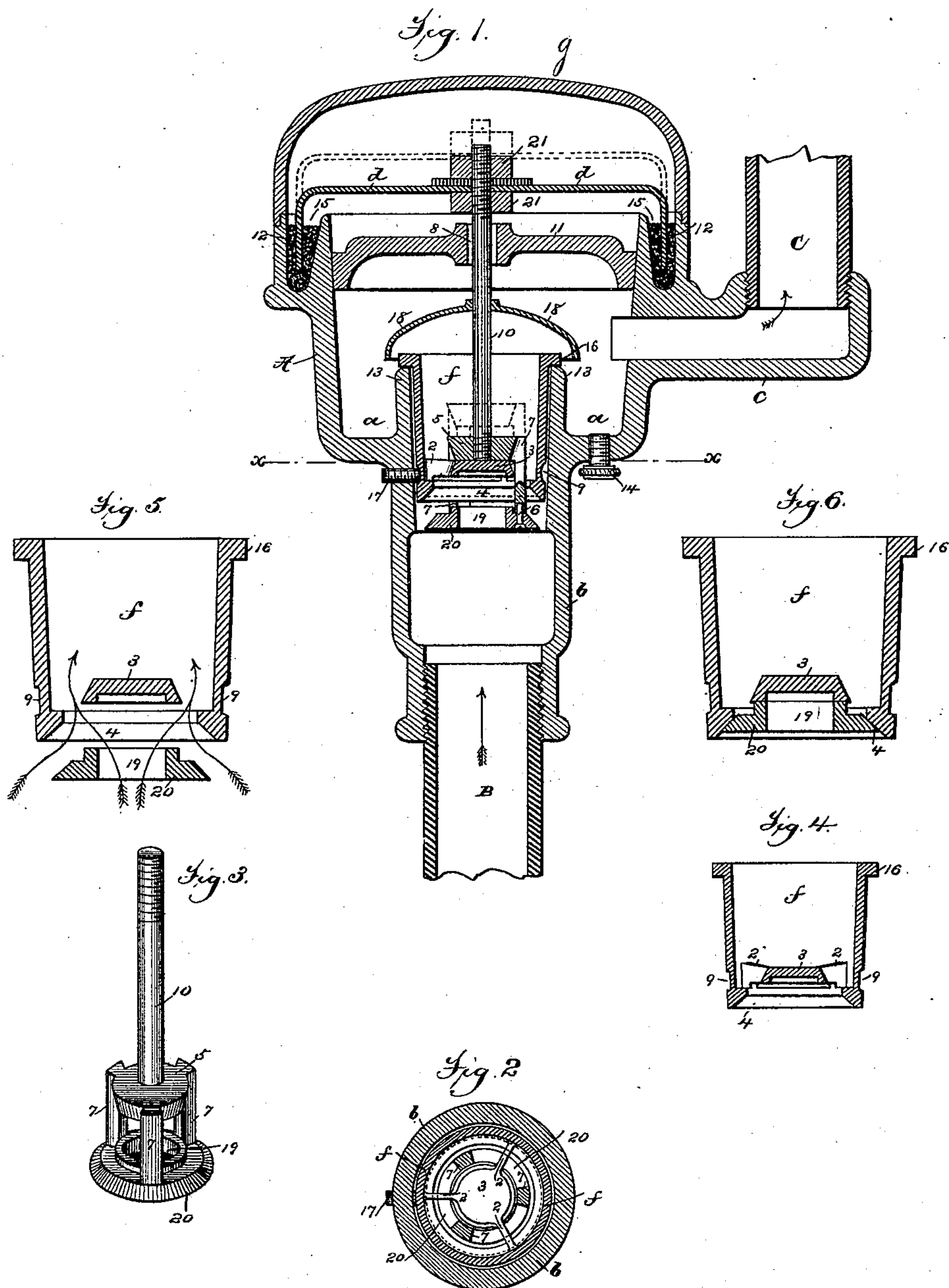


(No Model.)

S. A. BEATTY.  
GAS PRESSURE REGULATOR.

No. 354,674.

Patented Dec. 21, 1886.



Attest:  
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Atty:



# UNITED STATES PATENT OFFICE.

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## GAS-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 354,674, dated December 21, 1886.

Application filed June 9, 1886. Serial No. 204,579. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL A. BEATTY, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Gas-Pressure Regulators, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to that general class of gas-pressure regulators which are applied to the service-pipes of houses for the purpose of so regulating the flow of gas as to deliver it to the burners at a uniform pressure, thereby avoiding the waste of gas when the pressure in the main is too great.

