June 22, 1926.

1,589,386

P. S. HARPER

GAS BURNER

Filed April 10, 1922

Fig. 1.

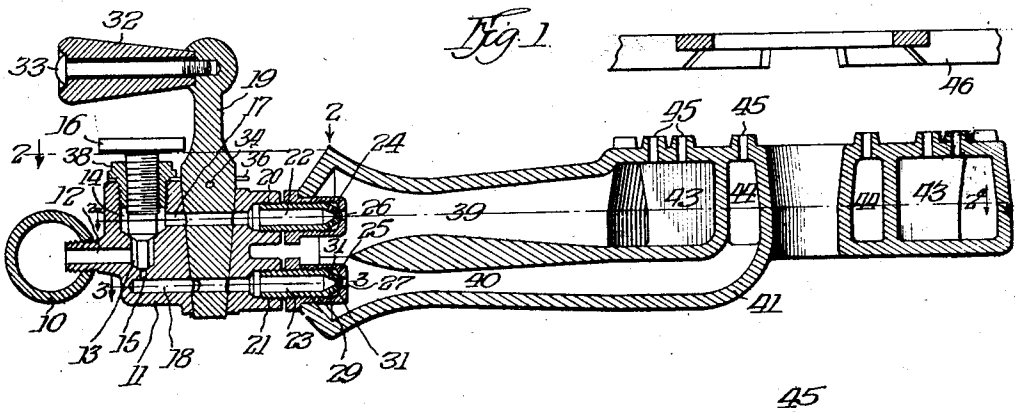



Fig. 2.

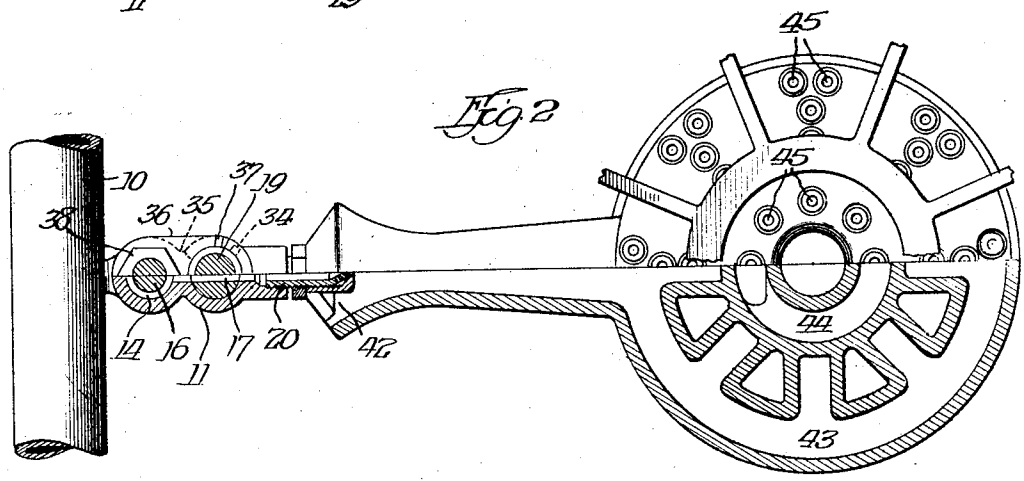



Fig. 3.

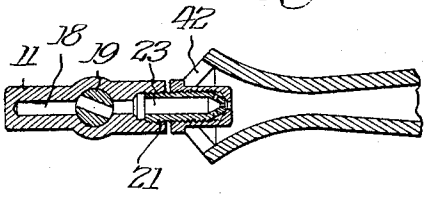



Fig. 4.

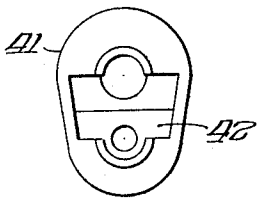
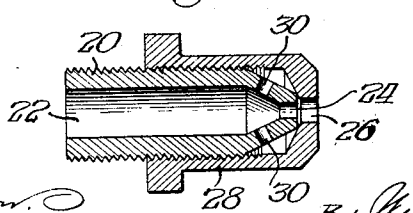



Fig. 5.




