

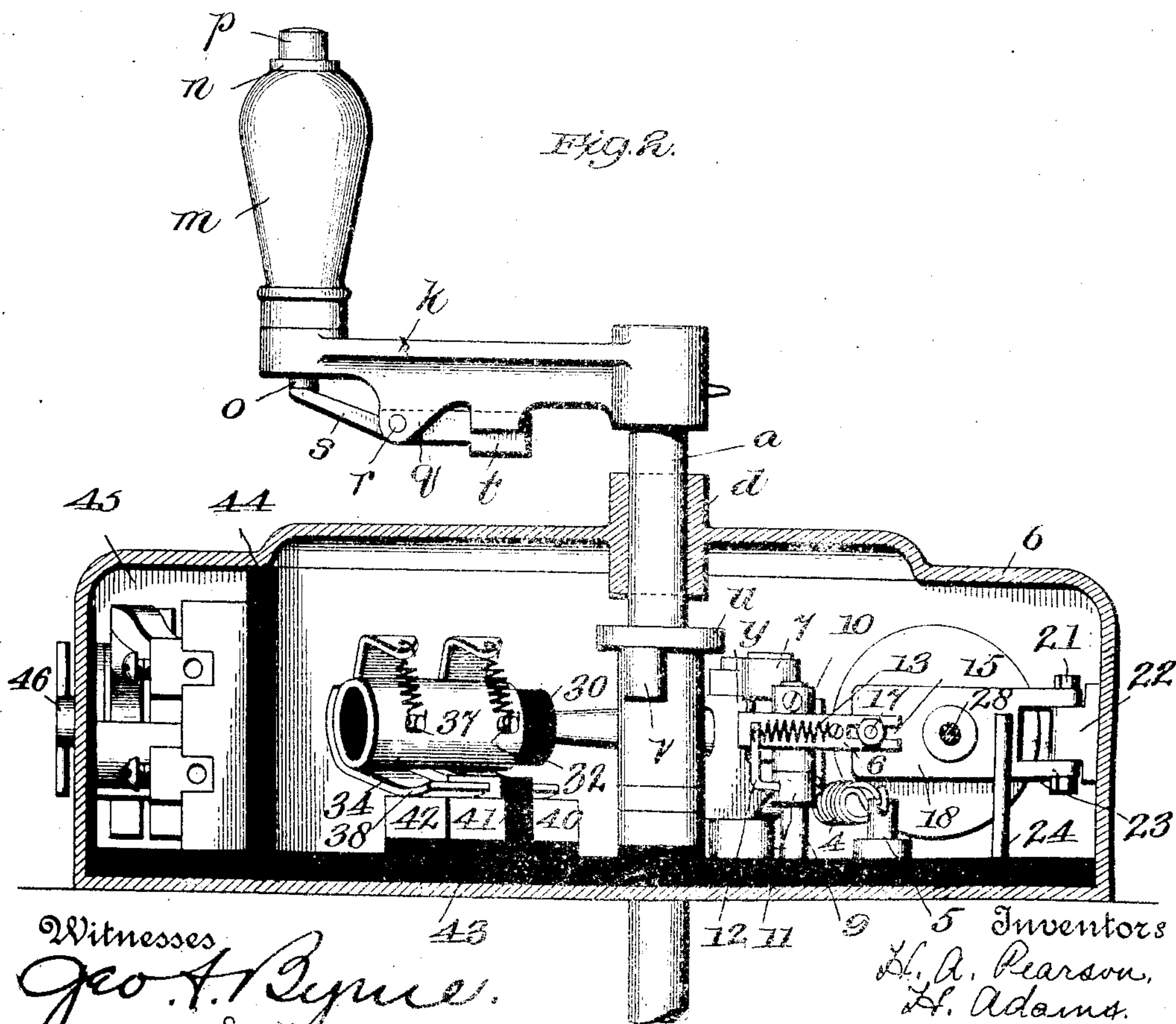
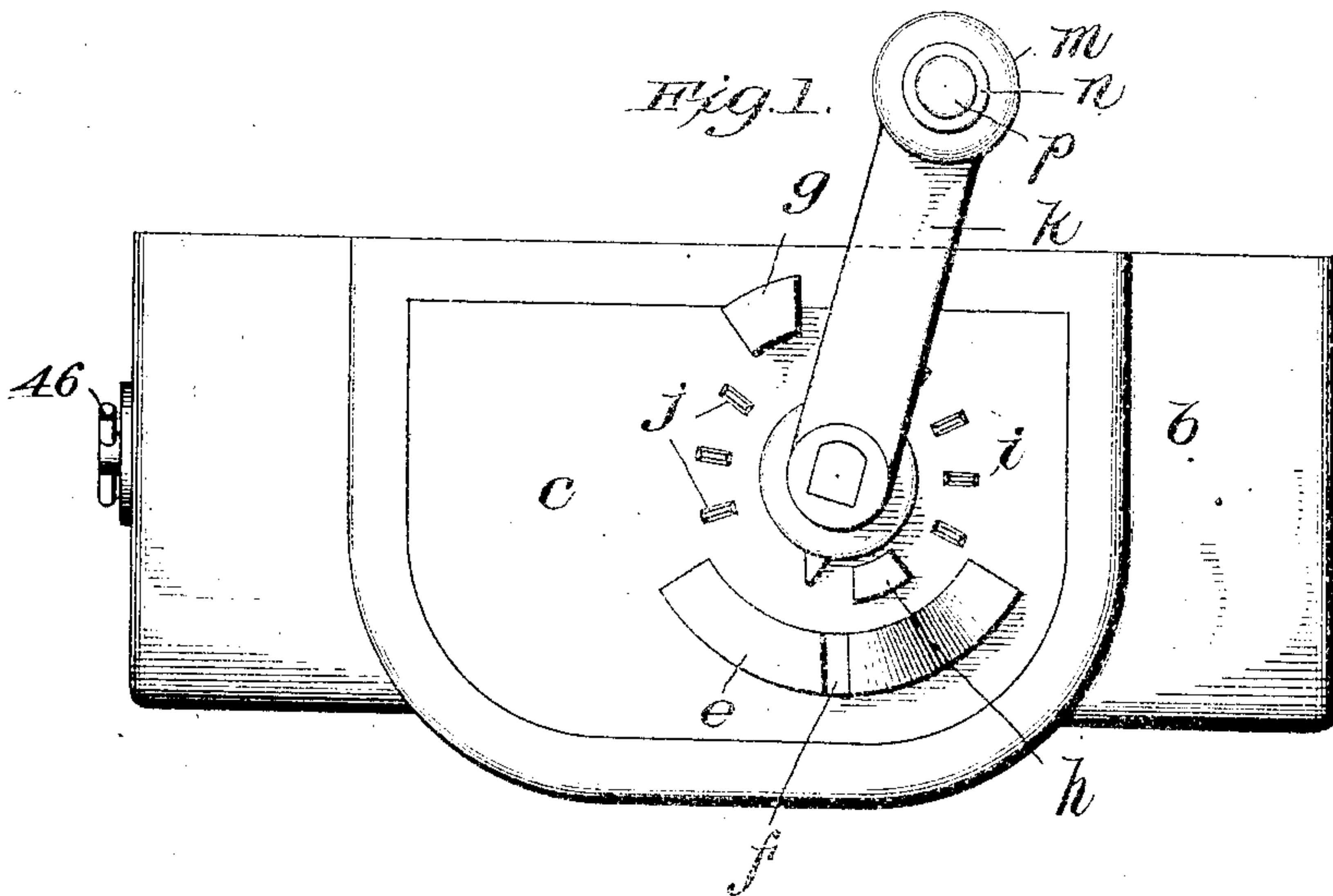
No. 864,027.

