

Oct. 5, 1937.

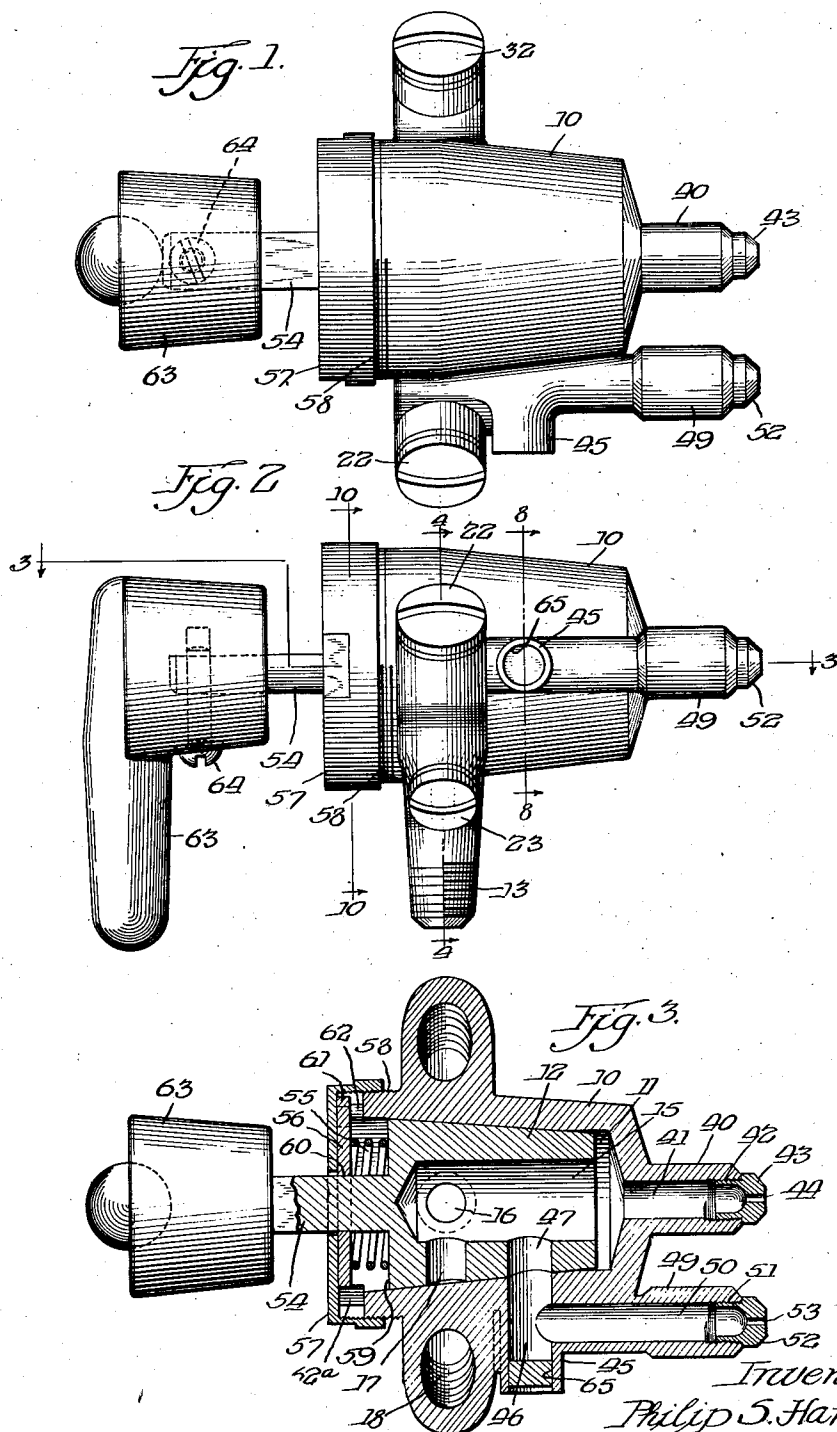
P. S. HARPER

2,095,064

GAS VALVE

Filed April 25, 1936

3 Sheets-Sheet 1



Inventor:
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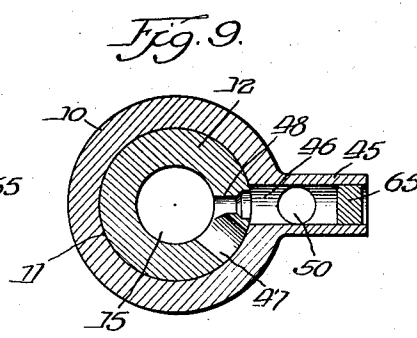
