Sept. 1, 1953

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2,650,613

GRADUATED UNIVERSAL VALVE FOR GAS APPLIANCES WITH SLITTED SLEEVE

Filed May 15, 1948

2 Sheets-Sheet 1

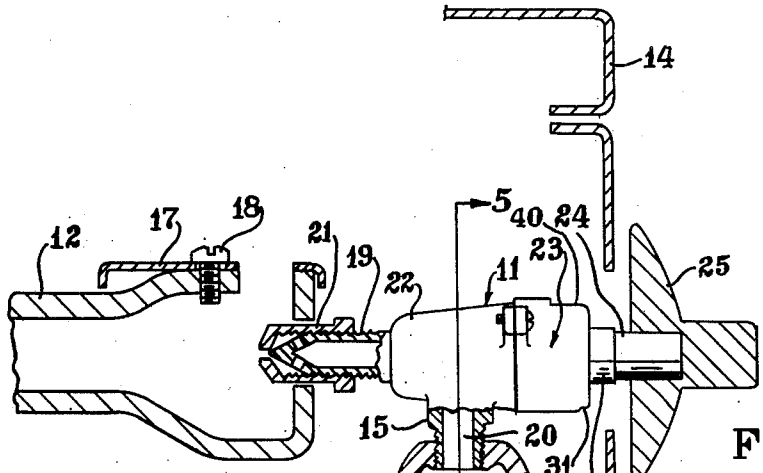

Fig.1.

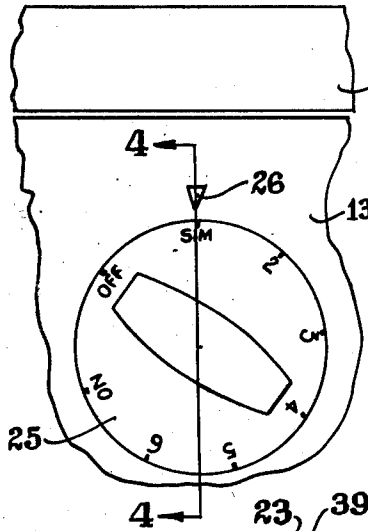

Fig.2.

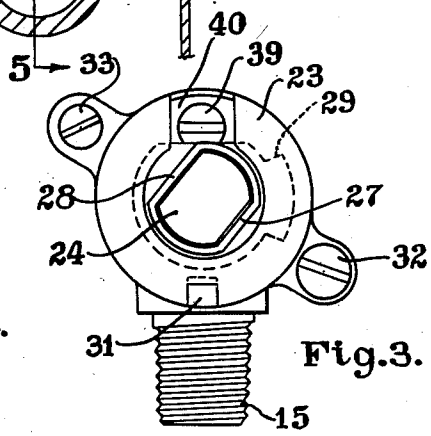

Fig.3.

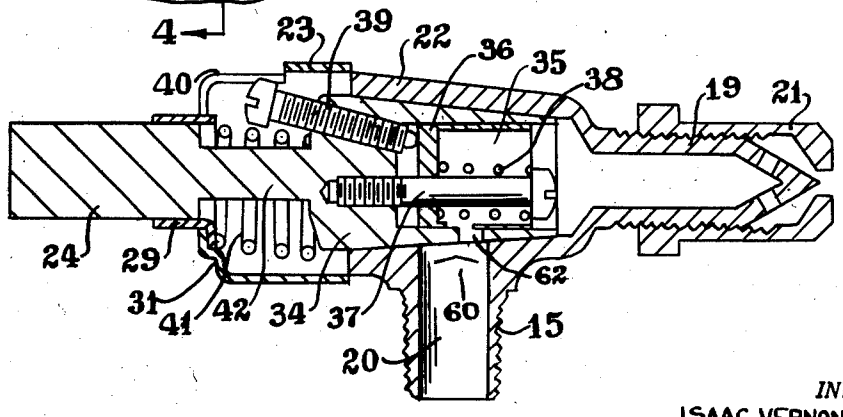

Fig.4.

