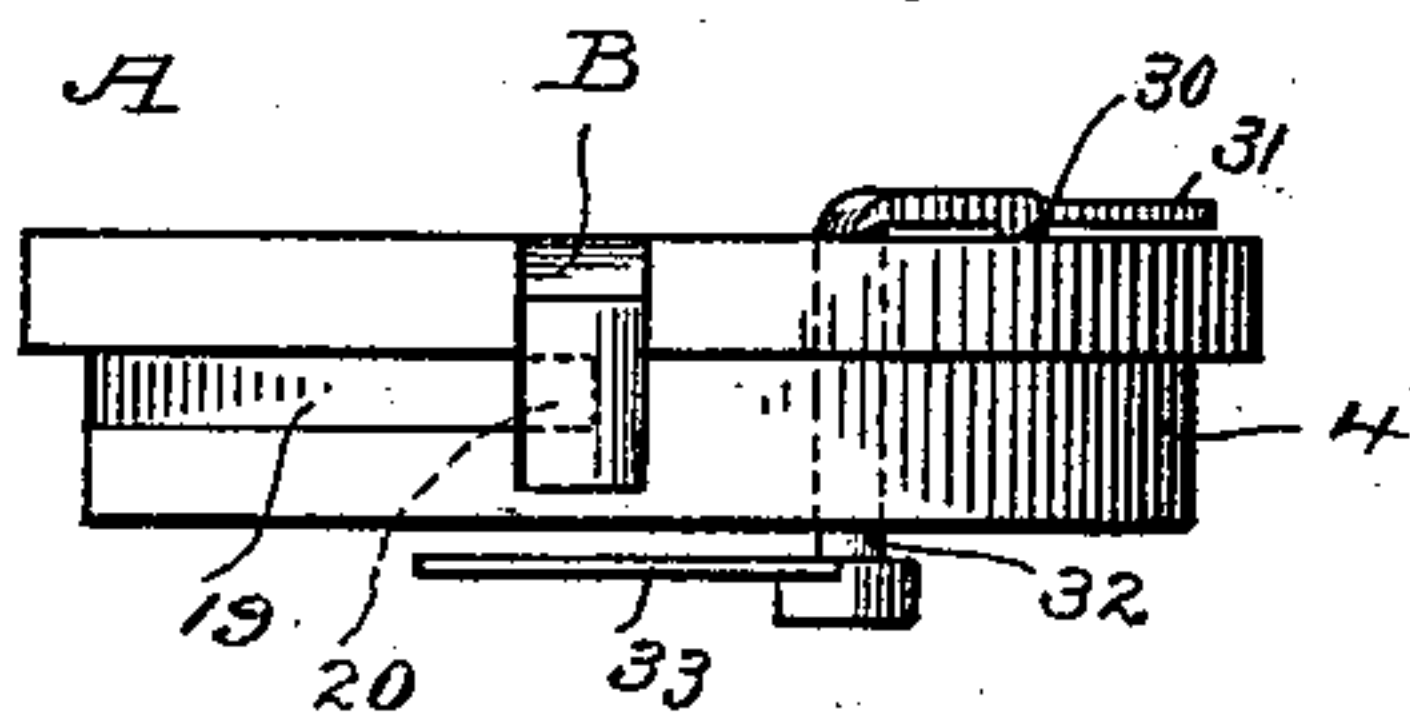
