Oct. 14, 1958 N. M. HUFF ET AL 2,855,956

GAS VALVES

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Fig. 1.

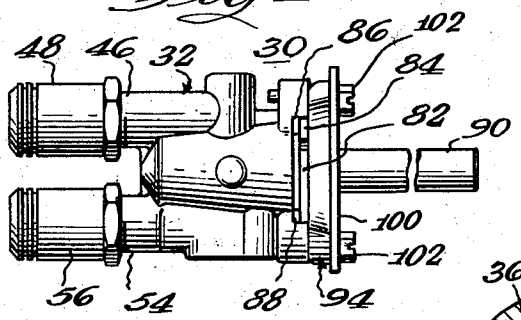


Fig. 2.

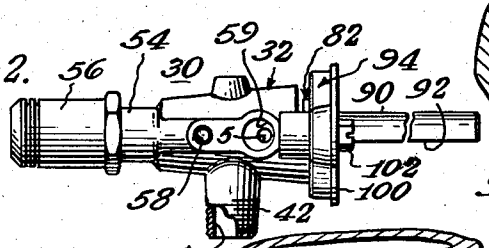
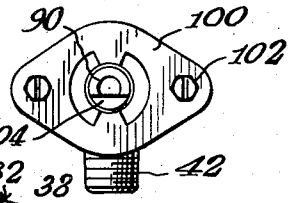


Fig. 3.



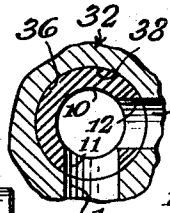


Fig. 9.

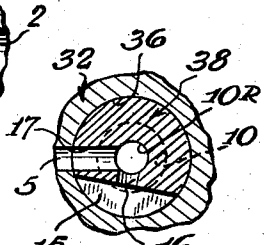


Fig. 4.

FULL ON

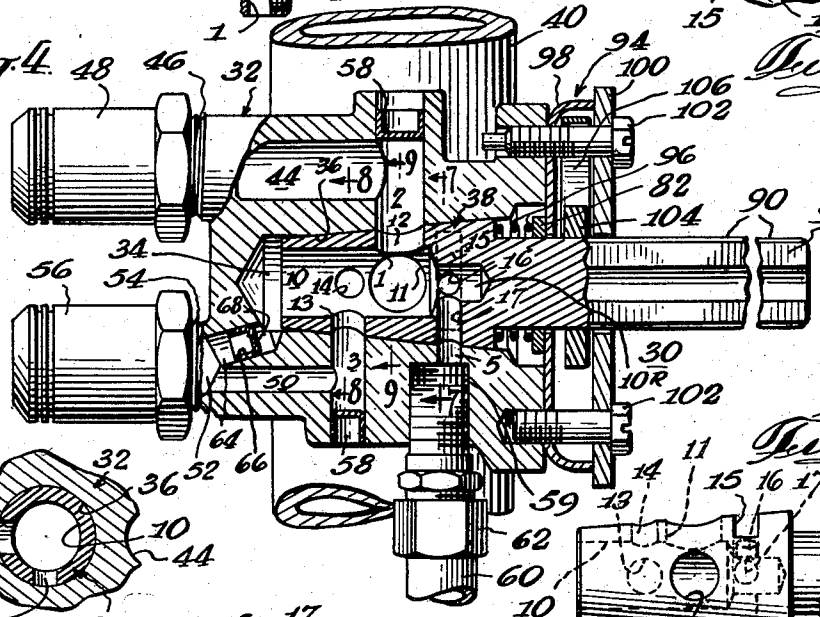


Fig. 7.

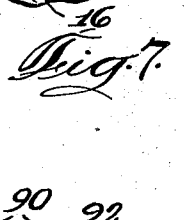


Fig. 6.

Fig. 8.

