

LOCK.

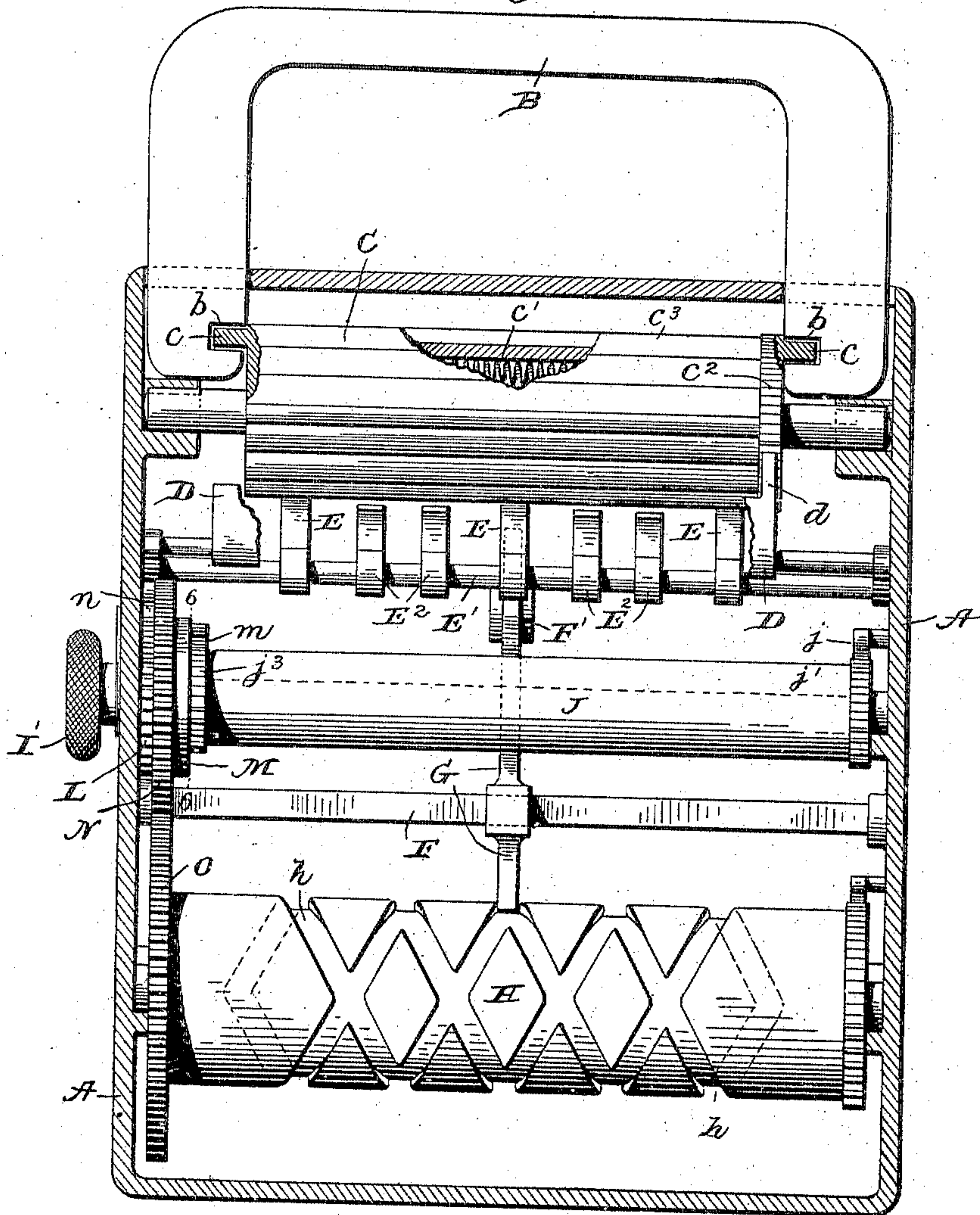
APPLICATION FILED OCT. 11, 1909.

947,623.

Patented Jan. 25, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Jas. Hutchinson:  
Thos. R. Steath.

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H. B. ZENDEL.

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3 SHEETS—SHEET 2.

Fig. 2.

