No. 669,302. Patented Mar. 5, 1901.

J. FRANKLIN.

GAS BURNER.

(Application filed Oct. 22, 1900.

(No Model.) 2 Sheets—Sheet 1.

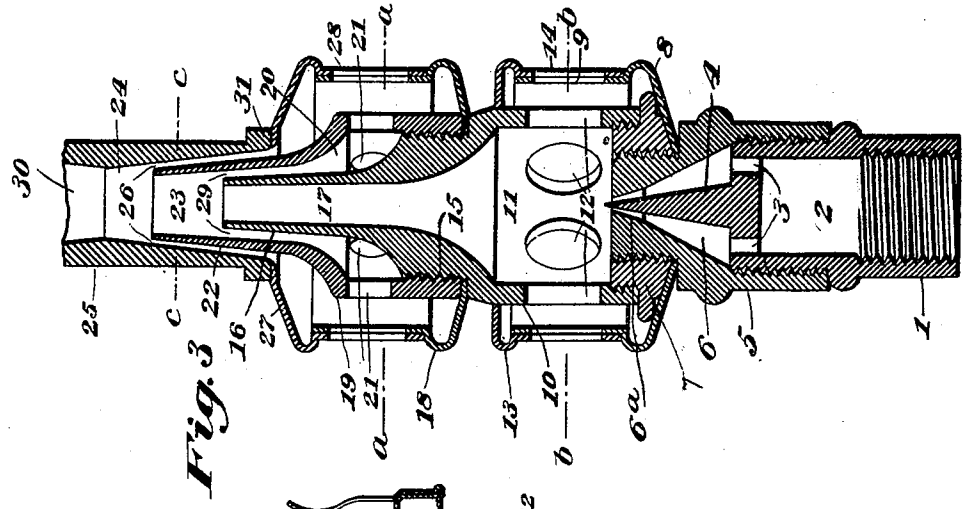

Fig. 3

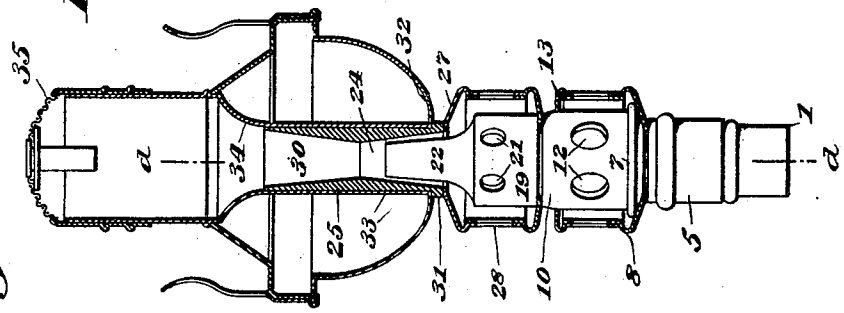

Fig. 2

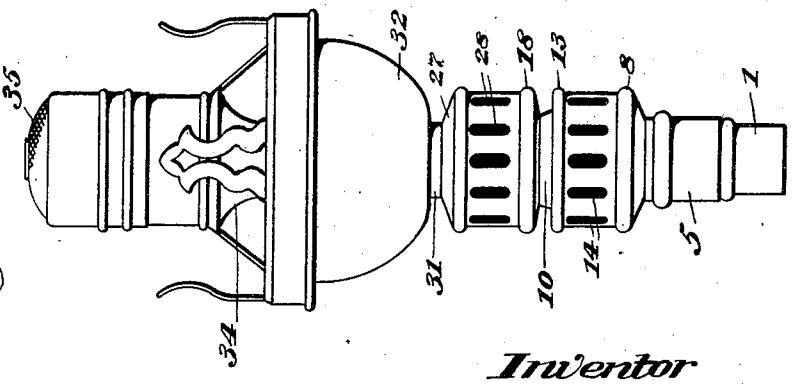

Fig. 1

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Fig. 8

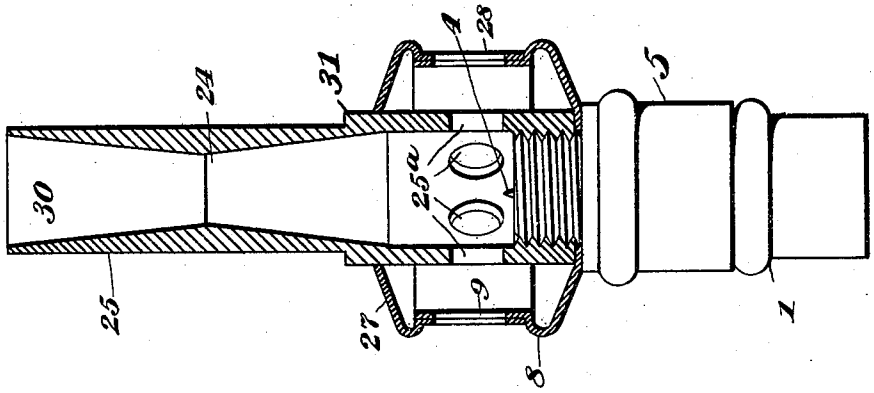


Fig. 7

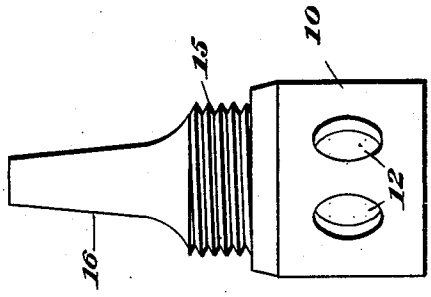


Fig. 6

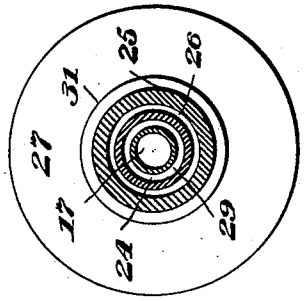


Fig. 4

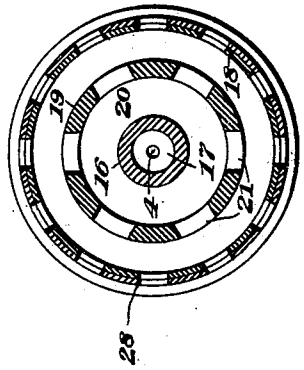
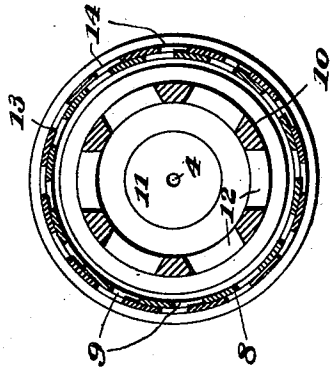


Fig. 5



Witnesses

J. D. Thorne

H. E. Coppin.

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by John Elias Jones,

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UNITED STATES PATENT OFFICE.

JOHN FRANKLIN, OF NORWOOD, OHIO.

GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 669,302, dated March 5, 1901.

Application filed October 22, 1900. Serial No. 33,838. (No model.)

To all whom it may concern:

Be it known that I, JOHN FRANKLIN, a citizen of the United States of America, and a resident of Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Gas-Burners, of which the following is a specification.

This invention relates to certain improvements in gas-burners, and especially in that class of Bunsen burners which are more particularly designed for use in connection with incandescent mantles; and the object of the invention is to provide a gas-burner of this general character of a simple and inexpensive nature having improved means for mingling the air and gas, so as to insure a perfect combustion of the inflammable compounds, such as is essential for obtaining the best results with incandescent mantles.

The invention consists in certain novel features of the construction, combination, and arrangement of the several parts of the improved gas-burner, whereby certain important advantages are attained and the device is made simpler, cheaper, and otherwise better adapted and more convenient for use, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my invention, Figure 1 is a side elevation showing a gas-burner