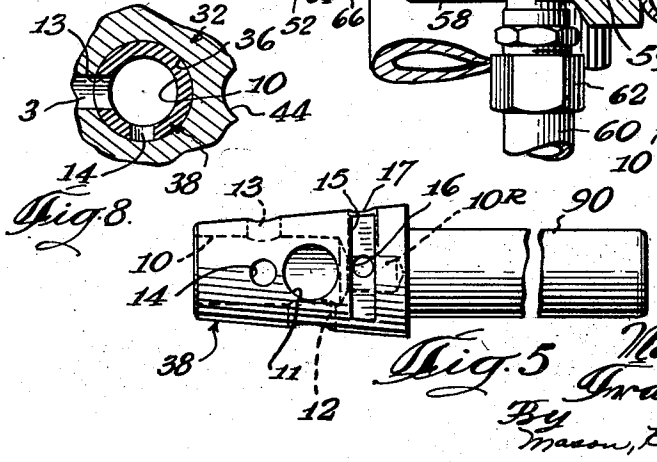


Fig. 5.

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Fig. 10.

FULL ON

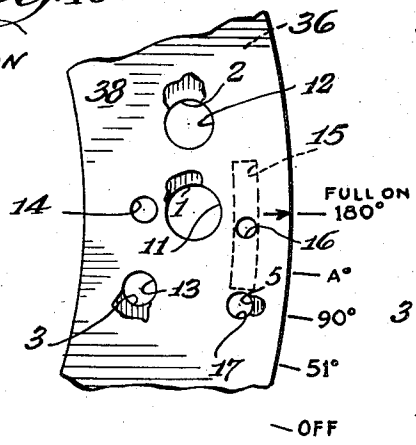


Fig. 14.

CARRY OVER

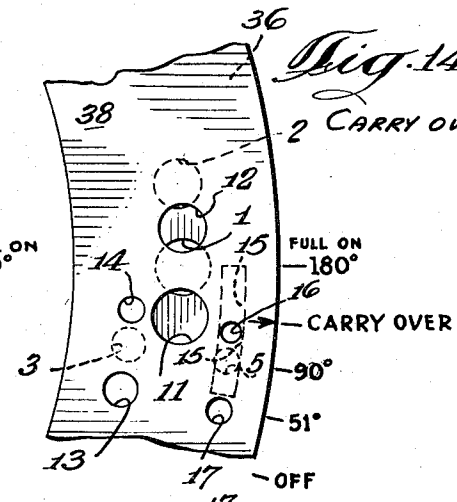


Fig. 11.

FULL SIMMER

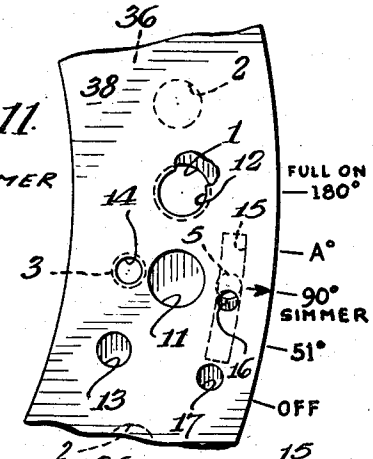
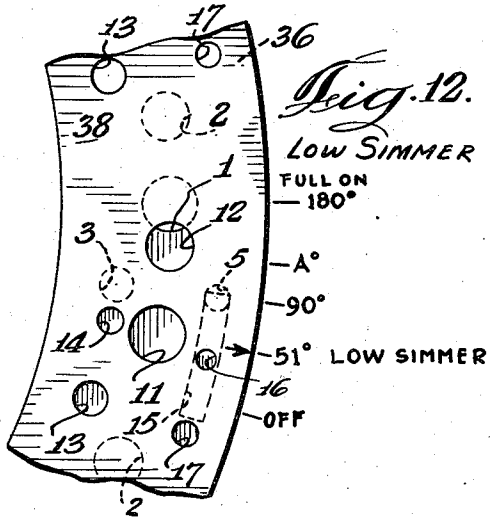


Fig. 12.

LOW SIMMER



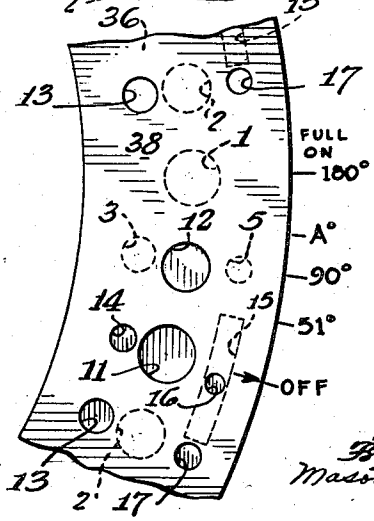


Fig. 13.

