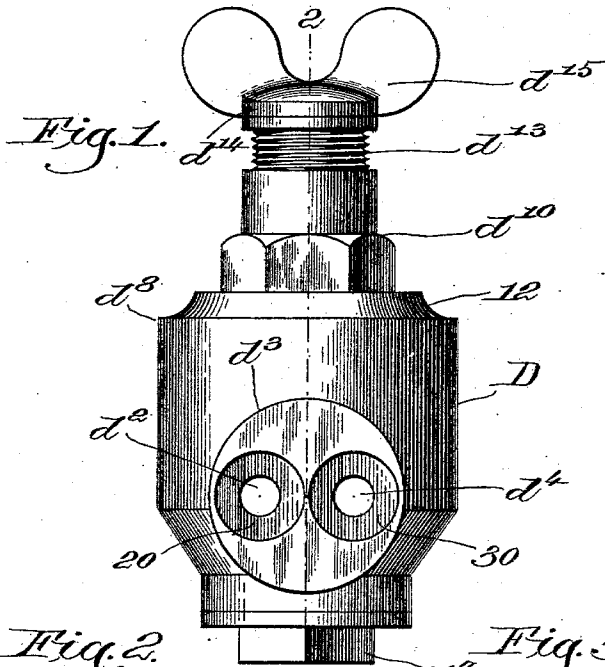


H. STRATER.  
PRESSURE REGULATING VALVE.

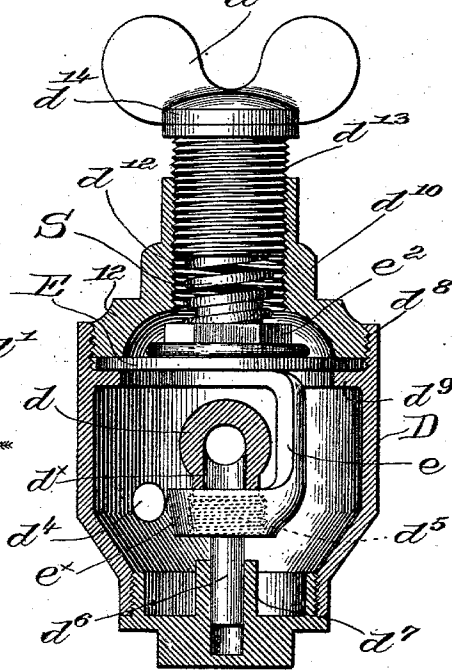
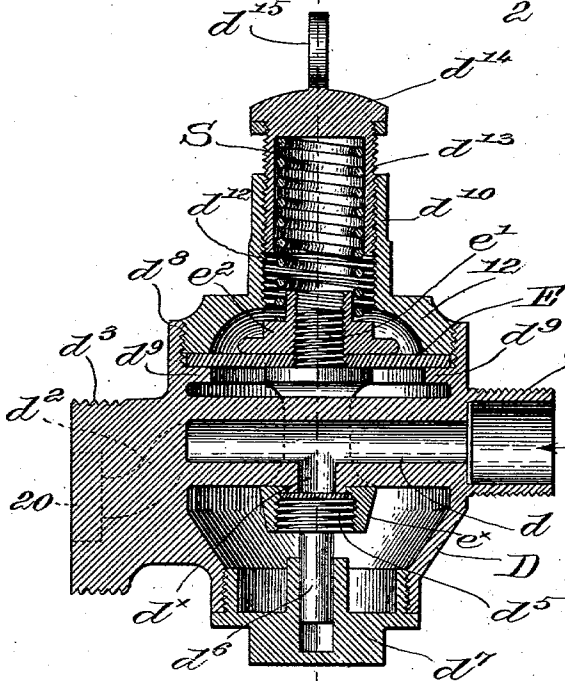
APPLICATION FILED SEPT. 26, 1901.

NO MODEL.



*Fig. 2.*

*Fig. 3.*



Witnesses:  
Thomas J. Summmond  
Adolph H. Wiser

Inventor:  
Herman Strater,  
By Lester Gregory  
Attys.

