

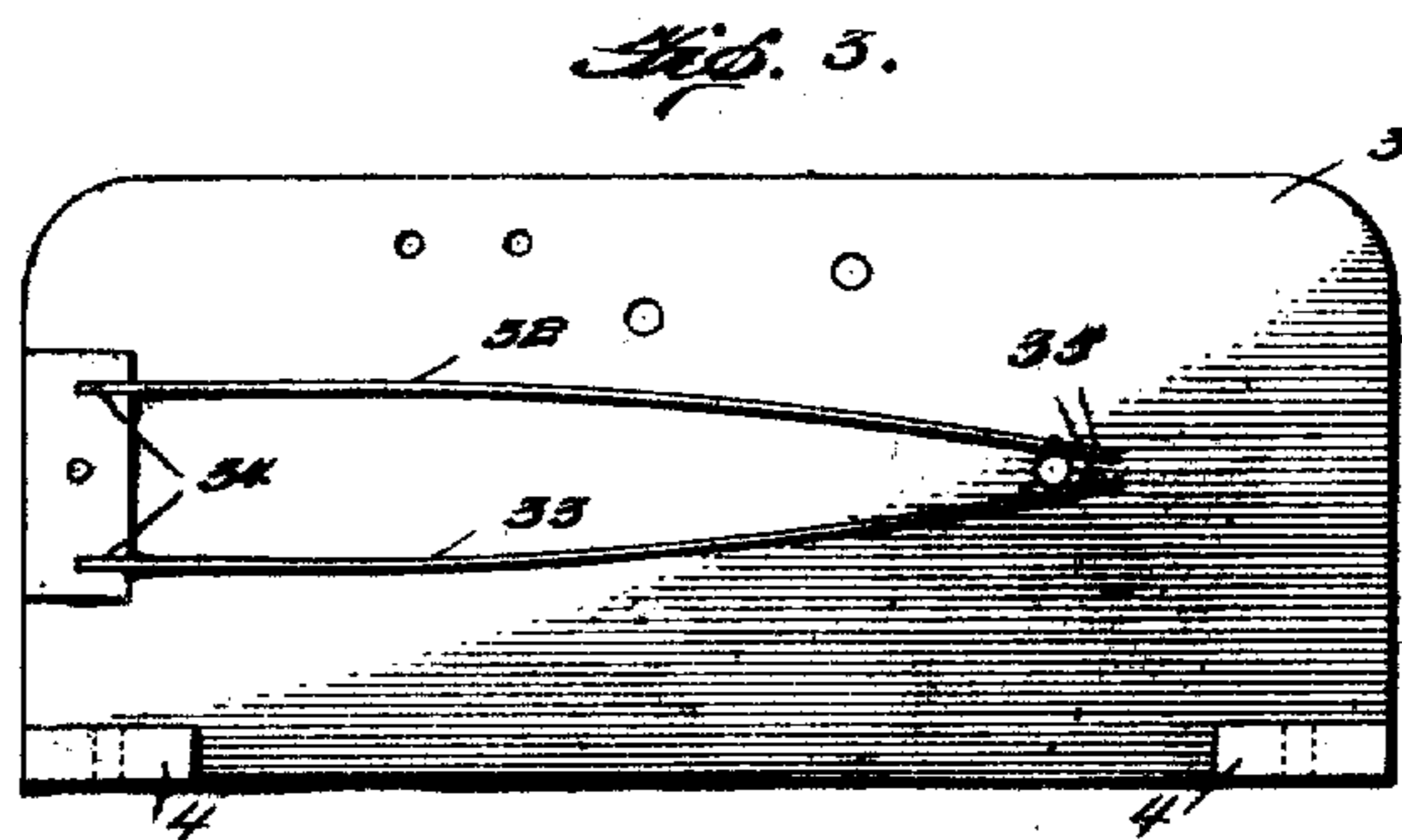
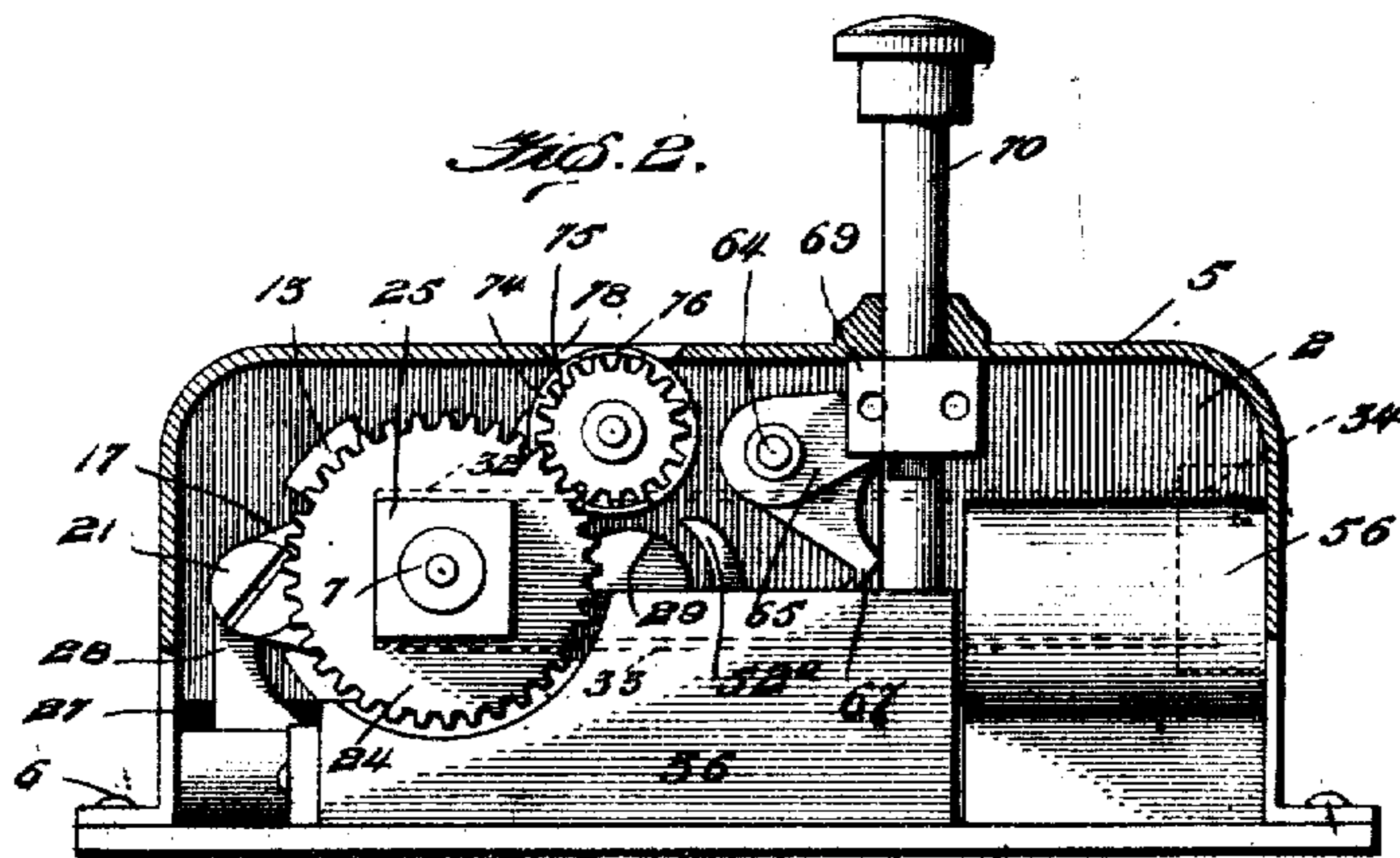
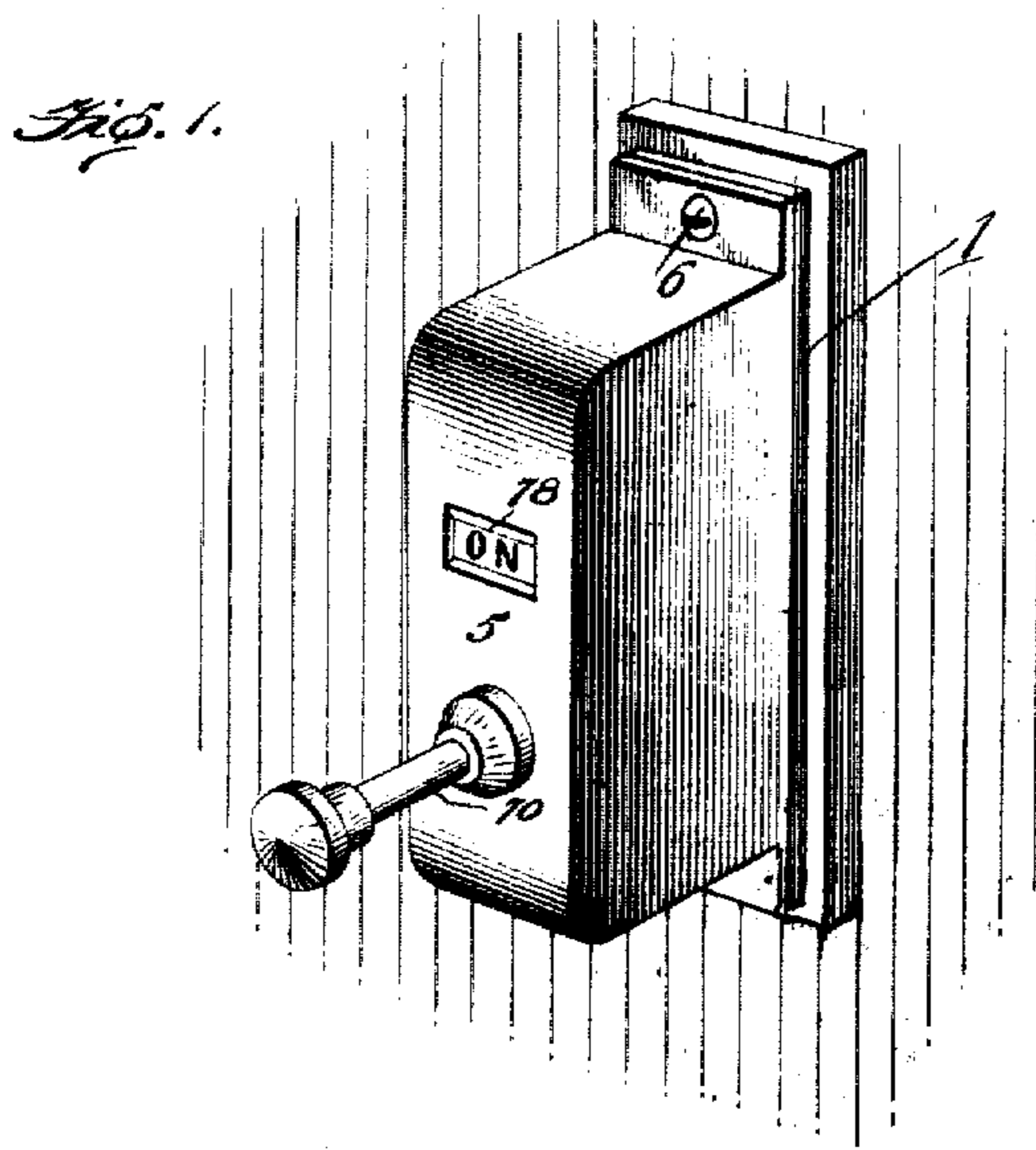
I. G. WATERMAN.
ELECTRICAL SWITCH.

