C. E. SQUIRES.

SO-CALLED REDUCING VALVE.

APPLICATION FILED MAY 11, 1908.

912,503. Patented Feb. 16, 1909.

Fig. 1

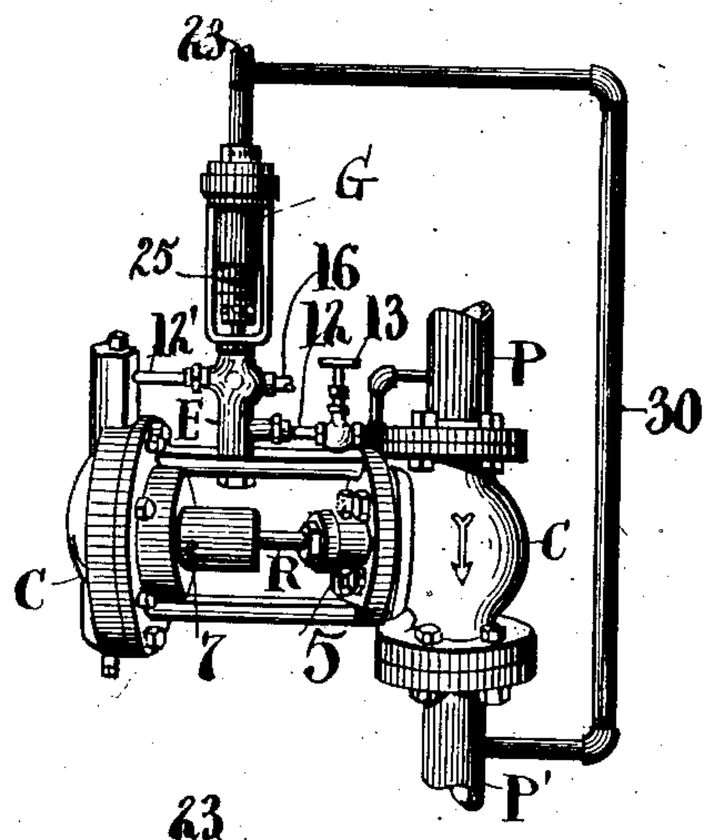
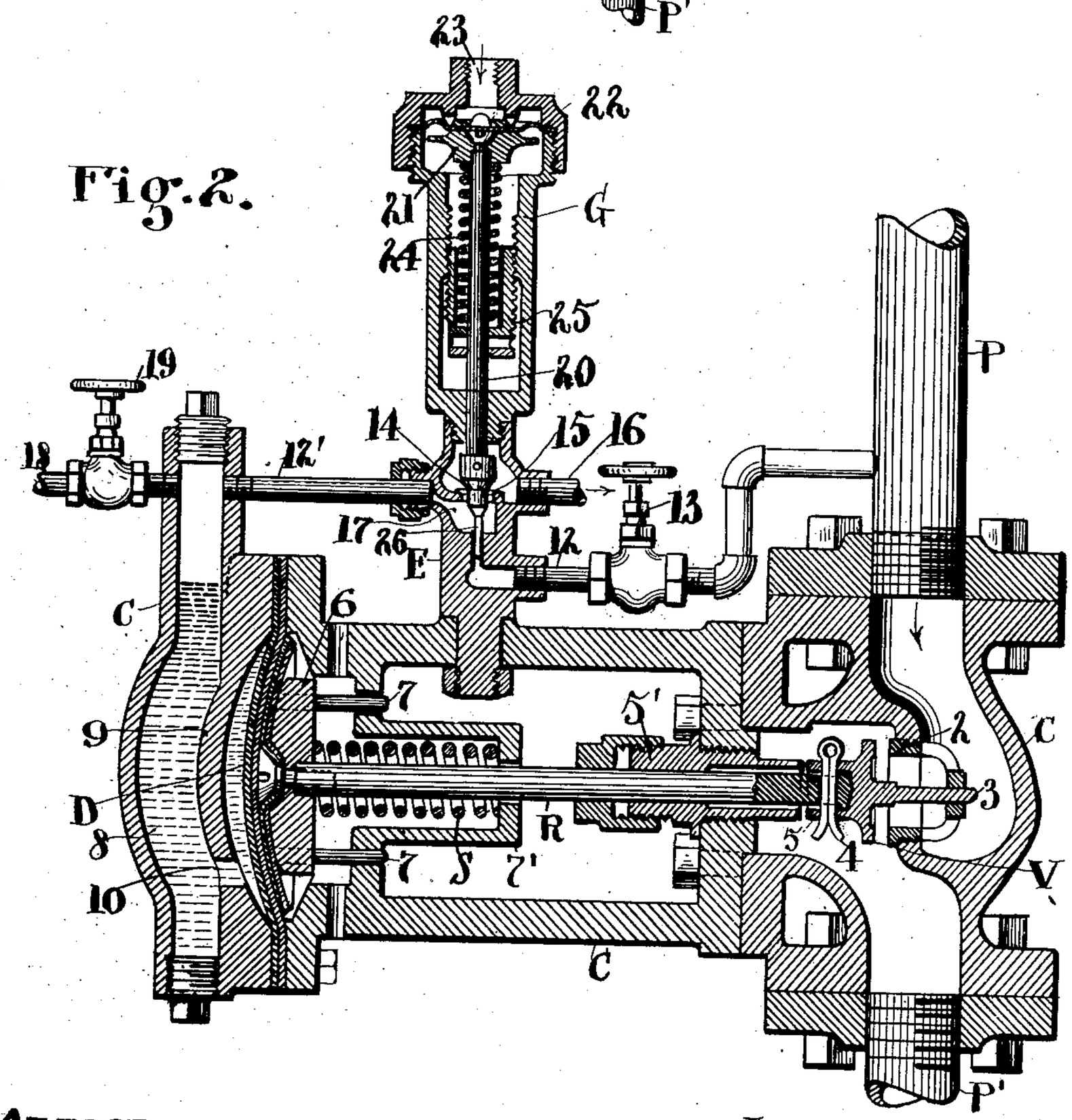


