

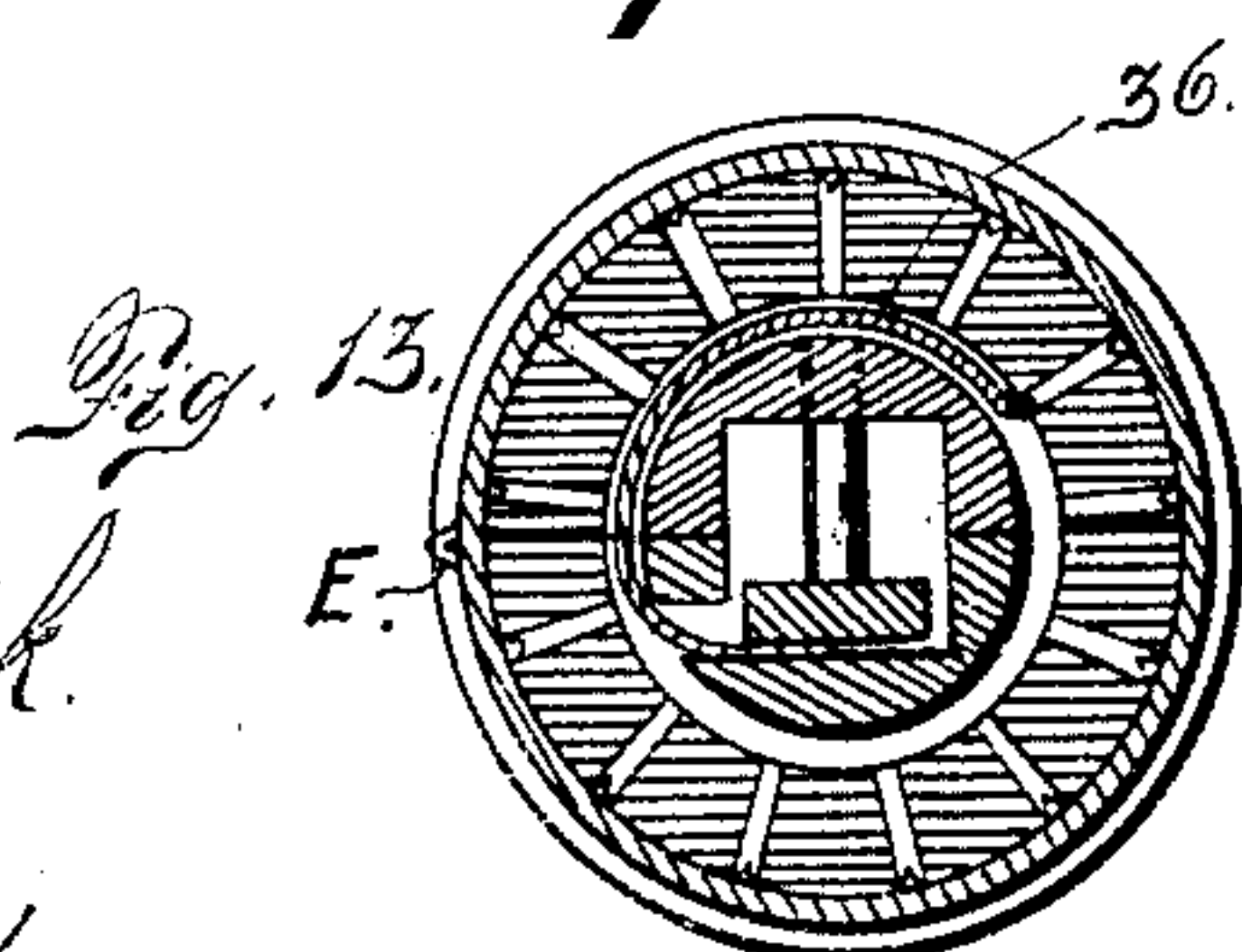
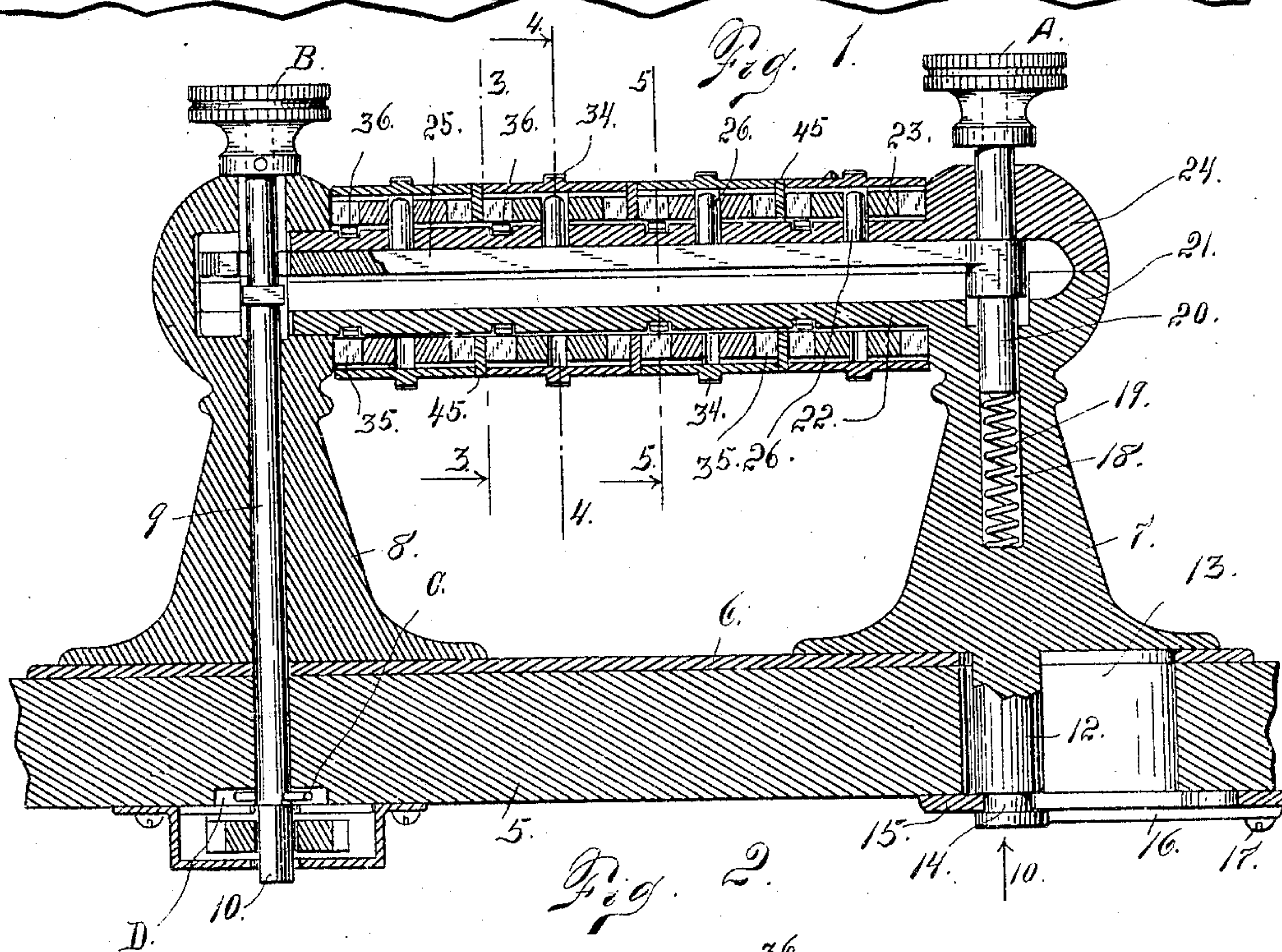