Witness:

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1,589,386

# UNITED STATES PATENT OFFICE.

PHILIP S. HARPER, OF CHICAGO, ILLINOIS.

## GAS BURNER.

Application filed April 10, 1922. Serial No. 551,010.

My invention relates to a gas burner and particularly to a sectional type of burner as used on open top gas ranges and gas plates.

My invention consists in its preferred form of a gas burner having a plurality of sections, a valve for controlling the number of sections burning, and a coordinated means intercepting in proportionate degree the gas supply passages to the different sections.

The principal object of my invention is a sectional open top burner having a valve for successively cutting off the gas supply to the different sections and a single means whereby the height of flame may be adjusted alike in all sections regardless of the number of sections burning.

A further object of my invention is the provision of a gas range burner in which the ratio of gas to primary air in any individual section thereof is controlled by adjusting the respective gas nozzle thereto.

Another object is to provide in said class a burner having adjustable nozzles in which efficiency of air injection closely approaches that of a burner having fixed area nozzles.

These and other objects of my invention will be more apparent by reference to the accompanying sheet of drawings in which—

Figure 1 is a sectional elevation of my said invention taken through the center of Figure 2 with a section of grid shown above the burner;

Figure 2 is a plan view in partial section approximately on line 2—2 and $2^a$—$2^a$ of Figure 1;

Figure 3 is a partial plan in section along the line 3—3 of Figure 1;

Figure 4 is a front view of the burner body member which is shown in the foregoing figures;

Figure 5 is an enlarged view of the upper fuel nozzle with fuel nozzle hood secured thereto.

Referring now specifically to the drawings, a fuel supply pipe 10 is shown into which is threaded a valve casing 11 having a gas passage 12 therein leading from the said supply pipe. The said passage 12 leads in the valve casing 11 to a chamber 13 having a large passage 14 at the top and a small passage 15 at the bottom, the openings from the chamber 13 to the said passages forming valve seats for which corresponding seating surfaces are provided on the adjusting screw 16 extending through the said chamber 13, as shown. The said large passage 14 communicates with a horizontal passage 17 which is intercepted by a valve plug 19 having the said passage continuing therethrough and the small passage 15 communicates with another horizontal passage 18 which likewise is intercepted by the said plug member 19, the said passages 17 and 18 leading on the opposite side of the said plug 19 to respective gas nozzles 20 and 21 in threaded engagement with the valve casing 11. In the said gas nozzles, main pasages 22 and 23 lead to primary nozzle openings 24 and 25 which are central with secondary openings 26 and 27 respectively in nozzle hood members 28 and 29 which are screwed over their respective nozzles with long and well fitted threads. The said secondary openings 26 and 27 are larger in size than the respective primary openings 24 and 25 so that the jets of gas issuing from the latter are not materially affected by passing through the said secondary openings. The main nozzle passages 22 and 23 are each provided with a plurality of side openings 30 and 31 which extend from the side thereof opening under the front ends of the nozzle hoods 28 and 29. The said nozzle hoods when screwed all the way home seat on the ends of the said nozzles thereby sealing off any passage of gas by way of the said last mentioned openings 30 and 31, but by loosening the said hoods more or less as required, an adjustable amount of gas is allowed to pass through the said openings 30 and 31 and into the burner by way of the secondary openings 26 and 27, the result of such adjustment being a change in nozzle area and consequently a change in air injection for a given quantity of gas.

Referring now to the valve plug member 19, the gas pasages 17 and 18 therethrough are situated in different vertical planes so that on rotation of the said plug by means