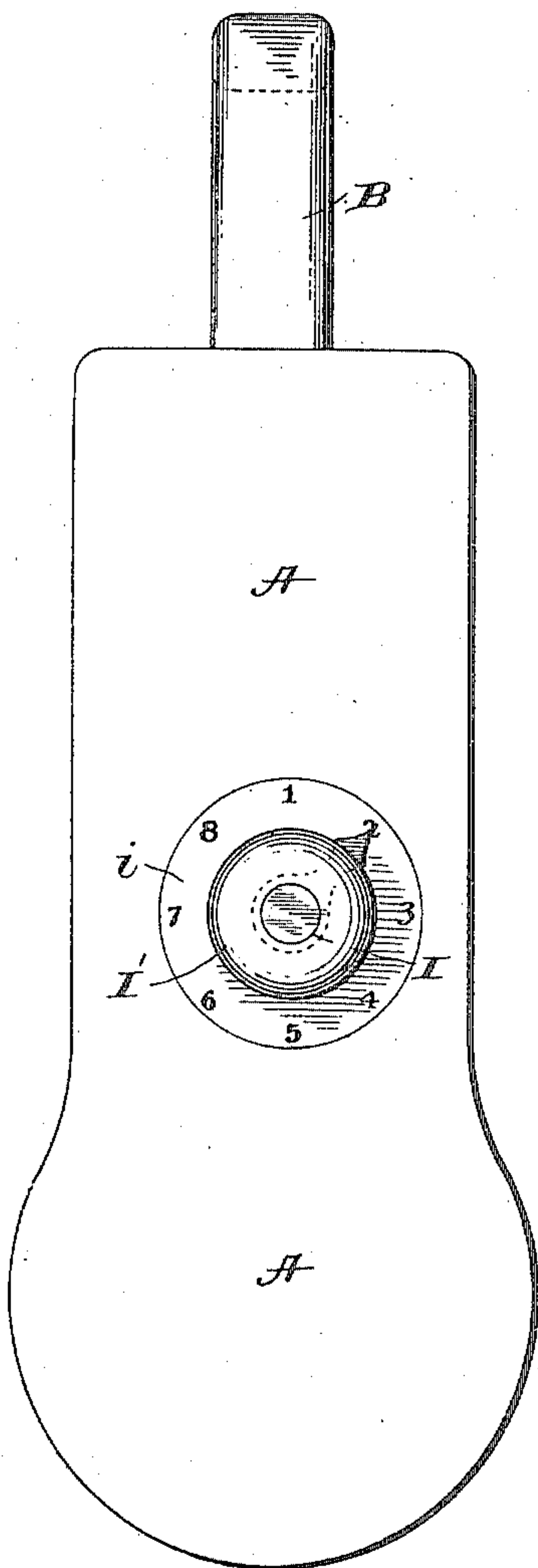


Fig. 3.

