

F. J. BURNS.
PERMUTATION LOCK.

APPLICATION FILED MAR. 30, 1908.

910,783.

Patented Jan. 26, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

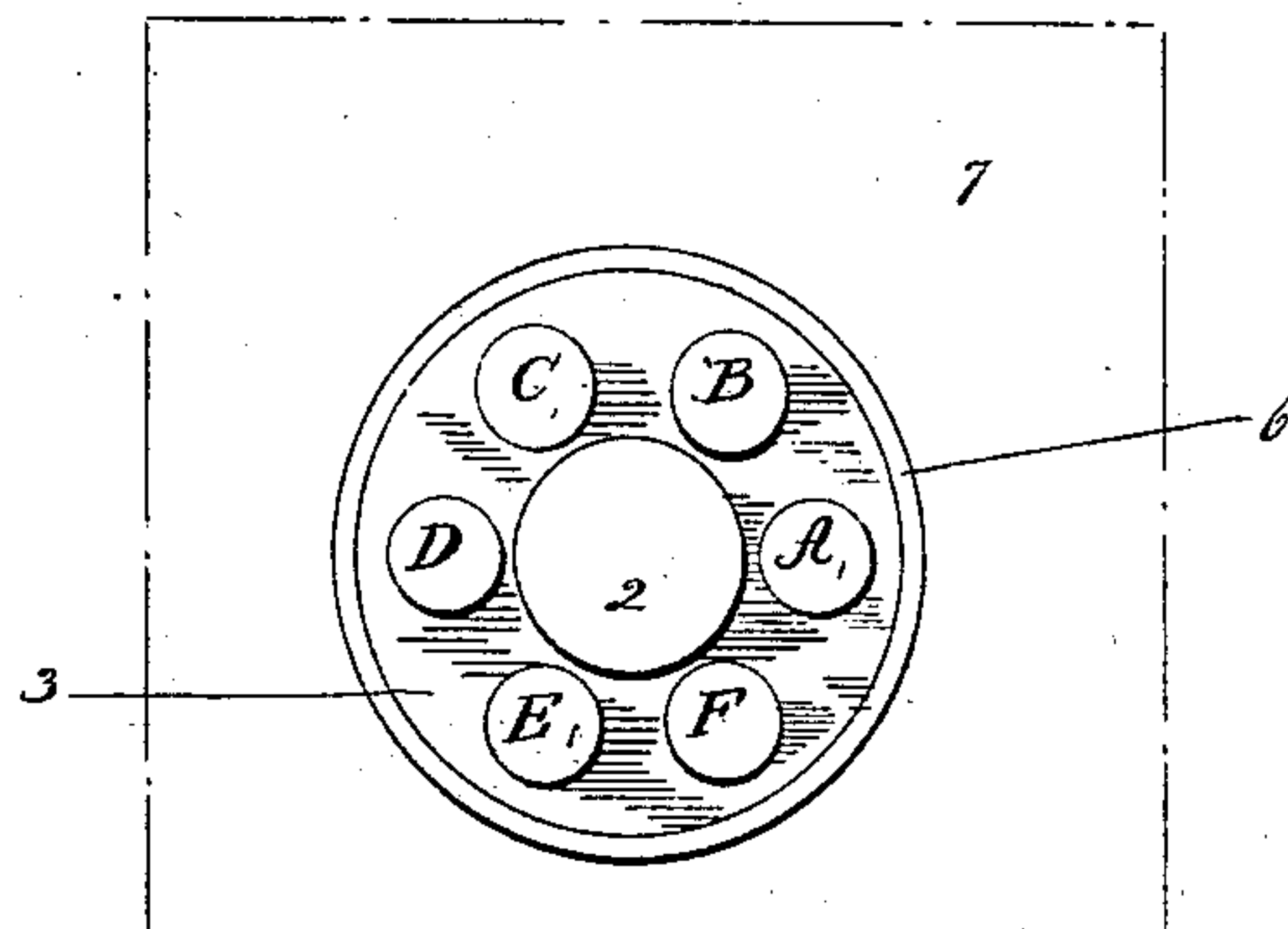


Fig. 2.