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GRADUATED UNIVERSAL VALVE FOR GAS APPLIANCES WITH SLITTED SLEEVE

Filed May 15, 1948 2 Sheets-Sheet 2

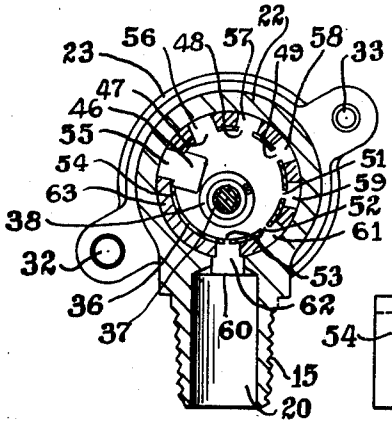

Fig. 5.

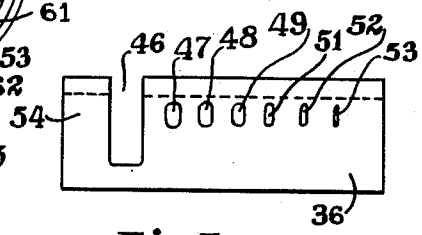

Fig. 7.

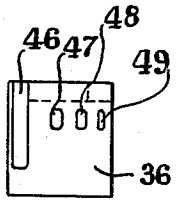

Fig. 6.

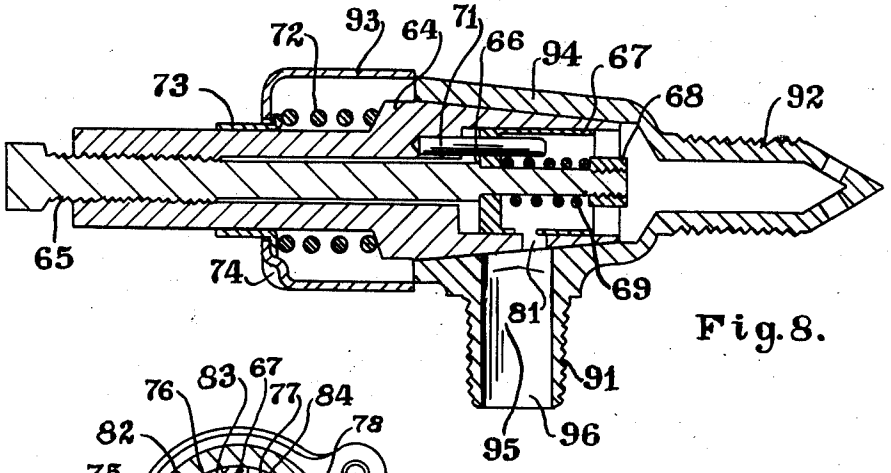

Fig. 8.

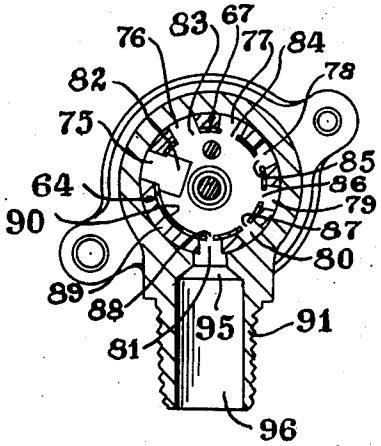

Fig. 9.

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2,650,613

UNITED STATES PATENT OFFICE

2,650,613

GRADUATED UNIVERSAL VALVE FOR GAS APPLIANCES WITH SLITTED SLEEVE

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Application May 15, 1948, Serial No. 27,167

10 Claims. (Cl. 137—637.4)

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The invention described in this application relates to valves. The valve disclosed and described herein in illustration of the invention is especially designed for use in controlling a cooking top burner of a kitchen range but it is to be understood that the inventions involved clearly have other uses. Thus the inventions involved are also useful in the control of gas oven burners. They may also be used for the control of gas outside of the cooking field, such as the various types of gas heating appliances. They may even be used for the control of other fluids including liquids as well as gases. The valve illustrated is designed so that not only may the gas be turned on and off but also the size of the flame may be varied as the valve is rotated from the full "on" position to the "off" position or from the "off" position to the full "on" position or from the full "on" position to the "simmer" position, etc. For example as illustrated the size of the gas flame may be decreased through a series of steps from an "on" or maximum flow position down to a condition in which the flame will provide only enough heat to cause the material being cooked to boil gently or "simmer" and then the gas may be cut off by a movement of the valve to the closed or "off" position. On the other hand if desired, I may modify the design to provide similar valves in which the valve may be turned from the "off" position directly to the "full on" position and then the flame may be decreased gradually through a number of positions to the "simmer" position.

