

No. 711,325.

Patented Oct. 14, 1902.

H. C. LOWRIE.
COMBINATION LOCK.

(Application filed Mar. 15, 1902.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 2.

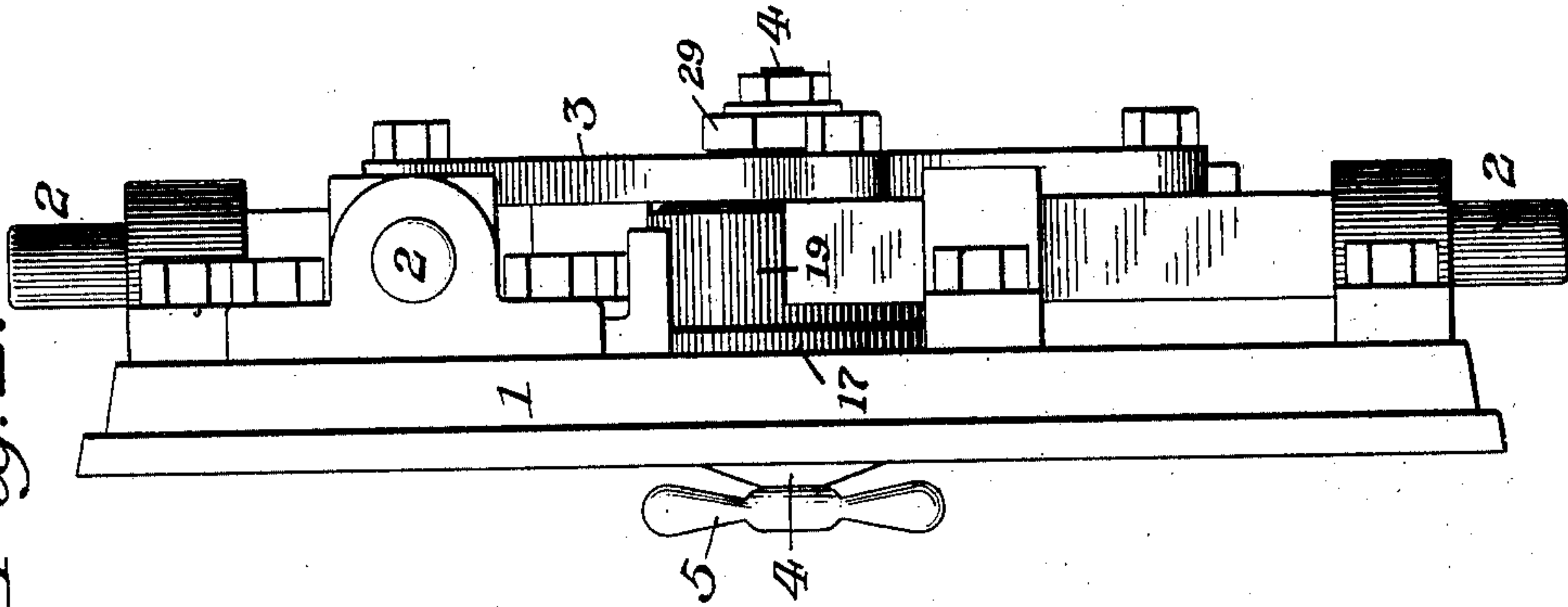
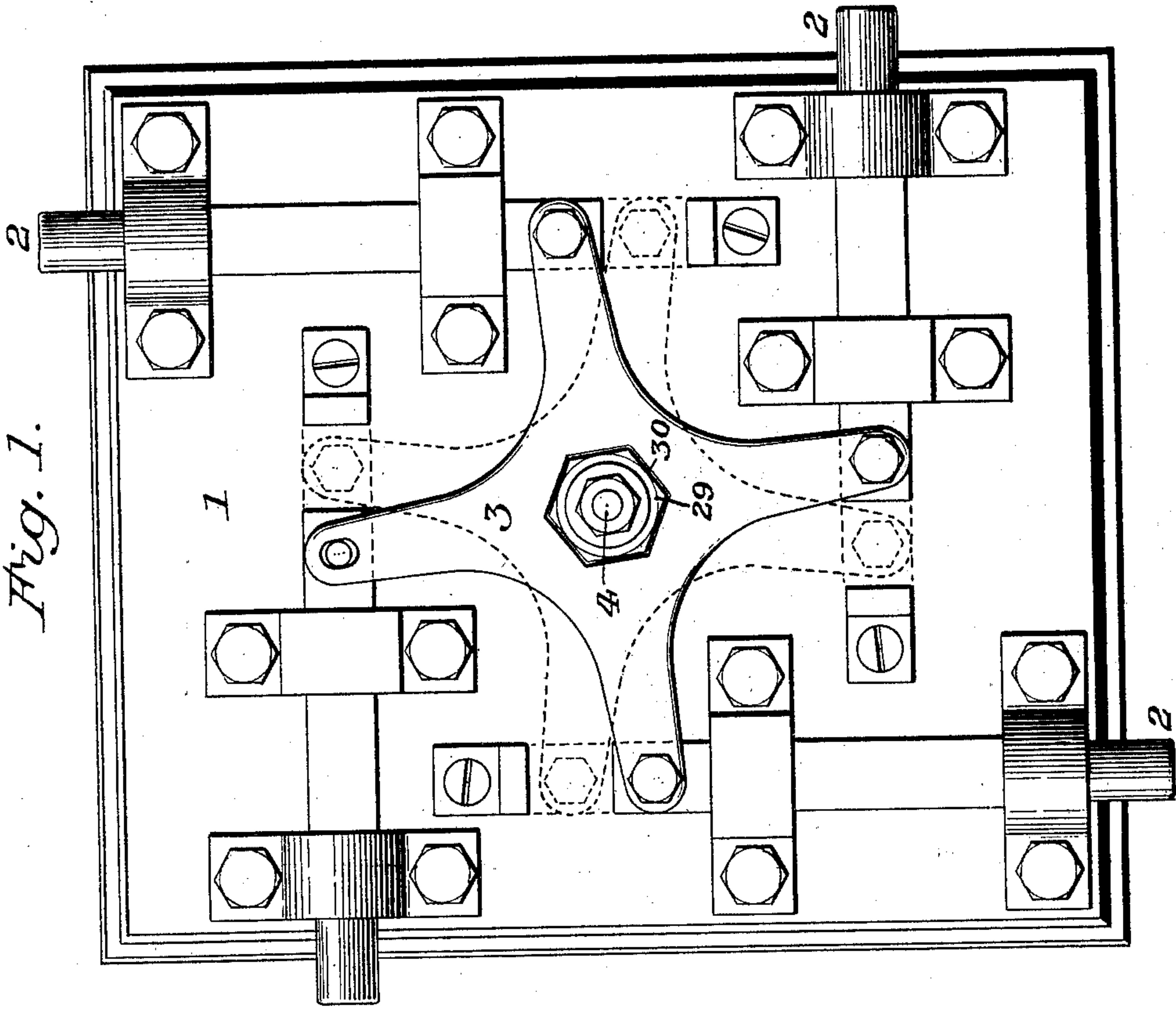