embodying my improvements; and Fig. 2 is a sectional elevation taken longitudinally through the improved burner, the air-regulating devices and mingling-tube being shown in section, while the internal mixing-cones are shown in elevation. Fig. 3 is an enlarged partial section taken axially through the mixing devices in the plane indicated by line *d d* in Fig. 2. Fig. 4 is an enlarged transverse section taken through the mixing devices in the plane indicated by the line *a a* in Fig. 3. Fig. 5 is a section similar to Fig. 4, but taken in the plane indicated by the line *b b* in Fig. 3. Fig. 6 is a section taken transversely through the mixing devices in the plane indicated by the line *c c* in Fig. 3. Fig. 7 is an enlarged detail view showing the lower mixing cone or member detached. Fig. 8 is an enlarged axial section showing a modified form of the improved burner wherein the mixing-cones are omitted.

Referring first to Figs. 1 to 7, 1 indicates a valve member made in cylindrical form having a gas-chamber 2 formed in it and provided at its lower part with interior screw-threads for connection with a gas-supply pipe. The chamber 2 is closed at its upper end and is provided with gas-ducts 3 3, and at the central part of said closed upper end the member 1 has an upwardly-extended conical projection 4, forming a valve. The ducts 3 3 are arranged around the sides of the needle-valve or projection 4. The upper part of the member 1 is exteriorly screw-threaded and is adapted to screw into a valve-casing 5, also made in cylindrical form and having a gas-chamber 6, adapted when the parts are connected, as shown in Fig. 3, to receive gas from the chamber 2 by way of the ducts 3 3. The chamber 6 is closed at its upper end and has a central gas duct or passage 6^a, in which the needle-valve or projection 4 is adapted to extend, as shown in Fig. 3. By this construction it will be seen that when the casing 5 is turned relatively to the member 1 the valve 4 is caused either to approach or to recede from its seat at passage 6^a, so as to effectually regulate the flow of gas through said passage to the burner.