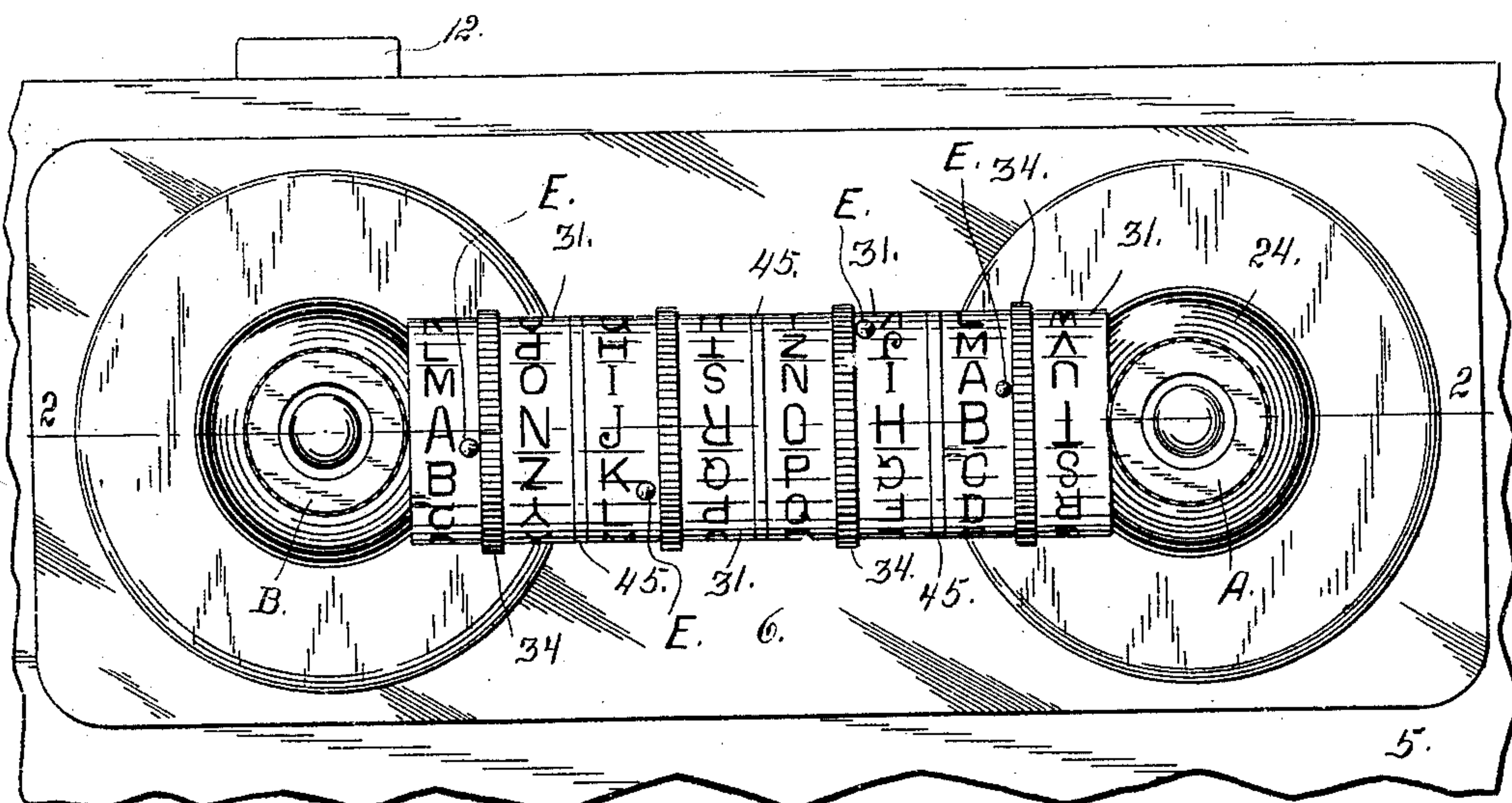
No. 840,088.

