

No. 719,768.

PATENTED FEB. 3, 1903.

C. ENGBERG & J. ERICKSON.  
ELECTROHYDRAULIC VALVE.

APPLICATION FILED APR. 7, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

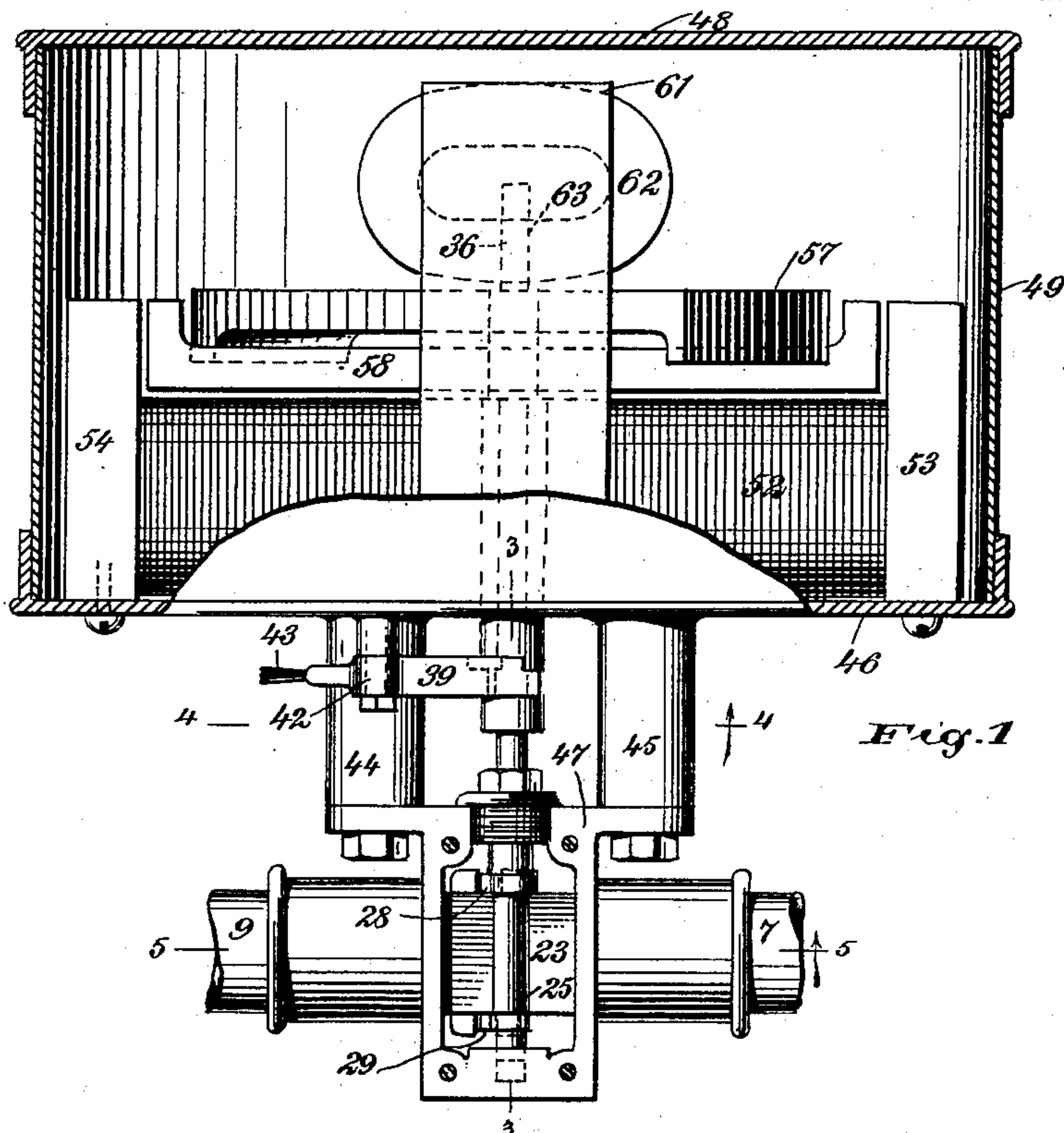
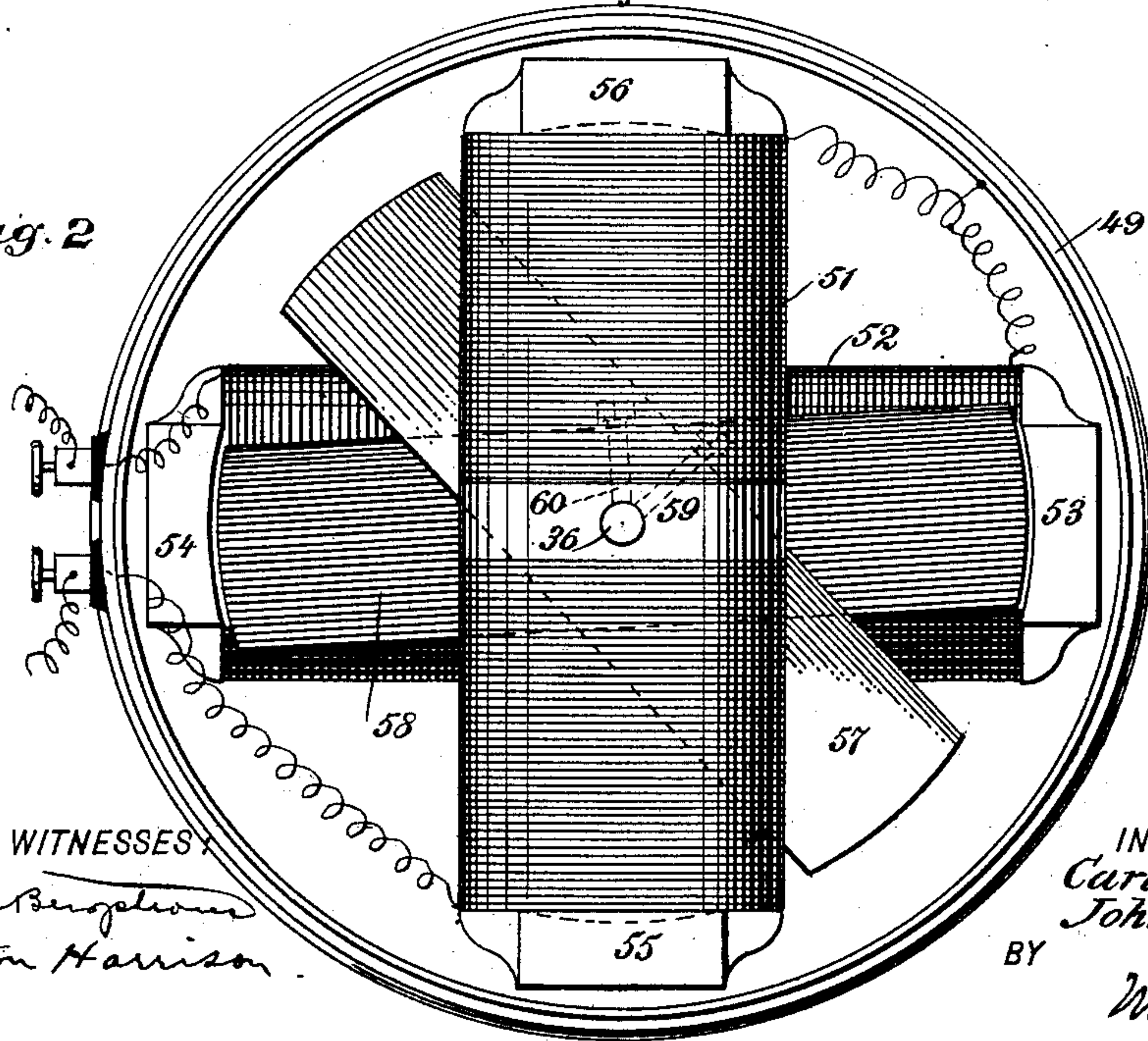


