

UNITED STATES PATENT OFFICE.

ARTHUR R. BULLOCK, OF CLEVELAND, OHIO.

PRESSURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 673,133, dated April 30, 1901.

Application filed September 18, 1899. Serial No. 730,825. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR R. BULLOCK, a citizen of the United States of America, and a resident of the city of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Pressure-Regulators, of which the following is a specification.

My invention relates to improvements in gas-pressure regulators, particularly of the kind as described in my application, Serial No. 723,676, filed July 13, 1899; and the object of this my present improvement is to provide for efficient facilities whereby an automatic drainage of condensation can be effected from the internal gas-conveying pipe and also to assure a noiseless discharge of gas from said pipe. I attain this object substantially in the manner and by the means as illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical sectional view of such gas-pressure-reducing apparatus provided with the improvements above referred to, and Fig. 2 is an enlarged perspective view of the discharge-nozzle of the gas-conveying pipe.

Like letters of reference denote like parts in the drawings and specification.

The apparatus in which my improvements become especially useful and desirable consists, substantially, of the vessel A, the diaphragm *a*, with depending tube *b*, the flue *e*, a float C, carrying the cup D, and a float E, connected to which is the pipe F.

The gas enters through opening *i* and discharges at *f*. Both the upper compartment *j* and lower compartment *l* are partially filled with liquid (usually water) for support of the floats in suspended position, approximately as shown. The inner cup D is likewise filled with liquid to serve in the nature of a liquid check against the escape of gas from that end of pipe F which extends into said cup. The other end of said pipe extends above the float E into the gas-containing part of compartment *l*. The floats rise and fall according to the supply of gas to said chamber or compartment. A supply above the normal consumption of gas causes a descension of the lower float and an ascension of the upper float. The floats in turn effect a deeper im-

mersion of the pipe into said cup, and it is thus that the gas in flue *e* is maintained at the predetermined low pressure by being subjected to a higher resistance in its flow from the high-pressure compartment to that of the low-pressure chamber or the tube *e*. For a fuller description of the operation of such apparatus I refer to the application above cited.

To assure at all times a free flow of gas through pipe F is the main object of the present invention, and to accomplish this I provide a draining contrivance in connection with the lower return portion of said pipe F. Said contrivance comprises the extension *d* of the pipe F, the cup *h* in the bottom of the vessel A, and the U-shaped drainage-pipe *m*. One branch of said pipe extends upwardly outside the vessel A, while the other branch enters the said extension or foot branch of pipe F, substantially as shown in Fig. 1. Mercury or other liquid substance of high specific gravity is placed within the pipe *h*, while the pipe *m* is partially filled with water. The mercury admits of a free movement of the pipe F, but yet prevents the liquid in the compartment *l* from entering said pipe. The water in the pipe *m* is supplied to resist the gas-pressure in pipe F—that is, to prevent escape of gas. In order to accomplish this under any and all circumstances, the outer branch of pipe *m* is elevated sufficiently to contain a column of water, which can be as high as the one existing within the apparatus. The dotted line *x y* indicates the height of the column in the instance as shown. In a thus-equipped apparatus condensation of vapors can be automatically expelled from the pipe F, and it is the very pressure existing within the pipe F which accomplishes this, especially when such apparatus is used in connection with or for an acetylene-gas generator, and the gases enter the pipe F under a comparatively high temperature, and then condensation takes place of the vapors which usually are carried with such gas, since the water through which said pipe passes is of a lower temperature than the gas or vapors contained in said pipe. All condensation which may be formed can run into the extension of pipe F, wherein it is collected by pipe *m*, to be finally driven out or expelled from said pipe. Simply by establishing the outer terminal of pipe *m* at proper

elevation not only is it possible to maintain a liquid seal against the pressure of gas within the pipe F, but also provision is made for a clear passage through said pipe and an automatic drainage of condensing matter from said pipe. Furthermore, the mercury within pipe *h* allows of a free movement of pipe F and prevents the water from entering said pipe as well as the gas from leaving said pipe.

To assure a noiseless escape of gas from pipe F, I provide an enlarged and finely-perforated nozzle, which serves in the capacity of an atomizer for the gas, thereby causing the gas to leave the cup in a finely-subdivided state and without making a gurgling noise. Also purification of the gas is effected by causing atomization thereof in the manner and by the means substantially as shown.

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

1. In a gas-pressure reducing and regulating apparatus of the kind substantially as shown, the combination with the internal gas-conduit of a liquid-sealed foot branch and a U-shaped drain-pipe leading from within said branch downwardly, thence upwardly outside said apparatus all constructed and

arranged substantially as and for the purpose set forth.

2. In a gas-pressure reducing and regulating apparatus, the combination with the curved gas-pipe leading from the high-pressure to the low-pressure compartment of a foot branch at the lower curve of said pipe, a U-shaped drain-pipe extending from the interior of said branch to the exterior of said apparatus, and a cup containing liquid of high specific gravity for sealing said pipe, substantially in the manner as and for the purpose set forth.

3. In a gas-pressure regulator the combination with an internal curved pipe leading from the high-pressure compartment to the low-pressure compartment of a liquid-sealed draining contrivance at the lower portion of said pipe and an atomizing-nozzle at the exit of said pipe all constructed and arranged substantially as and for the purpose set forth.

Signed by me at Cleveland, Ohio, this 24th day of August, A. D. 1899.

ARTHUR R. BULLOCK.

Witnesses:

BERNH. F. EIBLER,
GEO. W. KINNEY.