J. A. BOWER.

VALVE.

APPLICATION FILED NOV. 7, 1914.

1,185,970. Patented June 6, 1916.

Fig. 1.

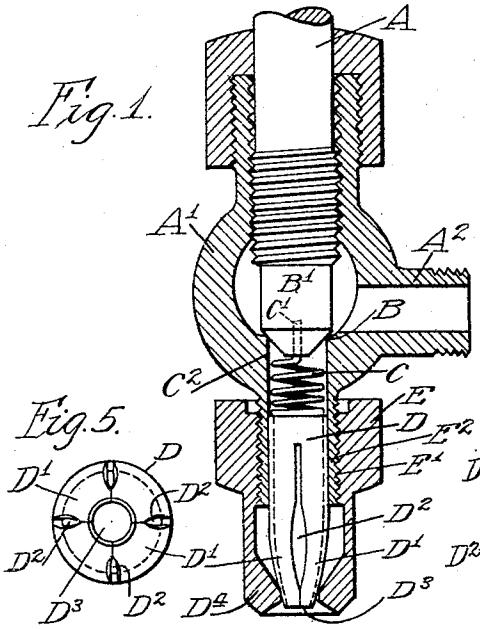


Fig. 2.

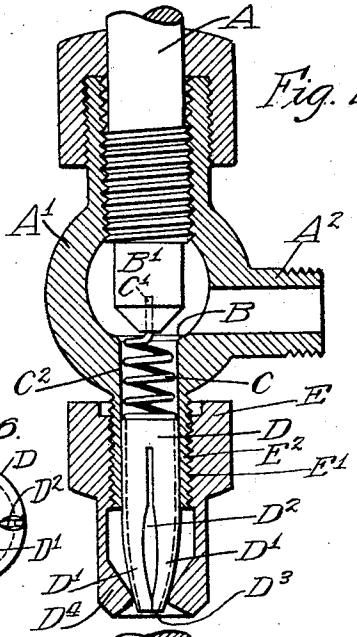


Fig. 5.

Fig. 6.

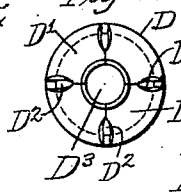


Fig. 3.

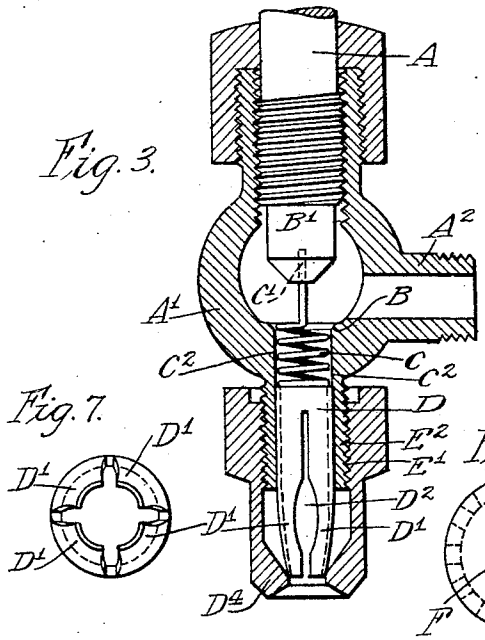


Fig. 4.

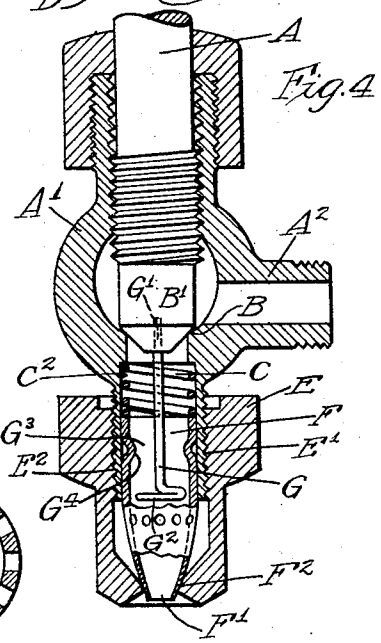
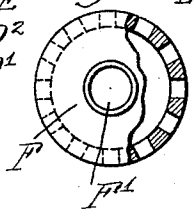


Fig. 7.

Fig. 8.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN A. BOWER, OF CEDAR RAPIDS, IOWA.

VALVE.

1,185,970. Specification of Letters Patent. Patented June 6, 1916.

Application filed November 7, 1914. Serial No. 870,788.

To all whom it may concern:

Be it known that I, JOHN A. BOWER, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented a certain new and useful Improvement in Valves, of which the following is a specification.