Fig. 2



WITNESSES:

*John Magnusson*  
*Walton Harrison*

INVENTORS  
*Carl Engberg*  
*John Erickson*

BY

*Munn*  
ATTORNEYS

No. 719,768.

PATENTED FEB. 3, 1903.

C. ENGBERG & J. ERICKSON.  
ELECTROHYDRAULIC VALVE.

APPLICATION FILED APR. 7, 1902.

2 SHEETS—SHEET 2.

NO MODEL.

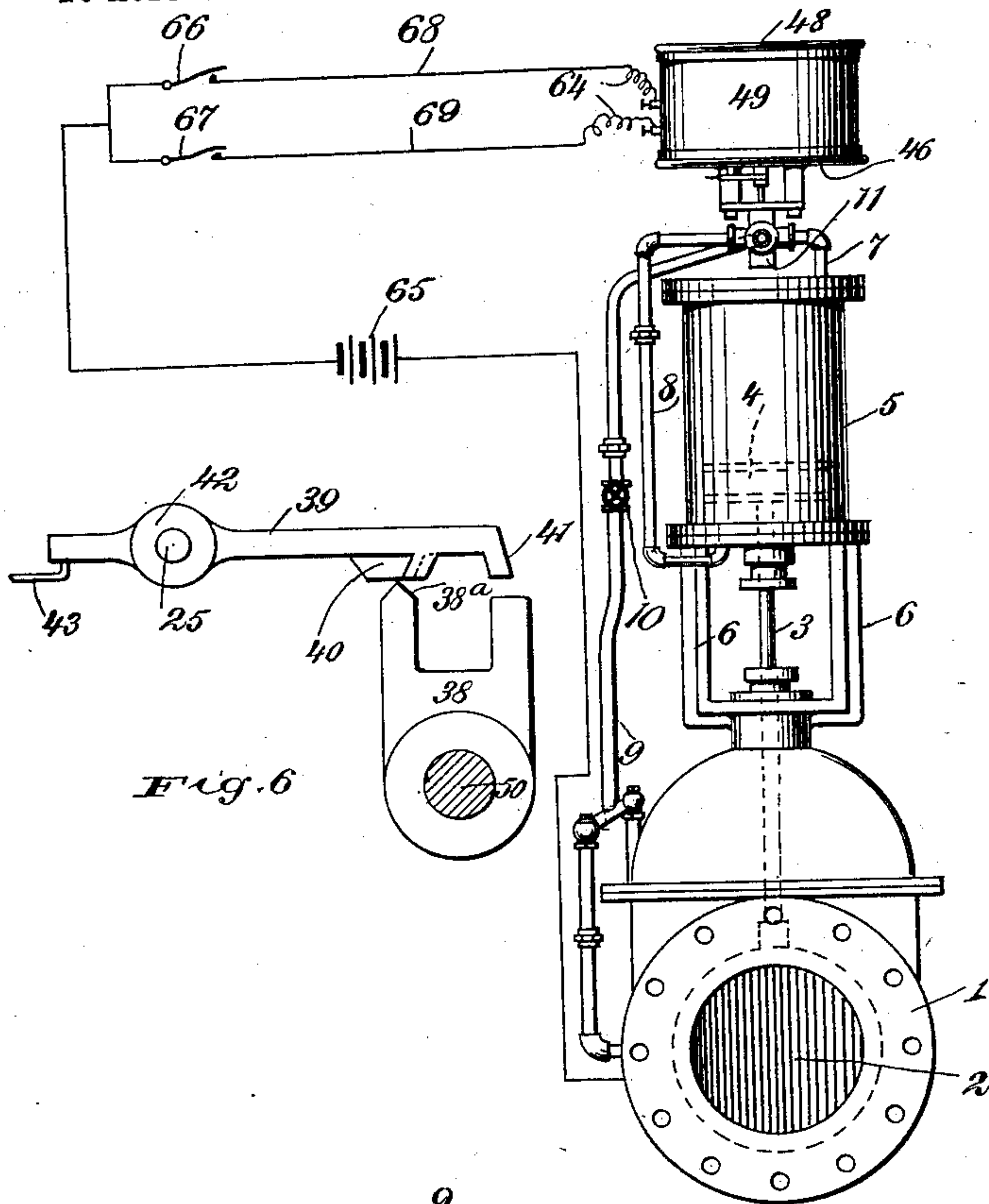


Fig. 6

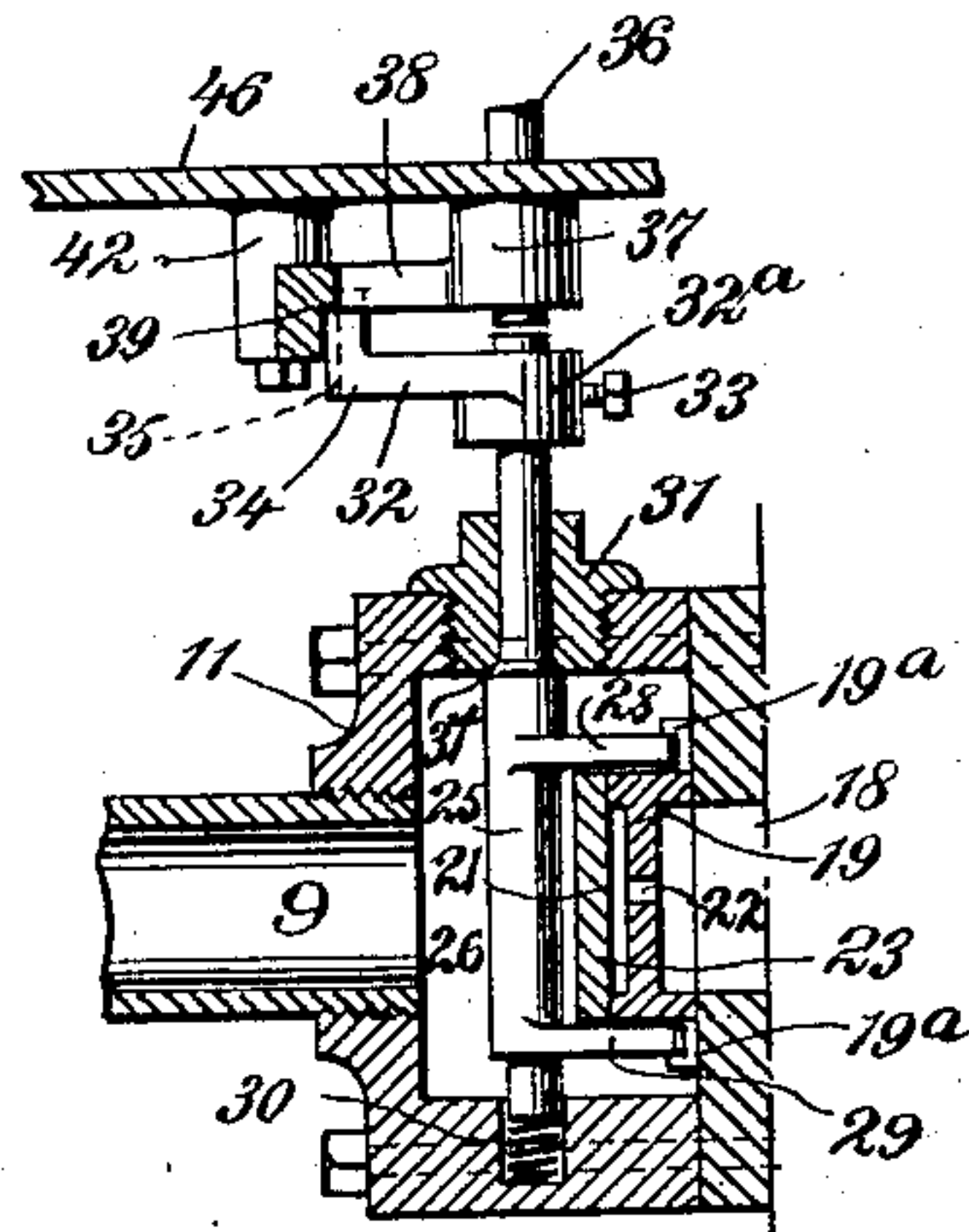


Fig. 3

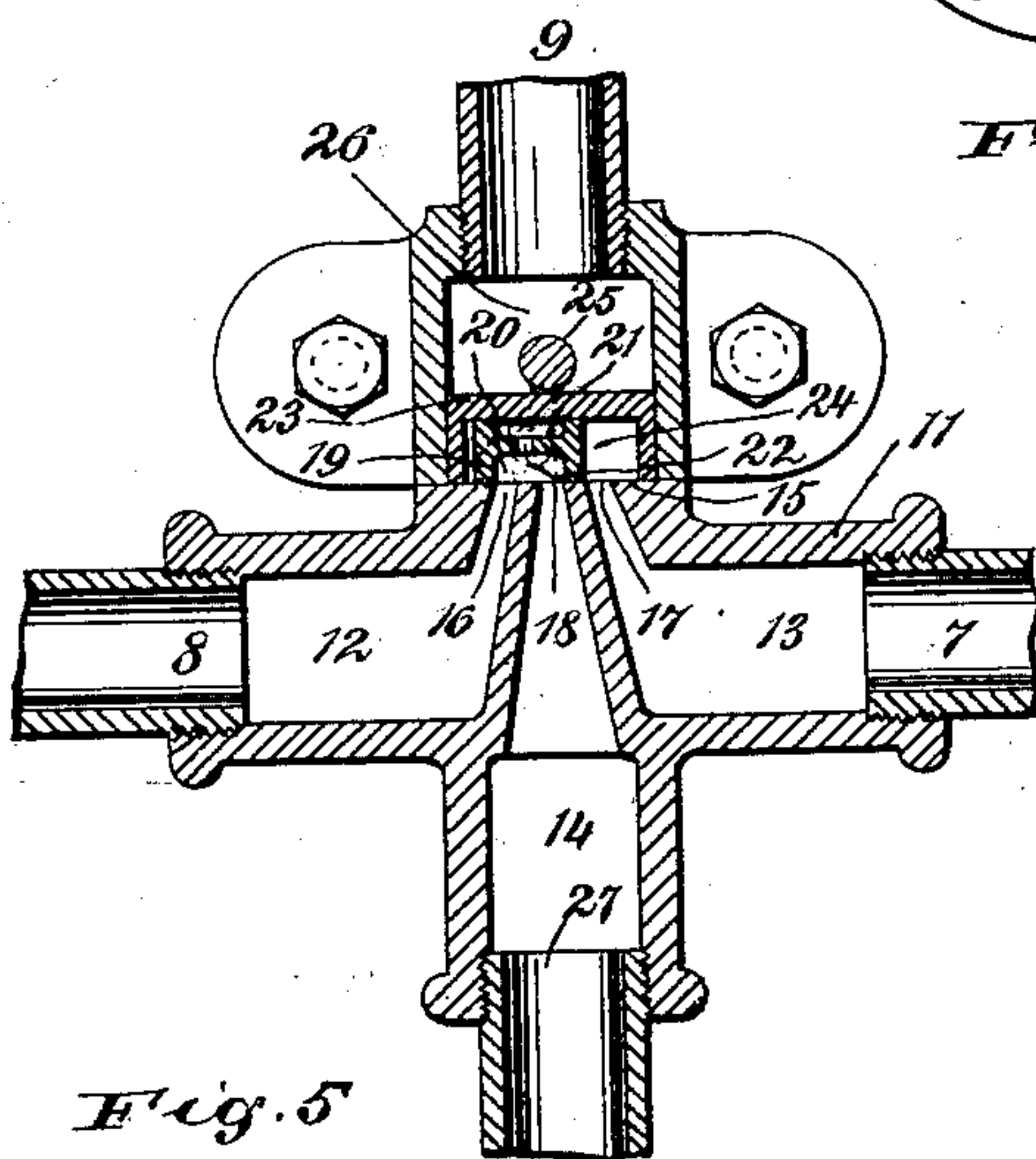


Fig. 5

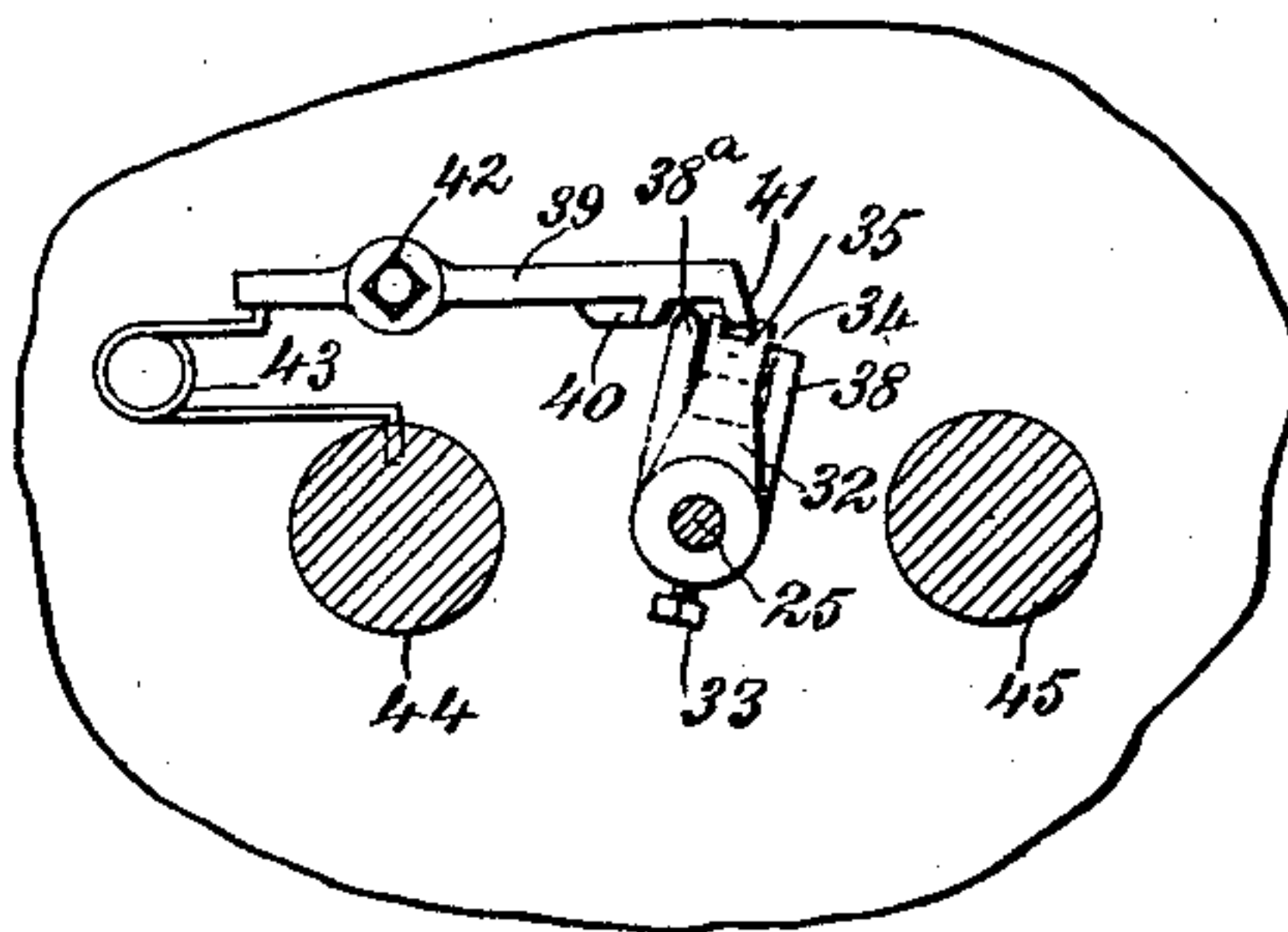


Fig. 4

WITNESSES:

*John Engberg*  
*Walton Harrison*

INVENTORS

*Carl Engberg*  
*John Erickson*

BY

*Neuman*  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

CARL ENGBERG AND JOHN ERICKSON, OF ST. JOSEPH, MICHIGAN.

## ELECTROHYDRAULIC VALVE.

SPECIFICATION forming part of Letters Patent No. 719,768, dated February 3, 1903.

Application filed April 7, 1902. Serial No. 101,696. (No model.)

*To all whom it may concern:*

Be it known that we, CARL ENGBERG and JOHN ERICKSON, citizens of the United States, residing at St. Joseph, in the county of Berrien and State of Michigan, have invented certain new and useful Improvements in Electrohydraulic Valves, of which the following is a full, clear, and exact description.

