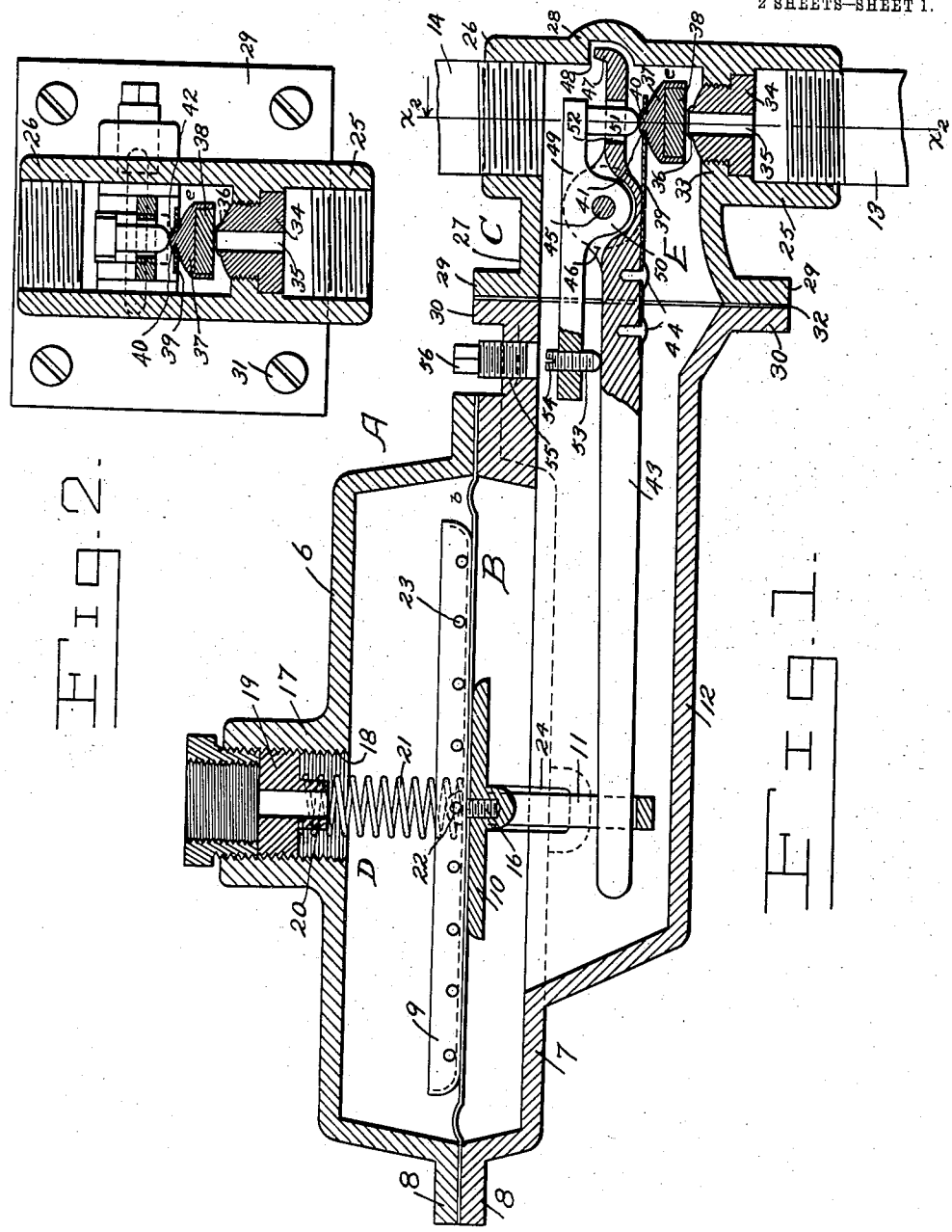


1,058,102.

Patented Apr. 8, 1913.
 2 SHEETS—SHEET 1.