PATENTED JAN. 1, 1907.

E. E. QUAINANCE.  
PERMUTATION LOCK.

APPLICATION FILED FEB. 13, 1906.

2 SHEETS—SHEET 1.



Witnesses

Otto E. Hoddick.  
Dena Nelson.

E. E. Quaintance.

Inventor

*[Signature]*

Attorney



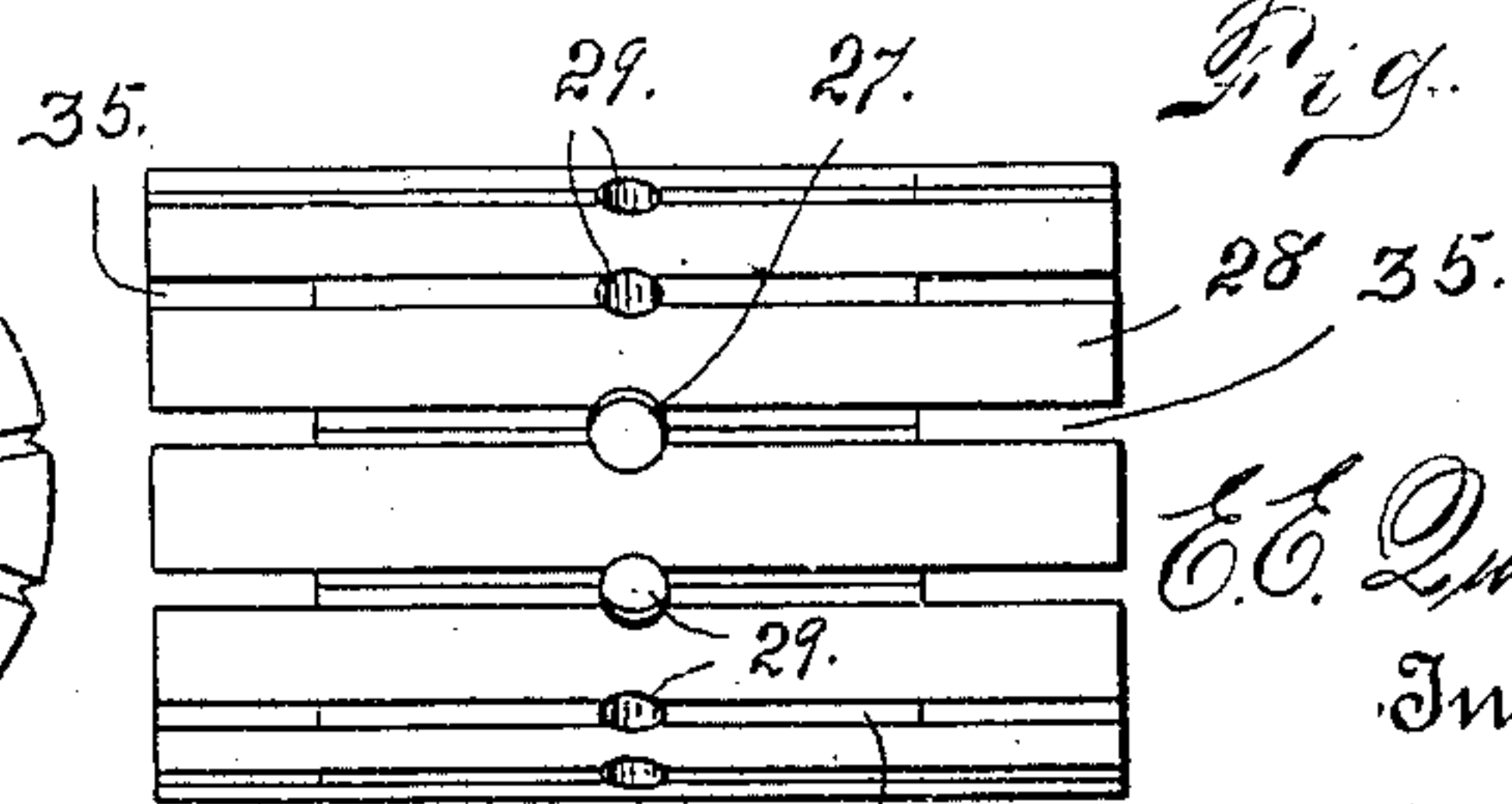
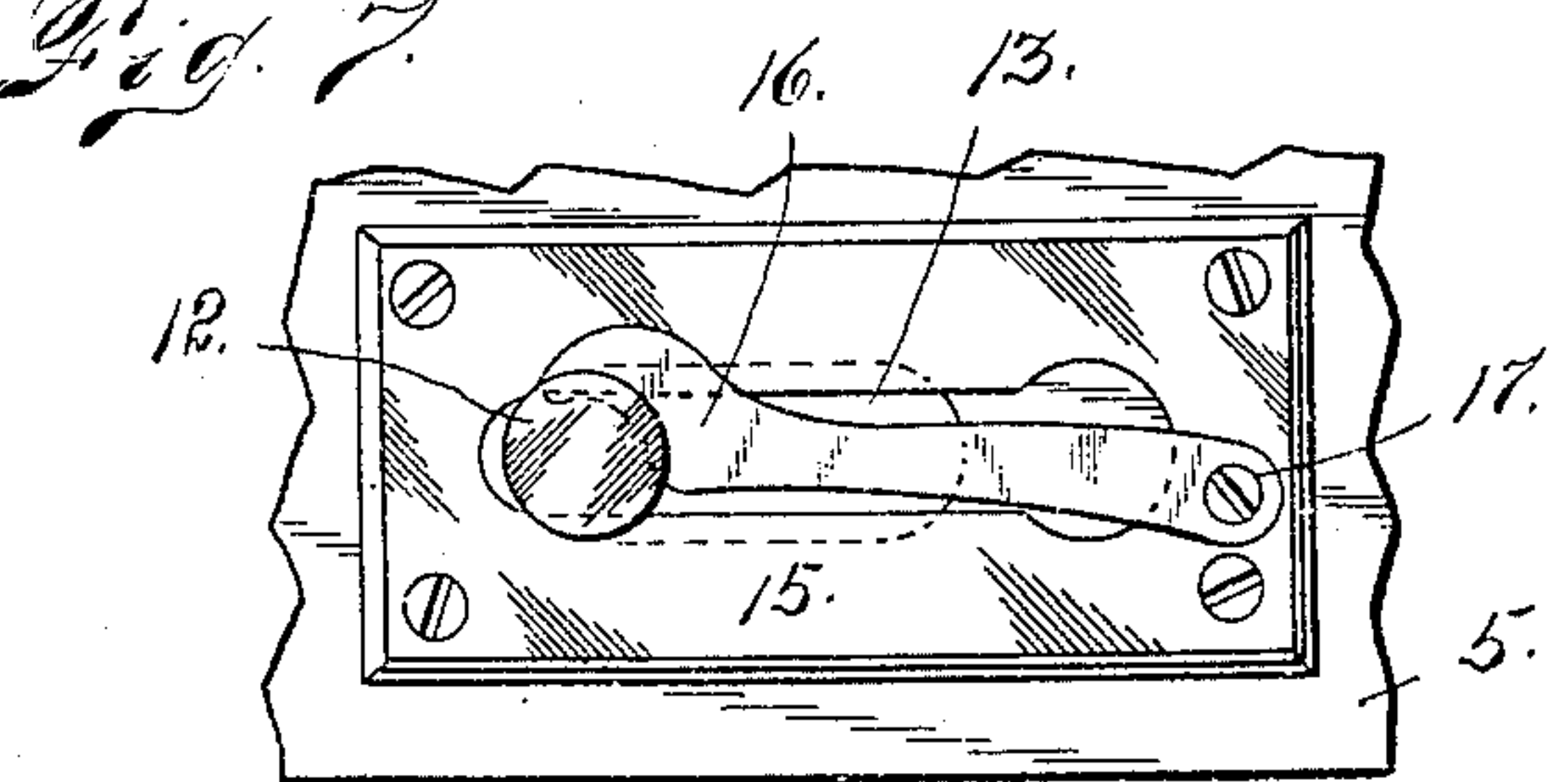
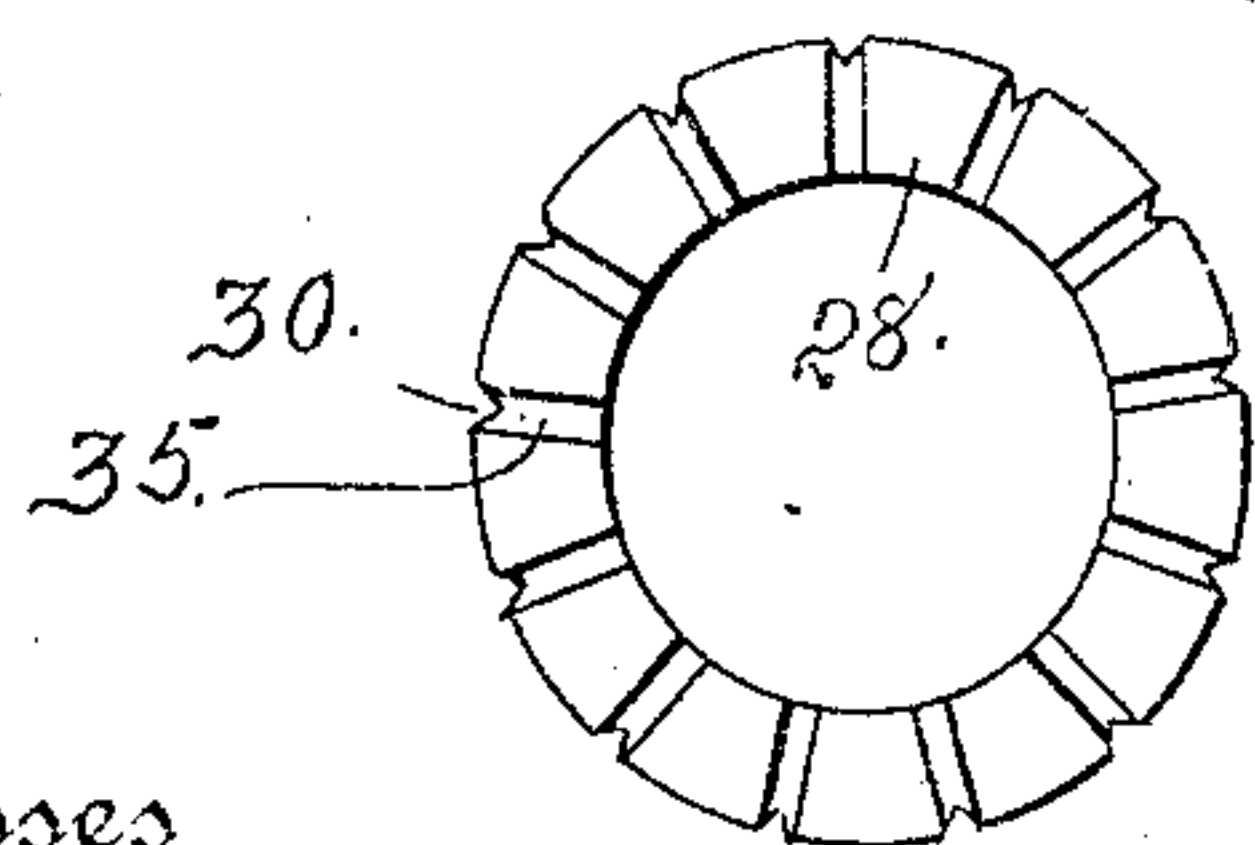
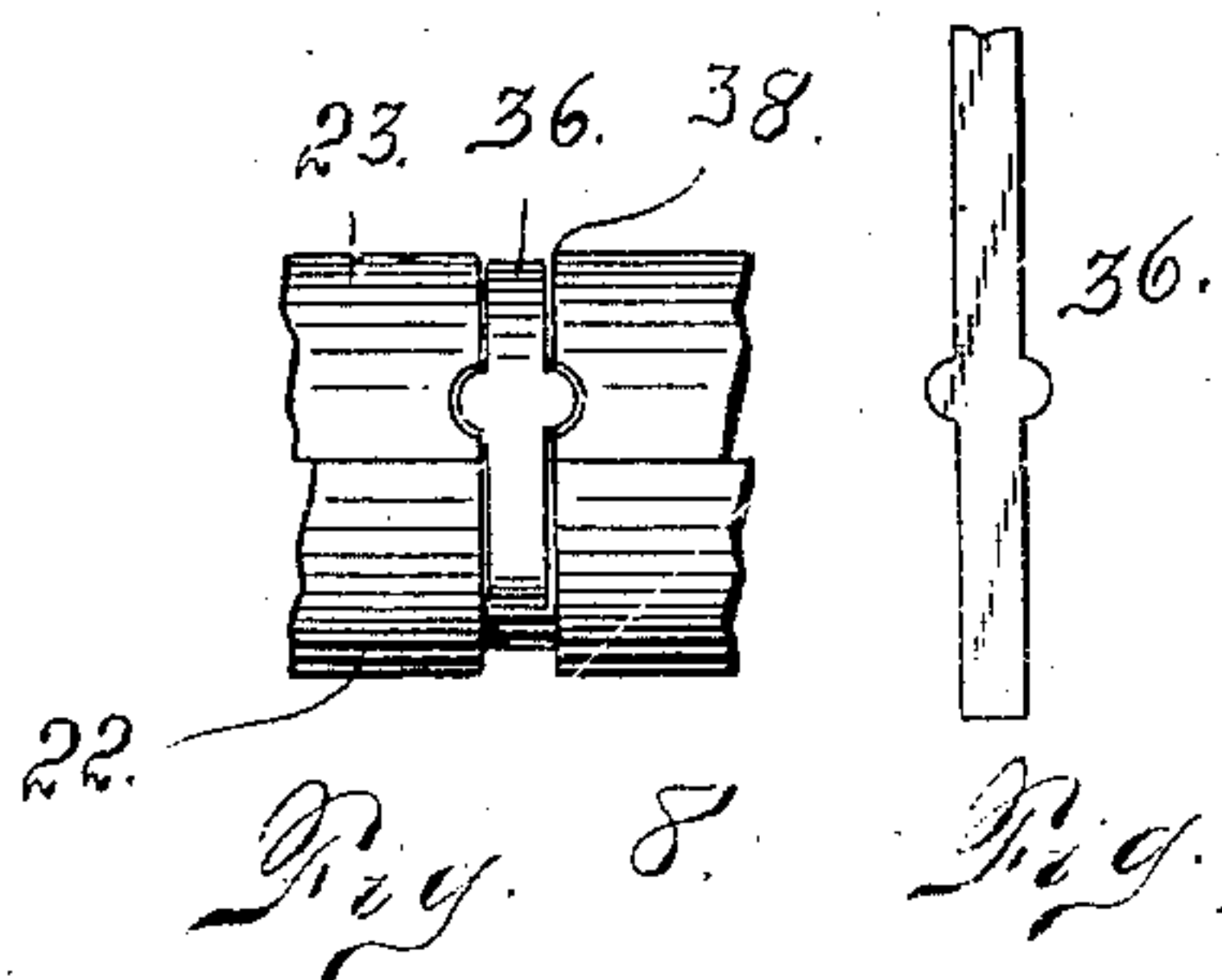