APPLICATION FILED OCT. 6, 1906. RENEWED FEB. 27, 1909.

921,761.

Patented May 18, 1909.

4 SHEETS—SHEET 1.



Witnesses
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Inventor
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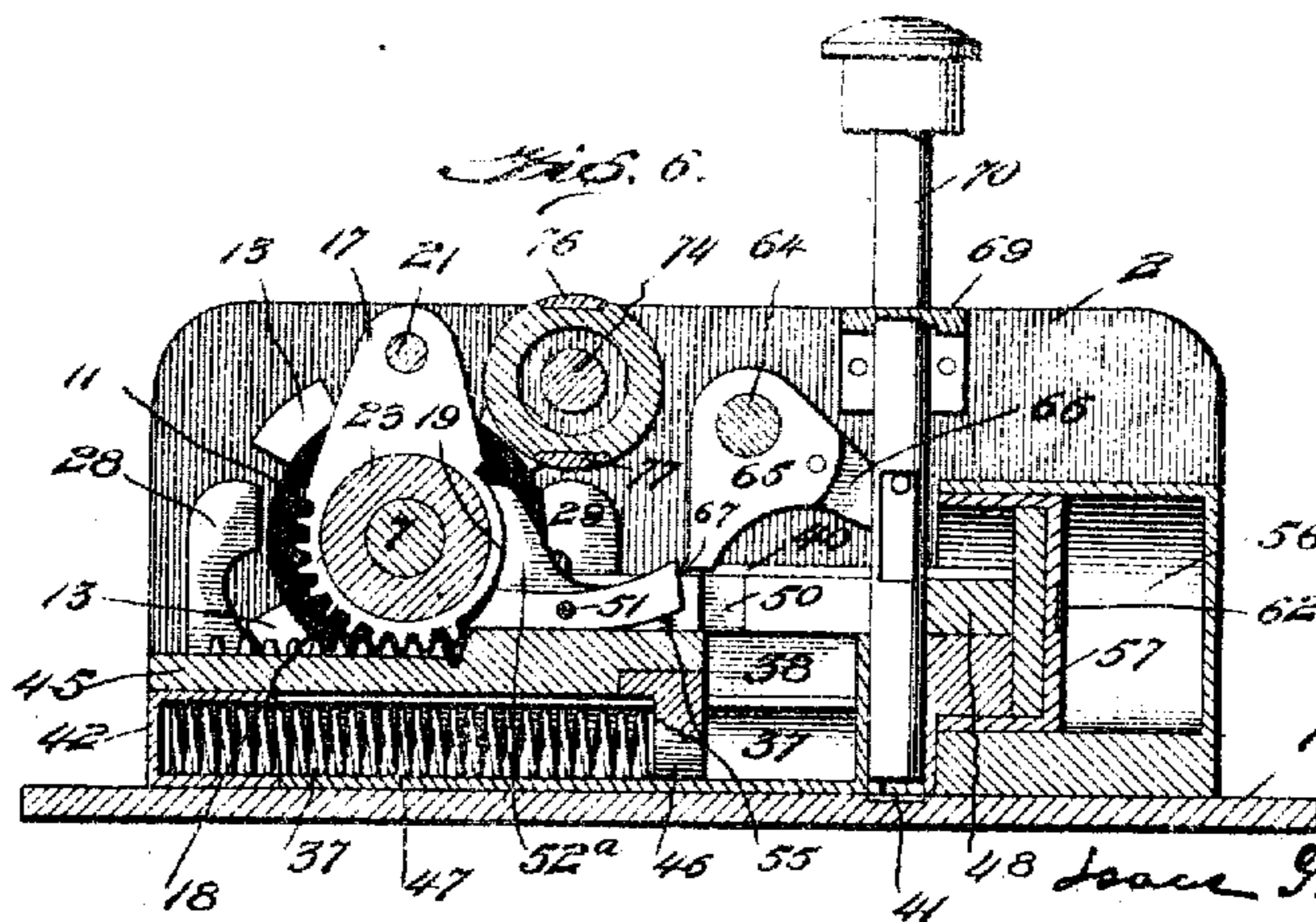
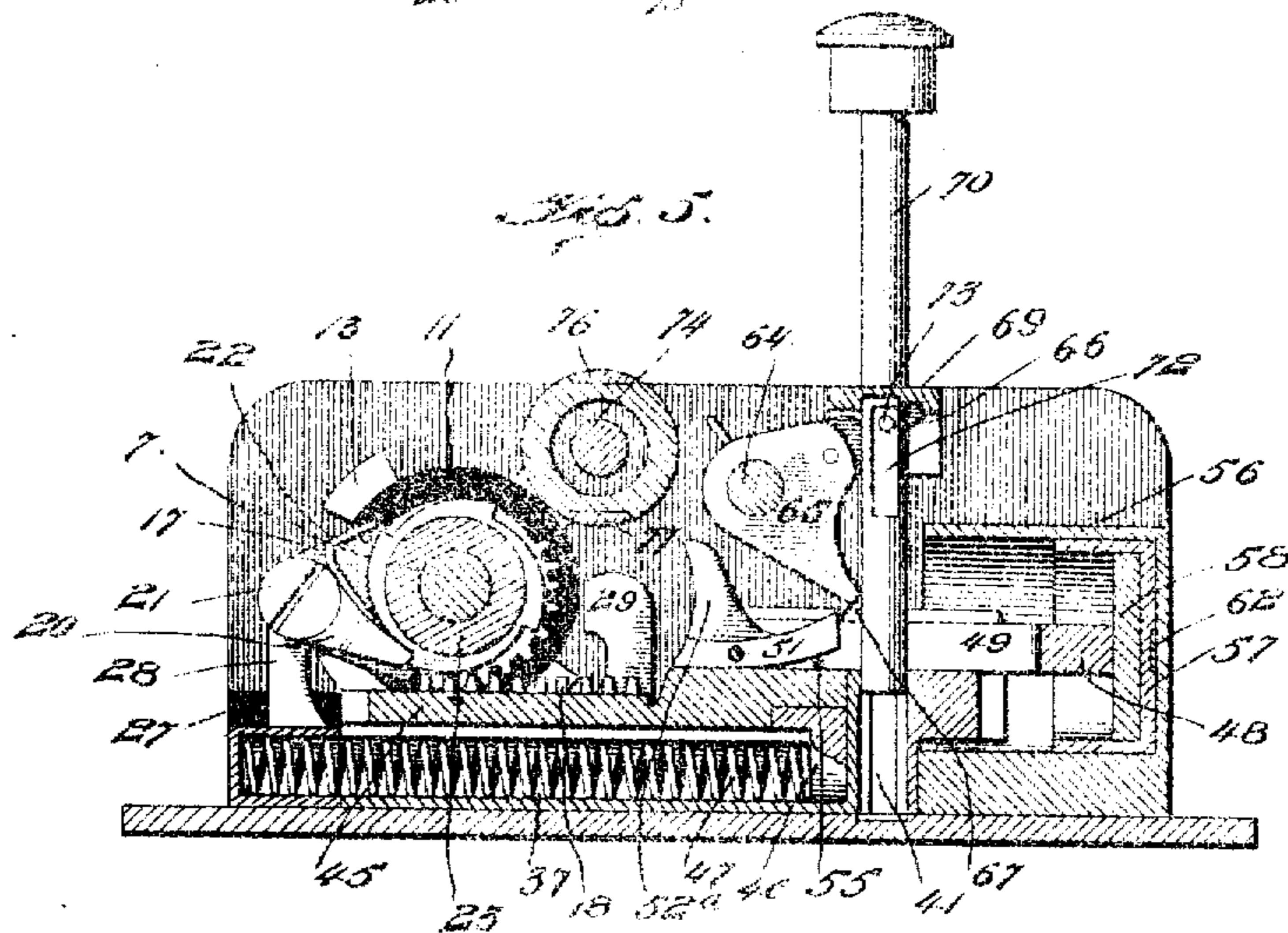
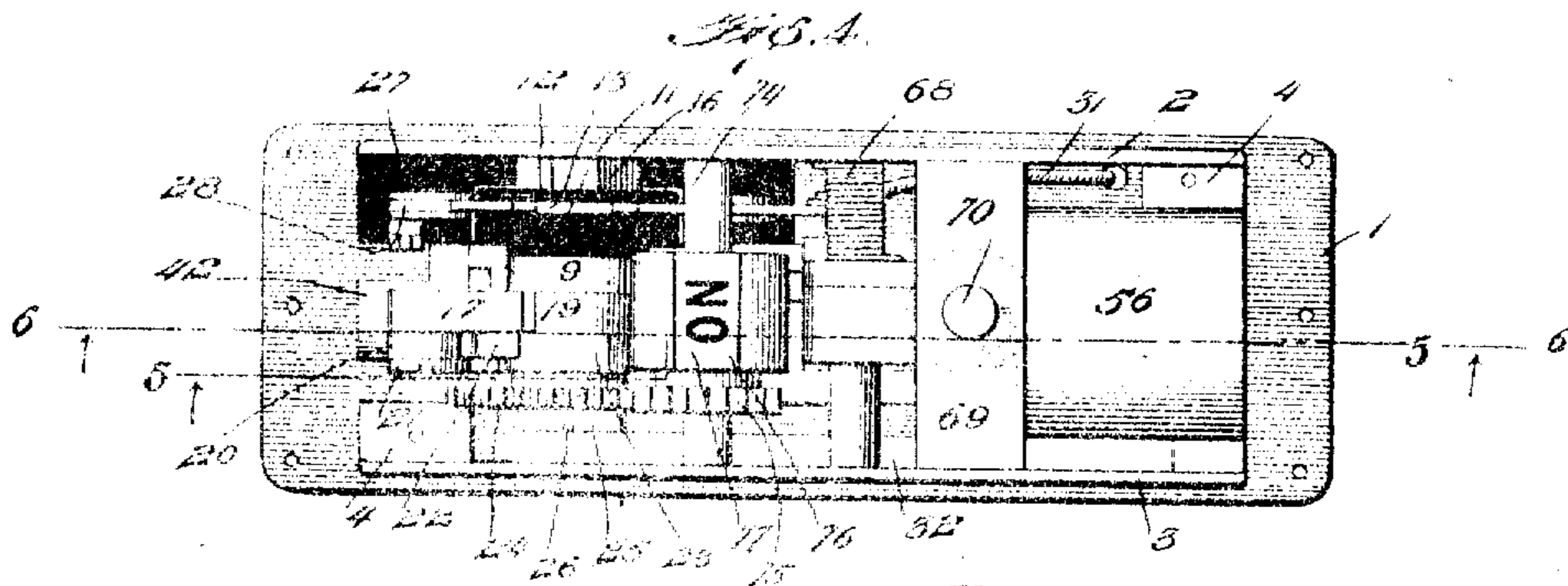
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4 SHEETS—SHEET 2.



