

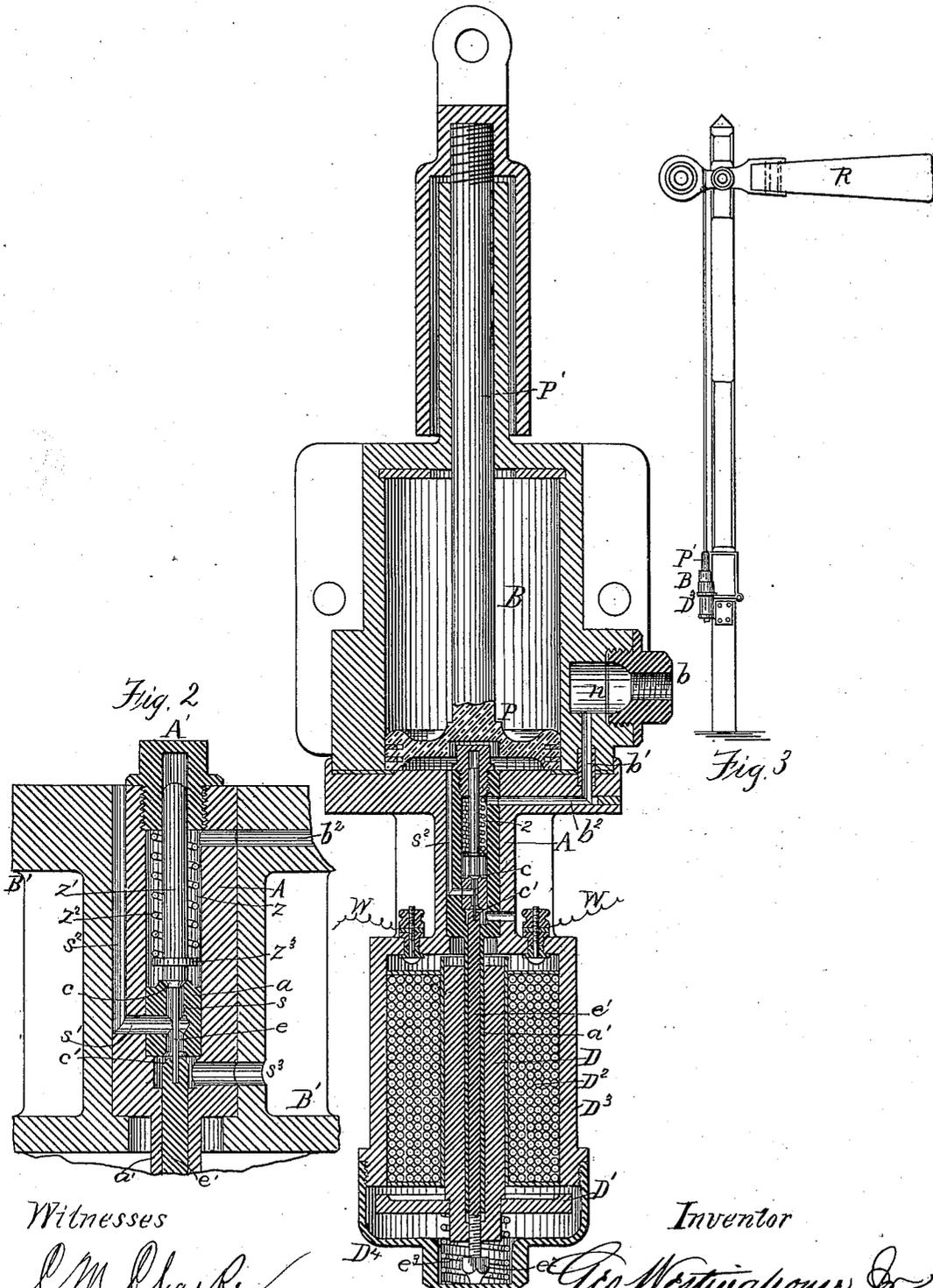
(No Model.)

