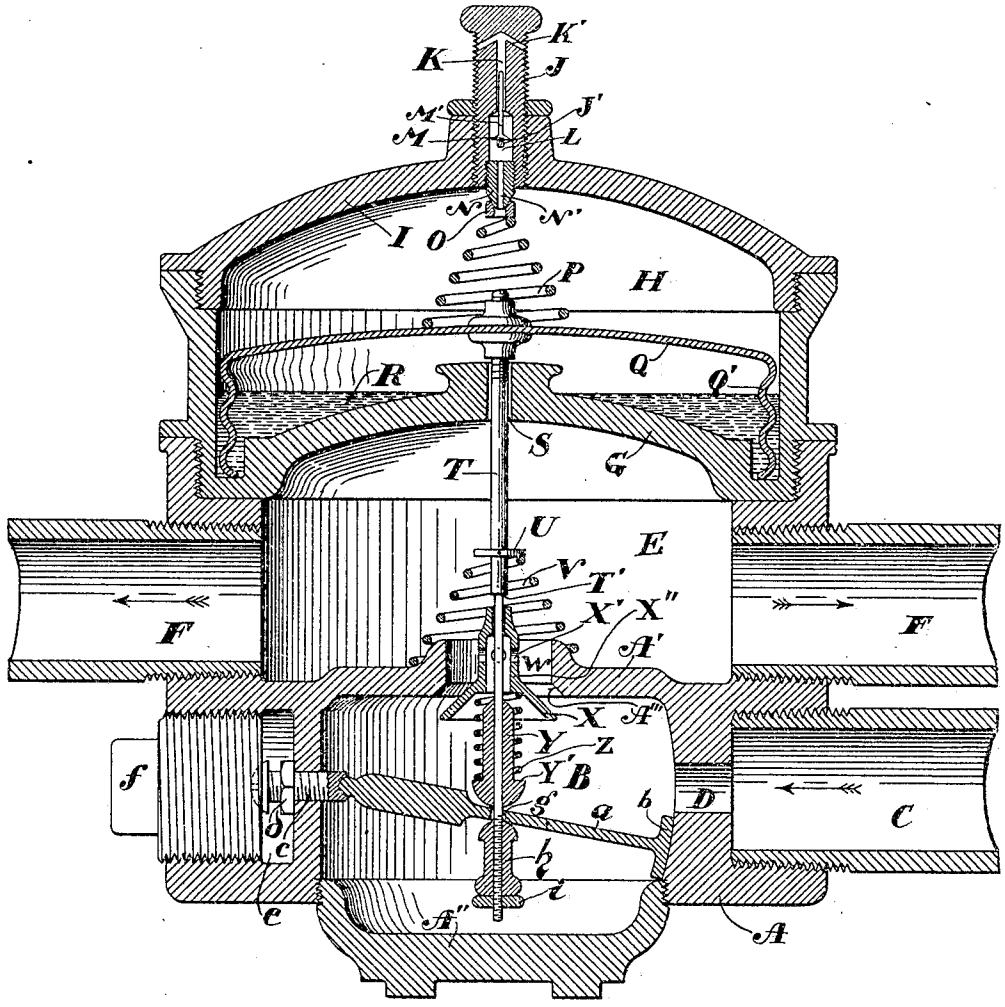
No. 788,079. PATENTED APR. 25, 1905.

F. WHEELER.

GAS REGULATOR.

APPLICATION FILED MAY 20, 1904.



WITNESSES

Chas. L. Hyde.

Jno. C. Butler.

INVENTOR

Ferdinand Wheeler.

BY Howard V. Harpham

ATTORNEYS.

No. 788,079. Patented April 25, 1905.

UNITED STATES PATENT OFFICE.

FERDINAND WHEELER, OF LOS ANGELES, CALIFORNIA.

GAS-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 788,079, dated April 25, 1905.

Application filed May 20, 1904. Serial No. 208,980.

To all whom it may concern:

Be it known that I, FERDINAND WHEELER, 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.

My invention relates to regulators in which an inverted-cup-shaped float is used with a sealing fluid, preferably of mercury; and the object thereof is to provide an improved device to automatically regulate the flow of gas to the burner. I accomplish this object by the regulator described herein and illustrated in the accompanying drawing, which is a central vertical longitudinal section of my improved gas-regulator with certain of the parts shown in elevation.

