

No. 817,388.

PATENTED APR. 10, 1906.

E. E. QUAINANCE.
COMBINATION LOCK.

APPLICATION FILED JAN. 17, 1905.

2 SHEETS—SHEET 1.

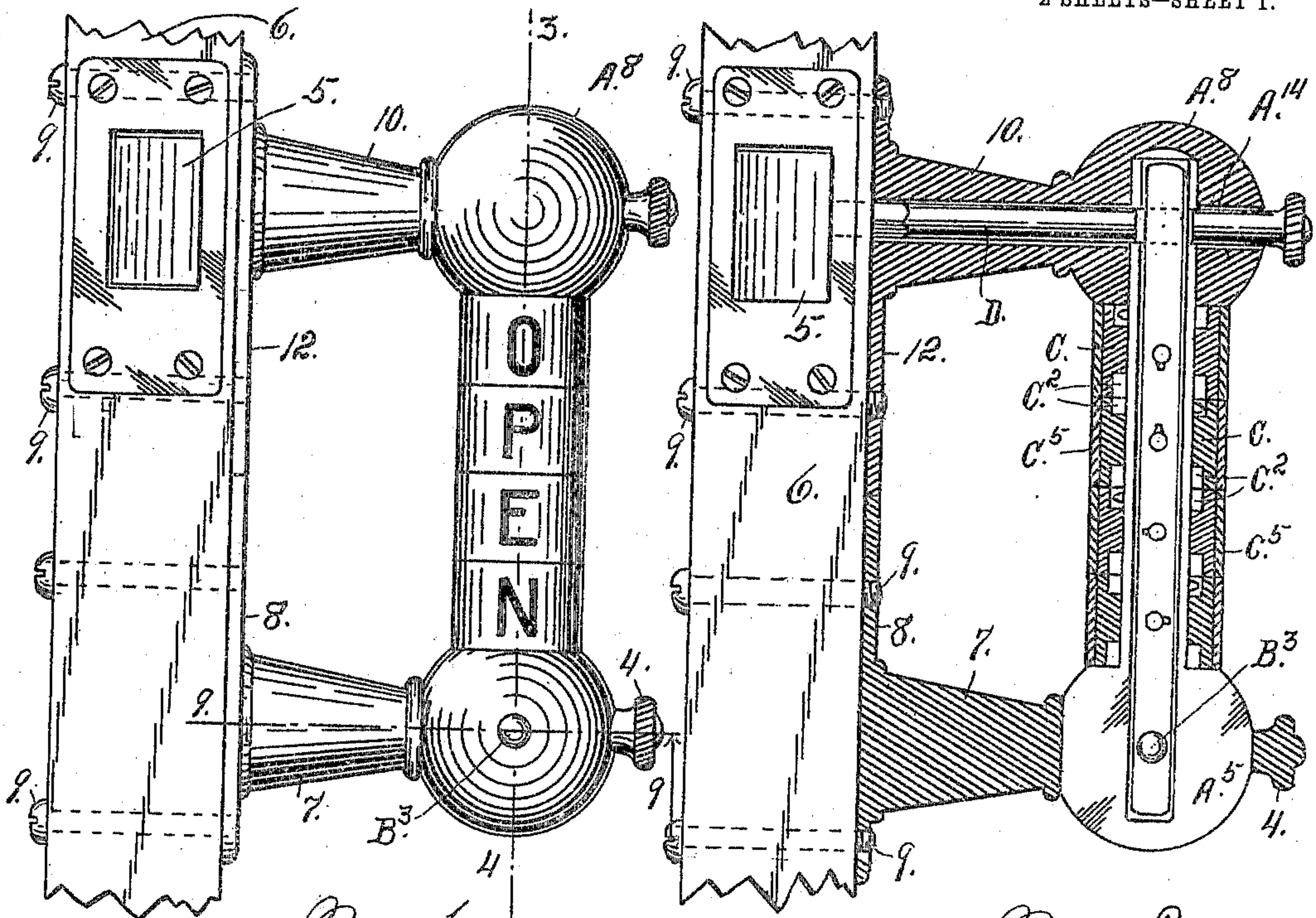


Fig. 1.

Fig. 2.

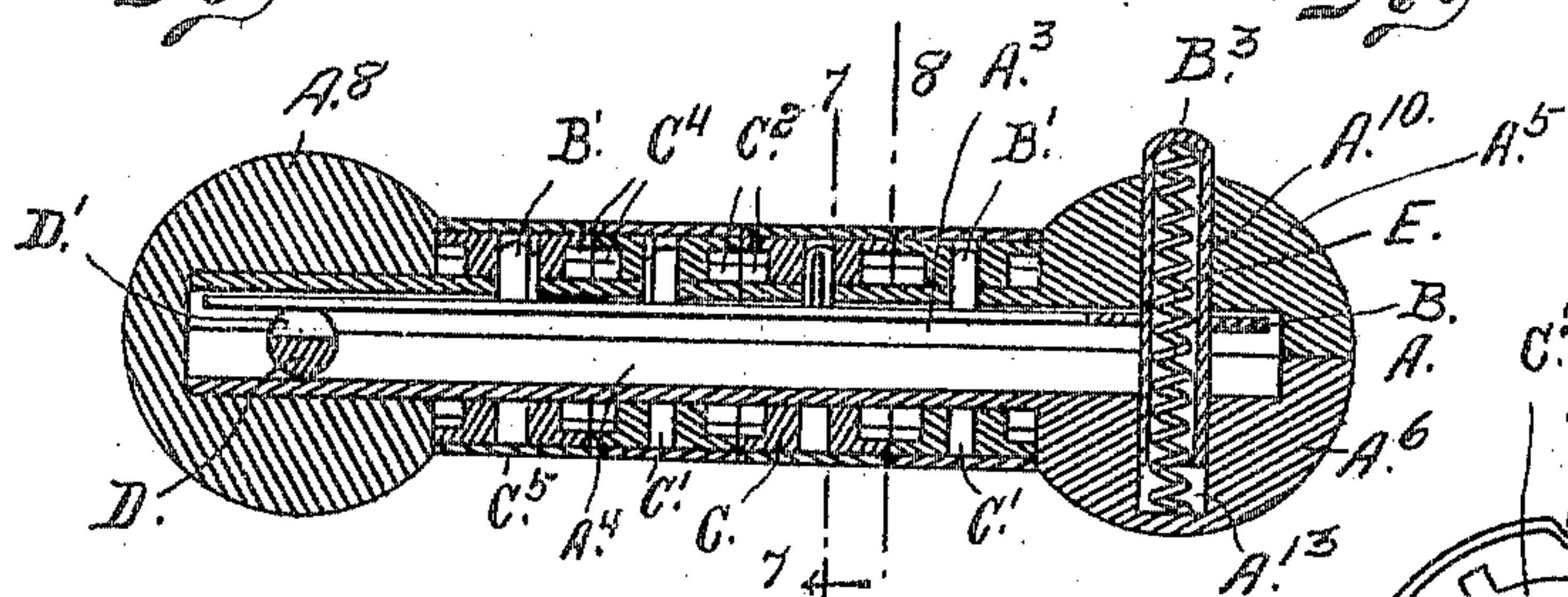


Fig. 3.

