Oct. 21, 1941. M. N. SUVAK ET AL 2,259,592

VALVE

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FIG. 2.

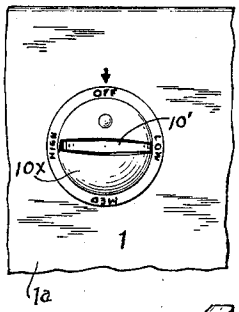


FIG. 1.

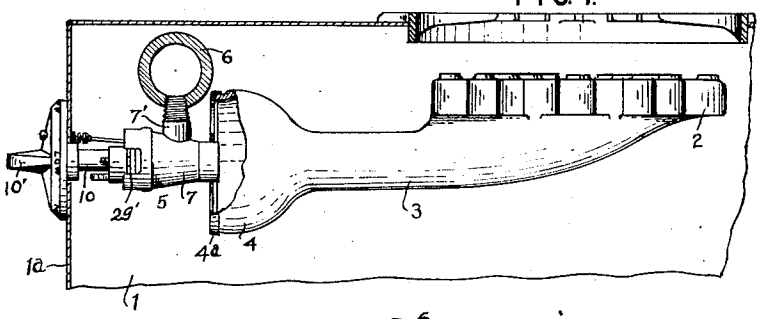


FIG. 3.

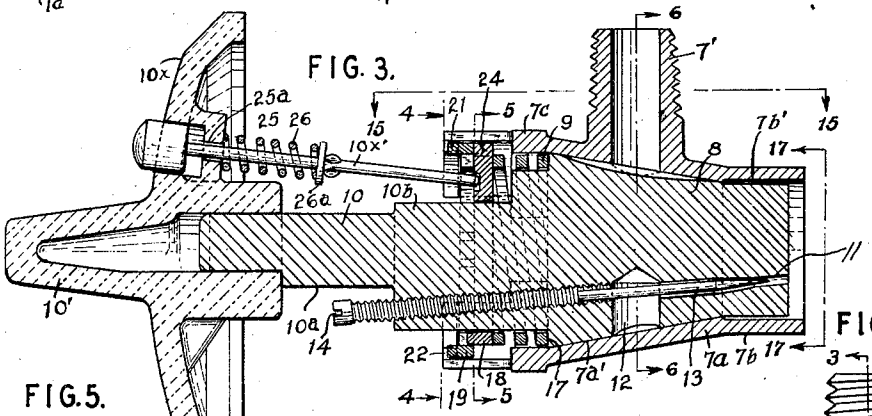


FIG. 4.

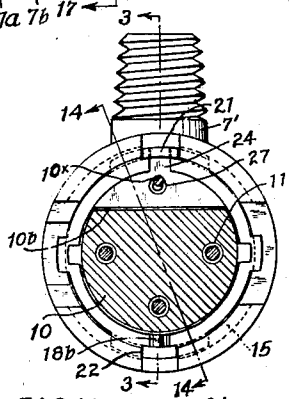


FIG. 5.

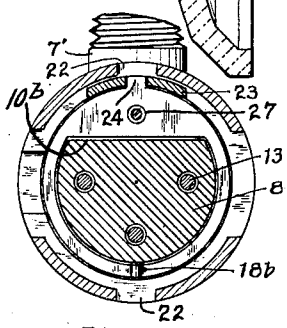


FIG. 6.

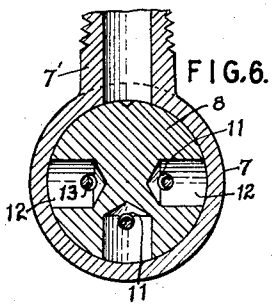


FIG. 9.

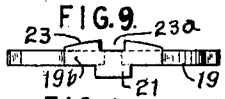


FIG. 8.

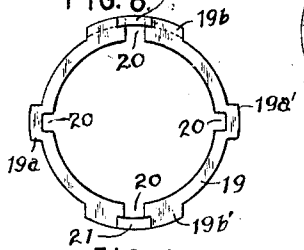


FIG. 10.