PATENTED AUG. 20, 1907.

H. A. PEARSON & H. ADAMS.
AUTOMATIC CIRCUIT CLOSER.

APPLICATION FILED OCT. 22, 1906.

4 SHEETS—SHEET 1.



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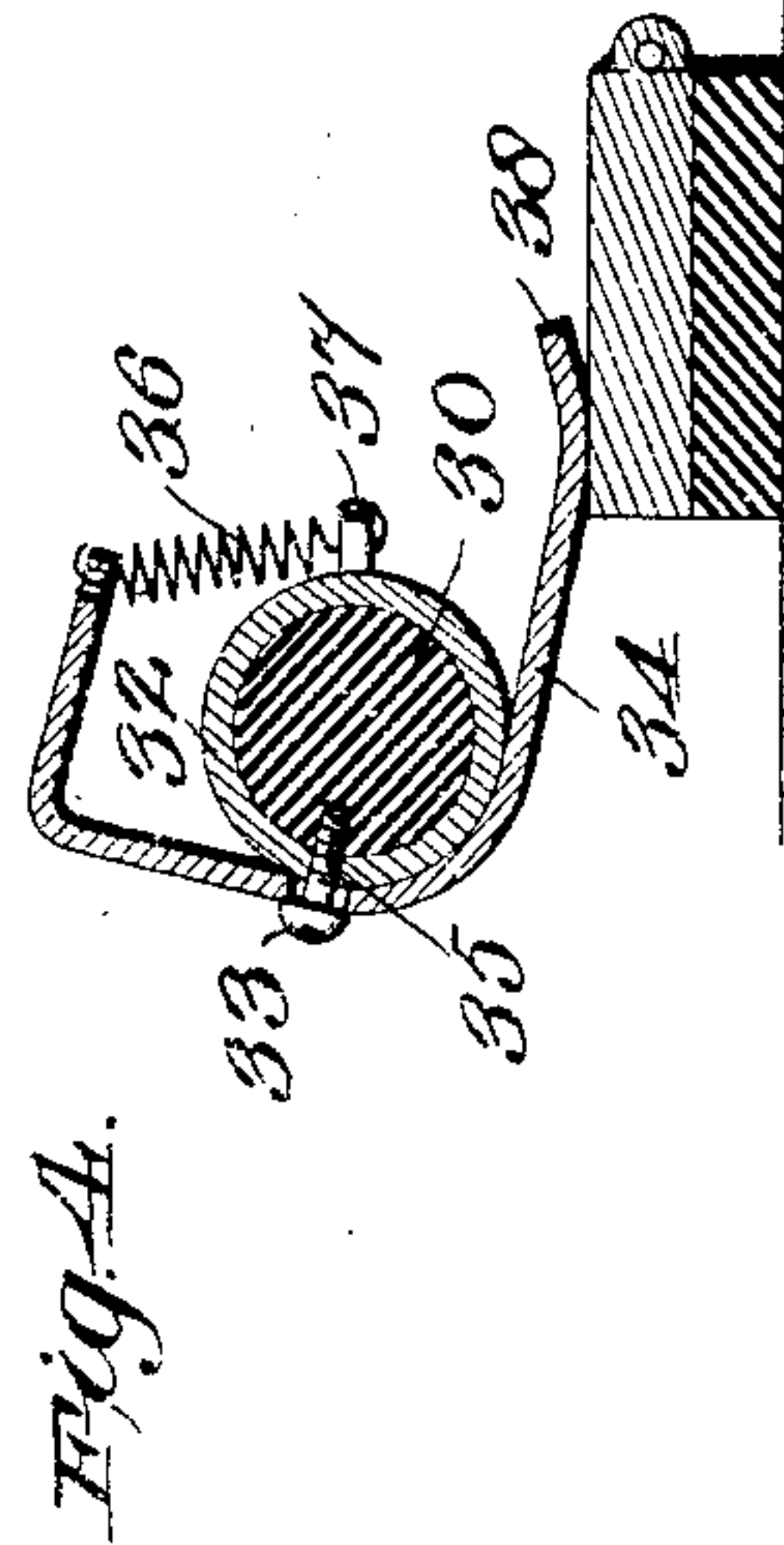
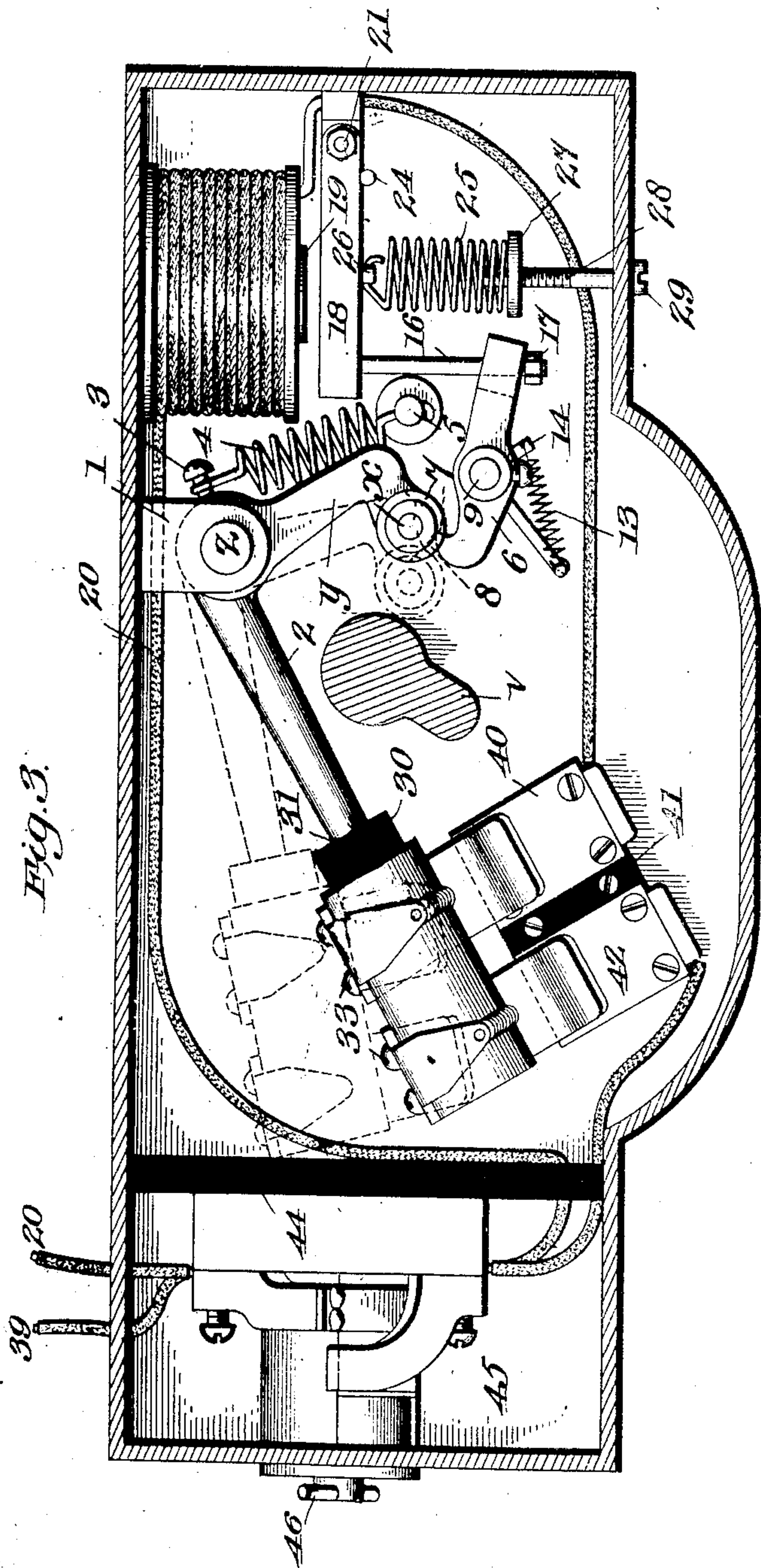
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4 SHEETS—SHEET 2