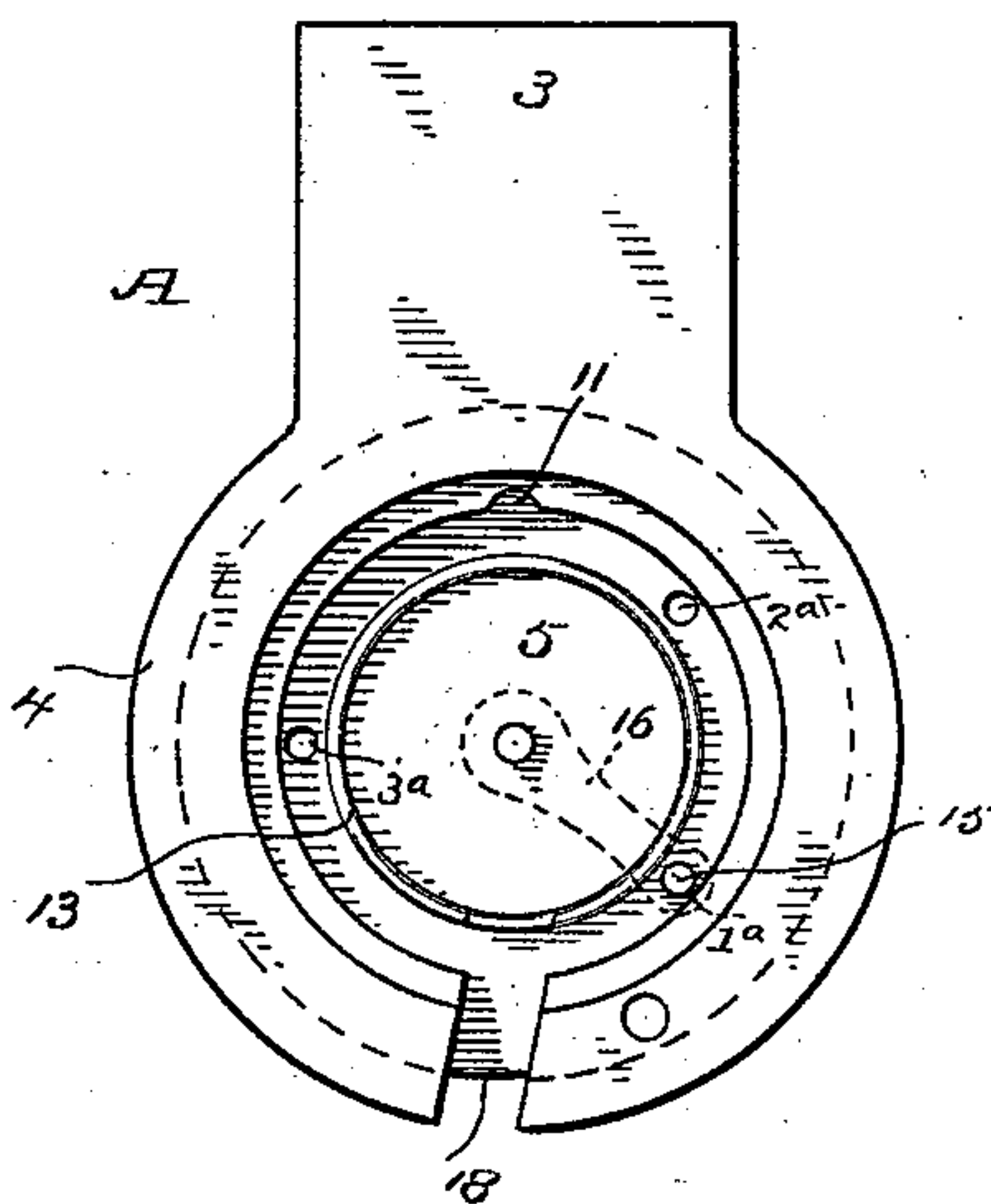