Fig. 1.



Attest:
C. W. Fowler
C. W. Keate

Inventor:
Harvey C. Lowrie,
By Howell South
attorney.

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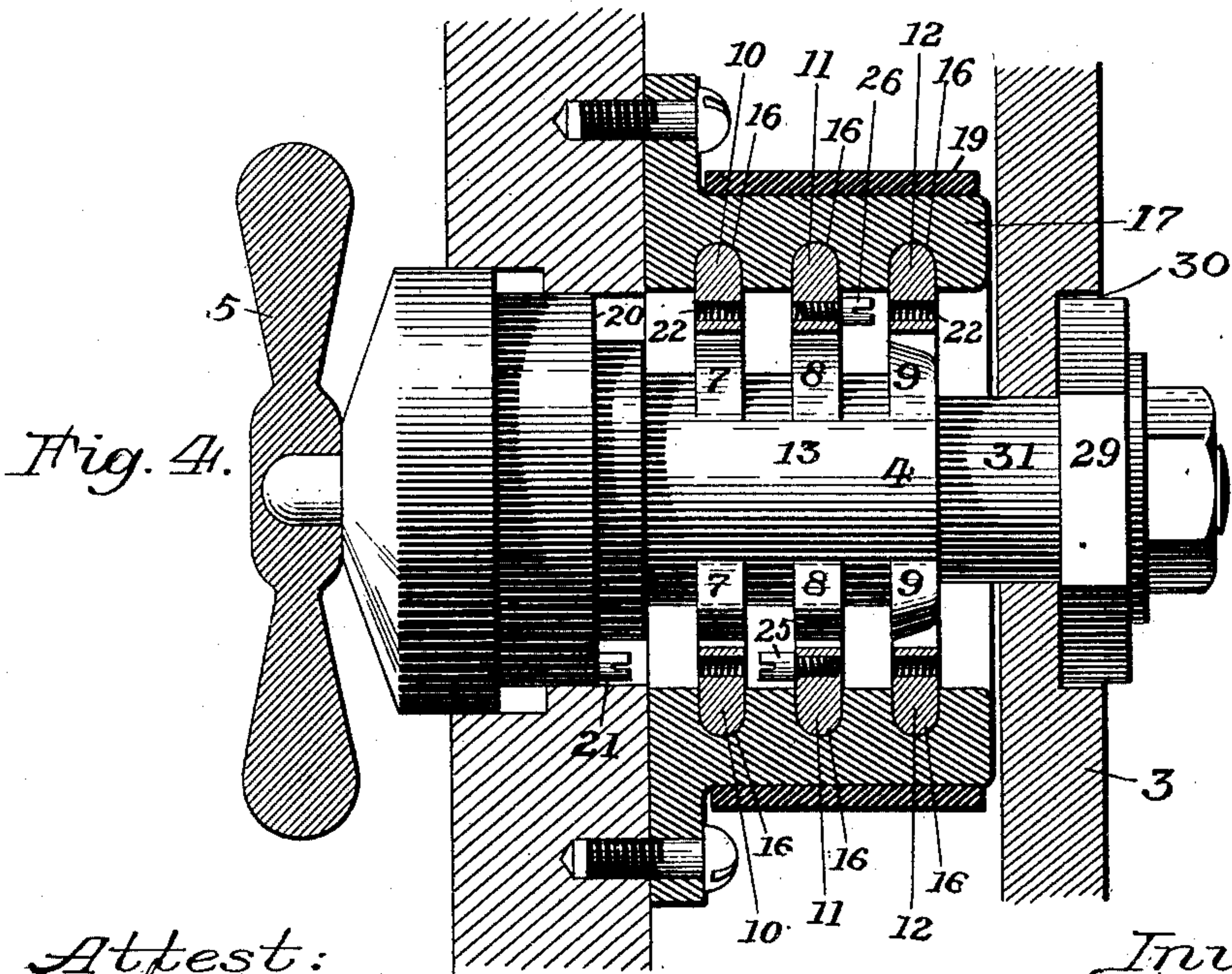
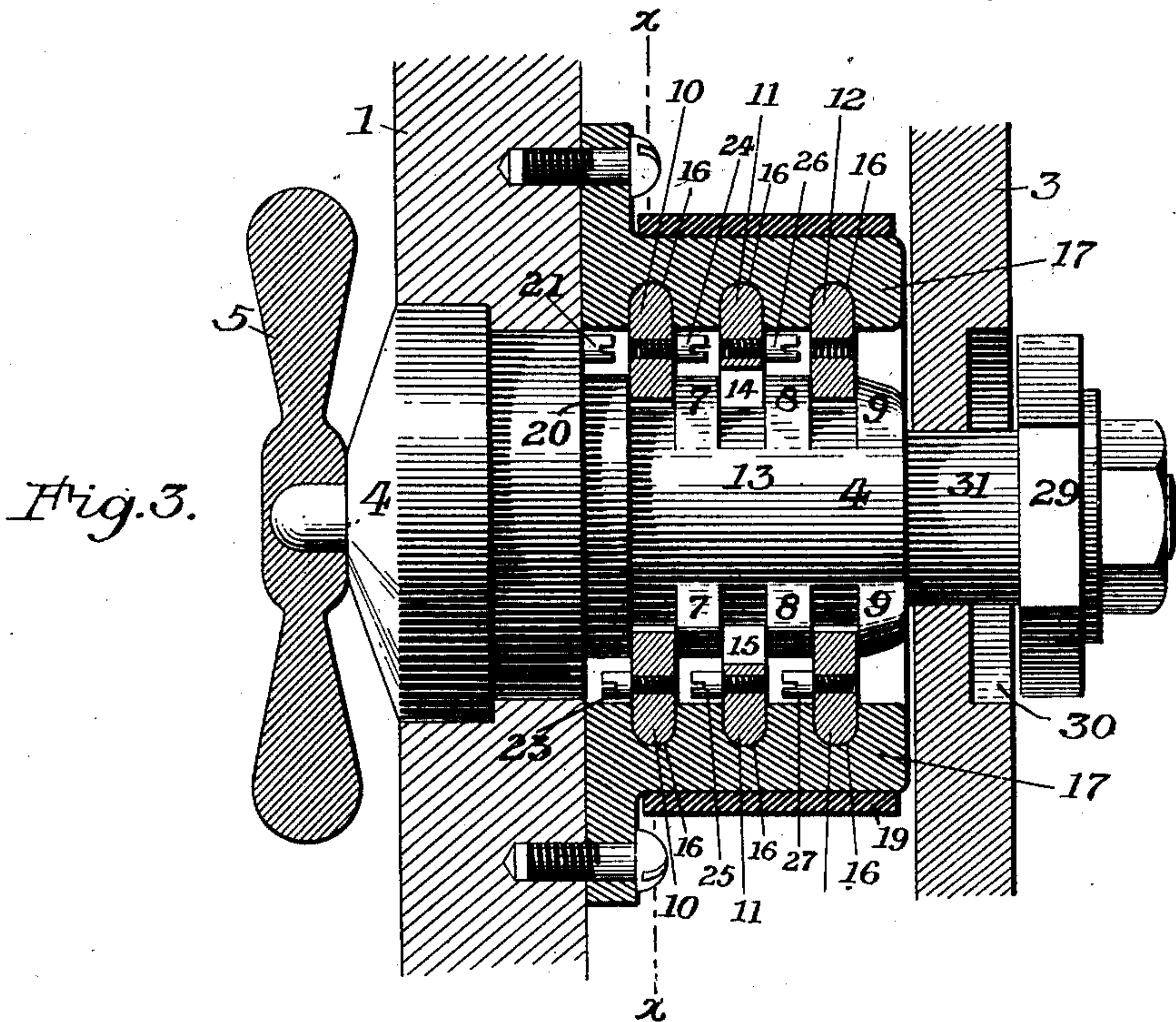
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Attest:
C. W. Fowler
Clerk

Inventor:
Harvey C. Lowrie,
By Lowell Smith
Attorney.

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3 Sheets—Sheet 3.

Fig. 5.