Witnesses
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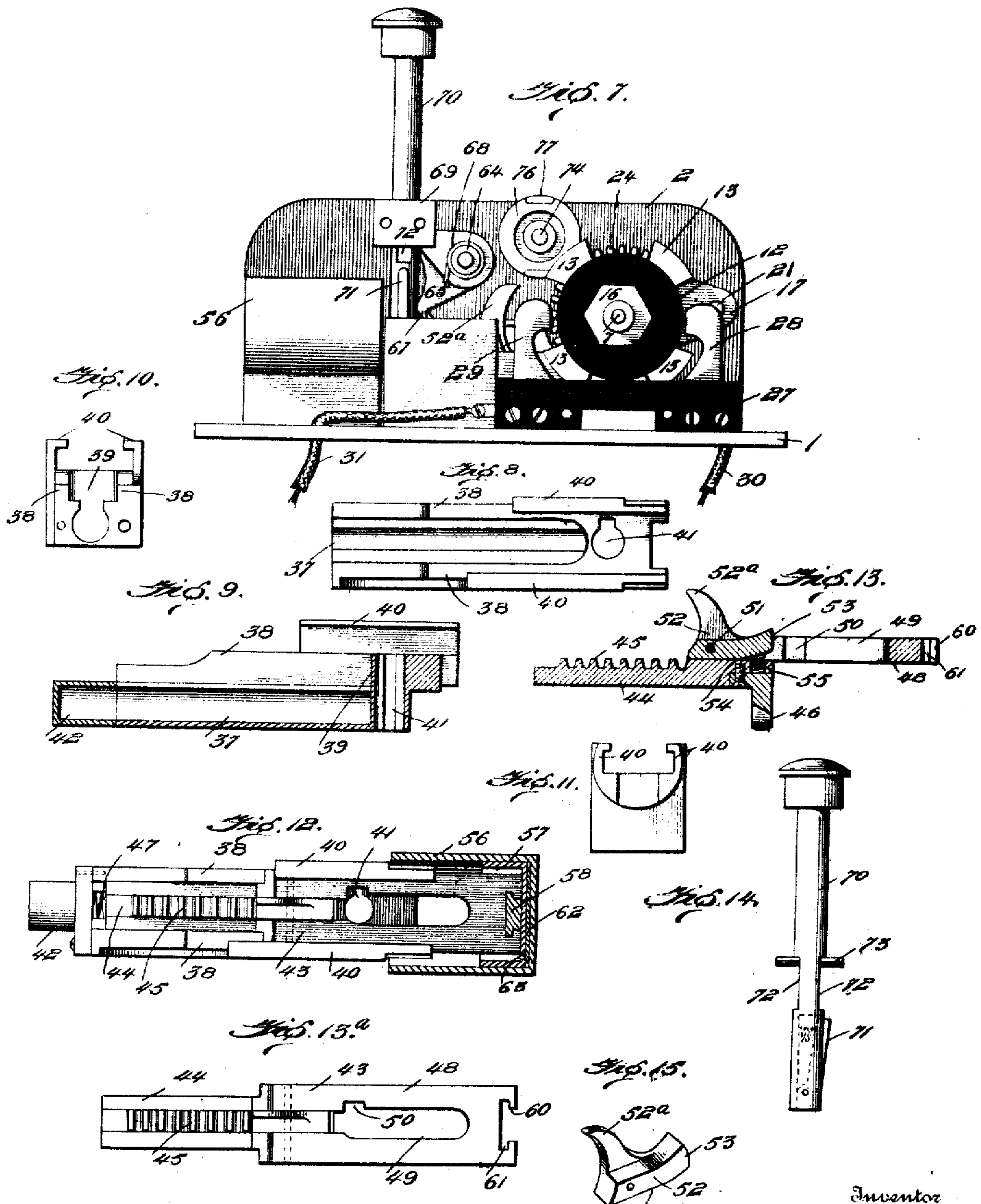
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4 SHEETS—SHEET 3.



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ELECTRICAL SWITCH.

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921,761.

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4 SHEETS—SHEET 4.

Fig. 16.

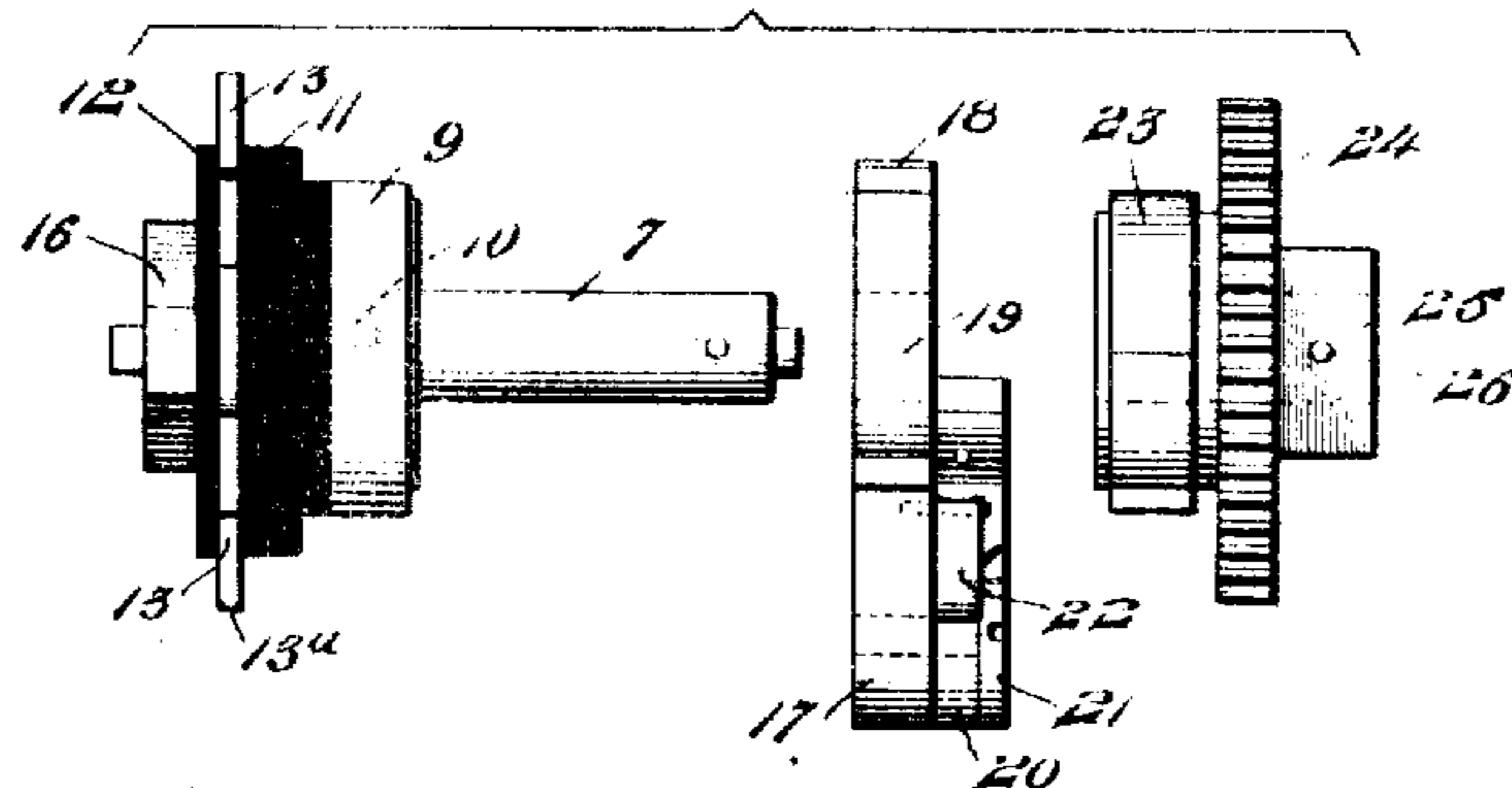


Fig. 17.

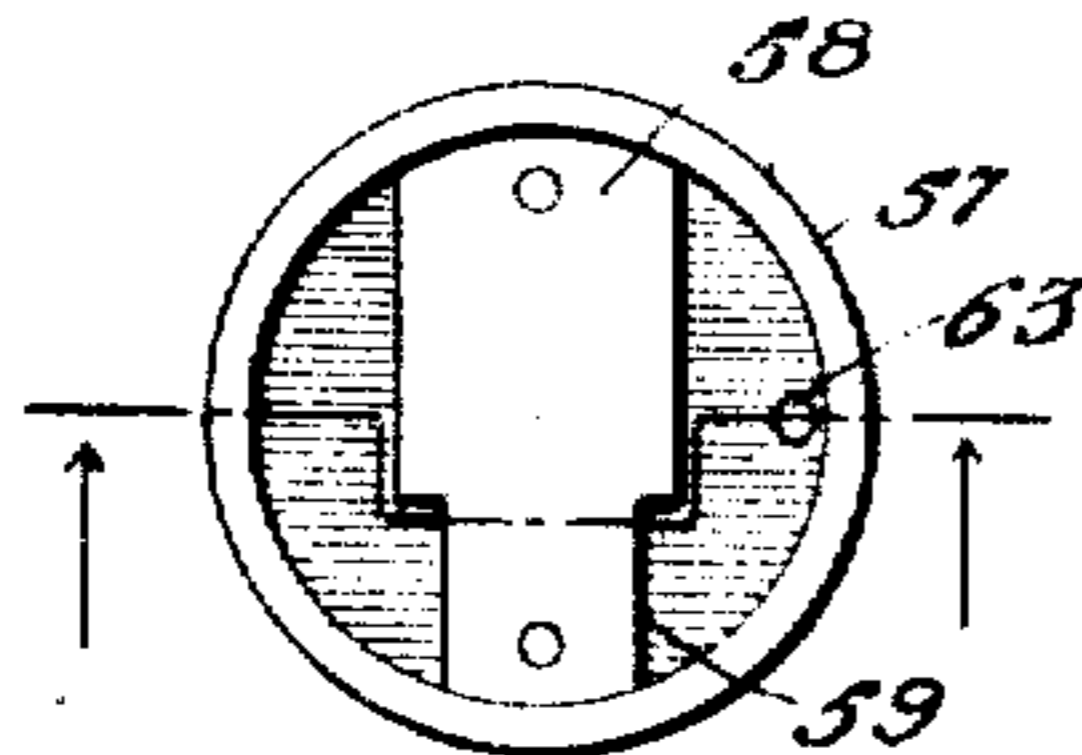


Fig. 18.

