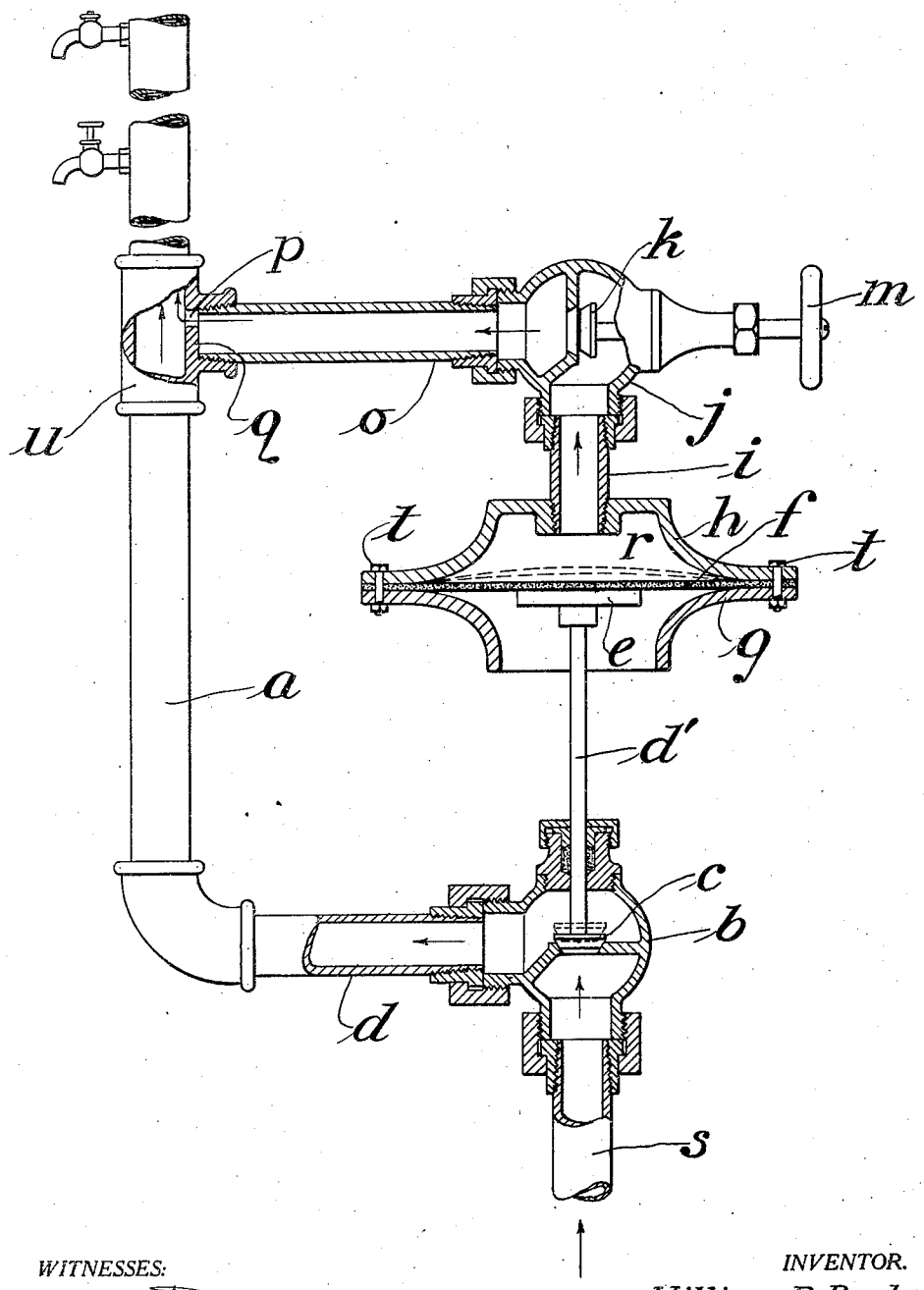
W. P. BURKE.

VACUUM REDUCING VALVE.

APPLICATION FILED MAY 23, 1913.

1,162,731. Patented Nov. 30, 1915.



WITNESSES:

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VACUUM REDUCING-VALVE.

Specification of Letters Patent. Patented Nov. 30, 1915.

1,162,731.

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To all whom it may concern:

Be it known that I, WILLIAM P. BURKE, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Vacuum Reducing-Valves, of which the following is a specification.

This invention relates to improvements in pressure regulators and is particularly designed for use in connection with high pressure water service where it is desired to lower the pressure before it is distributed through the pipes of a dwelling or other building.

An object of the invention is to provide means to automatically open and close the inlet valve in proportion with the quantity of water that is required. It is a well known fact that in some pressure reducing valves or regulators that, when several faucets or valves are open on the upper floors of an apartment or other building and if the faucets or valves on the lower floors are open at the same time, the water will not flow on the upper floors. One of the features of this invention is to overcome this objection.

Broadly, the invention consists of a diaphragm device for controlling the movements of the inlet valve by permitting the water at its reduced pressure to act on the opposite side of the diaphragm which is in communication with the house-pipe. A valve is also provided for shutting off this communication whereby the diaphragm may be renewed without shutting off the flow of water to the building.