Prior hereto the large majority of gas valves (especially valves for controlling the cooking top burners of gas ranges) have been produced with a casing having a single port and a plug formed with a single port which may be moved into and out of registration with the port in the casing so that in the open position there is substantially a full flow of gas and in the closed position there is no flow of gas. As the ports in such prior art valves are brought from exact registration to the closed position there is a decrease in the size of the flame produced but inasmuch as the control is not usually accurate nor definite therewith, the operator of such prior art devices had to be very careful to prevent the gas from being turned completely off or to such a low position that the flame would go out. In order to obviate this difficulty some designers have designed valves with a plurality of different sized ports through which gas may flow. These are usually complicated and expensive to manufacture and some are very difficult to control. In none of such prior art valves having a plurality of ports can the adjustment

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be made for the heating value of the gas as hereinafter defined.

In my valves as illustrated herein the various settings of the gas flame are controlled by the use of numbers on the knob or control dial so that after the valve is properly adjusted, an operator may set the valve for any desired flame without looking at the flame but merely by the use of the numbers on the knob. It is true that some valves constructed according to my inventions, could be operated in the full "on" position and adjacent thereto in a manner similar to the manner in which the prior art single port valves may be operated as described above (i. e. as the ports are brought from exact registration) (i. e. the full "on" position) to closed position there is a decrease in the size of the flame produced. However, my valves are not intended or expected to be so operated. It is so much more satisfactory to operate my valves in the manner in which they are especially intended that the operators will never resort to the cumbersome operation which is similar to the operation of the prior art valves.

My inventions are especially important when used in connection with gases having high heating values (i. e. high B. t. u. ratings) such as the bottle gases (i. e. liquefied petroleum gas such as butane and propane) and also the natural gases. With such gases it is especially difficult with the single port prior art valves to obtain a simmer flame without inadvertently extinguishing the flame entirely. The prior art valves heretofore referred to, which are formed with a plurality of ports on the other hand are not usually satisfactory with all types of gases because of difficulties in adjusting them for the wide range in heating value, specific gravities and distribution pressure of gases used. The table given in my co-pending application, Serial No. 776,687, filed September 29, 1947, gives the approximate statistics for various types of gases and illustrates the wide differences in these important characteristics thereof. Not only the B. t. u. value of the gas but also the specific gravity thereof and the distribution pressure under which the gas is supplied, affect the adjustment of the valve. Whenever used hereinafter in this specification and claims, I intend the words "heating value" or "heat value" to be construed to mean heating value, specific gravity of gas and/or distribution pressure thereof at the appliance, etc.

In the valves described and shown in this application in illustration of my invention I provide a plug member with a series of substantially

equal ports formed therethrough associated with a sleeve member which restricts the size of most of these ports through a series of steps so that the effective size of the ports vary. Moreover I provide means whereby this sleeve may be moved from one position to another so that the effective size of all of the ports may be decreased or increased simultaneously in order to compensate for the heat value of the gas with which the valve is being operated.

Objects

One of the objects of my invention therefore, is the construction of an improved valve especially useful in connection with gas burners, the valve being simple in operation and economical in construction. A further object of my invention is the provision of a valve especially useful in connection with gas burners which may be adjusted from a full "on" position through a series of positions to a simmer setting position or may alternatively be moved to an "off" position.

A further object of my invention is the provision, in combination with a valve of the character described, of means for adjusting the valve to compensate for different heating values of the gas for which it is to be used.