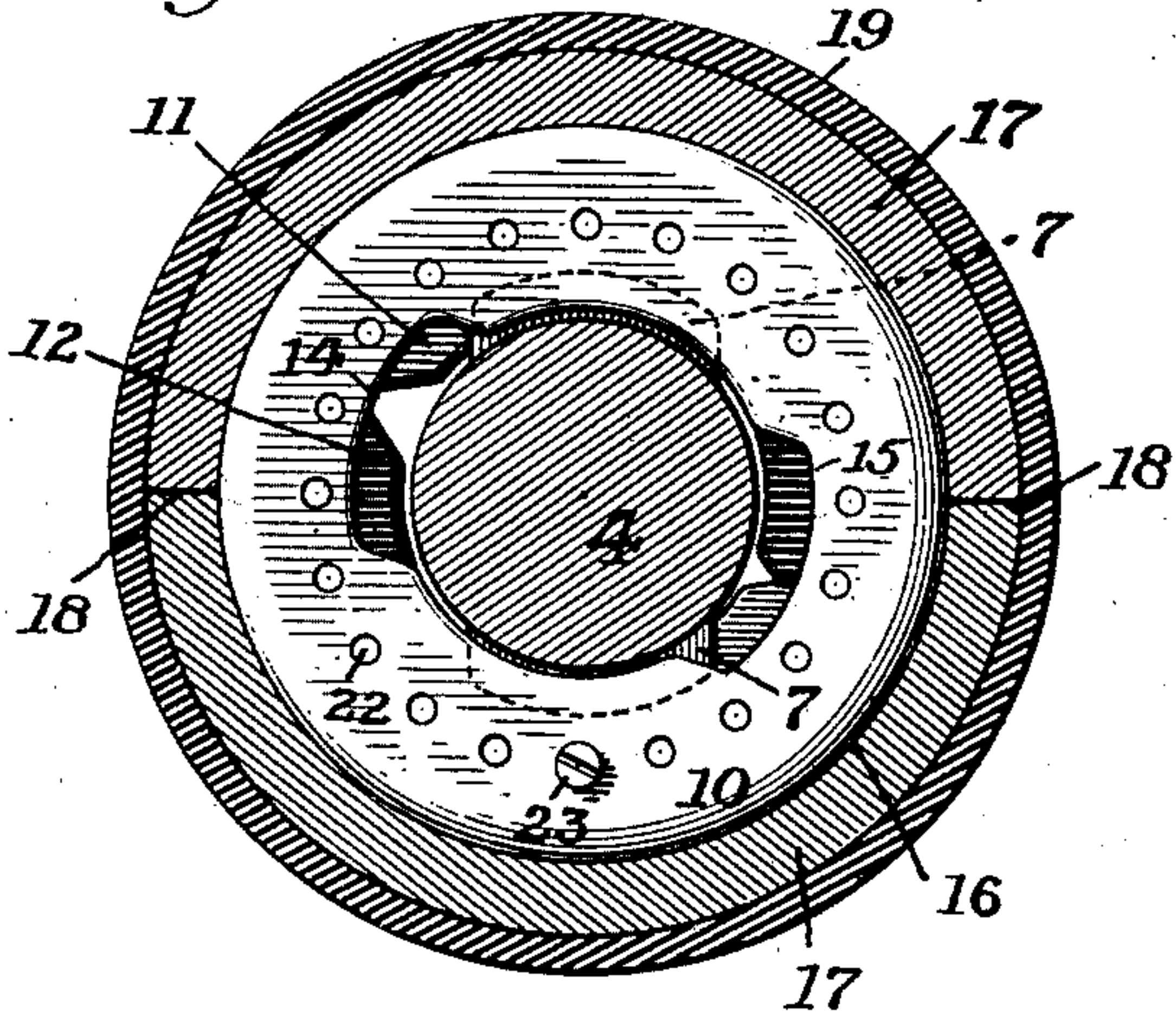


Fig. 6.