My improved regulator is provided with three chambers—an inlet-chamber and an outlet or distributing chamber and a sealing or pressure-regulating chamber.

In the drawings, A is the casing of the inlet-chamber B and distributing-chamber E of my gas-regulator, these chambers being divided by the partition-wall A′. The inlet-chamber is connected by the inlet-pipe C, through inlet-port D, with a suitable gas-supply, (not shown,) and the outlet or distributing chamber is in communication, by means of pipes F, with the various service-pipes which carry the gas to the gas-jets. The top of the distributing-chamber is closed by the casing G of the annular pressure-regulating and sealing chamber H, which is preferably screwed thereinto and forms the top of the distributing-chamber. The top of the sealing-chamber is closed by a cap I, preferably screwed into the top of the casing thereof. Through a threaded hole in the top of the cap is screwed the tension-regulating and vent plug J, having an air-channel K therein, which at its top opens through the side of the plug in one or more branches K′, which preferably incline downwardly to avoid as far as possible the lodgment of dust therein. The lower end of the air-channel opens into the air-valve chamber L, in which is mounted the air-valve M, having its stem M′ projecting into the air-channel. Closing the lower end of this air-chamber is the plug N, having a channel N′ extending therethrough. A pin or lug J′ in the vent-plug holds the valve from closing the channel N′. The lower end of this plug forms a bearing for an annular ring O, to which is secured the top of the volute spring P, whose lower end rests on the inverted-cup float Q. The sides Q′ of this float are corrugated horizontally and project into the sealing liquid R, preferably of mercury, in the sealing-chamber. By means of the vent-plug and spring the desired resistance for the float is secured. The bottom of the casing of the sealing-chamber projects upwardly in the center and is provided with an aperture S therein, through which valve-stem T passes. This valve-stem is secured to the float and in the distributing-chamber is provided with a collar U, which provides a bearing for the volute spring V, which surrounds the stem and whose lower end rests upon the partition-wall A′, which is provided with port W, through which the valve-stem, reduced in size, passes.

Mounted on the lower reduced portion of the valve-stem T is the duplex high and low pressure valve X Y. The upper bell-shaped valve-stopper X has an upwardly-projecting extension X′ of a diameter less than the port W, through which it projects, and is provided with a plurality of outlet-ports X′. The lower portion of this low-pressure valve-stopper is bell-shaped, the outwardly-flaring mouth of which contacts in its upward movement with the seat A′, closing the opening in the port W, surrounding the extension. The passage through the bell-shaped valve X is closed by the valve-stopper Y, rigidly secured on valve-stem T. The lower portion of the valve-stopper Y is provided with an annular shoulder Y′. Resting upon this shoulder and encircling the valve-stopper Y is the spiral spring Z, the upper end of which bears against the bell-shaped valve X and normally holds the same from contact with the top of the valve-stopper Y, leaving a passage therebetween. Upon the increase of pressure in the gas-mains

connected with my regulator the valve X will continue to rise until the flaring edges thereof contact with seat A''', closing the same and limiting the amount of gas which can pass through the port W from the inlet to the outlet-ports X' in the extension of the valve-stopper X. Now when the gas-pressure gets very high the float will raise the valve-stem high enough to carry valve-stopper Y upwardly and close the opening through the low-pressure valve and shut off all communication between the inlet and outlet chambers. The lower end of the high-pressure valve is rounded and rests upon the stem *a* of the swinging gate-valve *b*, which is adapted to be swung backward and forward across port D and to open and close the same, and thereby regulate the admission of gas therethrough to the inlet-chamber. The pivoted end of the stem of the swinging valve is mounted in a plug *c*, screwed through the casing A and adapted to be locked in its proper position by a lock-nut *d*. To prevent leakage, this plug is inserted through the casing in the bottom of a threaded hole *e*, which is closed by a plug *f*. The valve-stem T passes through a hole *g* in the stem of the swinging valve. The swinging-valve stem rests on a nut *h* on the valve-stem T, whose upper end is rounded. This nut is locked on the stem by a lock-nut *i*. A screw-plug A'' in the bottom of the casing of the inlet-chamber provides access to the chambers to assemble the parts. I have described my device as a "gas-regulator;" but it is equally well adapted to regulate the flow of water or other liquid.