G. WESTINGHOUSE, Jr.

ELECTRICALLY ACTUATED FLUID PRESSURE MOTOR.

No. 358,521.

Patented Mar. 1, 1887.



Witnesses

*E. M. Clarke*  
*R. H. Whittlesey*

Inventor

*Geo. Westinghouse Jr.*  
 by *J. Thomson Bell* atty.

# UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

## ELECTRICALLY-ACTUATED FLUID-PRESSURE MOTOR.

SPECIFICATION forming part of Letters Patent No. 358,521, dated March 1, 1887.

Application filed August 30, 1886. Serial No. 212,180. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE WESTINGHOUSE, Jr., residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Electrically-Actuated Fluid-Pressure Motors, of which improvements the following is a specification.

10 In the accompanying drawings, which make part of this specification, Figure 1 is a longitudinal sectional view of so much of my improved motor as is necessary to illustrate my present invention. Fig. 2 is a like view, to an enlarged scale, of the valvular and ported portion of the apparatus, and Fig. 3 illustrates the manner of using the same as a motor for actuating a railway-signal.

20 My present invention relates to certain improvements in the class of apparatus constituting the subject-matter of Patents No. 245,108, granted to me August 2, 1881, and No. 245,592, granted to me August 9, 1881; and while my present apparatus may be applied to any desired use, I have more particularly devised it with reference to its use in connection with railway-signals and as a mechanism for operating them.

30 In Fig. 3 I have shown it as applied to a semaphore-signal; but it may be applied to any form or style of signal capable of being moved or actuated directly or indirectly from a reciprocating piston. Such piston is represented at P, and its stem P' is connected with the signal R in any suitable way, so as to transmit motion thereto. This piston works in a cylinder, B, and, except as described, works in the way common to the pistons of single-acting engines.

40 In a hollow casing or box, B', I insert a bushing, A, and close the hollow chamber *z* of the same at one end by a close-ended socketed plug, A', and near the other end of such chamber I secure a three ported valve-block, *a*. The longitudinal passage-way or port *s* has playing endwise therein a stem, *e*, made a little less in cross-section than the transverse area of the port. Such stem projects from the seating end of a valve, *c*, and abuts against the under side of another valve, *c'*, and these valves seat on valve-seats made in the valve-

block *a* at the opposite ends of the port *s*; but such valves are at such distance apart that only one can be seated at a time, and only a short length of stroke is required in such seating and unseating them. The third or lateral port, *s'*, of the valve-block *a* communicates by a port, *s''*, with the lower end of the cylinder B beneath the piston. Fluid-pressure to actuate the piston is introduced from any suitable source or supply through port *b*, and thence it passes by ports *b'* *b''* to the chamber *z*.

60 The valve *c* is carried by a stem, *e'*, and a spiral spring, *e''*, thereon, bearing at one end against a collar, *e'''*, and at its other end against the end of the plug A', keeps such valve to its seat when not otherwise acted on.

70 The valve *c'* is formed on the end of a rod, *e'*, which at its other end abuts against the end of a screw-stem, *e''*, and which works through a tubular extension, *a'*, of the bushing A. Immediately surrounding this is the hollow core D, to the end of which is affixed an armature, D', so that through one or the other, or both, the helix or coil D<sup>2</sup>, when charged or excited by the closing of an electric circuit through the same by wire W W, may impart an endwise thrust or motion to the rod *e'*, and thereby seat the valve *c'* and unseat the valve *c*, so that when the circuit is broken a reverse motion may result in reversing the position of the valves.

80 The helix or coil D<sup>2</sup> is inclosed in a hollow box, D<sup>3</sup>, which, when polarized by the current, will attract the armature D', and the end is covered by the cap D<sup>4</sup>. An escape-port, *s*<sup>3</sup>, leads to the open air from the chamber in which the valve *c'* works; also, a spring, *e*<sup>3</sup>, may be added to counterbalance, in whole or in part, the weight of the moving devices where arranged for vertical action, as shown.

