A. E. FLEENER.

PRESSURE REGULATOR.

APPLICATION FILED JUNE 15, 1920.

1,399,013. Patented Dec. 6, 1921.

Fig. 1.

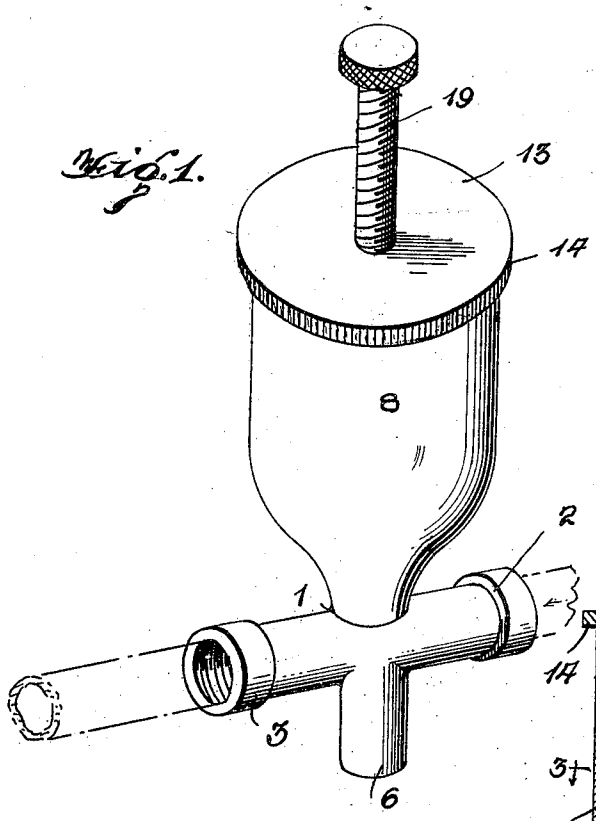



Fig. 2.

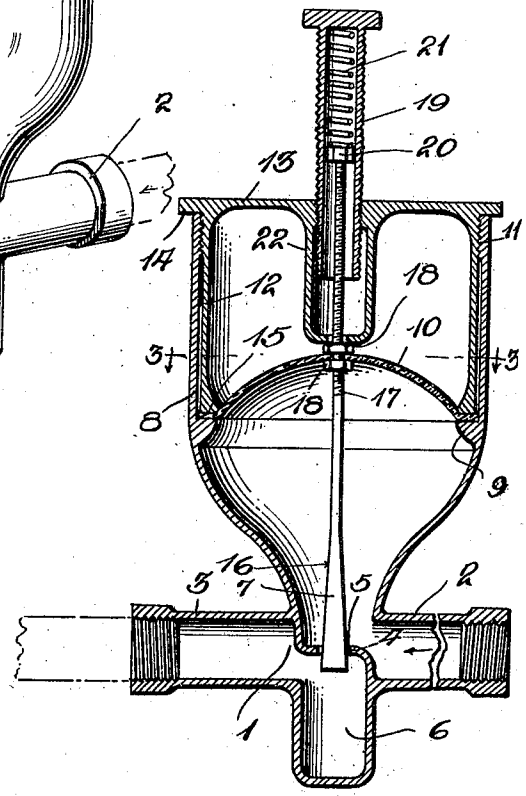
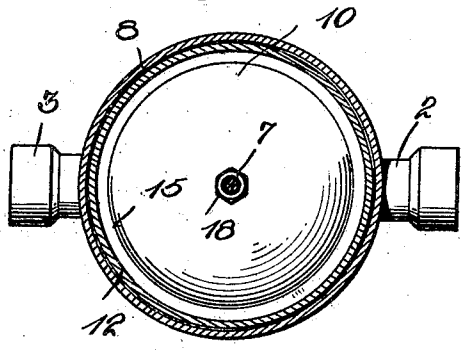



Fig. 3.




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# UNITED STATES PATENT OFFICE.

AUSTIN E. FLEENER, OF COLUMBUS, OHIO.

## PRESSURE-REGULATOR.

1,399,013. Specification of Letters Patent. Patented Dec. 6, 1921.

Application filed June 15, 1920. Serial No. 389,221.

*To all whom it may concern:*

Be it known that I, AUSTIN E. FLEENER, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Pressure-Regulators, of which the following is a specification.

This invention relates to pressure regulators and is intended more particularly for use in connection with heating apparatus which burn natural gas, the object of the invention being to automatically maintain an even flow at the burner and thereby prevent waste due to excessive flow and unnecessary widening of the inlet. The invention seeks to provide a simple and efficient mechanism whereby the pressure of the inflowing gas will automatically position a valve controlling the flow to the burner so that the volume of gas permitted to escape will be uniform. While, as stated, the invention is intended more particularly for use in connection with heating appliances using natural gas as a fuel, it is capable of advantageous use in other fields as will be readily understood.

The invention is illustrated in the accompanying drawings and consists in certain novel features which will be particularly pointed out in the claims following a detailed description.

In the drawings—

Figure 1 is a perspective view of a device embodying my invention;

Fig. 2 is a vertical longitudinal section of the same;

Fig. 3 is a horizontal section on the line 3—3 of Fig. 2.