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4 SHEETS—SHEET 3.

Fig. 5.

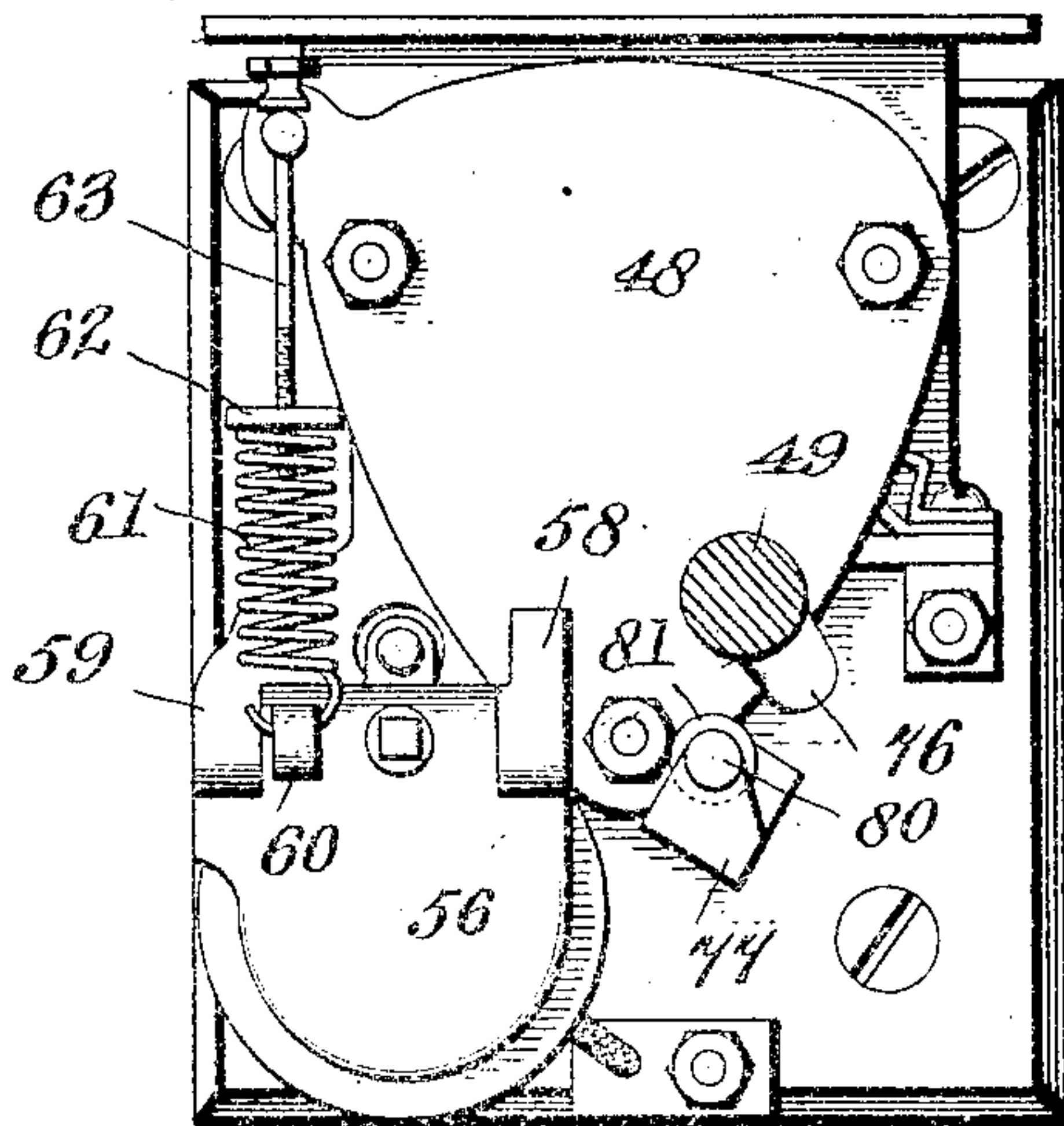
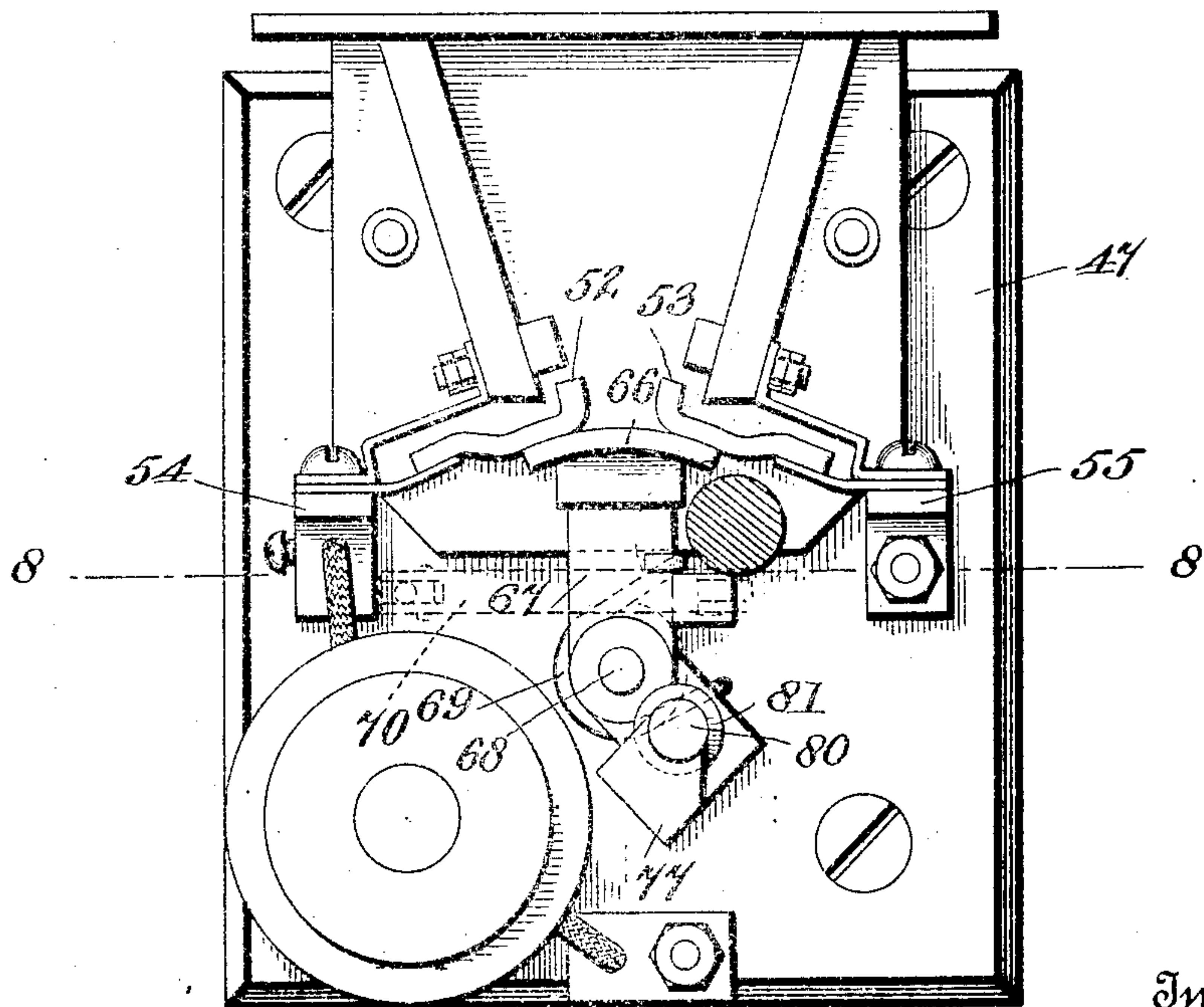


Fig. 6.



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4 SHEETS—SHEET 4

Fig. 7.