# UNITED STATES PATENT OFFICE.

HERMAN STRATER, OF BOSTON, MASSACHUSETTS.

## PRESSURE-REGULATING VALVE.

SPECIFICATION forming part of Letters Patent No. 745,402, dated December 1, 1903.

Original application filed July 20, 1901, Serial No. 69,049. Divided and this application filed September 25, 1901. Serial No. 76,527. (No model.)

*To all whom it may concern:*

Be it known that I, HERMAN STRATER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Pressure-Regulating Valves, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object the production of a novel and efficient pressure-regulating valve; and the present application is a division of an application, Serial No. 69,049, filed by me the 20th day of July, 1901, and now United States Patent No. 684,955, wherein the valve forming the subject-matter of this present application is shown in connection with an air-compressing apparatus.

By the valve to be hereinafter described I am enabled to distribute fluid from a common source of supply by a plurality of outlets into different channels, the pressure in one of such channels being at substantially the pressure of the source of supply and in the other channel at a lower and adjustable pressure. The regulation of the pressure in the one channel does not alter or vary the pressure in the other, and while the valve is particularly adapted for use in connection with air-compressing apparatus of the type shown in my said patent it is not restricted to such use or employment.

Figure 1 is an end elevation of a pressure-regulating valve embodying my invention viewing the outlet end of the case or shell. Fig. 2 is a vertical longitudinal section thereof on the line 2 2, Fig. 1; and Fig. 3 is a transverse sectional view on the line  $x^3 x^3$ , Fig. 2, looking toward the left.

The valve herein illustrated comprises a hollow shell or case D, having a tubular through-passage  $d$  extended therethrough, communicating at its inlet end with an externally-threaded nipple  $d'$ , adapted to be connected in suitable manner with the fluid-supply, the opposite outlet end communicating by a duct  $d^2$  (see dotted lines, Fig. 2) with an annular recess 20, Fig. 1, in the end of a head  $d^3$ , shown as externally screw-threaded. A second duct,  $d^4$ , offset from the center of the

case or shell, (see Fig. 3,) leads directly from the interior of the latter to a second recess, 30, in the head, the recesses being adapted to receive the ends of the two branches or channels (not shown) into which the fluid is directed by the valve, any suitable coupling being screwed onto the head  $d^3$  to connect the valve with the channels.

About midway between its ends and at its under side, as herein shown, the through-passage  $d$  is shown as provided with a port  $d^x$ , Figs. 2 and 3, opening into the case D and controlled by a puppet-valve  $d^5$ , its depending stem being guided in a recessed screw-cap  $d^7$ , which closes the lower opening in the case, so that the valve  $d^5$  can move toward and from the port  $d^x$ . The open top of the case, which herein is shown as substantially cylindrical, is provided with an internally-threaded hub  $d^8$ , having an annular inturned flange  $d^9$ , on the upper face of which is seated a flexible diaphragm E, of stout rubber, thin metal, or other suitable material.

A C-shaped yoke  $e$  loosely embraces the through-passage  $d$ , (see Figs. 2 and 3,) and the puppet-valve  $d^5$  is screwed into the lower end  $e^x$  of the yoke, the upper end of the latter bearing against the lower face of the diaphragm and having an upturned threaded spindle  $e'$  extended therethrough. A nut  $e^2$ , having a large flat base, is screwed upon the shank and tightly upon the outer face of the diaphragm, securely connecting it with the yoke and preventing leakage around the spindle, the nut being movable up and down in the recessed or cup-like lower end 12 of an upright nipple  $d^{10}$ , which is screwed into the hub  $d^8$  and bears upon the diaphragm E near its periphery, maintaining it fluid-tight upon the seat  $d^9$ . The nipple is internally threaded, as at  $d^{12}$ , to receive the tubular exteriorly-threaded shank  $d^{13}$ , depending from an annular head  $d^{14}$ , provided for convenience with a thumb-nut  $d^{15}$ . A strong spiral spring S is inserted in the shank between the under side of the head  $d^{14}$  and the nut  $e^2$ , resting upon the latter, and by screwing the shank  $d^{13}$  into the nipple  $d^{10}$  the spring will be compressed to a greater or less extent.