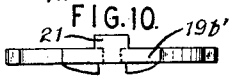


FIG. 7.

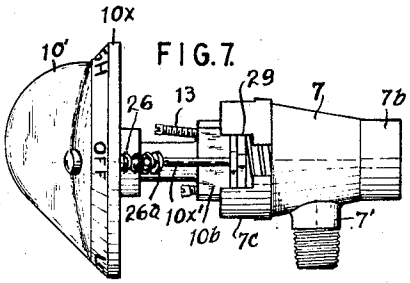


FIG. 11.

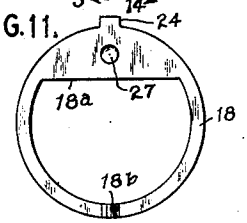
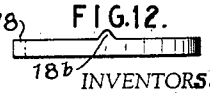


FIG. 12.



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FIG. 13.

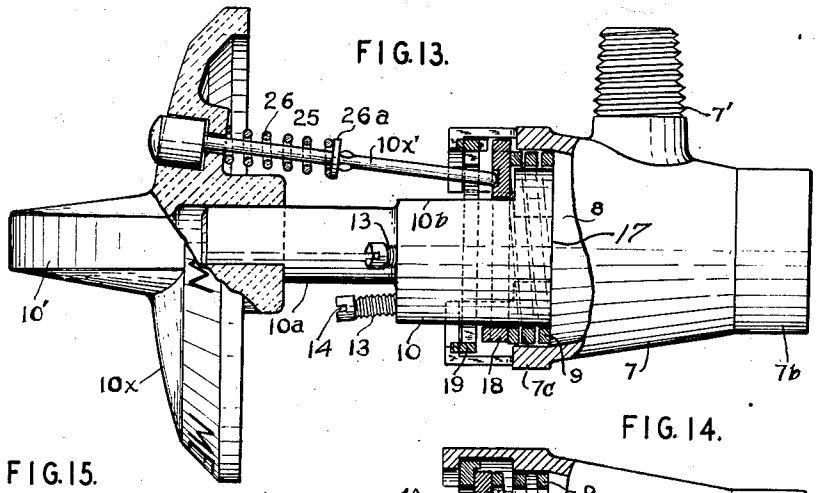


FIG. 14.

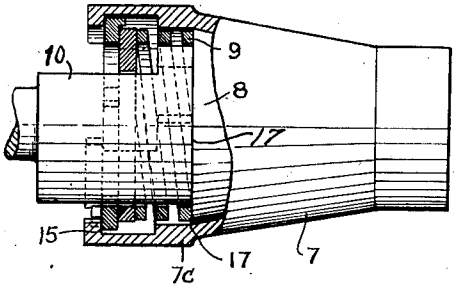


FIG. 15.

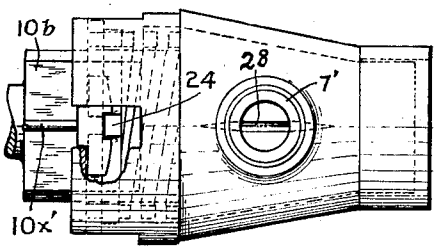


FIG. 16.

