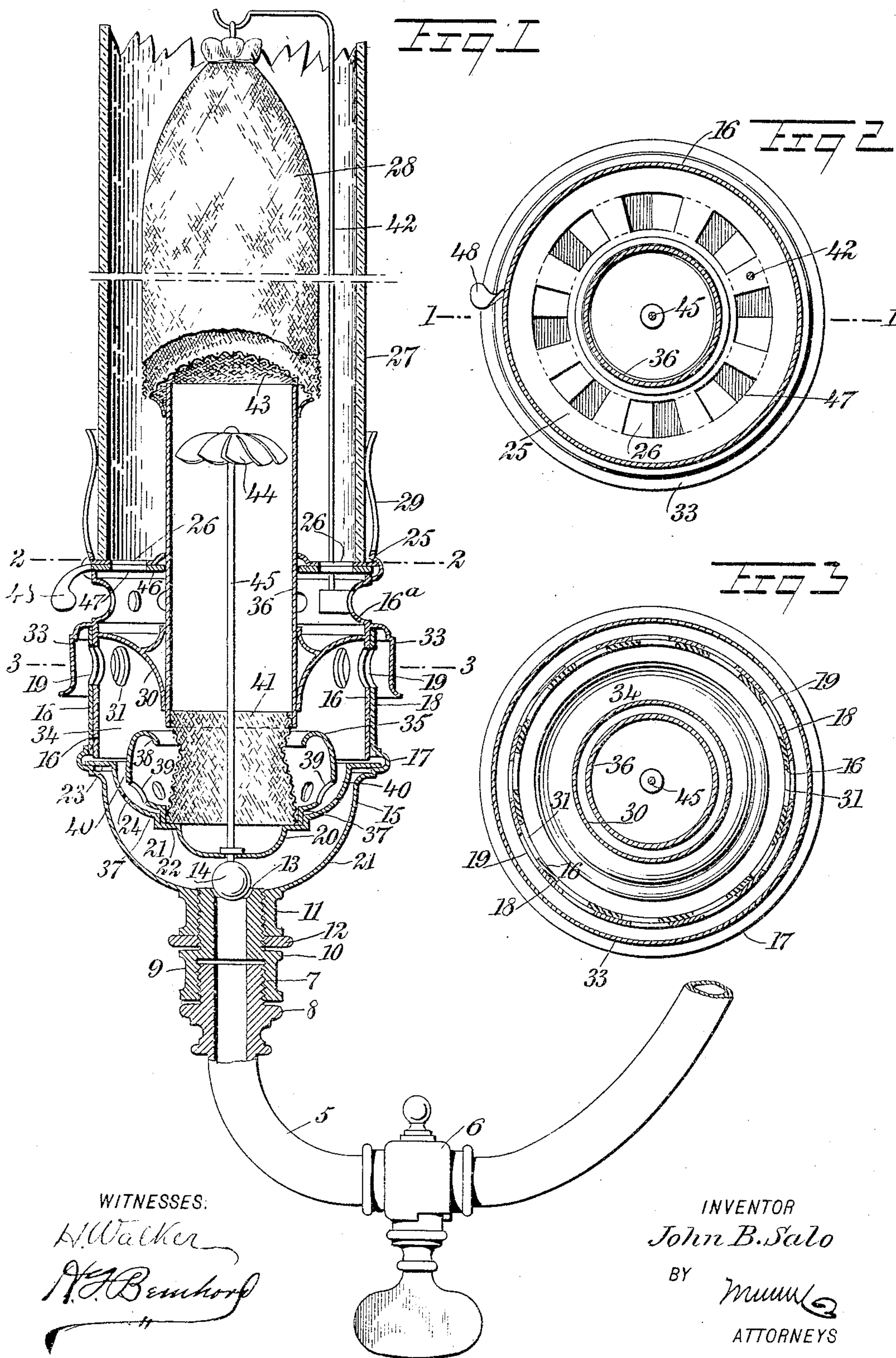


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PATENTED DEC. 27, 1904.

