

No. 650,724.

Patented May 29, 1900.

J. P. METZGER.
PRESSURE REGULATOR.

(Application filed Mar. 21, 1900.)

(No Model.)

2 Sheets—Sheet 1.

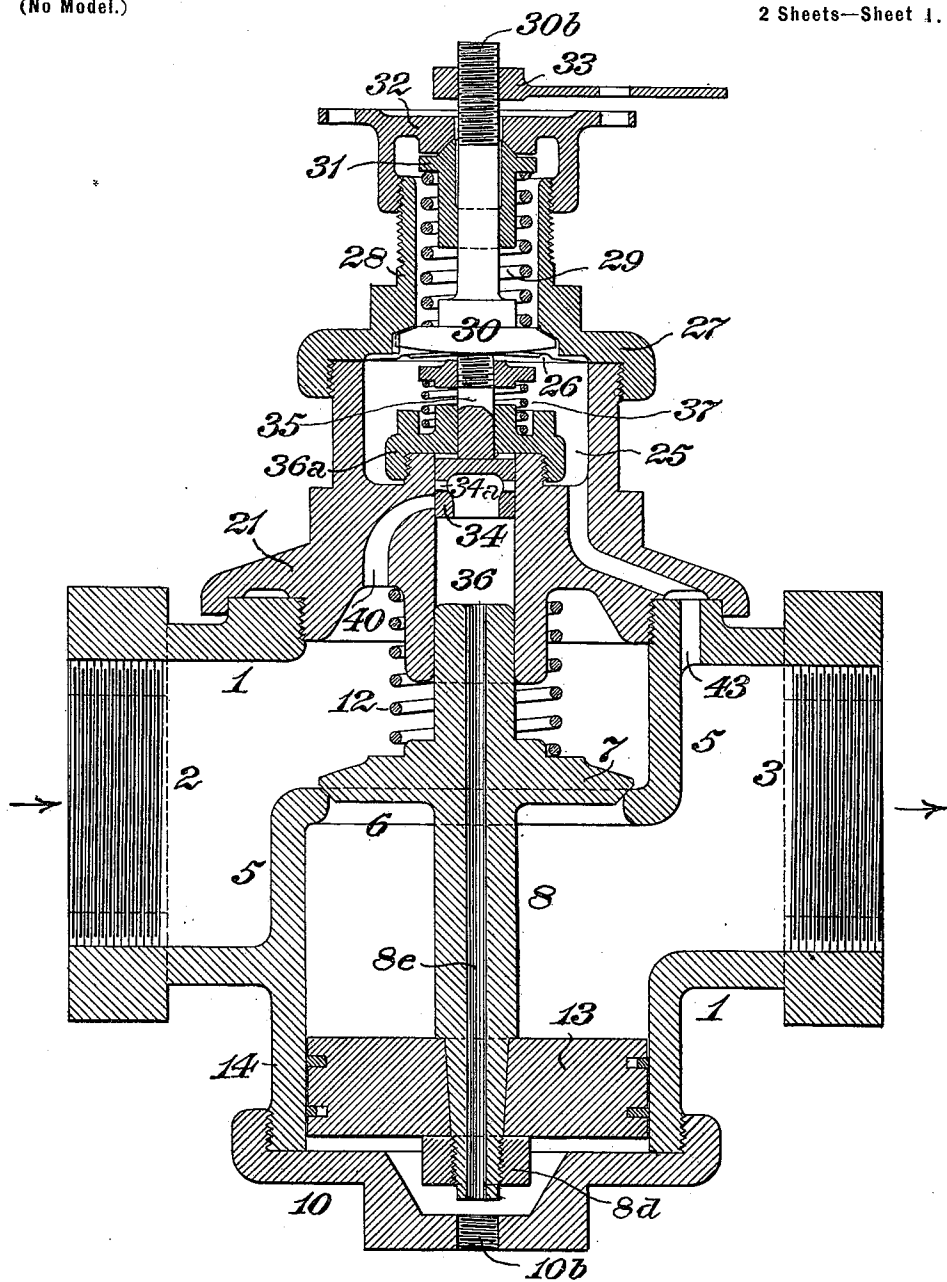


Fig. 1.

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Henry Whitehouse

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by *J. Snowden Bell*
att'y.