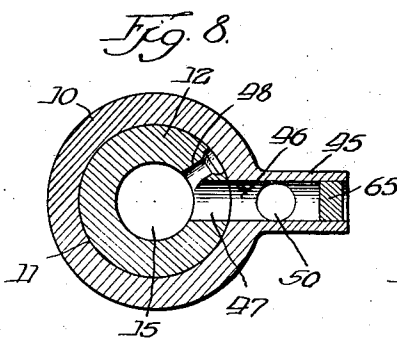
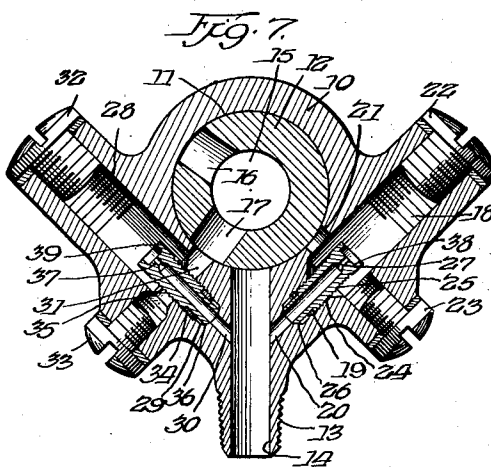
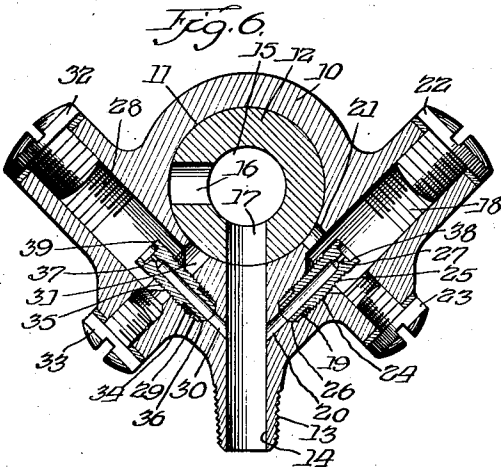
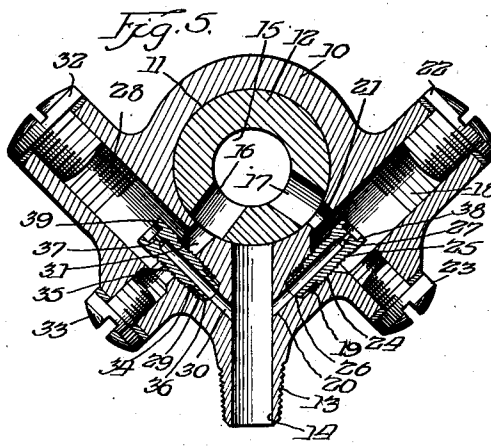
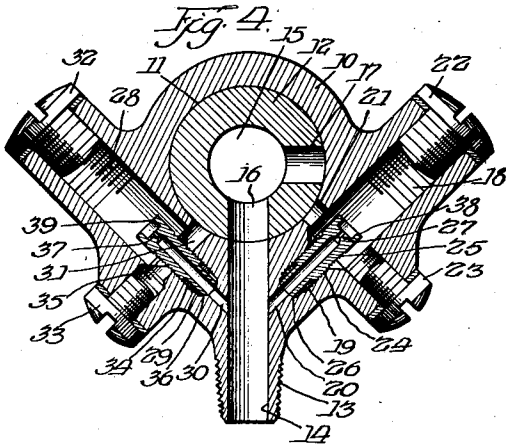
P. S. HARPER