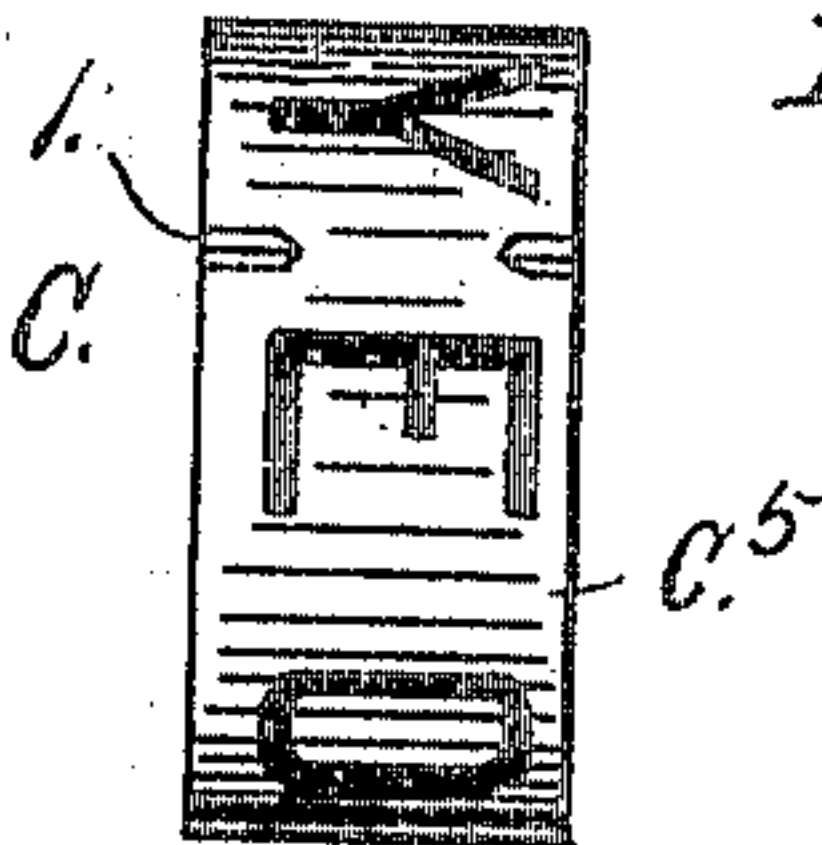


Fig. 5.