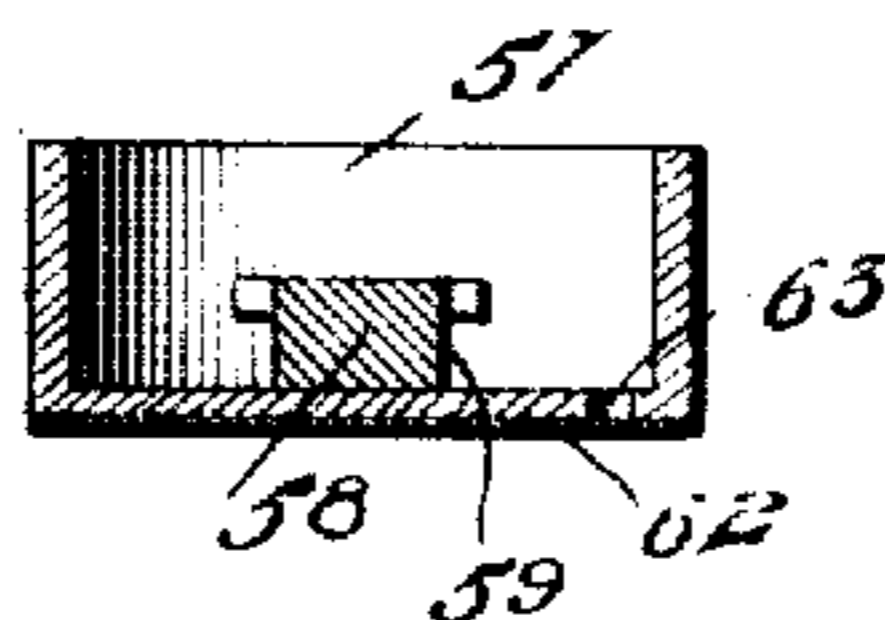


Fig. 19.

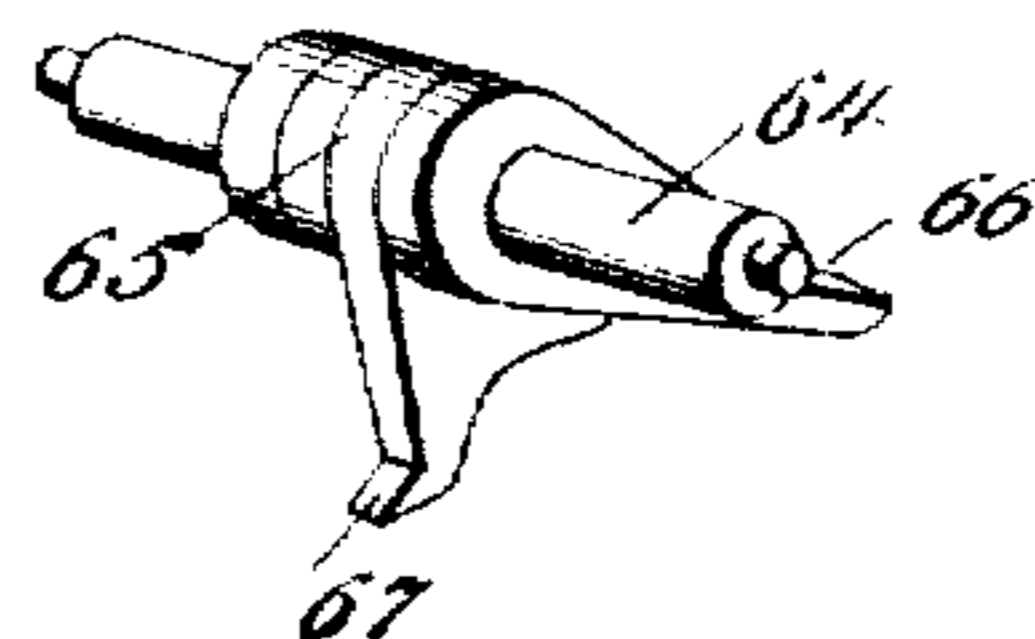