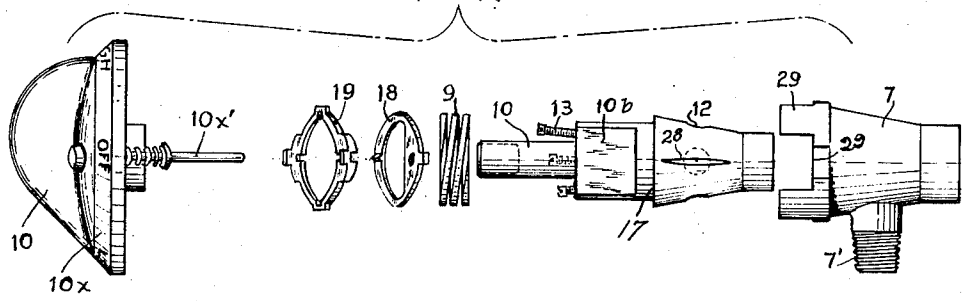
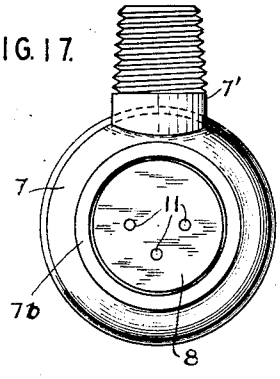


FIG. 17.



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UNITED STATES PATENT OFFICE

2,259,592

VALVE

Michael N. Suvak and Michael Dzama, Cleveland, Ohio

Application March 15, 1940, Serial No. 324,140

8 Claims. (Cl. 277—50)

This invention relates to a gas burner, more particularly a gas supply and regulating valve mechanism in associated relation to the burner inlet or mixing chamber therefor.

One object of the invention is to provide an improved valve mechanism having controllable gas discharge means whereby the valve is adapted for use with a burner utilizing natural or artificial gas supplied at varying pressures.

Another object of the invention is to provide an improved valve wherein the flow of gas into the mixing chamber for a burner is controlled at the discharge port, whereby the resulting flame may be regulated to provide desirable combustion and heating conditions.

Another object of the invention is to construct an improved gas valve, wherein the valve element thereof is provided with means for regulating the supply of gas to the mixing chamber.

Another object of the invention is to construct, in a gas burner, an improved valve having a valve element provided with a plurality of ducts and movable to predetermined positions, the valve element being arranged to cut off the supply of gas in one predetermined position thereof and when moved to each of the remaining positions, permitting flow of gas through one of the ducts.

Another object of the invention is to construct an improved gas valve the valve element of which is provided with a plurality of valved controlled ducts having outlets for discharging the gas into the mixing chamber for a burner and inlets each arranged in a predetermined position of the valve element to register with the gas supply means.

Another object of the invention is to construct an improved gas valve having a rotatable valve element arranged to cut-off the gas supply and provided with a plurality of discharge ports each arranged to be connected to the gas supply and having an adjustable valve device therefor, whereby the volume of gas discharged from each port may be regulated and the amount of gas discharged for combustion varied by the rotation of the valve element.

A further object of the invention is to provide an improved valve for a gas burner and a gas flow regulating means controlled by the rotation of the valve element of the valve and means for releasably locking the element in predetermined gas discharge positions.

A still further object of the invention is to provide an improved valve of this type of simple construction and capable of ready assembly.

Other objects of the invention will be apparent to those skilled in the art to which our invention relates from the following description taken in connection with the accompanying drawings, wherein

Fig. 1 is a fragmentary sectional view of a stove having a gas burner and a valve mechanism embodying our invention applied thereto.

Fig. 2 is an elevational front view of parts shown in Fig. 1.

Fig. 3 is a longitudinal section through the valve.

Fig. 4 is a section on the line 4—4 of Fig. 3.

Figs. 5 and 6 are sections on the lines 5—5 and 6—6, respectively of Fig. 3.

Fig. 7 is an elevational view of the valve, but from the side opposite to that shown in Fig. 1.

Fig. 8 is a plan view of one of the devices for releasably locking the valve element of the valve in each predetermined position.

Figs. 9 and 10 are elevations of the device shown in Fig. 8.

Fig. 11 is a plan view of the other device for releasably locking the valve element.

Fig. 12 is an elevational view of the part shown in Fig. 11.

Fig. 13 is a view of the valve, with parts broken away and showing the operation of releasing the valve element for rotation.

Fig. 14 is a fragmentary view of the valve, partly in section on the line 14—14 of Fig. 4.