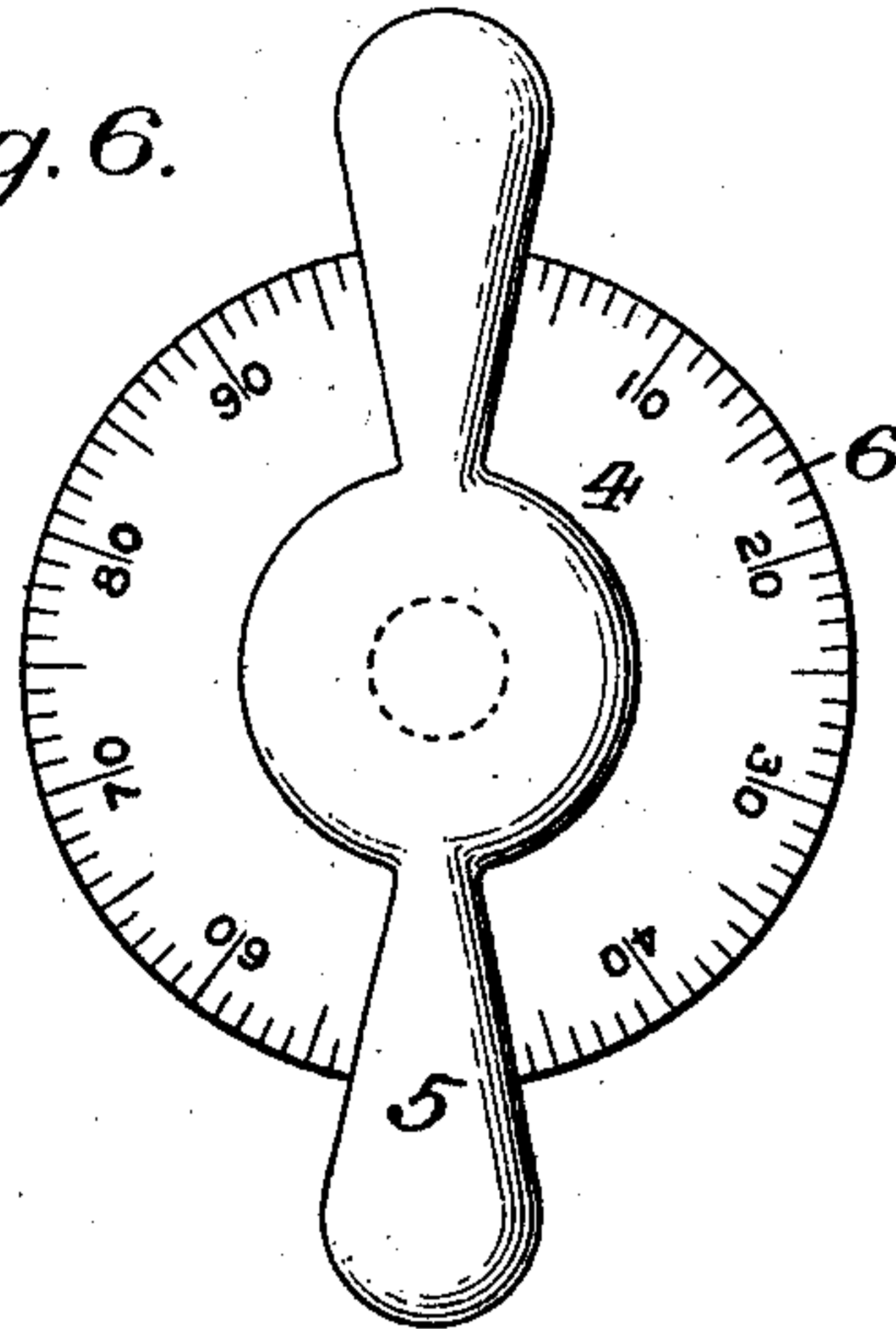


Fig. 7.