My invention relates to valves or devices for regulating and controlling the flow of fluids.

It is applicable to a large variety of valves, cocks and the like used for gas fire extinguishers, water nozzles and indeed for practically all purposes where the flow of gases or liquids is to be regulated or controlled.

I have illustrated it in connection with means for controlling gas.

Figure 1 is a vertical cross section showing the parts closed; Fig. 2 a similar cross section showing the parts open for a minimum supply of fluid; Fig. 3 a similar cross section showing the parts open for a maximum supply of fluid; and Fig. 4 a similar cross section of a modification; Figs. 5, 6, 7 and 8 are end elevations respectively of the discharge ends of the devices shown in Figs. 1, 2, 3, and 4.

Like parts are indicated by the same letter in all the figures.

A is a valve stem, A^1 a valve body, A^2 a fluid supply pipe leading to the valve body.

B is a valve seat within the body, B^1 a valve on the steam A.

C is a spring one end of which C^1 is received in a vertical aperture in the valve stem and it lies within a chamber C^2 in the lower part of the valve body.

D is a regulator preferably cylindrical, hollow and composed of sheet spring metal forming fingers D^1, D^1 separated by intervals D^2 and adapted to be forced together at their outer ends so as to leave when in the position shown in Fig. 1 a minimum aperture D^3.

E is a cylindrical casing screw-threaded at E^1 to a projecting screw-threaded portion E^2 on the valve body. Within the casing and regulator is the regulator chamber. The lower end of the casing is inwardly reduced as at D^4 and its walls are inclined so that when the regulator tube is forced down between these walls at D, D^4 they are forced together and when pressure is relieved against the upper end of the regulator tube, the expansive tendency of the fingers will force the tube upwardly, permit the fingers to expand and enlarge the minimum opening until it becomes the maximum size and enlarge the opening from its minimum size at the outer ends of the fingers to its maximum size at the cross section of the case at D^4.

Referring to Fig. 4, many of the parts are similar to those already described. F is a tubular regulator without the spring fingers having the minimum aperture F^1 and seated at F^2 in the outward end of the case. In this case the spring C has no connection with the valve, but a hook G is secured at G^1 to the valve stem and provided at its lower end with a cross-bar G^2 within the hollow regulator. This cross-bar is longer than the narrow cross-section G^3 formed by the ledge G^4 on the inside of the hollow regulator.

I do not, of course, wish to be limited to the particular form, structure, size, proportion and arrangement of these several features. Indeed, although my drawing is that of a working valve, I wish it to be considered diagrammatic in the sense that it is intended simply to illustrate the general structure of my invention. It will, of course, be understood that great modification can be made and that the principle of my invention can be applied not only to valves of this general class but to valves of greatly differing class and also cocks and the like.

As the quantity, quality or pressure of gas, that is to be consumed in a burner of a given size varies, so should the size of the orifice through which the gas passes into the air-mixing chamber, vary.

The agent, force or power, that injects, takes or sucks in and mixes it with the gas, is the velocity of the jet as it leaves the cock or valve orifice and passes through the air mixer and tube to the burner. If you change the velocity of the jet, you also change the proportion of air taken in with the gas.

If the size of the burner, the size of the orifice through which the gas passes to the "air mixer", the quality of the gas, the pressure of the gas, and the amount of flame required to do the work, always were the same, then there would be no need of an adjustable orifice. Passing over the varying quality and pressure of the gas and considering that the work to be done varies as it does,—in every kitchen there are cooking utensils that vary greatly in size and capacity; some things require low heat, slow

cooking and some require quick work and full volume of flame. Gas companies are continually spending money trying to teach the users of gas ranges to not burn all of the gas they can, but to just burn the amount required to do the work they have to do; a kettle once set to boiling, with the burner turned full on, can be kept boiling with the burner turned one-fourth, one-half, or even three-fourths off; in the oven, when the bread begins to brown, the cook turns off part of the gas, and continues the baking with a less amount of flame, etc., etc.