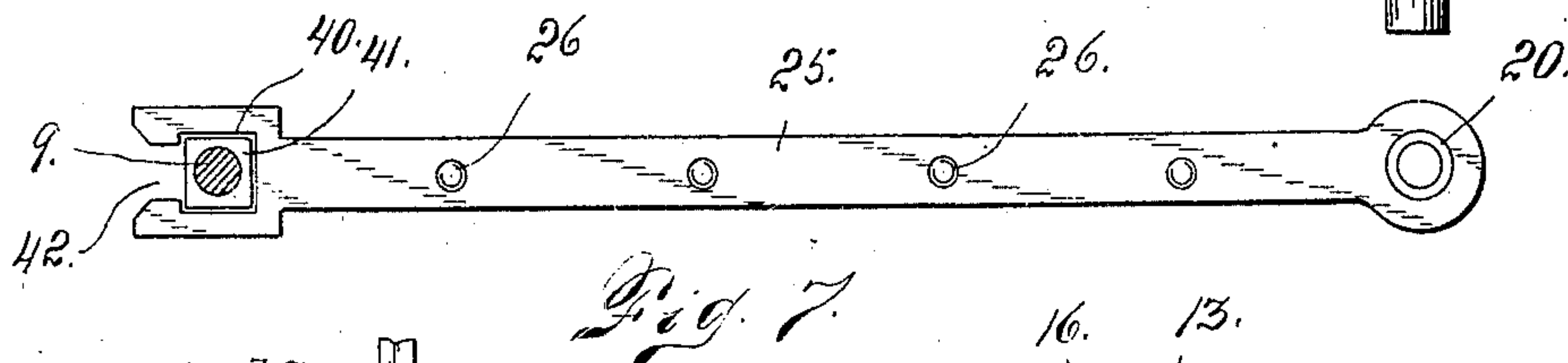
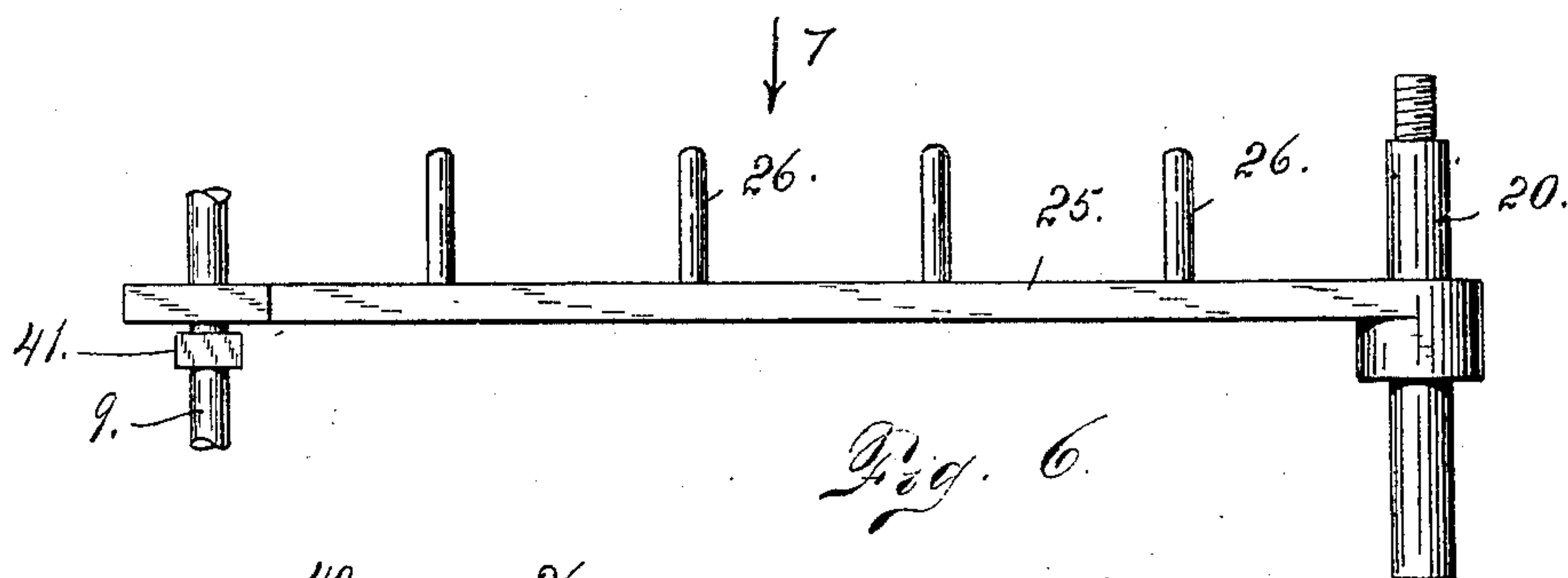
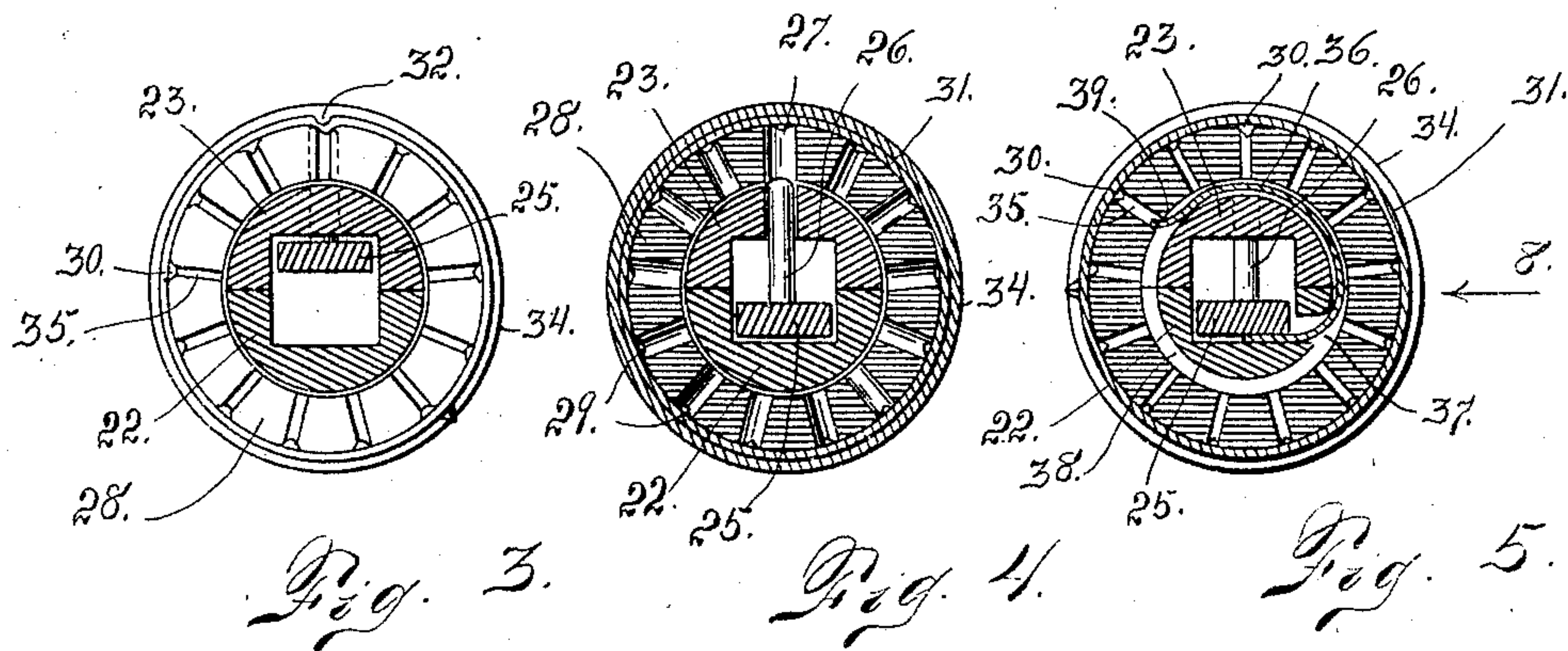
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2 SHEETS—SHEET 2.