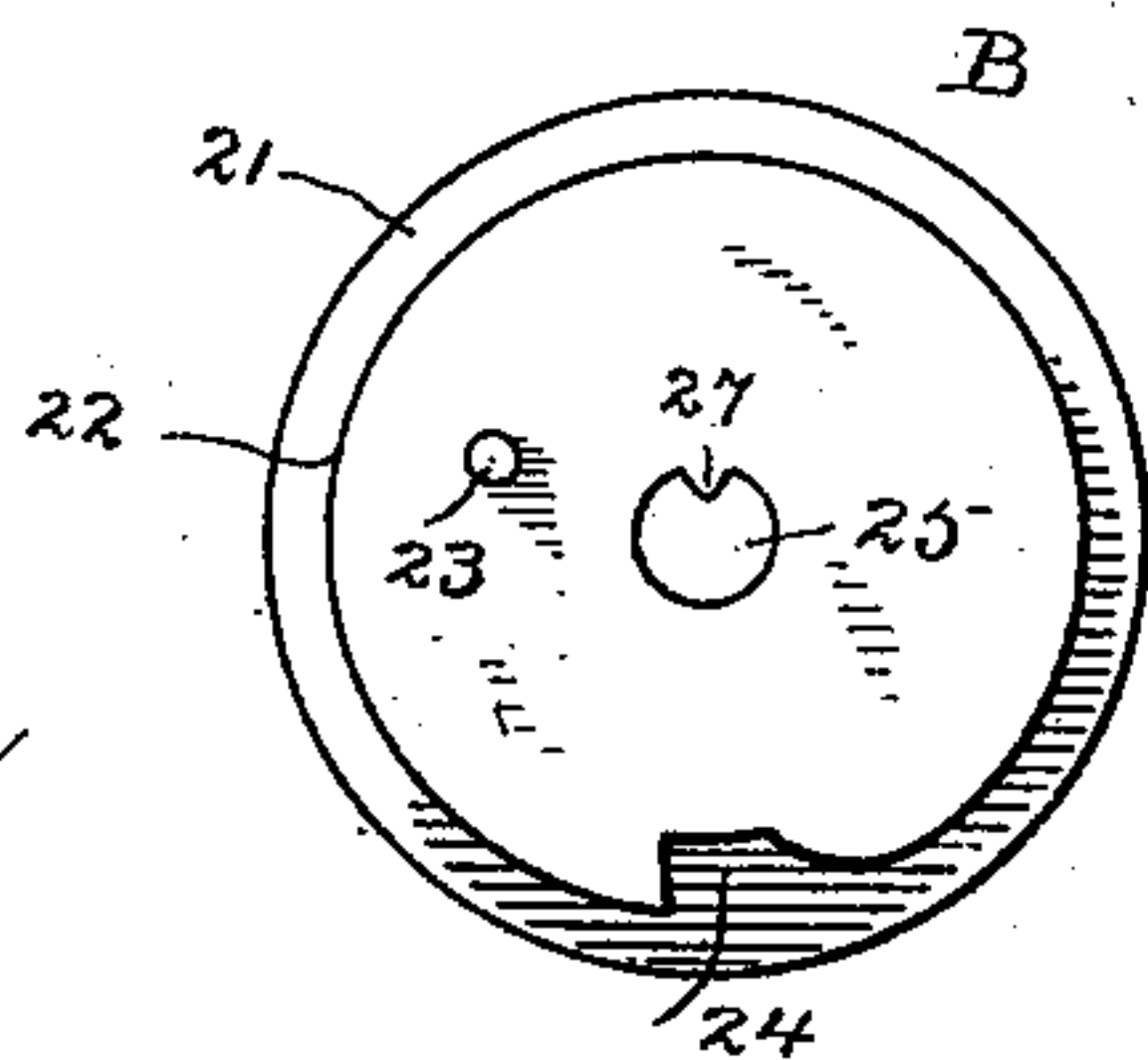