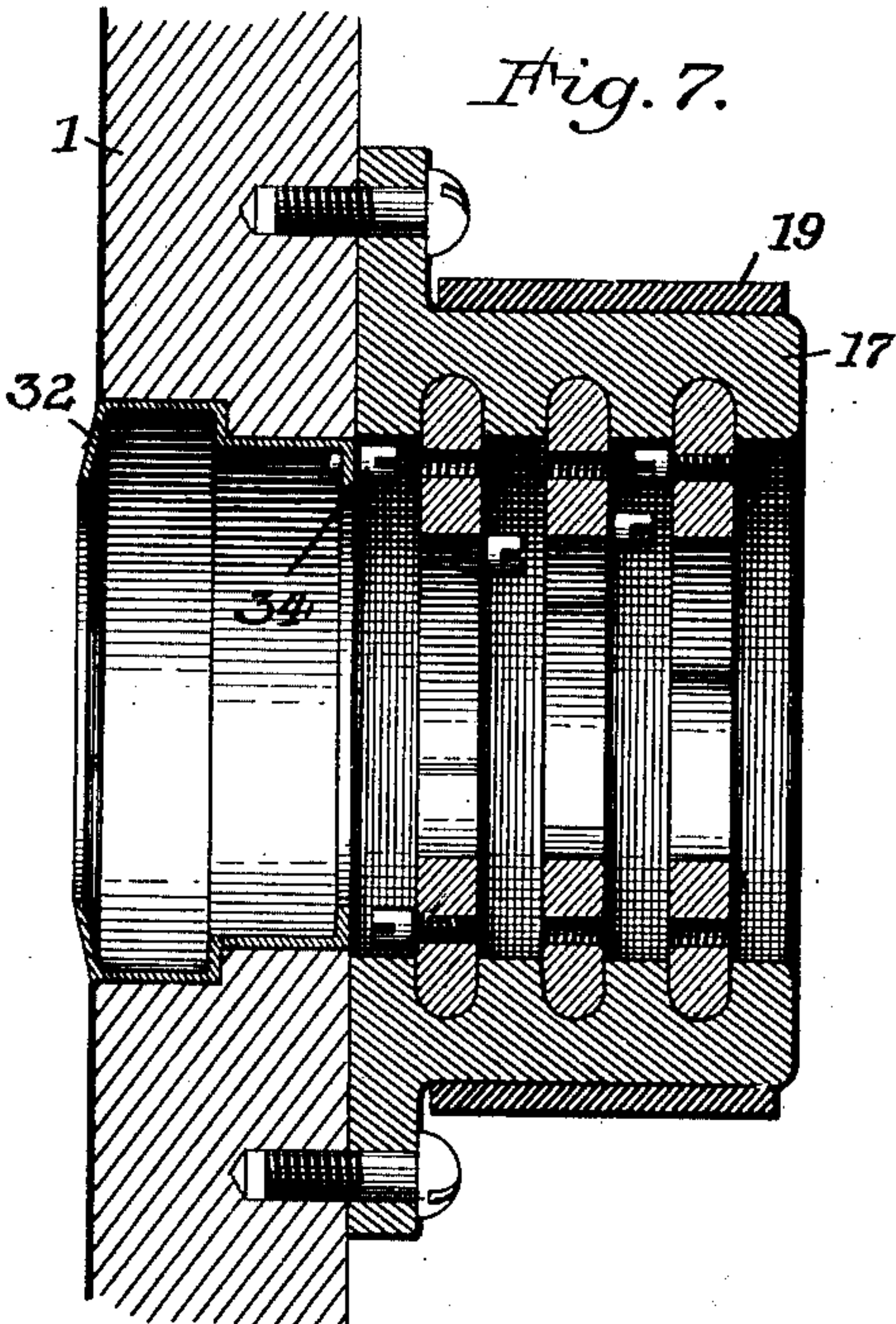
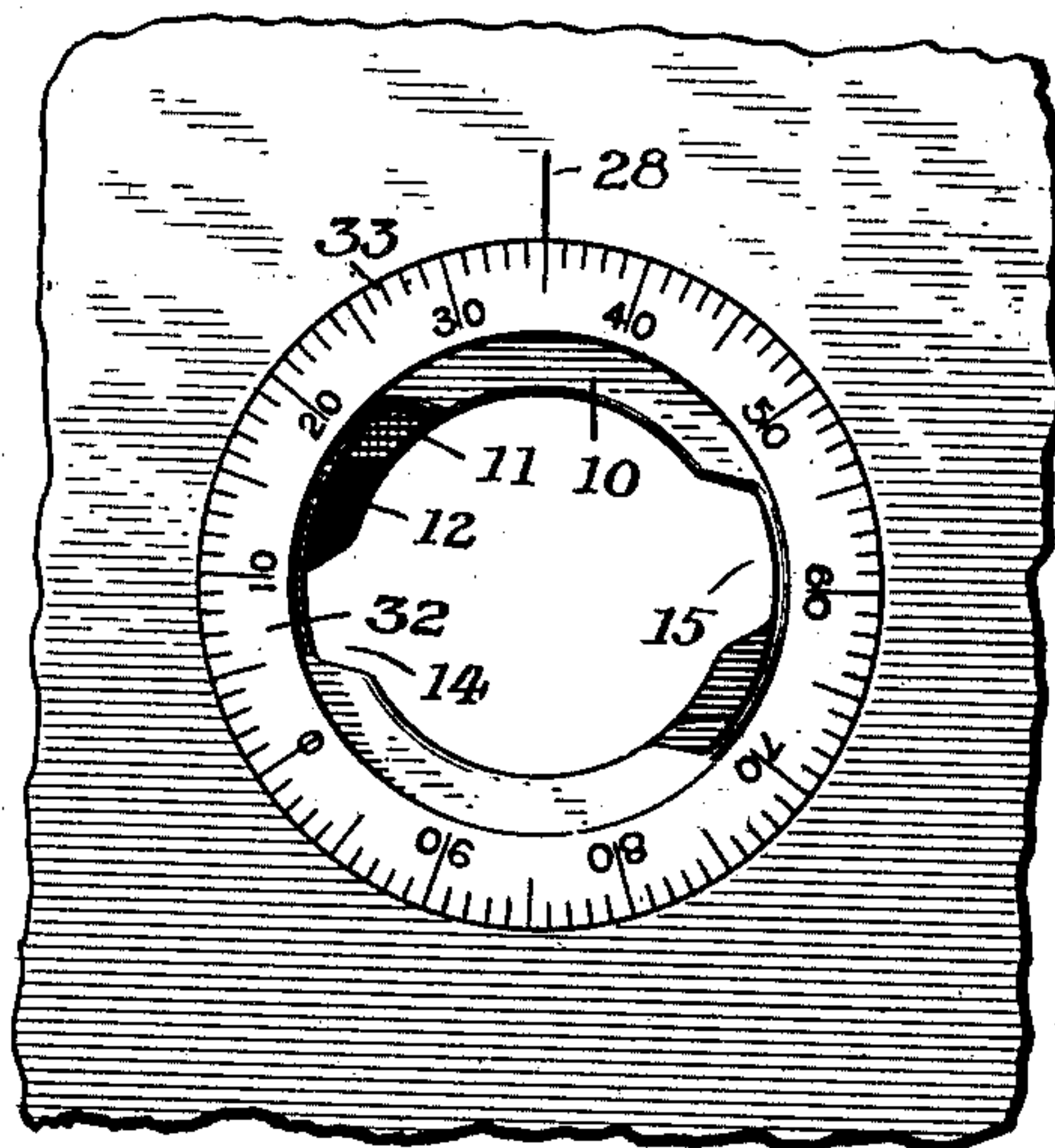