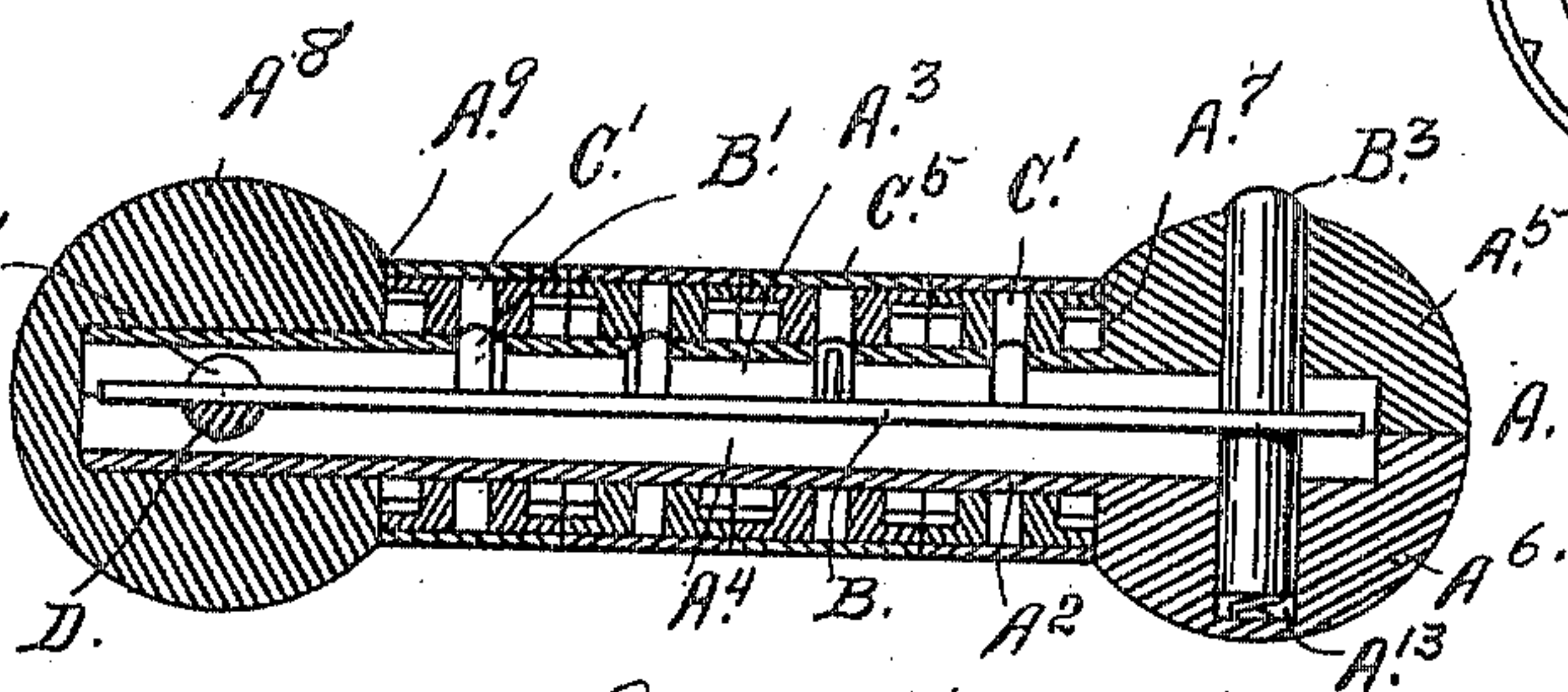
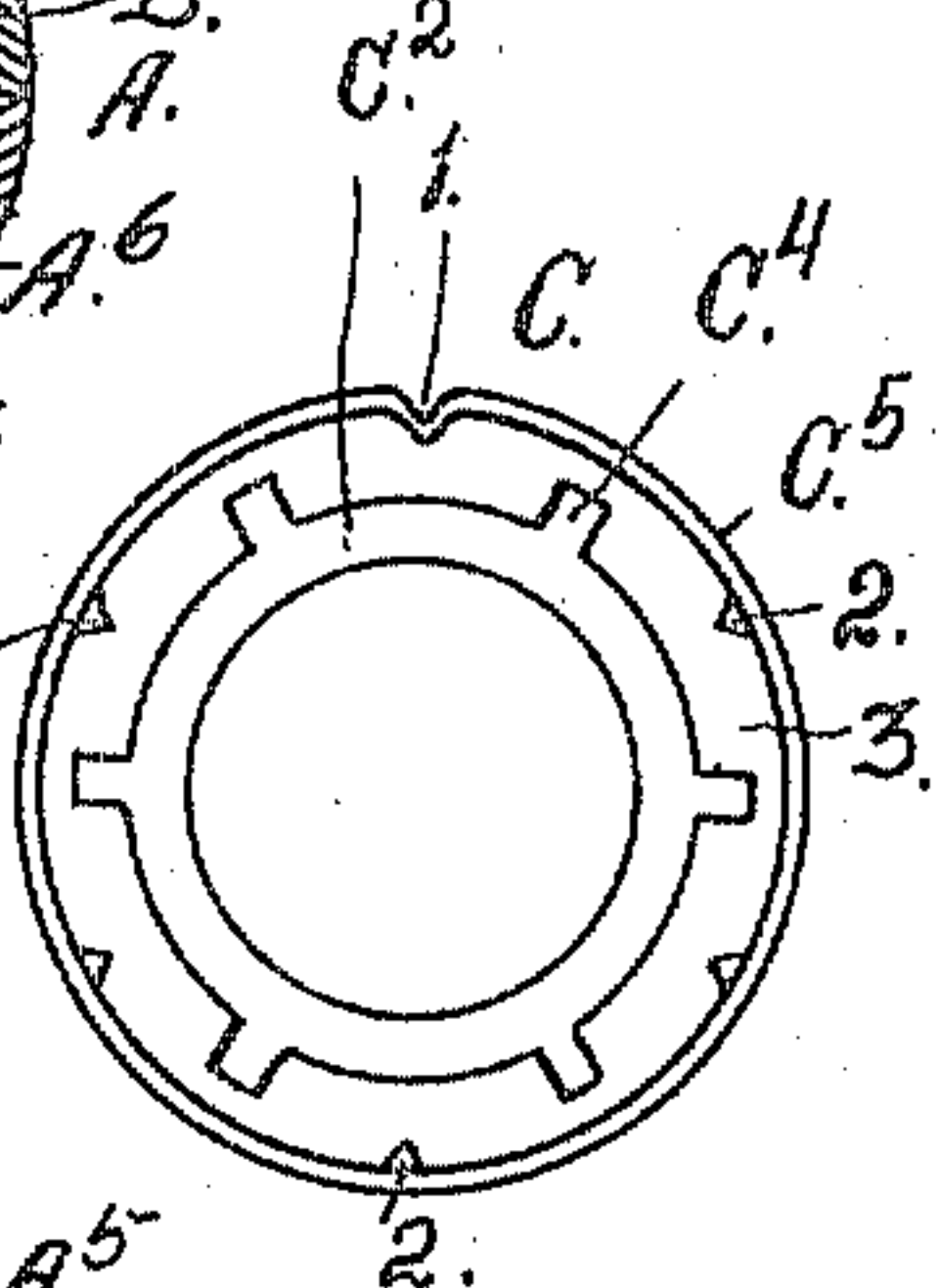


Fig. 4.

Fig. 6.



Witnesses
Otto E. Hoddick.
Dena Nelson.

Inventor
E. E. Quaintance.
by *A. J. Mien*
Attorney

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2 SHEETS—SHEET 2.