The fluid entering the valve-case D from the source of supply through the inlet  $d'$

passes along the through-passage  $d$  and duct  $d^2$  to the connected channel or conduit at the pressure of the entering fluid. At the same time some of the fluid tends to pass from the through-passage into the case D through the port  $d^x$ , provided the puppet-valve  $d^5$  is open, the spring S acting upon the upper side of the diaphragm, tending to open said valve, while the pressure of the fluid admitted into the case acts upon the under side of the diaphragm, tending to seat the valve and close the port  $d^x$ . Now by regulating the pressure of the spring in accordance with the full pressure of the fluid from the source of supply and according to the working pressure desired in the branch or conduit communicating with the outlet  $d^4$  it will be manifest that the fluid which passes into the case D and out through said outlet will be at any desired pressure below the full or initial pressure of the fluid as it is received from the source of supply. Should the diaphragm be ruptured, leakage through the nipple  $d^{10}$  can be prevented by screwing down the shank  $d^{13}$  until the head  $d^{14}$  is seated on the annular upper end of the nipple, and, if desired, a washer  $w$ , of suitable material, may be placed upon the shank immediately below the head.

The openings in the top and bottom of the valve-case D permit the ready assembling of the internal parts of the apparatus, and the variable pressure is controllable at all times from the exterior of the case by or through the governing means for the spring S.

Various changes or modifications may be made in the construction and arrangement herein shown and described without departing from the spirit and scope of my invention.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A pressure-regulating valve comprising a case having a tubular through-passage extended through it and provided with a port on one side opening into the case and adapted to be connected at one end with the fluid-supply, an outlet at the other end of said through-passage, a separate outlet for and in continuous communication with the case, a flexible diaphragm in the latter, a valve for the port in the through-passage, connected with the diaphragm, the through-passage extending across the case between the valve and diaphragm, fluid-pressure in the case acting upon one side of the diaphragm to seat the valve and close said port, preventing traverse of fluid from the through-passage

into the case, and adjustable means acting upon the opposite side of the diaphragm to open the port, whereby the pressure of the fluid passing through the case to its outlet can be reduced at will below the pressure of the fluid-supply and independently of the traverse of fluid through the through-passage.

2. In a pressure-regulating valve, a case having a tubular through-passage therein extended from one to the other side of the case and provided with a port opening into the case, a separate outlet-port for and in continuous communication with the case, a flexible diaphragm within the case and adapted to be moved in one direction by fluid-pressure in said case, a spring to act upon the diaphragm in opposition to such pressure, means to vary the pressure of the spring, a valve for the port in the through-passage, and a yoke connecting said valve and diaphragm, and loosely embracing the through-passage, the valve being closed by fluid-pressure and opened by the spring, without varying the pressure or the flow of fluid traversing the through-passage.

3. In a pressure-regulating valve, a case having an integral tubular through-passage therein extended from one to the other side and provided with a port opening into the case, a separate outlet-port for and in continuous communication with the case, a flexible diaphragm within the case and adapted to be moved in one direction by fluid-pressure in said case, a spring to act upon the diaphragm in opposition to such pressure, means to vary the pressure of the spring, said means including a screw-threaded member having an annular head, said head when seated upon the portion of the case supporting the said member closing the case thereat, to prevent leakage should the diaphragm be ruptured, a valve for the port in the through-passage, the valve being closed by fluid-pressure and opened by the spring, without varying the pressure or flow of fluid traversing the through-passage, and a C-shaped yoke partly surrounding the through-passage, and connected at opposite sides thereof with the valve and diaphragm respectively.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERMAN STRATER.

Witnesses:

GEO. W. GREGORY,  
AUGUSTA E. DEAN.