

May 29, 1934.

N. E. WERNER

1,960,609

CROSS FLAME GAS BURNER

Filed April 4, 1932

Fig. 1.

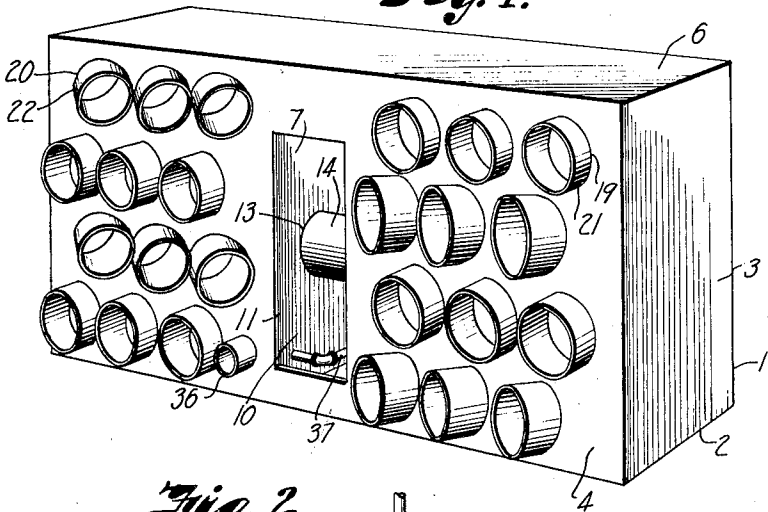


Fig. 2.

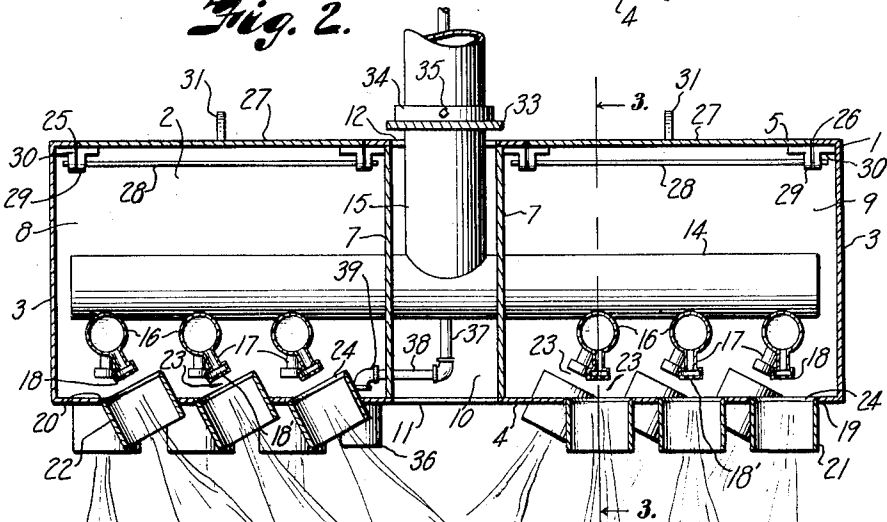


Fig. 3.

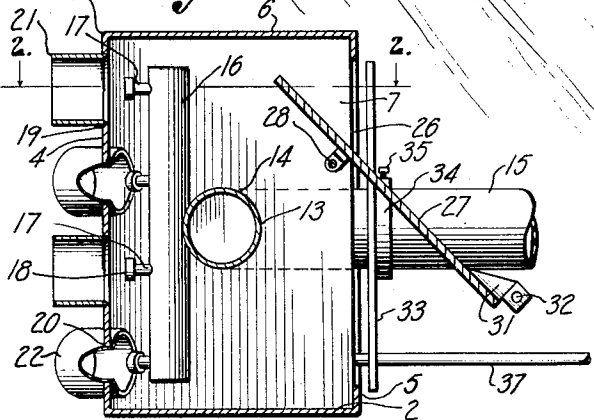
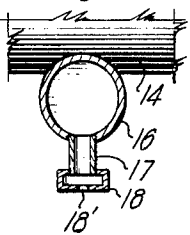


Fig. 4.