Fig. 15 is a fragmentary plan view of the valve, parts being broken away.

Fig. 16 is a view showing the parts of the valve in separated relation.

Fig. 17 is an end elevation on the line 17—17 of Fig. 3.

In the drawings, 1 indicates a portion of a stove for domestic use having a burner 2 to which is connected a gas inlet pipe 3, terminating at its outer end in a mixing chamber 4 into which the gas is supplied or discharged by a valve mechanism, indicated as an entirety at 5, the valve mechanism being connected to a gas supply pipe 6. The burner 2 may be of any desired construction but preferably comprises a hollow base member and a top member, the latter being formed with a plurality of flame ports which may be disposed in any desired arrangement. No claim is made herein to the construction of the burner 2. The mixing chamber 4 is of conventional construction, having an apertured outer wall and a plate 4a rotatable relative thereto and provided with spaced portions so that by adjustment of the plate the size of the apertures in the outer wall of the chamber is

varied to regulate the quantity of air admitted to the chamber for mixture with the gas.

The valve mechanism 5 comprises the following: 7 indicates a casing provided with a laterally extending nipple 7', which is externally threaded and mounted in an opening formed in the supply pipe 6. The casing 7 consists of a body portion 7a open at its opposite ends, its inner end extending into the mixing chamber 4. The inner wall of the casing 7 intermediate its ends is of conical shape to form a seat 7a' for the correspondingly shaped portion of a valve element 8, adapted to be rotated therein to predetermined positions as later set forth. The opposite end portions of the casing 7 beyond the seat 7a' are of cylindrical shape as shown at 7b, 7c. The inner wall of the inner end portion 7b is relieved, as shown at 7b', to permit the valve element 8 to properly seat at all times to insure a non-leak relation with its seat, while permitting wear of the walls of the element and seat, whereas the outer end portion 7c encloses the releasable locking means (later referred to) and a spring 9 co-operable therewith and serving normally to maintain the valve element 8 in engagement with its seat 7a'. 10 indicates the shank for the valve element 8 extending outwardly beyond the end portion 7c, so as to carry on its outer end outwardly of the front wall 1a of the stove 1 a handle 10'. The handle 10' is secured to the shank in any desired manner and is preferably provided with a flange 10x, to support the outer end of a thrust member 10x' which will be later referred to. The outer portion of the shank 10 is reduced, as shown at 10a for a purpose which will later be apparent and the inner or enlarged section of the shank 10 is of non-circular shape in cross section, that is, provided with a flat side 10b for a purpose hereinafter set forth.

11 indicates a plurality of openings extending through the valve element 8 and enlarged section of the shank 10, each opening 11 intermediate its ends merging with a laterally extending chamber 12 arranged to register with the duct leading through the nipple 7' when the valve element 8 is rotated. Each chamber 12 and that portion of the adjacent opening 11 leading to the inner or discharge end of the valve element 8, forms a flow passage or conduit for the gas leading into the mixing chamber 4. The walls of each opening 11 adjacent its discharge end are shaped to co-operate with a valve device 13 to permit a predetermined volume of the gas to be discharged from the inner end of the opening. The valve device 13 consists of a rod extending into the opening 11 from its outer end and is adjustable endwise therein to spacedly relate its inner end to the walls of the opening so as to predeterminately regulate the volume of the gas discharged into the mixing chamber 4. Accordingly, by varying the adjustment of the valve devices 13, one relative to the other, the volume of the gas supplied to the mixing chamber may be regulated, so that when one chamber 12 is in registry with the supply duct of the nipple 7' the burner 2 will provide a low flame and when another chamber 12 is in registry with the supply duct, the burner 2 will provide a higher flame dependent upon the heating capacity desired. As shown, the inner end portion of each valve device 13 is shaped to co-operate with the walls of the adjacent opening 11, so that movement or adjustment of the device endwise will vary the annular space between it and the walls of the opening to increase or decrease the volume of the gas that will flow therethrough when the opening 11 is connected with the supply nipple 7'.