Features of my invention include the provision of a body member formed with an inlet port and an outlet port; having associated therewith a plug formed with a plurality of ports spaced around the circumference thereof; and having associated and combined with the plug and having a restricting port for each of the ports of the plug valve and arranged to be adjusted relative to these ports in order to restrict or increase the size of all of the ports simultaneously in order to compensate for the heating value of the gas being used. It should be understood that the plug may be rotated to register each of the ports of the plug separately and selectively with the inlet port of the casing so that the valve in operation may control the size of the flame to provide a flame of the size desired corresponding to each of the ports as modified by the associated port of the sleeve, whereby adjustment of the valve for different heating values of the gas is possible and whereby after adjustment operation of the valve to control the size of the flame is possible.

Further objects and features of the invention will be apparent from the subjoined specification and claims when considered in connection with the accompanying drawings showing for the purpose of illustration only the embodiments of my invention.

Drawings

In the drawings,

Fig. 1 is a view in side elevation of a valve constructed according to my invention the valve being shown associated with the front plate or main panel and cooking top frame of a cooking range and with the mixing tube thereof, portions of the valve, the mixing tube, the plate, the frame, and the gas manifold being shown in section;

Fig. 2 is a view in front elevation of the valve of Fig. 1 showing also a fragment of the range with which it is associated;

Fig. 3 is a view in front elevation of the valve of Figs. 1 and 2, portions of the range and the control knob having been removed;

Fig. 4 is a view in vertical section taken substantially on the line **4—4** of Fig. 2;

Fig. 5 is a view in vertical section taken substantially on the line **5—5** of Fig. 1;

Fig. 6 is a view of the sleeve in elevation;

Fig. 7 is an expanded view of the sleeve showing the sleeve as it would appear if severed and unrolled;

Fig. 8 is a sectional view similar to Fig. 4 showing an alternative form of valve; and

Fig. 9 is a view similar to Fig. 5 showing another vertical sectional view of the valve of Fig. 8.

Referring now to the drawings for a detailed description of the invention it may be seen that I have shown in Fig. 1 a valve **11** associated with a range having a mixing tube **12**, a main panel **13**, and a cooking top frame **14**. The valve **11** has a downwardly extending inlet boss **15** which is screwed into an inlet gas manifold **16**. The mixing tube **12** is provided with an air shutter **17** which is held in any desired adjusted position by a screw **18**. The inner end of the valve **11** is formed as a threaded projection or nozzle **19** onto which there is screwed an orifice cap **21** which extends into the mixing tube **12**. The boss **15** is formed with an inlet bore or passage **20**. The valve **11** has a main body member **22** and this is provided with a spring cap **23** forming a casing or cover. Within the body member **22** and the casing **23** is a plug member having a stem **24** which extends forwardly from the valve and on which there is removably secured a knob or dial member **25**. As may be seen in Fig. 2 this knob or dial member is formed with markings "off," "sim," 2, 3, 4, 5, 6, and "on." These markings cooperate with an indicating mark **26** formed on the panel **13** to indicate the position of the valve and indicate the amount of gas which may flow through the valve at the corresponding setting thereof.

As may be seen more clearly in Fig. 3, the stem **24** is formed with a relatively short flat surface **27** and a relatively large flat surface **28** by reason whereof the position of the knob **25** on the stem **24** is accurately determined. Associated with the stem **24** is a stop sleeve **29** which as shown in Figs. 1 and 3 surrounds a portion of the stem **24**. It is to be understood that this stop sleeve cooperates with a stop **31** formed as an indentation in the casing member **23** and so limits the movement of the dial **25**. Thus the stem **24** and its associated plug may not be turned beyond the "off" position in one direction (clockwise in Fig. 3) and the full "on" position in the other direction (counterclockwise in Fig. 3). As may also be seen in Figs. 1 and 3 the casing or spring cap **23** is secured to the main body member **22** by means of a relatively large screw **32** and a relatively small screw **33** which pass through corresponding pairs of ears formed on the body member **22** and the casing **23**.