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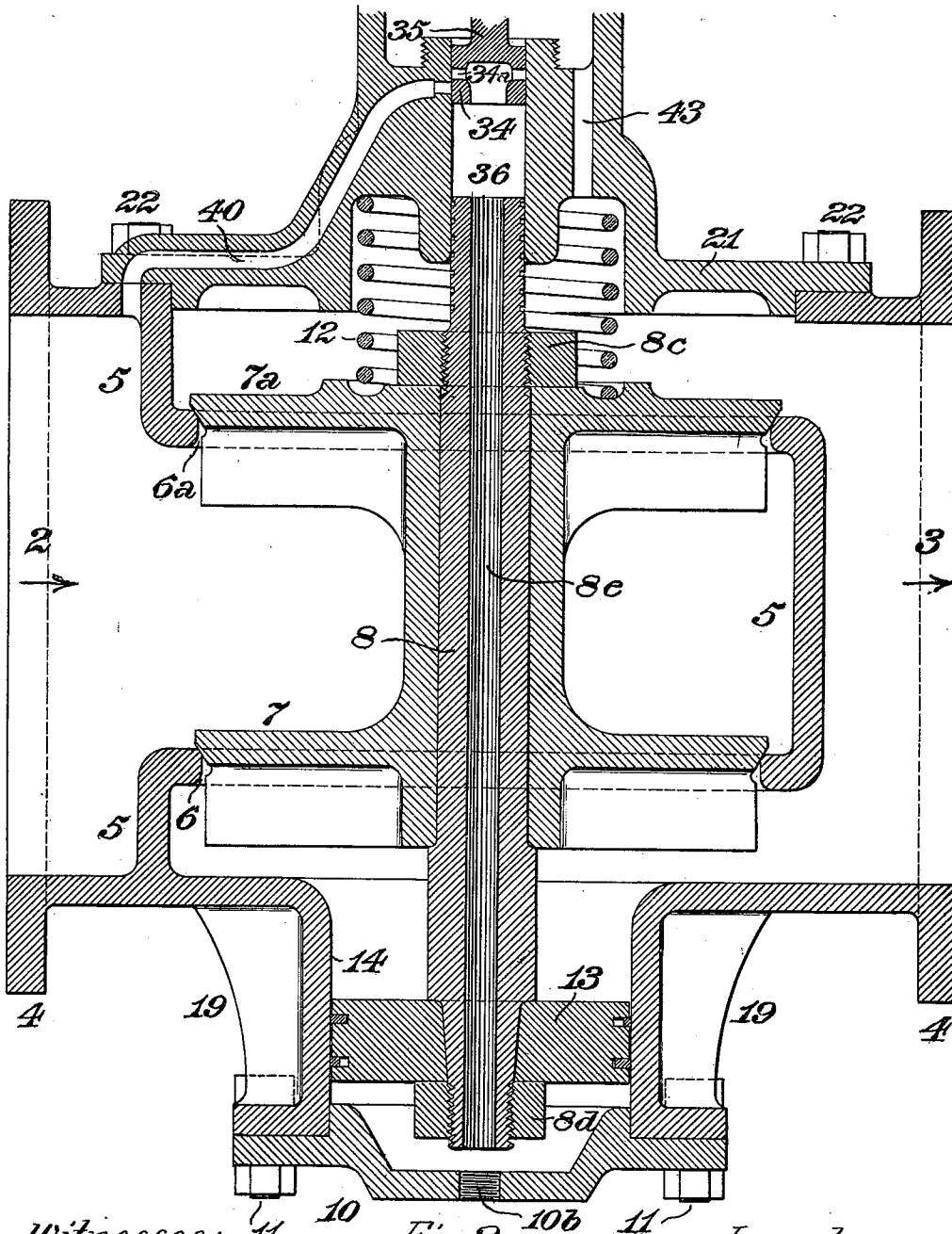
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2 Sheets—Sheet 2.



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Fig. 2.

106 11
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UNITED STATES PATENT OFFICE.

JULES P. METZGER, OF NEW YORK, N. Y., ASSIGNOR TO JOHN S. LESLIE,
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PRESSURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 650,724, dated May 29, 1900.

Application filed March 21, 1900. Serial No. 9,542. (No model.)

To all whom it may concern:

Be it known that I, JULES P. METZGER, of the borough of Manhattan, in the city and State of New York, have invented a certain
5 new and useful Improvement in Pressure-Regulators, of which improvement the following is a specification.

My invention relates to pressure-regulating appliances of the general class which are exemplified in an application for Letters Patent of the United States filed by me November 24, 1899, Serial No. 738,125, (Case A,) and is an improvement upon certain features of the pressure-regulators set forth in said applica-
10 tion and in my application, Serial No. 741,811, filed December 28, 1899, (Case C.)

The object of my present invention is to effect a simplification of structure and economization of cost by a reduction in the number of parts employed, as well as to provide a construction in which the parts shall be less susceptible to the injurious action of high temperatures and pressures without entailing increased cost or sacrificing any of the essential features of structure or operation which
20 characterize an effective and reliable pressure-regulating device.

The improvement claimed is hereinafter fully set forth.