Witnesses  
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Fig. 12.

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# UNITED STATES PATENT OFFICE.

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## PERMUTATION-LOCK.

No. 840,088.

Specification of Letters Patent.

Patented Jan. 1, 1907.

Application filed February 13, 1906. Serial No. 300,843.

*To all whom it may concern:*

Be it known that I, ELSWORTH E. QUAINANCE, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Permutation - 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 characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in permutation-locks of the general description set forth in Patent No. 785,834, issued to me March 28, 1905, and Patent No. 817,388, issued to me April 10, 1906.

My present improvement relates to certain features of novelty whereby the lock is adapted for use as a lock for doors or other movable devices which are required to be secured from time to time.

The invention will now be described in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 may be termed a "front" view of my invention with the structure to which it is applied partly broken away. Fig. 2 is a vertical longitudinal section taken on the line 2 2, Fig. 1. Figs. 3, 4, and 5 are sections taken on the lines 3 3, 4 4, and 5 5, respectively, of Fig. 2. Fig. 6 is a detail elevation of the locking-bar and the end spindles with which it is connected. Fig. 7 is a top view of the same or a view looking in the direction of arrow 7 in Fig. 6, the spindle at the left being shown in section. Fig. 8 is a fragmentary side elevation of the hollow spindle shown on a larger scale and with one of the click-springs in place. This view is taken looking in the direction of arrow 8 in Fig. 5, assuming that the mechanism outside of the spindle is removed. Fig. 9 is a detail view of a spring extended. Fig. 10 is a view looking in the direction of arrow 10 in Fig. 2. Fig. 11 is an end elevation of a tumbler shown on a larger scale. Fig. 12 is a side elevation of the same. Fig. 13 is a cross-section similar to Fig. 5, but showing a click-spring projecting in the opposite direction from that shown in Fig. 5.

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

Let the numeral 5 designate a suitable device as a movable part to which my improved lock is applied. To the part 5 is secured an escutcheon-plate 6, upon which are mounted two pedestals 7 and 8. The pedestal 8 is rigidly secured to the escutcheon-plate, and in it is journaled a spindle 9, which passes through the pedestal and through the parts 6 and 5, its inner extremity being made angular in cross-section, as shown at 10, whereby it is fashioned to operate a latch-bolt 12.

