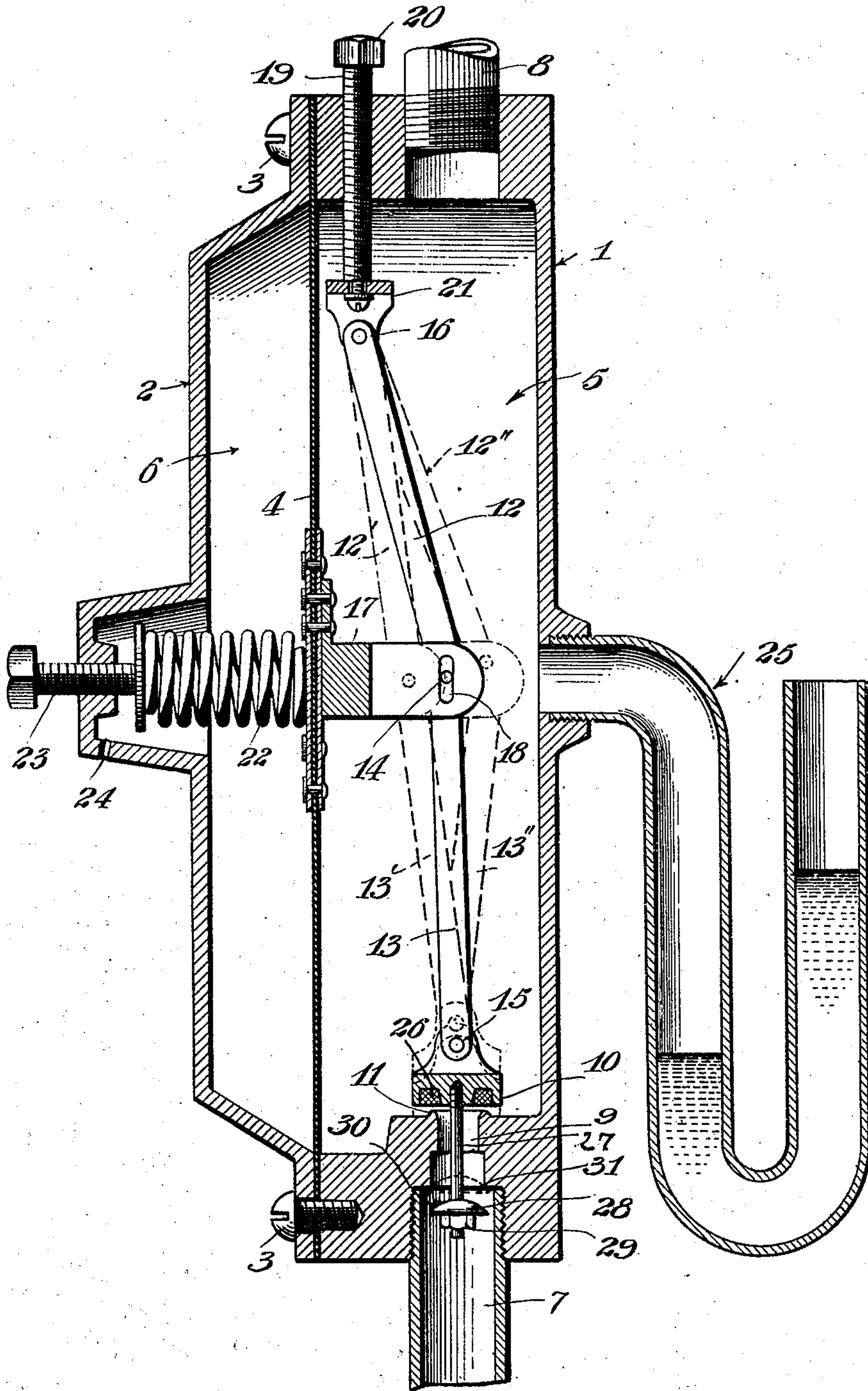


No. 806,470.

PATENTED DEC. 5, 1905.

A. J. & N. HODGE.
FLUID PRESSURE REGULATOR.
APPLICATION FILED MAY 9, 1904.



Witnesses

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UNITED STATES PATENT OFFICE.

ARTHUR J. HODGE AND NATHANIEL HODGE, OF PASADENA, CALIFORNIA.