It will be noted that we provide three chambers 12, each connected to a separate discharge opening 11, so that the burner 2 may provide a low flame, a high flame or a flame of intermediate height. In this arrangement two of the chambers 12 are diametrically disposed and the third chamber 12 is arranged intermediate the diametrically disposed chambers, so that that portion of the valve element 8 diametrically opposite the intermediate chamber 12 forms a cut-off, as shown in Fig. 6. It will thus be seen that in one predetermined position of the valve element 8 the supply of the gas from the nipple 7' is cut-off and by rotation of the valve element to any one of its other predetermined positions to register one of the chambers 12 with the nipple 7', that volume of the gas is supplied to the mixing chamber dependent upon the heating capacity or height of flame desired. As shown in Fig. 3, the walls of that portion of each opening 11 outwardly of the adjacent chamber 12 are provided with screw threads and the outer portion of each valve device 13 is provided with screw threads, so that by rotating the device it may be adjusted endwise to vary the size of the outlet at the discharge end of the adjacent opening 11. The outer ends of the valve devices 13 extend through and beyond the enlarged section of the shank 10, the reduced portion of the latter providing a space for these extended ends and permitting the engagement of a suitable tool therewith to effect adjustment of the valve devices 13. By preference, the outer end of each valve device is formed with a kerf 14 whereby a screw driver may be used to rotate it. Also, by preference, the openings 11 are inclined relative to the axis of the valve element toward its inner end so as to discharge the gas approximately centrally of the mixing chamber and to make the outer ends of the valve devices more accessible.

Means are provided for releasably locking the valve element 8 in its cut-off position and yieldingly locking it in each of its remaining predetermined positions. These means are interposed between an inturned flange 15 on the outer end of the cylindrical portion 7c and the spring 9, which is in engagement with a shoulder 17 on the valve element surrounding the enlarged section of the shank, so that a single spring serves normally to maintain the valve element 8 in its seat 7a' and normally to maintain the elements of the locking means in engagement with each other and the flange 15.

The locking means comprise inner and outer annular elements 18 and 19. The outer member is provided with diametrically related extensions 19a, 19a', and diametrically related extensions 19b, 19b', each of the latter extensions being midway between the extensions 19a, 19a'. These extensions loosely fit the inner wall of the cylindrical portion or collar 7c inwardly of the flange 15, the collar being formed with openings to permit the elements to be assembled within the portion 7c and rotated into their final position and then held in engagement with the flange 15 by the spring 9. The inner wall of the element 19 opposite each extension is formed with a recess 20 for a purpose later set forth. The outer faces of the extensions 19b, 19b', are provided with laterally extending lugs 21 which fit into notches 22 formed in the side wall of

the cylindrical portion or collar 7c and flange 15 in diametrical relation, and preferably in a plane cutting the axis of the nipple 7', the engagement of the lugs 21 with the end walls of the notches 22 serving to lock the element 19 against rotation. The opposite face of the extension 19b is provided with a pair of spaced, laterally extending lugs 23, the space 23a between the lugs arranged to receive a locking member 24 projecting radially from the inner element 18. The locking element 18 fits the enlarged section of the shank 10, its inner wall having a contour complementary thereto, whereby its flat portion 18a is disposed in engagement with the flat wall 10b of the shank, to secure the element to the shank for rotation therewith. 18b indicates a catch device on the outer face of the locking element 18, preferably disposed in diametrical relation to the locking member 24. The catch device 18b is arranged to project into each recess 20 to yieldingly limit the rotation of the valve element 8 at each predetermined position, its side walls being inclined outwardly toward each other so that the catch device may ride out of each recess when the valve element 8 is to be rotated from one predetermined position to another predetermined position. As will be seen from the drawings, (a) the locking element 9 is positioned in the cylindrical portion or collar 7c to dispose the space 23a in the plane of the axis of the nipple 7', and in this position each of the recesses 20 opposite the extensions 19a, 19a', 19b', is related to one of the chambers 12, and (b) the locking member 24 is in longitudinal alinement with the cut-off wall portion of the valve element 8, so that when the latter is in its closed or cut-off position (see Figs. 3 and 6) the locking member 24 is disposed in the space 23a to lock the shank 10 against turning until released against the tension of the spring 9 by a release means, indicated as an entirety at 25. The catch device 18b is preferably disposed in the recess 20 opposite the extension 19b', but is free to ride out of this recess, as already set forth, when the valve element is rotated. These parts are secured in this position due to the outward pressure exerted by the spring 9. Upon operation of the release means 25, the shank 10 may be turned in either direction to rotate the valve element 8 to the next predetermined position or a succeeding predetermined position, the valve element being yieldingly locked in each position by the projection of the catch device 18b into the adjacent recess 20.