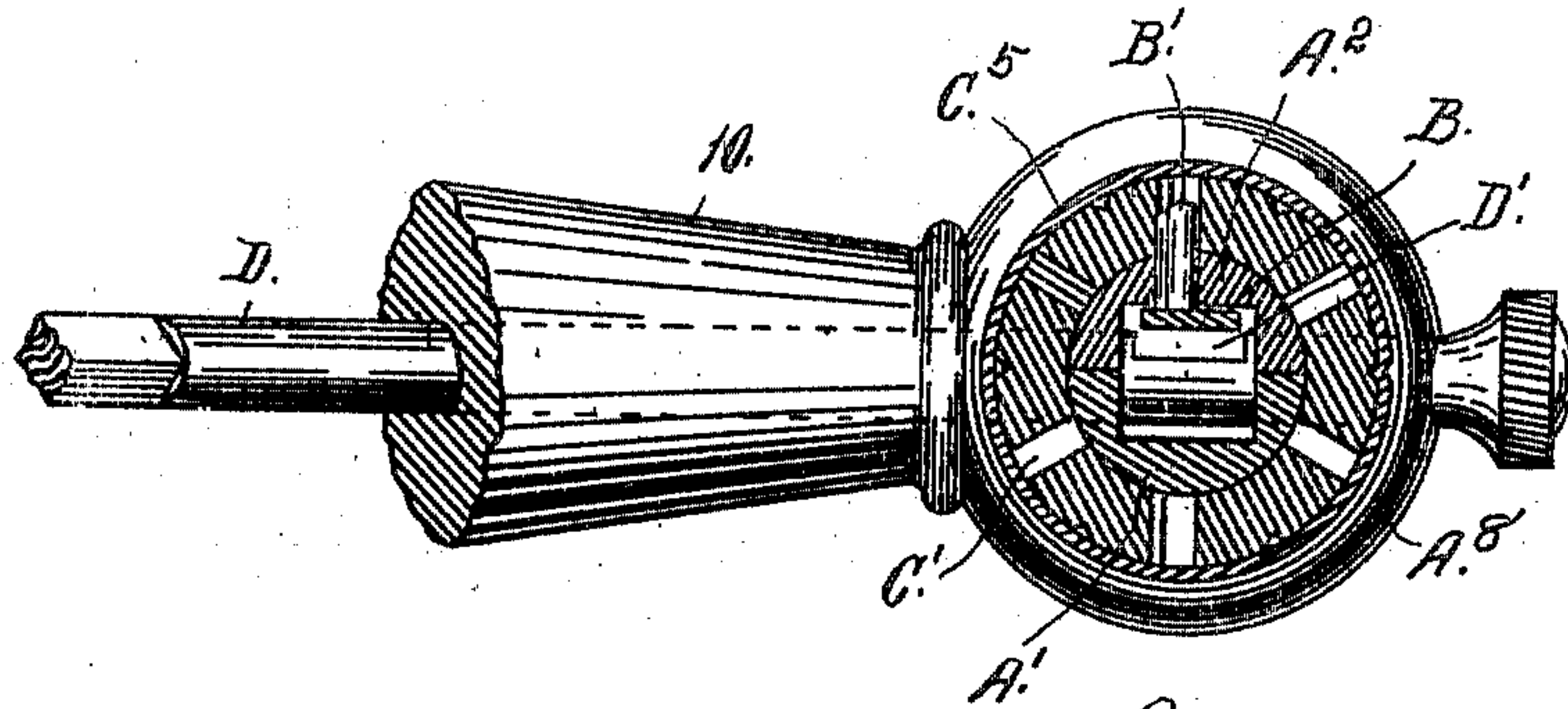


Fig. 7.

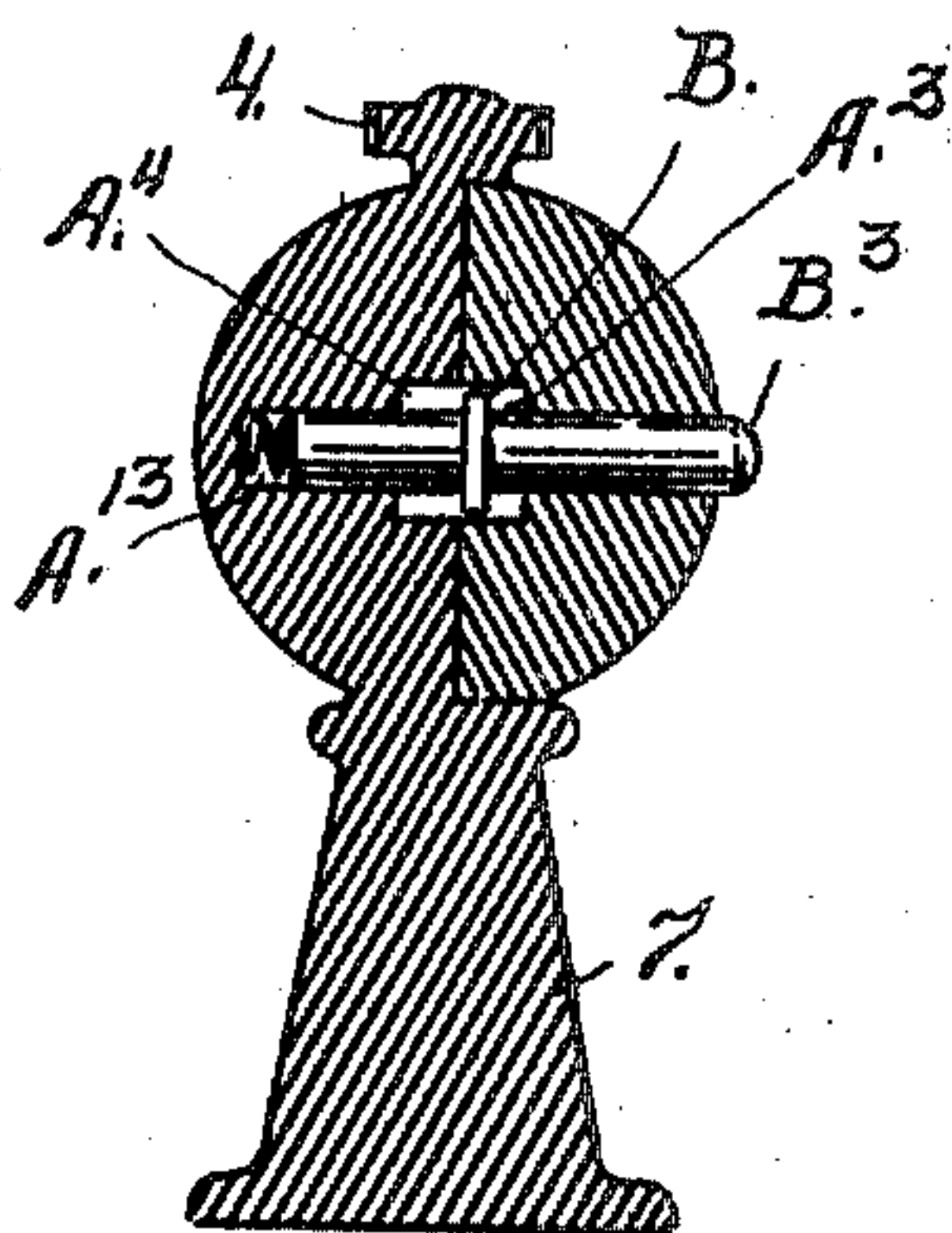


Fig. 9.