Fig. 9.



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UNITED STATES PATENT OFFICE.

CYRUS F. RAYMOND, OF DANBURY, CONNECTICUT.

COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 541,502, dated June 25, 1895.

Application filed December 6, 1894. Serial No. 530,999. (No model.)

To all whom it may concern:

Be it known that I, CYRUS F. RAYMOND, a citizen of the United States, residing at Danbury, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Combination-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide a simple, inexpensive and practically non-pickable lock of this class which shall be adapted for general use but more especially adapted for drawers, lockers, &c., and which shall be capable of being opened by the sense of touch or by the sense of hearing and in which the resistance is determined entirely from the outside by pressure upon the operating knob, thereby enabling the operator to open it more readily in the dark by the sense of hearing or by the sense of touch should his fingers be numb.

With these ends in view I have devised the novel lock of which the following description in connection with the accompanying drawings is a specification, letters and numerals being used to designate the several parts.

Figure 1 is a section on the line *xx* in Fig. 3, looking down, the bolt being shown in full lines in the locking position and in dotted lines in the unlocking position; Fig. 2, a rear elevation; Fig. 3, a section on the line *yy* in Fig. 1, looking up; Fig. 4, a view of the cap-plate detached; Fig. 5, a view of the bolt with all the tumblers in place; Fig. 6, an end view of the bolt as seen from the bottom in Fig. 5; Fig. 7, a view of the bolt, showing the operating-tumblers in place, the driving-tumbler being removed; Fig. 8, a view of the bolt with all the tumblers removed, and Fig. 9 is an inverted plan view of the driving-tumbler removed.

1 denotes the case, A the bolt as a whole, and 2 a ring which is a portion of the case and retains the bolt in place therein. The bolt consists of a locking portion denoted by 3 and a body portion denoted by 4. The movement of the bolt in locking and unlocking is oscillatory, a recess 48 being provided in the case for the bolt to move in, and the movement of

the bolt to the locking position being determined by wall 49 at one end of the recess and the movement to the unlocking position being determined by wall 50 at the other end of the recess. The body portion is made circular and is provided with a circular recess 5 which receives the tumblers which are denoted by 6. These tumblers are rings and are each provided with a plurality of lugs 7 on their inner peripheries, in the present instance three, and on their outer peripheries with an engaging notch 8. Between these tumblers I place washers 9 which are provided on their outer peripheries with lugs 10 which engage a groove 11 in the body to hold the washers against turning with the tumblers, and with cut away portions 12 to accommodate the locking dog as will be more fully explained. At the bottom of recess 5 is a rib 13 upon which the lower tumbler rests. This tumbler is provided on its lower side with a pin 14 which is adapted to engage a pin 15 carried by a spring arm 16, the latter being pivoted on the outer side of the body and said pin being adapted to pass through either one of a series of holes in the bottom of the body and into the track of pin 14. Three holes are shown in the present instance, said holes being indicated respectively by 1^a, 2^a, and 3^a.

17 denotes the locking dog which lies in a recess 18 in the body of the bolt and is normally moved inward into engagement with locking notches 8 in the tumblers by a spring 19 which is also recessed into the body of the bolt. The inner end of this spring engages a recess 20 in the locking dog, see dotted lines in Fig. 5, so as to permit the dog to be readily removed by pushing it straight forward and out through recess 18. The locking dog is inserted in place from the inner side of this recess.

47, see Fig. 2, denotes a notch in ring 2 which is engaged by the locking dog when the parts are in the locked position thereby locking the bolt firmly to the ring.

B denotes the driving tumbler which is provided with a flange 21 which rests upon a shoulder 22 at the outer edge of recess 5 so as to retain the driving tumbler out of contact with the tumblers. Upon the under side of the driving tumbler is a pin 23 which is adapted to engage the lug 7 on the upper

tumbler. In the periphery of the driving tumbler is a notch 24 which is straight upon one side and inclined upon the other so that in setting up the combination the locking dog will ride down the incline and will engage the straight side of the notch as will be more fully explained. At the center of the driving tumbler is a hole 25 to receive the spindle 26, one of said parts, in the present instance the hole in the tumbler, being provided with a rib 27 which engages a corresponding groove in the spindle so that the driving tumbler will always turn with the spindle. The outer face of the driving tumbler is provided with a plurality of series of notches 29. In the present instance I have shown said tumbler as provided with circular ribs 28 two only being shown although more may be used if preferred, and each rib as having formed therein a number of notches 29, any one of which is adapted to be engaged by a lug 30 on a swinging arm 31 which is pivoted in the body, the shank 32 of said arm passing through the body and being provided at its lower end with a pointer or finger piece 33.

Upon the outer face of the body are gage marks 34 with which the pointer is adapted to register and which indicate with which one of the circular ribs lug 30 is in engagement. The driving tumbler and the tumblers are retained in position by a cap plate 35 which is held in position by a screw 36 and a lug 37 which engage recess 18 in the body. See Fig. 3. Upon the outer face of the cap plate are lugs 38 and 39 which determine the oscillation of swinging arm 31 and between said lugs is a lug 40 which is lower than lugs 38 and 39 so as to permit the swinging arm to pass over it but is high enough to retain the swinging arm in either one of its normal positions, that is to say, in a position in which lug 30 is in engagement with one of the circular ribs 28.