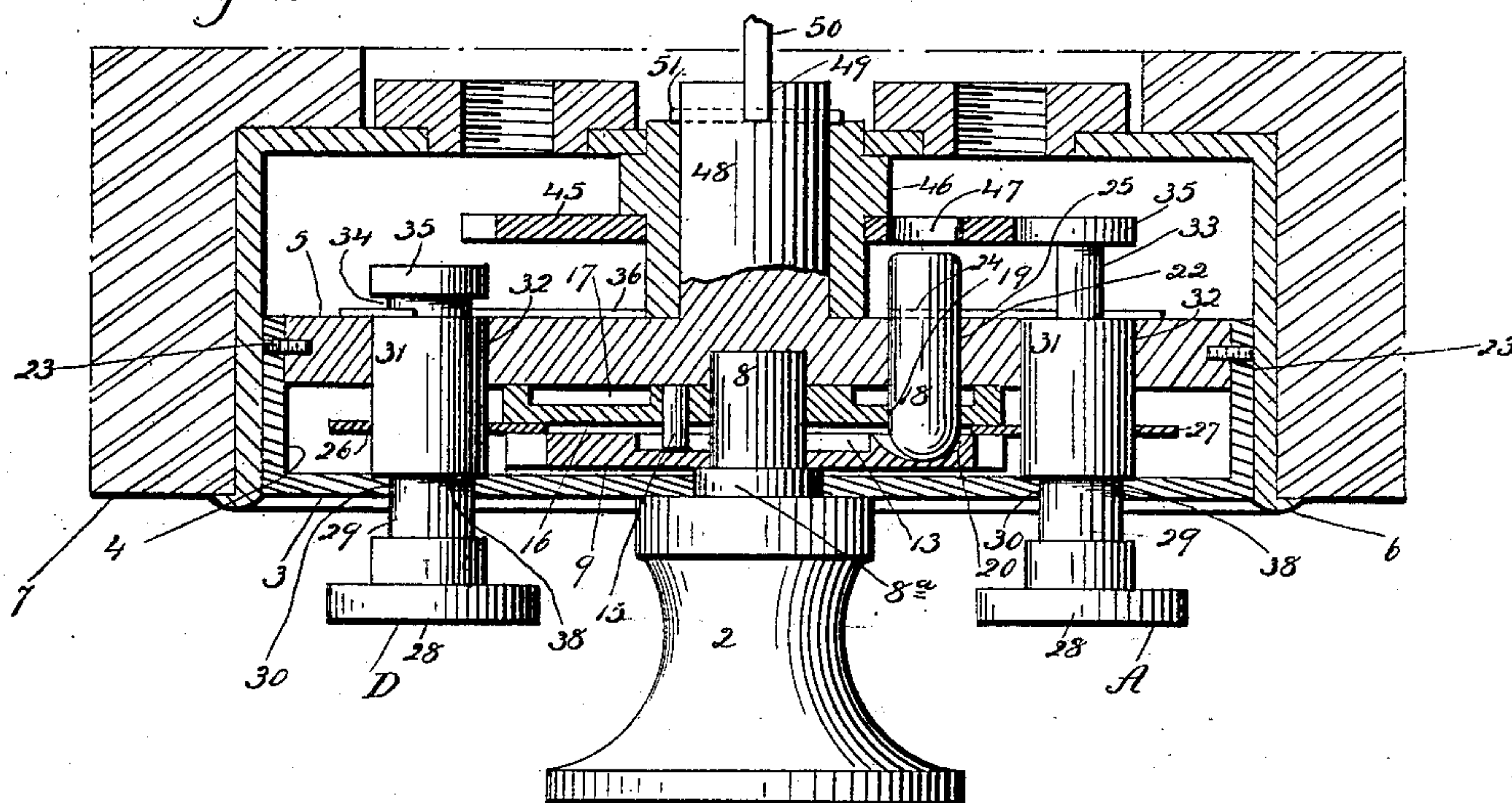
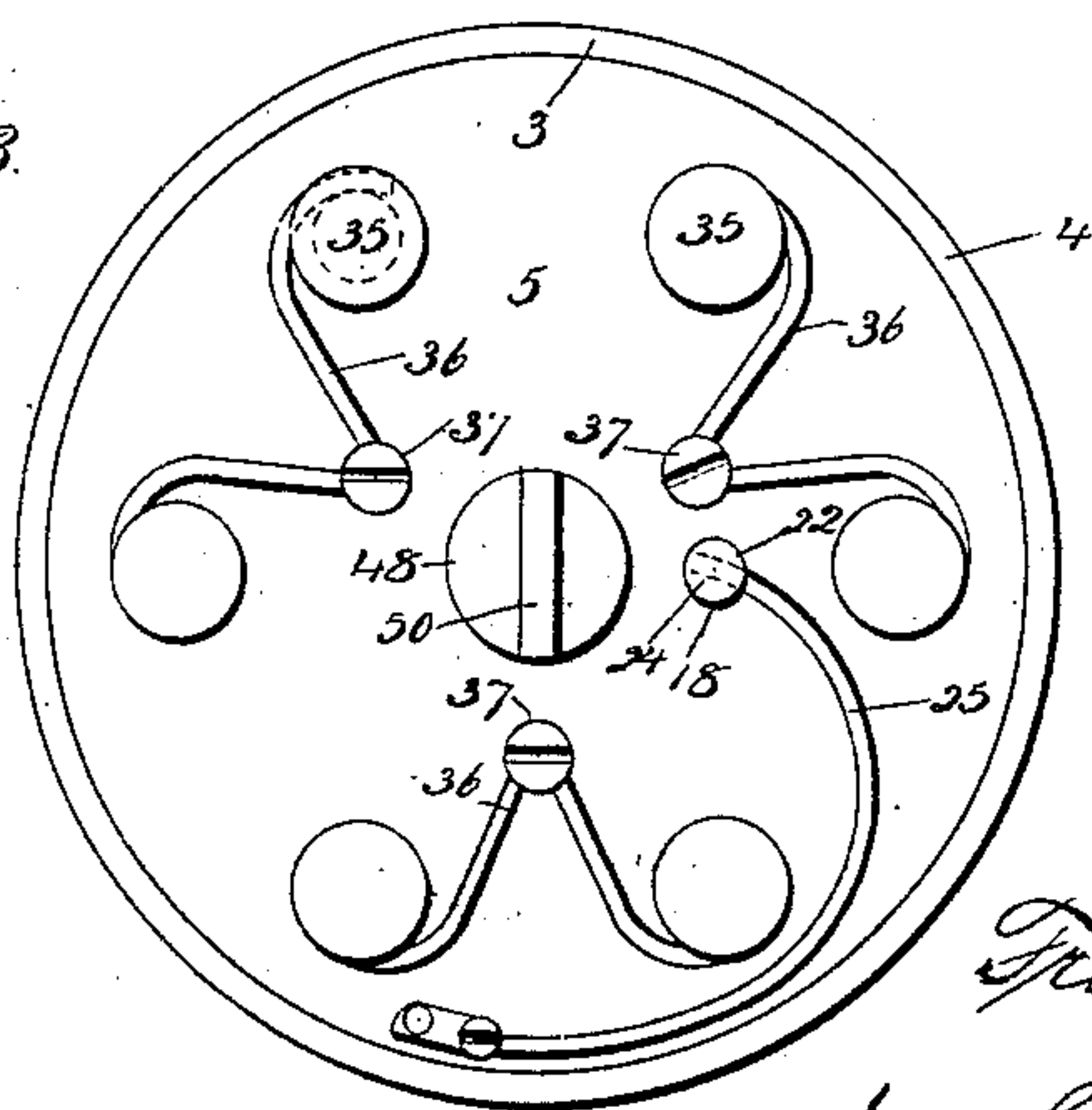


