

(No Model.)

2 Sheets—Sheet 1.

G. WESTINGHOUSE, Jr.  
Fluid Pressure Brake.

No. 243,417.

Patented June 28, 1881.

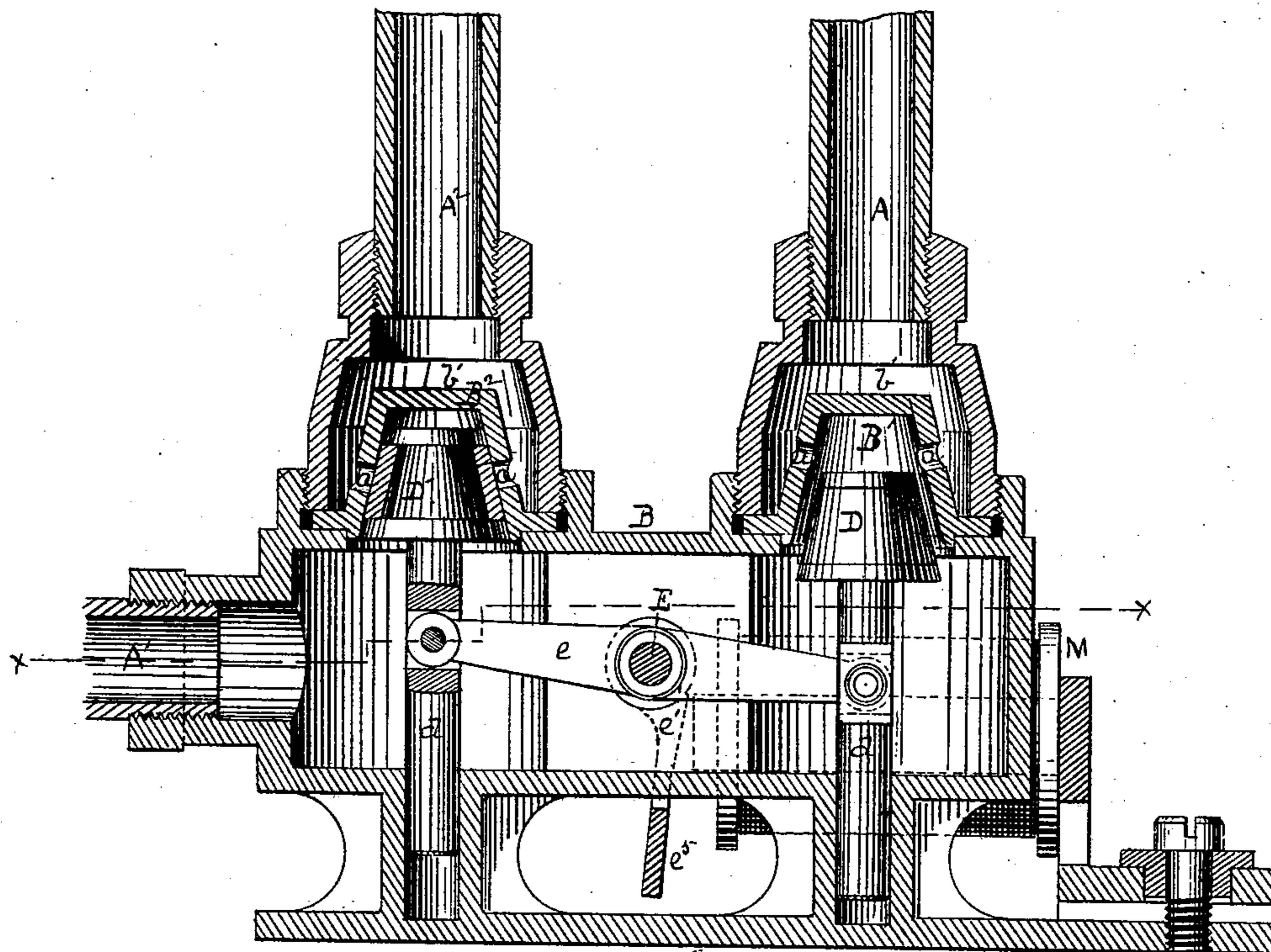


Fig. 1.