41 denotes a spring which is secured to the cap plate by screw 36 and the other end of which bears upon swinging arm 31. This spring is provided with a hole 42 through which the spindle passes, the latter being provided with a collar 43 adapted to bear upon the spring. At the outer end of the spindle is an operating knob 44 of ordinary construction.

In assembling, the locking dog, tumblers, washers and driving tumbler are placed in their proper positions in the body of the bolt. The swinging arm and spring 41 are then placed in position and the several parts then secured in place by attaching the cap plate as already described. The bolt is then laid in position in the case and ring 2 is placed over the body of the bolt and secured there by screws 45. The lock is secured in place by screws 46 which pass through the ring and the case and engage the wood of the door or drawer upon which the lock is placed.

The operation is as follows: The operator turns the spindle and with it the driving tum-

bler until the tumblers are picked up one after the other by the engagement of the pins and lugs already described and until pin 14 on the lower tumbler engages pin 15 on the spring arm which brings all of the tumblers to a dead stop. The engaging notch 8 in the lower tumbler will now be in position to be engaged by the locking dog. The operator then turns the spindle in the opposite direction until all of the tumblers except the lower tumbler are again picked up and the tumbler next to the lower tumbler is placed in such a position that the engaging notch 8 in said tumbler will register with the locking dog, this position being indicated by a definite number of clicks or stops caused by the engagement of lug 30 on the swinging arm with the notches 29 in one of the circular ribs. As soon as the second tumbler has been placed in the unlocking position the spindle is again reversed and turned until the third tumbler is placed in the unlocking position, this position of the third tumbler also being indicated by a definite number of clicks or stops, this operation being repeated as many times as there are tumblers in the lock. When the last tumbler has been placed in position so that the notch will register with the locking dog spring 19 will force the locking dog inward so that the inner end thereof will engage the series of locking notches, it having been stated already that the washers are all cut away to accommodate the locking dog. As soon as the locking dog has engaged the notches in the tumblers continued forward movement of the spindle will permit the locking dog to ride down the inclined side of notch 24 in the driving tumbler until the locking dog engages the straight side of said notch. The tumblers and the locking bolt are now locked together by the locking dog and continued movement of the spindle will swing the bolt from the locking to the unlocking position, it being of course understood that as soon as the notches 8 all register with the locking dog spring 19 which controls the locking dog will withdraw the latter from notch 47 in the ring thereby releasing the bolt and leaving it at the control of the spindle. While the parts are in this position the bolt may be oscillated freely by the spindle. When turned forward the combination cannot be broken up because the locking dog will be in engagement with the straight side of notch 24 and when the spindle is turned backward the combination will not be broken up until the bolt has reached the locking position for the reason that spring 19 will hold the locking dog in engagement with notch 24 with sufficient force to prevent the locking dog from riding up the incline thus leaving the bolt at the control of the spindle and permitting the bolt to oscillate freely with it. As soon however, as the bolt is brought to the locking position its continued movement will be stopped by its engagement with wall 49 at the end of the recess in which the bolt oscil-

lates. The locking dog will now be in position to register with notch 47 and continued movement of the spindle will cause one end of the dog to ride up the inclined side of recess 24 and out of engagement with notches 8 in the tumbler and into engagement with notch 47 in the ring thereby disengaging the tumblers from the bolt and locking the bolt to the ring. Continued movement of the spindle will of course break up the combination, the locking dog being retained in engagement with notch 47 by the several tumblers, so that the bolt is kept locked to the ring until the combination is again set up.