Fig. 3.



Witnesses
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2 SHEETS—SHEET 2.

Fig. 5

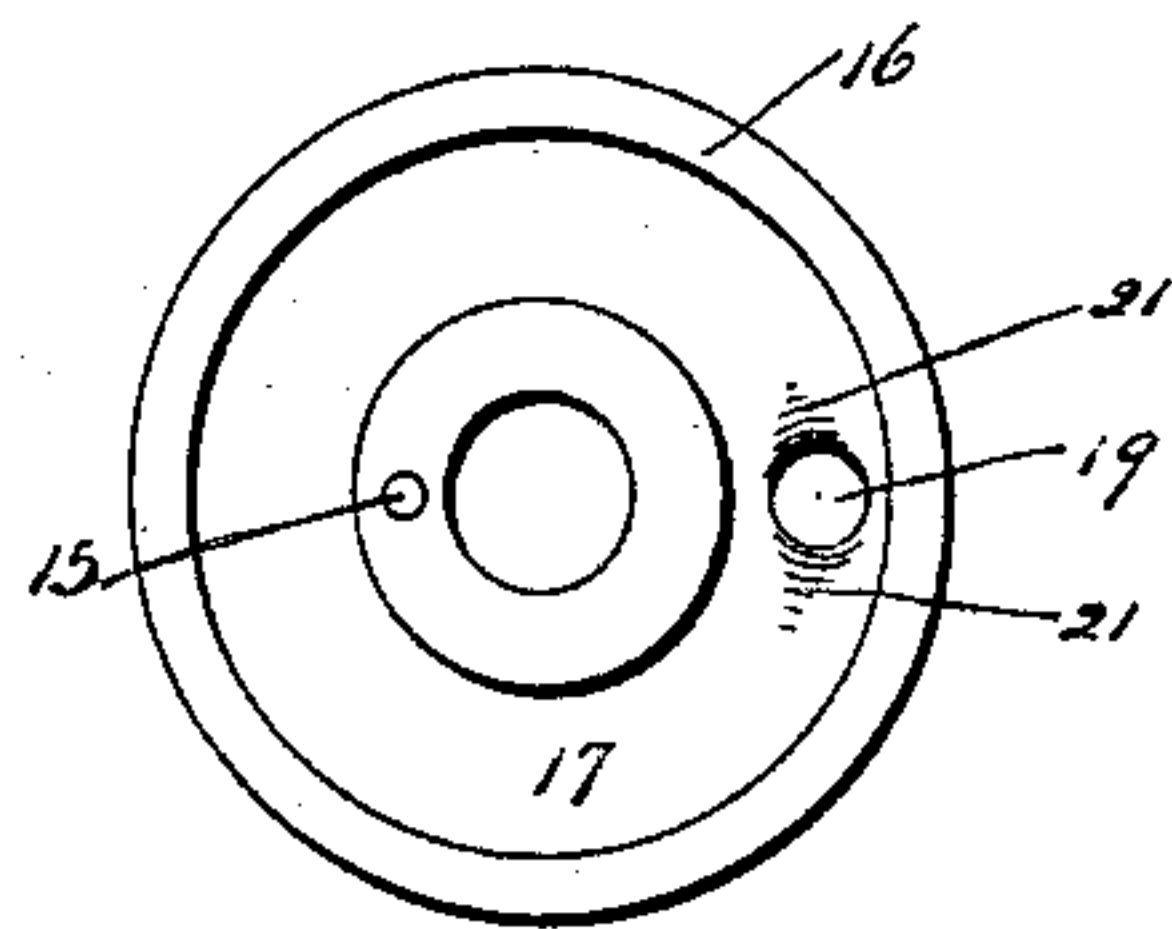