The release means 25 comprises the endwise movable rod 10x' (already referred to) which extends at its inner end through the locking element 19 for engagement with the locking element 18. The outer end of the rod extends through and is slidably mounted in an opening 25a formed in the flange 10x. A light spring 26 coiled around the rod and interposed between the flange 10x and a collar 26a fixed to the rod, tends normally to move the rod inwardly to maintain its inner end in engagement with the element 18. By preference, the locking element 18 is formed with a depression 27 into which the inner end of the rod 10x' is seated, the walls of the depression and opening 25a serving to support the rod 10x'. The rod 10x' is operated by pushing inwardly on its outer end (a suitable button being provided on such end) to move the rod endwise, the effect of which is to move the locking element 18 away from the locking element 19 to disengage or remove the locking member 24 from the space 23a, against the tension of the spring 9, as shown in Fig. 13, following which operation the shank 10 and valve element 8 may be rotated in either direction. As the handle 10', flange 10x, rod 10x', shank 10, locking element 18 and valve element 8 rotate as a unit, the thrust rod 10x' is always in position to release the locking member 24 from engagement with the lugs 23 which form the space 23a between them. The side walls of the lugs 23 are inclined upwardly from their outer ends so that in the rotation of the valve element 8 to its cut-off position (Figs. 3, 4, 5 and 6), the locking member 24 may ride up either side wall and project into the recess 23a.

28 indicates a shallow cavity formed in the outer wall of the valve element 8 for holding a suitable lubricant.

Our construction of valve is advantageous for the reason, among others, that it may be operated to any predetermined position to provide a flame of any desired height or heating capacity. In our form of valve mechanism the valve element thereof, while being operable to one position to completely cut-off the supply of gas, (a) it is formed with a plurality of discharge openings each arranged to be connected with the gas supply dependent upon the operated position of the valve element and (b) it carries a plurality of valve devices, one for each opening, independently adjustable to separately regulate the volume of gas discharged from the openings, whereby each opening may be arranged to discharge a larger or smaller volume of gas as compared to each of the remaining openings. In this arrangement the same volume of gas is admitted to the valve element when in each operated position thereof, but the discharge of the gas therefrom is controlled by the adjustment of each valve device in its discharge opening and by the rotation of the valve element to any one of a plurality of positions. It will thus be seen that with a known pressure of the gas supply and the spacing of the burner from the container to be related thereto, the valve devices 13 may be relatively adjusted so that by rotation of the valve element 8, a low flame, a high flame or an intermediate flame at the burner of the desired height will result. The discharge openings for the gas being within the mixing chamber 4, the volume of the gas discharged from each opening is controlled at or adjacent its discharge end and not at the point of cut-off thereof from the source of supply. By reason of this construction the valve is adaptable for use in localities using a gas supplied from either a natural or artificial source. The outer end of the thrust rod 10x' is arranged adjacent to the handle 10' so that in grasping the latter the rod may be conveniently operated.