Referring to the drawing, the figure of which shows a pipe that conveys the water from the source of supply to the house-pipes, the lower end of which is connected with the city water pressure through a suitable globe valve construction, the valve of which is controlled by a diaphragm. The upper side of this diaphragm receives the reduced pressure of water from the house-pipe. A suitable valve is interposed between the house-pipe and the opposite side of the diaphragm whereby the pressure admitted to the house-pipes is controlled.

Referring to the drawing in detail, *a* designates a pipe which is connected to the pipes throughout the building which may be considered one containing several floors. The lower end of this pipe is connected to a globe valve construction, indicated at *b*, the valve proper being shown at *c*.

d designates the connection between the pipe *a* and the valve *b*.

d' is the valve stem on the upper end of which is placed the plate *e* which bears directly against the underside of the diaphragm *f* that is suitably clamped between the two plates *g* and *h*. The upper plate is formed with an opening therein to receive a connection *i* that communicates with a second globe valve *j*, the valve proper being shown at *k* that is operated by means of the hand-wheel *m*. Extending between the valve *j* and the house-pipe *a* is the connection *o* that communicates with the house pipe *a* by means of the small opening *p*.

q designates a projection that nearly closes the communication from the pipe *a* to the connection *o* except for the small opening *p*.

The area of the disk *e* and the valve *c* must bear a definite relation to each other in order to permit a definite pressure to flow to the house, and, normally, the valve *c* will only open a slight distance to allow the definite pressure of water to flow through the house-pipe *a* as, for example, 40 pounds when the valves or faucets on the lower floors are open. If it is desired to allow a greater pressure and volume of water to flow through the pipe *a*, it is evident that the diameter of the disk *e* should be made smaller or nearer the size of the valve *c*, it being understood that the reduced water pressure in the space *r* above the diaphragm *f* is equal to that in the house-pipe *a*.

Should several valves or faucets be open at the same time on the upper and lower floors, it is evident that the pressure on the upper floors would be very much reduced or possibly no water would flow at all unless some means were provided to open the valve *c* a greater distance in order to provide for this increased volume of water that is required. In order to meet this requirement, the diaphragm *f* must move upward to permit the valve *c* to open this greater distance. This result is automatically accomplished by reason of the larger volume of water flowing through the pipe *a* when a large number of faucets are open, which increased volume of water will cause a partial

vacuum to be produced in the chamber *r* above the diaphragm *f*. The partial vacuum in the chamber *r* is caused by reason of the water in the pipe *a*, as it flows past the small opening *p* that communicates with the chamber *r*, the valve *j*, and the pipe *o*. At the same time that the pressure is reduced in the chamber *r*, the incoming water through the pipe *s*, which is connected to the high pressure city main, will lift the valve *c* a sufficient distance to permit a greater volume of water to flow through the pipe *a* whereby all of the floors of a building may be supplied at the same time.

If it is necessary to change or to put in a new diaphragm indicated at *f*, it is only necessary to close the valve *k* by means of the hand-wheel *m* thus shutting off the water from the chamber *r*. Then, by removing the bolts *t*, a new diaphragm can be readily inserted. When this operation takes place, the water flows through the house-pipe *a* at the normal city pressure without any reduction.

It will be seen from this invention that two important results are accomplished;—first, that the valve works automatically to supply water on several floors of a building simultaneously, and, second, that the diaphragm or reducing mechanism may be repaired without shutting off the flow of water to the building. The construction shown at *p* and *q* in the T member *u* may be termed a vacuum T construction, since the water flowing through the pipe *a* produces vacuum in the space *r*. An important feature of the present invention is the extension piece *q* having the small opening *p* at the upper side of the connection *o*. When water is flowing through the pipe *a*, at its normally reduced pressure, say 40 pounds, the same pressure is transmitted to the chamber *r*; but, when a large volume flows through the pipe *a*, the pressure in the chamber *r* is reduced by the suction effect caused by the water flowing past the opening *p* and not through the same into the chamber *r*. It will be seen therefore that the opening *p* is very much less in area than the connection pipe *o*.

What I claim is:—

1. In a pressure reducing device, the combination with a main, a service pipe, faucets served by the service pipe, and a pressure reducing valve controlling communication between the main and service pipe, comprising a casing including two sections the lower of which is open at its lower end to the atmosphere, a diaphragm disposed between said sections and clamped between the meeting edges thereof against displacement, a valve stem extending from the valve to the diaphragm through the open end of the casing and operating freely therethrough, said stem having a head thereon, said head being removable through the open end of the casing and an ejector having a relatively small opening formed therein adjacent its upper side, affording communication between the service pipe and the upper side of the casing above the diaphragm, said valve which controls the flow of water from the main to the service pipe being closed when all of the faucets are closed and opened proportionately according to the number of faucets which are opened, upon the step by step movement of the diaphragm, as the said faucets are opened and closed.

2. In an apparatus of the character described, a main and a service pipe including supply faucets, a valve controlling the communication between the main and service pipe, and means for actuating the valve including an ejector pipe, a T-coupling connecting the ejector pipe and service pipe, and a partition in the T-coupling having a relatively small opening in the upper side thereof, whereby water seeping within said ejector pipe will not reach the level of the opening and thereby effect the passage of air through said opening.

WILLIAM P. BURKE.

Witnesses:
HARRY W. BOWEN,
HENRY A. BOOTH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."