2,095,064

GAS VALVE

Filed April 25, 1936

3 Sheets-Sheet 2



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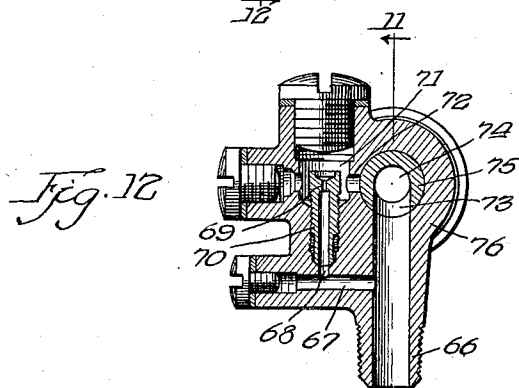
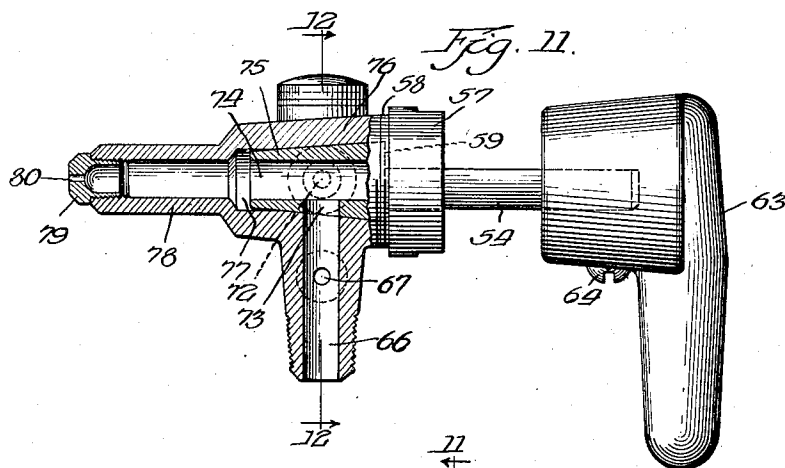
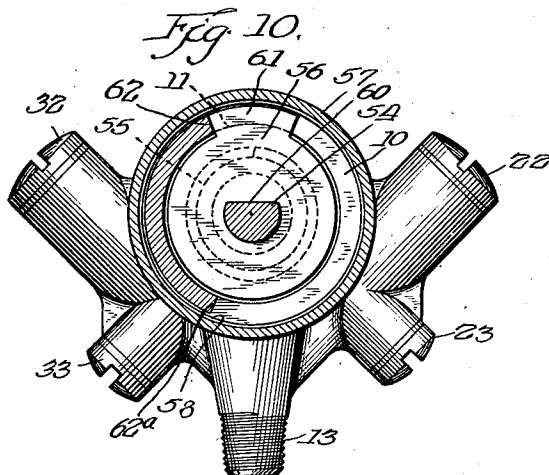
P. S. HARPER

2,095,064

GAS VALVE

Filed April 25, 1936

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,095,064

GAS VALVE

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Application April 25, 1936, Serial No. 76,359

4 Claims. (Cl. 251-105)

This invention pertains to gas valves as commonly used for controlling inlet of gas to gas range burners.

This invention consists of a new combination and an advantageous arrangement of parts and gas passages of a gas valve to provide for certain definite graduations of the amount of gas flowing from the gas outlet or outlets.

An object of this invention is to provide a gas range valve which will supply gas to a gas range burner in definitely predetermined quantities at certain operating positions. In the operation of a gas range burner there are four particularly desirable heating speeds and all graduations of heat input between these four speeds are used to a lesser extent. First, a hot flame is necessary to heat food quickly and to bring liquids to a boil in the shortest possible time without, at the same time, overloading the burner. A rate of 9000 to 12,000 B. t. u. per hour is satisfactory for this purpose in the average burner now used, but each burner has its particular maximum capacity for which it is suited. Second, a lesser, but at the same time an evenly distributed flame is needed to provide proper conditions for frying. A rate of 4,000 B. t. u. per hour is satisfactory for this purpose, but again the exact figure will depend upon the characteristics of the particular burner and its installation in the stove. Third, a small simmer flame is required to direct a small concentrated quantity of heat to a vessel in order to keep liquids at the boiling point without boiling away an excessive amount of water, and, for this purpose a rate of approximately 1500 B. t. u. per hour is satisfactory. Fourth, a very small flame is required to keep liquids, such as coffee, soup, or the contents of any covered vessel, warm without further boiling or cooking. A simmer flame turned down to the point where about 250 B. t. u. are consumed per hour will accomplish this result with almost all vessels used in ordinary cooking even though these vessels vary from a one quart to an eight quart size.

In everyday cooking the housewife is constantly faced with the necessity of adjusting the gas burners to these four conditions and has no way of determining whether the burners are performing at proper capacity for the cooking purpose she has in mind except by observing the flames and by constantly watching the food to see that it is cooking properly.