J. B. SALO.  
GAS BURNER.

APPLICATION FILED OCT. 9, 1903. RENEWED NOV. 10, 1904.





# UNITED STATES PATENT OFFICE.

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## GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 778,712, dated December 27, 1904.

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*To all whom it may concern:*

Be it known that I, JOHN B. SALO, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Gas-Burner, of which the following is a full, clear, and exact description.

My invention relates to gas-burners of that class which employ incandescent mantles, and the leading feature of this improvement is a burner adapted to consume any kind of gas or combustible vapor, such as city gas, natural gas, and a vapor produced by carbureting air. The burner of the present invention does not belong to that type familiarly known as "Bunsen" burners, because it is supplied with air and with a mixture of air and combustible vapor on a different principle.

In this improved burner I make provision for the independent regulation of the gas-supply, the air-supply to the gas to produce an aerated combustible mixture, and the air-supply to the chimney, said regulators being capable of individual adjustment in an easy and efficient way, so as to vary the volume of gas, the volume of air supplied to and mixed with the gas, and the volume of air admitted to the chimney and to the mantle to secure substantially perfect combustion.

Another feature of my invention is the provision of gas-checks within the burner at such a point or points as will prevent during initial ignition the back flash of the flame, thus overcoming the miniature explosion of gas, which is such a common objection to mantle-burners when starting the same.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the actual scope thereof will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical sectional elevation through a gas-burner constructed in accordance with my invention, the plane of the sec-

tion being indicated by the dotted line 1 1 of Fig. 2. Figs. 2 and 3 are sectional plan views taken on the lines 2 2 and 3 3, respectively, of Fig. 1.

5 designates a gas-pipe, which is provided with a cock or valve 6 of any suitable construction. The free upturned end of this pipe is provided with an external thread at 7 and a rib or collar 8, the latter adapted to limit the downward movement of a coupling 9, which is screwed on the threaded end 7 of said pipe. The coupling is provided with a lower female-threaded portion for application to the pipe 5; but its upper portion is reduced in diameter to provide an intermediate collar 10, said upper reduced portion of the coupling having an external or male screw-thread. The coupling is formed with a gas-passage adapted to have communication with the pipe 5, and on this upper threaded portion of the coupling is screwed a sleeve 11, which forms a part of the lower member of the burner, said sleeve being held in its adjusted position by an interposed check-nut 12, that is also screwed on the male-threaded portion of the coupling 9 and is adapted for engagement with the under face of the sleeve 10. The coupling serves as a means for uniting the gas-burner to the gas-pipe, and it provides for the bodily adjustment of the entire burner in a way to regulate the passage of gas from the pipe to the burner. For this purpose the upper extremity of the coupling 9 is formed with an internal valve-seat 13, on which is adapted to be seated a gas-valve 14, the latter being in the form of a globe or ball valve, which when using gas under pressure will seek its seat by gravity, said valve being of such weight as to be lifted or raised solely by the pressure of gas passing from the tube 5 into the burner.

In using the burner with carbureted vapor the valve 14 should be attached to a part of the upper burner member, such as the stem 45, so that the valve will be lifted positively from its seat.

The burner proper consists of a double-bottom lower member 15 and an upper member



16, said members being peculiarly fashioned, as indicated by Fig. 1, and assembled in such relation as to be adjustable one upon the other and upon the coupling 9. The lower member 5 15 of the burner has a concavo-convex bottom which is made in one piece with the female threaded sleeve 11, or said sleeve may be suitably attached to said member, the latter being also provided with a circumferential bead 10 17 and an upstanding annular flange 18, the latter having an annular series of air-ports 19. The lower member of the burner is furthermore provided with an inner or false bottom 20, which is secured within said member 15 15 so as to produce an intermediate gas-chamber 21, in which is arranged the gas-controlling valve 14, said chamber 21 having communication directly with the coupling 9 and with the gas-pipe when the valve 14 is lifted from its 20 seat. The inner or false bottom 20 of the double-bottom chambered lower member 15 is provided at a point intermediate of its height with an annular collar 22, and said false bottom 20 is furthermore provided at 25 its upper edge with a circumferential flange 23, the latter being received within the beaded portion 17 of the burner member and secured thereto in any suitable or desirable way. This false bottom 20 is furthermore provided 30 with an annular series of gas-ports 24, the same being located between the annular shoulder 22 and the flange 23, each port being of small diameter, as indicated by Fig. 1.