Fig. 8.



Attest:
C. W. Fowler.
C. W. Fowler

Inventor:
Harvey C. Lowrie
By *Lowell B. Smith*
Attorney.

UNITED STATES PATENT OFFICE.

HARVEY C. LOWRIE, OF DENVER, COLORADO.

COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 711,325, dated October 14, 1902.

Application filed March 15, 1902. Serial No. 98,370. (No model.)

To all whom it may concern:

Be it known that I, HARVEY C. LOWRIE, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented new and useful Improvements in Combination-Locks, of which the following is a specification.

My invention relates to the class of combination or permutation locks in which the locking mechanism and the bolts are operated by a single spindle, so that a safe-door or other article to which the lock is applied need be pierced at a single point only to accommodate the one spindle instead of at two points to accommodate the lock-spindle and a separate bolt-operating spindle.

In United States Letters Patent No. 693,142, granted to me February 11, 1902, I show and describe mechanism for securing a circular door to its casing, said mechanism embodying locking-lugs which are movable around the peripheral line of the door into and out of engagement with lugs or projections which co-operate therewith to lock the door to its casing. My present invention involves the application of the locking mechanism there shown to a bolt-operating spindle, the latter being held by said mechanism against longitudinal movement, which is necessary for coupling it to the bolt or bolts, but free to be rotated for unlocking said mechanism, as will be hereinafter explained.

The object of my present invention is the production of a lock of the character referred to which shall be simple in structure, strong, and efficient for the purposes intended; and to these ends it consists in the novel features to be hereinafter described, and particularly pointed out in the claims hereunto annexed.

Referring to the drawings furnished and forming a part of this specification, Figures 1 and 2 represent a safe-door in rear and side views, respectively, with my lock applied thereto. Fig. 3 is a vertical central section through the locking mechanism. Fig. 4 is a similar view showing the parts in their unlocked positions. Fig. 5 is a sectional view of the same on line *xx* of Fig. 3. Fig. 6 is a front or face view of the spindle detached from its case. Fig. 7 is a vertical longitudinal section through the lock-casing and a por-

tion of the safe-door with the operating-spindle removed and a device inserted in the spindle-opening for finding the lock combination, and Fig. 8 is a front or face view of the parts shown in Fig. 7.