Fig. 6

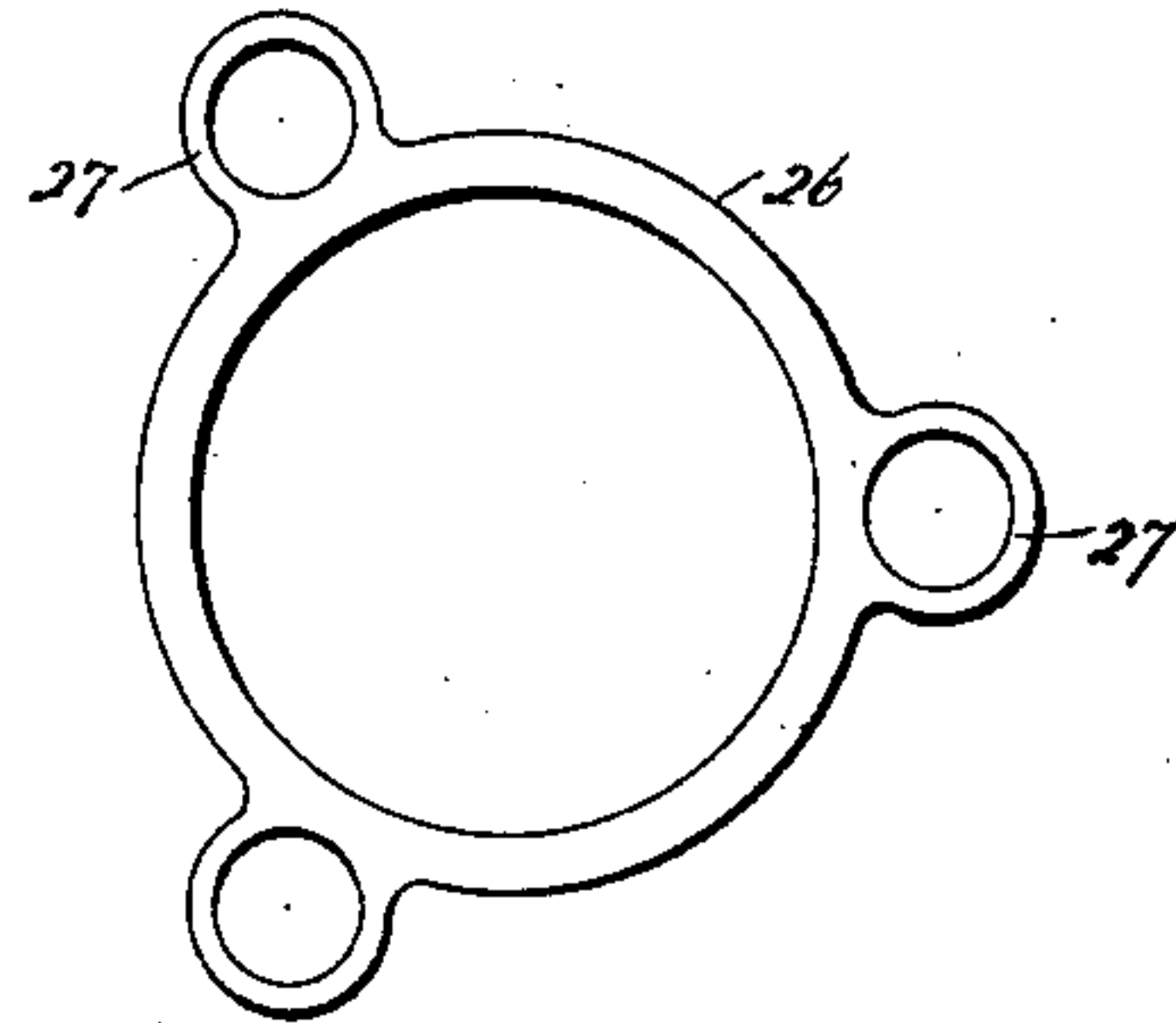


Fig. 4

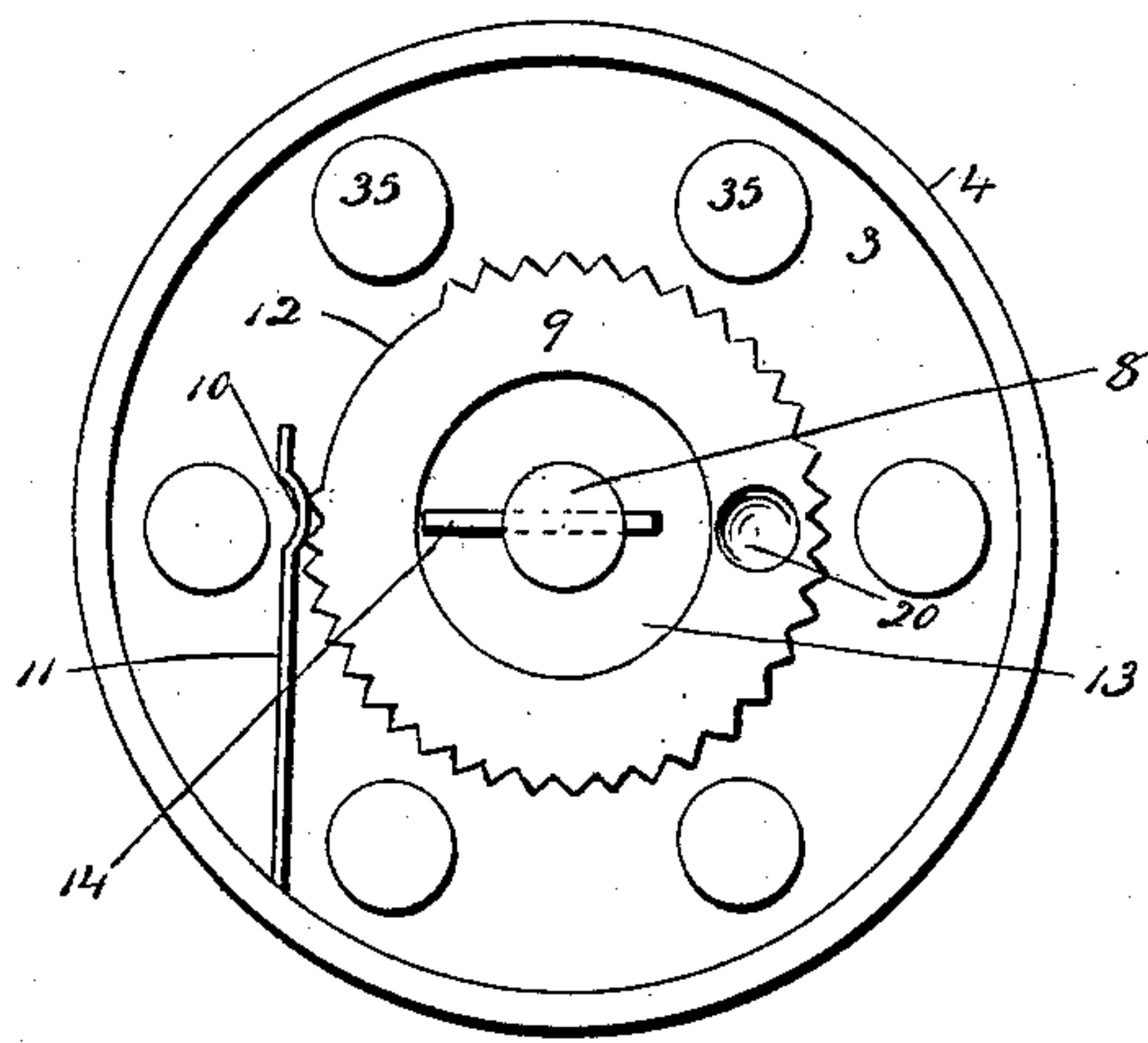