By this construction it will be seen that when the pressure is low there is an opening between the inlet and outlet chambers sufficiently large to permit all the gas from the inlet-pipe to pass unobstructed through the regulator and that as the pressure rises by turning off the burners this opening is gradually closed. As the pressure in the outlet-chamber is reduced by the increased use of the gas the tension of spring P will depress float Q, which will cause stem T to first open the high-pressure valve. Shoulder T' on the valve-stem will then contact with extension X'' of the low-pressure valve X and carry it off its seat, thereby opening passage W, thereby maintaining at all times a uniform pressure on the gas as long as the pressure in the mains exceeds that at which the regulator is set. The horizontally-corrugated sides of the float offer a much greater resistance to a sudden pressure than a float with smooth sides, and thereby prevents a sudden jump or vibration of the valves which regulate the opening between the inlet and outlet chambers, especially when the sealing fluid is mercury, and thus keeps the gas-flame steady. By providing for the closure of the opening between the inlet and outlet chambers by two valves of different areas and different spring-pressure the opening and closing thereof keeps the flame comparatively steady.

By providing a channel through the pressure-regulating plug which permits the air to flow into and out of the sealing-chamber and providing a valve to control such channel greater freedom of movement of the float is provided for than if the air could not flow into and out of the same. In case the float should break or the gas blow through the seal the valve M would be seated and close such channel and prevent any escape of gas whatever. It will also be seen that by having several service-pipes lead from the outlet-chamber one regulator may serve for several different services by having all the gas therefor pass into the inlet-chamber.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A gas-regulator having an inlet-chamber, an outlet-chamber and a float-chamber; a float in the float-chamber; a valve-operating stem carried by said float and passing therefrom down through the outlet-chamber into the inlet-chamber; a duplex inlet-closing valve carried by said stem adapted to open and close the opening between said inlet and outlet chambers and the opening leading from the service-mains into the inlet-chamber.

2. In a gas-regulator of the character herein described the swinging valve *a* pivoted in the side of the valve-chamber in the socket *c*, the said valve being operatively connected at its center thereof with the valve-stem and means to move the said valve against the seat thereof and provide for any opening between the valve and the seat caused by the wear of the valve on the seat.

3. A gas-regulator, comprising an inlet-chamber; an outlet-chamber above said inlet-chamber and in communication therewith; a float-chamber above the distributing-chamber and in communication therewith, sealing fluid in said float-chamber; an inverted-cup-shaped float in the chamber; a spring in said chamber bearing on said float; an adjusting-screw bearing on said spring; a stem secured to said float and passing downwardly through the outlet-chamber and into the inlet-chamber; valves on said stem adapted to regulate opening in the port connecting said chambers the upper valve being bell-shaped and slidingly mounted on said stem and having an aperture extending therethrough; a lower valve on and rigidly secured to said stem; a spring on said stem adapted to bear against said valves and adapted to normally keep the valves apart; said two valves being adapted to close the communication between the inlet and outlet chambers, said lower valve being adapted to close the aperture through the upper valve.

4. A gas-regulator comprising an inlet-

chamber; an outlet-chamber in communication therewith; a float-chamber above the outlet-chamber and in communication therewith; sealing fluid in said float-chamber; an inverted-cup-shaped float in said float-chamber; a spring in said chamber bearing on said float; an adjusting-screw bearing on said spring said adjusting-screw having a channel therein connecting the interior of said chamber with the external air; a valve to control said channel; a stem secured to said float and passing downwardly through the outlet-chamber and into the inlet-chamber; two valves on said stem one above the other, said upper valve being larger than the lower valve and being slidingly mounted on said stem and having an aperture extending therethrough; a spring mounted on the lower of said valves and bearing against the upper valve and adapted to normally keep the valves apart, said two valves being adapted to entirely close the communication between the inlet and outlet chambers when no gas is being consumed, the lower valve being adapted to close the aperture through the upper valve; a swinging valve in the inlet-chamber operatively connected to said stem, whereby on the rise or fall thereof said swinging valve will close or open the inlet into said inlet-chamber.