The pedestal 7 is journaled in an elongated opening 13, formed in the parts 5 and 6, its inner extremity having a circumferential groove 14, which is engaged by a securing-plate 15, fastened to the inner surface of the part 5. The journal 12 of the pedestal is both rotatable and slidable within the opening 13. The pedestal may be locked against sliding movement by a locking-arm 16, pivotally mounted at 17.

Within the pedestal 7 beyond the escutcheon-plate is bored a recess 18, in which is located a coil-spring 19, whose tendency is to force a spindle 20 outwardly. The outer extremity of the pedestal 7 is enlarged, as shown at 21, and this enlarged portion is provided with a spindle member 22, extending at right angles to the spindle 20 and cooperating with a spindle member 23, which, as shown in the drawings, is provided with an enlarged semispherical extremity 24, which engages the enlargement 21 of the pedestal. The spindle members 22 and 23 are interiorly grooved to form a longitudinal recess in which is located a locking-bar 25, provided with pins 26, adapted to enter openings 27, formed in tumblers 28, rotatably mounted upon the hollow spindle. Each tumbler is provided with a number of smaller openings 29, none of them, however, except the opening 27, being large enough to receive a pin 26. There is a pin 26 for each tumbler, and there may be any desired number of tumblers rotatively mounted upon the hollow spindle of the lock. As shown in the drawings, (see Fig. 2,) there are four of these tumblers and each is longitudinally grooved on its outer surface, as shown at 30, to receive a sleeve 31, the latter being provided with a slight indentation or tongue 32, adapted to enter any groove of the tumbler. One of



these grooves 30 is in line with each of the openings 27 and 29. The sleeves 31 are provided with characters, as letters, to facilitate the setting of the combination as desired.

5 In other words, with a lock of this character the sleeves may be so set upon the tumblers as to require the alined coincidence of any combination of letters on the series of sleeves 31 in order to permit the opening of the lock.  
 10 As shown in the drawings, each sleeve 31 is provided with a centrally-located milled rib 34, upon each side of which is formed a complete alphabet of letters. By virtue of this arrangement practically unlimited capacity  
 15 or range is allowed for varying the combination of the lock.

The tumblers 28 are reversible. The grooves 30 at each extremity of the tumbler are cut entirely through, as shown at 35, as a  
 20 convenient manner of forming recesses or grooves to receive the click-springs 36, which engage the tumblers on the inside. These springs produce a clicking sound every time a groove or slot 35 is reached, and if the opera-  
 25 tor knows the number of grooves in any tumbler he can tell from the number of clicks when the tumbler has been given a complete rotation or any desired portion thereof. The click-springs 36 are inserted in openings 37,  
 30 formed in the member 22 of the hollow spindle. This spindle is provided with circumferential grooves 38, into which the springs are bent before putting the tumblers in position. One extremity of each spring is in-  
 35 serted in an opening 37 of the spindle, while the other extremity (designated 39) projects slightly outwardly from the spindle and engages the slots or grooves 35 of a tumbler.

The locking-bar 25 is rigidly connected  
 40 with the spindle 20 and is provided with a number of pins 26 equal to the number of manipulating-tumblers. This locking-bar is laterally movable within the longitudinal opening or hollow of the tumbler-spindle.  
 45 When the tumblers are so arranged that all of the large openings 27 are in alinement, the spring 18 will force the spindle 20 outwardly and impart to the locking-bar 25 a corre-  
 50 sponding movement, whereby all of its pins 26 are made to enter the openings 27 of the tumblers. The extremity of the locking-bar remote from the spindle 20 is provided with a polygonal opening 40, adapted to approxi-  
 55 mately fit a counterpart portion 41 of the spindle 9. Beyond the opening 40, or farther to the left thereof, referring to Figs. 1, 6, and 7 of the drawings, the extremity of the bar is cut away, as shown at 42, to allow the locking-bar to move away from the spindle 9  
 60 when disengaged from its part 41. The opening 42 is somewhat narrower than the opening 40, so that when the part 41 of the spindle 9 engages the opening 40 the locking-bar is prevented from endwise movement in  
 65 either direction. When, however, the recoil

of the spring 19 forces the locking-bar to the position shown in Fig. 2, whereby its pins are made to enter the orifices 27 of the tumblers, the locking-bar is shifted on the spindle 9 sufficiently to disengage its opening 40 from  
 70 the part 41 of the said spindle, in which event the spindle 9 is allowed to rotate, while at the same time the locking-bar of the pedestal 7 is allowed to move toward the right (see Fig. 2) a sufficient distance to disengage  
 75 the locking-bar from the pedestal 8 and allow the pedestal 7 to be turned on its journal, thus exposing the tumblers 28 and their sleeves 31 to removal for any purpose, as in changing the combination of the lock. 80

When it is desired to return the members to the locking position, the pedestal 7 is turned into the proper position and then pushed toward the pedestal 8, the journal 16 moving in the elongated opening 13. Then  
 85 in order to lock the spindle 9 against turning the spindle 20 is forced into the recess 18 against the spring 19 until the opening 40 of the locking-bar engages the angular portion 41 of the spindle 8. Then by turning any  
 90 sleeve 31 and its tumbler the locking-bar will be held in the said position until the proper combination of letters is brought into alinement to again release the parts. The spindles 9 and 20 are provided with exteriorly-  
 95 located milled knobs A and B for convenience of manipulation. Of course in order to shift the pedestal 7 longitudinally in the opening 13 it is necessary to throw the locking device 16 outwardly or disengage it from  
 100 the journal. This device 16, however, makes it practicable to prevent the moving of the pedestal 7 without having first adjusted the device 16 from the inside. This under some  
 105 circumstances may be desirable. Between the tumblers and their lettered sleeves 31 are preferably placed separating rings or washers 45 to prevent any tendency on the part of one tumbler to actuate an adjacent  
 110 tumbler.

The hollow spindle, together with the tumblers and sleeves, forms a cylindrical body constituting a handpiece for manipu-  
 115 lating the door or other movable part upon which the lock is mounted. The end tumblers of this handpiece, together with their sleeves, engage shoulders on the pedestals 7 and 8. Hence when the parts are assembled the movable parts carried by the hollow  
 120 spindle are held in compact form and in operative relation. In order to prevent the spindle 9 from moving longitudinally or endwise, a pin C is connected therewith at its inner extremity and projects into a recess D  
 125 of the part 5, which prevents the spindle from being pulled out through its pedestal.