Fig. 2.



ATTEST

E. M. Fisher

F. C. Mussun.

INVENTOR

Charles E. Squires

BY Fisher & Moore ATTYS.

UNITED STATES PATENT OFFICE.

CHARLES E. SQUIRES, OF CLEVELAND, OHIO.

SO-CALLED REDUCING-VALVE.

No. 912,503. Specification of Letters Patent. Patented Feb. 16, 1909.

Application filed May 11, 1908. Serial No. 432,096.

To all whom it may concern:

Be it known that I, CHARLES E. SQUIRES, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in So-Called Reducing-Valves, and do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in so-called reducing valves, and the invention is such that it serves to reduce the pressure of any of the commonly confined fluids, such as steam, air or gas, and to maintain any desired pressure below initial pressure regardless of what the initial pressure may be.

In the accompanying drawings, Figure 1 is a side elevation of the parts comprising my invention, and Fig. 2 is an enlarged sectional elevation lengthwise of the device as it is shown herein.

The invention as thus shown is comprised in a number of essential and co-acting parts which may be arranged in the exact manner shown or in such equivalent manner as will give the same results substantially, but the present illustration serves to present the invention in a practical working form. Therefore, as shown, the invention comprises a suitable casing, C, which comprehends the main or supporting part to which the other parts are brought and with which they are operatively associated as will now appear. Thus the pipe P represents the inlet pipe and pipe P′ the outlet pipe from said casing, and V represents the main or reducing valve. A passage through the casing from one pipe to the other is provided with a valve seat 2 removably fixed in said passage, in this instance, and provided with a bearing for the stem 3 of said valve, which is further supported from valve rod R by a cotter pin 4, or its equivalent, through the annular extension 5 of the valve and the end of rod R on which said extension is sleeved. Said rod is further supported in a suitable bearing 5′ in the casing and a head 6 thereon has stems 7 working in a portion of casing C. Diaphragm D bears against said head and is confined about its edge in said casing. A limited but sufficiently large chamber is provided in said casing C to operatively accommodate said diaphragm and head 6 and afford play to open and close main valve V, and a spiral spring about rod R in a cup 7′ of the casing affords a counter spring pressure as to said diaphragm and head and thus holds said valve open normally, or when artificial pressure is withdrawn or diminished on said diaphragm. As shown a fluid pressure space 8 also is provided in casing C in advance of said diaphragm and separated therefrom by an apron or wall 9 having a passage 10 to admit fluid pressure to the diaphragm when pressure is desired. Such pressure proceeds from the main source or supply open to pipe P, and a pipe connection 12 having a controlling valve 13 therein proceeds from said main source through an interposed coupling member E, seated in casing C and provided with a branched fluid passage for both inlet and exhaust from and to chamber 8 as the work may require. The pilot valve 14 has a seat 15 in this coupling, in connection with which it controls the exhaust from chamber 8, through pipe 16. From pipe 12 the fluid traverses coupling E through passage 17 beneath the pilot valve to pipe 12′, which opens into the top of chamber 8, where there is empty space for the pressure fluid, air, gas, or steam over the liquid in the lower portion of said chamber and next to diaphragm D, flooding the exposed surface thereof. A hand controlled exhaust is provided from the top of chamber 8 by pipe 18 and valve 19, but automatic action is through valve controlled coupling E. The pilot valve 14 is automatically controlled through its rod 20 and head 21 having a diaphragm 22 over the same and which is exposed to fluid pressure on its top through inlet passage 23 entering said tubular member G which is supported over or upon coupling E. A spring 24 about rod 20 sustains head 21 as against the pressure of diaphragm 22 and lifts the pilot valve from its seat when pressure on said diaphragm is relaxed, as shown.