In Figs. 1 and 2 I have illustrated a safe-door 1, provided with four bolts 2 2 2 2, which slide in bearings in such a manner as to permit of projection and retraction for locking or unlocking the door in a well-known manner; but it is to be understood that the form and arrangement of the bolts and the manner of connecting them to the operating member of the lock may be widely varied without departure from the main features of my invention. As shown, the top, bottom, and two sides of the door are each provided with one of the four bolts, and each bolt is connected at its rear end to a bolt-actuator 3, the latter being rotated by the lock-spindle for operating all of the bolts simultaneously, as will be readily understood.

The bolt-actuator 3 is mounted on the rear end of the spindle 4 of the lock, and the latter is mounted on the rear of the door, with spindle 4 projecting through to the front thereof, and said spindle is provided with a knob or handle 5, by means of which said spindle is revolved for releasing the locking mechanism and also for rotating the bolt-actuator, the revolutions for the former purpose being guided by a dial 6 in the same manner as the operating-spindle of an ordinary combination-lock.

Spindle 4 is provided with lugs or projections 7, 8, and 9, which are located in different lateral planes. There may be any number of these lugs, spaced a sufficient distance apart to accommodate the locking-rings 10, 11, and 12, and there may be only one or there may be two or more lugs in each plane, this being immaterial to my invention. In the drawings I show two lugs in each lateral plane located on opposite sides of the spindle, so as to leave unobstructed spaces 13 on opposite sides thereof to permit of longitudinal movement of the spindle when the cut-out portions of the locking-rings are brought in proper alinement with said lugs, as will be explained.

The locking-rings 10, 11, and 12 are duplicates of each other and should correspond in number to the number of lugs or sets of lugs

7, 8, and 9 on the spindle, with which the rings coöperate for holding the spindle against longitudinal movement. Each ring surrounds the spindle and is cut away adjacent thereto, as at 14 and 15, to afford passage-ways for the spindle-lugs when the cut-away portions of all the rings are in proper alinement therewith, as will be readily understood. Each ring is mounted in a groove 16 in the cylindrical case 17 and is free to be moved or rotated therein around said spindle, and to facilitate assembling the rings in the case the latter is made in two parts or split centrally, as at 18, Fig. 5, the two parts of the case being held together by an external sleeve 19, as clearly shown.

Spindle 4 is provided with a shoulder 20, in which are numerous screw-threaded holes, in one of which is inserted a pin 21, and each of the rings 10, 11, and 12 is also provided with screw-threaded holes 22, in which pins are also inserted, said pins being so arranged that when spindle 4 is rotated its pin 21 will collide with a pin 23 on ring 10 and push it around in its groove 16 so that pin 24 at the rear of said ring will collide with a pin 25 on ring 11, said ring 11 being in like manner pushed around in its groove, so that it will in turn move ring 12 by means of the pins 26 and 27, all of which will be readily understood.

The rings and spindle being in locking engagement, three complete turns of the spindle will bring ring 12 under control, so that it may be moved to any desired position with reference to the index 28, Fig. 8, on the door or on the spindle-casing should the latter be made to extend through the door. Then by reversing the rotation of the spindle ring 11 may be adjusted without disturbing ring 12, and by again reversing the rotation of the spindle ring 10 may be brought in line with the others, and if all of the rings be so adjusted as to bring their cut-out portions or passage-ways 14 and 15 into alinement the spindle by a reversal of rotation may be adjusted so that its lugs 7, 8, and 9 will be in alinement with said passage-ways, the spindle being then free to be pulled forward for coupling it to the bolt-actuator.

The bolt-actuator 3 is mounted on the rear end of spindle 4, which is reduced in diameter, as at 31, to afford a bearing of sufficient length to permit the spindle to be moved longitudinally, as above described. Any suitable means may be employed for coupling the spindle and actuator by a longitudinal movement of the former without departure from my invention. On the end of the spindle I have mounted a hexagonal plate of collar 29, which when the spindle is moved forward will enter an opening or cavity 30 of similar shape in the rear of the actuator. The spindle and actuator may be thus coupled together, and when so coupled the bolts 2 may be projected or retracted by a rotation of the spindle.

To lock the mechanism, it is only necessary to push the spindle rearwardly, which uncouples it from the actuator, and then give it one or two turns to throw the locking-rings out of alinement.

The screw-threaded holes 22 in the locking-rings and similar holes in the shoulder 20 of the spindle are provided for shifting the positions of the pins 21, 23, 24, 25, 26, and 27 for the purpose of changing the lock combination. After a change has been made in the position of any one or more of these pins it will require some little calculation to determine the true opening combination, and this must be done before the parts have been assembled and locked, for after that it will be difficult, if not impossible, to determine it.

In order that the combination of my lock may be changed at pleasure by the user and quickly and accurately determined, I have devised a "combination-finder," which, while it forms no part of the lock itself and is a separate and distinct device, is nevertheless an important adjunct to the main invention in that it simplifies the changing of the combination to such an extent that the operation may be performed by the user without liability of error, provided due care is exercised in noting the movements of the finder in its proper manipulation.