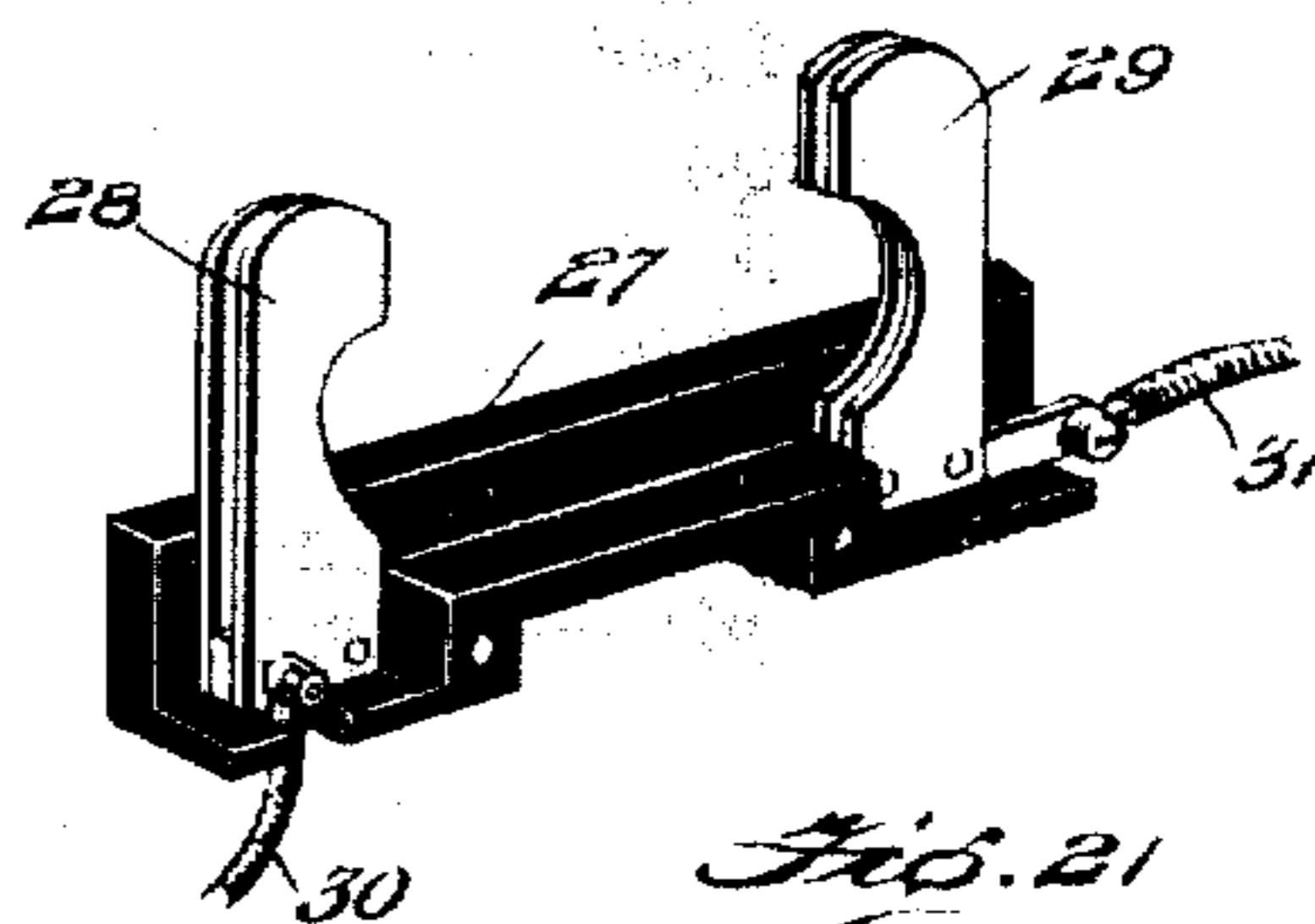
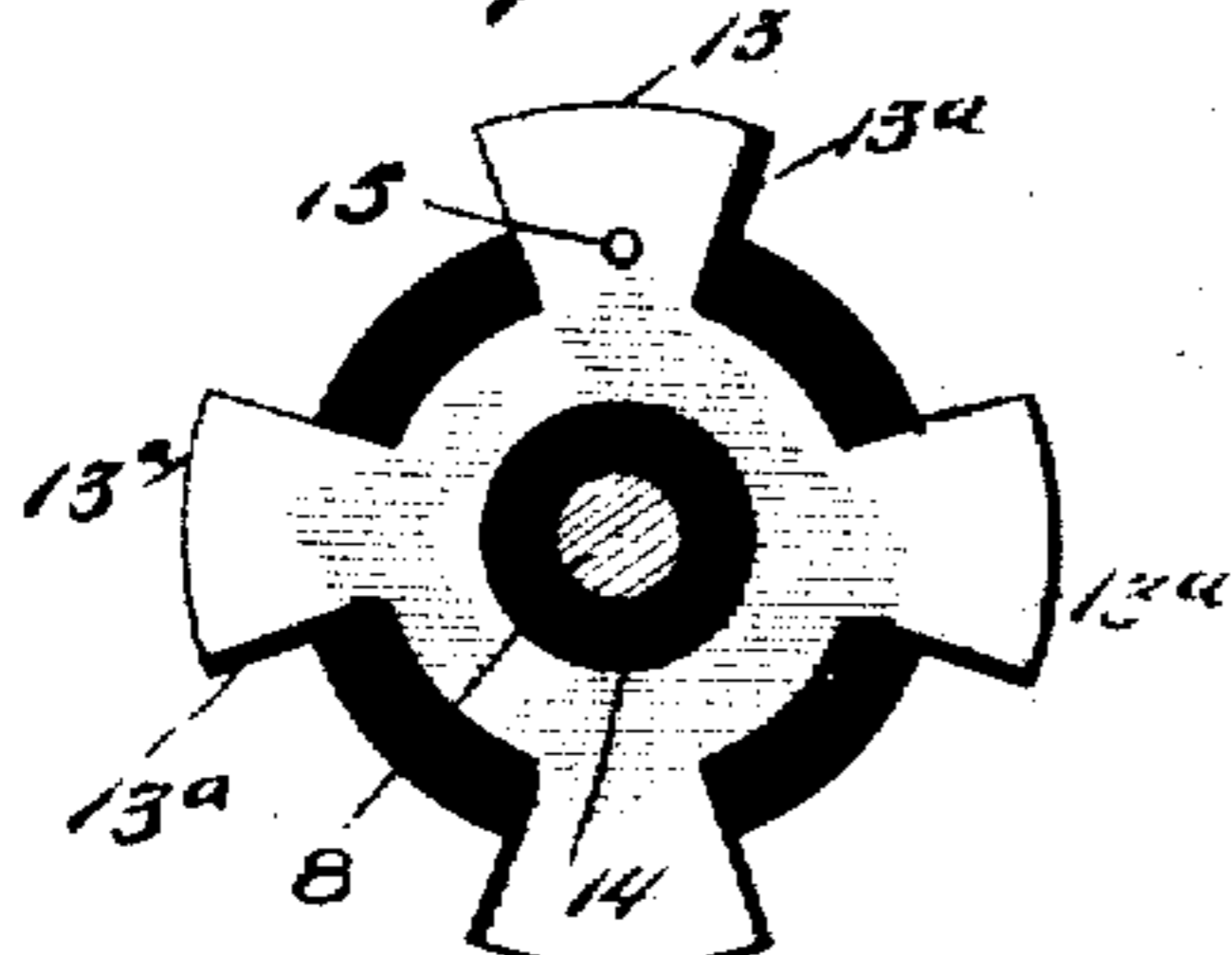