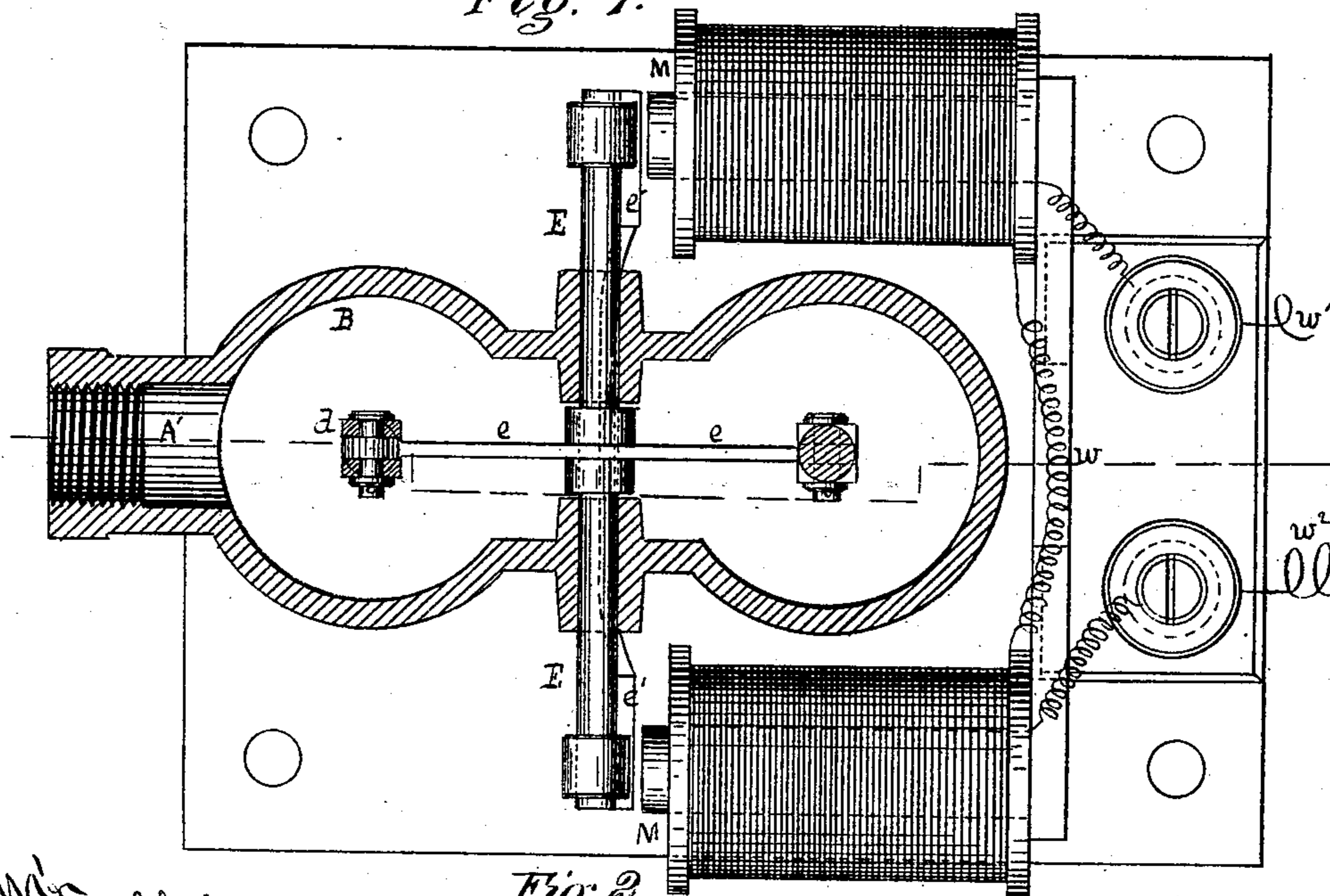


Fig. 2.

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By Attorney George H. Christy