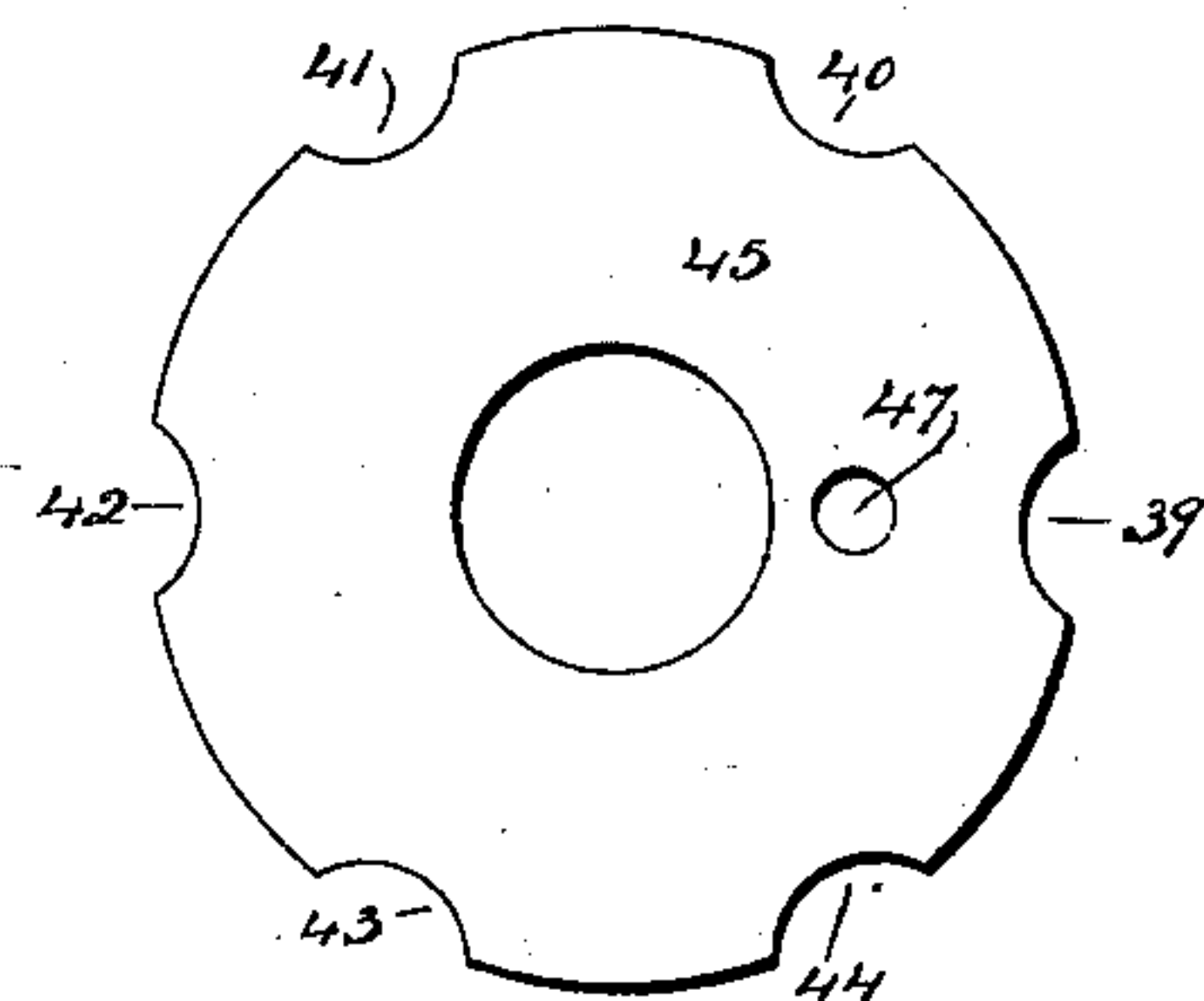


Fig. 7



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UNITED STATES PATENT OFFICE.