Fig. 20.



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UNITED STATES PATENT OFFICE.

ISAAC G. WATERMAN, OF SANTA BARBARA, CALIFORNIA.

ELECTRICAL SWITCH.

No. 921,761.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed October 6, 1908, Serial No. 337,718. Renewed February 27, 1909. Serial No. 480,470.

To all whom it may concern:

Be it known that I, ISAAC G. WATERMAN, a citizen of the United States, residing at Santa Barbara, county of Santa Barbara, and State of California, have invented certain new and useful Improvements in Electrical Switches, of which the following is a specification.

This invention relates to electrical switches of that general type disclosed in certain of my prior patents, instances of which are Nos. 775,016; 775,053; and 775,055, all dated November 15, 1904, which I have designated "temporary contact" snap switches because the switch contacts engage but momentarily or temporarily during operation of the switch, in contradistinction to well-known types of electric switches where the contacts remain engaged with each other.

The primary object of my temporary contact snap switches being to obtain no more than a temporary or momentary engagement of the electrical contacts when the switch is operated and to insure against any such accidental or designed manipulation of the switch-operating devices as will cause the electrical contacts to remain engaged with each other, the present invention has for its particular object the provision in a temporary contact snap switch, of means preventing holding of the contacts together or in permanent or relatively permanent engagement regardless of the manner in which the switch-operating means may be manipulated.

Another object is to provide means which will, on proper manipulation of the operating device, cause the switch to automatically operate, without possibility of interruption by the user, to cause the contacts to temporarily engage for such a desired period of time as may be necessary to obtain the requisite electrical current in the circuit controlled by the switch and then separate with a rapid snap action, thus insuring reliability of circuit control and also preventing harmful sparking.

Other objects are, generally, the provision of a temporary contact snap switch of compact form, improved and novel construction and reliable in operation.

Having these objects in view, and others not specifically mentioned, which will appear hereinafter, the invention consists of certain improved and novel features of construction

coöperating in a new and original manner as fully set forth hereinafter and in the claims.

In the accompanying drawings:—Figure 1 is a perspective of the complete switch; Fig. 2, a longitudinal section; Fig. 3, a view of the interior face of the side of the casing nearest the observer in Figs. 2 and 4; Fig. 4, a plan with the casing removed; Fig. 5, a longitudinal section on line 5—5 of Fig. 4, showing the parts in normal positions; Fig. 6, a longitudinal section on line 6—6 of Fig. 4, showing the parts as they appear when the push-button has been pushed in almost to the limit of its movement and just prior to the disengagement of the rocker and dog; Fig. 7, a side elevation, with the parts in normal position, looking toward the side farthest from the observer in Fig. 4, the side plate of the casing being removed; Fig. 8, a detail plan of the guide casing for the switch actuating slide, the spring abutment cap being removed; Fig. 9, a longitudinal section thereof, with the spring abutment cap attached; Fig. 10, an end elevation at the left of Fig. 8; Fig. 11, an end elevation at the right of Fig. 8; Fig. 12, a detail plan of the switch-actuating slide and its guide casing, associated together in normal position, and also showing in section the dash-pot and plunger; Fig. 13, a longitudinal section in detail of the switch-actuating slide and dog carried thereby; Fig. 13^a, a plan view of Fig. 13; Fig. 14, a detail of the push-button stem and parts carried thereby; Fig. 15, a perspective of the dog of Figs. 13 and 13^a; Fig. 16, an enlarged detail of the switch contact, its shaft, and actuating devices carried by its shaft, shown in disassociated arrangement but in relative position; Fig. 17, a detail view looking into the plunger; Fig. 18, a horizontal cross-section of Fig. 17; Fig. 19, a perspective detail view of the rocker which is actuated by the push-button stem; Fig. 20, a detail view looking at the face of the four-armed contact, the outer securing means therefor having been removed; and Fig. 21, a perspective detail of the stationary contacts and the insulating block on which they are positioned.

