

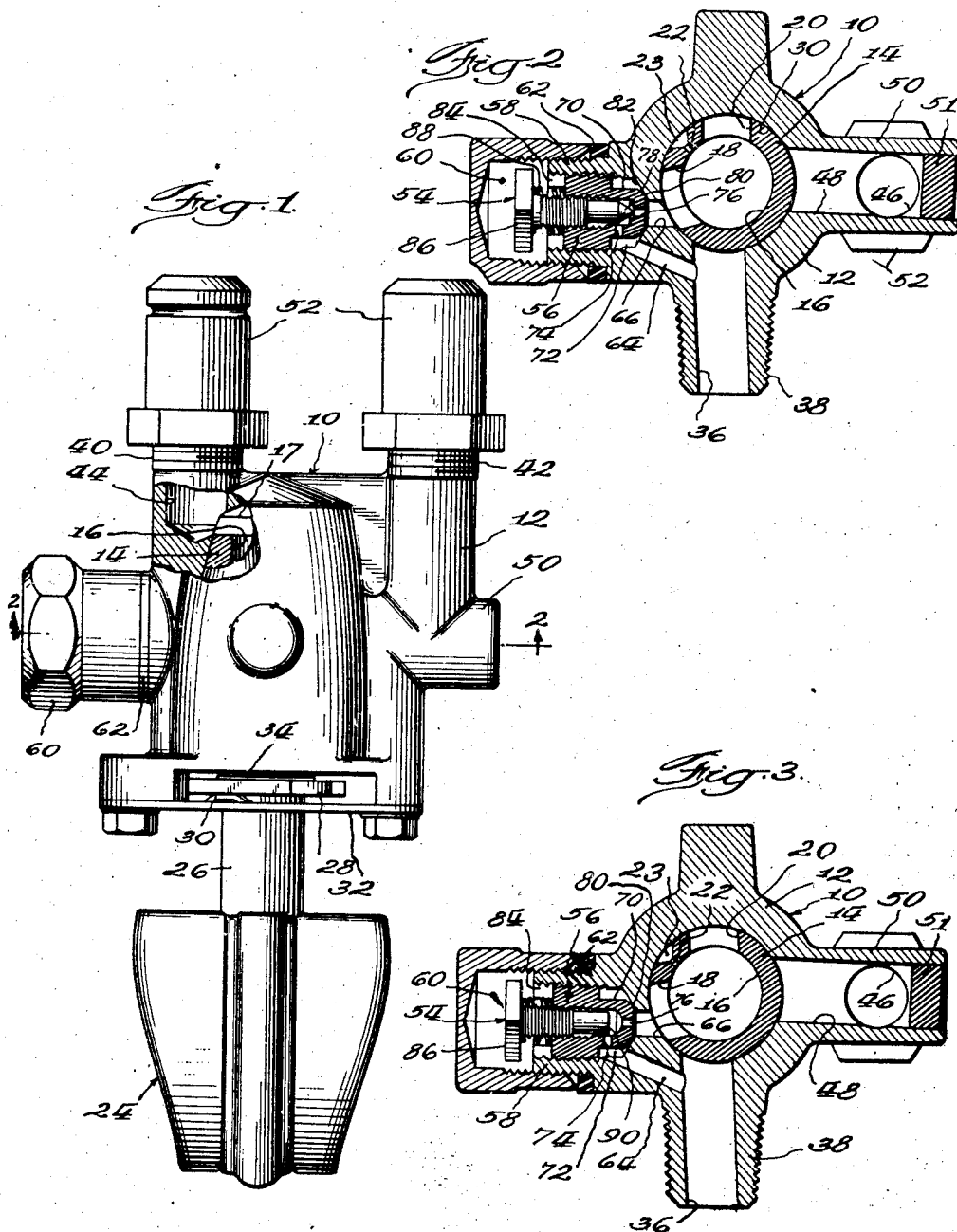
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G. F. TURNER ET AL

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GAS VALVE

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Inventors.
George F. Turner
Vincent C. Peterson
By Donald W. Ross
Williams, Bradbury & Hinkle
Attys.

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GAS VALVE

George F. Turner, Vincent C. Peterson, and Donald W. Ross, Chicago, Ill., assignors to Harper-Wyman Company, Chicago, Ill., a corporation of Illinois

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The present invention relates to gas valves and more particularly to the provision of a valve with improved low adjustment means for accurately regulating the flow of very small quantities of gas to a burner. The low adjustment means of this invention may be applied to high-low valves used in conjunction with a single burner or to valves constructed to supply gas to the simmer section of a double gas burner either at a high rate or at a very low rate.