OFF

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GAS VALVES

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Application April 24, 1952, Serial No. 284,152

1 Claim. (Cl. 137—625.32)

The present invention relates to gas valves, and particularly to so-called double gas valves, i. e., valves used with gas burners each having two burner sections and wherein the double valve controls the supply of gas to both sections. Burners of this type are called double burners and one of the burner sections is generally called the main burner and the other section the simmer burner.

There are disclosed in the copending applications of Charles C. Lamar and Charles C. Lamar et al., applications Serial Nos. 277,219, and 277,218, filed March 18, 1952 (the former of which has matured into Patent No. 2,770,253, dated November 13, 1956, and the latter of which is now abandoned, it having been superseded by a continuation application Serial No. 449,042, filed August 11, 1954), double gas valves which can be constructed simply even though they provide a considerable number of desirable operating characteristics and which can be made economically because of their small size. The present invention is directed to a new and improved double valve of the character disclosed in the aforementioned applications and is disclosed in connection with such valves. It has for one of its primary objects the provision of a new and improved double valve having associated with its means for supplying gas at full line pressure to a pilot burner or other burner system in the various operative positions of the valve.

In double gas valves of the type to which the present invention relates, a number of operative positions are provided in addition to the off position. These operative positions include a full on position wherin gas is supplied at a maximum rate to both the main and simmer burner sections, a full simmer only position position wherein gas is supplied at a maximum rate to the simmer burner only, and a low simmer position wherein a predetermined low quantity of gas is supplied to the simmer burner only. The valves are constructed and arranged also to provide what are called turndown ranges wherein regulatable quantities of gas can be supplied to both the burner sections or to the simmer burner section only. The present invention provides valves of the character aforesaid with means for supplying a substantially constant quantity of gas to an associated burner, such as a pilot burner, in all the operative positions of the valve.

The construction, furthermore, of the valve of the present invention is such that a valve can be used with other like valves in a system in which full gas pressure may be applied at the pilot burner outlet, with a valve in its off position, without danger of leakage.

In brief, the valve of the present invention includes a valve body having a valve chamber and a gas inlet passageway and a main burner outlet passageway coplanar therewith but angularly spaced from it and both communicating with the chamber. The body has also what may be termed a first or full simmer outlet passageway angularly spaced from the others and also axially spaced from them. Within the valve chamber is mounted a rotatable valve plug having an axial passageway and four transverse passageways or ports of which three are aligned

with the inlet passageway and both the main and simmer burner outlet passageways in the full on position of the valve, and of which three, one (the one aligned with the main burner outlet passageway in the full on position) is aligned with the inlet passageway and the fourth is aligned with the full simmer burner outlet passageway in the full simmer position. The valve includes also other passageway defining means providing what may be called a low simmer and carry-over passageway including flow restricting means for predetermining the flow of gas in the low simmer position and at the low end of the turndown to both sections where a changeover is made from the supply of gas to both burner sections to the supply of gas to the simmer burner section only. This passageway defining means may take the form of a low simmer and carry-over outlet passageway in the body communicating with the full simmer outlet passageway and valve chamber so as to be in continuous communication with the axial passageway in the plug.

According to the present invention gas is supplied continuously to another burner or burner system through a further system of passageways comprising an outlet passageway (hereinafter called a pilot takeoff passageway) and an arcuate slot in the valve plug open to the axial passageway in the plug and extending angularly over a range somewhat less than that equivalent to the operative position range of the valve plug. The further system (hereinafter called the pilot takeoff system) includes also a transverse passageway in the plug at or near one end of the slot and which is drilled at the same time as the pilot takeoff passageway in the full on position of the valve thereby to insure full registry at the full on position. The slot and transverse passageway of the pilot takeoff system are axially spaced from the main and simmer passageways to insure adequate sealing in all the positions of the valve, including the off position and even though full pressure should be applied at the pilot takeoff passageway.