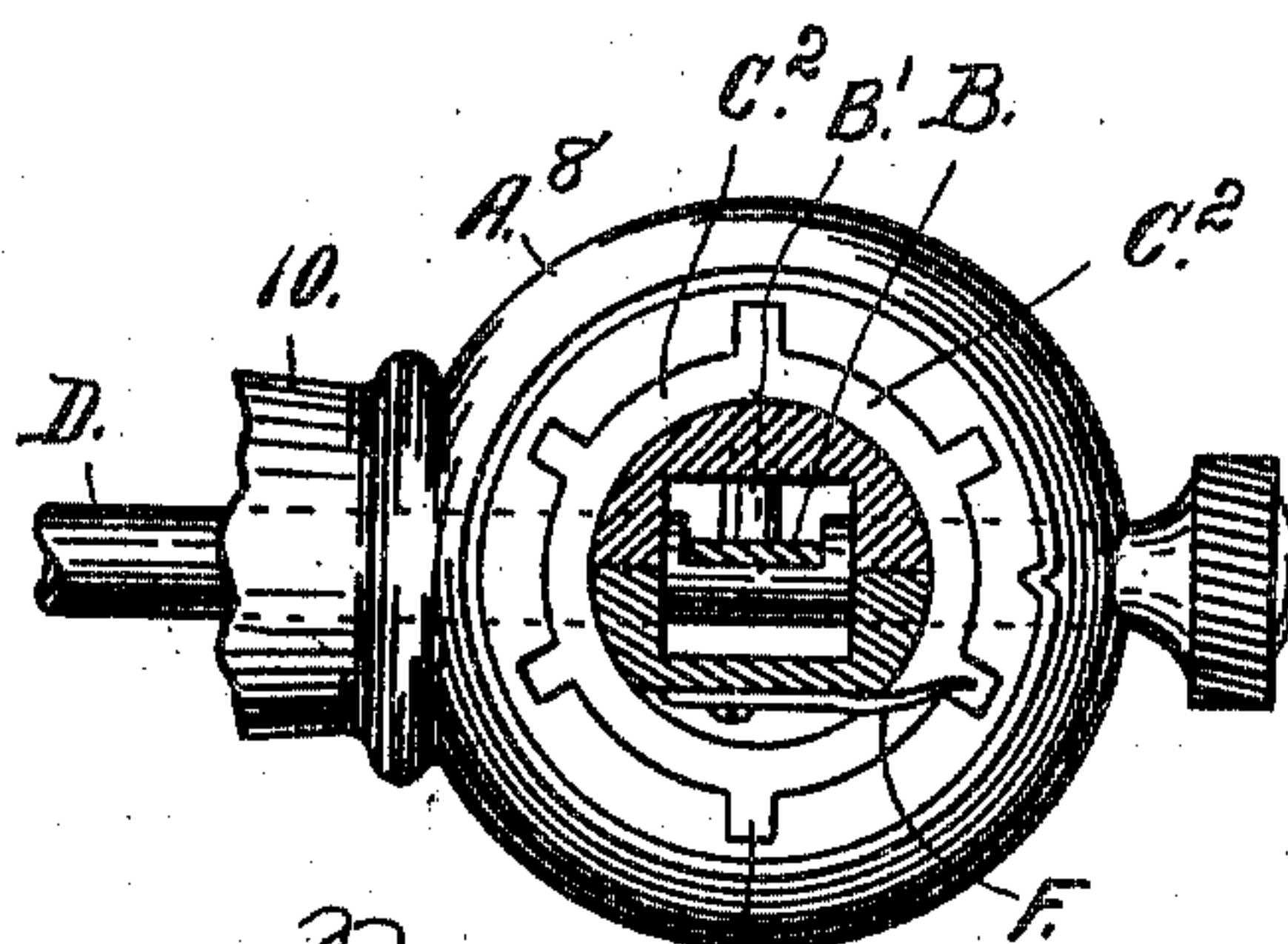


Fig. 8.

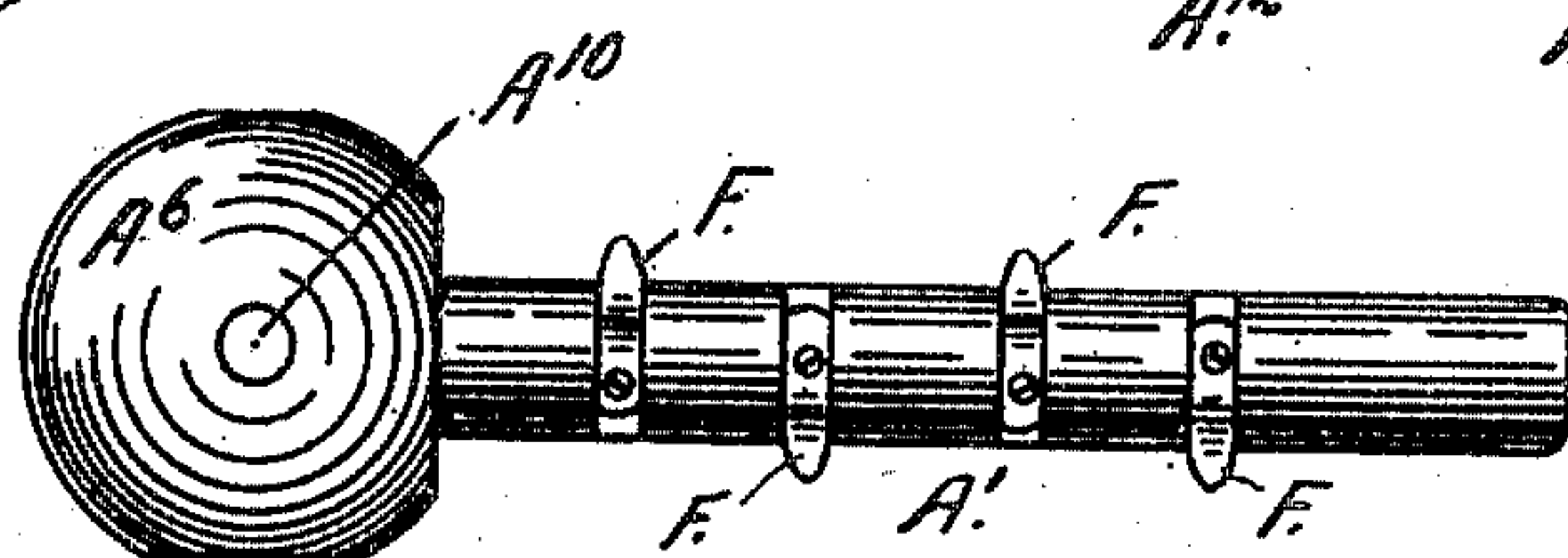


Fig. 11.