5. In a regulator of the character herein described having a float-chamber, an outlet-chamber and an inlet-chamber; a float in the float-chamber carrying a vertically-arranged valve-stem depending therefrom, said valve-stem projecting downwardly through the outlet-chamber and into the inlet-chamber; a swinging gate-valve in the inlet-chamber adapted to open and close the inlet thereto, the said swinging gate-valve being workably connected to said valve-stem; a high-pressure valve on said stem; a low-pressure regulating-valve disposed above the same; a spiral spring adapted to spread the valves apart, the low-pressure regulating-valve having an upward hollow extension and provided with a plurality of outlet-ports, said low-pressure regulating-valve being bell-shaped at the mouth thereof and adapted when in its elevated position to contact with a valve-seat surrounding the port connecting the inlet and outlet chambers together; an offset shoulder on said stem adapted to contact with the upper end of the low-pressure valve and depress the same when the pressure on the gas falls and open the low-pressure valve.

6. In a gas-regulator of the character herein described having a pressure-regulating float; a stem secured to said float, the said stem extending centrally from the float-chamber through the outlet-chamber into the inlet-chamber; a swinging valve workably secured on said stem and adapted to close the inlet-port between the inlet-chamber and the gas-mains; a high-pressure regulating valve-stopper rigidly mounted on said stem; a low-pressure regulating valve-stopper slidingly mounted on said stem above said high-pressure valve-stopper and having discharge-ports in the upper extension thereof; a spiral spring disposed between the upper and lower valve-stoppers and adapted to normally hold said stoppers apart; a volute spring surrounding said stem and resting upon the partition dividing the inlet and outlet chambers and bearing at its upper end against an annular lug on the valve-stem.

7. In a gas-regulator such as herein described; a duplex valve adapted to close the port leading from the inlet to the outlet chamber comprising a valve-stem secured at its upper end to a pressure-regulating float, the said stem extending downwardly through said port and carrying thereon a high and low pressure regulating-valve, comprising the bell-shaped low-pressure regulating-valve X slidably mounted on said stem; a high-pressure regulating-valve rigidly affixed to said stem below the low-pressure regulating-valve and a spiral spring disposed on said stem between said valves.

8. In a gas-regulator of the character herein described, means to open and close the inlet-port between the inlet-chamber and the gas-mains and the ports between the inlet-chamber and the outlet-chamber comprising the swinging valve *b* pivoted on the side of said chamber and adapted to open and close the inlet into said inlet-chamber upon the movement up and down of the valve-stem T; the low-pressure regulating-valve X slidably mounted on said valve-stem being bell-shaped and adapted when in its elevated position to close the port W leading from the inlet to the outlet chamber, the said valve being provided with openings X′ therein for the passage therethrough of gas; a high-pressure valve Y rigidly secured to said stem; a spiral spring disposed between said valves the lower end thereof resting upon the valve Y and the upper end contacting with the valve X.

9. In a gas-regulator having an inlet-chamber and an inlet-port leading thereinto; a swinging valve in said chamber adapted to close the port leading thereinto, the said chamber having a valve-seat concentric with the pivot of said swinging valve and means to move the pivot on which said valve works substantially as herein shown and described.

10. In a gas-regulator of the character herein described a chamber for the reception of gas; a port leading thereinto; a swinging valve adapted to close said port upon the movement of the valve-stem and means to keep said valve in frictional engagement with the seat thereof.

11. A gas-regulator having an inlet-chamber and an outlet-chamber and a float-chamber; a

float in the float-chamber; a valve-operating stem carried by said float and passing therefrom down through the outlet into the inlet chamber; a swinging valve workably connected with said valve-stem and adapted to be operated thereby, the said swinging valve being pivoted on one side of the outlet-chamber on an adjustable base, the said base being provided with means for its adjustment substantially as shown whereby the wear on the face of the swinging valve and the seat thereof may be provided for.

In witness that I claim the foregoing I have hereunto subscribed my name this 14th day of May, 1904.

FERDINAND WHEELER.

Witnesses:
G. E. HARPHAM,
MARGARETE C. NICKELESON.