FRANK J. BURNS, OF THOMASTON, CONNECTICUT.

PERMUTATION-LOCK.

No. 910,783.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Application filed March 30, 1908. Serial No. 424,257.

To all whom it may concern:

Be it known that I, FRANK J. BURNS, a citizen of the United States, residing at Thomaston, in the county of Litchfield and State of Connecticut, have invented a new and useful Improvement in Permutation-Locks; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1 a view in front elevation of a lock constructed in accordance with my invention. Fig. 2 an enlarged view thereof in central horizontal section on a greatly enlarged scale. Fig. 3 a detached view in inside elevation of the tumbler mechanism of the lock on a scale one-third smaller than the scale of Fig. 2. Fig. 4 a corresponding view with the plate removed from the rotary case of the lock. Fig. 5 a detached view of the wheel tumbler. Fig. 6 a detached view of the washer. Fig. 7 a corresponding view of the locking-disk.

My invention relates to an improvement in permutation locks of that class which are designed to be operated not by sight nor hearing, but by the sense of feeling, the object being to produce a simple, compact and convenient lock of the character described which shall be composed of few parts and not liable to derangement and have a wide range of permutation.

With these ends in view my invention consists in a lock having certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

In carrying out my invention as herein shown, I employ a rotary finger-button 2 concentrically mounted in a circular rotary button-carrying case 3 having a concentric flange 4, closed by a plate 5 and located within a fixed case or shell 6 which is mounted in the wood work 7 of the door to which the lock is applied. The rotary finger-button 2 is provided with a short arbor 8 projecting into the case 3 and carrying a count-wheel 9 which is made adjustable upon it for changing the combination of the lock as will be described later on. The teeth of this wheel are engaged with the nose 10 of a count-spring 11 located within the case, a portion of the teeth being broken away to form a clearance space 12 through which the nose 10

of the spring will travel without putting the spring under tension, whereby the user of the lock is informed through his fingers by the sense of feeling that the wheel has been brought into its starting or zero position to begin counting the number of times that the nose rides over a tooth. The button 2 is used for turning the wheel 9 in one direction or the other until it is apparent to the user that the space 12 of the wheel has been registered with the nose 10 of the spring. In this way the user is given a point to start from in counting 1, 2, 3, 4, 5, &c., according to the number of times that the nose of the spring rides over the teeth of the wheel. The inner face of the wheel is formed with a circular recess 13 entered by the projecting end of the pin 14 employed to secure the count-wheel 9 to the arbor 8 which is formed with a shoulder 8^a upon which the count-wheel 9 is seated and against which it is held by the said pin 14 the friction of which upon the bottom of the recess 13 causes the wheel 9 to be rotated with the arbor 8.

The projecting end of the pin 14 coacts with an operating-pin 15 entering the recess 13 and carried by a wheel-tumbler 16 the inner face of which is formed with a concentric recess 17 for the reception of the rounded forwardly projecting end of a locking-pin 18 for the reception of which the said tumbler is formed with a transverse hole 19 and the count-wheel with a seat 20. Two inclines 21 in the bottom of the recess 17 lead into the hole 19 in the tumbler 16. The said locking-pin 18 is mounted for longitudinal movement in a transverse hole 22 in the plate 5 which is secured in place by screws 23 passing into its edge from the periphery of the flange 4 of the rotary case 3. The projecting inner end of the pin 18 is formed with a transverse hole 24 receiving a spring 25 attached to the outer face of the plate 5 and exerting a constant effort to move the locking-pin forward so as to shoot it into the hole 19 in the tumbler 16 when the said hole is brought into registration with it and into the seat 20 in the count-wheel 9 when the seat is brought into registration with the said hole 19. A thin sheet metal washer-like spacer 26 formed with three perforated retaining ears 27 is interposed between the count-wheel 9 and the tumbler 16 for the purpose of preventing the tumbler from being frictionally rotated by the count-wheel 9. The said pin 14 is made available for changing the combination of

the lock for the reason that it is employed to frictionally hold the count-wheel 9 in its operative relation to the arbor 8. By shifting the count-wheel 9 with respect to the pin 14, the combination will be changed for the reason that a definite number of the teeth of the count-wheel must ride under the count-spring 11 before the hole 19 in the wheel-tumbler 16 and the seat 20 in the count-wheel 9 will be lined up or brought into registration with the locking-pin 18 because the engagement of the pin 15 carried by the wheel-tumbler 16 with the projecting end of the pin 14 depends upon the location of the pin 14 with regard to the clearance space 12 of the count-wheel. Let it be supposed, for instance, that the teeth of the count-wheel are numbered consecutively from left to right, beginning with first tooth at the right hand end of the space 12. Then suppose that the count-wheel 9 has been frictionally coupled to the arbor 8 with the operating or longer end of the pin 14 in alinement with the last tooth of the series as shown in Fig. 4. To change the combination it is only necessary to hold the count-wheel stationary and at the same time turn the arbor 8 against the friction of the pin 14 so that the pin will be in opposition to some other tooth of the count-wheel from which it will follow that the pin 15 on the wheel-tumbler will engage in a different place with the pin 14, with regard to the clearance space 12.