Other objects and advantages of the present invention will become apparent from the ensuing description of an illustrative embodiment thereof, in the course of which reference is had to the accompanying drawings, in which:

Fig. 1 is a full scale top plan view of a valve constructed in accordance with the invention, with the pilot takeoff fitting omitted;

Fig. 2 is a full scale side elevational view of the valve as shown in Fig. 1;

Fig. 3 is a full scale end view looking at the valve as shown in Figs. 1 and 2 from the stem end;

Fig. 4 is an enlarged top plan view partly in axial section, with the valve in its full on position and showing the pilot takeoff fitting;

Fig. 5 is a plan view of the valve plug as viewed from the bottom in the full on position;

Fig. 6 is a side elevational view of the plug as shown in Fig. 5;

Figs. 7, 8 and 9 are fragmentary transverse cross sectional views taken along the lines 7—7, 8—8 and 9—9 of Fig. 4;

Fig. 10 is a conical layout of the plug chamber and plug with the valve in its full on position;

Figs. 11, 12 and 13 are views similar to Fig. 10 illustrating the valve in its full simmer, low simmer, and off positions; and

Fig. 14 is a view similar to the preceding views illustrating the valve in its carry-over range.

Referring now to the drawings, and first to Figs. 1–9, inclusive, the double gas valve of the present invention is indicated as a whole by reference character **30**. It comprises a valve body **32** having a chamber **34** with a conical inner surface **36** within which is mounted a

movable control member illustrated as a rotatable tapered or conical valve plug **38**.

Gas is supplied to the valve plug from any suitable source such as a gas manifold **40** (see Fig. 4). The valve body is provided with a gas inlet passageway **1** formed within an externally threaded boss **42** (see Fig. 3) utilized in securing the valve to the manifold. The inlet passageway **1** is radial relative to the longitudinal axis of the valve plug and chamber, and the body is provided also with radial outlet passageway portions **2** and **3** through which gas is supplied to the main and simmer burners respectively. Passageway **2** communicates with an axially extending main burner outlet passageway **44** formed in the valve body and terminating in an externally threaded boss **46** to which is secured an adjustable hood **48** which predetermines the maximum quantity of gas supplied to the main burner section of the double burner (not shown) in the full on position of the valve in a manner well known to those skilled in the art. Passageway **3**, comprising part of the full simmer outlet passageway, communicates with a generally axially extending outlet passageway portion **50** in the valve body which in turn communicates with a simmer burner outlet passageway **52** formed in an externally threaded boss **54** at the end of which is mounted an adjustable hood **56** which predetermines the maximum quantity of gas supplied to the simmer burner section (not shown) in both the full on and full simmer positions. All of the passageways mentioned can be readily formed as by drilling the valve body. The passageways **2** and **3** can be drilled from the outside of the valve body after which the outer ends can be readily closed as by the cup-shaped plugs **58**. These passageways and the passageway **1** can also be drilled at the same time as the hereinafter referred to passageways **11**, **12** and **13**. The valve plug is provided with an axially extending passageway **10** and with four radial passageways, **11**, **12**, **13**, and **14**, of which as best illustrated in Fig. 4, the passageways **11**, **12**, and **13** are aligned with the passageways **1**, **2**, and **3** in the valve body in the full on position of the valve plug. The passageways **3**, **13**, and **14** are axially spaced from the passageways **1**, **11**, **2**, and **12** so that there can be no registry of any of the first set with any of the second. Also, passageway **14** registers with the passageway **3** in the full simmer position, in which position passageway **12** registers with the inlet passageway **1** as will be described in greater detail hereinafter.

In accordance with the present invention the valve is constructed and arranged also to supply gas at full line pressure to another burner or burner system such, for example, as a pilot burner, in the various operative positions of the valve. This supply is provided through a further outlet passageway **5** (the pilot takeoff passageway) in the valve body which is connected to another burner system or burner such as a pilot burner through an internally threaded opening **59**, conduit **60** and a fitting **62**, of which the conduit or fitting may be provided with a flow restricting orifice determining the flow of gas to the pilot burner. The supply to the pilot takeoff outlet passageway is effected through a coplanar system of passageways in the valve plug including a slot **15** on the exterior of the plug, a passageway **16** connecting the slot to axial passageway **10** and a passageway **17** near one end of the slot leading from the exterior of the plug to the axial passageway. The arrangment is such that gas is supplied to the pilot takeoff **5** over the major portion of the operative range of the valve through passageway **16** and slot **15** and at the limit (the full on position) through passageway **17**. The latter is close enough to the end of the slot to insure a continuous flow of gas and, being in registry with passageway **5** at the limit position, insures an adequate flow in this position. Also, passageways **5** and **17** can be drilled at the same time to insure registry. Incidentally, passageways **16** and **17** communicate with a reduced diameter portion **10R** of the axial passageway **10**, but this is not essential.