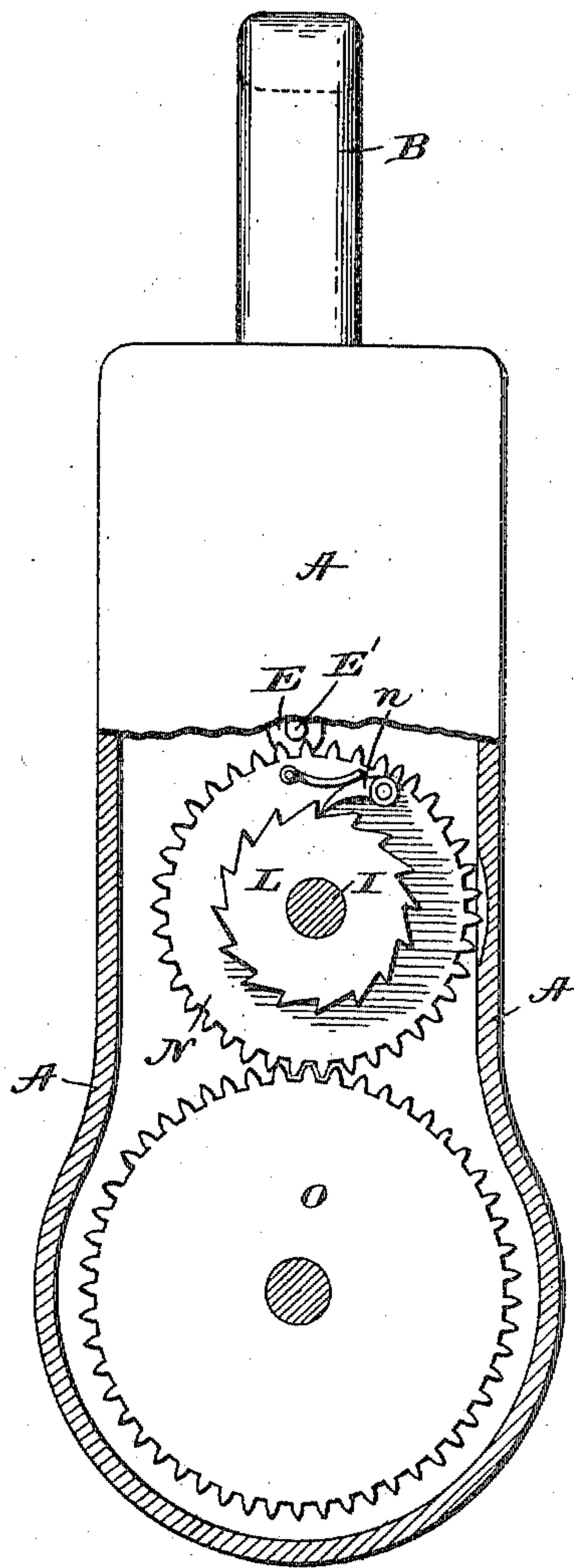
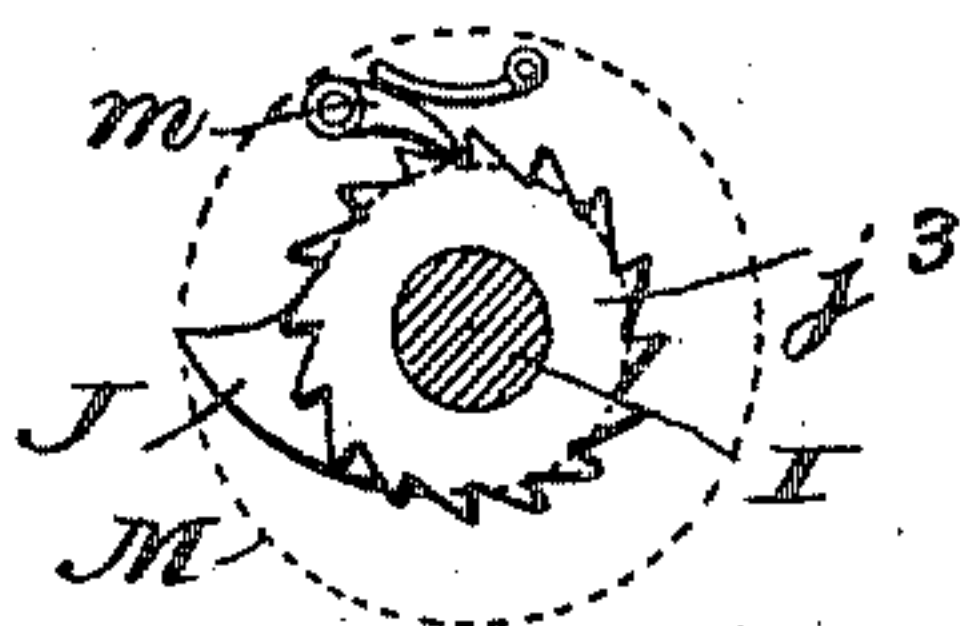