The finger-button 2 is surrounded by six push buttons which, for ease of identification, I shall designate by A, B, C, D, E and F. As shown these buttons are fixed upon short studs 28 formed upon the outer ends of trunnions 29 having bearing in holes 30 in the case 3, these trunnions being themselves formed at the outer ends of button-shanks 31 having bearing in holes 32 in the plate 5. The longitudinal movement of each button is the same as the trunnions 29 are all of the same length. Three of the button-shanks are furnished at their inner ends with concentric stems 33, and three with narrow annular grooves 34 thus virtually dividing the six buttons into two groups of three buttons each. As shown the buttons A, C and E have the stems 33, and the buttons B, D and F the narrow grooves 34. The re-arrangement of these buttons in different ways provides for an immense number of changes in the permutation of the lock for which other permutations are provided, as described, by shifting the wheel 9 with respect to the arbor 8 against the friction of the pin 14 on the bottom of the recess 13, such friction being relied upon to cause the said wheel to be turned with the finger-button 2. Each button-shank 31 is formed at its inner end with a circular locking-flange 35 corresponding to the shank in diameter and therefore all alike. Push-button springs 36 secured to the outer

face of the plate 5 by screws 37 engage with the inner ends of the button-shanks 31 and hold the push-buttons in their normal outwardly projected positions in which their shoulders 38 engage with the inner face or bottom of the case 3, as clearly shown in Fig. 2. The said locking-flanges 35 coact with shallow notches 39, 40, 41, 42, 43 and 44 located in the edge of a circular locking-plate 45 fixed upon a hub 46 about midway the length thereof, the said hub being mounted in the center of the shell 6 and located in line with the arbor 8 of the button 2. Normally the locking-flanges 35 of the three buttons A, C and E which are the buttons provided at their inner ends with the stems 33, are entered into the notches 39, 41 and 43 whereby the plate 5, and hence the rotary case 3, will be held against rotation until the said push-buttons A, C and E are pushed inward against the tension of their springs 36 for a sufficient distance to clear their flanges 35 from the said notches 39, 41 and 43, whereby the case 3 will be released for rotation, provided at this time the locking-pin 18 has moved forward so as to disengage its rear end from the locking-hole 47 in the plate 45.

To unlock the lock, the push-buttons A, C and E must be simultaneously pressed inward as described. Should the buttons D, B and F or any one of them be pushed inward, their locking flanges 35 will be entered into the notches 40, 42 and 44, as the case may be, and so lock the case against rotation. Normally the said push buttons D, B and F in the permutation we are now considering, do not perform any locking function but remain inactive except in the case of a surreptitious attempt to open the lock. I may here add that the spacer 26 is held in place by the passage of three of the button-shanks 31 through its perforated ears 27.

For the purpose of utilizing the rotary movement of the case 3 in the operation of the latch-bolt, whatever the character of that may be, the plate 5 is provided with a heavy concentric stud 48 the rear end of which projects through the hub 46, and is formed with a slot 49 for the reception of one end of a flat coupling bar 50 which is secured in place by a pin 51, the opposite end of the said bar being entered into or in some suitable manner connected with the roll-back of the latch-bolt mechanism which I have not described as it may be of any ordinary and well known construction.

Having now described the mechanism of my improved lock, I will briefly set forth the mode of its operation supposing it to be set upon the numbers 4 and 3, and supposing also that its buttons A, C and E are normally coacting with the locking-disk 45, and that its buttons D, B and F are normally retired. To unlock the lock the user grasps the finger-button 2 and turns it to the right or to the

left until he ascertains by the sense of feeling that the clearance space 12 of the count-wheel 9 has been brought under the nose 10 of the count-spring 11. He will know this because at this time the wheel may be turned, within the narrow limit set by the length of the said space, to the right or left without the pressure required to force the teeth of the wheel under the nose of the spring. Having thus secured his starting point, the finger-button 2 is turned from left to right until 4 has been counted by feeling, the nose of the spring riding over four teeth in the count-wheel. When four has been counted in this way the hole 19 in the wheel-tumbler 16 will have been brought into registration with the locking pin 18 which will be automatically entered into the said hole 19 by the action of its spring 25, the tumbler 16 having been picked up and turned so as to bring its hole 19 into registration with the pin 18 by the engagement of one face or the other of its operating-pin 15 with the pin 14. The finger-button 2 is now turned from right to left until the fingers detect the riding of the nose of the count-spring over three teeth in the count-wheel at which time the seat 20 in the count wheel will have been brought as shown in Fig. 2, into registration with the hole 19 in the wheel-tumbler 16 whereby the locking-pin 18 is left free to be moved by its spring 25 into the seat 20 in the count-wheel, this movement of the pin being sufficient to clear its inner end entirely from the locking hole 47 in the notched locking disk 45. If now the user of the lock simultaneously pushes the push-buttons A, C and E inward so as to clear their locking flanges 35 from the notches 39, 41 and 43, the case 3 may be rotated, whereby its rotary movement will be communicated to the coupling bar 50 which will operate the latch bolt of the lock. Should the user not operate these three buttons at the same time, the case will not be released for rotation, or should he operate these three buttons at the same time and one or more of the buttons D, B and F, he will not release the case 3 for rotation for the reason that the inward movement of any one of the normally cleared or retired push-buttons will at once enter its locking-flange 35 into its appropriate notch in the disk 45 and so lock the case 3. Therefore even if anyone should learn the numbers 3 and 4 on which the lock is set he could not unlock it without knowing which buttons to simultaneously press or vice versa. Of course the lock may be set on other numbers and on other push buttons, the range of permutation in this respect being very great. As the lock is operated by the sense of feeling rather than by any dials or audible clicks the operation of the lock in the presence of any number of people will not enable anyone, however familiar with the construction of such locks to

secure a knowledge of the numbers on which it is set as no one but the person who is operating the lock can feel the operation of its internal mechanism.