15 The invention relates more particularly to a gas-pressure regulator having the general features of construction of that shown and described in United States Letters Patent No. 333,587, heretofore granted to me.

20 The invention consists in certain details in the construction and organization of the apparatus, by which it is rendered more efficient and more easily maintained in proper working condition.

25 As an understanding of the invention can be best given by a description of the complete apparatus embodying the same, all preliminary description will be omitted and a description of the complete apparatus given, reference being had to the accompanying drawings, in which—

30 Figure 1 is a sectional elevation of a gas-pressure regulator similar to that shown in the Letters Patent referred to, but having its pressure-regulating valve and seat constructed according to the present invention. Fig. 2 is a cross-section taken upon the line  $x x$  of Fig. 1. Fig. 3 is a perspective view of the pressure-regulating valve removed from its seat. Fig. 4 is a vertical section of the valve-seat with the valve removed; and Figs. 5 and 6 are enlarged diagrammatic views of the valve and seat, showing the valve in its opened and also in its closed position.

45 Referring to said figures, it is to be understood that the apparatus therein illustrated is, as before stated, of substantially the same general construction as that shown in the Letters Patent before referred to. It consists of an

irregular-shaped casing, A, which is of suitable size and form to contain the various parts of the apparatus. This casing will preferably be of substantially the form shown; but its form is not material, and may be varied within wide limits without departing from the invention. The casing will preferably be made of iron; but it may be made of any other material which will not be injuriously affected by the gas or by the mercury used for the seal, which will be hereinafter explained. This casing is provided at its bottom with a downwardly-extending neck,  $b$ , to which is connected the induction-pipe B, through which the gas enters the regulator, and at its side with an offset,  $c$ , to which is connected the discharge-pipe C, through which the gas is conducted from the regulator to the burner or burners.

55 The opening from the neck  $b$  into the casing A is surrounded by an upwardly-projecting rim or flange, 13, which forms an annular chamber,  $a$ , in the bottom of the casing A, in which any liquid resulting from condensation will accumulate. The bottom of the chamber  $a$  is provided with a suitable opening closed by a screw-plug, 14, through which any liquid which may accumulate in the chamber can be withdrawn.

60 The casing A is so formed as to provide near its top an annular reservoir, 15, which is filled or partly filled with mercury, glycerine, or other sealing-fluid 12, in which is immersed the downwardly-projecting rim or flange of an inverted cup or cup-shaped diaphragm,  $d$ . Attached to the center of the cup  $d$  is a vertical rod, 10, which carries at its lower end the pressure-regulating valve.

65 Located just below the cup  $d$  is a light removable plate, 11, having a central opening, 8, through which the rod 10 passes, and which serves as a guide for the rod and prevents the cup  $d$  from moving laterally, so as to be brought into contact with the walls of the casing A. The opening 8 is of sufficient size to allow the gas to pass upward around the rod 10 into the space between the cup  $d$  and plate 11; but the plate 11 serves to prevent the full pressure of the gas from being too suddenly exerted upon the cup.

70 The casing A is provided at its top with a removable cover,  $g$ , which may be secured to



the casing in any suitable manner. It will preferably, however, be hinged to the casing, and will be provided with some suitable fastening and locking device, (not shown,) by which it can be secured, so as to prevent access being had to the interior of the regulator by any one but the proper person.

Fitted into the upper part of the neck *b* is a removable sleeve, *f*, (preferably slightly tapering, as shown,) the lower end of which forms the seat for the regulating-valve carried by the rod 10. The upper end of the sleeve *f* may be provided with a narrow flange, 16, which rests upon the top of the rim 13. The sleeve *f* is held in place by a set-screw, 17, which passes through the wall of the neck *b*, and the end of which abuts against the sleeve or enters a circumferential groove, 9, formed in the sleeve near its lower end.

The rod 10 is provided above the sleeve *f* with a hood, 18, which surrounds the rod and projects over the upper end of the sleeve *f*, so as to prevent any of the liquid resulting from condensation or any of the sealing-fluid which may be accidentally spilled from the reservoir 15 from passing downward through the sleeve.

The construction thus far described is, as will be observed, substantially the same as that shown in the Letters Patent before referred to.