of the handle 32 fastened thereto by the screw 33 one quarter turn from open to closed position the passage 17 is first in full open position or in perfect register with its continuation in the valve casing 11 while at the same time the lower passage 18 is in half open position, as shown particularly in Figure 3. On turning the said plug in the direction stated passage 17 comes to half open position with the passage 18 in full registry and further turning closes off the passage 17 entirely with the lower passage 18 still in half open position. Further turning of the plug 19 also cuts off the passage 18 entirely when all gas flow to the burner will cease. A pin 34 extends through the said plug member 19 and projects from both sides thereof engaging with suitable stops as 35 to limit the movement of the said plug 19 to a quarter turn. A flat spring member 36 bears upon the said pin 34 maintaining the said plug member 19 in proper seated position and the said spring has suitable grooves or depressions therein as 37 which engage the said pin at a proper time to indicate the complete cutting off of gas by way of the top passage 17 when the said passage has just been brought completely out of registry by the turning of the plug member as hereinbefore described. The said spring member consists of a substantially flat piece of phosphor bronze or other suitable material approximately one thirty-second of an inch thick, and said member has two holes punched therein for the passage therethrough of bushing piece 38 and plug member 19. The said spring member is anchored and fastened to the valve casing 11 by means of the bushing piece 38 passed therethrough and screwed into the said valve casing at the top of the before-mentioned passage 14, the said bushing piece being drilled and tapped for containing the aforesaid adjusting screw 16 as shown.

On issuing from the aforesaid fuel nozzles 20 and 21 the gas passes at high velocity into respective mixing tubes 39 and 40 in the burner body member 41, air being injected into the said tubes by way of opening 42 in the front end of the said burner body. The said mixing tubes 39 and 40 communicate directly with respective burner sections 43 and 44 each of circular shape and concentrically positioned. A plurality of burner ports 45 extends from the upper side of each of the said sections from which combustion takes place in the usual manner, a grid piece 46 extending above the said ports on which is placed the cooking vessel to be heated. For convenience I have shown a particular arrangement of the said burner ports and the said grid which allows the lighting of the outer section from the inner section without firing back to the gas nozzle, such arrangement being specifically claimed in my copending application Serial No. 551,011 filed April 10, 1922.

The nozzle openings 24 and 25 in the said fuel nozzles 20 and 21 are proportioned to the size of the burner sections 43 and 44 respectively and the areas controlled by the adjusting screw 16 seating on openings to the passages 14 and 15 are also in proportion to the sizes of the burner section, such openings in the case of the passages to the smaller burner section 44 being very small as compared with a half opening of the passage 18. The half closure of this said passage 18 therefore does not appreciably effect the flow of gas therethrough, a full flow of gas being obtained for both sections with the valve plug 19 in the open position even though the said passage 18 is then in half registry.

As to the operation of my invention, individual adjustment is made of each gas nozzle as described heretofore so as to inject the air in the proper ratio to each burner section, the said adjustments being permanent for a given quality of gas. With the plug member 19 in wide open position as shown in the drawings the adjusting screw 16 is set in proper position so as to obtain the desired full height flame such adjustment being changed from time to time as necessary to compensate for changing gas supply pressure. In heating water or other liquid the valve plug 19 is kept in full open position until the boiling point is reached when the said plug is turned so as to fully cut off the outer section 43 and partially cut down the inner section 44 to whatever extent required depending on the size of the cooking vessel, a great saving of gas resulting from the higher efficiency of the small section over a large single burner on reduced heat as shown in my pending application, Serial No. 439,905 filed January 26, 1921. In the case of frying or any other cooking operation requiring a uniform distribution of heat over the bottom of the vessel the valve plug 19 is left in wide open position while for a decreased amount of heat the adjusting screw 16 is turned down such action causing a uniform decrease in flame height from both sections, a much closer adjustment being obtainable in this manner than with adjustment of the valve plug in the ordinary burner.

It should be noted that my invention does not require in every form the adjustable nozzles shown, a practical adaptation employing nozzles of fixed area together with an air shutter for adjusting the air opening as 42. However the preferred form incorporates the adjustable nozzles as herein specified, such improved means for air ratio adjustment being feasible in connection with separate means as the screw 16 for adjusting the quantity of gas to the respective sections.

While I have described more or less pre-

cisely 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 spirit or scope of my invention.

I claim:

1. In a gas burner, a burner body member having a plurality of burner sections and having a plurality of mixing tubes therein; a plurality of fuel nozzles projecting into the said mixing tubes one nozzle to each tube; a valve casing having a plurality of passages therein leading to the said fuel nozzles; a common adjusting means intercepting all of the said passages, each passage being intercepted in proportion to the size of its respective burner section and control means in the said valve casing.