FLUID-PRESSURE REGULATOR.

No. 806,470.

Specification of Letters Patent.

Patented Dec. 5, 1905.

Application filed May 9, 1904. Serial No. 206,984.

To all whom it may concern:

Be it known that we, ARTHUR J. HODGE and NATHANIEL HODGE, citizens of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented new and useful Improvements in Fluid-Pressure Regulators, of which the following is a specification.

The invention relates to the class of pressure-regulators wherein a diaphragm supported in a suitable chamber is exposed on one side to the pressure of the gas and on the other side to a pressure independent of the gas-pressure, the movements of this diaphragm under fluctuation of the pressure of the gas serving to operate the valve controlling the supply of gas through the regulator to the service-pipes.

One object of this invention is to provide improved means for operation of the regulating-valve from the diaphragm and for adjusting such operation.

Another object of the invention is to provide valve means for shutting off the supply of gas in case of an abnormal fall of pressure in the regulator due to a leak or to other causes.

A further object of the invention is to effect this result by the use of the same controlling and operating mechanism that effects the regulation to maintain constant pressure.

Other objects of the invention will appear from the following description and claims.

The accompanying drawing is a vertical section of a fluid-pressure regulator embodying our invention.

1 designates the casing or body of the regulator, and 2 the cover or closure-plate, removably secured thereto by screws 3. The diaphragm 4 is clamped between the body 1 and the plate 2, dividing the space within the casing and closure-plate into two chambers 5 6.

7 designates the gas-supply or fluid-pressure-supply pipe or inlet, and 8 the service-pipe or outlet from the pressure-regulator, both of these pipes communicating with the aforesaid chamber 5. An opening or passage 9 in the wall of said chamber 5, communicating with pipe 7, is adapted to be closed by a valve 10 to control communication from the supply-pipe 7 to the chamber 5.

11 designates a seat for valve 10. Said valve is connected to supporting and operating means

consisting of toggle links or members 12 13, 55 which are pivoted together and to the diaphragm at 14, the outer end of one link being pivoted to said valve at 15 and the outer end of the other link being pivoted at 16 to a suitable support. The pivotal connection between the diaphragm and the toggle-links is such as not to interfere with the free longitudinal movement of said links. For this purpose a bracket 17, secured to the diaphragm and forked to embrace the toggle-links, is provided with a slot or elongated seat 18 on each side to receive the knuckle-pivot 14 of the toggle-links. 60

19 designates an adjustable support for one end of the toggle device, said support consisting of a screw working in a tapped hole in the side of the casing 1 opposite the gas-inlet and provided at its outer end with an operating-head 20 and at its inner end with a swivel 21, to which the toggle-link 12 is pivotally connected. By operation of this screw or support the valve 10 may be adjusted relatively to its seat. 70

A spring 22 is provided in the chamber 6 to bear against the diaphragm 4, and an adjusting-screw 23, working in the plate 2, serves to control or regulate the pressure of this spring against the diaphragm. The chamber 6 communicates with the outer air through a small opening 24, permitting only gradual flow of air therethrough. 85

25 designates the usual trap-vent, formed as a U-tube, containing suitable liquid and communicating at one end with the chamber 5 and at the other end with the outer air. Valve-seat 11 may be formed as a raised annular ridge adapted to bear against a packing ring or washer 26 on valve 10. 90

Connected to the valve 10 by a stem 27 is an emergency-valve 28, held on said stem by a nut 29. Said emergency-valve desirably has a rounded or convex seating-face 30, adapted to cooperate with a valve-seat 31 at the outer end of the inlet-opening 9. When the device is in normal operation with the valve 10 near its seat, as shown in full lines, the emergency-valve 28 is sufficiently removed from its seat to enable free flow of gas past same, this flow being regulated by the valve 10. 100

The screw 19 is adjusted so that when the toggle-links are almost straightened out, as shown in dotted lines at 12' 13', the valve 10 105

will be closed against its seat, shutting off the gas-supply, and the screw 23 is so adjusted that the toggle will assume this position when the pressure is at the desired maximum.

