No. 862,696. PATENTED AUG. 6, 1907.

B. C. BATCHELLER.

GOVERNING MECHANISM FOR PNEUMATIC TUBE SYSTEMS.

APPLICATION FILED MAR. 21, 1905.

3 SHEETS—SHEET 1.

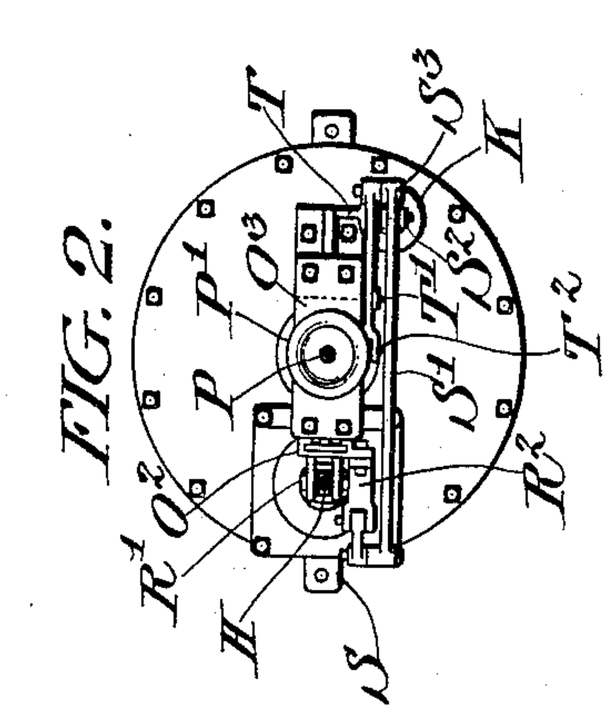

FIG. 2.

FIG. 1.

WITNESSES:

L. Stuart

D. S. Williams

INVENTOR

Burton C. Batcheller

BY

Francis D. Chambers

ATTORNEY.

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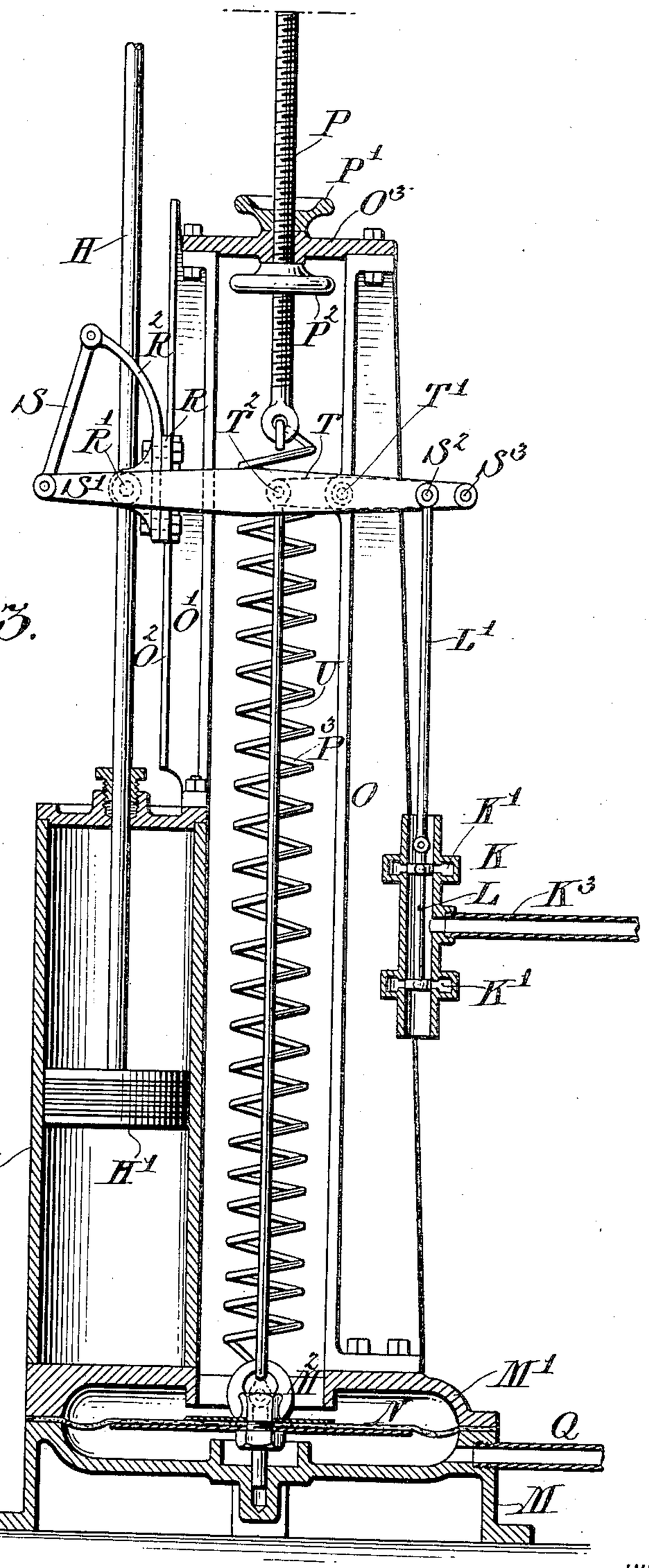