30 In the accompanying drawings, Figure 1 is a longitudinal central section through a pressure-regulator, illustrating an embodiment of my invention; and Fig. 2, a partial longitudinal central section through a pressure-regulator, illustrating a structural modification of the main or regulating valve.

The general combination of operative members and the operative principle thereof are in all essential particulars similar in my present invention to those of the appliance set forth in my applications, Serial Nos. 738,125 and 741,811, aforesaid, and the same need not, therefore, be herein fully and at length described. The members which are not here-
40 in claimed will therefore be referred to only so far as may be necessary to explain the relation thereto of my present invention.

Referring first to the construction shown in Fig. 1, the valve casing or shell 1 has an inlet-passage 2 at one end and an outlet-pas-
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sage 3 at the other, each being provided with a screw-thread, for which a flange may be substituted in larger-sized regulators for connection with a fluid-pressure pipe. The inlet and outlet passages are separated by a wall or partition 5, extending across the casing and having an opening or passage 6, controlled by a main or regulating valve 7, which may be either formed integral with or fixed to a stem 8 and seats upon a face on the upper side (being that next the inlet-passage) of the partition 5.

The opening movements of the regulating-valve 7 are effected by a properly-packed piston 13, which is actuated by fluid under pressure from the inlet side of the casing, as presently to be described, and is fitted to traverse in a piston chamber or cylinder 14, formed upon the valve-casing 1 below and in line axially with the regulating-valve 7. The piston 13 is fixed upon the valve-stem 8, preferably, as shown, by being held thereon between a shoulder or collar and a nut 8^a, engaging a screw-thread on the end of the stem. The outer end of the piston-chamber is closed by a removable head or cap 10, in which an opening 10^b is tapped for the connection of a pipe to drain off water of condensation. The regulating-valve is inserted and removed through an opening in the casing, which is closed by a removable top cap 21 and is subject to the pressure of a spring 12, which bears against its upper side and against a shoulder on the cap 21 and acts in conjunction with the inlet-pressure to seat the valve.

85 The upper portion of the top cap 21 is recessed to form a pressure-chamber 25, which communicates by a port 43 with the outlet side of the casing and is closed at top by a flexible diaphragm 26, which is fitted in a central opening in the top cap 21 of substantially-smaller diameter than the piston-chamber, and which is secured peripherally between the face of the top cap and a diaphragm-holder 27, connected removably thereto, as by screw-threads. The diaphragm-holder and its accessories are substantially similar in all essential particulars to those of my applications, Serial Nos. 738,125 and 741,811 aforesaid, and as it does not in and of itself
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form part of my present invention it need not be herein at length described further than to note that it incloses a lower spring-seat 30, which is pressed against the upper face of the diaphragm 26 by a diaphragm-spring 29.

The admission of fluid from the inlet side of the casing 1 to the piston-chamber 14 to effect the upward movement of the piston 14, and the consequent opening movement of the connected regulating-valve 7, is effected and regulated by a secondary or controlling-valve 34, formed upon or fixed to a stem 35, and adapted to move vertically in a cylindrical chamber 36 in the lower portion of the top cap 21, in line axially with the diaphragm-spring 29 and with the stem 8 of the regulating-valve. The valve-stem 35 passes through a cap 36^a, which closes the upper end of the valve-chamber 36 and abuts against the diaphragm 26, against which it is pressed by a spring 37, bearing on the cap 36^a and on a nut screwed to the valve-stem. The controlling-valve is hollow or tubular and is provided with a lateral port or ports 34^a in position to register with a port 40, leading from the inlet side of the casing to the chamber 36, communication between said port and said chamber being regulated and controlled by the valve 34 in its traverse. The stem 8 of the regulating-valve 7 fits truly in and is guided by the chamber 36 and may be fitted with peripheral grooves, as shown in Fig. 2, to act as a preventive against leakage from the inlet side of the casing into said chamber. A port or passage 8^a extends longitudinally through the valve-stem 8 and maintains continuously-open communication between the valve-chamber 36 and piston-chamber 14.

The modification shown in Fig. 2, which illustrates a construction preferred for use in regulators of the larger sizes, accords in all essential features with the appliance above described and differs therefrom only in the particular that, as in application Serial No. 741,811, the regulating-valve is of the double-beat puppet-type, the valve-disks 7 7^a controlling ports or openings 6 6^a in the valve-casing 1, and also that the top cap 21 is secured to the casing by bolts 22 and the inlet-passages are provided with flanges 4 for connecting-bolts instead of being screw-threaded. The valve-disks 7 7^a are shown as cast integral and are fixed upon the stem 8 between a shoulder formed thereon and nut 8^c, engaging a screw-thread on the upper portion thereof, but it will be obvious that they may be separately connected to the valve-stem 8, if preferred. The piston-chamber 14 is provided with peripheral ribs 19 and is closed at bottom by a cap 10, which is connected removably to the casing by bolts 11.