Witnesses.
 H. Gearing.
 Alfred H. Daehler

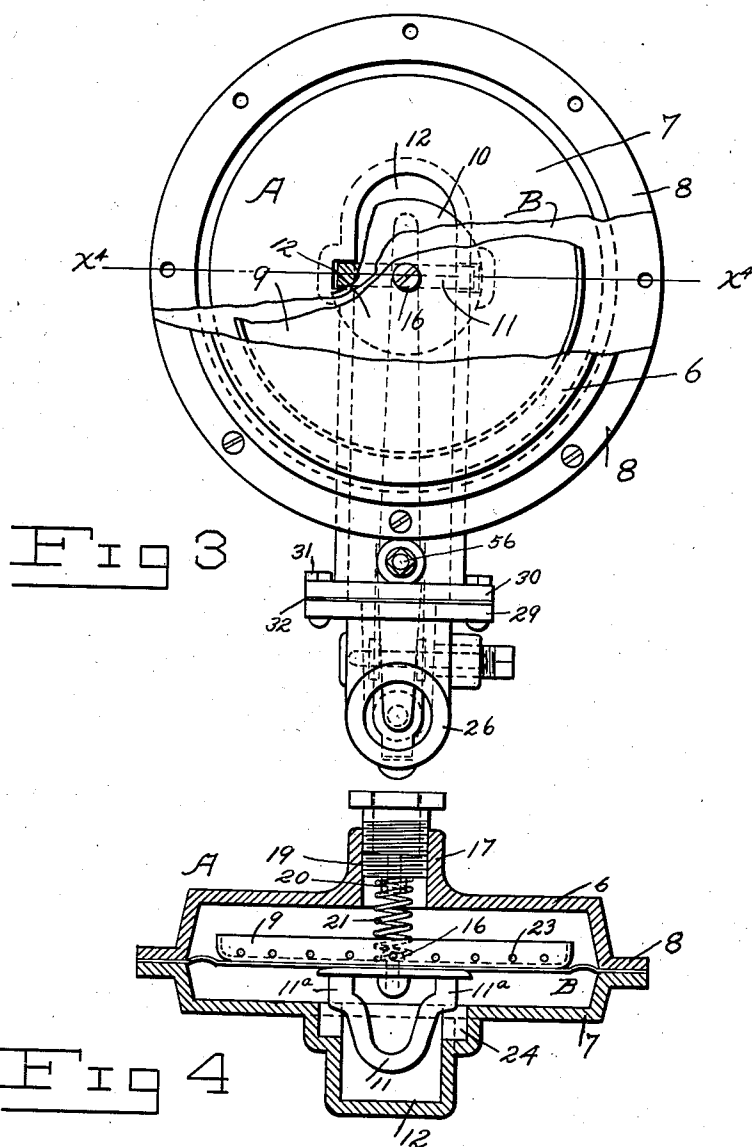
Inventor,
 James R. Ricketts.
 By Raymond Westlake, Jr.
 his Attorney.

J. R. RICKETTS.
GAS REGULATOR.
APPLICATION FILED AUG. 14, 1912.

1,058,102.

Patented Apr. 8, 1913.

2 SHEETS—SHEET 2.



Witnesses.
H. Gearing.
Alfred H. Daehler

Inventor,
James R. Ricketts,
By *Raymond Westlake*,
his Attorney.

UNITED STATES PATENT OFFICE.

JAMES R. RICKETTS, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO PERFECTION GAS REGULATOR COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

GAS-REGULATOR.

1,058,102.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed August 14, 1912. Serial No. 715,050.

To all whom it may concern:

Be it known that I, JAMES R. RICKETTS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Gas-Regulators, of which the following is a specification.

This invention relates to gas regulators whereby the pressure or head of gas provided at the point of consumption may be controlled, automatically, and be maintained even and constant as predetermined.

The present invention constitutes in certain of its aspects a further development of a departure from or modification or improvement with relation to the invention constituting the subject-matter of a prior application for United States Letters Patent for gas regulators filed by me May 28, 1912, Serial No. 700,228.

The present invention has for its object to provide improvements in gas regulators which will be superior in point of relative simplicity and inexpensiveness in construction and organization, combined with positiveness and reliability and efficiency in service and sensitive responsiveness to variations in working conditions.

Further particular objects of the invention are the provision of an improved gas regulator which will operate for long periods of time without requiring attention or repair, which will not stiffen up or lose its responsiveness to variations in working conditions, and the installation and connection or disconnection of which from the main and service pipes will be attended with convenience and capable of speedy performance.

With the above and other objects in view, the invention consists in the novel provision, formation, construction, combination, association and relative arrangement of parts, members and features, all as hereinafter described, shown in the drawings, and finally pointed out in claims.