An ordinary gas valve is constructed so that the inlet gasway passes through the casing and into the rotary plug. In the position of full flow

the gasway in the plug registers completely with the gasway in the casing. In throttling the gas to lessen the flow, the plug is turned until the gasways no longer register. This position of the plug is the point of complete cutoff. Because of the fact that the area of the orifice at the outlet nozzle is so small in comparison with the area of the gasway, no appreciable throttling effect is obtained until the area of the gasway is cut down and the valve is almost at the point of cutoff. The actual throttling range covers only a few degrees of turn. For this reason it is difficult to obtain a fine adjustment of the rate of flow which will meet with the cooking requirements. Furthermore, after adjustment has been made, the operator of the valve can only judge whether the burner is producing the proper heat by observing the flames and the food that is cooking. This is no more than guesswork and the primary object of this invention is to take the guesswork out of top burner cooking by providing a valve which when properly positioned automatically provides a plurality of the definite heats most used in cooking.

The valve disclosed is designed to deliver gas to the burners in proper quantities for the four purposes hereinbefore explained. The valve is also arranged so that the position of the valve handle for each purpose has a broad range so requiring no skill of exact adjustment in operation. The four specific operating positions of the burner can be plainly indicated either by a click mechanism or by other means integral with the valve or by marking the positions on the front panel of the stove. All guesswork connected with heat regulation of the top burner of a stove is eliminated, resulting in better cooking of food and saving of time to the housewife.

Another object of this invention is to provide a valve for a gas range burner which will always be in adjustment to supply gas to the burner at the rate of input best suited to the particular burner, thus avoiding over-adjustment which is so common in gas range installations and which causes waste of gas and liberation of carbon monoxide.

Another object of this invention is to make available on the gas range cooking top a plurality of predetermined heats without the uncertainty of having to be guided by the appearance of the flame.

Another object of this invention is the provision of a valve enabling the obtainment of a low warming heat on a small simmer section of a

double burner without any danger of the flames being turned entirely out when the adjustment to get such warming heat is attempted.

Another object of this invention is the provision of a valve enabling the obtainment of a low wide-spread or frying heat on a double burner without any danger of the flames being turned entirely out when the adjustment to get such a heat is attempted.

Another object of this invention is to provide a valve for a gas range top burner which may be operated so as to obtain more quickly than has heretofore been possible a low heat over the entire burner or a low heat on a simmer section.

Another object of this invention is to make provision for supplying all the cooking heats most commonly needed in a stove top heating unit as well as graduations of heat between these definite heats.

Another object of this invention is to make a valve in which the flow is regulated and definitely metered in a plurality of operating positions by means of fixed orifices.

Another object of this invention is to place such fixed orifices in the valve in a position where they will be protected from an accumulation of dirt and foreign matter.

Another object of this invention is to place the orifices where they may be readily accessible for removal and replacement.

Another object of this invention is the provision of a valve which will supply fuel to heating units of a stove cooking top at rates consonant with all the definite heats of an electric range together with a lower definite heat than is available on an electric stove.

An object of this invention is the provision of a valve adequate for supplying a plurality of definite heats to a gas stove top burner regardless of variation in the specific gravity or heating value of the gas supply in various parts of the country.

These and other objects of this invention will be more apparent from the following description and from the drawings in which—

Figure 1 is a top plan view of a double gas range valve of the type of this invention as fully assembled and ready for installation in the manifold of a gas range;

Figure 2 is a side elevational view of the valve shown in Figure 1;

Figure 3 is a sectional view on line 3—3 of Figure 2 showing in particular the lengthwise gas passages through the body and plug;

Figure 4 is a section through the entering gasway on line 4—4 of Figure 2, showing the valve in the full open position;

Figure 5 is a view on line 4—4 of Figure 2 showing the valve in proper position for medium full burner operation, such as frying;

Figure 6 is a sectional view on line 4—4 of Figure 2 showing the valve in proper position for full operation of the simmer burner;

Figure 7 is a sectional view on line 4—4 of Figure 2 showing the valve in proper position for low burning position of the simmer burner;

Figure 8 is a section on line 8—8 of Figure 2, also showing the valve in the full open position and in the same position as Figure 4;

Figure 9 is a sectional view on line 8—8 of Figure 2, showing the valve in the same position as Figure 5 for medium operation of the full burner;

Figure 10 is a section on line 10—10 of Figure 2 showing the arrangement of stops;

Figure 11 shows a modification of the valve, and is a section through the entering gasway and the rotary axis of the plug on line 11—11 of Figure 12;

Figure 12 is a section through the entering gasway and transverse to the rotary axis of the plug on line 12—12 of Figure 11.