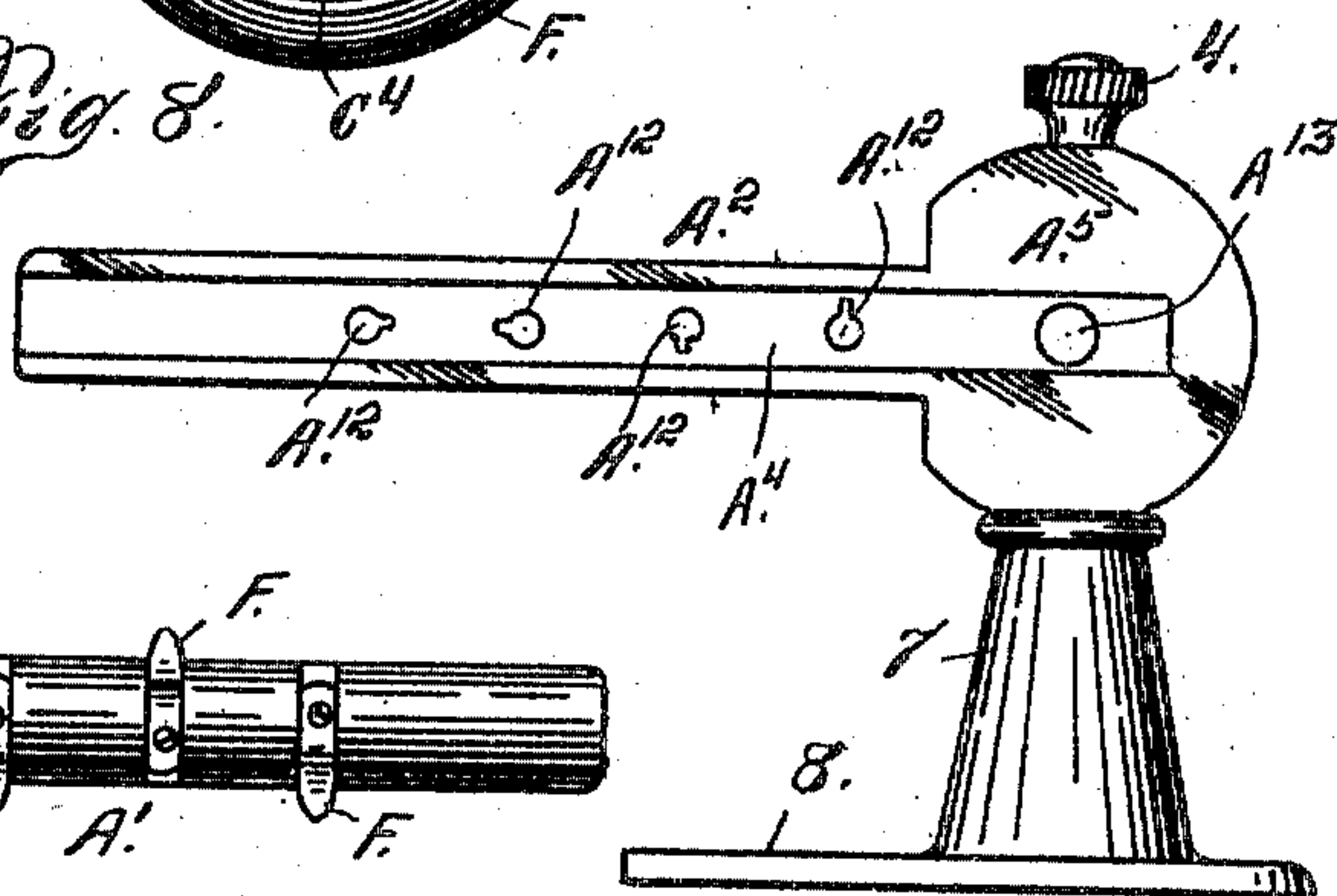


Fig. 10.

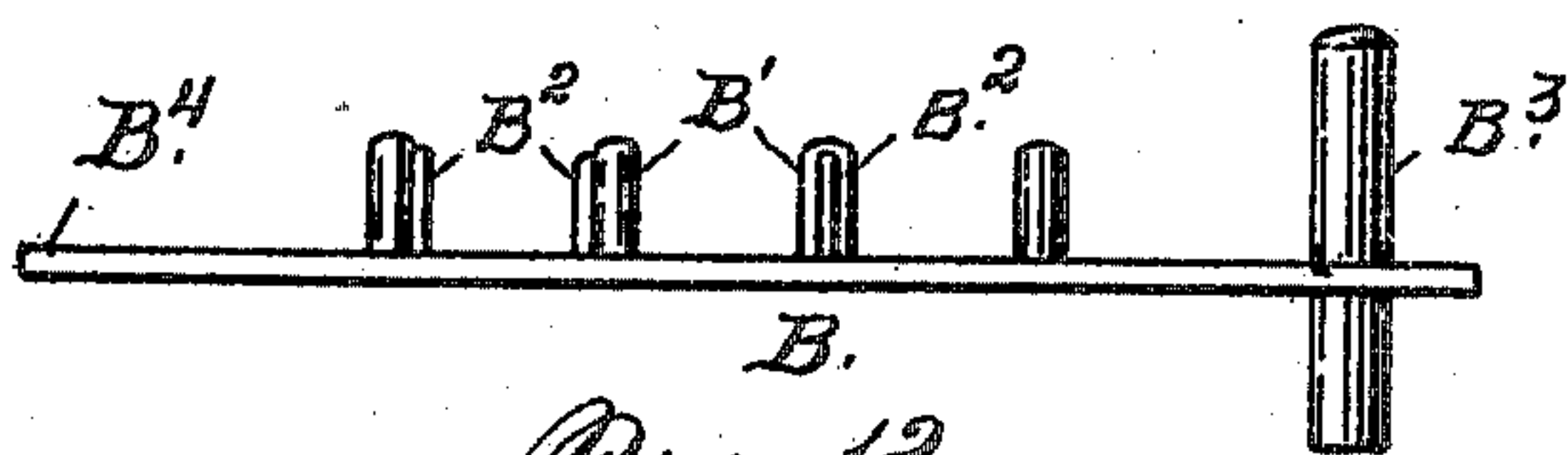


Fig. 12.

Witnesses
Otto E. Huddick
Dena Nelson.

E. E. Quainance.
Inventor
by *A. B. Miller*
Attorney

UNITED STATES PATENT OFFICE.

ELSWORTH E. QUAINANCE, OF COMO, COLORADO.

COMBINATION-LOCK.

No. 817,388.

Specification of Letters Patent.

Patented April 10, 1906.

Application filed January 17, 1905. Serial No. 241,450.

To all whom it may concern:

Be it known that I, ELSWORTH E. QUAINANCE, a citizen of the United States, residing at Como, in the county of Park and State of Colorado, have invented certain new and useful Improvements in Combination-Locks; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in combination-locks.

The general construction of my present invention is similar to that set forth in my previous patent, No. 785,834, dated March 28, 1905. The form of construction, however, is varied to adapt the combination or permutation lock mechanism for use as a door-lock. In this case the ball extremities of the hollow spindle are mounted on posts or pedestals, which are secured to the door by means of screws accessible only from the inside, while the lock mechanism is on the opposite side. This makes it impossible to detach the mechanism from the outside. The cylindrical structure located between the two enlarged extremities of the hollow spindle and composed of the rotary tumblers forms a handle adapted to be grasped for the purpose of swinging the door back and forth. In my improved construction a rotary spindle is journaled in a solid ball or enlarged extremity of the lock, the said spindle also passing through the pedestal upon which the ball is mounted, its inner extremity being shaped to engage and operate the door bolt or latch in any suitable or ordinary manner. The specific construction whereby the inner extremity of this spindle is connected with the bolt or latch is not illustrated, since it is very common and nothing is claimed thereon in this application.