In carrying out my invention, I employ a valve casing 1 having oppositely disposed nozzles 2 and 3 which constitute an inlet and an outlet, respectively, and are internally threaded so that they may be interposed in and secured to the pipe line or gas conductor. The valve casing is provided with an internal web or partition 4 through which a port 5 is formed and below the said partition or web is a depending extension or cup 6 which accommodates the valve 7 when the same is lowered. Upon its upper side, the valve casing is enlarged so as to present a bowl 8 having an internal annular shoulder or rib 9 upon which the edge of a flexible diaphragm 10 may rest. The bowl is extended above the shoulder or rib 9 and its upper extremity is internally threaded, as indicated at 11, to receive the depending annular wall 12 of a cap 13. The cap 13 extends laterally beyond the wall 12 and thereby presents a stop flange 14 which is adapted to impinge against the upper edge of the bowl 8. The lower edge of the depending circular wall 12 is expanded, as shown at 15, to constitute a clamping jaw which will bear upon the upper side of the diaphragm 10 at the edge of the same and thereby clamp the diaphragm against the shoulder 9, as will be readily understood on reference to Fig. 2. The parts should be so proportioned that the jaw 15 may exert sufficient pressure upon the edge of the diaphragm to securely hold the same and form a gas-tight joint while the stop shoulder 14 will prevent the said jaw being turned home so tightly that it will cut into the diaphragm and consequently destroy the same.

The valve 7 consists of a rod having its lower portion slightly expanded in a conical form, as shown at 16, and playing through the port 5, the diameter of said port being slightly greater than the greatest diameter of the valve so that even when the valve is in its highest position the flow of gas will not be entirely cut off. The valve is threaded, as shown at 17, at an intermediate point of its length and nuts 18 are mounted upon the said threaded portion at opposite sides of the diaphragm 10 to securely clamp the diaphragm to the valve. The upper portion of the valve extends through and above the cap 13 and plays within an adjusting sleeve 19 having threaded engagement with the cap at the center thereof. The upper extremity of the valve is equipped with a nut 20 or other abutment and between the said abutment and the upper closed end of the adjusting sleeve a spring 21 is coiled within the sleeve. Depending centrally from the cap concentric with the sleeve and the valve is a bumper 22 which has its lower end disposed in the path of the nuts 18 so that under maximum pressure of the gas the expansion of the diaphragm will be limited by the contact of the said nuts against the bumper.

The operation of the device is thought to be evident, but it may be briefly summarized. The flow of gas having been established at the meter or other controlling point, the gas will pass through the inlet 2 to the port 5 and as the said port is obviously much smaller than the passage from the inlet the gas will accumulate within the chamber de-

fined by the lower portion of the bowl 8 and the diaphragm 10. By adjusting the sleeve 19 longitudinally, the spring 21 may be regulated so as to exert more or less force upon the nut or abutment 20 and thereby set the valve to permit gas, under any desired pressure, to escape through the port 5 and the outlet 3 to the point of use. Initially, the valve will be in its lowest position so that a maximum flow of gas will be permitted, but as the gas accumulates below the diaphragm its pressure will overcome the force of the spring 21 and will expand the diaphragm and lift the valve so that the flow through the port 5 will be automatically reduced.

It will be readily seen that the flow of gas through the outlet of the pressure regulator will be uniform. The pressure of gas naturally varies greatly under the influence of weather conditions, extent of consumption and other circumstances. The variation in the pressure of the gas is especially noticeable in cold weather inasmuch as during the day, when the consumption is greater, the controlling valves are fully open so as to admit all gas possible to the burners and it frequently happens at night, when the consumption is not so general and, consequently, the pressure of the gas is increased, due to the increased pressure resulting from decreased consumption, a considerable quantity of gas is wasted at the burners which would be saved if my device were installed. The bumper 22 prevents the diaphragm being expanded to such a degree that the valve will be withdrawn from the port 5 and, consequently, the device will be operative at all times. The screw-threaded connection between the bowl and the cap closing the same permits the cap to be adjusted so as to exert sufficient pressure upon the diaphragm to effect a gas-tight joint and the threaded connection between the bowl and the cap also aids in preventing leakage of gas from the bowl. This result is further assured by the threaded connection between the adjusting sleeve and the cap. The device is exceedingly simple in construction and may be manufactured and installed at a low cost. The tension of the spring 21 having been adjusted, the device requires no further attention upon the part of the user and will automatically control the pressure of the gas and prevent leakage and loss of the gas as well as minimize the possibility of overheated stoves and the dangers attending such condition.

Having thus described the invention, what is claimed as new is:

1. A pressure regulator comprising a bowl having an inlet and an outlet and provided with an internal flange, a diaphragm having its edge resting on said flange, a cap fitted in the upper end of the bowl and having its wall extended to bear upon the diaphragm and clamp the same against said internal flange, the cap being provided with a stop shoulder to engage the upper end of the bowl, a valve consisting of a rod extending through and secured to the diaphragm and having its lower end expanded and playing through the outlet of the pressure chamber, a bumper depending from the cap around the valve to limit the expansive movement of the diaphragm and a tension device carried by the cap and acting on the said valve in opposition to the pressure of the fluid in the pressure chamber.

2. A pressure regulator comprising a bowl having an inlet and an outlet, a diaphragm disposed across the interior of the bowl, a cap closing the upper end of the bowl, a valve consisting of a rod extending through and secured to said diaphragm and having its lower end playing through the outlet of the pressure chamber and its upper end provided with an abutment, an adjusting sleeve fitted in the cap around the upper end of the valve and the abutment thereon, and a tension spring disposed within the adjusting sleeve between said abutment and the upper end of the sleeve.

In testimony whereof I affix my signature.

AUSTIN E. FLEENER. [L. S.]