Referring now especially to Figs. 4 and 5 it may be seen that the stem **24** is a part of a plug member **34**. The plug member **34** is hollow as at **35** and houses within said hollow a sleeve member **36**. This sleeve member is important in connection with this embodiment of my invention and will be described more completely later. This sleeve member **36** is resiliently held in position by an off center screw **37** threaded into the plug **34** and extending through an off center opening to the sleeve **36**. A spring **38** bears at one end on the base of the sleeve **36** and at its opposite end on the head of the screw **37**. Bearing also on the base of the sleeve **36** but on the opposite side from the spring **38** is an obliquely extending adjustment screw **39** the head of which may be seen in Fig. 3. It will be noted that this adjustment screw is wholly within the spring cap **23**.

As will be more fully described later the adjustment screw 39 acting on the sleeve 36 positions the sleeve 36 as may be desired, it being understood that the spring 38 maintains the sleeve 36 always in contact with the screw 39. It will also be noted that in the simmer position access to the screw 39 is possible through a notch 40. Positioned between the stop sleeve 29 and the main body of the plug 34 is a spring 41. The spring 41 surrounds a reduced portion 42 of the plug 34 and maintains the stop sleeve 29 and the plug 34 in correct position.

Referring now to Figs. 5, 6, and 7 for a more specific description of the sleeve 36 it may be seen that the sleeve is formed with a relatively large notch, slot or port 46 formed in both the base and side of the sleeve. This larger notch 46 is provided to allow a full flow of gas at the "on" position. The sleeve is also formed with a plurality of oblong slots of varying widths such as 47, 48, 49, 51, 52, and 53. These slots vary in width from the relatively narrow slot 53 to the relatively wide slot 47. They are oblong with parallel sides and the end which cooperates with the associated round port in the plug is arcual. The opposite end may also be arcual, although this is not material. By this construction a finer and more accurate adjustment with gases of high heating value is possible. The sleeve is also formed with an imperforate portion 54.

As appears most clearly in Fig. 5, the plug 34 is formed with a series of ports 55, 56, 57, 58, 59, 61, and 62 which correspond in position with the ports 46, 47, 48, 49, 51, 52, and 53. However, all of the plug ports 56, 57, 58, 59, 61, and 62 are round and of substantially equal size. They could be drilled simultaneously or consecutively on the same center line and in the same plane. The port 55 is oval in shape. The plug also has an imperforate portion 63 corresponding to sleeve portion 54. The inlet port from the inlet bore or passage 20 is oval as shown at 60 and as may be understood from a comparison of Figs. 4 and 5.

It is believed that the operation of the valve described above will be fairly obvious from the description. With the valve in the position shown in Figs. 2, 3, 4, and 5, gas may flow from the manifold 16 through the inlet passage 20 through the plug port 62, and the sleeve simmer port 53 into the interior of the sleeve and thence through the nozzle 19, the orifice cap 21 into the mixing tube 12 and thence to the burner to maintain a flame which will give enough heat to boil material placed thereon gently or to simmer. If the valve is turned in a clockwise direction (as shown in Fig. 2 or 3) or in a counterclockwise direction (as shown in Fig. 5) until the stop sleeve 29 contacts with the stop 31 and the indication "off" registers with the arrow 26, the imperforate portions 54 and 63 will cover the inlet port opening from the inlet passage 20 so that no gas may flow from the gas manifold 16 to the mixing tube 12. If on the contrary the valve is turned in a counterclockwise direction as shown in Figs. 2 and 3 (clockwise as shown in Fig. 5) the sleeve ports 52, or 51, 49, 48, 47, and 46 may be caused successively to register with the inlet port connected with the inlet passage 20 so that successively larger amounts of gas may flow to maintain successively larger flames. Thus the user may secure a flame of any intensity desired by the user. If the valve is turned still farther in a counterclockwise direction as is shown in Figs. 2 and 3 (clockwise direction as shown in Fig. 5) substantially a full flow of gas will be allowed through the inlet passage 20, the ports 46 and 55, the interior of the sleeve 36, the nozzle 19, the orifice cap 21, and the mixing tube 12 to the burner.

The valve may be adjusted for gases of various heating values. For the purpose of adjusting the valve to the desired settings the valve is first turned to the full "on" position and the orifice cap 21 and the air shutter 17 are adjusted to give the proper flow of gas and the proper air adjustment respectively. Then the valve is turned back to the "simmer" position and the screw 39 is adjusted to move the sleeve inward or outward until the flame is the minimum that will be maintained without danger of going out.