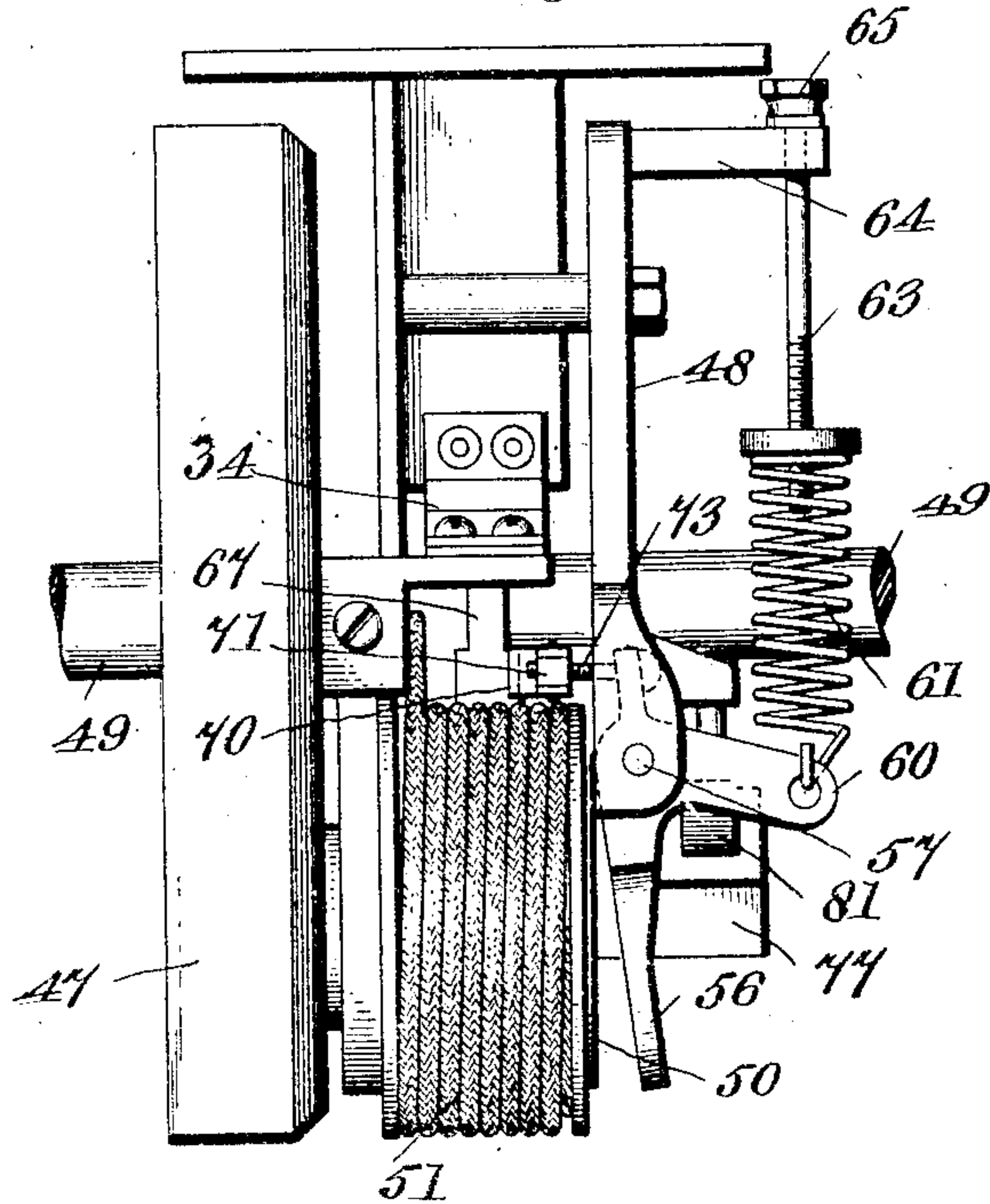


Fig. 8.