In operation the adjusting device having been screwed down so as to impart the proper pressure to the diaphragm 26 by the spring 29, the port or ports 34^a of the controlling-valve will be brought into communication

with the port 40 of the top cap 21 and fluid under pressure will be admitted from the inlet side of the casing through the ports 40 and 34^a, the valve-chamber 36, and the passage 8^a in the valve-stem 8 to the piston-chamber 14 below the piston 13, thereby raising the piston and unseating the regulating-valve 7. Fluid from the outlet side of the casing will then enter the pressure-chamber 25 through the port 43 and act upon the lower side of the diaphragm 26, forcing up the latter until the pressure is brought into equilibrium with that of the spring, as excess of outlet-pressure will lift the diaphragm, and the spring 37, aided by fluid-pressure, will coincidentally raise the controlling-valve 34, which will automatically throttle the supply of fluid to the piston 13 and permit the regulating-valve 7 to be correspondingly closed by the spring 12.

My present invention enables an independent controlling-valve chamber to be dispensed with, thereby attaining the substantial advantages in practice of reduction of cost and weight and simplification of parts, and providing a direct fluid-pressure port which is not liable to become clogged and can be inspected by removing the top cap. The valve and piston stem is also effectively guided and maintained in true axial line, and liability to warping of the regulating-valve is reduced.

I claim as my invention and desire to secure by Letters Patent—

1. In a pressure-regulator, the combination of a valve shell or casing having inlet and outlet passages separated by a partition, a main or regulating valve controlling a passage in said partition, a piston-chamber and a controlling-valve chamber connected with the casing, on opposite sides, respectively, of the regulating-valve, a piston fixed to the stem of the regulating-valve and fitting the piston-chamber, a passage through said stem establishing communication between the piston-chamber and controlling-valve chamber, and a controlling-valve fitting in the controlling-valve chamber and governing communication between the same and the inlet-passage of the casing.

2. In a pressure-regulator, the combination of a valve shell or casing having inlet and outlet passages separated by a partition, a main or regulating valve controlling a passage in said partition, a top cap connected to the casing, above and in line axially with said valve, a piston-chamber on the casing, below and in line axially with said valve, a stem carrying said valve and piston and having a longitudinal port or passage, and a controlling-valve fitting in the top cap and governing communication between the inlet-passage of the casing and the passage of the valve and piston-stem.

3. In a pressure-regulator, the combination of a valve shell or casing having inlet and outlet passages separated by a partition, a main or regulating valve controlling a passage in

said partition, a top cap connected to the casing, above and in line axially with said valve, a piston-chamber on the casing, below and in line axially with said valve, a controlling-valve chamber in the top cap, having an open lower end, a stem carrying the regulating valve and piston and fitting and guided in the controlling-valve chamber, a longitudinal port or passage in said stem, establishing constant communication between the controlling-valve chamber and piston-chamber, and a controlling-valve fitting in the controlling-valve chamber and governing communication between said chamber and the inlet-passage of the casing.

4. In a pressure-regulator, the combination of a valve shell or casing having inlet and outlet passages separated by a partition, a main or regulating valve controlling a passage in said partition, a top cap connected to the casing, above and in line axially with said valve, a piston-chamber on the casing, below and in line axially with said valve, a stem carrying said valve and piston and having a longitudinal port or passage, a controlling-valve chamber in the top cap which is in constant communication with the passage of said stem, a port in the top cap establishing communication between the controlling-valve chamber and the inlet-passage of the casing, a controlling-valve working in the controlling-valve chamber and governing communication between the same and said port in the top cap, and a spring-

pressed flexible diaphragm, subject to pressure from the outlet-passage of the casing and bearing on the controlling-valve stem.

5. In a pressure-regulator, the combination of a valve shell or casing having inlet and outlet passages separated by a partition, a main or regulating valve controlling a passage in said partition, a top cap connected to the casing, above and in line axially with said valve, a piston-chamber on the casing, below and in line axially with said valve, a stem carrying said valve and piston and having a longitudinal port or passage, a controlling-valve chamber in the top cap which is in constant communication with the passage of said stem, a port in the top cap establishing communication between the controlling-valve chamber and the inlet-passage of the casing, a controlling-valve working in the controlling-valve chamber and governing communication between the same and said port in the top cap, a pressure-chamber in the top cap, a port connecting said chamber with the outlet-passage of the casing, a flexible diaphragm in said chamber bearing on the controlling-valve, and an adjustable pressure device inclosed in a casing connected to the pressure-chamber and adapted to act upon the flexible diaphragm.

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Witnesses:

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