It should be here noted that access to the screw 39 is only possible when the plug of the valve is set in the simmer position. Thus the positioning of the valve for the simmer position is in a sense automatic. That is to say it is impossible to try to adjust the flame to a simmer setting except when the plug is positioned at the simmer position.

The intermediate positions are automatically adjusted for the "heating value" of the gas by the single adjustment.

It will be understood that more or less of the area of the oblong sleeve ports 47, 48, etc., is uncovered depending on the heating value of the gas being used. When adjusted for use with the liquefied petroleum gases only about 10% of their area is utilized. The natural gases require a setting where the oblong ports are much further uncovered. The mixed gases require still larger openings. The manufactured gases (especially if the prevailing gas pressure is low) may require a setting wherein the oblong sleeve ports are near the fully uncovered position. It may also be noted that the screw 39 and notch 40 might be positioned at other places on the circumference of the valve provided they are both moved together and provided the screw 37 does not interfere and provided that the inner end of the screw 39 is positioned so that it may not enter the notch 46. It is to be understood that one edge of the oblong ports 47–53 inclusive overlaps one edge of the associated round ports 56–62 inclusive. The amount of the overlap depends on the adjustment of the sleeve 36 by the screw 39. The edges which overlap may be called the adjustment edges. I wish to point out here that lines drawn to contact the adjustment edges of ports 47–53 and 56–62 should preferably be parallel. Because of the oval shape of the port 60, it is not so important that these lines be parallel to circumferences of the plug, but it is important that they be parallel to each other in order that movement of the sleeve 36 by the screw 39 shall adjust each of the ports proportionately.

In the embodiment shown in Figs. 8 and 9 the main body 94 is provided with a nozzle 92 and with a spring cap casing 93. The plug 64 is formed with a longitudinal axial bore through which the relatively long screw 65 extends. This screw 65 is formed with a shoulder at 66 against which the base of the sleeve 67 bears. At its rearward end the screw 65 is provided with a nut 68 which bears against a spring 69 interposed between the nut 68 and the base of the sleeve 67. A guide pin 71 secured in the plug 64 extends through a hole formed in the sleeve 67 and causes the sleeve to rotate coincidentally with the plug 64. A spring 72 is interposed between the plug 64 and a stop sleeve 73 which cooperates

with a stop indentation 74. The plug 64 is formed with an oblong port 75 and with round ports 76–81 inclusive and the sleeve is formed with varying width slit-like ports 83–88 inclusive and with a large slot or notch 82. The plug is formed with an imperforate portion 89 and the sleeve with a corresponding imperforate portion 90. The main body is formed with a threaded boss 91 adapted to be threaded into the gas intake manifold.

The operation of this embodiment is similar to that of the embodiment previously described. Adjustment of the simmer setting is accomplished by turning the valve to the simmer position, removal of the knob or dial member and adjustment of the screw 65.

Features of my invention not previously sufficiently emphasized are the shape of the neck 60 of the inlet port 20 and the shape of the neck 95 of the inlet port 96. As may be seen by comparison of Figs. 4 and 5 and by comparison of Figs. 8 and 9, the necks or ports 60 and 95 are oblong with the greater length extending longitudinally of the valve. As stated above the port 55 is oval or oblong in shape and ports 56, 57, 58, 59, 61, and 62 are round in shape. The port 55 corresponds substantially in size with the size of the neck or port 60. Similarly as stated above the port 75 is oblong in shape and ports 76–81 inclusive are round in shape with the port 75 corresponding substantially in size with the neck or port 95. These features make it possible to obtain a relatively large number of ports (or valve positions) with a plug and valve body of regular size.

It is not necessary to hold the stem of the plug when adjustment of screw 39 is being made. It is best however, to hold the stem of the plug when making simmer adjustment of screw 65 (Fig. 8). The full on flow of gas is determined by the position of the orifice cap. The proper flame characteristic is determined by adjustment of the air shutter.