In the drawings:—Figure 1 is a transverse vertical sectional view, parts being in elevation, of a gas regulator constructed and organized in accordance with the invention; Fig. 2 is a vertical transverse sectional view, taken upon the lines x^2-x^2 , Fig. 1, and looking in the direction of the appended arrow;

Fig. 3 is a top plan view of the improved gas regulator, parts being in section and parts being broken away for clearness of illustration, the showing being upon a diminished scale; and, Fig. 4 is a vertical transverse sectional view, partly in elevation, taken upon the line X^4-X^4 , Fig. 3.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring with particularity to the drawings, the improved regulator comprises a casing A within which is held a transverse diaphragm B, the casing A preferably comprising a circular top member 6 and a circular bottom member 7 detachably joined by co-engaging edge flanges 8, the diaphragm B being gripped and held at its edges between such flanges. A circular cupped weight 9 rests upon the upper surface of the diaphragm and is clamped to the diaphragm by a disk or plate 10 beneath the diaphragm and from which depends a bracket 11 ranging downwardly within a radial extension 12 of the bottom casing member 7, at the outer end of which extension is a detachable fitting C with which are connected a gas main pipe 13 and a service pipe 14.

The weight 9 and plate 10 are jointly clamped to the diaphragm B by a machine screw 16; at the center of said weight and plate centrally of the casing A. The top member 6 of the casing A is provided with an upwardly projecting centrally disposed nipple 17 interiorly threaded as at 18, and into which is threaded a perforated plug 19, through which is centrally passed a tube 20 projecting beneath the plug and serving as a centering for a compression coil spring 21, one end of which is inserted in the tube 20 and the other end of which passes through an eye 22 in the head of the machine screw 16, such spring 21 and its connections constituting compression means D acting upon the diaphragm B. The cupped weight 9 is provided with a plurality of ports 23 in its edge walls opening inwardly just above the flat body of the weight, such edge walls being upwardly curved from the flat body; and oil may be introduced to the upper surface of the weight 9 through the tube 20 and will flow across the upper surface of the weight and then through the ports 23 and out onto the

diaphragm B at its marginal portions b, preserving the flexibility thereof and the sensitive responsiveness of the diaphragm to variations in gaseous pressure beneath the diaphragm. The tube 20 also serves as a vent to allow air to enter and escape from the chamber within the casing A above the diaphragm B, in compensation for fall and rise of the diaphragm.

10 The bracket 11 consists of a downwardly projecting open loop or stirrup having straight top side portions 11^a received in channels or ways 24 in the side walls of the casing extension 12, and serving to confine the bracket to a path of vertical play. Furthermore, when the weight 9 is connected with the disk 10 by the screw 16, the ways 24 keep the bracket 11 from turning, permitting the screw to be effectively threaded in connection with the disk 10 which carries the bracket 11.

The gas pipes 13 and 14 are threaded respectively in alined nipples 25 and 26 forming part of the fitting C and are readily attached to and disconnected from said nipples. Gas feed control means E regulate the flow of gas from the nipple 25 to the casing A beneath the diaphragm B, through the casing extension 12; and the gas subsequently flows from such chamber beneath the diaphragm B to the nipple 26 and the service pipe 14 under automatically regulated pressure. The gas feed control means E are operatively connected with the diaphragm B through the bracket 11, which bracket rises and falls with the diaphragm in accordance with variations of gaseous pressure beneath the diaphragm. The gas feed control means are entirely mounted in connection with the fitting C, which comprises a tubular body 27 with which the nipples 25 and 26 communicate, said body being closed at the outer end 28, and at the opposite end being open and provided with a rim flange 29 which is detachably connected with a matched flange 30 at the outer end of the radial casing extension 12, by nut and bolt devices 31 or the like. A suitable gasket 32 is interposed between the flanges 29 and 30. The nipple 26 unobstructedly communicates with the interior of the tubular fitting body 27; but at the inner end of the nipple 25 is provided an annular flange providing a port within which is threaded a plug 34, comprised within the gas feed control means E, the further organization of which is as follows:—The plug 34 is provided with a gas port 35 and is crowned, as at 36, to form a valve seat which, with a valve head 37, are comprised within valve means e. The valve head 37 is provided with a compressible facing 38 which is set into the valve head, flanged to receive it, and is presented to the upper orifice of the gas port 35. The valve head