Referring now to the drawings in which like parts are designated by like characters throughout and particularly to Figures 1 to 10, inclusive, a gas cock casing 10 is shown, with a central plug receiving passage 11 therein, in which is placed a tapered plug 12 which is seated on a tight and well-lubricated bearing. The casing 10 has a threaded projection 13 thereon for connection to a gas manifold (not shown), with a gasway 14 therein. The tapered plug 12 has an approximately axial passage 15 therein and two transverse passages 16 and 17 which connect with the said passage 15 and which open on the bearing surface of the plug. Passages 16 and 17 are in the same transverse plane which is shown in section in Figure 4. As will be explained later, in one rotary position of the plug passage 16 registers with gasway 14 in the gas cock casing 10 and in another rotary position 17 registers with gasway 14.

On one side of the casing 10 a small passage 20 is drilled downward at an angle of about 45° with the gasway 14 and connecting therewith. A larger passage 19 is drilled coaxial with and connecting with passage 20 so that at the bottom of passage 19 there is formed a conical shaped seat 26. Said larger passage 19 is threaded at 24 to accommodate an orifice fitting 25 which seats on the conical shaped seat 26. The orifice fitting is hexagonal shaped in cross section at point 38 to permit tightening by means of a socket wrench. A still larger passage 18 is drilled substantially coaxial with and connecting with passage 19, said passage 18 being of sufficient size to admit an ordinary socket wrench for tightening the orifice fitting 25. Passage 21 is drilled at an angle to the common axis of passages 18, 19 and 20, connecting with the largest passage 18 and with the plug receiving passage 11 at the bearing surface. The orifice fitting 25 has a small orifice 27 which is of such size as to restrict the flow of gas to an amount necessary for supplying heat to an ordinary large burner for low heat cooking processes such as frying. Passages 18 and 21 are closed to the atmosphere by means of stopper plugs 22 and 23 respectively.

On the opposite side of the casing 10 from passage 20, a small passage 30 is drilled downward at an angle of about 45° with the gasway 14 and connecting therewith substantially opposite the opening of the aforesaid passage 20. A larger passage 29 is drilled coaxial with and connecting with passage 30 so that at the bottom of passage 29 there is formed a conical shaped seat 36. Said larger passage 29 is threaded at 34 to accommodate an orifice fitting 35 which seats on the conical shaped seat 36. The orifice fitting is hexagonal shaped in cross section at point 39 to permit tightening by means of a socket wrench. A still larger passage 28 is drilled substantially coaxial with and connecting with passage 29, said passage 28 being of sufficient size to admit an ordinary socket wrench for adjusting the orifice fitting 35. Passage 31 is drilled at an angle to the common axis of passages 28, 29 and 30, connecting with the largest passage 28 and with the plug receiving passage 11 at the bearing surface. The orifice fitting 35 has a small orifice 37 which

is small enough to restrict the flow of gas to an amount necessary for warming purposes. Gas flow from passage 30 to passage 31 is restricted by the size of orifice 37. Passages 28 and 31 are closed to the atmosphere by means of stopper plugs 32 and 33 respectively.

Referring now particularly to Figure 3, which is a horizontal section through the rotary axis of the plug, the casing 10 has a projection 40 which is adapted to project into the mixing tube leading to the simmer section of an ordinary double gas range burner (not shown). The projection 40 has its axis substantially coinciding with the rotary axis of the plug and is nearer to the small end of the tapered plug than the large end. Projection 40 has a passage 41 therein extending from the plug receiving passage 11 and threaded at the opposite end at point 42 to receive a threaded spud 43. Spud 43 has a fixed orifice 44 therein of proper size to furnish the right quantity of gas to an ordinary simmer burner operating at full capacity.

From Figures 3 and 8 it can be seen that the casing 10 has a transverse projection 45 located on one side of the plug 12 and having its axis in the horizontal plane passing through the axis of the plug and in a vertical plane between the gasway and the smaller end of the tapered plug. The transverse projection 45 has a passage 46 therein opening on the bearing surface and sealed at the outer end from the atmosphere by means of a stopper plug 65. The casing 10 has an additional projection 49 to one side of projection 40, extending in a direction and sense parallel thereto and having its axis in substantially the same horizontal plane as the axis of projection 40. Projection 49 is adapted to project into the mixing tube of the main section of an ordinary double burner and has a passage 50 therein connecting with the passage 46 in the casing and threaded at the outer end at point 51 to receive a threaded spud 52. Spud 52 has a fixed orifice 53 therein of proper size to furnish the right quantity of gas to an ordinary main burner operating at full capacity.