I claim:—

1. In a permutation lock operated by the sense of feeling, the combination with a toothed count-wheel having in the line of its teeth a clearance space forming a starting point for counting, of a count-spring coacting with the teeth and the said clearance-space of the said wheel, a wheel-tumbler concentric with the said wheel by which it is operated, a spring-actuated locking pin arranged to pass transversely through the said tumbler into engagement with the said wheel, and a locking-plate with which the said pin is normally engaged.

2. In a permutation lock operated by the sense of feeling, the combination with a rotary case, of a concentric finger button mounted therein, a toothed count-wheel turned by the said button and having a clearance space in the line of its teeth, a count-spring coacting with the teeth and clearance space of the said wheel, a wheel-tumbler picked up and rotated by the count wheel, a locking-pin coacting with the said tumbler and count-wheel, and a locking-plate normally engaged by the locking-pin for preventing the said case from turning.

3. In a permutation lock operated by the sense of feeling, the combination with a flanged rotary case, of a circular plate secured to the said flange, a concentric finger-button mounted in the case, a toothed count-wheel turned by the said button and having a clearance-space located in the line of its teeth, a count-spring coacting with the said teeth and clearance-space, a wheel-tumbler concentric with the count-wheel and operated thereby, a locking-pin mounted in the said plate and coacting with the said tumbler and count-wheel, and a fixed locking-plate with which the said pin is normally engaged for locking the said case against rotation.

4. In a permutation lock operated by the sense of feeling, the combination with a rotary case, of a concentric finger-button mounted therein, a toothed count-wheel turned by the said button and having a clearance space in the line of its teeth, a count-spring coacting with the teeth and clearance space of the said wheel, a wheel-tumbler concentric with the said count-wheel by which it is operated, a spring-actuated locking-pin arranged to pass transversely through the said tumbler into engagement with the said wheel, a fixed locking-plate with which the said pin is normally engaged, and a series of push-buttons carried by the said case and coacting with the said locking plate, the said buttons being arranged concentric with the said finger-button, and one or more of the buttons being normally engaged with the plate for locking the

case, and one or more of the buttons being normally disengaged from the plate but engaged therewith for locking the case if pushed inward.

5 5. In a permutation lock operated by the sense of feeling, the combination with a rotary case, of a concentric finger-button mounted therein, a toothed count-wheel turned by the said button and having a clearance space
10 in the line of its teeth, a count-spring coacting with the teeth and clearance space of the said wheel, a wheel-tumbler concentric with the said wheel by which it is operated, a spring-actuated locking-pin arranged to pass
15 transversely through the said tumbler into engagement with the said wheel, a fixed locking-plate with which the said pin is normally engaged, a series of push-buttons mounted in the said case and arranged concentric with
20 the said finger-button and each provided at its inner end with a locking-flange, the flanges of one or more of the said buttons being normally engaged with the locking-plate, and the flanges of one or more of the buttons being
25 normally disengaged from the plate but engaged therewith if operated.

6. In a permutation lock operated by the sense of feeling, the combination with a rotary case, of a concentric finger-button, a
30 toothed count-wheel carried thereby, a spring co-acting with the teeth of the said wheel a wheel-tumbler concentric with the count wheel by which it is operated, a spring-actuated locking pin coacting with the said
35 count-wheel and tumbler, a fixed locking-plate with which the said pin is normally engaged and from which it is disengaged when predetermined portions of the wheel and tumbler are brought into alinement with its
40 outer end, and a series of push buttons carried by the said case and coacting with the

said plate, one or more of the push-buttons being normally engaged therewith and one or more being normally cleared therefrom.

7. In a permutation lock operated by the sense of feeling, the combination with a finger-button having an arbor, of a count-wheel mounted upon the said arbor on which it is rotatably adjustable for changing the combination of the lock, the said count wheel having in the line of its teeth a clearance space forming a starting point for counting, a count spring coacting with the teeth of the said wheel and the said clearance space of the said wheel, a wheel tumbler concentric with the said wheel by which it is operated, a spring-actuated locking pin arranged to pass transversely through the said tumbler into engagement with the said wheel, and a locking plate with which the said pin is normally engaged.

8. In a permutation lock operated by the sense of feeling, the combination with a finger-button having an arbor, of a toothed count-wheel mounted upon the said arbor, a spring co-acting with the teeth of the said wheel a coupling-pin passing through the said arbor and engaging with the said wheel, whereby the wheel is caused to rotate with the arbor and permitted to be adjusted in position with respect thereto, a wheel-tumbler concentric with the count-wheel and carrying a pin coacting with the said coupling-pin, and a locking pin coacting with the said tumbler and count-wheel.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

FRANK J. BURNS.

Witnesses:

JAS. M. CHATFIELD,
JAS. MALAHANN.