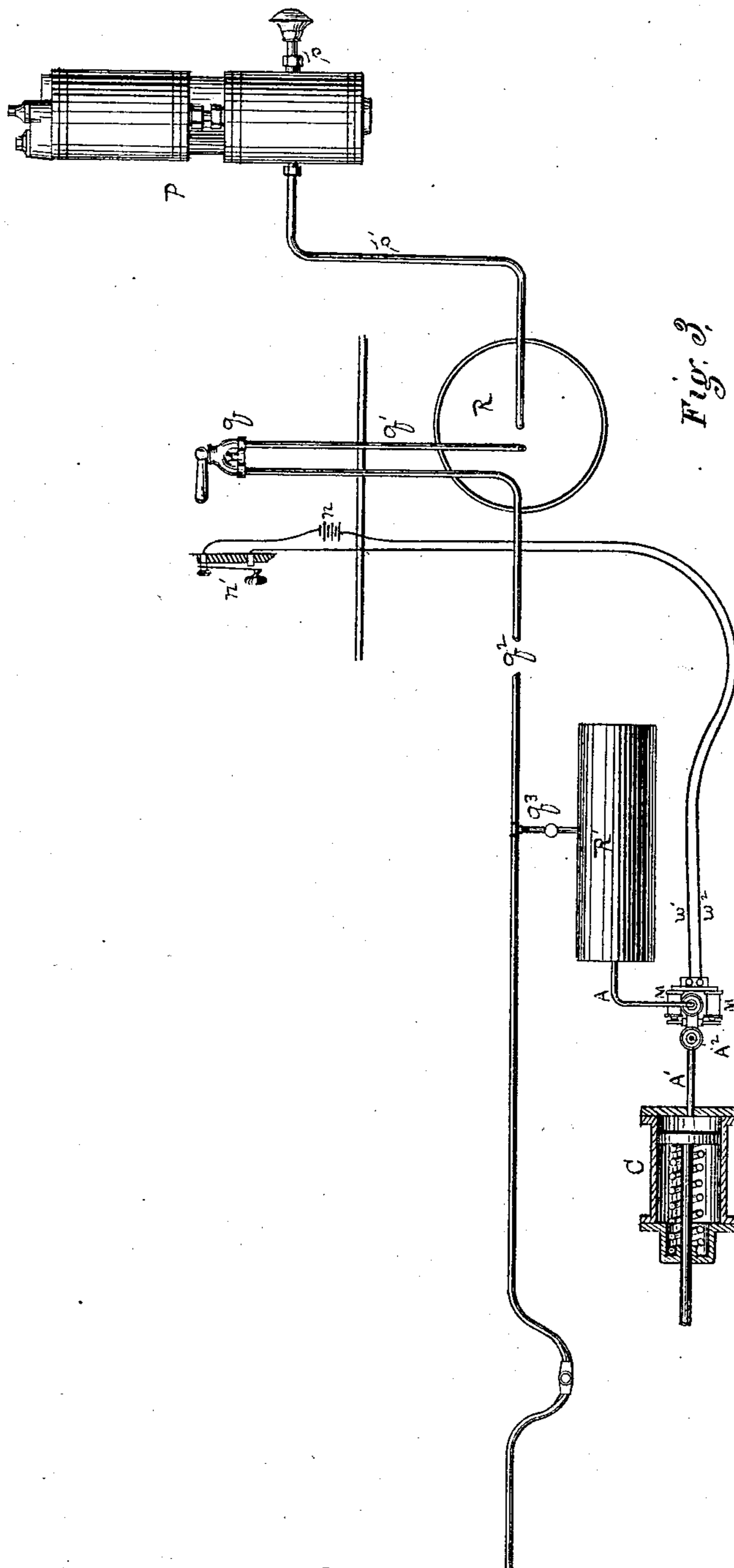
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2 Sheets—Sheet 2

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Fluid Pressure Brake.

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Patented June 28, 1881.



Witnessed  
R. H. Whittles  
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By Attorney George H. Christy

# UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

## FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 243,417, dated June 28, 1881.

Application filed March 31, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE WESTINGHOUSE, Jr., of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Apparatus for Actuating Fluid-Pressure Brakes by Electricity; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a longitudinal sectional view of my electric valve-moving apparatus by which a previously stored-up or accumulated fluid-pressure may be turned on or let off so as to actuate the brakes. Fig. 2 is a sectional view thereof in the plane of the line  $x x$  of Fig. 1; and Fig. 3 is a diagram view of such parts of an air-brake apparatus as are necessary to illustrate the present invention.

While my present apparatus is applicable to the actuating of valves generally, by which to open and close alternately a pair of fluid-pressure ports, so as alternately to turn on and exhaust a previously stored-up fluid-pressure, the particular use I apply it to is the doing of such work in a fluid-pressure-brake apparatus.

In the diagram, Fig. 3, P may represent the usual air-compressor, such as is employed in the Westinghouse air-brake apparatus.

$p$  is the air-induction pipe leading into the pumping-cylinder, and  $p'$  the pipe leading thence to the main reservoir R. From the latter a pipe,  $q'$ , leads to the operating-cock  $q$ , by which to turn on or shut off pressure through the brake-pipe  $q^2$ , which leads back with interposed hose and couplings beneath the cars. Each car is fitted with an auxiliary reservoir, R', and a brake-cylinder, C, the former having a pipe-connection,  $q^3$ , with the brake-pipe, and the latter having a piston-and-stem connection with the brake-levers. Each has about the size or capacity usual in the Westinghouse automatic brake.