Referring to Figures 8 and 9, the plug 12 has a transverse passage 47 which connects with longitudinal passage 15 in the plug and which registers with passage 46 in the casing at the same time passage 16 registers with gasway 14. Plug 12 has an additional transverse passage 48 drilled into longitudinal passage 15 at an oblique angle to passage 47; passages 47 and 48 having their axes in substantially the same transverse plane 8-8. As shown in Figure 9, passage 48 registers with passage 46 in the body when the plug is rotated to the position in which passages 16 and 17 in the plug register respectively with passages 31 and 21 in the body.

The upper end of the plug 12 has an extension 54 which is D shaped in cross section. This extension 54 extends through a coil spring 55, a stop washer 56, and a nut 57 which is screwed onto a threaded portion 58 of the casing 10, the spring in this assembly being compressed by the nut 57 against the shoulder 59 on the plug 12, thus serving to hold said plug firmly seated on the bearing surface. The stop washer 56 is shaped as shown in Figure 10 with a D shaped opening 60 therein, which allows the washer to fit on the stem and prevents any appreciable rotary movement of the washer relative to the stem 54. The projection 61 on the stop washer 56 acts against the stops 62 and 62-A on casing 10, thus allowing a definite predetermined amount of rotary

motion. The valve may be operated by turning the handle 63 which is fastened on the stem by means of a screw 64.

As explained before the valve shown has four operating positions in which the flow of gas is controlled to meet specific cooking conditions. These four positions are shown in Figures 4, 5, 6, 7 and in Figures 8 and 9, and which with the closed position of the valve covers the complete range of its operations. When the valve is turned to closed position the main section inlet 16 is in a vertical position and the simmer section inlet 17 is in a horizontal position, or 180° from the position shown in Figure 4. The valve turns approximately 180° in a counterclockwise direction from closed position to the position of maximum flow when the stop washer rests against the other stop. Figures 4 and 8 show sections of the valve in the position of flow of gas to both the main burner orifice 53 and simmer orifice 44. Gas flows in through passage 14 in the body and passage 16 in the plug to passage 15. From passage 15 gas flows through passages 11 and 41 to the simmer orifice 44 and from passage 15 gas flows through passages 47, 46 and 50 to the main burner orifice 53.

The amount of gas flowing to the simmer burner is regulated by the size of fixed orifice 44, and the amount flowing to the main burner is regulated by the size of fixed orifice 53. For stoves and burners of modern design and efficiency, a rate of about 1500 B. t. u. per hour is satisfactory for the simmer burner and about 7500 B. t. u. to 10,500 B. t. u. for the main burner. The size of the orifice required to meet these conditions depends on the heating value of the gas which is known to vary widely in different localities. However, the sizes of the orifices needed to maintain the proper capacities can be definitely determined when the characteristics of the gas and the pressure are known. In order to operate most advantageously the stove should be equipped with a pressure regulator to maintain a steady pressure on the inlet side of the valve.

The valve is turned on approximately 45° in a counterclockwise direction from the closed position, to the position in which a reduced amount of gas sufficient for warming purposes is available to the simmer section only. Figure 7 shows the location of passages when the valve is in this position. Gas flows through passages 14, 30, orifice 37, passages 28, 31, 17, 15, 11 and 41, to the simmer orifice 44. Orifice 37 is smaller than the simmer orifice 44 and, therefore, governs the flow from the outlet. The said orifice 37 is made of proper size to allow enough gas to flow for warming purposes. A rate of about 250 B. t. u. per hour is satisfactory. In this position inlet passages 14 and 21 in the body are sealed. Also the outlet passage 46 to the main burner orifice is sealed.

The valve is turned on approximately 90° in a counterclockwise direction from the closed position to the position in which a full quantity of gas is delivered to the simmer burner. This position is shown in Figure 6. Gas flows through gasway 14, passages 17, 15, 11 and 41 to the simmer outlet orifice 44. The main burner passage 46 is sealed.