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 4.

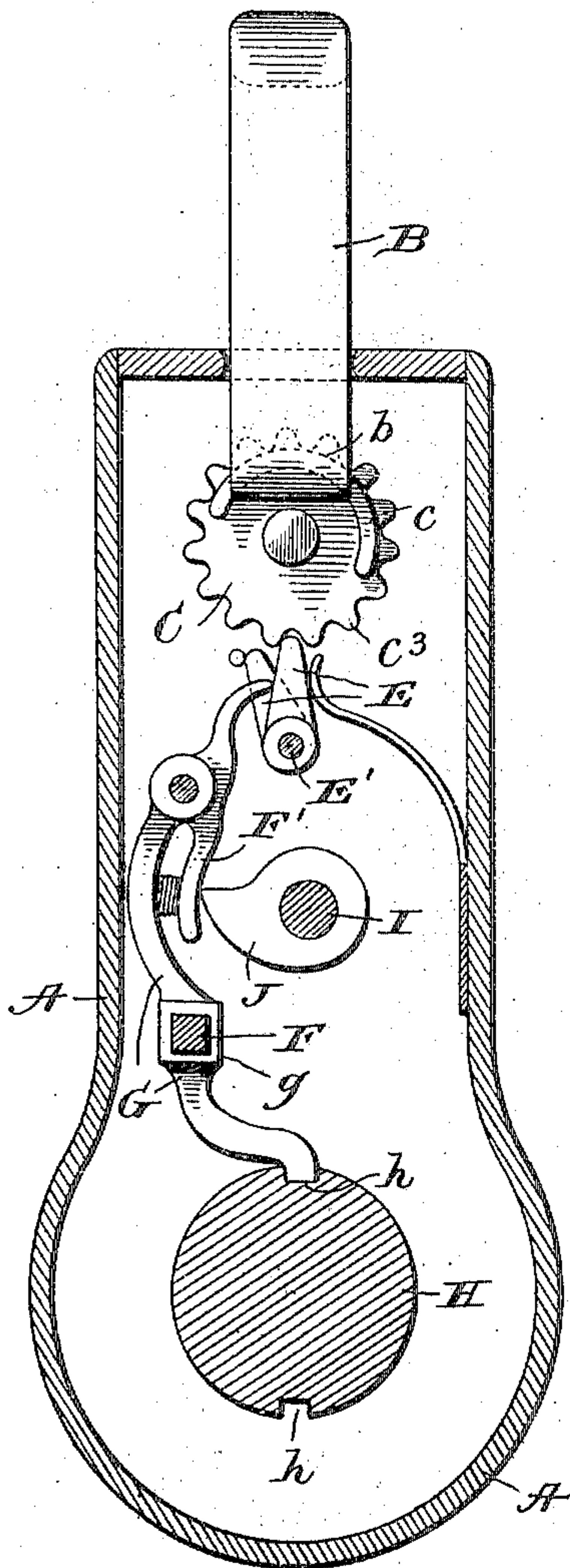
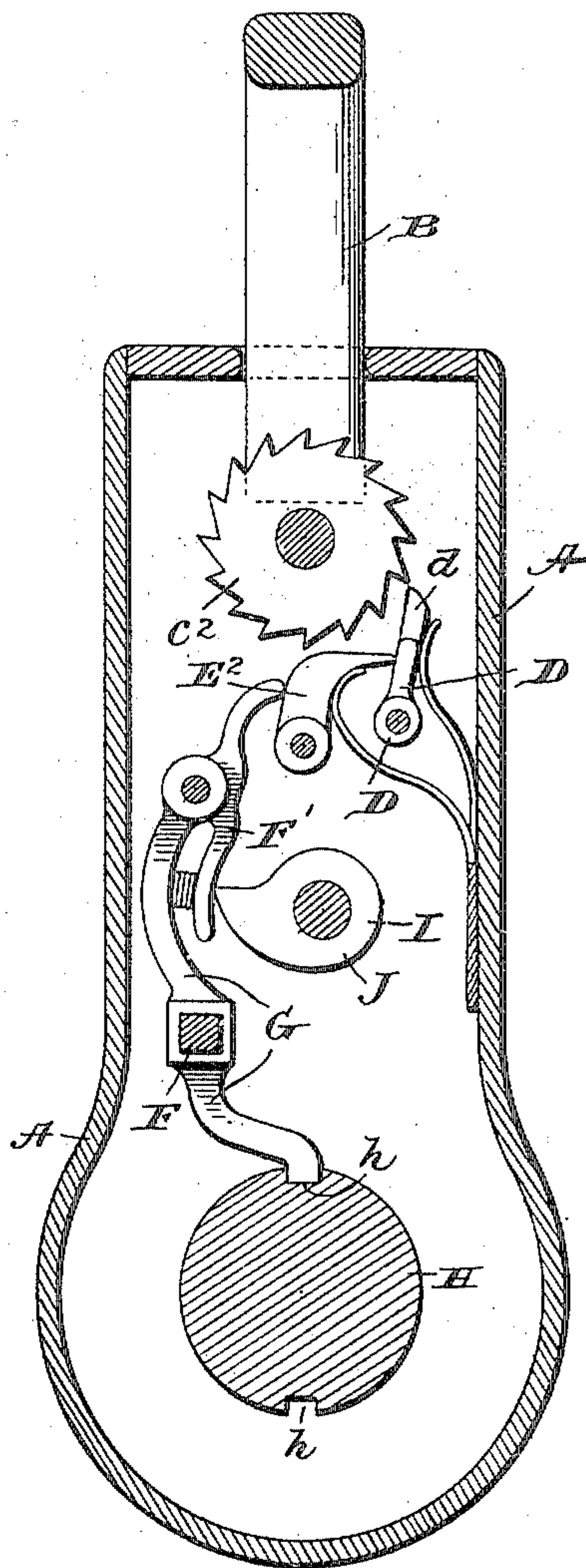


Fig. 5.



Jas E. Hutchinson:  
 Thos. C. Heath.

Hyman B. Zindel,  
By Wm. Means Attorney.



# UNITED STATES PATENT OFFICE.

HYMAN BERNARD ZENDEL, OF PASSAIC, NEW JERSEY.

## LOCK.

947,623.

Specification of Letters Patent.

Patented Jan. 25, 1910.

Application filed October 11, 1909. Serial No. 522,020.

*To all whom it may concern:*

Be it known that I, HYMAN B. ZENDEL, citizen of the United States, residing at Passaic, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Locks, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to an improvement in locks and more particularly to locks of the permutation type.

The object of the present invention is the provision of an improved lock of this character which is so constructed that it cannot be opened except by one who is familiar with the proper combination.

Other objects of the invention will be apparent from the detailed description hereinafter when read in connection with the accompanying drawing wherein a convenient embodiment of the invention is illustrated and wherein like numerals of reference refer to similar parts in the several views.

In the drawings, Figure 1 is a front elevation of a padlock constructed in accordance with the present invention, the front of the lock casing being removed, Fig. 2 is an end elevation showing the operating knob or handle, Fig. 3 is a similar view with a portion of the lock casing broken away, Fig. 4 is a longitudinal section showing the actuating lever after it has been moved to engage one of the actuating members, Fig. 5 is a similar view showing the actuating lever after it has been moved to engage one of the false actuating members, and Fig. 6 is a cross section on line 6—6 of Fig. 1.