High-low valves have heretofore been used on domestic gas ranges having single section burners. Valves of this type which are now in use are generally constructed with a low adjustment which will restrict the heat production of the burner to approximately 1500 B. t. u. per hour. Many gas ranges are also equipped with double burners having main and simmer burner sections. The gas valves used with these burners are constructed to supply gas to the simmer section only or to both the main and simmer sections. It has heretofore been proposed to provide gas valves that are operable also to supply gas to the simmer burner section at a predetermined low rate sufficient to keep warm small quantities of liquid or food. The position of the valve when this small quantity of gas is supplied to the simmer burner is commonly known as the "low simmer" position.

In the low simmer position gas is supplied to the burner at a rate sufficient to produce 250 B. t. u. or even as little as 200 B. t. u. per hour. In view of different gas rates that may be desired and the variations in B. t. u. content of gases, it is preferable to provide the valve with adjusting means for varying the rate of flow of the gas. Ordinarily, little trouble is encountered with the high-low gas valves since the minimum flow is comparatively large, but considerable difficulty has been encountered in restricting the flow of gas to provide but 250 B. t. u. per hour, particularly when high B. t. u. content bottled gas is used. When this type of gas is used, the low adjustment valve has to be adjusted to provide an opening having an area as small as .000026 square inch.

The primary object of the present invention is to provide a gas valve with new and improved means for regulating the quantity of gas supplied to a burner.

Another object of this invention is to provide a gas valve with adjusting means capable of satisfactorily regulating the flow of high B. t. u. gas to an amount which will provide the burner with

the gas at a rate of approximately 250 B. t. u. per hour.

A further object of the present invention is to provide a gas valve with means for adjusting the quantity of gas supplied to a burner that is equally effective when gas is to be supplied at a rate sufficient to provide 1500 B. t. u. per hour as at a rate to provide as little as about 250 B. t. u. per hour.

A further object of the invention is the provision of a new and improved low adjustment means for restricting the flow of gas through a valve provided with means to take up looseness and prevent play between the parts thereof, thereby insuring a constant flow of gas through the low adjustment means at any particular position of adjustment.

A further object of the invention is the provision of a new and improved low adjustment means for a valve of the high-low type which is of simple, durable construction, inexpensive to manufacture, yet capable of minute and accurate adjustment.

A further object of the invention is the provision of a new and improved low adjustment means for a gas valve for controlling the flow of small quantities of gas which is so constructed that the danger of clogging is eliminated.

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

Fig. 1 is an enlarged top plan view of a gas valve embodying the present invention;

Fig. 2 is a cross-sectional view taken on the line 2-2 of Fig. 1 but with the valve in low simmer position and illustrating the details of construction of the low adjustment means of the present invention; and

Fig. 3 is a view similar to Fig. 2 showing the details of construction of a modified form of the low adjustment means.

Referring now to the drawing and more particularly to Figs. 1 and 2, it may be seen that the gas valve, which is indicated generally by reference character 10, is a double gas valve adapted for use with double gas burners. It comprises a valve body 12 within which is mounted a rotatable control member illustrated as a tapered plug 14. The plug is provided with an axial passageway 16 providing communication between the interior of the valve plug and a chamber 17, within which the plug is mounted. The plug is provided also with a pair of main radially disposed passageways 18 and 20 located

approximately 90° from each other and a small and also radially disposed auxiliary passageway 22 located between the main and radial passageways. The end of passageway 22 adjacent the outer surface of the valve plug is enlarged, as indicated by reference character 23, to insure proper flow of gas in certain positions of the valve plug.

The particular construction and arrangement of the plug and passageways referred to herein-after form no part of the present invention, this being disclosed and claimed in the application of Philip S. Harper, Gas valves, filed contemporaneously herewith. The valve plug is rotatable by a handle 24 secured to a valve stem 26 formed integrally with the plug. The valve has associated with it a movement restricting and position indicating washer or detent plate 28 surrounding and movable by the valve stem and cooperating with a plurality of projections 30 (only one of which is shown) extending inwardly from a plate 32 also surrounding the valve stem but fixedly secured to the valve body. Plate 28 is urged toward plate 32 by a spring 34 surrounding the valve stem and also urging the valve plug into its seat. The particular construction and arrangement of these plates form no part of the present invention, the construction being disclosed and claimed in the application of Turner et al., Gas valves, filed contemporaneously herewith.