2. In a gas burner, a burner body member having a plurality of burner sections and having a plurality of mixing tubes therein; a plurality of fuel nozzles projecting into the said mixing tubes one nozzle to each tube; a valve casing having a plurality of passages therein leading to the said fuel nozzles; a common adjusting means intercepting all of the said passages, each passage being intercepted in proportion to the size of its respective burner section, and control means in said casing whereby fuel is supplied to the burner through any number of the said passages.

3. In a gas burner, a burner body member having a plurality of burner sections and having a plurality of mixing tubes therein; a plurality of adjustable fuel nozzles projecting into the said mixing tubes one nozzle to each tube; a valve casing having a plurality of passages therein leading to the said fuel nozzles; a common adjusting means intercepting all of the said passages, each passage being intercepted in proportion to the size of its respective burner section and control means in the said valve casing.

4. A gas burner comprising two heating sections, each section with an individual mixing tube leading thereto; adjustable fuel nozzles projecting into each of said mixing tubes one nozzle to each tube, a valve casing having passages therein leading to each of the said fuel nozzles, fuel adjusting means intercepting each of said passages, each passage being intercepted substantially in proportion to the size of its respective burner section, and a common control means intercepting said passages.

5. In a gas burner, a burner body member having a plurality of burner sections and having a plurality of mixing tubes therein, a plurality of fuel nozzles projecting into the said mixing tubes one nozzle to each tube, a valve casing having a plurality of passages therein leading to the said fuel nozzles, a common adjusting means intercepting the said passages, each passage being intercepted substantially in proportion to the size of its respective burner section, and control means intercepting the said passages.

6. In a gas burner a burner body member having two burner sections and two corresponding mixing tubes therein; fuel nozzles projecting into each of the said mixing tubes one nozzle to each tube; a valve casing having two passages therein, one passage leading to each of the said fuel nozzles; a screw having two seating surfaces thereon arranged to engage two valve seats one in each of the said passages in the said valve casing, the said valve seats being in such proportion as to cause the ratio of the openings to be substantially equivalent to the ratio of the size of the respective burner sections and control means in the said valve casing.

7. In a gas burner a burner body member having a plurality of heating burner sections extending in substantially the same horizontal plane and arranged in a single substantially circular heating unit having a plurality of burner ports in the upper side of each of the said burner sections, and having a plurality of mixing tubes connecting directly into the said sections, each tube to its respective section; a plurality of fuel nozzles projecting into the said mixing tubes; a valve casing having a plurality of passages therein leading to the said fuel nozzles and continuing therethrough; adjusting means intercepting the said passages, and control means in the said valve casing.

8. A gas burner comprising a plurality of burner sections, the said burner having a plurality of mixing tubes corresponding in number to the said burner sections, a valve casing having passages therethrough leading to said mixing tubes, a master valve within said valve casing whereby the flow of fuel through the said valve body is controlled, and valves in each of said passages for controlling the flow of fuel therethrough.

9. A gas burner comprising two heating sections, each section with an individual mixing tube leading thereto; an adjustable fuel nozzle projecting into each of said mixing tubes; a valve casing having pasages therein leading to each of the said fuel nozzles; fuel adjusting means intercepting each of said passages; and a common control means intercepting said passages.

10. A gas burner comprising a plurality of burner sections, the said burner having a plurality of mixing tubes corresponding in number to the said burner sections, a gas nozzle projecting into each of said mixing tubes, a valve casing having passages therethrough leading to said gas nozzles, a master valve whereby flow of gas through the said valve casing is controlled, and in

addition independent restricting means in at least one of said passages in said casing leading to at least one of said gas nozzles.

11. A gas stove burner comprising a burner section with a mixing tube connecting thereto, an adjustable gas nozzle projecting into the said mixing tube, a valve casing having a passage therein leading to said gas nozzle, means of gas shut off intercepting said passage, and adjustable means for controlling the area of said passage.

Signed at Chicago, Illinois, this 3rd day of April, 1922.

PHILIP S. HARPER.