The combination may be changed in two ways. Supposing lug 30 on the swinging arm to be in engagement with either of the circular ribs on the driving tumbler it is obvious that by shifting pin 15 on the spring arm and placing it in another of the holes 1^a, 2^a or 3^a in the body of the bolt, the position at which the tumblers will come to what I have termed the dead stop in commencing to set up the combination, will be shifted. As there are three holes in the body in the present instance it is obvious that three changes in the combination may be made by shifting pin 15 which shifts the position of the dead stop in setting up the combination. Other changes in the combination may be made with or without changing pin 15 by shifting lug 30 on the swinging arm from one series of notches to the other. These changes may be made by simply pressing the pointer and shank inward slightly so that the swinging arm will ride over lug 40 and will lie on the opposite side thereof, that is to say, the swinging arm will pass from a position between lug 38 and lug 40 to a position between lug 39 and lug 40 or vice versa. As there are two rings and three holes it follows that six changes may be made in the combination which must be manipulated to release the bolt from the ring and engage it to the spindle. As already stated no dial is used and the combination is operated either by the sense of feeling or by the sense of hearing. By that I mean that by the sense of touch the operator detects when lug 30 on the swinging arm drops into either of the notches 29 in the circular ribs on the driving tumbler, these stops being also apparent to the sense of hearing as a click will be produced each time the lug engages a notch. In locking and unlocking drawers, lockers, &c., it is frequently necessary to manipulate the combination in the dark and also to manipulate it when the hand of the operator may be more or less numbed with the cold. I have provided for both of these conditions by the use of spring 41 which normally bears lightly upon the swinging arm but which may be pressed inward more or less forcibly by the engagement therewith of collar 43 so that in manipulating the lock by pressing inward on the spindle the operator may increase the resistance as much as he may desire within reasonable limits so that each time lug 30 passes

into a notch on the driving tumbler the stop will be apparent and quite a loud click will be made.

Having thus described my invention, I claim—

1. In a lock of the character described the combination with an oscillatory bolt consisting of a locking portion and a body portion and provided with a recess to receive tumblers and a driving tumbler, a spindle and a suitable case, of a locking dog lying in a recess in the bolt and adapted to engage the tumblers when the combination is set up thereby locking the spindle, tumblers and bolt together so that the bolt may be turned to the unlocking position and to engage the case when the bolt is in the locking position and the combination is broken.

2. The combination with a suitable case, a spindle and an oscillatory bolt having a recess to receive tumblers 6 and a driving tumbler, the lower tumbler 6 being provided with a pin 14, and said bolt having holes through the body thereof, of an arm 16 carrying a pin 15 adapted to pass through either of said holes and to lie in the track of pin 14 so as to form an adjustable dead stop for the lower tumbler in setting up the combination.

3. The combination with the case, spindle, tumblers and bolt of a combination lock and a driving tumbler provided in its outer face with notches, of an arm 31 having a lug 30 adapted to engage said notches so that in setting up the combination the driving tumbler will be checked each time said lug comes in engagement with one of the notches.

4. The combination with a suitable case, a spindle having a collar 43, a bolt, tumblers and a driving tumbler, said driving tumbler being provided in its outer face with notches, of a swinging arm having a lug adapted to engage said notches, a spring adapted to bear upon said arm and itself engage by collar 43 so that inward pressure upon the spindle will cause said lug to engage the notches with more or less force to enable the operator to set up the combination by hearing or by touch, substantially as described.

5. The combination with a suitable case, a spindle, a bolt, tumblers, and a driving tumbler, said driving tumbler having on its outer face a plurality of series of notches, of a swinging arm having a lug adapted to engage either of said series of notches so that new combinations may be made by shifting the lug from one series to another.

6. The combination with a suitable case, a spindle, a bolt, tumblers, and a driving tumbler, said driving tumbler having on its outer face a plurality of series of notches, of a swinging arm having a lug adapted to engage either of said series of notches a shank and a pointer by which the lug may be shifted from one series to another and suitable means for retaining the swinging arm in position after adjustment.

7. The combination with a suitable case, a

spindle and an oscillatory bolt having a recess to receive tumblers 6 and the driving tumbler having in its outer face a plurality of series of notches the lower tumbler 6 being provided with a pin 14 and said bolt having holes through the body thereof, of an arm 16 carrying a pin 15 adapted to pass through either of said holes and to lie in the track of pin 14 so as to form an adjustable dead stop for the lower tumbler in setting up the combination and an arm 31 having a lug 30 adapted

ed to engage either series of notches on the driving tumbler so that new combinations may be effected by shifting pin 15, by shifting lug 30 and by shifting both. 15

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

CYRUS F. RAYMOND.

Witnesses:

FREDERICK S. OLMSTED,
CHRISTIAN QUIEN.