The valve-casing 5 is reduced and exteriorly screw-threaded at its upper part and is adapted to receive a nut 7, serving to clampingly secure upon said member 5 a cup-shaped regulator-shell 8, of circular form, being extended above but concentric with said casing 5 and having in its side walls openings 9, adapted for the passage of air for admixture with the gas discharged at the passage 6^a. The nut 7 has an annular flange around its margin, and above said flange the nut is reduced and screw-threaded to receive a mixing member 10, of cylindrical form, having a mixing-chamber 11 within it to receive the gas discharged at the passage 6^a and having openings 12 in its side walls for the inflow of air through the regulating devices into chamber 11 for admixture with gas in said chamber. The member 10 is arranged concentrically within the regulator-shell 8, and upon the upper part of said member 10 is held to

turn loosely a second regulator-shell 13, of inverted-cup shape, arranged to fit outside the member 8 and also provided with openings 14, adapted to correspond with the openings 9 when the shell 13 is turned properly with relation to shell 8, so as to permit the entry of air to the mixing member 10. The shell 13 acts as a valve when turned and may be so set as to more or less completely cut off the entry of air through the openings 9 into the inclosed mixing devices. Above the shell 13 the mixing member 10 is also reduced and exteriorly screw-threaded, as shown at 15 in Figs. 3 and 7, to form a shoulder on which is rested another cup-shaped shell 18 similar to the shell 8, and upon said screw-threaded part 15 is threaded an upper mixing member 19, cylindrical in form and concentric within the shell 18. The member 19 is formed with an interior chamber 20, having openings or ports 21, similar to those of the lower mixing member 10 and adapted for the entry of air from the openings of the regulating devices into said chamber 20.

Within the member 19 the lower mixing member 10 has a reduced conical upwardly-extended nozzle 16, formed with a tapered bore or passage 17 for the escape of the mixed gas and air from said member 10. The upper mixing member 19 is also provided with a reduced and cone-shaped nozzle 22, having a tapered bore or passage 23 of slightly-larger diameter than the nozzle 16, so that between the two parts is formed a narrow annular air-flue 29 for the upward passage of air from the chamber 20 of member 19.

25 indicates the mixing-tube of the burner, the lower part of which is formed with a passage 24, gradually reduced in diameter toward the central part of the tube and arranged to receive the upper end of the nozzle 22, being slightly larger in diameter than said nozzle, so that a narrow annular flue 26 is formed between the burner-tube 25 and the nozzle, as clearly shown in Figs. 2, 3, and 6. The lower end of the mixing-tube 25 has an enlarged collar 31, which rests on an inverted-cup-shaped regulator-shell 27, having openings 28 and similar to the shell 13 and adapted to operate in connection with the shell 18 to permit of regulating the entry of air through the openings of said shells to the mixing devices within.

The upper part of the bore or passage of the mingling-tube 25 is gradually expanded or tapered toward its upper end, as seen at 30, so that at the central part of said tube its bore is smallest, being made gradually expanded in both directions from said central part. Exteriorly the mingling or mixing tube 25 is made of uniform diameter from its upper end down to the collar 31. The said contracted central part of the bore of the tube is arranged slightly above the upper end of the nozzle 22, so that before the mixed air and gas is permitted to enter the upper expanding part 30 it is confined in said contracted part, so as to insure a proper admixture of the air entering by way of the annular flue 26 with the mixed air and gas flowing through the nozzle 22. In a like manner the upper end of the nozzle 16 is located below the upper contracted end of nozzle 22, so as to insure the admixture of the air entering by way of the flue 29 with the gas and air flowing through the nozzle 16.

Upon the mingling-tube 25 is mounted the burner 32, having a central tube 33 of a diameter to fit snugly on the mingling or mixing tube 25 and resting on the collar 31 at the base of said tube 25. The tube 25 being made of uniform diameter throughout, it is evident that the burner 32 may be readily slipped on or removed from the mixing-tube and when in place thereon is held securely against swaying or rocking movement upon said tube 25, so as to afford protection to the incandescent mantle supported on the burner. The upper part of the tube 33 is expanded and provided with a netting 35, the expanded part being produced by a swell 34 in the tube 33, commencing at the upper end of the mixing-tube and forming a substantial continuation of the expanded upper part 30 of the bore thereof.