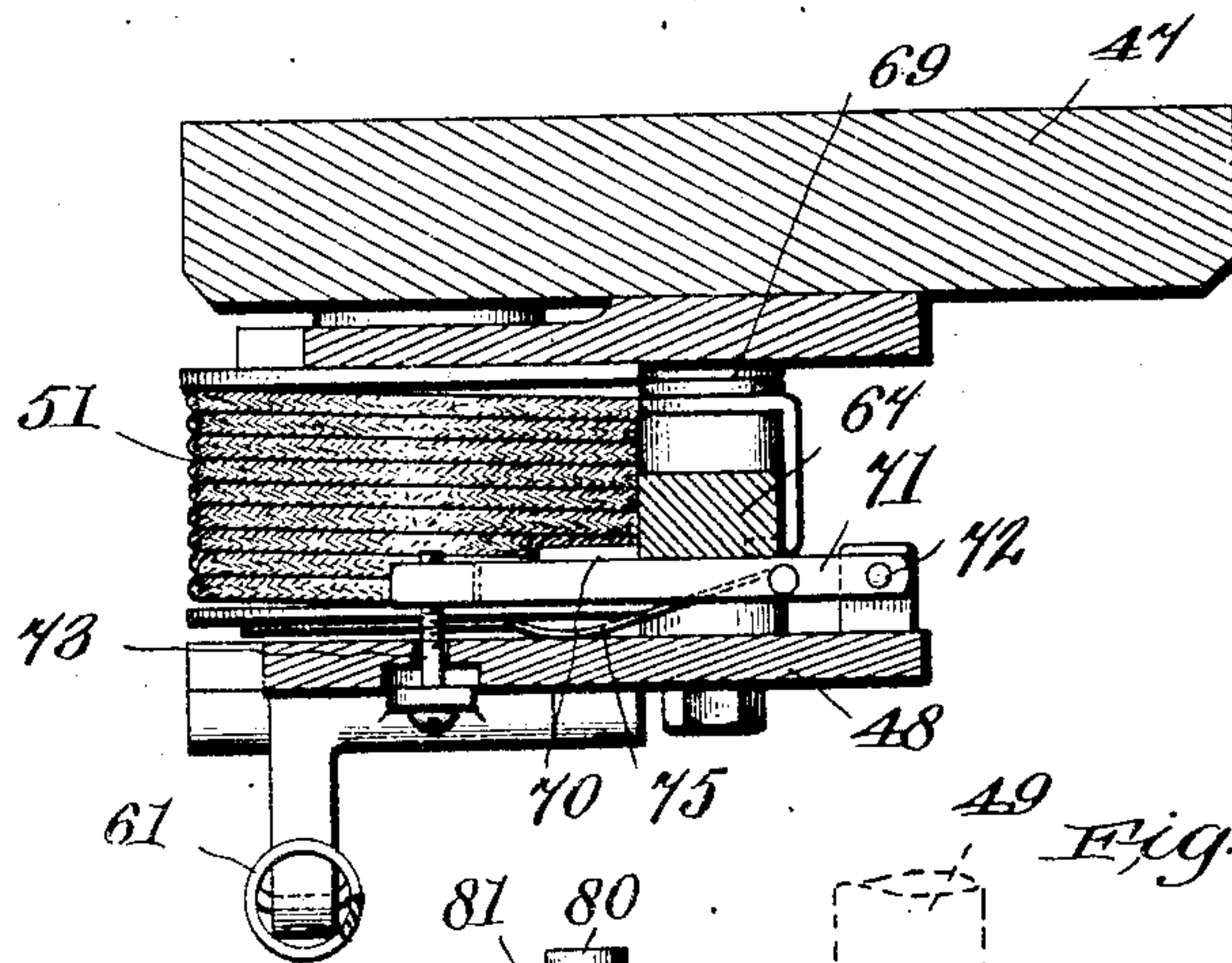
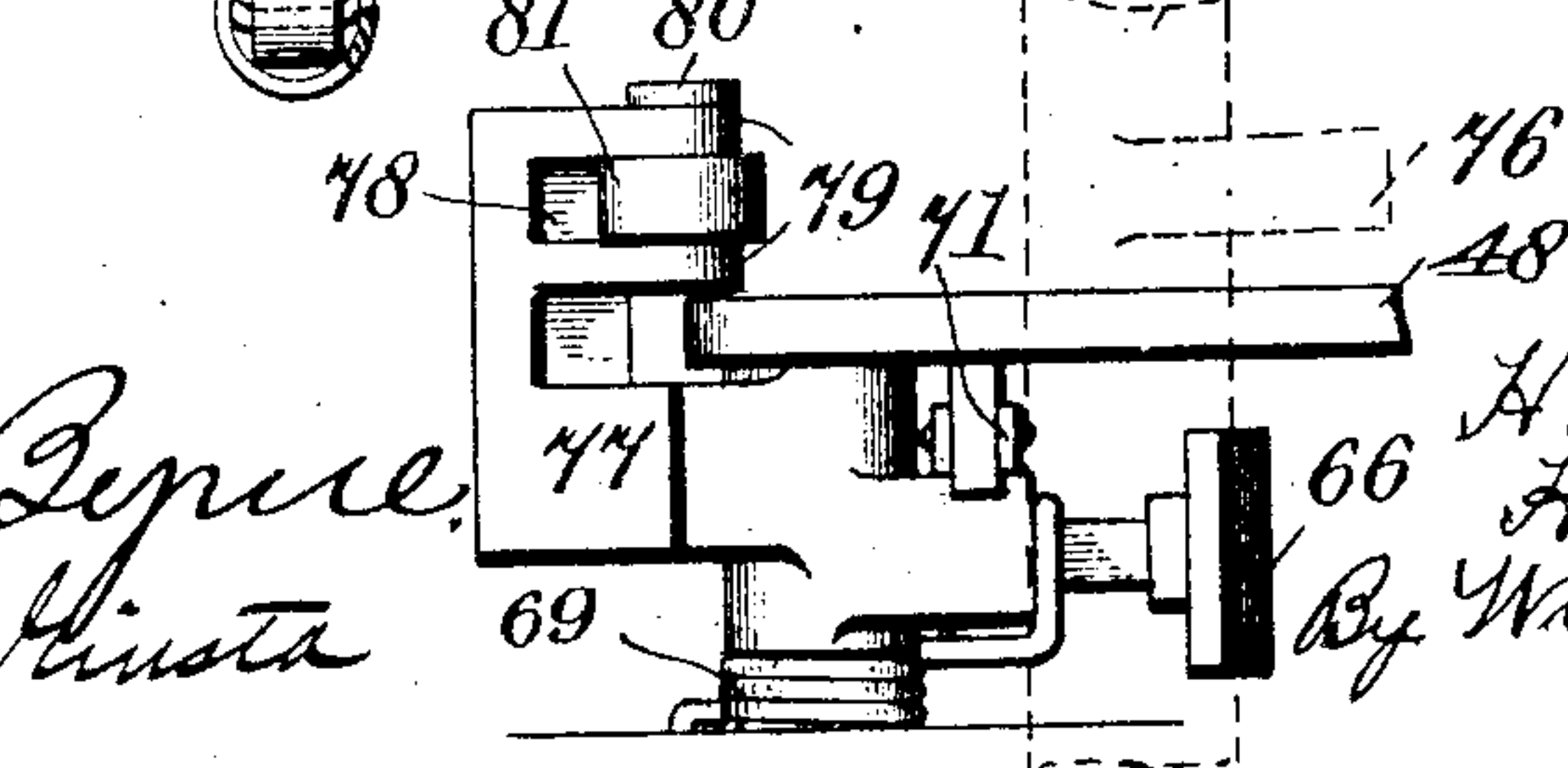