The embodiments of the valve disclosed herein are also shown in my application Serial No. 66,710, filed December 22, 1948, which is intended to include claims generic to the inventions disclosed herein. Said application Serial No. 66,710 also discloses embodiments of my inventions disclosed in my applicatcn Serial No. 776,687, filed September 29, 1946, and my application Serial No. 6,719, filed February 5, 1948.

It is to be understood that the above described embodiments of my invention are for the purpose of illustration only. Various changes may be made therein without departing from the spirit and scope of the invention.

I claim:

1. A valve comprising a non-rotatable casing member, a rotatable rotor member formed with a recess, formed with an open end, and having a plurality of openings all of substantially equal size, substantially equally spaced around the circumference of the plug; a hollow cylindrical sleeve formed with an open end, positioned in said recess, rotatable with said rotor member, and having a plurality of substantially equally and circumferentially spaced slits of progressively increased widths which are respectfully spaced in the same angular position circumferentially as the respective openings in the rotor member and register substantially with said openings in the rotor member; a handle for turning said rotatable rotor member and said sleeve member to a plurality of different positions to control the amount of gas flowing therethrough, the size of the flame and the heat developed, and means to move said sleeve longitudinally relative to the casing and to the rotatable rotor member to vary the registration of the ports to produce an infinite number of proportional orifice sizes by the cooperation of each individual slit and its cooperating rotor opening.

2. A valve comprising a casing having an inlet port and an outlet port; a rotor member positioned in said casing and formed with a plurality of circumferentially spaced side openings connected with one of said ports and formed with a recess having an opening at one end connected with the other of said ports; a cylindrical sleeve having an open end, positioned in said recess, formed with circumferentially spaced side openings registering substantially with the side openings of the rotor member, and rotatable with said rotor member to a plurality of rotatable positions in order to control the amount of fluid passing therethrough dependent upon the rotated position of the rotor member and the sleeve relative to the casing; a spring bearing upon said sleeve and urging it in one direction within said rotor member and a screw bearing upon said sleeve for moving it in the opposite direction and linearly parallel with the axis of rotation thereof and acting in ccoperation with said spring to adjust simultaneously the effective sizes of the side openings in the rotor member to control the amount of fluid which may pass through said valve for a plurality of said rotative positions.

3. A valve comprising a casing, formed with a large inlet port on one side thereof formed with an outlet at one end thereof and having a tapered recess; a tapered plug positioned in said recess, formed with a cylindrical bore having an open end facing toward said outlet, formed with a relatively large inlet opening arranged to register at times with said inlet port and with a plurality of smaller inlet openings each arranged to register at other times with said inlet port; a cylindrical hollow sleeve having one open end, positioned in said cylindrical bore, having its open end communicating with said outlet, having a relatively large port substantially registering at all times with the larger inlet opening, and having a plurality of slits each having a different width and each registering substantially with one of said smaller plug inlet openings; means consisting of a spring bearing on the base of said sleeve and urging the sleeve in one direction and an adjustment screw bearing on the base of said sleeve in the opposite direction for moving said sleeve longitudinally of the valve in said opposite direction to vary the overlapping of each of said sleeve openings relative to its registering plug opening to adjust simultaneously the effective size of each of said openings; and means consisting of a cap having a cut-out portion registering with the position of the screw when the plug is turned so that the most narrow slit is registered with the inlet port, for preventing adjustment of said adjustment screw except when said most narrow slit is registered with said inlet port.

4. In a valve; a non-rotative casing member having an inlet opening and an outlet opening; a rotative plug member positioned therein and formed with an inlet port registrable with the inlet opening and formed with a central recess, which recess is connected with the inlet port; a hollow cylindrical sleeve having an open end which open end is connected with said outlet

opening, having the opposite end closed to form an inside bottom surface, being positioned in said recess, and being formed with a port registering with the plug inlet port; a headed bolt member positioned in an off-center hole in said plug member and extending within said recess substantially longitudinally of the valve through an off-center hole in said sleeve so as to prevent rotation of said sleeve relative to said plug while allowing relative movement of the sleeve to the plug parallel with the rotative axis; a spring positioned between the head of said bolt and the inside bottom surface of said sleeve and means for moving said sleeve parallel with said rotative axis against the action of the spring.