With the ordinary gas cock or valve that has heretofore been used, the intention of the stove manufacturer has been to have the burners, the orifice, and all, proportioned so as to give right results when the valve or cock is turned wide open, and usually they have succeeded, but the efficiency is changed, and partially destroyed when the gas is turned part off by closing or partly closing the port in the valve or cock body. If the pressure of the gas in the stove manifold is, say, 3 inches, and the gas passes under this pressure through the full size port in the cock body, to and through an orifice of a given size on its way to the burner and right results are produced, then the same results cannot be produced if the flow of gas is reduced by partly closing the valve or cock plug and the orifice through which the gas finally passes to the mixing chamber, is very materially reduced, and the same results are had as would be if the pressure in the manifold, or the pipes or mains conducting gas to it be reduced in the same proportion. When such reduction of gas pressure takes place, the gas jet issuing from the nozzle has a greatly decreased velocity, and consequently sucks in much less air in proportion, and the result is a sluggish, velvety flame that is lacking in oxygen and is not effective. The direct acting adjustable orifice gas cock and valve does not reduce the velocity of the jet as the pressure of the gas is not reduced between the manifold and the orifice, for the flow is controlled by simply increasing or decreasing the size of the orifice, thus maintaining the highest possible velocity of the jet after it passes the orifice, and the alinement of the jet with the air mixing tube is not changed, as it is when the flow is controlled by adjusting the ordinary hood and needle point with which some cocks and valves are fitted.

It is a self-evident fact that to obtain the best possible results the gas should be delivered to the burner in such a way as to maintain a uniform mixture of gas and air, whether the gas be turned on to the burner full capacity, or but part on, and that the only way to do this and also to provide for the changes that are sometimes made necessary through the change of pressure or quality of the gas that is being delivered, is to govern the supply by changing the size of the orifice through which the gas finally passes to the air mixing chamber and not control the supply by setting up an interference with the flow by partially closing the valve or port through the cock plug, back and away from an orifice that does not vary in size.

The use and operation of my invention are as follows: Assuming the parts positioned as shown in Fig. 1, and that they are intended to be used in supplying gas to a gas stove, there will be no gas in the regulator chamber, the gas will be cut off at the valve seat B. If now gas is to be used, the valve stem A is rotated by a proper handle until the valve is lifted from its seat, whereupon a full supply and pressure of gas from the pipe A^2 will pass through the body of the valve and into the hollow regulator and regulator chamber. This gas will emerge at D^3 through the minimum opening which would be adjusted so as to supply the proper amount of gas under normal and ordinary conditions or something less than that amount. If now there is need for an additional supply of gas, the valve stem will be further turned so as to be lifted until the pressure on the spring C which has been holding the regulator tube in the position shown in Fig. 1 is diminished, whereupon the spring effect of the expanding fingers of the tube will force it backwardly against the slight pressure of the spring C, thus increasing the size of the discharge opening, and this action may be continued by retracting the stem A until the parts have assumed the position in Fig. 3, whereupon the maximum gas discharge opening will become effective. Since the regulator is formed so as to have no tendency to withdraw from the minimum illustrated in Fig. 4, the parts are arranged so that a further movement of the valve stem A will bring the cross-bar G^2 of the hook attached to the valve stem against the ledge G^4, whereupon a further motion of the valve stem will lift or draw the regulator upwardly against the action of the spring C until the maximum opening has been produced.

To restate the matter in more general terms applicable to all structures contained in my invention, there is a minimum opening from the regulator chamber always open, but the regulator chamber is itself closed so that normally no gas is admitted to the regulator chamber or discharged through the discharge opening. The first operation is to open its valve so as to permit a full flow of gas to pass through the regulator chamber and out through the minimum discharge opening.

The second operation is to enlarge the discharge opening until it reaches a max-

imum, this being done by a further movement of the valve which controls the gas supply and in the form of Fig. 1 it is accomplished by retracting the valve stem and permitting the spring regulator tube to expand until the opening has been varied from minimum to maximum.

We have used the term valve in its proper sense to indicate any kind of fluid controlling device.

I claim:

1. A fluid valve having a casing, an inlet valve, an outlet valve having a fixed minimum opening, means for opening the inlet valve and means comprising a cap in which the outlet valve is engaged, and spring fingers projecting from and forming a part of the outlet valve for retracting the outlet valve to increase its opening after the inlet valve has been opened.

2. A fluid valve having a casing, an inlet valve, an outlet valve with a fixed minimum opening, and means for first opening the inlet valve and then increasing the opening of the outlet valve, said means comprising a spring between the two valves which remains partially compressed to seat the outlet valve until the inlet valve has been retracted for some distance beyond the point necessary to open the inlet valve opening.

3. A fluid valve having a casing, an inlet valve, an outlet valve of spring metal with a fixed minimum opening and means for first opening the inlet valve and then retracting the outlet valve to increase its opening, said means comprising a spring between the two valves which remains partially compressed to seat the outlet valve until the inlet valve has been retracted for some distance beyond the point necessary to open the inlet valve opening.

In testimony whereof, I affix my signature in the presence of two witnesses this 28th day of October, 1914.

JOHN A. BOWER.

Witnesses:

MINNIE M. LINDENAN,

BESSIE S. RICE.

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