FIG. 3.

WITNESSES:

D. Stewart

D. S. Williams

INVENTOR

Benj. C. Batcheller

BY

Francis D. Chambers

his ATTORNEY.

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B. C. BATCHELLER.

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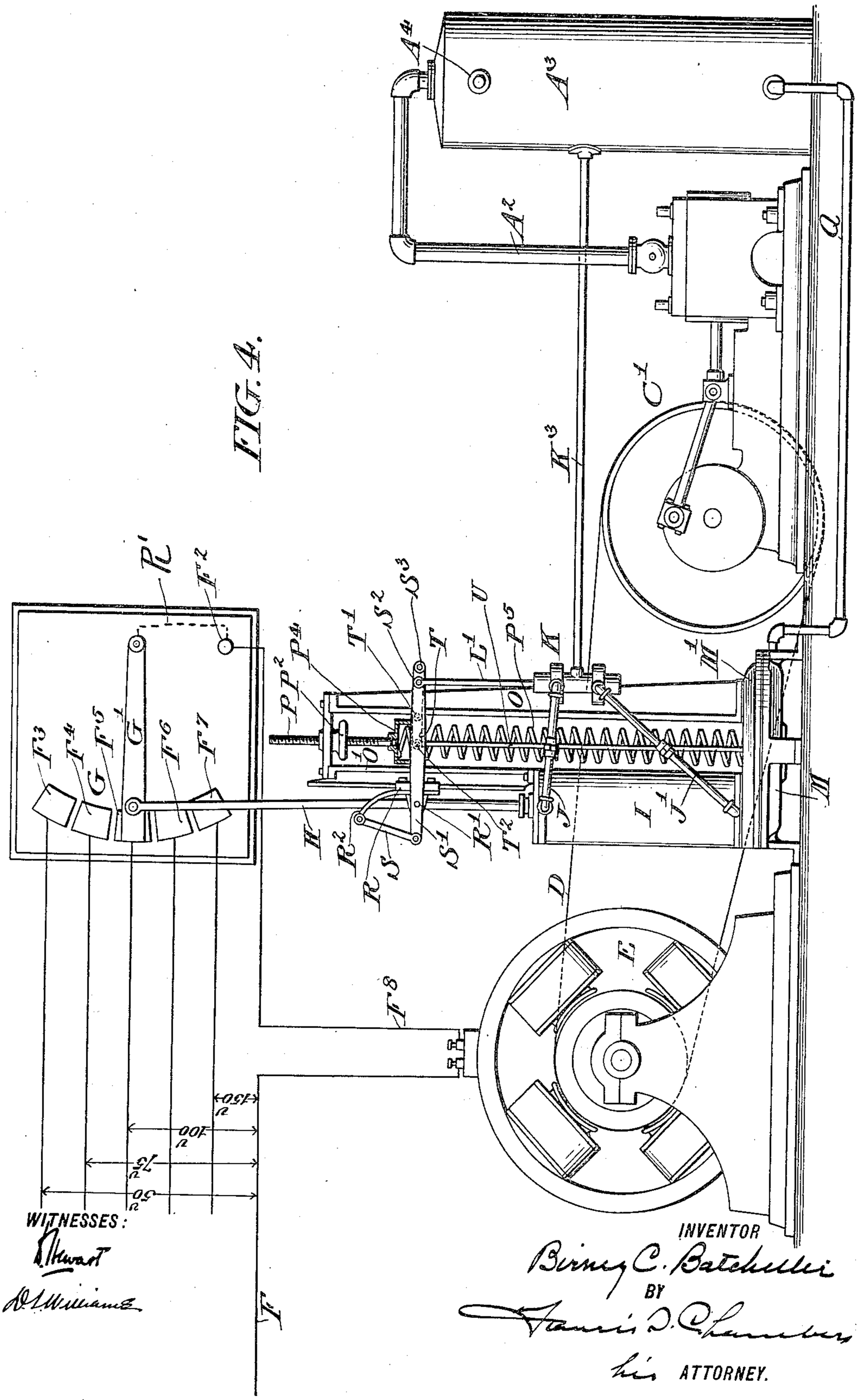
3 SHEETS—SHEET 3.