Referring now more particularly to the drawings A designates a padlock casing and B a shackle, the lower ends of the arms of which project into suitable openings formed in the top of the lock casing. The portion of the arms of the shackle B which are adapted to lie within the lock casing A are formed with recesses *b* in the inner sides thereof.

Journalled in the upper portion of the lock casing A and extending transversely thereof is a cylinder C, which is provided on the ends thereof with lugs or projections *c* which are adapted to engage the recesses *b* in the ends of the arms of the shackle B to hold the same in its locked position and from this construction it is obvious that to

release the shackle the cylinder C must be shifted a sufficient extent to disengage the lugs *c* thereof from engagement with the recesses *b* in the ends of the arms of the shackle B. A spring *c'* is utilized to hold the cylinder C with the lugs *c* thereof in engagement with the recesses in the arms of the shackle B.

Secured to one end of the cylinder C is a ratchet wheel *c*<sup>2</sup> which is engaged by a pawl *d* carried by a bar D which is pivotally supported in the lock casing A and extends transversely thereof just below the roller C. The pawl *d* is normally held in engagement with the ratchet wheel *c*<sup>2</sup> by means of a suitable spring which is secured to the lock casing and engages the rear side of the bar D. The tendency of the spring *c'* is to turn the cylinder C in a clockwise direction but movement of the cylinder in this direction is normally prevented by the pawl *d* which however, permits the cylinder to be shifted step by step in the opposite direction against the tension of the spring *c'*. If the pawl *d* is released from engagement with the ratchet wheel *c*<sup>2</sup>, the spring *c'* will immediately shift the cylinder and return the same to its normal position with the lugs *c* thereof in engagement with the recesses in the arms of the shackle B.

The cylinder C is provided with a plurality of teeth *c*<sup>3</sup> thereon which are adapted to be engaged by actuating members, to be hereinafter more particularly described, so that the cylinder may be shifted a sufficient distance to withdraw the lugs *c* thereof from engagement with the shackle B. In the present embodiment of the invention a plurality of such actuating members are utilized comprising fingers E, the lower ends of which are pivotally mounted upon a fixed bar E' which is supported in the lock casing A just below the cylinder C and parallel to the longitudinal axis thereof and the upper ends of which are normally held out of engagement with the teeth of the cylinder C by springs of any suitable type which are adapted to be secured in the lock casing. The actuating members E are adapted to be engaged by suitable mechanism to be hereinafter more particularly set forth and moved into engagement with the teeth of the cylinder C so as to shift the same a predetermined distance and the parts are so arranged and constructed that the actuating members must be actuated in a certain sequence in order to shift the cylinder a sufficient distance



to withdraw the lugs *c* thereof from engagement with the recesses *b* in the arms of the shackle B. In addition to the actuating fingers E a number of false actuating fingers *E*<sup>2</sup> are employed, which are also pivotally supported on the bar *E'*. The upper ends of the false fingers *E*<sup>2</sup> do not contact with the cylinder C but terminate short thereof and are provided with inwardly extending portions which rest upon the bar D heretofore described and the undersides of which are engaged by suitable springs in the lock casing. A number of false fingers are provided and the actuating fingers are arranged at different points along the supporting bar *E'* between the false fingers, the outer surfaces of all the fingers being positioned in substantially the same plane.

F designates a transversely arranged bar or rod which is fixedly secured in the lower portion of the lock casing A and which is of a square or other irregular cross section.

G designates an arm which is provided intermediate the ends thereof with a sleeve *g* which corresponds in cross section to the cross section of the rod F and is arranged to slide thereon. The lower end of the arm G engages a double spiral groove *h* formed upon the surface of the cylinder H which is journaled in the lower portion of the lock casing so that the rotation of said cylinder in one direction will cause the arm G to travel back and forth on the transversely arranged bar or rod F.

F' designates a lever which is pivotally secured intermediate the ends thereof to the upper end of the arm G, the upper end of said lever being arranged to overlies the actuating fingers and false fingers which are pivotally supported upon the bar *E'* and being held normally out of engagement therewith by a spring interposed between the lower end of the lever and the arm G.

I designates a transversely arranged shaft which is journaled within the lock casing A and projects beyond one side thereof. The projecting end of the shaft I is provided with an actuating knob or handle I' and with a suitable indicator which is arranged to travel over a dial *i* upon one side of the lock casing. The dial *i* is provided with a plurality of numerals or other characters thereon, there being one such character provided for each of the actuating fingers E and false fingers *E*<sup>2</sup>.