Another novel feature of construction consists in the arrangement of the "click-springs" mounted on one member of the hollow spindle, whereby these springs point in opposite directions, making it necessary to turn the adjacent tumblers in opposite directions for the purpose of unlocking the door. Each tumbler is also provided with two circumferential grooves, one on each side,

whereby the tumblers are reversible. The click-springs project into these grooves and engage the recesses leading outwardly from the grooves.

Another feature is that the body or inner portion of each tumbler is connected with the outer shell of the tumbler by means of an indentation in the shell adapted to enter any one of a series of grooves in the body of the tumbler. By removing the body portion of the tumbler from the shell and inserting it in a different relative position the combination of the lock mechanism may be changed.

Having briefly outlined my improved construction, as well as the function it is intended to perform, I will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is an edge view of a door to which my improved lock is attached, the latter being shown in side elevation. Fig. 2 is a similar view showing the lock in section. Fig. 3 is a longitudinal section taken through the lock mechanism, showing the locking-bar in the unlocked position. Fig. 4 is a similar view showing the locking-bar in the locked position. Fig. 5 is an enlarged exterior view of one of the tumblers. Fig. 6 is an end elevation of the same. Fig. 7 is a cross-section taken on the line 7-7, Fig. 3, the parts being shown on a larger scale and the pedestal or post partly broken away to disclose the bolt or manipulating-spindle. Fig. 8 is a section taken on the line 8-8, Fig. 3, the parts being shown on a larger scale. Fig. 9 is a section taken through one of the enlarged extremities of the hollow spindle shown in connection with its post or pedestal. Figs. 10 and 11 are detail views of the respective members of the hollow spindle. Fig. 12 is a detail view of the locking-bar.

The same reference characters indicate the same parts in all the views.

Let A designate a spindle composed of two parts A' and A². Each of these spindle parts is longitudinally recessed, as shown at A³ and A⁴. These longitudinal recesses register, making a hollow spindle in which is located a locking-bar B. The two spindle parts are respectively connected with knob extremities A⁵ and A⁶, which when the parts are assembled form a ball-extremity, as indicated in the drawings. The ball-extremity part A⁵ is provided with a post or pedestal 7, having

a base-plate 8 secured to the door by means of screws 9 inserted from the inside or the opposite side of the door to which the lock is applied. This ball extremity of the hollow spindle is provided with an offset or shoulder 5 A⁷. To the extremity of the spindle remote from the parts A⁵ and A⁶ a ball A⁸ is applied, the said ball, as shown in the drawings, consisting of an integral piece of material recessed to receive the spindle and when in 10 place holds the two spindle parts in operative position. Also formed integral with this ball extremity A⁸ is a post or pedestal 10, having a base-plate 12 applied to the door and also held in place by screws 9, inserted 15 from the inside. The ball or knob A⁸ is provided with a shoulder or offset A⁹, surrounding the spindle. Between the offsets or shoulders A⁷ and A⁹ is located a number of 20 tumblers C, which are mounted to rotate on the hollow spindle. Each tumbler is provided with a number of recesses C' of slightly-different shape arranged in a circular zone. One recess of each tumbler is adapted to receive 25 a pin B' of the locking-plate B when the tumbler is rotated to bring the proper recess C' into position to allow the pin to enter. Attention is called to the fact that only one recess C' of each tumbler, is shaped to receive 30 the pin B', located in the same cross-sectional plane. The recesses C' do not pass entirely through the tumbler, but terminate at the outer shell of the latter, upon which are formed letters or other suitable characters. 35 (See Figs. 1 and 5.) The tumblers may be so arranged on the spindle that when any particular combination of letters on the outer shell of the tumbler is brought together the lock may be opened. To open the lock, it is 40 necessary that the locking-bar B shall be free to move out of a recess D', formed in the bolt-manipulating spindle D, in order to allow the last-named spindle to turn sufficiently to throw or actuate the locking-bolt 5 of the 45 door 6. This spindle D has a milled head protruding from the ball extremity A⁸, the spindle being journaled in this ball extremity and also in its pedestal 10, its inner extremity being polygonal in cross-section, preferably 50 square, for bolt-manipulating purposes. This squared extremity of the spindle D is connected with suitable mechanism (not shown but of ordinary construction) for operating the bolt as the spindle D is given a 55 partial rotation.

To the extremity of the locking-bar opposite B⁴ is applied a tube B³, adapted to enter recesses formed in the knob parts A⁵ and A⁶ of the spindle. One of these recesses— 60 namely, that designated A¹⁰—extends entirely through the knob part to allow the closed extremity of the tube B³ to protrude when the locking-bar is in the unlocked position. (See Fig. 3.) The recess A¹³ of the 65 knob part A⁶ is closed at its outer extremity

to form a seat for a coil-spring E, whose opposite extremity engages the closed end of the tube B³. By virtue of this construction the spring which is under suitable tension has a tendency to throw the locking-bar to 70 the unlocked position and will so actuate the locking-bar when the tumblers are turned to permit this action or into such position that the recesses C' are properly arranged to enter them. When it is desired to lock the 75 device, the tubular part B³ is pressed downwardly sufficiently to disengage the pins B' from the recesses C', whereby the extremity B⁴ of the locking-bar is made to engage the recess D' of the spindle D, after which one or 80 more of the tumblers is turned to bring its recess C' out of line with the correspondingly-shaped pin B' of the locking-bar.

Each tumbler is provided with a pair of circumferential grooves C², into one of which 85 projects a leaf-spring F, the said springs being attached to the member A' of the hollow spindle. The adjacent springs F project in opposite directions and enter the respective circumferential grooves C² of their respective 90 spindles and engage the recesses C⁴, leading outwardly from said grooves. By reason of the adjacent springs pointing in opposite directions the adjacent tumblers must be 95 turned in opposite directions, since the direction of the points of the springs determines the direction of movement of the tumblers, as will be readily understood, since it would be impossible, assuming that a spring-point is 100 in one of the recesses C⁴, to turn the tumbler toward or against that point. It is evident that the tumbler must be turned away, so to speak, from the point of its click-spring or must be turned in a direction toward which 105 its click-spring points. These springs normally or temporarily hold the tumblers in the adjusted position and at the same time prevent them from rotary movement in the wrong direction. The outer extremities of these springs engage the outer walls of the 110 circumferential recesses C² and engage the recesses C⁴, which are formed at suitable intervals in the tumbler, whereby there is a distinct click every time a recess C⁴ passes a spring. 115

Attention is called to the fact that the member A' of the hollow spindle is provided with orifices A¹², corresponding in shape to the pins B' of the locking-bar, whereby these pins are allowed to pass freely through the 120 openings A¹². Indeed the outer extremities of the pins B', even when the locking-bar is in the unlocked position, engage the openings A¹² of the hollow spindle member A'.