In the regulator shown in the patent, however, the valve carried by the lower end of the rod 10 consisted of a simple cone, which seated itself upon a plain annular seat formed by the lower end of the sleeve *f*. The valve and seat thus constructed did not prove entirely satisfactory in practice, because the pressure of the gas in the induction-pipe which was exerted directly against the lower side of the valve constantly tended to close the valve, and this pressure, particularly if exerted suddenly, as when a large number of the burners which were being supplied from the regulator were shut off at once, was often sufficient to move the valve, and thus cause an irregular flow of gas to the discharge-pipe.

It is the especial object of the present invention to as far as possible cure this defective operation in the regulator, and to that end the valve and its seat are constructed in the manner which will now be described.

The regulating-valve consists of a disk, 20, which is beveled on its edge, as best shown in Fig. 3, and has its central portion removed, so as to form a valve which is of annular form. The disk 20, forming the valve, is removably secured by means of screws 6, (see Fig. 1,) to the ends of two or more (preferably three) arms, 7, which extend downward from a head, 5, secured to the lower end of the rod 10.

The seat for the valve is formed on the lower end of the sleeve *f*, and consists of the lower end of the sleeve, which is beveled inwardly to form an annular seat, 4, for the edge of the disk 20, and a central disk, 3, which closes the central opening, 19, of the

disk 20. When the parts are assembled, the disk 3 is located between the arms 7, as shown in Fig. 2, and is supported by radial arms 2, which pass between the arms 7 and are secured to the side of the sleeve *f*.

The operation of the regulator thus constructed is as follows: The weight of the cup *d*, together with the rod 10 and the valve, is so adjusted that when the pressure in the main is no greater than is desired at the burners the pressure exerted against the under side of the cup *d* will not be sufficient to raise the cup and valve, and the valve will consequently remain open, as shown in Figs. 1 and 5, thus allowing the full supply of gas to flow freely upward around the valve and through its central opening into the casing A, and thence outward through the discharge-pipe C to the burners. When, however, for any reason, the pressure in the gas-main becomes greater than is desirable—as, for example, by the shutting off of a part of the burners—so that the gas will be fed to the burners faster than it can be consumed, and will thus be wasted, the pressure exerted upon the under side of the cup *d* will be sufficient to raise the cup, and with it the rod 10 and the valve, so as to partly close the valve, and thus decrease the flow of the gas past the valve and reduce the pressure at the burners.

It will be observed that by providing the pressure-regulating valve with the central opening, 19, the lower surface of the valve, which is exposed to the pressure of the gas in the induction-pipe, is very much reduced, so that the upward pressure of the gas exerted upon the valve has comparatively little tendency to close the valve. By this means the movement of the valve is controlled almost entirely by the pressure of the gas upon the cup *d*, and thus a uniform or nearly uniform pressure is maintained in the discharge-pipe C.

The valve-rod 10 is provided upon each side of the cup *d* with adjusting-nuts, as 21, by which the rod can be adjusted so as to allow the valve to open to a greater or less extent, as may be desirable. By removing the cover *g* and the set-screw 17, all of the parts upon the interior of the casing A can, as will be seen, be readily removed for inspection and repair, and can be again replaced in the casing when desired, and this can be done without breaking the connections between the casing A and the pipes or disturbing the sealing-fluid.

What I claim is—

1. In a gas-pressure regulator, the combination, with the cup *d*, having its edge immersed in a sealing-fluid and arranged to be operated by the pressure of the gas, of the rod 10, connected to the cup, and provided at its lower end with the pressure-regulating valve 20, having the central opening, 19, the removable sleeve *f*, forming a seat for the edge of the valve, and having the disk 3, for closing the central opening of the valve, and the remov-



able cover *g*, the whole being so arranged that the cup, valve, and seat can be removed without disturbing the sealing-fluid, substantially as described.

- 5 2. In a gas-pressure regulator, the combination, with the cup *d*, having its edge immersed in a reservoir of sealing-fluid and arranged to be operated by the pressure of the gas, of the rod 10, connected to the cup, and  
10 provided at its lower end with the pressure-regulator valve 20, having the central opening, 19, the removable sleeve *f*, forming a seat for the edge of the valve, and having the disk 3, for closing the central opening, 19, of the

valve, the hood 18, the removable guide-plate 15 11, and the removable cover *g*, the whole being so arranged that the cup, valve, and seat can be removed from the regulator without disturbing the sealing-fluid, substantially as described. 20

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

SAMUEL A. BEATTY.

Witnesses:

J. A. HOVEY,

JAS. J. KENNEDY.