The pilot takeoff system, it should be noted, is spaced axially from passageways **1**, **11**, and **2**, **12** sufficiently to provide good sealing, thereby preventing sneak gas circuits in all plug positions.

A predetermined low quantity of gas is supplied to the simmer burner in the low simmer position of the valve plug and also at the low end of the turndown to both sections where changeover is effected from the supply of gas to both burner sections to the supply of gas to the simmer burner only. This low quantity of gas is supplied through a low simmer and carry-over passageway **64** connecting the simmer burner outlet passageway **52** to the valve chamber **34** into which the axial passageway **10** in the valve plug opens. Flow restricting means in the form of a cup-like insert **66** having a fixed orifice **68** is inserted into the passageway **64**.

The various positions of the valve may be indicated to the user in desired manner by suitable position indicating and determining means. The means illustrated herein will not be described in detail but it is of a character disclosed and claimed in the copending application of Philip S. Harper, Serial No. 544,484, filed November 2, 1955, and forming a continuation of application Serial No. 162,446, filed May 17, 1950, now abandoned. This means includes a full on and off position determining and indicating washer **82** having a radial projection **84** engaging a first shoulder **86** in the off position and another shoulder **88** in the full on position. The washer encircles the valve operating stem **90** having a flat side **92** and rotates with it. It is biased against a housing **94** by a spring **96** (see Fig. 4) which also maintains the valve plug seated. Additional intermediate position indicating mechanism is located within the housing **94**. The housing consists of a cup-shaped element **98** and an end cap **100** through which the valve stem projects. The housing is held in assembled relation relative to the valve body by the securing screws **102**. The additional intermediate position indicating mechanism includes a washer **104** also rotating with the valve stem and valve plug, and a spring element **106** cooperatively associated with the washer **104** to provide the desired position indication.

As hereinbefore indicated, the valve is operable into a plurality of positions indicated particularly in Figs. 10–14, inclusive. The off position is indicated in Fig. 13 and the operative positions are as follows: a full on position, Fig. 10; a full simmer only position, Fig. 11; a low simmer only position, Fig. 12; and a carry-over range lying between a supply of gas to both burners and to the simmer burner only, Fig. 14. The construction is also such that the supply of gas to both burner sections or simmer burner section only can be regulated in turn-down ranges.

In the full on position of Fig. 10, maximum quantities of gas are supplied to both the main and simmer burners. In this position the inlet passageway **1** is in full registry with passageway **11** so that gas is supplied to the axial passageway **10** and from the latter through the main and full simmer burner outlet passageways **2**, **44** and **3**, **50**, **52** to the main and simmer burners. Some gas is at the same time supplied to the simmer burner through passageway **64** and orifice **68** but this is only a small quantity. In the full on position an adequate supply of gas flows to the pilot burner through the axial passageway **10**, **10R**, and the transverse passageway **17**, which is in full registry with the pilot takeoff passageway **5** in the valve body.

When the valve is turned from its full on toward the full simmer position, the supply of gas to the two burner sections is gradually decreased, the throttling taking place at the outlet passageways rather than at the inlet. During this movement passageway **17** moves out of registry with passageway **5**, but before this happens, slot **15** registers with the latter to provide a continuous and adequate supply of gas to the pilot, the flow to the slot being through

10R and 16. Before the full simmer position of Fig. 11 is reached, the low turndown to both sections and carry-over range (see Fig. 14) is reached. In this range the supply of gas to the pilot burner is continued through passageway 16, slot 15 and passageway 5. Also, a predetermined low quantity of gas determined by the orifice 68 is supplied to the simmer burner outlet passageway through the low simmer and carry-over passageway 64 and from the inlet passageway 1 and either one or both of passageways 11 and 12 to the axial passageway.

