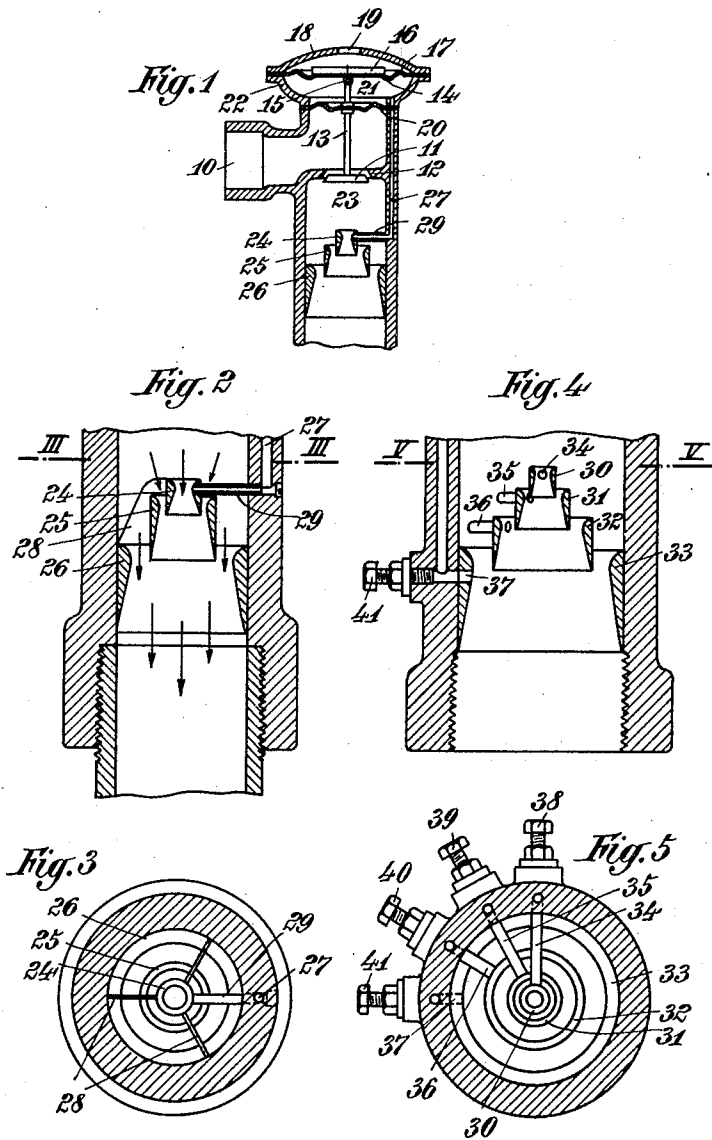


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R. NEUMANN
GAS PRESSURE REGULATOR
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GAS PRESSURE REGULATOR

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My invention relates to gas pressure regulators and has more particularly reference to regulators of this class in which a throttle valve is fixed to and co-operates with a diaphragm and is displaced in dependency upon the pressure prevailing behind it. With regulators of this design it has been found that with great gas consumption the throttle valve does not open to a sufficient extent so that the pressure decreases at the place of gas consumption. Therefore it has already been proposed to compensate for this drawback by reducing as far as possible the gas pressure below the diaphragm to which end a simple nozzle is made use of the smallest passage area of which communicates with the space below the diaphragm so that a greater sucking action is produced when large quantities of gas pass through the nozzle than with the passage of small quantities. This increased sucking effect is then transmitted to the space below the diaphragm whereby an additional opening of the valve is obtained when great quantities of gas are consumed.

Now my invention has for its object to improve the means that bring about this sucking action. For it has been found that a satisfactory nozzle of this design must have a considerable length. Furthermore, in order to obtain at all a satisfactory sucking effect of the nozzle, careful machining of the passage thereof is required. Now by the use of such a simple nozzle, indeed, an additional opening of the throttle valve is obtained, but this additional opening is not sufficient to cause an increase of pressure at the delivery end of the regulator, at the most uniform pressure being produced in so far as the increased losses of flow are compensated for within the regulator.

According to my invention a so-called multiplying nozzle is made use of in lieu of the above-mentioned very long simple nozzle which multiplying nozzle is composed of two or more nested small nozzles. This multiplying nozzle not only possesses a notably smaller structural length but also a far greater sucking effect which not only enables to cover the losses of flow within the regulator but also to obtain an increase of pressure at

the exit thereof. This increase of pressure is desirable because with great gas consumption the losses due to friction increase in the piping up to the place of consumption. For, with uniform pressure at the exit of the regulator these losses would cause decrease of pressure at the place of consumption, while a uniform pressure is obtained here by the increase of the pressure at the exit of the regulator, as it is the case with the arrangement according to my invention.