37 is yieldingly suspended from a leaf spring 39 by a neck 40 which is of irregular form and passes through an opening 41 of similar though larger irregular form, in the leaf spring 39, adjacent to the outer end thereof, the material of the neck 40 being upset to form a head 42 above the leaf spring 39 to hold the valve head to the leaf spring; and the conformations and proportions of the neck 40 and opening 41 are such as to permit the valve head to oscillate or to have a limited degree of play pendant from the leaf spring 39, but to prevent turning of the neck within the opening. This free play permits the valve head or the facing 38 thereof to seat truly and accurately upon the crown 36 of the plug 34 and to close the gas port 35 in such plug. The inner end of the leaf spring 39 is secured to the lower end of an oscillating arm 43, as at 44, such arm being pivotally supported adjacent to the end at which the leaf spring 39 is mounted thereon, upon a pin or shaft 45 passed transversely through the walls of the fitting body 27 and through spaced cheeks 46 upon the arm 43. The forward end of the arm 43 is received loosely within the bracket 11; and the rearward end, beyond the shaft 45, is formed into a stop finger 47 which is normally disposed slightly beneath a stop shoulder 48 formed in the outer end of the fitting body 27. Pivotaly mounted upon the shaft 45 between the cheeks 46, and intermediate of its ends, is a regulating arm 49 provided with a depending head 50 through which the shaft 45 passes, the upper surface of the arm 43 being recessed to receive such head. The rearward end of the regulating arm 49 is provided with a depending finger 51 passing freely through an opening 52 in the arm 43 and having a rounded terminal portion which has rolling contact with the rounded upper headed end 42 of the neck 40. The forward end of the regulating arm 49 carries a threaded pin 53 the lower end of which rests upon the arm 43, and the upper end of which is preferably slotted transversely as at 54 to receive a screw driver or similar implement passed through a registering hole 55 in the top member 6 of the casing A and normally closed by a threaded plug 56.

The operation, method of use and advantages of the improved gas regulator constituting the invention will be readily understood from the foregoing description, taken in connection with the accompanying drawings and the following statement:—The spring 21 is put under the proper compression, by manipulating the screw plug 19, to cause the diaphragm to hold the bracket 11 at the proper elevation, and consequently to hold the arm 43 at such elevation that the valve means e will permit gas to enter the

space beneath the diaphragm, through the port 35, and to flow to the nipple 26, when the proper pressure exists in the service pipe. If a higher pressure is required, the spring 21 is put under greater compression; and if a lower pressure is desired such spring is put under a lesser compression, the pressure of gas beneath the diaphragm acting at all times to elevate the diaphragm and the weight 9 thereon against the compression of the spring 21, all as will be readily understood by those skilled in the art concerned or familiar with such apparatus. During the existence of such proper predetermined pressure, the bracket 11 holds the arm 43 in such position that the valve head 37 is spaced slightly from the orifice of the gas port 35 through the plug 34 at the upper end of the nipple 25, thus permitting gas to traverse the port 35 and enter the chamber beneath the diaphragm. If for any reason the pressure in the gas main so increases that an undue pressure is set up beneath the diaphragm, and an undue service pressure is produced, the diaphragm rises, swings the arm 43 upwardly and brings the valve head 37 down upon the orifice of the port 35, effectually closing such passage, the compressible facing 38 truly seating upon the crown 36 constituting the valve seat, to which end the valve head 37 may slightly oscillate in its connection with the leaf spring 39. As soon as the pressure falls slightly beneath the diaphragm, the arm 43 at its longer forward end swings downwardly by gravity, the valve head 37 rises slightly from the crown or valve seat 36, and further gas is admitted beneath the diaphragm and to the service pipe 14. Usually only slight fluctuations occur in the pressure within the mains, and such slight variations will cause only slight elevation and depression of the diaphragm, resultantly spacing the valve head 37 less far or farther from the orifice of the port 35, so regulating the flow of gas that as the pressure in the main diminishes more gas can enter the chamber beneath the diaphragm, and as the pressure increases less gas enters the space beneath the diaphragm. The pressure in the chamber beneath the diaphragm is thus kept constant, in accordance with the standards set by the degree of compression of the spring 21 which opposes rising and assists depression of the diaphragm and of the weight 9 thereon. The stop finger 47 prevents the arm 43 from swinging downwardly too far at its forward end, thus assisting in assembling the fitting with the gas feed control means E in connection with the casing A, so that the arm 43 readily passes through the bracket 11. The fitting C, with the gas feed control means including the arm 43, are readily detached from the casing A and attached thereto; and when the main pipe 13 and the

service pipe 14 are connected with the fitting C, the casing A and the contents thereof are readily detached from the fitting C with the gas feed control means and the arm 43 mounted upon or connected with such fitting. The fitting remains connected with the pipes. This is of great convenience and is a great time-saving factor in repair and adjustment of gas regulator.