Our invention relates to an electrohydraulic valve—that is to say, to an appliance operated by electricity for opening and closing a valve for a hydraulic conduit or analogous structure.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a fragmentary elevation, partly in section, showing an electric motor and an auxiliary valve for operating the main valve. Fig. 2 is a plan view of the electric motor. Fig. 3 is a vertical section upon the line 3 3 of Fig. 1 looking toward the left-hand side of the sheet. Fig. 4 is a fragmentary section upon the line 4 4 of Fig. 1 looking in the direction of the arrow. Fig. 5 is a horizontal section upon the line 5 5 of Fig. 1 looking in the direction of the arrow. Fig. 6 is a fragmentary view somewhat similar to Fig. 4, but slightly enlarged. Fig. 7 is an elevation of the device complete.

Within the casing 1 is fitted the main valve 2, provided with a valve-stem 3 in the usual manner. A piston 4 is fitted into the cylinder 5, connected with said valve-casing by a bracket 6. The pipes 7 8 9 are for the purpose of operating the piston 4. A hand-valve 10 may be placed upon the pipe 9, if desired. A head 11 is connected with these pipes and is provided with hydraulic ports 12 13 14 and with a valve-seat 15. This valve-seat is provided with port-holes 16 17 18, through which the water passes into and out of the cylinder 5. An auxiliary valve 19, provided with an exhaust-cavity 20 and with a relief-hole 22, is slidably mounted under the hood 23 and is free to move within the space 24. A rocking stem 25 passes through the space 26 and is for the purpose of actuating the auxiliary sliding valve 19. A discharge-pipe 27 (shown more particularly in Fig. 5) is provided for the purpose of allowing the water to escape from the

cylinder 5 after being once used for operating the main valve. The auxiliary valve 19 is also provided with a clearance-space 21 for the purpose of preventing any undesirable water-pressure between the top of the valve and the hood in case of leakage between the valve and the hood.

Mounted integrally upon the rocking stem 25 are arms 28 29, the free ends of which enter apertures 19<sup>a</sup> 19<sup>a</sup> in the auxiliary valve, so that the rocking of the stem 25 causes the auxiliary valve to slide back and forth. A spiral spring 30 is provided for the purpose of normally pressing the rocking stem into the position shown. An annular plug 31 encircles this stem, so as to make a neat and water-tight joint 31<sup>a</sup>, thus dispensing with the necessity for a stuffing-box. Mounted upon the upper end of the rocking stem 25 is a clutch arm or member 32, provided integrally with a head 32<sup>a</sup> and secured in position by means of a screw 33. The outer or free end of this arm 32 is provided with a dog 34, of the shape indicated more particularly in Figs. 3 and 4, and provided with a slot 35. Mounted immediately above the rocking stem 25 and in alignment therewith is a stem 36, provided with a head 37, upon which is integrally mounted an arm 38, this arm and head constituting a clutch member. Immediately adjacent to the clutch members 32 and 38 is a rocking lever 39, provided with a lug 40 of the shape indicated more particularly in Figs. 4 and 6, and provided with a hooked end 41 for the purpose of engaging the slot 35 of the clutch member 32, as indicated more particularly in Fig. 4. A spring 43 engages the lever 39 and is mounted rigidly upon the bracket 44. Two brackets 44 and 45 support the casing of the electric motor. The clutch member 38 is yoke-shaped, as indicated in Fig. 6, and is provided with a beveled end 38<sup>a</sup> for the purpose of tripping the lug 40. When the device is not in use, the hooked end 41 of the lever 39 normally engages the slot 35 of the clutch member 34, thus preventing any motion in the shaft 25. This arrangement therefore serves as a sort of lock to prevent either the main or the auxiliary valve from being moved by any accidental cause or tampered with by unauthorized persons. When, however, the yoke-shaped clutch member 38 is moved by means



of the shaft 36, the beveled end 38<sup>a</sup> by lodging against the lug 40 causes the lever 39 to swing outward, thereby unlocking the auxiliary valve. The rotation of the shaft 36 being continued still farther, the free upper end of the dog 34 is engaged by the yoke-shaped clutch member 38 and caused to move radially in the same direction as the rotation of the shaft 36. In other words, the arrangement constitutes a clutch connection between the shaft 36 and the shaft 25, whereby a slight motion of the shaft 36 will merely unlock the valve without disturbing the rocking shaft 25; but a further movement of the shaft 36 will cause the shaft 25 to rock. If the shaft 36 be rotated in the opposite direction, the lever 39 moves into the position indicated in Fig. 4, thereby locking the auxiliary valve.