The upper member 16 of the burner fits 35 snugly within the upstanding perforated flange 18 of the lower burner member, the lower extremity of said member 16 terminating just above the circumferential flange 23 of the false bottom 20. This upper member 40 16 is provided with an inwardly-extending bead 16<sup>a</sup>, which is joined to a flat plate or disk 25, the latter having a plurality of air-ports 26, through which atmospheric air may pass into a chimney 27, that envelops an ordinary 45 gas-mantle 28. The upper portion of the member 16 is equipped with a gallery 29 of any suitable construction, the same being adapted to retain the chimney 27 in position on the burner. The burner member 16 is 50 furthermore provided with a dished diaphragm 30, which is made in one piece with or united to the member 16 at a line quite close to the bead 16<sup>a</sup> of said member. Finally, the member 16 is provided with a plurality 55 of air-ports 31, which are disposed in an annular series in that part of the member 16 directly below the diaphragm 30 thereof, said ports 31 being of corresponding area to the ports 19 and adapted to be adjusted into or 60 out of registration therewith for the purpose of controlling the volume of air adapted to be supplied to the gas and to be commingled therewith so as to produce a combustible mixture.

65 The upper member 16 of the burner is

furthermore provided with an external hood 33, which is united to the burner member at a point below the bead 16<sup>a</sup> thereof and above the diaphragm 30, said hood 33 being located 70 externally with respect to the member 15 and housing or inclosing the air-ports 19 therein. It will be understood that the upper member 16 of the burner is fitted rotarily upon the member 15, so that the upper mem- 75 ber can be turned or rotated in a horizontal plane for the purpose of regulating the area of the air-ports formed by the registration of the openings 19 31, which are provided in the members 15 16, respectively. The hood 33 serves to conceal the air-openings, it provides 80 a convenient means for the rotary adjustment of the member 16, and its lower end is open for the free admission of air into the hood, from whence the air passes through the open- 85 ings 19 31 into an air-chamber 34, the latter being provided within the lapping portions of the members 15 16.

The burner of my invention is constructed with means for mixing the air and gas which are supplied in regulated volumes to said 90 burner by the chambers 21 34, heretofore described, and said mixing means are shown by the drawings in the form of a drum 35, a foraminous member 41, and a tube 36. The drum 35 is of annular form and of the curved cross- 95 section shown by Fig. 1, the lower portion of said drum being provided with a depending foot-flange 37 and the upper part of the drum having an inwardly-curved flange 38. This drum is fitted within the dished false 100 bottom 20 so that its foot-flange 37 will enter and be secured within the annular seat formed by the shoulder 22 of said false bottom. The drum is in spaced relation to the false bottom, and the flange 38 of said drum extends quite 105 close to the lower part of the tube 36. This drum is spaced with relation to the false bottom, and said drum is formed with a plurality of ports 39, one of said ports being opposite each of the gas-ports 24 and each port 39 110 being of larger area than its corresponding coincident gas-port 24. By spacing the drum 35 with relation to the false bottom 20 an air-passage 40 is provided between the parts 20 35, which air-passage envelops the drum 35 115 and has direct communication with the chamber 34, into which air is adapted to be supplied by the ports 19 31 of the burner members, as will be readily understood.