While the openings 11 leading from the chamber 12 are of a size to permit the flow of the gas around the valve devices 13 to the outer end portions of the openings, we prefer to drill these end portions for co-operation with the valve devices to a predetermined size dependent upon the kind of gas supplied to the mixing chamber 4 and its source of supply, for example, when using natural gas these end portions have a diameter of .0465 inch; when using artificial gas, these end portions have a diameter of .111 inch; when using gas supplied from a tank these end portions have a diameter of .028 inch.

The opposite sides of the cylindrical portion or collar 7c are cut away, as shown at 29, 29', which cut-aways accommodate the extensions

19b, 19b' and member 24 to permit the locking elements to be inserted into the collar inwardly of the flange 15 and then rotated to position the lugs 21 in the notches 22. When this assembly is being made, the locking member 24 is positioned in the recess or space 23a, so that the shank 10 may be employed to rotate both of the elements 18, 19.

To those skilled in the art to which our invention relates many changes in construction and widely different embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. Our disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

What we claim is:

1. A valve for supplying a gas to a mixing chamber, comprising a casing having a gas supply inlet, a rotatable valve element in said casing and formed with a plurality of openings the outer ends of which are arranged to discharge the gas from the valve, the inner end of each opening being arranged to register with said inlet, said valve element being movable to predetermined positions to selectively connect each of said openings with said inlet independently of the remaining openings and means in each of said openings for regulating the discharge of the gas therefrom.

2. A valve as claimed in claim 1 wherein the regulating means for each opening consists of a device adjustably related to the walls thereof inwardly of its discharge end.

3. A valve as claimed in claim 1 wherein the regulating means for each opening consists of a valve device therein having a portion extending outwardly through the valve element and provided with means for adjusting said device to regulate the discharge of the gas into the mixing chamber.

4. A valve for supplying a gas to a mixing chamber, comprising a casing having a gas supply inlet, a rotatable valve element in said casing and formed with a plurality of longitudinally extending through openings and laterally extending ports each arranged to connect one of said openings intermediate its ends to said inlet in one predetermined position of said valve element, a device extending into the outer end of each of said openings and adjustably supported in that portion thereof outwardly of the adjacent port, the inner end of said device extending into said opening inwardly of said adjacent port for regulating the discharge of the gas into the mixing chamber.

5. A valve for supplying a gas to a mixing chamber, comprising a casing having a gas supply inlet, a rotatable valve element in said casing and formed with a plurality of longitudinally extending through openings and laterally extending ports each arranged to connect one of said openings intermediate its ends to said inlet in one predetermined position of said valve element, the walls of each said opening outwardly of the adjacent port being provided with screw threads, and a device extending into the outer end of each of said openings and screwed into said screw threaded walls thereof for adjustment of said device endwise, the inner end of said device extending into said opening inwardly of said adjacent port for regulating the discharge of the gas into the mixing chamber.

6. A valve as claimed in claim 1 wherein means are provided for yieldably locking the valve element in each operated position thereof.

7. A valve as claimed in claim 1 wherein the outer end of said valve casing is provided with an inturned flange and means are provided between said flange and said valve element for yieldably locking the latter in each operated position thereof, the spring of said locking means normally tending to maintain said valve element in its seat.

8. A valve for supplying gas to a mixing chamber, comprising a casing having a gas supply inlet, a valve element rotatably mounted in said casing and formed with a plurality of separate through openings each having intermediate its ends a laterally extending port adapted to register with said inlet when said valve element is rotated from closed position to predetermined positions, respectively, the wall of each opening adjacent its discharge end forming a valve seat and the wall of each opening outwardly of the adjacent port being provided with screw threads, and a device extending into each of said openings, the inner end of said device forming a valve element arranged to co-act with the seat in said opening to control the discharge of gas therefrom and said device having threaded engagement with said screw threads, whereby rotation of said device serves to move it endwise to adjust said valve element relative to its seat.

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