The normal spacing of the valve head 37 from the crown or seat 36 is determined by the adjustment of the regulating arm 49, pivotally, upon the pin or shaft 45 upon which it oscillates. To bring the valve head normally closer to its seat, and permit less gas for a time unit to pass through the port 35, the threaded pin 53 is screwed down farther through the arm 49, at the end remote from the finger 51, forcing down the finger, normally in contact with the head 42 of the neck of the valve head, and depressing the valve head against the tension of the leaf spring 39 upon which it is mounted. To produce opposite results, when the valve head is thus depressed under flexion of the leaf spring 39, the threaded pin 53 is turned to cause its elevation, the leaf spring 39 straightening out and carrying upwardly at its free end the head 37. The amount of gas to normally enter the regulator, at a given pressure, may thus be predetermined, and such predetermination may be taken into calculation jointly with the predetermination of the compression of the spring 21 so that the flow of gas passing through the regulator, at a given pressure, may be predetermined in accordance with the requirements of service supplied by the service pipe 14. The threaded plug 56 normally completely stops the hole 55 in the casing above the threaded pin 53, preventing leakage; but, when withdrawn, a suitable implement is readily introduced to the threaded pin.

The lubricating oil introduced to the upper surface of the cupped weight 9 flows in all directions thereupon to the openings 23 through which it spreads to the leather or other diaphragm B, at the marginal portions *b* thereof, keeping the same soft and pliable and delicately responsive to variations of gaseous pressure beneath the diaphragm.

The entire apparatus is relatively simple and inexpensive in organization, when its features of advantage and superiority are considered; and in use it reliably, and for long periods of time, keeps constant the pressure of gas taken from the main or branch main and conducted to the service pipe from which it is taken for consumption.

I do not desire to be understood as limiting myself to the particular construction, formation, organization, combination, relative arrangement and association of parts,

members and features shown and described; but reserve the right to vary the same, in adapting the improvement to varying conditions of use, without departing from the spirit of the invention and the terms of the following claims.

Having thus described my invention, I claim and desire to secure by Letters Patent:—

1. A gas regulator, comprising a casing provided with a diaphragm spanning the same, means for introducing gas to and withdrawing gas from a chamber confined in part by the diaphragm, and a weight upon the diaphragm and provided with a pierced marginal portion.

2. A gas regulator, comprising a casing provided with a diaphragm spanning the same, means for introducing gas to and withdrawing gas from a chamber confined in part by the diaphragm, and a weight upon the diaphragm and provided with a pierced upstanding marginal portion.

3. In a gas regulator a casing, a diaphragm spanning the casing, and a cupped weight upon the diaphragm and provided with a perforation whereby liquid introduced thereto may pass therefrom to the diaphragm.

4. A gas regulator, comprising a casing, a diaphragm spanning the casing, there being a gas port through which gas has access to the casing to a chamber confined in part by the diaphragm, an oscillating arm one end of which co-acts with the diaphragm, a leaf spring connected with the oscillating arm, a valve head carried upon a free end of the leaf spring adjacent to the other end of the oscillating arm and normally spaced from and arranged to seat to close said gas port, a regulating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the orifice of said gas port may be predetermined.

5. A gas regulator, comprising a casing, a diaphragm spanning the casing, there being a gas port through which gas has access to the casing to a chamber confined in part by the diaphragm, an oscillating arm one end of which co-acts with the diaphragm, a leaf spring connected with the oscillating arm, a valve head carried upon a free end of the leaf spring adjacent to the other end of the oscillating arm and normally spaced from and arranged to seat to close said gas port, a regulating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the orifice of said gas port may be predetermined, said regulating arm having a de-

pending finger passing through an opening in the oscillating arm and which coengages with said valve head.