The gas is supplied to the chamber 21, the 120 valve 14 being open, and this gas rushes through the contracted ports 24 in jets. The jets of gas flow directly through the ports 39 in the mixing-drum, and they induce a suction or current of air through the passage 40 125 from the chamber 34 and the coincident openings 19 31, whereby the air and gas are commingled within the drum 35, from whence the mixture passes through the foraminous member 41 into the mixing-tube 36. This tube 130



is fixed to the diaphragm 30 so as to be supported centrally within the burner, said tube extending upwardly through the plate 25 of the upper burner member and into the chimney 27. The foraminous member 41 constitutes a gas check and mixer which is provided within the mixing-drum 35 and the tube 36, said gas check and mixer being in the form of a perforated, slotted, foraminous, or gauze cylinder which extends from the lower part of the tube 36 to the false bottom 20 of the lower burner member, whereby the gas mixer and check passes through the mixing-drum 35, so as to prevent the back-flash which occurs in ordinary mantle-burners when a match or torch is applied to the burner for the purpose of igniting the gas, thereby overcoming one of the common objections to ordinary mantle-burners. Of course this gas mixer and check 41 permits the free passage of the combustible mixture produced by the admixture of air and gas when injected and induced to flow into the mixing-drum 35 in the manner described, and the combustible mixture is thus free to pass through the gas mixer and check and the tube 36 up to the mantle 28.

The mantle 28 is adapted to be supported within the chimney by a mantle-rod 42 or any equivalent device, the lower open end of said mantle enveloping the upper extremity of the mixing-tube 36. To prevent the admission of atmospheric air into the open lower end of the mantle and to overcome back flash, I employ a foraminous metallic cap 43, which envelops the upper end of the tube and closes the lower end of the mantle, said cap being disposed within said lower portion of the mantle 28, whereby the air admitted to the chimney by the ports 26 in the gallery is prevented from passing into the mantle to the mixing-tube. The mixing-tube is also equipped with an agitator 44, which may or may not rotate, said agitator being carried by the vertical stem 45, that passes from the mixing-tube downwardly through the mixer 41 and is secured in the false bottom 20. As shown by Fig. 1 of the drawings, this agitator-stem is extended through the false bottom so as to provide for the attachment of the gas-valve 14 when the burner is used for carbureted vapor; but when gas is supplied under pressure to the burner the valve 14 is disconnected from the stem, so that the lower member 15 on the sleeve 11 of the burner may be screwed in an upward direction on the coupling 9 for the purpose of adjusting the false bottom away from the gas-valve 14, thus providing an increased play or movement of the valve, which will admit a relatively larger volume of gas from the pipe into the chamber 21. By screwing the sleeve 11 and the burner in a downward direction on the coupling the valve 14 will be lowered toward its seat 13, and the opening movement of the valve will be correspondingly re-

stricted, thereby reducing the volume of gas which may pass from the pipe into the chamber 21.

My burner is also equipped with means for regulating the volume of air which is admitted through the gallery and the perforated plate 25 into the chimney 27 for passage to the mantle in order to support combustion and overcome the deposit of carbon on the surface of the mantle. The air-regulating means is embodied in a disk-like valve 46, which is disposed in underlapping relation to the perforated plate 25 and is rotarily supported within the member 16 of the burner. Said valve-disk is provided with a plurality of ports 47, which are adapted for registration with the openings 26 of the upper burner member, and said disk is also provided with a finger-piece 48, which extends outside of the burner and is always accessible for adjustment of the disk in a way to vary the relation of its openings 47 to the openings 26 in the plate 25 of the burner. It is evident that the plate 46 may be shifted in one direction to adjust its openings 47 partly out of registration with the openings 26, thereby decreasing the area of the air-ports and reducing the volume of air which may pass into the chimney; but a reverse adjustment of the valve-disk 46 increases the area of the air-ports and correspondingly augments the volume of air to be supplied to the chimney.

The bead 16<sup>a</sup> of the upper burner member is shown as provided with suitable air-holes for the passage of air above the diaphragm 30 and to the openings in the plate 25 and the valve-disk 46, thus allowing the upward circulation of air through the burner to the chimney; but the diaphragm 30 effectually cuts off communication between the upper and lower parts of the burner, so that a downdraft of air may take place through the chamber 34 when the air flows through the openings 19 31 to the annular passage 40 between the drum 35 and the false bottom 20.