The valve body is provided with a main gas inlet passageway 36 formed in a boss 38 as by a drilling operation. The boss is exteriorly threaded for attachment to the usual gas supply manifold, not shown. The valve body is also provided with a pair of axially extending, spaced-apart, exteriorly threaded bosses 40 and 42 that are drilled to form gas outlet passageways 44 and 46 through which gas is supplied to the simmer and main burner sections, respectively, of a double gas burner, not shown. Passageway 44 communicates directly with chamber 17 and there-through with axial passageway 16 of the valve plug, as shown in Fig. 1, and passageway 46 communicates with the plug surface at a point approximately 90° from the inlet passageway 36 through a passageway 48 drilled into a boss 50, also formed integrally with the valve body but closed as by a plug 51. Adjustably mounted hoods 52, provided with orifices and cooperating with fixed needle valves secured to the valve body, not shown but of conventional construction, are secured to the outer ends of bosses 40 and 42 to provide nozzles through which gas is supplied to the burners at suitable velocities when the valve is in its full on position.

The low adjustment means to which the present invention is directed comprises a needle valve, indicated generally by reference character 54, adjustably mounted in a tubular insert, indicated generally by reference character 56, mounted within an interiorly threaded boss 58 formed integrally with the valve body. Leakage of gas and undesired movement of the valve 54 are prevented by a cap 60 and a sealing gasket 62.

In the low simmer position in which the valve is illustrated in Fig. 2, a predetermined small quantity of gas flows from the inlet passageway 36 to the simmer section of the burner through a by-pass comprising a passageway 64 leading from the inlet passageway 36 to the low adjustment means, and a passageway 66 leading from the latter to the valve surface. It may be noted from Fig. 2 that passageways 64 and 66 are of

comparatively large size and that passageway 66 is of substantial length, so that the likelihood of clogging of these passageways is practically eliminated.

The insert 56 is provided with a reduced end portion 70 whereby it, with the bore in boss 58, provide an annular chamber 72 communicating with passageway 64. Communication between this annular passageway and the interior of the insert is provided by a small passageway 74 disposed radially relative to the common axis of the needle valve and insert. Communication between the interior of the insert and the passageway 62 is provided by a second small passageway 76 in axial alignment with the conical end 78 of the needle valve. The inner ends of the needle valve and of the interior of the insert are made smooth and to fit closely in order to avoid binding and to obtain smooth action when the needle valve is moved in or out to adjusted positions. The inner end of insert 56 is chamfered, as indicated by reference character 80, to provide a sharp edge for seating against the inner end 82 of the bore within boss 58 so that when the insert is threaded into place, the annular chamber 72 is effectively sealed from passageway 66. In order that the insert may be readily threaded into place, it is provided with a slot 84 at its outer end.

The needle valve 54 has a thumb screw 86 at its outer end so that it may be readily turned when the valve is being assembled or adjusted. In order to prevent any play between the needle valve and insert and in order to make certain the valve remains in adjusted positions, there is provided a compression spring 88 abutting against the adjacent ends of the insert and thumb screw.

In the embodiment of the invention just described, the regulation of the amount of gas flowing through the low adjustment means is effected by moving the conical end 78 of the needle valve relative to the passageway 76 formed at the inner end of the insert. The advantages of the invention may, however, be realized with other constructions, for instance, that illustrated in Fig. 3 wherein the inner end of the needle valve 54 is made flat, as indicated by reference character 90, and wherein adjustment of the gas flow is obtained by moving the valve to uncover more or less of the passageway 74. Very fine adjustments are obtained by moving the valve so that the passageway 74 is completely covered and the end 90 moved toward the inner end of the bore in the insert. In this connection it may be mentioned that the clearance between the end of the valve and the interior of the insert is, as stated above, very small, but that in spite of the closeness of the fit some gas flows from passageway 74 to passageway 76 even when the former is completely covered.

The valve illustrated in the drawing is operable from an off position to a plurality of operative positions, wherein gas is supplied to the main and simmer burner sections or to the simmer burner section alone either at a rate determined by the adjustment of hood 52 at the end of passageway 44 or at a rate determined by the setting of the needle valve 54. In so far as the present invention is concerned, it is not deemed necessary to describe the various operative positions other than the low simmer position indicated in Figs. 2 and 3, at which time the low adjustment means is effective. At this time gas flows through the inlet passageway 36 to the simmer burner section through passageway 64, annular chamber 72,

passageway 74, the interior of the insert 56, passageway 76, passageway 88, radial and axial passageways 18 and 16 in the valve plug, and chamber 17. The quantity of gas supplied at this time is dependent, as explained heretofore, upon the adjustment of needle valve 54, which may be adjusted, if desired, to cut off the flow of gas entirely by moving it inward to seal passageway 76.

The low adjustment means of the present invention is easy to construct and may be adjusted readily. In addition, the construction is such as to provide accurate regulation of the flow of small quantities of gas. This results from the fact that it is a relatively simple matter to provide the desired dimensional accuracy of the relatively movable parts of the low adjustment, that is, the insert and needle valve. These parts may both be made with close dimensional accuracy at low cost as on a screw machine. This is not the case with prior art low adjustment means wherein the movable valve portion is rotatably mounted in threads formed in the valve body.