FIG. 4.



WITNESSES:

S. Stewart

A. D. Williamson

INVENTOR

Birney C. Batcheller

BY

Francis D. Chamberlain

his ATTORNEY.

UNITED STATES PATENT OFFICE.

BIRNEY C. BATCHELLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE PEARSALL PNEUMATIC TUBE AND POWER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

GOVERNING MECHANISM FOR PNEUMATIC-TUBE SYSTEMS.

No. 862,696. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed March 21, 1905. Serial No. 251,209.

To all whom it may concern:

Be it known that I, BIRNEY C. BATCHELLER, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Governing Mechanism for Pneumatic-Tube Systems, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to pneumatic tube systems in which the air exhausting or compressing mechanism is actuated by an electric motor, my object being to provide for an automatic regulation of the speed of the motor by which the pressure in the tube or a connected chamber will be maintained approximately at a constant point, irrespective of the varying demand upon the energy of the apparatus. I accomplish this by providing a controlling mechanism for the motor circuit by which the speed of the motor and of the connected mechanism can be varied, and combining with the said controller means for operating it, which said means is, in turn, actuated by the varying pressure in the pneumatic tube or its connected chamber.

The general nature of my invention, as well as the specific improvements I prefer to use in connection with it, will be best understood as described in connection with the drawings which illustrate my invention and in which

Figure 1, is a side elevation of the motor, exhausting mechanism and governing devices; Fig. 2, being a plan view of the governing mechanism; Fig. 3, an enlarged sectional elevation of the governing mechanism, and Fig. 4, is a side elevation of a modified system operating by compression of the air.

A, Fig. 1, indicates the pneumatic tube or a chamber in connection therewith, B, the pressure mechanism, here shown as an exhaust blower, actuated through the pulley C, and belt D, by an electric motor E.

F, F^8, indicate the leads running from the motor to the binding posts F' and F^2 of a rheostat regulator of which G indicates the stationary contacts and G' the movable member or switch arm. The switch arm is connected by a conductor R' to the post F^2 and the contacts G are connected by resistances indicated at R. Leads S, S, from any suitable source of current run one to the binding post F' and the other to one of the end contacts G as shown. The movable member G', is connected through a rod H, with a piston H', moving in a pneumatic cylinder I, the ends of which cylinder are connected through conduits J, and J', with the ports K', and K', of the valve casing K, the ends of which are open to the atmosphere, as shown in Fig. 3, while between the ports the casing is connected by a pipe K^3, to the tube or chamber A.

L, indicates the valve, consisting of a stem provided with two pistons, as shown in Fig. 3, and connected with actuating mechanism through a connecting rod L'.

M, is a base in which, as shown, is formed the lower section of a diaphragm chamber, the upper section of the chamber being formed by a head M', opened freely to the atmosphere at M^2.

N, is a diaphragm extending across the diaphragm chamber and connected to the valve L, the diaphragm chamber also supporting the cylinder I, and the cylinder I, supporting a standard O', having guides O^2, secured to it, while the standards O, and O', are connected at top by a crossbar O^3.

P, is an adjusting screw working through the crossbar O^3, and adjusted by means of the nuts P', and P^2, the said adjusting screw being connected through a spring P^3, with the diaphragm N, as shown in Fig. 3.

Q, is a conduit leading from the lower side of the diaphragm chamber to the vacuum pipe A. Q', a throttling valve of any character by which the pressure in the diaphragm chamber is made relatively independent of rapid fluctuations in pipe A.

R, is a slide moving in the guideways O^2, and connected through lugs R', with the piston rod H. The head as shown is provided with an outwardly curved arm R^2, which through a link S, connects with one end of a lever S', the opposite end of which indicated at S^3, is connected with one arm of a double armed lever pivoted at T', and having its other end connected at T^2, with a rod U, which in turn is connected with the diaphragm N; to an intermediate point S^2, of the lever S', is connected the valve actuating rod L'.