Fig. 9.



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UNITED STATES PATENT OFFICE.

HENRY A. PEARSON AND HARRY ADAMS, OF THE UNITED STATES NAVY.

AUTOMATIC CIRCUIT-CLOSER.

No. 864,027.

Specification of Letters Patent.

Patented Aug. 20, 1907.

Application filed October 22, 1906. Serial No. 340,070.

To all whom it may concern:

Be it known that we, Lieutenant HENRY A. PEARSON and Gunner HARRY ADAMS, (the right name,) United States Navy, both citizens of the United States, and serving on board the United States steamship *Illinois*, attached to the North Atlantic Fleet, have invented certain new and useful Improvements in Automatic Circuit-Closers; and we do hereby 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.

Our invention relates to automatic circuit closers, and is designed to be applied directly to the controller shaft in connection with the circuit breaker, the circuit closer, the circuit breaker, and the governing switch all being inclosed in the same casing.

Our invention is primarily designed to be used with the electrical means generally used on board ship for operating turrets, cranes, winches, etc., in which it is, of course, desired to move such apparatus in either direction. Our invention, however, is not confined to such uses, but may be used with a controller of any type whatever, and may be set so that when the circuit breaker is opened either by an over-load current, or an under-load current, the movement of the controller handle to the "off" position will automatically close the circuit.

With the objects stated in view, our invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a top view of a controller box for use in operating turrets, etc. Fig. 2 is a side view thereof, the inclosing casing being shown in section. Fig. 3 is a longitudinal horizontal section of the same. Fig. 4 is a detail cross section of one of the contacts of the circuit breaker. Fig. 5 is a front view of a modified form adapted to be used for general purposes, such as street cars. Fig. 6 is a similar view with the cover removed. Fig. 7 is a side view of this modified form. Fig. 8 is a cross section on the line 8-8 of Fig. 6, and Fig. 9 is a detail view on a larger scale of the switch.

In working with the ordinary form of turret controllers, on board ship, it was found to be a source of considerable delay and annoyance to have a circuit breaker blow and then have to go through the regular cycle of putting the operating handle to the "off" position, to reach to the circuit breaker, which was more or less inconveniently situated, and close it, and then resume the operation of the controller, not to mention the delay consequent on occasionally failing to put the operating handle to the "off" position, before closing the circuit breaker, which would result in burning out a fuse or having the circuit breaker immediately blow again.