6. A gas regulator, comprising a casing, a diaphragm spanning the casing, there being a gas port through which gas has access to the casing to a chamber confined in part by the diaphragm, an oscillating arm one end of which co-acts with the diaphragm, a leaf spring connected with the oscillating arm, a valve head carried upon a free end of the leaf spring adjacent to the other end of the oscillating arm and normally spaced from and arranged to seat to close said gas port, a regulating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the orifice of said gas port may be predetermined, said regulating arm having a depending finger passing through an opening in the oscillating arm and which co-engages with said valve head; said oscillating arm and said regulating arm having a common center of oscillation.

7. A gas regulator, comprising a casing, a diaphragm spanning the casing, there being a gas port through which gas has access to the casing to a chamber confined in part by the diaphragm, an oscillating arm one end of which co-acts with the diaphragm, a leaf spring connected with the oscillating arm, a valve head carried upon a free end of the leaf spring adjacent to the other end of the oscillating arm and normally spaced from and arranged to seat to close said gas port, a regulating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the orifice of said gas port may be predetermined, said oscillating arm and said regulating arm having a common center of oscillation.

8. A gas regulator, comprising a casing, a diaphragm spanning the casing, there being a gas port through which gas has access to the casing to a chamber confined in part by the diaphragm, an oscillating arm one end of which co-acts with the diaphragm, a leaf spring connected with the oscillating arm, a valve head carried upon a free end of the leaf spring adjacent to the other end of the oscillating arm and normally spaced from and arranged to seat to close said gas port, a regulating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the orifice of said gas port may be predetermined, said regulating arm having a depending finger passing through an opening

in the oscillating arm and which co-engages with said valve head, said valve head and said finger having co-engaging rounded surfaces producing a rolling contact.

5 9. A gas regulator, comprising a casing, a diaphragm spanning the casing, there being a gas port through which gas has access to the casing to a chamber confined in part by the diaphragm, an oscillating arm one 10 end of which co-acts with the diaphragm, a leaf spring connected with the oscillating arm, a valve head carried upon a free end of the leaf spring adjacent to the other end of the oscillating arm and normally spaced from and arranged to seat to close said gas 15 port, a regulating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the orifice of said gas port may be predetermined, said regulating arm having a de- 20 pending finger passing through an opening in the oscillating arm and which co-engages with said valve head, said valve head and said finger having co-engaging rounded surfaces producing a rolling contact, and said valve head being loosely connected with said leaf spring.

30 10. A gas regulator, comprising a casing, a diaphragm spanning the casing, there being a gas port through which gas has access to the casing to a chamber confined in part by the diaphragm, an oscillating arm one 35 end of which co-acts with the diaphragm, a leaf spring connected with the oscillating arm, a valve head carried upon a free end of the leaf spring adjacent to the other end of the oscillating arm and normally spaced from and arranged to seat to close said gas 40 port, a regulating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the orifice of said gas port may be predetermined, said casing being provided with an

opening directly above said adjusting means and provided with a detachable closure.

11. A gas regulator, comprising a casing, a 50 diaphragm spanning the casing, there being a gas port through which gas has access to the casing to a chamber confined in part by the diaphragm, an oscillating arm one end of which co-acts with the diaphragm, a leaf 55 spring connected with the oscillating arm, a valve head carried upon a free end of the leaf spring adjacent to the other end of the oscillating arm and normally spaced from and arranged to seat to close said gas port, a 60 regulating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the 65 orifice of said gas port may be predetermined, said casing being provided with a detachable fitting in connection with which said oscillating arm and said valve head and said regulating arm are mounted and with 70 which the same are jointly detachable from said casing.

12. A gas regulator comprising a casing, a diaphragm spanning the casing, there being a gas port through which gas has access 75 to the casing to a chamber confined in part by the diaphragm, an oscillating arm one end of which co-acts with the diaphragm, a valve head normally spaced from and arranged to seat to close said gas port, a regu- 80 lating arm mounted upon said oscillating arm and co-acting with said valve head at one end, and adjusting means at the other end of said regulating arm whereby the normal spacing of said valve head from the 85 orifice of said gas port may be predetermined.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES R. RICKETTS.

Witnesses:

ALFRED H. DAEHLER,
CHARLES D. WARDEN.