Loosely mounted on the shaft I is a cam J which is positioned directly behind the lower end of the lever F' so as to engage the same when it is rotated. It is obvious that the engagement of the cam J with the lower end of the lever F' will cause the upper end of said lever to engage either one of the actuating fingers E or one of the false fingers *E*<sup>2</sup> according to the position which the arm G occupies when the cam is rotated. The size

of the cam J and the length of the lever F' are such that when the cam is actuated to shift the lever and cause the same to engage one of the actuating members E said member will be moved into engagement with the teeth of the cylinder and will at the end of its movement lie between the two lowermost teeth of the cylinder so that it cannot be actuated further by the lever and cannot return to its normal position until the cylinder has been actuated by another one of said actuating members when the spring of the first actuating member will return it to its normal position. It will thus be seen that in order to shift the cylinder the proper distance all of the actuating fingers must be actuated. The cam J is normally held against rotation and out of engagement with the lower end of the lever G by means of a spring pressed pawl *j* which is mounted within the lock casing and engages a ratchet wheel *j'* formed on one end of the cam. The cam J is of such length that it will engage the lower end of the lever F' when it is rotated regardless of the position which the arm G, which carries said lever, occupies on the bar F.

Keyed to the shaft I adjacent the end thereof which projects without the lock casing is a ratchet L and a disk M and loosely mounted on said shaft between said ratchet and disk is a gear wheel N which meshes with a gear wheel O carried by the cylinder H heretofore referred to. The gear wheel N carries a spring actuated pawl *n* which engages the teeth of the ratchet L while the disk M carries a spring pressed pawl *m* which engages a ratchet *j*<sup>3</sup> formed on the adjacent end of the cam J. The teeth of the ratchet L and of the ratchet *j*<sup>3</sup> extend in opposite directions, the teeth of the ratchet L being arranged so that when the shaft I is turned to the right or in a clockwise direction they will engage the pawl *n* and cause the gear wheel N to rotate with the shaft and thereby rotate the cylinder H through the gear wheel O. When the shaft I is moved in this direction the pawl *m* rides loosely over the ratchet *j*<sup>3</sup> on the cam J and the cam remains stationary. When the shaft I is turned to the left, however, the teeth of the ratchet L ride past the pawl *n* so that the gear N is held stationary and the pawl *m* will engage the ratchet *j*<sup>3</sup> on the cam and cause said cam to rotate with the shaft, the cylinder H being held against movement during the rotation of the shaft I in this direction by a pawl which is mounted in the lock casing and engages a ratchet formed on said cylinder.

The operation of the device is as follows: Assuming that there are three actuating fingers employed which correspond to the numbers 3—8—5 on the dial and that such fingers must be actuated in sequence in order to shift



the cylinder C a sufficient distance to free the lugs *c* thereof from the recesses *b* in the ends of the arms of the shackle, the operator first turns the knob I' to the right until the indicator carried by the shaft I points to the character 3 upon the dial *z*, which will cause the cylinder H to rotate and move the arm G on the bar F a sufficient distance to bring the upper end of the lever F' carried thereby directly over the actuating finger E which corresponds to the character 3 upon the dial; the knob I' is then turned to the left until the shaft I makes a complete revolution, during which movement of the shaft the arm G will remain stationary and the cam J will engage the lower end of the lever F', thereby causing the upper end of said lever to engage the proper actuating finger and shift the cylinder C a predetermined extent. This operation is repeated with the numbers 8 and 5 and the cylinder C will then have been shifted a sufficient amount to carry the lugs *c* thereof out of engagement with the recesses *b* in the arms of the shackle, so that the shackle can be then removed from the lock casing. If at any time the knob is turned to the right to bring the lever F' over any of the false fingers E<sup>2</sup> and then turned to the left, the cam J will cause the lever F' to engage said false finger and move the same against the pivoted bar D, which will withdraw the pawl *d* from the ratchet wheel *c*<sup>2</sup> and permit the spring to instantly shift the cylinder C back to its normal position. It will thus be seen that it is practically impossible for any one not familiar with the combination to open the lock as even if the first number should be accidentally ascertained or even if the first two numbers, the cylinder would immediately be restored to its normal position should any other number not in the combination be tried.

While a convenient embodiment of the invention is illustrated in the accompanying drawings, it will be understood that many changes may be made to the form and construction therein shown without departing from the spirit of the invention. It will also be understood that while the invention is illustrated and described as used in connection with a padlock, it may be used in connection with locks of other types.

I claim:

1. In a lock, a locking member, a spring tending to actuate said locking member in one direction, a plurality of actuating members adapted to engage said locking member to shift the same against the tension of its spring, and means common to all of said actuating members for operating any one thereof.

2. In a lock, a locking member, a spring tending to actuate said locking member in one direction, a plurality of actuating members adapted to shift the locking member

against the tension of its spring, means common to all of said actuating members for operating any one thereof, and means controlled by said operating means for releasing the locking member to permit its spring to restore it to normal position.

3. In a lock, a locking member, a spring tending to shift the locking member in one direction, a pawl preventing movement of the locking member by the spring thereof, a plurality of actuating members for shifting the locking member step by step against the tension of its spring, a false actuating member for releasing said pawl, and means common to said actuating members and false actuating member for operating any one thereof.