90 As a motive power I prefer compressed air, and to prevent the entrance of dirt, so far as possible, I insert any suitable strainer at the inflow port or passage, as at *n*.

95 The apparatus is to be so organized that fluid-pressure will be continuously operative through the port *b* and by ports *b'* and *b''* to the chamber *z*.

100 Normally the circuit through the coil D' will be broken, so that the valve *c* will be seated, the piston P will be down, and the

signal R will be at "danger." Then when the signal is to be cleared for the passage of a train the electric circuit will be closed by hand or automatically, the helix excited, and, in the manner described, the valve *c'* will be seated, and the valve *c* lifted from its seat. Then the passage leading to the escape-port *s*<sup>3</sup> will be closed and an open passage-way provided for the flow of compressed air from the chamber *z* by ports *s* *s'* *s*<sup>2</sup> to the piston-chamber B, beneath the piston P, so as to actuate the same and clear the signal.

As soon as it is desired to restore the signal to "danger" the electric circuit is broken, with the result of seating the valve *c* so as to cut off the supply, and unseating the valve *c'*, so that the air which has acted to raise the piston P may escape by ports *s*<sup>2</sup>, *s'*, *s*, and *s*<sup>3</sup>, and then the piston will come down by gravity, or by a spring, if necessary, and the signal will come back to "danger;" but while I believe this to be the best organization of the apparatus described it will also be within the present invention so to couple up the circuit-wires that the Robinson or Pope short-circuiting system may be applied or used in charging and discharging the coil or helix. Preferably I employ this mechanism in connection with a switch-actuating motor or engine, for which I have filed a separate application, and in which, when the switch has received its complete throw, the circuit may be shunted onto a line of signal-wires, here represented by W W, so that the setting of the signal to "safety" shall take place only on the proper setting of the switches for the passage of a train, and shall go to "danger" before the reverse switch motion begins; but such combination will form the subject-matter of a separate application, and other forms or constructions of circuit-closers may be employed at pleasure; and it will also be within the present invention to reverse the operation described, so that normally the signal shall be kept at either position, as may be desired, by keeping up a constant pressure in the cylinder B beneath the piston P, and allowing it to escape when the reversal of signals is desired.

Other forms of magnet arranged with its axis in line with the stem of the valves to be moved, so that the armature or core motion may be transmitted to the valves through a prolongation of the valve-stem, or through a rod in line therewith, may be substituted for that shown.

This apparatus derives its utility in part from the fact that all moving parts being in line with each other it is especially adapted to being affixed to the side of a signal-post, as illustrated in Fig. 3, where it is much less liable to injury or obstructions from dirt, snow, or ice, and is more accessible for repairs, &c., than if required to be set on a pedestal at the foot of the post.

I claim herein as my invention—

1. In an electrically-actuated fluid-pressure motor, the combination of a helix or coil, an armature, a valve-moving rod actuated thereby, a cylinder, a main piston and stem working therein, and valves and valve-stems for governing the induction and eduction of fluid, all located in or near the same axial line, these members being combined for joint operation to adapt the motor for lateral connection to and operation upon a supporting post or standard, substantially as set forth.

2. The combination of helix or coil *D'*, rod *e'*, actuated by the helix and moving in or nearly in the axial line of such helix, valve-stems *e z'*, valves *c c'*, spring *z*<sup>2</sup>, and suitable arrangement of fluid-pressure ports from the supply-port to the main cylinder and from such cylinder to the open air, substantially as set forth.

3. The bushing A, closed at one end by plug *A'*, in combination with valve-block *a*, valves *c c'*, and ports *s*, *s'*, *s*<sup>2</sup>, and *s*<sup>3</sup>, and electrically-actuated valve-moving rod *e'*, substantially as set forth.

In testimony whereof I have hereunto set my hand.

GEO. WESTINGHOUSE, JR.

Witnesses:

R. H. WHITTLESEY,  
J. SNOWDEN BELL.