It should be understood that the principles of the present invention may be utilized in connection with valves of different forms, size and construction, and that while the invention has been described in conjunction with certain preferred embodiments, these are deemed only to be illustrative.

What we claim as new and desire to secure by United States Letters Patent is:

1. In a gas valve of the type comprising a valve body, a gas inlet passageway having a portion of substantial cross section area opening into a portion of relatively small cross section area, a shoulder formed by the junction of said portions, a gas flow adjusting mechanism including in combination, a member fixedly mounted in the larger portion of said passageway having a portion of a cross section area less than the larger portion of said passageway, and greater than the smaller portion of said passageway and in contact with said shoulder whereby the latter portion is sealed from the larger portion, and defining therewith a chamber, said member having an opening therein coaxially disposed relative to said passageway and a passageway transverse to the axis of said opening connecting said opening with said chamber and a second passageway coaxially disposed relative to said opening and connecting said opening with the smaller portion of said passageway, and a second member fitting closely in said opening and movable therein to vary the flow of gas through said first member.

2. In a gas valve of the type comprising a valve body, a gas inlet passageway including a pair of relatively small diameter passageways communicating with a relatively large diameter opening threaded at one end, one of said passageways being coaxial with respect to said opening and located at the unthreaded end of said opening, a shoulder formed by the junction of said opening and said one passageway, and the other passageway communicating with the unthreaded portion of said opening near the shoulder, a gas flow adjusting mechanism including in combination, a tubular insert internally and externally threaded at one end and having its opposite end reduced to a diameter intermediate that of the said opening and said one passageway, said insert being mounted in said opening with its reduced diameter end abutting

against said shoulder to seal said one passageway from the other and having an axial passageway of a diameter less than said one passageway providing communication between the interior of said insert and said one passageway, said insert having also a passageway extending through a sidewall thereof at the unthreaded reduced diameter end, and a valve member threaded at its outer end mounted in the threaded end of said insert and having an unthreaded inner end closely fitting within said tubular member, whereby said valve member may be moved axially of said insert to vary the flow of gas through said insert.

3. In a gas valve of the type comprising a valve body, a gas inlet passageway including a pair of relatively small diameter passageways communicating with a relatively large diameter opening threaded at one end, one of said passageways being coaxial with respect to said opening and located at the unthreaded end of said opening, a shoulder formed by the junction of said opening and said one passageway, and the other passageway communicating with the unthreaded portion of said opening near the shoulder, a gas flow adjusting mechanism including in combination, a tubular insert internally and externally threaded at one end and having its opposite end reduced to a diameter intermediate that of the said opening and said one passageway, said insert being mounted in said opening with its reduced diameter end abutting against said shoulder to seal said one passageway from the other and having an axial passageway of a diameter less than said one passageway providing communication between the interior of said insert and said one passageway, the inner end of said axial passageway defining a valve seat, said insert having also a passageway extending through a sidewall thereof at the unthreaded reduced diameter end, and a valve member threaded at its outer end mounted in the threaded end of said insert, said valve member having an unthreaded inner end closely fitting within said tubular member and terminating in a conical end, whereby said valve member may be moved axially of said insert to adjust the position of the conical end relative to said axial passageway and thereby vary the flow of gas through said insert.

4. In a gas valve of the type comprising a valve body, a gas inlet passageway including a pair of relatively small diameter passageways communicating with a relatively large diameter opening threaded at one end, one of said passageways being coaxial with respect to said opening and located at the unthreaded end of said opening, a shoulder formed by the junction of said opening and said one passageway, and the other passageway communicating with the unthreaded portion of said opening near the shoulder, a gas flow adjusting mechanism including in combination, a tubular insert internally and externally threaded at one end and having its opposite end reduced to a diameter intermediate that of the said opening and said one passageway, said insert being mounted in said opening with its reduced diameter end abutting against said shoulder to seal said one passageway from the other and having an axial passageway of a diameter less than said one passageway providing communication between the interior of said insert and said one passageway, the inner end of said axial passageway defining a valve seat, said insert having also a passageway extending through a sidewall thereof at the unthreaded

reduced diameter end, and a valve member threaded at its outer end mounted in the threaded end of said insert, said valve member having an unthreaded inner end closely fitting within said tubular member and terminating in an end cut off at right angles to the axis of the member, whereby said valve member may be moved axially

of said insert first to vary the effective size of the passageway extending through the sidewall of the insert and then the effective size of the axial passageway in said insert.

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GEORGE F. TURNER.
VINCENT C. PETERSON.
DONALD W. ROSS.