4. In a lock, a rotary locking member, a spring tending to rotate said locking member in one direction, a pawl preventing movement of the locking member by its spring, means for shifting the locking member step by step against the tension of its spring, and means for releasing said pawl.

5. In a lock, a locking member, a plurality of actuating members adapted to successively engage said locking member to shift the same in one direction, and means common to all of said actuating members for operating any one thereof.

6. In a lock, a locking member, a plurality of actuating members adapted to successively engage said locking member to shift the same in one direction, and means movable to a position to engage any one of said actuating members.

7. In a lock, a locking member, a plurality of actuating members adapted to shift said locking member in one direction, a lever movable to a position to engage anyone of said actuating members, and means for actuating said lever.

8. In a lock, a locking member, a plurality of actuating members adapted to move said locking member in one direction, a lever movable to a position to engage anyone of said actuating members, and a cam for actuating said lever.

9. In a lock, a locking member, a plurality of actuating members adapted to shift said locking member in one direction, a lever movable to a position to engage anyone of said actuating members, means for shifting the lever, means for actuating said lever, and an operating member common to both of said means.

10. In a lock, a locking member, a plurality of actuating members adapted to move said locking member in one direction, a lever movable to a position to engage anyone of said actuating members, a cam for actuating said lever, and a single operating handle for shifting said lever and actuating said cam.

11. In a lock, a locking member, a plurality of actuating members adapted to shift



said locking member in one direction, a lever movable to a position to engage any one of said actuating members, an operating handle, means acting when the handle is moved in one direction to shift said lever to a position to engage anyone of said actuating members, and means acting when the handle is moved in the opposite direction to actuate said lever.

12. In a lock, a locking member, a plurality of actuating members adapted to move said locking member in one direction, a lever movable to a position to engage anyone of said actuating members, a cam for actuating said lever, an operating handle, means acting when the handle is moved in one direction to shift said lever to a position to engage anyone of said actuating members, and means acting when the handle is moved in the opposite direction to rotate said cam.

13. In a lock, a locking member, a plurality of actuating members adapted to shift said locking member in one direction, a plurality of false actuating members, means operable upon the actuation of any of said false members for returning the locking member to normal position, and means common to all of said actuating members and false members for operating anyone thereof.

14. In a lock, a locking member, a plurality of actuating members adapted to shift said locking member in one direction, a plurality of false actuating members, means operable upon the actuation of any of said false members for returning the locking member to normal position, and means movable to a position to engage anyone of said actuating members and false members.

15. In a lock, a locking member, a plurality of actuating members adapted to move said locking member in one direction, a plurality of false actuating members, means operable upon the actuation of any of said false members for returning the locking member to normal position, a lever movable to a position to engage anyone of said actuating members and false members, and means for actuating said lever.

16. In a lock, a locking member, a plurality of actuating members adapted to move said locking member in one direction, a plurality of false actuating members, means operable upon the actuation of any of said false members for returning the locking member to normal position, a lever movable to a position to engage anyone of said actuating members and false members, and a cam for actuating said lever.

17. In a lock, a locking member, a plurality of actuating members adapted to move said locking member in one direction, a plurality of false actuating members, means operable upon the actuation of any of said false members for returning the locking member to normal position, a lever movable

to a position to engage anyone of said actuating members and false members, means for shifting the lever, means for actuating said lever, and an operating member common to both of said means.

18. In a lock, a locking member, a plurality of actuating members adapted to move said locking member in one direction, a plurality of false actuating members, means operable upon the actuation of any of said false members for returning the locking member to normal position, a lever movable to a position to engage anyone of said actuating members and false members, an operating handle, means acting when the handle is moved in one direction to shift said lever to a position to engage anyone of said actuating members and false members, and means for actuating said lever when the handle is moved in the opposite direction.

19. In a lock, a locking member, a spring tending to actuate said locking member in one direction, a pawl normally holding said locking member from movement by its spring, a plurality of actuating members adapted to shift said locking member in one direction against the tension of its spring, and a plurality of false actuating members, and means operable upon the actuation of any of said false members for releasing the pawl from engagement with said locking member.

20. In a lock, a locking member, a spring tending to actuate said locking member in one direction, a pawl normally preventing movement of said locking member by its spring, a plurality of actuating members adapted to shift said locking member against the tension of its spring, a plurality of false actuating members, means operable upon the actuation of any of said false members for releasing the pawl from engagement with the locking member, and means common to all of said actuating members and false members for operating anyone thereof.

21. In a lock, a locking member, a spring tending to actuate said locking member in one direction, a pawl normally preventing movement of said locking member by its spring, a plurality of actuating members adapted to shift said locking member against the tension of its spring, a plurality of false actuating members, means operable upon the actuation of any of said false members for releasing the pawl from engagement with the locking member, a lever movable to a position to engage anyone of said actuating members and false members, and means for actuating said lever.