In each circuit there is a switch as well as a circuit

breaker. The controllers occasionally give trouble by the contacts burning, so that the fingers jam, making it necessary to throw out the switch, open the controller box, and file off the contacts. Besides this, the switch is thrown out when finished with the controller, making it necessary to throw it in every time it is used. In the ordinary construction, the switch is generally more remote from the controller than the circuit breaker, so that it always involves a loss of time to have to work it as above noted in the position where it is placed. To remedy these difficulties is the object of our present invention, which is designed to have the circuit breaker close automatically when the operating handle is thrown to the "off" position, by placing the circuit breaker and circuit closer in the top or bottom of the controller box, so that the controller shaft will act directly upon the circuit closing device. The switch, of whatever type, is also placed in the controller box, so that the operator will have under his immediate control the circuit closer, the circuit breaker, and switch, all inclosed by the controller box, keeping them separated from outside influences, thus avoiding the liability of accident, and yet readily accessible.

There is a considerable element of danger, particularly in turrets, ammunition hoists, etc., in the sparks that fly from the switch when opened, or the circuit breaker when it blows, as in the ordinary construction they are fully exposed and not far removed from the powder charges. All the difficulties and dangers hereinbefore set forth are obviated by the use of our improved apparatus.

Referring to the form shown in Figs. 1 to 4, which is particularly adapted for operating turrets, etc., on board ship, *a* represents the ordinary controller shaft, which in addition operates our automatic closing device. This passes through the casing *b*, which may be the top part of the controller box, or may be attached thereto, and in which casing are located the switch, the circuit breaker, and the automatic circuit closer.

The casing *b* is provided on its top with a raised extension *c* of the ordinary type, in which is formed a bearing *d* for the controller shaft. On the extension *c* is mounted the stop piece *e* provided with a slot *f* denoting the zero position. The stop piece *e* is curved in the arc of a circle, as shown in Fig. 1, and is also highest at the central point where the slot *f* is cut. *g* and *h* represent the usual stop pieces limiting the movement of the handle in either direction, and *i* and *j* represent projections on the top of the casing to indicate to the operator the distances to move the controller handle to turn on the current to a greater or less degree, the projections *i* representing the forward motion, and the projections *j* the reverse motion.

On the shaft *a* is mounted the operating crank *k* provided with a handle *m* loosely mounted on a rod

n attached to the crank k . Through the rod n loosely passes a pin o normally held in the position shown in Fig. 2 by means of a spring (not shown) inside the rod n . A button p is mounted on the top of the handle, so that the pin o may be pressed downward, when desired.

The lower side of the crank k is provided with two projections q through which runs a pin r , on which is pivoted the bent lever s having a projection t on its inner end, which projection is adapted to engage the slot f when the handle m is moved to the proper position, thus locking the handle in that position, in which case no current will flow to the motor for operating the upright. The outer end of the lever s engages the pin o .

Within the casing b the controller shaft has rigidly attached to it a disk u which may be made integral having an extension v projecting below and to one side of the same, the outer face of this projection being curved. This projection v is adapted to contact with a roller w loosely mounted on a pin x , which projects upwardly from a bent lever y , which lever is fastened to a shaft z , loosely mounted in brackets 1 secured to the rear side of the casing b .

Attached to the shaft z is the arm 2, which carries the contact points. Of course the lever y , pin z , and arm 2, may be made integral, if preferred. In the enlarged part of the lever y , where it encircles the pin z , is inserted a screw 3, to which is attached a strong spring 4, the other end of which is secured to a pin 5 mounted in the bottom of the casing. The tendency of the spring 4 is to throw the arm 2, and the parts connected therewith, from the position shown in full lines in Fig. 3, to the position shown in dotted lines. This tendency is, under ordinary conditions, resisted by a pivoted pawl or catch. This pawl or catch 6 has a toothed end 7 adapted to fit into a notch 8 cut into the outer end of the bent lever y , as shown in dotted lines in Fig. 3. The catch 6 is loosely mounted upon a pin 9 projecting upwardly from the bottom of the casing. It is held between two collars 10 and 11 fastened to the pin 9, but is free to revolve thereon. From the collar 11 extends a bent pin 12, to the upper part of which is attached one end of a spring 13, the other end of said spring being attached to a pin 14 carried by the catch 6, this spring always tending to hold the point 7 of the catch 6 in contact with the notch 8. The other end of the catch 6 is slotted, as shown at 15, and through this slot loosely passes a rod 16 having a nut 17 thereon, which rod is carried by the armature 18 of the electro magnet 19, around which the electric wire 20 carrying the current is wound, the armatures 18 being pivotally mounted on a pin 21, which pin passes through a bearing 22 in the wall of the casing, and through ears 23 on one end of the armature.

A pin 24 projects upwardly from the bottom of the casing, which pin limits the movement of the armature in one direction. A spring 25 is attached at one end to a pin 26 in said armature, and at the other end to a disk 27, through which passes a screw 28, the head 29 of which is located outside of the casing b , so that by moving the screw the disk 27 may be moved, thus varying the tension of the spring. Under ordinary conditions, this spring 25 keeps the armature 18 in contact with the pin 24.

To the end of the arm 2 is attached a cylinder 30 of

rubber, or similar insulating material, by any suitable means, as, for example, screws 31. On the outside of this insulating cylinder is secured a hollow cylinder 32 made of brass, or any suitable good electrical conductor, by means of screws 33. On this cylinder 32 are secured the contact strips 34 by means of the screws 33, which pass loosely through slots 35 in said contact strips. The upper ends of said strips are bent, and to the bent ends are secured springs 36, the other ends of said springs being secured to pins 37 fastened to the cylinder 32. The lower end of each of these contact strips is bent upwardly, as shown at 38.

20 and 39 represent the wires of the electric circuit, the wire 20 being coiled around the magnet 19, as hereinbefore described, and then passing into one end of a stationary contact block 40, which is secured on top of a base 41 of rubber or other insulating material.

The wire 39 runs to another contact block 42 secured on the insulating base 41, and the ends of the contact strips 34 are adapted, when the current is flowing, to engage with said contact blocks, as shown in full lines in Fig. 3, the springs 36 always keeping said strips firmly in contact with said blocks. The current comes in through the wire 20, passes around the magnet 19, thence to the contact block 40, thence through one of the contact strips to the brass cylinder 32, thence to the contact block 42, and then to the return wire 39.