The electric motor is inclosed in the casing, consisting of the bottom 46, the top 48, and sides 49. The motor consists of electromagnets 51 52, provided with pole-pieces 53 54 55 56, and an armature, consisting of the bars 57 58, secured upon the shaft 36 and adjustable relatively thereto by means of set-screws 59 60, as indicated by dotted line in Fig. 2. The armature of the motor is supported upon the frame 61, provided with a depending bracket 62, in which a bearing 63 is located for the purpose of engaging the shaft 36.

The operation of the device is as follows: Supposing the valves to be closed and locked, as indicated in Figs. 4 and 7, and that the operative desires to open the main valve, by means of the electric circuit 64, which may be actuated by any well-known mechanical expedient, such as a battery 65 and push-buttons 66 67, the armature of the motor, consisting of bars 57 58, mounted upon the shaft 36, is caused to rock slightly in a direction either clockwise or counter-clockwise, as desired. This motion of the shaft 36 causes the clutch member 38 to move slightly, thereby enabling the beveled end 38<sup>a</sup> of the yoke 38 to unlock the valve, as above described. The yoke-shaped clutch member 38 moving a little farther in the same direction engages the clutch member 34, forming a positive connection therewith, and causes the stem or shaft 25 to rock slightly, thereby moving the auxiliary valve 19 in the manner above described. The valve 19 being moved, say, into the position indicated in Fig. 5, the water from the pipe 9 enters the space 26 and passes under the hood 23, the ends of which are opened into the space 26. From this space the water passes through the port-hole 17, port 13, and pipe 7 to one end of the cylinder, thus driving the piston to the other end thereof. The spent water expelled by the piston passes through the pipe 8, port 12, port-hole 16, exhaust-cavity 20 of the auxiliary valve, through the port-hole 18, port 14, and out at pipe 27 to the ground. The elec-

tric motor being actuated in the opposite direction, the water takes the reverse course—to wit, pipe 9, spaces 26 and 24, port-hole 16, port 12, pipe 8, to cylinder 5, the spent water from the cylinder passing through pipe 7, port 13, port-hole 17, exhaust-cavity 20 of the auxiliary valve, port-hole 18, port 14, and out through pipe 27. The valve in moving in one direction locks itself and in moving in the opposite direction unlocks itself.

The armature of the electric motor is caused to rock in opposite directions, as above mentioned, by means of the push-buttons 66 67, which are separately connected by the wires 68 69 with the magnets. Upon pressing the button 66 the magnet 51 draws the armature-bar 57 into a position parallel with itself, and, vice versa, when the button 67 is pressed the armature-bar 58 is rendered parallel with the magnet 52.

By aid of the mechanism above described an operative may open and close any hydraulic valve, however cumbersome, by the mere pressure of a finger. If desired, the wires may be run any distance, and the operative may thus be able to actuate the valve from such distance.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. An electrohydraulic valve, comprising a main valve, a balanced slide-valve for operating the same, a rocking member for actuating said slide-valve, said rocking member being provided with a clutch, a motor provided with a revoluble armature, and a clutch member connected with said armature.

2. An electrohydraulic valve, comprising a main valve, a slide-valve provided with apertures, a rocking stem provided with arms for engaging said apertures, an electric motor provided with a revoluble armature, clutch members connected with said rocking stem and said armature, said clutch members being normally loose relatively to each other, but free to lock with a positive grip.

3. An electrohydraulic valve, comprising a main valve, a slide-valve, a rocking member for actuating said slide-valve, an electric motor provided with a revoluble armature, and a lost-motion connection between said armature and said rocking member, the arrangement being such that the inertia of said armature may be overcome before said slide-valve is actuated by said armature, thereby preventing said slide-valve from sticking.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CARL ENGBERG.  
JOHN ERICKSON.

Witnesses:

M. H. STUART,  
O. J. BEUMA.