5 When the pressure falls below this maximum, the toggle-links will be moved laterally by the diaphragm, so as to shorten the toggle and open the valve 10 sufficiently to allow gas or fluid to pass through, and the
10 amount of such opening will adjust itself automatically to the requirements of the service-pipes by reason of the corresponding fall of pressure in the chamber 5. In case, however, of an abnormal fall of pressure, such as
15 would be caused by a break in the service-pipes, the diaphragm will move the toggle-links to an extreme position 12" 13", so that the emergency-valve 28 will be pulled up against its seat, closing the gas-inlet and preventing further passage of gas or fluid.

The purpose of the opening 24 in the wall of the chamber 6 is to maintain atmospheric pressure in said chamber. Said opening, however, is so small as to restrict the passage of
25 gas therethrough, so that in case there is a break or leak in the diaphragm 4 gas-pressure will gradually accumulate in said chamber 6 to such an extent as to substantially equalize the pressure on both sides of the diaphragm,
30 whereupon the spring 22 moves the diaphragm and toggle-links over to position to close the emergency-valve.

While the apparatus above described is the preferred embodiment of our invention, it may
35 be variously modified, as will be understood by one skilled in the art, without departing from the spirit of our invention.

What we claim is—

1. A pressure-regulator comprising a chamber
40 provided with gas inlet and outlet means, a diaphragm exposed to the pressure in said chamber, means for adjusting the pressure on said diaphragm, a valve controlling the gas-inlet means, an operating connection between
45 the diaphragm and the valve, and adjusting means connected to the operating connection to adjust the valve toward and from its seat.

2. A pressure-regulator comprising a chamber
50 provided with gas inlet and outlet means, a diaphragm exposed to the pressure in said chamber, means for adjusting the pressure on said diaphragm, a valve controlling the gas-inlet means, a support adjustable toward and from said valve, and a connecting means connected to said support, to the diaphragm and
55 to the valve to operate the valve from the diaphragm and to adjust the valve from the movable support.

3. A pressure-regulator comprising a chamber
60 provided with gas inlet and outlet means, a diaphragm exposed to the pressure in said chamber, means for adjusting the pressure on said diaphragm, a valve controlling the gas-inlet means, a screw working in the wall of
65 said chamber, and connecting means opera-

tively connected to said screw and to the valve to adjust the valve by adjusting the said screw, and a connection between said operating connecting means and the diaphragm to operate the valve from the diaphragm, said connection comprising relatively sliding parts permitting adjustment of the valve by the screw while maintaining the operative connection from the diaphragm.

4. A pressure-regulator comprising a chamber
75 provided with gas inlet and outlet means, a diaphragm exposed to the pressure in said chamber, means for adjusting the pressure on said diaphragm, a valve controlling the gas-inlet means, an adjustable support and a toggle
80 connected at its ends to the valve and to the adjustable support and connected at its joint to the diaphragm.

5. A pressure-regulator comprising two
85 chambers, and an intervening diaphragm, one of said chambers being provided with gas inlet and outlet means, means for adjusting the pressure on said diaphragm, a valve controlling the gas-inlet means, toggle-links pivotally connected to said diaphragm, one end of
90 one toggle-link being connected to said valve, and an adjustable support connected to the other toggle-link.

6. A pressure-regulator comprising two
95 chambers, and an intervening diaphragm, one of said chambers being provided with gas inlet and outlet means, means for adjusting the pressure on said diaphragm, a valve controlling the gas-inlet means, toggle-links pivotally connected to said diaphragm, one end of
100 one toggle-link being connected to said valve, and an adjustable support connected to the other toggle-link, said adjustable support comprising a screw having a swivel connection with the toggle-links.

7. A pressure-regulator comprising two
105 chambers, and an intervening diaphragm, one of said chambers having an inlet and an outlet for the fluid, means for adjusting the pressure on said diaphragm, a regulating-valve controlling said inlet, toggle-links pivotally connected to said diaphragm, one end of one toggle-link being connected to said valve, an adjustable support connected to the other toggle-link, and an emergency-valve also controlling
110 said inlet and connected to the regulating-valve to be drawn against its seat by the movement of the toggle-links in opening the regulating-valve to a considerable degree.

In testimony whereof we have signed our
120 names to this specification, in the presence of two subscribing witnesses, at Pasadena, in the county of Los Angeles and State of California, this 2d day of May, 1904.

ARTHUR J. HODGE.
NATHANIEL HODGE.

In presence of—

JOHN McDONALD,
P. J. CHRIST.