The reduced pressure, so-called, or pressure beneath initial pressure, automatically controls itself by its action upon the diaphragm 22 of the auxiliary or pilot valve. The reduced pressure is applied through inlet 23 and resisted on the other side of the diaphragm by spring 24, which is adjusted to the pressure by the adjusting nut 25. In use the diaphragm of this auxiliary valve is balanced between the spring and the reduced pressure, the slightest change of which affects the diaphragm.

The operation of the pilot valve is as follows: Steam at initial pressure slowly passes the plug 26 of the pilot valve and builds up pressure on main diaphragm D and thus closes the main valve V. Then as the reduced pressure falls below the determined point it is overcome by the spring 24 under the auxiliary diaphragm, which unseats the pilot valve and allows the pressure on the main diaphragm to exhaust to atmosphere through the exhaust port 16. Then the main valve opens again until, as the reduced pressure passes the desired point, the whole operation is repeated. For clearness this action is described as intermittent. It is found in practice, however, that both the pilot and the main valves remain slightly open, and as a consequence there is a continuous flow of steam through the main valve, accompanied by a continuous slight exhaust. The variation of the reduced pressure is so slight that it is hardly noticeable.

What I claim is:

1. In pressure reducing devices for steam and the like, a casing having a diaphragm chamber in one end and a valve seat in the other end, an inlet pipe on the pressure side of said seat and an outlet pipe on the reduced side of said seat, a valve rod lengthwise of said casing and a valve on one end thereof adapted to said seat, and a diaphragm in said chamber fixed on the other end of said rod and a spring in opposed relation to said diaphragm, in combination with means to sustain fluid pressure against said diaphragm comprising a pipe connection from said inlet pipe to said diaphragm chamber and a pilot valve in said connection adapted to automatically control the pressure in said diaphragm chamber.

2. In pressure reducing mechanism, a casing having a fluid passage through the same at one end and a diaphragm chamber at the other end and inlet and outlet pipes open to said passage, a reducing valve located in said passage between said pipes and a rod carrying the same, a diaphragm on said rod in said chamber adapted to press the valve to its seat and a spiral spring opposed to said diaphragm to open the said valve, in combination with an exhaust passage from said chamber and means to control said passage comprising a pilot valve adapted to seat therein, a diaphragm chamber and a diaphragm therein operatively connected with said pilot valve, and a fluid passage to said diaphragm chamber open to the reduced pressure in said outlet valve.

3. A pressure reducing mechanism substantially as shown comprising a main casing having a valve seat at one end and inlet and outlet pipes on opposite sides of said seat respectively, and a diaphragm chamber at its other end and a diaphragm therein, a main valve for said seat operatively connected with said diaphragm and a spring counter to said diaphragm, in combination with means to regulate the pressure on said diaphragm and main valve comprising a fluid conveying pipe from said inlet pipe to said diaphragm chamber, a pilot valve located in the line of said pipe and a plug thereon to control the flow of pressure fluid to said diaphragm chamber, and a reduced pressure diaphragm and a spring oppositely and operatively connected with said pilot valve.

4. A reducing valve mechanism comprising a main valve and a diaphragm to close the same and a spring to open the valve, a fluid inlet passage from initial pressure to said diaphragm and an exhaust from said passage, in combination with a pilot valve controlling said exhaust and a plug thereon controlling the said fluid inlet passage, a diaphragm operatively connected with said pilot valve and a reduced fluid pressure passage open thereto, and a counter spring for each of said diaphragms adapted to keep the said valves normally open.

In testimony whereof I sign this specification in the presence of two witnesses.

CHARLES E. SQUIRES.

Witnesses:
E. M. FISHER,
F. C. MUSSUN.