In the full simmer position of Fig. 11, the passageway 12 in the plug registers with the inlet passageway 1 and the passageway 14 registers with the passageway 3 so that a full supply of gas is supplied to the simmer burner outlet passageway. The supply of gas to the pilot burner continues through passageway 16, slot 15 and outlet passageway 5.

The supply of gas to the simmer burner can be regulated in a turndown range between the full and low simmer positions, the throttling again occurring at the bearing surface of the plug and body by the gradual movement out of registry of passageways 3 and 14.

The low simmer position is indicated in Fig. 12. In it gas flows from the inlet passageway 1 to the simmer burner passageway through the passageway 12, axial passageway 10 in the valve plug, the chamber 34, passageway 64, and the insert 68. The supply of gas to the pilot burner is continued through passageway 16, slot 15 and outlet passageway 5.

In the off position illustrated in Fig. 13, the inlet passageway 1 is closed by the valve plug so that the supply of gas is cut off entirely.

In some installations a number of valves may be connected through associated pilot takeoff passages and conduits 60 to the same pilot burner arrangement. As a result, full gas pressure can be applied to a closed valve when another valve is opened, this pressure being applied at the plug surface through the takeoff passageway 5. The present construction is such that even should this occur there is no undesired leakage of gas through a closed valve. This results from the fact that there is adequate sealing space between the passageway 5 and other passageways in the off position. Note, in Fig. 13, the spacing between passageways 5 and 12, and also between 5 and the adjacent end of slot 15.

From the foregoing detailed description of the present invention, it may be noted that the valve is simple to construct and provides not only the generally desired operating conditions of a double valve, but also provides a continuous supply of gas to a pilot or other burner by means of a construction that can be manufactured readily and economically and wherein no sneak gas circuits are present to cause undesired flareup or leakage on either of the burners.

While the present invention has been described in connection with the details of a particular embodiment thereof, it should be understood that these details are not intended to be limitative of the invention except insofar as set forth in the accompanying claim.

Having thus described our invention, what we claim as new and desire to be secured by Letters Patent of the United States is:

A double gas valve for a double burner comprising main and simmer burner sections, including a valve body having a chamber, a transverse gas inlet passageway leading to said chamber, main and full simmer burner gas outlet passageways leading transversely from said chamber, a tapered valve plug rotatably mounted in said chamber having a first transverse passageway aligned with said inlet passageway and second and third transverse passageways aligned with said main and full simmer outlet passageways, respectively, in a full on position of the valve, said valve plug including also an axial passageway open at one end and communicating with the three mentioned passageways in the plug and including also a fourth transverse passageway in coplanar relation with said third passageway in the plug and said full simmer burner outlet passageway, said inlet, main burner outlet, and first and second plug passageways being in coplanar relation and axially displaced from the other coplanar passageways so that the two coplanar sets of passageways do not register in any position of the plug, means defining a low simmer and carry-over passageway with a flow restricting orifice therein connecting said axial passageway to said full simmer outlet passageway, the angular spacing of said passageways in the body and plug being such that the valve plug is operable from its full on position to a full simmer position wherein the fourth transverse passageway in the plug is in registry with the full simmer burner outlet passageway and said second passageway in the plug is in registry with the inlet passageway and the main burner outlet passageway is closed, and so that the plug is movable from said full simmer position into a low simmer position wherein both the main and full simmer burner outlet passageways are closed at the plug and a low quantity of gas is supplied to the simmer burner outlet passageway only through said axial passageway and orifice, and said body including a takeoff passageway opening into said chamber at a point axially spaced from the other passageways in the direction of the larger diameter portion of the tapered plug and said plug including passageway defining means comprising an external slot in the plug, a passageway connecting said slot to said axial passageway, and a transverse passageway connecting the exterior of the plug to said axial passageway for supplying gas to said takeoff passageway in the flow establishing positions of said plug, said last mentioned transverse passageway being aligned with said take-off passageway in the full on position, and the takeoff passageway being so dimensioned and positioned as to be effectively sealed from the other passageways in the plug and body in the off position of the valve.

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