22. In a lock, a locking member, a spring tending to actuate said locking member in one direction, a pawl normally preventing movement of said locking member by its spring, a plurality of actuating members adapted to shift said locking member against



the tension of its spring, a plurality of false actuating members, means operable upon the actuation of any of said false members for releasing the pawl from engagement with the locking member, a lever movable to a position to engage anyone of said actuating members and false members, an operating handle, means acting when the handle is moved in one direction to shift said lever to a position to engage anyone of said actuating members and false members, and means for actuating said lever when the handle is moved in the opposite direction.

23. In a lock, a rotatable locking member, a spring tending to rotate said locking member in one direction, a pawl normally preventing movement of said locking member by its spring, a plurality of pivoted actuating members adapted to successively rotate said locking member against the tension of its spring, a plurality of pivoted false actuating members, means operable upon the actuation of any of said false members for releasing the pawl from engagement with the locking member, and means common to all of said actuating members and false members for operating anyone thereof.

24. In a lock, a locking member, a plurality of actuating members adapted to shift the locking member in one direction, a lever, an operating shaft, gearing acting only when the shaft is turned in one direction to shift the lever to a position to engage anyone of said actuating members, and means for actuating said lever when the shaft is turned in the opposite direction.

25. In a lock, a locking member, a plurality of actuating members adapted to shift said locking member in one direction, a lever, an operating shaft, a cam loosely mounted on said shaft and adapted when rotated to engage said lever, gearing acting only when said shaft is turned in one direction to shift the lever to a position to engage anyone of said actuating members, and a clutch serving to couple the cam to the operating shaft when said shaft is turned in the opposite direction.

26. In a lock, a casing, a locking member, a plurality of actuating members for said locking member, a cylinder rotatably supported in said casing and provided with a spiral groove in the periphery thereof, an arm slidably mounted in the casing and provided with a portion adapted to engage the spiral groove in said cylinder, a lever carried by said arm and adapted to engage anyone of said actuating members, means for rotating said cylinder, and means for actuating said lever.

27. In a lock, a casing, a locking member, a plurality of actuating members for said locking member, a cylinder rotatably supported in said casing and provided with a spiral groove in the periphery thereof, an

arm slidably mounted in the casing and provided with a portion adapted to engage the spiral groove in said cylinder, a lever carried by said arm and adapted to engage anyone of said actuating members, means for rotating said cylinder, means for actuating said lever, and an operating handle common to both of said means.

28. In a lock, a casing, a locking member, a plurality of actuating members for said locking member, a cylinder rotatably supported in said casing and provided with a double spiral groove in the periphery thereof, an arm slidably mounted in the casing and provided with a portion adapted to engage the spiral groove in said cylinder, a lever carried by said arm and adapted to engage anyone of said actuating members, an operating shaft, gearing acting only when the shaft is turned in one direction to rotate said cylinder, and means for actuating said lever when the shaft is turned in the opposite direction.

29. In a lock, a casing, a locking member, a plurality of actuating members for said locking member, a cylinder rotatably supported in said casing and provided with a double spiral groove in the periphery thereof, an arm slidably mounted in the casing and provided with a portion adapted to engage the spiral groove in said cylinder, a lever carried by said arm and adapted to engage anyone of said actuating members, an operating shaft, a cam loosely mounted on said shaft and adapted when rotated to engage said lever, gearing acting only when the operating shaft is turned in one direction to rotate said cylinder, and a clutch serving to couple the cam to the operating shaft when said shaft is turned in the opposite direction.

30. In a lock, a casing, a rotatable locking member, a plurality of actuating members adapted to move said locking member in one direction, a plurality of false actuating members, means operable upon the actuation of any of said false members for returning the locking member to normal position, a lever, an operating shaft, gearing acting only when the lever is turned in one direction to shift the lever to a position to engage anyone of said actuating members and false members, and means for actuating said lever when the shaft is turned in the opposite direction.

31. In a pad lock, a casing, a shackle fitting into said casing, the arms of which are provided with inwardly extending recesses, a cylindrical locking member journaled in said casing and provided at its ends with projecting lugs adapted to engage the recesses in the arms of the shackle, and means for shifting said locking member intermittently to free the lugs thereof from engagement with the arms of the shackle.



32. In a pad lock, a casing, a shackle fitting into said casing, the arms of which are provided with inwardly extending recesses, a cylindrical locking member journaled in  
5 said casing and provided at its ends with projecting lugs adapted to engage the recesses in the arms of the shackle, a plurality of actuating members adapted to successively shift said cylindrical locking member, a plurality of false actuating members,  
10 means operable upon the actuation of any

of said false members for returning the locking member to normal position, and means common to all of said actuating members and false actuating members for operating anyone thereof. 15

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

HYMAN BERNARD ZENDEL.

Witnesses:

ARTHUR S. CORBIN,  
GARRET ROOSMA.