In operation the cock 6 is opened and the gas passes from the pipe and the coupling past the gas-valve 14, the gas finding its way into the chamber 21, from whence it passes in the form of jets through the ports 24. The jets induce a circulation of air through the ports 39 into the mixing-drum 35, the air passing freely in a downward direction through the chamber 34 and combining with the gas to produce the combustible mixture. This mixture passes through the gas-check 41 into the mixing-tube 36 and acts on the agitator 44 so as to rotate the latter, and finally the mixture in a proper aerated condition passes through the perforated cap 43 into the mantle, where the combustible mixture is consumed to produce a blue flame and heats the mantle to incandescence. It will be understood that the burner may be rotated on the coupling 9 for the purpose of bodily raising or lowering



the burner and regulating the valve 14 to control the admission of gas to the chamber 21. Furthermore, the upper member 16 and its contained parts may be rotated upon the lower member, so as to vary the area of the air-ports formed by the openings 19 31, and thereby regulate the volume of air which passes in a downward direction to the passages 40 and the openings 39 for union with the gas supplied from the chamber 21 by the ports 24. Finally, the valve-disk 46 may be regulated with relation to the perforated plate 25 for controlling the volume of air which is supplied to the chimney and envelops the mantle 28, thus insuring proper combustion.

The three several adjustments provided in my burner—one for the regulation of gas and two for the regulation of air—enable the burner to be used in connection with any kind of gas—that is to say, with gas having light or heavy specific gravity—because the volume of air to be commingled with the gas can readily be determined and the volume of gas supplied from the pipe to the burner can be governed by a simple adjustment of the burner itself.

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

1. A device of the class described, having a supply member adapted for communication with a source of gas-supply, a valve movable relatively to said member, a rotatable member mounted on said supply member and cooperating with said valve for regulating the quantity of gas admitted to the burner, and a false bottom above said rotatable member whereby a gas-chamber is formed between the rotatable member and the false bottom and an outlet in said false bottom for the gas.

2. A device of the class described, having a supply member adapted for communication with a source of gas-supply, a valve movable relatively to said member, a rotatable member mounted on the supply member, and cooperating with the valve for regulating the quantity of gas admitted to the burner, an inner member fitted within and concentric with said rotatable member, air-ports in said rotatable and inner members, the ports in one member arranged for registration with the ports in the other, substantially as described.

3. A burner consisting of chambered members fitted together for rotary adjustment and provided with complementary openings, means for admitting gas to one of said members, a mixing-tube extending upwardly through the burner, and a mixing device disposed between the mixing-tube and the means for admitting gas.

4. A burner having a chambered lower member provided with a gas-inlet and with air-openings, an upper member rotarily fitted to the lower member and also provided with air-openings adapted to register with those of the lower member, an updraft mixing-tube

through the burner, and a mixing device interposed in the line of communication of the mixing-tube with the members of the burner.

5. The combination with a coupling adapted for communication with a gas-supply, of a downdraft-burner having a chamber and mounted on said coupling, and a gas-valve disposed within said chamber of the burner and adapted to be seated on the coupling, said burner being adjustable bodily on the coupling and regulating the valve for controlling the area of the gas-passage between said burner and the coupling.

6. A burner comprising a chambered lower member having a false bottom provided with gas-ports, an upper member rotarily adjustable on the lower member and regulating the volume of air admitted to said burner, and a mixing device located within the members of the burner and having air-ports which are disposed in registration with the gas-ports in the lower burner member.

7. A device of the character described comprising a lower chambered member provided with gas-ports and an upper member provided with air-ports, a diaphragm attached to the upper member above the air-ports and arranged to form a chamber between the upper and lower members, a mixing device and a gas and air inlet to said mixing device, substantially as described.

8. A downdraft-burner comprising a lower member having a false bottom arranged to produce with said member an intermediate gas-chamber, said false bottom being provided with gas-ports of small area, an upper member having means for the admission of air, and a mixing device disposed to form an air-passage between itself and the false bottom, said mixing device having air-ports which communicate with the air-passage and are disposed in registration with the gas-ports of the lower member.