The sleeves 31, in combination with the letters of the alphabet, may be provided with projections E, which will enable the operator to open the lock in the dark. These pro- 130



jections are illustrated in Fig. 1. They may have any desired position with reference to the large openings 27 of the tumblers, and this being known to the person whose business it is to open the lock he will know exactly how many clicks to turn in sleeve after the projection E has reached the uppermost part of the handle member of the lock. For instance, assuming that the lock is in the locked position, all the projections E are in alinement at the top. The operator will know that each tumbler must be turned a definite number of clicks in one direction or the other in order to bring all of the large openings 27 of the tumblers into alinement to permit the pins 26 of the locking-bar to enter.

Having thus described my invention, what I claim is—

1. In a lock, the combination with a suitable support, of a relatively stationary pedestal mounted on the support, a bolt-operating spindle journaled in the pedestal, a second pedestal journaled in the support and connected therewith to have a limited movement toward and away from the stationary pedestal, a hollow spindle mounted on the journaled pedestal, a locking-bar located in the hollow spindle, and a spring-actuated spindle mounted on the stationary pedestal parallel with the bolt-operating spindle, the spring-actuated spindle being rigidly connected with the locking-bar, the said bar being provided with a number of pins, tumblers rotatively mounted on the hollow spindle, each tumbler having an opening of a size to receive a pin of the locking-bar so that when the corresponding openings of all the tumblers are in alinement, the pins of the bar may simultaneously enter the tumblers, the stationary pedestal being recessed adjacent to the bolt-operating spindle to receive the locking-bar, the bolt-operating spindle having a polygonal-shaped part adapted to receive a corresponding opening formed in the adjacent extremity of the locking-bar, the outward movement of the spring-actuated spindle when the pins of the locking-bar enter the tumblers, being sufficient to disengage the locking-bar from the polygonal-shaped part of the bolt-operating spindle, the locking-bar being open at the end to allow it to pull away from the bolt-operating spindle, and the last-named spindle being free to turn for bolt-operating purposes when the locking-bar is actuated as aforesaid, the movement of the movable pedestal away from the stationary pedestal being sufficient to disengage the locking-bar from the stationary pedestal, allowing the journaled pedestal to turn whereby the hollow spindle and its connections are exposed at one extremity for the purpose set forth.

2. In a lock of the class described, the combination with a suitable support, of a lock

composed of two pedestals, one of which is journaled in the support and also has a movement toward and away from the support, a hollow spindle rigidly connected with the stationary pedestal, a locking-bar located in the hollow spindle and protruding into the movable pedestal at one extremity and into the stationary pedestal at the other extremity, the said locking-bar having pins, a spring for actuating the bar in the hollow spindle, tumblers mounted on the spindle and cooperating with the pins, a bolt-operating spindle journaled in the stationary spindle and connected with the locking-bar to prevent the turning of the bolt-operating spindle when the bar is in a given position, the bar being capable of such movement within the hollow spindle as to release the bolt-operating spindle to permit the latter to turn, the connection of the locking-bar with the bolt-operating spindle being also such that when the bolt-operating spindle is released, the movable pedestal and the parts connected therewith may be moved away from the stationary spindle for the purpose set forth.

3. The combination with a suitable support, of two pedestals one of which is journaled in the support and has a movement toward and away from the other pedestal, a hollow spindle connecting the two pedestals, the spindle being rigidly attached to one pedestal and removably connected with the other pedestal, a locking-bar located in the hollow spindle, a revoluble bolt-operating spindle journaled in the stationary pedestal and having a part shaped to engage the locking-bar whereby the bolt-operating spindle may be locked against rotation, a spring acting on the locking-bar to shift it sufficiently to release the bolt-operating spindle, a permutation-lock mechanism mounted on the hollow spindle and cooperating with the locking-bar, one pedestal being journaled in the support and also having a movement toward and away from the other pedestal for the purpose set forth.

4. A permutation-lock composed of two members, a hollow spindle connecting the members, a locking-bar located in the hollow spindle, tumblers mounted on the hollow spindle and having openings, the locking-bar being provided with pins adapted to enter said openings when the tumblers are properly adjusted, the tumblers being interiorly grooved, and click-springs connected at one extremity with the hollow spindle, the latter having circumferential grooves to receive the springs when the tumblers are slipped over the spindle, the outer extremities of the springs engaging the grooves of the tumblers as the latter are rotated for the purpose set forth.

5. In a permutation-lock, the combination with a suitable support, of two members, a hollow spindle connecting the members, a



locking-bar located in the hollow spindle and movable transversely therein, a spring acting on the locking-bar, the latter being provided with pins, tumblers mounted on the hollow spindle and having openings to receive the pins when the tumblers are adjusted to cause the position of the openings to coincide with the position of the pins, a sleeve mounted on each tumbler and provided with characters to facilitate the arrangement of the tumblers for unlocking purposes, a bolt-operating spindle journaled in one member and cooperating with the locking-bar, while the other member is journaled in the support and also has a movement toward and away from its companion member for the purpose set forth.

6. A lock including two pedestals one of which is movable, and a connection between the two pedestals including permutation devices capable of adjustment to allow one pedestal to move away from the other.

7. A lock including two pedestals, one of which is movable toward and away from the other and also has a revoluble movement around the axis of the pedestal, and a connection between the two pedestals including permutation devices capable of adjustment

to allow the movable pedestal first to move away from the other pedestal and then turn on its axis to throw the permutation devices out of a straight alinement between the two pedestals.

8. A permutation-lock provided with a spindle having click-springs, tumblers revolvably mounted on the spindle, the said tumblers being provided with grooves engaging the click-springs, each tumbler being provided with an outer sleeve detachably connected with the tumbler and having an interior projection adapted to engage any groove of the tumbler, the tumbler being provided with openings, a locking-bar located in the spindle and having pins adapted to enter the openings of the tumblers when the latter are properly adjusted, each sleeve of each tumbler being provided exteriorly with a projection adapted to occupy any desired position with reference to the opening of the tumbler.

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

ELSWORTH E. QUAINANCE.

Witnesses:

DENA NELSON,  
OTTO E. HODDICK.