Between the auxiliary reservoir and brake-cylinder, or in the line of pipe-connection from one to the other, I arrange a box, B, shown to an enlarged scale in Figs. 1 and 2, and of substantially the form represented, or of other convenient form.

A pipe, A, from the auxiliary reservoir R' opens into a valve-chamber,  $b$ , wherein is a conical valve-seat, B', having one or more ports,  $a$ , suitably arranged to be opened and closed by the movement of a valve, D. The pipe A' from the end of the box leads to the brake-cylinder C. A third port, A<sup>2</sup>, leads from a valve-chamber,  $b'$ , to the open air, so as to act as an escape or release port. In this chamber is a conical valve-seat, B<sup>2</sup>, ported as at  $a$ , wherein is seated and unseated a valve, D', so as to open and close such ports. The valves D and D' are mounted on suitable stems,  $d$ , and the latter work in suitable guides. These stems are pivoted to the opposite ends of a lever,  $e$ , which latter is secured on a rock-shaft, E, supported in proper bearings.

On each outer end of the rock-shaft is a crank-arm,  $e'$ , (the two arms being connected by bar  $e^5$ ), and each arm constitutes an armature, which is arranged opposite to or facing the poles of an electro-magnet, M, and the coils of such magnet are connected by wires  $w w' w^2$  with each other and with battery  $n$  or other source of electrical power; and in the circuit so made a make-and-break mechanism,  $n'$ , of any known style or construction, is to be added, the same being arranged within reach of or easy access by the officer whose duty it may be to apply the brakes. So long as the circuit is unbroken the armatures  $e'$  are held against the magnets M, with the result of closing the valve D and opening D', so as to cut off communication from the auxiliary reservoir to the brake-cylinder or to the waste-port, but so as to open communication from the brake-cylinder to the waste-port, and through it to the external atmosphere. The brakes will then be off and the train in running condition; but should the electrical circuit be broken, either intentionally or by accident, the armatures  $e'$  will no longer be attracted to the magnets M, and as in this use of the apparatus the auxiliary reservoirs throughout the train are to be charged and kept charged with a working-pressure, such pressure, acting on the valve D with sufficient force to overcome the friction and inertia of the parts to be moved, will then open the valve D, and in doing so close the valve D'. A supply of fluid-pressure will then pass from each auxiliary reservoir to its

brake-cylinder by pipes A and A', so as to cause the brakes to be applied, the waste-port A<sup>2</sup> at the same time being closed. Remaking the circuit results in attracting the armatures  
 5 e' to the magnets M, so as thereby to reverse the described valve-motions, close the auxiliary reservoir, and open the brake-cylinder to the waste.

Other forms or arrangements of valves and  
 10 ports may be employed for the purposes set forth, and also the mechanism of transmitting an armature motion to a movable valve or valves may be varied at pleasure, provided only the mode of operation be unchanged in  
 15 substantially a similar system of apparatus; also, the box B, with its appliances, may be arranged on or near the locomotive, and with the pipe A running to the main reservoir, in which case the pipe A' will be the brake-pipe;  
 20 also, by adapting the motions and moving parts to a reversal of the direction of operative fluid-pressure, the same invention may be used in substantially the same way as a part of a vacuum-brake; and, still further, it will be  
 25 within my invention to arrange, fit up, and connect the apparatus so that the communication from reservoir or other form of power-chamber shall be opened and to the escape shall be closed by making or restoring the elec-  
 30 tric circuit, and vice versa.

The area of valve-surface subject to pressure

must be properly proportioned with reference to the pressure and with reference to the power of the magnet; but this will come within the knowledge of the skilled mechanic. 35

I claim herein as my invention—

1. A pair of valves arranged in the lines of communication from a power-chamber to a brake-cylinder, and from the latter to the external air, in combination with an electrical  
 40 apparatus adapted by the making and breaking of the circuit to shift such valves simultaneously, the one to an open and the other to a closed position, substantially as set forth.

2. The valves D D', arranged on the opposite arms of a lever, e, pivoted on a rock-shaft, in combination with armatures e' and electro-  
 45 magnets M, substantially as set forth.

3. In combination with auxiliary reservoir R' and compressing apparatus for keeping the  
 50 same continuously charged with fluid-pressure, a brake-cylinder, C, and an interposed electrically-operated valvular apparatus adapted to apply and release the brake-power by breaking and restoring the electric circuit, substantially  
 55 as set forth.

In testimony whereof I have hereunto set my hand.

GEORGE WESTINGHOUSE, JR.

Witnesses:

R. H. WHITTLESEY,

GEORGE H. CHRISTY.