9. A gas-burner having a chambered lower member provided with gas-ports of small area, a chambered upper member having means for the admission of air thereto, a mixing device having ports opposite the gas-ports, a tube in communication with said mixing device, and a gas-check between the mixing device and the tube.

10. A gas-burner having a chambered lower member provided with gas-ports located internally thereof, an upper chambered member having air-inlets, a mixing-tube, and a perforated mixing member communicating with the mixing-tube and with the upper member, said mixing member having openings in registration with the gas-ports of the lower member.

11. A gas-burner having a lower member provided with a false bottom having gas-ports, an upper member having air-admission ports, and a passage from said ports to a mixing device, a mixing-drum disposed to form an in-



intermediate air-passage between itself and the lower member, and provided with ports in registration with the gas-ports, a mixing-tube extending upwardly from the drum, a gas-check  
5 between said drum and the tube, and a revoluble agitator disposed within said mixing-tube.

12. A gas-burner having a chambered lower member provided with gas-ports, an upper  
10 member having air-inlets and a passage, a mixing-tube, and a mixing-drum provided with openings in registration with the gas-ports.

13. A gas-burner having a chambered lower member provided with gas-ports and with air-  
15 inlets, an upper member provided with air-inlets and fitted rotarily to the lower member, an updraft mixing-tube, and a foraminous mixing device communicating with the two members and with the lower part of the mix-  
20 ing-tube.

14. A gas-burner having a chambered lower member provided with gas-ports and with a gas-valve, said lower member having air-open-  
25 ings above said chamber, an upper member revolubly fitted to the lower member and provided with air-openings and with an external hood which conceals the air-openings of the lower member, and a mixing device adapted to be supplied with air and gas admitted by  
30 the respective members of the burner.

15. A device of the class described, having a lower member provided with a gas-chamber and with air-ports, a supply member on which the lower member is fitted for vertical adjust-  
35 ment, an upper member having air-ports and mounted rotarily on the lower member, a gas-valve located in the gas-chamber and carried by the lower member for movement therewith relatively to the supply member, a mix-  
40 ing-tube and a mixing device below said tube.

16. A device of the class described, having a lower member provided with a gas-chamber and air-inlets, an upper member rotarily fitted on the lower member and provided with  
45 a diaphragm and with air-inlets located above and below the diaphragm respectively, a mixing-tube, a mixing device below said tube, and

an air-valve mounted on the upper member and controlling the flow of air through a chamber located in said member above the  
50 diaphragm.

17. A gas-burner having a lower member provided with a gas-chamber and with air-in-  
lets, an upper member rotarily fitted to the lower member and provided with air-inlets, a  
55 mixing-tube, a foraminous mixing member at the lower part of the mixing-tube, a stem, a valve at the lower part of the stem, a distributor on the stem, and a coupling having a valve-seat opposite to the valve.  
60

18. A device of the class described, having a supply member provided with a valve-seat, a burner rotarily mounted on the supply mem-  
ber and provided with a gas-chamber and  
65 with air-inlets, a mixing-tube, a perforated mixing member at the lower part of said tube, a suitably-mounted valve-stem extending within the tube, a valve on the stem, and a distributor supported by the stem within the  
70 mixing-tube.

19. A gas-burner having a chambered mem-  
ber provided with air-inlets and with a gal-  
lery, a perforated plate on said member, a  
mixing-tube extending through said plate,  
75 means for supplying an admixture of gas and air to said tube, and a perforated air-valve mounted rotarily on the burner member and coöperating with the perforated plate.

20. A gas-burner having a perforated air-  
plate and a gallery, a mixing-tube of less di-  
80 ameter than the air-plate and extending upwardly therethrough, and a foraminous gas-check surmounting the mixing-tube and forming an annular shoulder which is of greater diameter than the mixing-tube and is located  
85 externally thereof.

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

JOHN B. SALO.

Witnesses:

H. F. BERNHARD,  
JNO. M. RITTER.