In operation, the valve L, is normally in the position indicated in Fig. 3 in which position it closes both ports K', and K', so that the piston H', and the connected rheostat member G', remains in fixed position. If the vacuum in the conduit A, increases to an abnormal point a corresponding vacuum is created in the lower side of the vacuum chamber and the diaphragm drawn downward which, through the rod U, draws downward the inner arm of the lever T, forcing its outer arm upward and, through the rod L', drawing the valve L, upward so as to connect the top port K', and the lower end of the cylinder I, with the vacuum chamber, while the bottom port K', and the top end of the cylinder I, are connected to the atmosphere. In consequence of this shifting of pressure the piston H, moves downward shifting the movable rheostat member G', to diminish the current in the motor circuit, but the downward movement of the piston is accompanied by a downward movement of the slide R, which, through its described connections, moves the left hand end of the lever S', downward and, of course, shifts the point S^2, in the same direction, with the result of gradually restor-

ing the valve to normal position, which position it will occupy until a variation of the vacuum causes it again to shift in one direction or the other. Thus it will be seen that each variation of the vacuum will cause a shifting of the rheostat and a return of the valve to normal position, the apparatus being entirely sensitive and resulting in an economical use of the electric power applied for the actuation of the system.

In Fig. 4 I have shown my invention applied to a compressed air system and with a further modification of the electric mechanism. The motor E, here drives an air compressor, indicated at C′, the air being delivered through pipe A^2, into a reservoir A^3, A^4, being the pipe leading to the tube system. The governor device is modified by using a spring P^5, under compression between the diaphragm N, and an adjusting cap P^4, instead of the tension spring P^3, otherwise the mechanism is the same except that the connections to valve K, are reversed. In Fig. 4, instead of using a rheostat, as in Fig. 1, I show contacts F^3, to F^7, each connected to a circuit wire of different voltage, the movable member G′, moving from one contact to the other and connecting them in turn with the motor wire F^8 through binding post F^2 and conductor R′. In this form it will be understood that the motor lead F runs to one side, and the conductors connected to the contacts F^3 to F^7 run to the other side of the suitable source of electric current not shown.

It will be obvious that the mechanical features of construction may be varied in many ways which will occur to mechanics or engineers, without departure from the invention, and I do not wish to be understood as limiting myself in the claims to the specific construction illustrated except in so far as the specific construction is distinctly referred to therein.

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

1. In a pneumatic tube system having in combination with the pneumatic tube or a connected chamber, a machine for producing a determined air pressure therein, and an electric motor for actuating the said machine, mechanism for controlling the speed of the motor and means for operating said controlling mechanism to regulate the speed of the motor and maintain an approximately constant pressure in the tube or chamber consisting of a pneumatic cylinder having a piston connected to actuate the controller, said cylinder having its ends connected through a valve casing to the tube, in combination with a valve and valve casing situated in the conduits leading to the cylinder ends from the tube; said valve normally closing both conduits and, when moved, opening the end of the cylinder to the air and the other to the pressure in the tube, a diaphragm chamber connected at one side to the tube, a diaphragm situated in said chamber, means for forcing said diaphragm in a direction opposite to that in which the pressure in the chamber tends to move it, and a lever system connected to the diaphragm, the valve and the piston, whereby the motion of the diaphragm acts to shift the valve from normal position and the motion of the piston acts to return the valve to said normal position.

2. In a pneumatic tube system having in combination with the pneumatic tube or a connected chamber, a machine for producing a determined air pressure therein and an electric motor for actuating said machine, mechanism controlling the speed of said motor and means for operating said controller to regulate the speed of the motor and maintain an approximately constant pressure in the tube, consisting of a pneumatic cylinder having a piston connected to actuate the controller, said cylinder having its ends connected through a valve casing to the tube in combination with a valve and valve casing situated in the conduit leading to the cylinder, ends from the tube, said valve normally closing both conduits and, when moved, opening one end of the cylinder to the air and the other to the pressure in the tube, a diaphragm chamber connected at one side to the tube, a diaphragm situated in said chamber, means for forcing said diaphragm in a direction opposite to that in which the pressure in the chamber tends to move it, a slide R, connected and moving with the piston, a two-armed pivoted lever T, connected at one end to the diaphragm, a lever S′, connected at one end to the slide R, and at the other end to the free end of lever T, and a connection from an intermediate point on lever S′, to the valve.

BIRNEY C. BATCHELLER.

Witnesses:
CHAS. F. MYERS.
D. STEWART.