The valve is turned on approximately 135° in a counterclockwise direction to the frying position in which a small quantity of gas is directed to both main burner and simmer burner. Figures 5 and 9 show sections of the valve in this rotary position. Gas enters passage 14, divides and part flows through passage 30, orifice 37, 75

passages 28, 31 and 16 to longitudinal passage 15 in the plug, while another part flows through passage 20, orifice 27, passages 18, 21 and 17 to longitudinal passage 15. The gas reunites in longitudinal passage 15 and then divides and flows to orifices 44 and 53 in proportion to the cross sectional area of these orifices. Gas flows through passages 11 and 41 to the simmer section orifice 44 and also through connecting passages 48, 46, 50 to the main section orifice 53.

The combined area of orifices 37 and 27 in the orifice fittings 39 and 38 is smaller than the combined area of outlet orifices 44 and 53 and, therefore, the size of orifices 37 and 27 governs the quantity of gas flowing. As has been said before, orifice 37 must be of such cross sectional area to allow proper flow to the simmer section for warming purposes. Orifice 27 must then be of such size to correctly limit the flow so that when the valve is in position for frying, both burners receive the combined amount of gas that is proper for frying processes. A rate of about 4000 B. t. u. per hour is satisfactory. The combined areas of orifices 37 and 27 must provide proper flow of gas to produce this heat.

The four operating positions and the position in which there is no flow can be indicated by marking them on the front panel of the stove. The positions can also be positively indicated by means of a pin acting against a click sleeve or by some other means integral with the valve. A valve of the construction shown having any such indicating means would be within the scope of this invention.

Figures 11 and 12 show a modified form of the valve in which there is just one outlet but two positively controlled rates of flow are possible with this one outlet. When the valve is fully open, gas may enter passage 66 and flow directly through passages 73, 74, 77 and 78 to orifice 80 in spud 79. In the low heating position gas flows from passage 66 through passages 67, 68, orifice 69, passages 71, 72, 73, 74, 77 and 78 to orifice 80. The said orifice 69 in the orifice fitting 70 reduces the gas to an amount satisfactory for slow cooking processes. The principles of operation are the same as shown in the valve of Figures 1 to 10 inclusive.

In each case where a fixed orifice has been specified, some other gas restricting means might be used such as a small tube or an adjustable orifice which had been definitely set at the required opening. In installing the valve the flow of gas could be accurately metered and each orifice adjusted for all operating positions of the valve according to the pressure and heating value of the gas. The scope of this invention is thus not limited in all claims to the fixed orifice construction which has been shown, for either adjustable or fixed orifices might be used without departing from the basic principles of operation.

It is intended that valves to be used on stoves in natural gas territories will have plainly marked orifice fittings drilled properly for natural gas. The amount of heat supplied to the burner will depend not only on the size of the orifices but upon the specific gravity of the gas, the heating value of the gas, and the inlet gas pressure. It is my intention to use a pressure regulator in connection with the valve disclosed to keep the pressure in the manifold substantially constant. Natural gas has a fairly uniform heating value and specific gravity but the pressure in various localities varies rather widely. However, in almost no case is the pressure ever below 7" of

water and a regulator set at the factory to maintain the pressure constant at 7" would be satisfactory for any natural gas conditions. With the pressure constant and with the specific gravity and heating value substantially uniform, a valve having orifices drilled for natural gas can be used in any natural gas territory to supply the heating speeds desired. Thus a stove equipped with the proper valves and having the regulator set properly, will function correctly in any natural gas territory.

Similarly another set of plainly marked orifice fittings would be necessary for manufactured gas. The regulator would have to be set much lower at about 3" pressure to include all manufactured gas service conditions. A third set of orifice fittings would meet the requirements for a mixture of manufactured and natural gas. Specially drilled orifice fittings could be supplied for other gases or for peculiar pressure conditions. Any persons desiring to move into a territory supplied with a different type of gas could easily change their stove over by supplying the proper orifices and by a simple adjustment of the regulator. The pressure regulator is not absolutely necessary because the gas pressure in any community remains fairly constant and the orifices could be drilled of proper size to meet the local pressure requirements.

While I have described more or less precisely the details of construction, I do not wish to be understood as limiting myself thereto as I contemplate changes in form and the proportion of parts and the substitution of equivalents as circumstances may suggest or render expedient without departing from the scope of my invention.