The case consists of a base 1, side plates 2 and 3 detachably connected thereto by screws passing into ears 4 on said side plates, and a shell 5 detachably fastened to the base 1 by screws.

Journalled in the side plates 2 and 3 is a

shaft 7 having a reduced portion 8, on which is secured a metal collar 9, which is detachably connected by pin 10 to a fiber or insulating washer 11 on portion 8. There is another fiber or insulating washer 12 on portion 8, and between the washers 11 and 12 is a four-armed one-piece metal contact 13 which has an insulating bushing 14 and secured to washer 11 by pin 15. A nut 16 on the screw-threaded end of the shaft clamps the parts together. Loose on the opposite side of the collar 9 is a rocker-arm 17 having a mutilated gear face 18 and a blank face 19. A pawl 20 is pivoted by screw 21 to the outer end of rocker-arm 17 and is pressed by a spring 22 into engagement with a ratchet wheel 23 formed integral with a gear 24 and a nut 25, all of which are secured on shaft 7 by a pin 26.

A block 27 of insulating material is secured by suitable screws to the base plate and side 2 adjacent the latter, and double metal contacts 28 and 29 rise from and are secured to this block in position for the oppositely projecting arms of contact 13 to engage therewith when the switch is actuated. The arms of contact 13 are rounded at 13^a so they may readily pass between the respective double contacts 28 and 29. The circuit wires 30 and 31 are connected to the contacts 28 and 29.

To insure a snap action on the parts and insure that the arms of contact 13 will quickly snap out of engagement with the contacts 28 and 29, the flat springs 32 and 33 (see Figs. 3 and 4) are employed, their ends being anchored to side plate 3 at 34 and their free ends 35 bearing on the nut 25. When the contact 13 is turning with shaft 7, the nut 25 spreads the free ends of springs 32 and 33 and on the release of the operating mechanism, the springs snap the shaft and contact 13 to normal position, giving a quick break of the contact.

Secured to the base 1 is a guide casing 36 having an elongated slotted chamber 37 surmounted and flanked by guides 38 terminating in a shoulder 39. Additional guides 40 are provided at one end portion of the casing above the guides 38. A "keyhole" slot or opening 41 for the reception of the end of the push-button to be described later, is provided in the casing 36. Detachably connected to the outer end of the casing 36 is a spring-abutment cap 42.

The numeral 43 designates a switch-actuating slide which has a part 44 slidable in guides 38 and provided with a rack 45 meshing with gear face 18 and also having a headed spring-abutment 46 received in and fitting chamber 37 whose neck moves in the slot of said chamber.

An expansion coil spring 47, located in chamber 37 and having one end received in the abutment cap 42 and its other end bear-

ing against the headed abutment 46, tends to force the actuating slide 43 toward the right, as shown in Fig. 5.

The actuating slide 43 has a lock-out extension 48, which slides in guides 40 and is provided with a slot 49 extending lengthwise thereof and provided with an offset slot, notch or recess 50, which normally lies in vertical alinement with the straight part of "keyhole" slot or opening 41.

Pivoted on a pin 51 in a depression in the slide 43 is a dog 52 having a curved abutment-head 52^a, which is adapted to abut the blank part 19 of rocker-arm 17 when the push-button, to be described later, is nearly at the limit of its inward movement. The dog has a tail 53 and a curved back 54. A spring 55 tends to throw the tail of the dog upwardly.

To cushion the return movement of the actuating slide as it is moving from left to right of Figs. 5 and 6 and thereby enable the arms of contact 13 to more or less slowly engage the double contacts 28 and 29, there is provided a dash-pot 56 secured to base 1, and a plunger or piston 57 therein which is secured to extension 48. The plunger 57 is hollow and has a detachable bridge 58 having a reduced part 59 adapted to enter the neck-slot 60 of a slot 61 in the end of extension 48, whereby the plunger is rendered readily detachable. A flap-valve 62 and port 63 are provided, whereby the air may pass freely through the plunger and into the dash-pot when the slide 43 is moving toward the left of Figs. 5 and 6 so there will be an air cushion for the plunger when the actuating slide is returning to normal position under the influence of spring 47 which will retard, more or less, the engagement of the contact 13 with contacts 28 and 29 and insure a sufficiently lengthy, though only temporary or momentary, engagement of said contacts and cause an electrical current of proper duration to flow; the air escapes around the plunger during this return movement thereof.

Attached to a rock-shaft 64 journaled in the side-plates 2 and 3, is a rocker 65 which has a clevis 66 at the end of one of its arms and its other arm is much narrower and provided with a toe 67, which is adapted to engage the tail 53 of dog 52, as shown in Figs. 2, 5, 6 and 7, but this engagement is released when the abutment-head 52^a of the dog strikes the blank part 19 of rocker-arm 17. A coil spring 68 encircles the shaft 64 and is engaged with the rocker and with the side-plate 2, said spring tending to hold the rocker 65 in the position shown in Fig. 5.

Bridging the side-plates 2 and 3 is a cross-piece 69 which has a round opening there-through to guide a cylindrical push-button or stem 70, whose lower end is slidable through the slot 49 and in the round part of

the opening 41. This push-button or stem has an outwardly spring-actuated pivoted dog 71, which is of a size to pass through the offset notch or recess 50 and into the offset part of keyhole slot or opening 41 when said slots are in register, which is only when all of the parts are in normal position, as shown in Fig. 5. At all other times the notch 50 is out of alignment with the offset part of keyhole slot 41 and hence, assuming that the push-button has been depressed so that the dog 71 is below the lock-out extension 48, the said extension prevents the push-button from rising. The push-button, if raised, can be depressed, regardless of the position of the parts, because the dog 71 will simply ride past and be depressed by the margin of the slot 49, but when the dog 71 is below the extension 48, the push-button cannot rise unless said extension is in normal position. The push-button has its opposite sides flattened at 72 where it is straddled by the clevis 66 of the rocker 65 and a transverse pin 73 carried by the push-button stem bears on the said end of the rocker, in consequence of which when the push-button stem is depressed, the rocker 65 will move, while the spring 68 causes the rocker 65 to follow the push-button stem in its upward movement. Journalled in the side-plates 2 and 3 is a shaft 74 which carries a pinion 75 meshing with gear 24 and this shaft also carries rotary indicator bearing plates 76 and 77 on which appear the words "On" and "Off" which are adapted to appear through a sight opening 78 in the shell or case 5 to indicate whether the electrical valve (with which this switch is particularly adapted for use) is open or closed. The indicator may bear any suitable indicia according to the use to which the switch is put.