My invention further provides to improve regulators of this design by each of the individual nozzles through a duct communicating with the regulating chamber of the diaphragm, which ducts can be opened and closed independently on one another. This arrangement enables to regulate the sucking action at the exit of the regulator at will.

In order that my invention may be clearly understood and readily carried into effect, two embodiments of the same are illustrated by way of example in the drawing which accompanies and forms part of this specification and in which

Figure 1 is a vertical section of a gas pressure regulator designed in accordance with my invention,

Figure 2 is a section of the exit end of this regulator on an enlarged scale,

Figure 3 is a horizontal section on line III—III of Figure 2,

Figure 4 is a section similar to that of Figure 2 and shows the other embodiment of my improved regulator in which each of the individual nozzles by a duct communicates with the regulating chamber, and

Figure 5 is a section on line V—V of Figure 4.

Referring first to Figures 1 to 3, the entrance socket of the regulator is denoted by 10, while 11 denotes a throttle valve with its seat 12. Valve 11 is carried by a stem 13 to the upper end of which is fixed by pin and eye connection 15 a disc 14 surrounded by a diaphragm 17 and carrying a weight 16. The diaphragm 17 and weight 16 are protected by a cover 18 which has an aperture 19 leading to the outer air.

A further diaphragm 20 is fixed to the stem

13 below diaphragm 17 so that a chamber 21 is formed by these two diaphragms and the casing 22, the latter being screwed or fixed in any other suitable manner to the casing part 5 carrying the entrance socket 10.

As will be seen, the incoming gas is throttled by valve 11 and then enters the delivery socket 23. Within this socket are disposed several nested nozzles 24, 25, and 26 10 in such a manner that the effect of the well-known multiplying nozzle is obtained. These nozzles by a duct 29, and 27, the latter provided in the wall of socket 23, communicate with the chamber 21 formed by the diaphragms 17 and 20 and forming the controlling chamber of the regulator. The more 15 gas flows through the exit of the regulator, the greater is the suction and the more gas is sucked from chamber 21 so that the weight 20 19 sinks whereby valve 11 is opened to a greater extent.

The individual nozzles are preferably carried by sheet metal brackets 28, see Figures 2 and 3, which project from the wall of part 23. In the embodiment shown only the nozzle 24 is connected by the duct 29, and 27 to chamber 21, while in the other embodiment, Figures 4 and 5, four individual nested nozzles 30, 31, 32, and 33 are arranged each of 30 which communicates by the ducts 34, 35, 36, and 37, respectively, with chamber 21. Regulating screws 38, 39, 40, and 41 allow throttling of the ducts 34-37, Figure 5. According to which suction is required at the exit of 35 the regulator, either the duct 34 of nozzle 30 or, with the smallest suction, duct 37 of nozzle 33 is opened by setting the respective screw. These manipulations enable so to adjust the increase of pressure at the exit of the 40 regulator as required due to the length of the pipe leading from the regulator to the place of consumption that the pressure at the latter remains uniform.

Furthermore, I attain the following further possibility of regulation by means of the arrangement illustrated in Figures 4 and 5: I may open for instance the ducts 34 and 37 that is the nozzles producing the strongest and lowest sucking effect so that these two 50 nozzles act in unison upon the chamber 21. This results in the fact that when great quantities of gas flow through the regulator it is nozzle 30 which acts at the beginning and effects strong suction from chamber 21, which 55 suction is then slowly reduced through duct 34 of nozzle 33. This effect is desirable for instance when a further gas flame is to be lighted to which end the regulator is to deliver temporarily the gas under increased 60 pressure.

What I claim and desire to secure by Letters Patent is:—

1. A regulator of the class described comprising a regulating chamber formed by two 65 diaphragms one of which is adapted to be act-

ed upon by the pressure prevailing behind the regulator, a throttle valve cooperable with this diaphragm, the other diaphragm being adapted to shut off said chamber against the entrance pressure, at least two nested nozzles 70 disposed behind said throttle valve, and a communication from at least one of these nozzles to said regulating chamber.

2. A regulator of the class described comprising a regulating chamber formed by two diaphragms one of which is adapted to be 75 acted upon by the pressure prevailing behind the regulator, a throttle valve cooperable with this diaphragm, the other diaphragm being adapted to shut off said chamber against the entrance pressure, a plurality of nested 80 nozzles disposed behind said throttle valve, and a separate communication from each of said nozzles to said regulating chamber.

3. A regulator of the class described comprising a regulating chamber formed by two diaphragms one of which is adapted to be 85 acted upon by the pressure prevailing behind the regulator, a throttle valve cooperable with this diaphragm, the other diaphragm 90 being adapted to shut off said chamber against the entrance pressure, a plurality of nested nozzles disposed behind said throttle valve, a separate communication from each of said 95 nozzles to said regulating chamber, and means for separately shutting off said separate communications.

In testimony whereof I have affixed my signature.

RUDOLF NEUMANN. 100

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