When the parts are in the position shown in dotted lines in Fig. 3, obviously this circuit is broken, as the contact strips are withdrawn from the contact blocks. This withdrawal is effected by the spring 4 as soon as the point 7 of the catch 6 is removed from the slot 8, and this takes place whenever there is an over-load current, the result of which is to energize the magnet 19 so strongly that it will attract to it the armature 18, overcoming the tension of the spring 25, and thereby disengage the catch 6 from the lever y , whereupon the spring 4 breaks the circuit. The turning of the shaft a , however, in either direction, restores the parts to their normal position, the projection v contacting with the roller w and forcing the parts back into the position shown in full lines in Fig. 3, no matter which way the handle m is moved. Of course, the breaking of the circuit deenergizes the magnet 19, so that the operator does not have to overcome the force of the electric current.

The bottom of the casing b is provided with a lining 43 of insulating material, and a vertical partition 44 of insulating material separating the circuit breaking and closing devices from the switch, which will next be described. This switch is contained in a small compartment 45 located in one end of the casing b , and is of any ordinary or preferred type, and is operated by means of the handle 46. The construction of the switch, therefore, will not be described in detail.

The modified form, shown in Figs. 5 to 9, embodies our automatic circuit closer, as applied to an ordinary form of circuit breaker, such as is used on electric cars, for example. Such circuit breakers are usually located immediately under the roof of the car, but we prefer to locate them immediately above or below the controller box, so that the operation of the controller shaft will automatically operate the circuit closing devices. In this modification, 47 represents the base plate, and 48 a removable front plate, the controller shaft 49 passing through them.

50 represents an electro magnet around which the circuit wire 51 runs, 52 and 53 representing respectively contact strips running from the binding posts 54 and 55.

56 represents the armature of the magnet pivoted on a pin 57 in ears 58, extending from the base plate 48. The armature has a projecting pin on its outer face 60, with which a spring 61 engages, the other end being connected to a disk 62 screw threaded on a rod 63, which passes loosely through a hole in the projecting arm 64 on the base plate 48. The screw rod 63 is provided with a head 65, and obviously by rotating this head the tension of the spring 61 may be adjusted, as desired.

The contact points 52 and 53 are closed by means of a contact strip 66, carried on the end of an arm 67 mounted on the pin 68. A strong spring 69 encircles the lower part of this pin 68, and normally tends to throw the parts from the position shown in Fig. 6 to the left, thus breaking the circuit. Under ordinary conditions, the action of this spring is resisted by means of a stop 70 carried by the arm 71 pivoted on a pin 72, a screw 73 being attached to the other end of said arm and passing loosely through a hole in the armature, the head 74 of said screw preventing it from slipping through the armature. A spring 75 normally keeps said arm 71 pressed away from the armature and in contact with the arm 67, the result being that under ordinary conditions the stop 70 prevents the spring 69 from moving the arm 67 to the left and breaking the circuit; but when a current too heavy for the motor passes through the circuit, the electro magnet is energized sufficiently to draw down its armature against the tension of the spring 61, which disengages the stop 70 from the arm 67, whereupon the spring 69 immediately swings the arm 67 to the left, breaking the circuit, and of course stopping the current. When, however, the controller shaft 49 is moved to the "off" position, the circuit is automatically closed again by the following means. The controller shaft 49 has upon it a projecting portion 76 having a rounded end. The arm 67 is extended beyond the point where it is pivoted on the pin 68, forming an extension 77, which extension is also provided with an upwardly extending portion 78 provided with ears 79, in which is mounted a pin 80, on which is loosely mounted a roller 81.

From the construction described, it will be seen that a movement of the controller shaft to the "off" position will bring the projection 76 into contact with the roller 81, swinging the arm 67 back to its original position, as shown in Fig. 6, whereupon the stop 70 will hold the parts in this position with the strip 66 in contact with the parts 52 and 53, the circuit being thereby closed until the armature 56 is again moved.

As previously stated, our automatic circuit-closer is adapted for use in connection with any of the ordinary forms of circuit breaker, can be applied to any kind of a circuit, and any kind of a controller.

Having thus described our invention, what we claim

as new and desire to secure by Letters Patent of the United States, is:—

1. The combination of a controller shaft, a casing adapted to be placed in proximity to the controller box and provided with a bearing for said shaft, said casing being provided with an insulating bottom and partition dividing it into chambers, a switch located in one of said chambers, circuit breaking devices located in the other of said chambers, and means operated by the movement of the controller shaft to automatically close the circuit, if broken, as the controller shaft is moved to its "off" position, substantially as described.

2. The combination of a casing adapted to be placed in proximity to the controller box, a controller shaft passing through said casing, circuit breaking devices located in said casing, and including a spring normally tending to separate the contact points, a catch normally resisting the action of said spring, an electro magnet around which the circuit wires pass, an armature for said magnet, a spring normally holding said armatures out of contact with said magnet, connections between said armature and said catch, whereby the movement of said armature will release said catch, thereby causing the circuit to be broken, and means operated by the movement of the controller shaft to its "off" position for re-establishing the circuit, if broken, substantially as described.

3. The combination of a controller shaft having a projecting cam thereon, spring operated circuit breaking devices, said circuit breaking devices being provided with an extended arm carrying a roller against which the cam on the controller shaft is adapted to strike when the circuit is broken, a catch for normally holding the circuit breaker in its closed position, said circuit breaker including a conducting cylinder mounted on an insulating support and having spring controlled contact strips mounted on said conducting cylinder, substantially as described.

4. The combination of a controller shaft provided with a cam, circuit breaking devices composed of arms arranged at right angles to each other, one of said arms carrying contact strips, and the other of said arms carrying a roller adapted to be struck by said cam, if the circuit is broken, a spring normally tending to open the circuit, a catch normally engaging one of said arms and resisting the action of said springs, and electro magnetic devices governing the action of said catch, whereby an over-load current will release said catch, causing said spring to open said circuit, substantially as described.

5. The combination of a controller shaft provided with a projecting cam, circuit breaking devices comprising two arms at right angles to each other and pivotally mounted at the junction of said arms, one of said arms being provided with insulating material and movable contact strips, and the other of said arms being provided with a roller adapted to be struck by said cam on the revolution of said shaft, if the circuit is broken, a spring normally tending to open said circuit, a spring controlled catch for engaging the roller arm of the circuit breaking devices and normally resisting the action of the spring tending to break the circuit, and electro magnetic devices operatively connected to said catch, whereby on the operation of said devices said catch will be moved against the tension of the spring normally controlling it, releasing the circuit breaking devices, and causing the first named spring to break the circuit, substantially as described.

In testimony whereof, we affix our signatures, in presence of two witnesses.

HENRY A. PEARSON.
HARRY ADAMS.

Witnesses:

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