Assuming the parts to be in the normal position shown in Fig. 5, on depressing the push-button stem 70, the rocker 65 is moved, and by its engagement with the tail 53 of the dog 52 which is carried by the slide 40, shifts the slide and parts carried thereby to the left (of Fig. 5) against the pressure of the spring 47. This movement, on account of the engagement of rack 45 with gear face 18, turns the rocker-arm 17 and drags the pawl 20 over the ratchet wheel 23, but if the push-button stem is not depressed until the dog 71 passes below the lock-out extension 48, the shaft 7 will not be turned and, consequently, the contact 13 will not be turned and no electrical completion of the circuit controlled by the switch will be made, and on the release of the push-button stem 70, the parts will return to normal position. If, however, the push-button stem 70 is completely depressed so that the dog 71 passes below the lock-out extension 48, the movement of the rocker 65 will have been sufficient to shift the slide 43 beyond the position shown in Fig. 6,

whereupon the abutment-head 52^a of the dog 52 will strike against the blank part 19 of the rocker-arm 17, and this action will cause the dog to be tilted or depressed against the pressure of its spring so the tail 53 will snap out of engagement with the dog 67, thus completely releasing the actuating slide 43 and all parts except the push-button stem 70 and the rocker 65, so that the parts of the switch, except parts 65 and 70, are entirely out of the control of the operator. When the parts have been brought to the position described (which is a little farther to the left than shown in Fig. 6) the pawl 20 will have been brought to a position where it can engage one of the teeth of the ratchet wheel 23, and hence when the parts are released as above described, the spring 47, which has been previously placed under compression, as shown in Fig. 6 will expand and return the actuating slide 43 to the normal position shown in Fig. 5, and in so doing, the shaft 7 will be turned and opposite arms of contact 13 will pass into engagement with the double stationary contacts 28 and 29, but on account of the employment of the dash-pot 56 and plunger 57 working therein, the return movement of the parts is cushioned by the air which has passed into the dash-pot through the valve in the plunger when the switch was being first operated. This cushioning action enables the arms of contact 13 to remain in engagement with the double contacts 28 and 29 a sufficiently long period to insure proper electrical energization of the circuit and of the device, such as an electrical valve, included in said circuit, but it will be understood that the engagement of the contacts is only momentary or temporary and that the arms of contact 13 pass entirely out of engagement with the double contacts 28 and 29. When the arms of contact 13 are about ready to pass out of engagement with contacts 28 and 29, the spring-arms 32 and 33, which have been spread apart by the turning of the nut 25, snap against opposite faces of said nut and give a quick disengagement or snap action separation of the arms of contact 13 from the contacts 28 and 29, thus obviating sparking. The dog 71 having passed below the lock-out extension 48, when the abutment-head 52^a strikes the blank part 19 of rocker-arm 17 and thus disengages the tail of the dog from the toe 67, the push-button stem 70 and the rocker 65 continue to remain in depressed position and hence no manipulation of the push-button stem can affect the action of the parts in returning to normal positions and, therefore, the temporary engagement of the electrical contacts is insured and is not subject to the control of the operator so that neither by accident or design can the contacts be held in engagement. When the parts are returning to normal position as heretofore described, the toe 67 passes to the

side nearest the observer of the abutment-head 52^a, and hence does not catch on any part of the dog 52. Immediately the parts have regained their normal positions, the offset notch 50 comes into register with the offset part of the keyhole slot 41, and the dog 71 being then in alinement with both notches aforesaid, the spring 68 returns the rocker 65 and the push-button stem to the normal positions shown in Fig. 5, the toe 67 riding over the tail 53 and slightly depressing it and then snapping into engagement with said tail, as shown in Fig. 5.

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

1. In an electrical switch, the combination with relatively movable electrical contacts adapted for temporary engagement only, of means for causing only momentary or temporary engagement of said contacts when they are relatively actuated, and actuating means which prevents the contacts from remaining in engagement with each other.

2. In an electrical switch, the combination with relatively movable electrical contacts adapted for temporary engagement only, of means for causing only momentary or temporary engagement of said contacts when they are relatively actuated, and hand-operated actuating means which prevents the contacts from remaining in engagement with each other.

3. In an electrical switch, the combination with relatively movable electrical contacts adapted for temporary engagement only, of a push-button stem, and means for relatively actuating the contacts from the push-button stem to cause them to only momentarily or temporarily engage each other and which also prevents the contacts from remaining in engagement with each other.

4. In an electrical switch, the combination with relatively movable electrical contacts adapted for temporary engagement only, of means for relatively actuating said contacts to cause them to only momentarily or temporarily engage each other, and automatically locked-out means for operating the actuating means aforesaid.

5. In an electrical switch, the combination with relatively movable electrical contacts adapted for temporary engagement only, of means for relatively actuating said contacts to cause them to only momentarily or temporarily engage each other, means for setting said actuating means for operation, and means for releasing and locking out the setting means aforesaid.

6. In an electrical switch, the combination with relatively movable electrical contacts adapted for temporary engagement only, of a push-button stem, means for relatively actuating the contacts to cause them to only momentarily or temporarily engage each

other, means for setting the actuating means by the movement of the push-button stem, means for automatically releasing the actuating means aforesaid, and means for locking out the push-button stem until the parts have completed their cycle of operation, whereby when the actuating means have been set, the cycle of operations will be carried out without possibility of interference by manual manipulation of the push-button stem.

7. In an electrical switch, the combination with relatively movable electrical contacts adapted for engagement, of means for relatively actuating the contacts to cause them to only momentarily or temporarily engage each other, automatically locked-out means for operating the actuating means aforesaid, and a cushioning device for insuring relatively slow movement of the actuating means.

8. In an electrical switch, the combination with relatively movable electrical contacts adapted for engagement, of means for relatively actuating the contacts to cause them to only momentarily or temporarily engage each other, automatically locked-out means for operating the actuating means aforesaid, and a dash-pot and plunger for insuring relatively slow movement of the actuating means.

9. In an electrical switch, the combination with relatively movable electrical contacts adapted for engagement, of means for causing a relatively slow momentary or temporary movement of the electrical contacts while they are in engagement, and means for imparting a relatively quicker or snap action to the contacts as they disengage from each other.

10. In an electrical switch, the combination with an electrical contact, of a rotary contact arranged to only momentarily or temporarily engage the contact aforesaid when the switch is operated, means for rotating said rotary contact relatively slowly as it momentarily or temporarily engages the electrical contact first-named, and means for imparting a relatively quicker or snap action to the rotary contact as it passes out of engagement with the other contact.

11. In an electrical switch, the combination with relatively movable electrical contacts adapted for temporary engagement only, of means for causing a relatively slow momentary or temporary movement of the electrical contacts while they are engaged and for preventing them from remaining in engagement with each other, and means for imparting a relative snap action to the contacts as they disengage from each other.

12. In an electrical switch, the combination with an electrical contact, of a rotary contact adapted to engage the contact aforesaid, a ratchet wheel rotating with the ro-

tary contact, a rocker-arm, a pawl adapted to engage the ratchet wheel, a spring-retracted actuating member for rocking the rocker-arm aforesaid, a hand-operated member, automatically released means for setting the actuating member from the hand-operated member, and means for locking out the hand-operated member after the actuating member has been set and until said actuating member returns to normal position.

13. In an electrical switch, the combination with relatively movable electrical contacts adapted for only momentary or temporary engagement with each other when actuated, of a spring-retracted actuating member for relatively moving the contacts, an independently spring-retracted hand-operated member, automatically released means for setting the actuating member from the hand-operated member, and means for locking out the hand-operated member after the actuating member has been set and until said actuating member has returned to normal position.

14. In an electrical switch, the combination with relatively movable electrical contacts adapted for only momentary or temporary engagement with each other when actuated, of a spring-retracted actuating member for relatively moving the contacts, an independently spring-retracted hand-operated member, automatically released means

for setting the actuating member from the hand-operated member, means for locking out the hand-operated member after the actuating member has been set and until said actuating member has returned to normal position, and a cushioning device for checking or slowing the return movement of the actuating member.

15. In an electrical switch, the combination with relatively movable electrical contacts adapted for only momentary or temporary engagement with each other when actuated, of a spring-retracted actuating member for relatively moving the contacts, an independently spring-retracted hand-operated member, automatically released means for setting the actuating member from the hand-operated member, means for locking out the hand-operated member after the actuating member has been set and until said actuating member has returned to normal position, a cushioning device for checking or slowing the return movement of the actuating member, and means for imparting a relative quick or snap action to the movable contacts as they disengage from each other.

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

ISAAC G. WATERMAN.

Witnesses:

LOUIS RABUT,
CHARLES RABUT.