The outer part or shell C⁵ of each tumbler 125 is connected with the inner body portion of the tumbler by an indentation 1, adapted to enter any one of a series of counterpart recesses with which the inner member 3 of the tumbler is provided. By removing the body 130

portion 3 of the tumbler from the shell C⁵ the part 3 may be inserted with the indentation 1 of the shell in a different recess 2, thus changing the relative position of the openings C' of the respective tumblers.

In assembling the parts the spring E is first placed in the tube B³ of the locking-bar, after which the open extremity of the said tube is dropped into the recess A¹³ of the knob extremity of the spindle member A². In this event the body of the locking-bar is located within the recess A⁴ of the spindle member A². The spindle member A' is then placed in position so that the closed extremity of the tube B³ enters the opening A¹⁰ and so that its openings A¹² are engaged by the pins B' of the locking-bar. The tumblers C are then placed in position on the spindle, one of them abutting against a shoulder A⁷ of the knob extremity of the spindle. The knob 8 is then applied to the extremity of the spindle remote from the knob parts A⁵ and A⁶, whereby the tumblers are held between the two knob extremities of the spindle. The knob or wall extremities of the device are secured to the door through the instrumentality of the posts or pedestals 7 and 8, as heretofore explained. In assembling the parts the tumblers should be so put in place that the locking-bar is in the unlocked position, so that after the knob extremity A⁸ is applied the bolt-manipulating spindle D may be inserted through the opening A¹⁴ of the knob into a registering opening in the pedestal 10, the inner extremity of the spindle D passing to the bolt-manipulating position. It will be seen that by having the locking-bar in the unlocked position, as shown in Fig. 7, the spindle D may be inserted so that its recess D' shall be in position to receive the locking-bar B when in the locked position. After all the parts are assembled the locking-bar may be placed in the locked position by pressing on the protruding extremity of the tube B³, the latter being held in this position until one or more tumblers have been turned to bring their openings or recesses C' out of register with their corresponding pins B' of the locking-bar.

If it is desired to leave the lock so that it may be unlocked in the dark, one of the tumblers should only be shifted a short distance—for instance, the space between the recesses C⁴. This will be known by the click of the spring F when its extremity enters the first recess C⁴. As there are six of these recesses in each tumbler, the operator will know that when he turns this tumbler five clicks or a sufficient distance to hear the click of the spring E five times the tumbler will again be in the unlocked position. This is an important feature in a lock of this character.

As shown in the drawings, the different shapes of the pins B' result from applying a feather or tongue B² to the said pins on dif-

ferent sides. Of course any other suitable manner of accomplishing this object may be employed. Attention is called to the fact that the tumblers are temporarily locked in place by the outer rounded extremities of the pins B', which slightly enter the recesses C' of each tumbler every time a recess is brought into register with a pin extremity, since the feathers B² of the pins B' are slightly shorter than the pins. This engagement of the outer rounded extremities of the pins with the recesses C' causes a distinct click every time a recess C' passes a pin.

From what has already been stated it will be understood that the combination of the lock may be changed by changing the relative position of the tumblers upon the spindle. This may of course be done by removing the knob A⁸ and taking off two or more tumblers and replacing them in different relative positions. It may also be done by changing the relative position of the body 3 of a tumbler with its shell, whereby the recess C' of the tumbler shall occupy a different position with reference to a given letter on the shell of the tumbler.

In order to give uniformity of appearance to the knob extremity of the spindle, the part A⁵ is provided with a small milled projection 4, formed integral with the knob part A⁵.

Having thus described my invention, what I claim is—

1. The combination with a bolt to be operated, of a hollow spindle having enlarged extremities provided with separated supporting-pedestals, a locking-bar transversely movable in the hollow spindle and provided with pins, tumblers revolubly mounted on the hollow spindle and having recesses adapted to receive the pins of the locking-bar, and a spindle journaled in one knob and its pedestal, its inner extremity engaging the bolt in operative relation, the bolt-operating spindle being connected with the locking-bar intermediate its extremities whereby the last-named spindle is locked when the locking-bar is in one position and unlocked when the said bar is in the other position.

2. The combination with a bolt to be operated, of a hollow spindle having enlarged extremities provided with pedestals suitably mounted, the spindle being composed of two parts, one of the enlarged extremities being composed of parts formed integral with the adjacent extremities of the spindle parts, one of the spindle parts being also provided with orifices, a transversely-movable locking-bar located within the hollow spindle and having pins passing through the orifices of the said spindle part, tumblers revolubly mounted on the spindle intermediate its enlarged extremities, the tumblers having recesses adapted to receive the pins of the locking-bar when the tumblers are properly adjusted, and a bolt-manipulating spindle journaled in one

of the enlarged extremities of the divided spindle, the inner extremity of the bolt-operating spindle being connected in operative relation with the bolt while its opposite extremity protrudes from the enlarged extremity of the divided spindle, the bolt-operating spindle being connected intermediate its extremities with a locking-bar whereby when the latter is in one position the bolt-operating spindle is locked against movement, while when the locking-bar is in the other position the last-named spindle is allowed to turn to operate the bolt, substantially as described.

3. The combination of a hollow spindle having enlarged shouldered extremities, tumblers located between the extremities of the spindle and revolubly mounted thereon, each tumbler having a number of recesses, a spring-actuated locking-bar located within the spindle and having a pin for each tumbler, the pins being adapted to enter one recess of each tumbler, each tumbler having also a circumferential groove surrounding the spindle and a number of recesses formed in the outer wall of the groove, and a number of oppositely-disposed leaf-springs corresponding with the number of the tumblers, the said springs being attached to the spindle

and protruding into the said grooves for the purpose set forth.

4. The combination of a hollow spindle having enlarged shouldered extremities, tumblers located between the extremities of the spindle and revolubly mounted thereon, each tumbler having a number of recesses, a spring-actuated locking-bar located within the spindle and having a pin for each tumbler, the pins being shaped to enter one recess of each tumbler, each tumbler having also a pair of circumferential grooves surrounding the spindle, and a number of recesses formed in the outer wall of each groove, the spindle being provided with a number of oppositely-disposed leaf-springs corresponding with the number of tumblers and adapted to enter one groove of each tumbler, the two grooves of each tumbler being so formed that the tumblers are reversible whereby their grooves may be alternately employed to receive the springs of the spindle for the purpose set forth.

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

ELSWORTH E. QUAINANCE.

Witnesses:

HENRY F. WOLFE,
THOMAS E. RICHARDSON.