I claim:

1. A gas range valve for a double burner, comprising a casing with a plug receiving passage, a plug rotatably bearing on a portion of the passage surface, said casing having two discharge orifices, said casing having a gasway with an inlet opening, said plug and casing having a system of passages therein and therebetween connecting the gasway with each discharge orifice in at least one rotary position of the plug, one passage of said system having a restricting orifice therein the area of which is less than the area of the smaller discharge orifice, a second passage of said system having a restricting orifice therein, said system of passages having an arrangement such that in one rotary position of the plug all gas flows through the first mentioned restricting orifice to the smaller of the said discharge orifices, and such that in a second rotary position of the plug gas may bypass around each of the said restricting orifices flowing from the inlet gasway to the smaller of the said discharge orifices, and such that in a third rotary position of the plug gas may flow from the inlet gasway to both discharge orifices dividing into two streams, one stream flowing through one of the said restricting orifices and the other stream flowing through the other of the said restricting orifices, and such that in a fourth rotary position of the plug gas may bypass around the restricting orifices in flowing from the inlet gasway to both discharge orifices, and operating means for rotation of the valve.

2. A gas range valve for a double burner comprising a casing with a plug receiving passage, a plug rotatably bearing on a portion of the passage surface, said casing having an outlet nozzle and an outlet passage connecting said plug receiving passage with said outlet nozzle, said cas-

ing having a second outlet nozzle and a second outlet passage connecting therewith and having an opening on the said bearing surface, said casing having a gasway on the inlet side of the plug which has an opening on the bearing surface, 5 said casing having a branch passage with a restricting orifice therein extending from the gasway to the bearing surface, said casing having a second branch passage with a restricting orifice therein extending from the gasway to the bearing 10 surface, said plug having a system of passages with openings on the bearing surface and on the bottom of the plug such that in one rotary position of the plug all gas flows through the first mentioned branch passage to the first mentioned 15 nozzle, and such that in another rotary position of the plug gas may flow through the gasway into the plug and to the first nozzle without being restricted in flow before reaching the nozzle, and 20 such that in a third rotary position of the plug the gasway is sealed at the plug and gas may flow through both branch passages into the plug and thence to both nozzles, and such that in a fourth rotary position of the plug gas may flow 25 unrestricted through the gasway into the plug and thence to both nozzles, and operating means for rotation of the plug.

3. A gas range valve for a double burner comprising a casing with a plug receiving passage, 30 and a plug rotatably bearing on a portion of the passage surface, said casing having an outlet nozzle and an outlet passage connecting said plug receiving passage with said outlet nozzle, said casing having a second outlet nozzle and a 35 second outlet passage connecting therewith and having an opening on the said bearing surface, said casing having a gasway on the inlet side of the plug which has an opening on the bearing surface, said casing having a branch passage with 40 a restricting orifice therein branching from the gasway and extending to the bearing surface, said plug having a system of passages with a plurality of openings on the bearing surface and an opening on the bottom of the plug such that in 45 one rotary position of the plug all gas flows

through the said branch passage to the first mentioned outlet nozzle, the second outlet passage being sealed at the bearing surface, and such that in another rotary position of the plug gas may flow through the gasway into the plug and 5 to the first mentioned outlet nozzle without being restricted in flow before reaching the nozzle, the said second passage being sealed at the bearing surface, and such that in a third rotary position of the plug the gas may flow unrestricted 10 through the gasway into the plug and then to both nozzles, and operating means for rotation of the plug.

4. A gas range valve for a double burner comprising a casing with a plug receiving passage, 15 a plug rotatably bearing on a portion of the passage surface, said casing having an outlet nozzle and an outlet passage connecting said plug receiving passage with said outlet nozzle, said casing having a second outlet nozzle and a second 20 outlet passage connecting therewith and having an opening on the said bearing surface, said casing having a gasway on the inlet side of the plug which has an opening on the bearing surface, said casing having a branch passage with a re- 25 stricting orifice therein branching from the gasway and extending to the bearing surface, said plug having a system of passages with a plurality of openings on the bearing surface and an opening on the bottom of the plug such that in 30 one rotary position of the plug gas may flow through the gasway into the plug and to the first nozzle without being restricted in flow before reaching the nozzle, the second outlet passage being sealed at the bearing surface, and such that 35 in a second rotary position of the plug the gasway is sealed at the plug and gas may flow through the said branch passage into the plug and thence to both nozzles, and such that in a third rotary position of the plug gas may flow 40 unrestricted through the gasway into the plug and thence to both nozzles, and operating means for rotation of the plug.

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