When the combination is to be changed, spindle 4 is removed from its casing 17, when its pin 21 and the pin 23 on ring 10 may be shifted without disturbing other parts of the lock; but the pin 24 on ring 10 and pins 25, 26, and 27 on rings 11 and 12 can only be shifted in position by removing the rings from the casing, this being done by removing the sleeve 19 and one-half of the casing, when all of the rings may be removed. After the desired number of pins have been shifted the rings are assembled in the casing and the latter closed and secured by the sleeve 19. The finder 32, Figs. 7 and 8, is then inserted in the spindle-opening and manipulated, as will be explained. This finder 32 is preferably made of thin sheet metal formed into a ring which accurately fits the spindle-opening, as shown in the drawings. On the face of the finder is a dial 33, corresponding to the dial 6 on the face of the spindle, and at the rear thereof, which corresponds to the shoulder 20 of the spindle, is a series of screw-threaded holes corresponding to the holes in said shoulder, and in one of these holes is a pin 34, which must occupy the same position with respect to the finder-dial as the pin 21 occupies with respect to the spindle-dial. The center of the finder being open, the position of the several rings may be plainly seen, as shown in Fig. 8, so that by turning or revolving the finder and noting the movements of the rings (which will be moved by the finder in the same manner as by the spindle) they may be brought into proper alinement, and the movements of the finder which are necessary to accomplish this (which should be noted and re-

corded) will be the proper movements to accomplish the same result by means of the spindle; but the position of the spindle when first inserted in the casing after the finder is removed must also be noted and recorded as the position to which the spindle must be moved in order to withdraw it after it has been manipulated to adjust the several rings.

The finder just described if made of proper size and shape may also be used to determine the combination of the safe-door lock described in my aforesaid prior Letters Patent.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a combination-lock the combination of an operating-spindle having lugs or projections, two or more rings surrounding said spindle adapted to cooperate with said lugs for preventing or permitting longitudinal movement of said spindle, said rings being cut out adjacent to said spindle to afford passage-ways for said lugs, means whereby the cut-out portions of all the rings may be moved into or out of alinement with each other and a bolt-actuator adapted to be coupled to and uncoupled from said spindle by longitudinal movements of the latter, substantially as described.

2. In a combination-lock the combination of a bolt-operating spindle provided with lugs or projections, rings surrounding said spindle adapted by rotation to engage and disengage said lugs for preventing or permitting a longitudinal movement of said spindle, means whereby said rings may be rotated to their proper positions of adjustment by rotations of said spindle and a bolt-actuator adapted to be coupled to and uncoupled from said spindle by longitudinal movements of the latter, substantially as described.

3. In a combination-lock the combination of a bolt-operating spindle provided with lugs or projections, rings surrounding said spindle supported independently thereof and adapted by rotation around said spindle to engage and disengage said lugs for preventing or permitting longitudinal movement of said spindle, and means whereby said rings may be rotated to their proper positions of adjustment by rotating said spindle, substantially as described.

4. In a combination-lock the combination of a rotatable bolt-actuator, a spindle adapted by longitudinal movement to be coupled to or uncoupled from said actuator, lugs or projections on said spindle, two or more rings surrounding said spindle adapted by rotation to engage and disengage said lugs for preventing or permitting longitudinal movement of said spindle, and means whereby said rings may be rotated and adjusted with reference to each other by rotating said spindle, substantially as described.

5. In a combination-lock the combination of one or more bolts, an actuator therefor, an

operating-spindle for said actuator provided with lugs or projections, means whereby said spindle may be coupled to or uncoupled from said actuator by longitudinal movements of said spindle, two or more rings surrounding said spindle and supported independently thereof, said rings being adapted by rotation around said spindle to engage or disengage said lugs for preventing or permitting longitudinal movement of said spindle, and means whereby said rings may be moved or rotated by rotating said spindle, substantially as described.

6. In a combination-lock the combination of a rotatable bolt-actuator having an opening or depression therein, a rotatable spindle provided with a collar or projection adapted to enter said opening or depression when said spindle is moved longitudinally, two or more rings surrounding said spindle having portions cut away adjacent to the spindle, lugs on said spindle adapted to cooperate with said rings for holding the spindle against longitudinal movement, and means whereby said rings may be rotated by the spindle for placing the cut-out portions of all the rings in or out of alinement with each other, substantially as described.

7. In a combination-lock the combination of an operating-spindle provided with lugs or projections, rings surrounding said spindle adapted by rotation to engage and disengage said lugs for preventing or permitting longitudinal movement of said spindle, a two-part casing provided with interior grooves in which said rings are mounted, means for securing the separable parts of said case together, and means whereby said rings may be rotated in said grooves around said spindle and adjusted with reference to each other and to the spindle by rotations of the latter, substantially as described.

8. In a combination-lock the combination of an operating-spindle having lugs or projections, two or more rings surrounding said spindle and adapted by rotation around the same to engage and disengage said lugs for preventing or permitting longitudinal movement of said spindle, a two-part cylindrical casing provided with interior grooves for supporting said rings, an exterior sleeve for holding the parts of said casing together, and means operated by rotating said spindle for rotating and adjusting said rings, substantially as described.

9. In a combination-lock the combination of an operating-spindle having lugs or projections, two or more rings surrounding said spindle adapted by rotation to engage and disengage said lugs for preventing or permitting longitudinal movement of said spindle, pins on each of said rings adapted by engagement to impart motion from one ring to another, a similar pin on the spindle for engaging a pin on one of said rings, means for shifting the radial location of one or more of said

pins with respect to the ring or spindle to which it is attached and a bolt-actuator adapted to be coupled to and uncoupled from said spindle by longitudinal movements of the latter, substantially as and for the purposes specified.

In testimony whereof I have hereunto set

my hand in presence of two subscribing witnesses.

HARVEY C. LOWRIE.

Witnesses:

ARTHUR N. INMAN,
JOHN S. FOWLER.