5. A valve comprising a stationary casing having an inlet port and an outlet port; a rotative plug within said casing having a recess with an opening at one end which is connected to one of said ports and having a plurality of circumferentially spaced side openings positioned in axial alignment and each connected to the other of said ports; a sleeve within said recess formed with a plurality of circumferentially spaced side openings positioned in axial alignment and each substantially registering with one of the side openings of the plug; means for preventing rotation of the sleeve relative to the plug and for maintaining the side openings of the sleeve in substantial registration with the side openings of the plug; and means for moving said sleeve longitudinally relative to the plug to vary the effective size of the openings formed by the respective side openings in the plug and the registering side openings in the sleeve.

6. A valve comprising a casing, formed with an inlet port on one side and with an outlet at one end thereof and having a tapered recess; a tapered plug in said recess, formed with a cylindrical bore having an open end facing toward said outlet, formed with a relatively large inlet opening arranged to register at times with said casing inlet port, and formed with a plurality of smaller inlet openings spaced circumferentially of the plug, positioned in axial alignment, and each arranged to register at other times with said casing inlet port; a cylindrical hollow sleeve having an open end, being positioned in said cylindrical bore, having its open end communicating with said outlet, having a relatively large port substantially registering at all times with the large inlet opening and having a plurality of relatively small openings spaced circumferentially of the sleeve, positioned in axial alignment, and each registering substantially with one of said smaller inlet openings; means comprising a screw for moving said sleeve longitudinally to vary the longitudinal registration of said relatively small openings with the smaller inlet openings to vary simultaneously the effective size of all of said smaller inlet openings; and means constraining said sleeve against rotation relative to said plug.

7. A valve having the structure of claim 5 in which the ports in the plug are round and in which the ports of the sleeve are oblong ports having parallel sides, having at least one end formed as an arc, and each having a different size from each of the others.

8. A valve having the structure of claim 5 in which the ports in the plug are round and in which the ports in the sleeve are oblong ports having parallel sides, having at least one end formed as an arc, each being of a different size, and having one edge of each overlapping one edge of the plug ports so that a line drawn through the overlapping edges of the plug ports is parallel to a line drawn through the overlapping edges of the sleeve port.

9. A valve having the structure of claim 2 in which the casing has a tapered recess; the rotor member is a tapered plug in said tapered recess; the recess in the rotor member is a cylindrical bore having an open end facing towards said outlet; the rotor member is formed with a relatively large inlet opening registering at times with said casing inlet port, and is formed with a plurality of smaller inlet openings each registering at other times with said casing inlet port; the cylindrical sleeve is hollow, has its open end communicating with said outlet, has a relatively large port substantially registering at all times with the large inlet opening of the plug and has a plurality of smaller openings each registering substantially with one of said smaller inlet openings of the plug.

10. A valve having the structure of claim 2 in which the casing has a tapered recess; the rotor member is a tapered plug positioned in said tapered recess; the recess in the rotor member is a cylindrical bore having its open end facing toward said outlet; the rotor member is formed with a relatively large inlet opening arranged to register at times with said casing inlet port, and is formed with a plurality of smaller inlet openings all of substantially the same size as each other and each arranged to register at other times with said casing inlet port; the cylindrical sleeve is hollow, has its open end communicating with said outlet, has a relatively large port substantially registering at all times with the larger inlet opening of the plug, and has a plurality of smaller slit openings positioned at the same angular position as the smaller inlet openings of the plug and each arranged to register substantially with one of said smaller plug inlet openings; and the means for moving the sleeve longitudinally changes the orifice size of each slit proportionately with each other slit so that the valve is universal for all kinds of gas.

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2,229,826	Thornbery	Jan. 28, 1941
2,252,185	Kluse	Aug. 12, 1941
2,288,913	Moecker	July 7, 1942

FOREIGN PATENTS

Number	Country	Date
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552,778	Germany	of 1932
637,448	France	of 1928
772,759	France	of 1934