In operation when the gas is flowing to the valve member 1 it escapes to valve-chamber 6 and therefrom passes by way of the passage 6^a to the lower mixing-chamber 11, wherein it is mixed with a volume of air entering by way of the ports or openings 12 and capable of regulation by operation of the movable regulator-shell 13. The movement of valve-casing 5 also permits of regulating the supply of gas to said mixing-chamber 11. From the chamber 11 the mixed air and gas flows through the bore or flue 17, absorbing heat from the walls thereof, and escapes into the upper part of the bore 23 of the nozzle 22 of the upper mixing member 19, where it is mingled with a fresh supply of air from the annular flue 29, this air-supply being also capable of regulation by the movement of the regulator-shell 27. From the flue or bore 23 the mixed air and gas next escapes into the contracted part of the bore 24 of the mingling or mixing tube 25, where it is again mixed with a fresh supply of air from the flue 26 and also regulated from the movable regulator-shell 27. As the mingled air and gas in the contracted part of the tube 25 rises it enters the upper expanded part 30 of the bore of said tube and upon absorbing heat from the walls of said tube is permitted to gradually expand as it rises, so as to insure the supply of an intimate mixture of air and gas in proper proportions, such as is necessary for complete combustion, to the burner.

From the above description it will be seen that the construction of the improved burner is extremely simple and inexpensive and permits of readily and conveniently regulating the supply of air and gas to the mixing devices, so as to insure the best results from

gases of different degrees of richness, and also permits of readily taking the device apart for purposes of repair or cleaning. It will also be obvious from the above description that the device is capable of some modification without material departure from the principles and spirit of the invention, and for this reason I do not wish to be understood as limiting myself to the precise form and arrangement of the several parts of the device herein set forth. For example, in some cases the construction shown in Fig. 8 may be employed. In this construction the mixing devices or nozzles are omitted and the mingling-tube 25 is made to screw directly on the valve-casing 5, so as to receive gas therefrom. A regulator-shell 8 is held clamped between said tube and casing, and an inverted-cup-shaped shell 27, carried on tube 25, operates in connection therewith to regulate the supply of air for admixture with the gas, such air being admitted to the tube 25 through openings 25^a in the walls thereof. The tube 25 has its bore 24 made with a central contracted part and tapered toward its upper and lower ends, so as to insure the proper admixture of the air and gas and permit the required expansion of the mixture as it rises to the burner.

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

1. In a gas-burner, the combination of a lower mixing member having means to supply air and means to supply gas to it and provided with a conical discharge-nozzle, an upper mixing member having means to supply air to it and also provided with a conical discharge-nozzle inclosing and of greater diameter than the nozzle of the lower member and adapted to receive the air and gas from the nozzle of the lower member for admixture with air supplied between the two nozzles from the upper member and a mingling-tube arranged to receive the mixed air and gas from the nozzle of the upper member, substantially as set forth.

2. In a gas-burner, the combination of the lower mixing member having means to supply air and means to supply gas to it and having a central, conical, upwardly-extended nozzle for the discharge of air and gas from the interior of said member, an upper mixing member having threaded engagement with the upper part of said lower member and provided with means to supply air to its interior, said upper member being also provided with an upwardly-extended conical nozzle inclosing and of greater diameter than the nozzle of the lower member and adapted to receive air and gas from the nozzle of the lower member for admixture with air supplied between the two nozzles from the upper member and a mingling-tube arranged to receive the mixed air and gas from the nozzle of the upper member, substantially as set forth.

3. In a gas-burner, the combination of a part having a reduced and exteriorly-screw-threaded portion and provided with a central gas-passage, a nut screwed upon said reduced portion, a mixing member carried by the nut and having air-ports in its walls and provided with a chamber with which said ports communicate and which is also adapted for communication with the gas-passage of the first-named part, a cup-shaped regulator-shell clamped at its lower portion between the nut and the first-named part and having perforated walls inclosing the mixing member, and another regulator-shell held to turn on the mixing member and having in its walls perforations adapted for registry with the perforations of the walls of the first-named regulator-shell, substantially as set forth.

4. In a gas-burner, the combination of a lower mixing member having means to supply air and means to supply gas to it and having a central, conical, upwardly-extended nozzle for the discharge of air and gas from the interior of said member, an upper mixing member having threaded engagement with the upper part of said lower member and having ports for the entry of air into its interior and also provided with an upwardly-extended conical nozzle inclosing and of greater diameter than the nozzle of the lower member and adapted to receive air and gas from the nozzle of the lower member for admixture with air supplied between the two nozzles from the upper member, a mingling-tube arranged to receive the mixed air and gas from the nozzle of the upper member, and two regulator-shells one of which is clamped between the two mixing members at its lower part, said regulator-shells being arranged to inclose the upper mixing member and having in their walls perforations adapted for registry to regulate the supply of air to the upper mixing member, substantially as set forth.

Signed at Cincinnati, Ohio, this 18th day of October, 1900.

JOHN FRANKLIN.

Witnesses:
JOHN ELIAS JONES,
J. D. THORNE.