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1,960,609

CROSS FLAME GAS BURNER

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15 Claims. (Cl. 158—104)

My invention relates to burners and more particularly to a device of that character particularly adapted for burning gas.

The principal object of my invention is to provide a burner that will effect crossing of the flames in such a manner that the molecular structure of the gases is completely broken up and that an aspirating effect is produced for thoroughly commingling the gas molecules with air.

In accomplishing this and other objects of my invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of a burner constructed in accordance with my invention.

Fig. 2 is a longitudinal section on the line 2—2 Fig. 3, illustrating particularly the crossing of the flames issuing from the burner.

Fig. 3 is a cross section of the burner on the line 3—3 Fig. 2, showing a primary air door in partly opened condition.

Fig. 4 is an enlarged sectional view of a burner jet.

Referring more in detail to the drawing:

1 designates a preferably rectangular burner housing having a bottom and end walls 2 and 3, front and rear walls 4 and 5 and a top wall 6.

A pair of inner intermediate partition walls 7 divide the burner housing in left and right chambers 8 and 9 and are spaced to produce a secondary air passage 10 opening through the front and rear walls as respectively shown at 11 and 12. Mounted longitudinally in the housing and extended through openings 13 in the partition walls is a manifold 14 connected at its center with a supply line 15 leading outwardly from the housing through the rear opening 12 to a suitable source of fuel supply.

Connected to the longitudinal manifold and communicating therewith are a plurality of vertical branches 16 each in turn including a series of nozzles or jets 17 provided with caps 18 threaded or otherwise secured thereon and having orifices 18' proportional in size to mixing nozzles later to be described.

As a result, both vertical and horizontal series of jets are provided for distributing the escaping gas equally over the front of the burner housing.

In order to effect crossing of the ignited streams of fuel to break up the molecular structure of the gas, the upper horizontal series of jets in the right and left chambers are respectively directed laterally from the branches 16

and at an angle from these branches to direct the fuel from the oblique jets into the path of fuel flowing from the lateral jets.

This arrangement of the jets in the horizontal series is preferably reversed in the next lower series so that the flames from the oblique jets will cross each other without meeting directly, thereby producing an aspirating effect along a transverse center line of the burner housing to draw secondary air through the passage 10 as illustrated in Fig. 2.

The front wall 4 of the housing is provided with openings 19 and 20 for respectively receiving lateral and oblique mixing nozzles 21 and 22 fixed in the openings by welding or the like in substantially concentric alignment with the jets, a space 23 being reserved between the inner ends of the mixing nozzles and the outer ends of the jets to admit a supply of air into the mixing nozzles together with gas flowing from the jets, and the inner ends 24 of the mixing nozzles being preferably bell-shaped to facilitate such entering movement.

Under ordinary conditions, air is supplied in sufficient quantities to the left and right chambers through openings 25 and 26 in the rear wall 5, these openings being controlled by doors 27 pivotally carried on shafts 28 extended through cooperating bearing brackets 29 and 30 fixed respectively to the doors 27 and to the rear wall 5.

As is particularly shown in Fig. 3, the bearing brackets are secured to the doors above their longitudinal central line so that the portion of the door below the hinge will be heavier and the door be normally closed by gravity.

Ears 31, preferably formed integrally with the doors adjacent the lower edges, are provided with openings 32 for receiving an end of a control rod or other suitable device (not shown) for actuating the doors, it being desirable to automatically control both the supply of fuel to the burner and the relative opening of the doors by flow meters or similar devices, thereby insuring admittance of a proper amount of air for the fuel consumed.

If under unusual conditions, the supply of air flowing through the primary air inlets is insufficient, additional air may be introduced through the secondary air inlet 12 which is normally closed by a gate 33 slidably mounted on the supply line 15 and provided with a collar 34 secured in adjusted position on the inlet line by a set screw 35.

As in other burners of this character, a pilot

is provided including a relatively small nozzle 36 secured to the front wall of the housing in communication with a line 37 running parallel to the inlet line and provided with a lateral 5 portion 38 terminating in an elbow 39 adjacent the pilot nozzle.

Assuming a burner to be constructed and assembled as described, its operation would be as follows:

10 After opening the pilot line and lighting the fuel flowing from the line, a valve (not shown) controlling flow of fuel to the supply line is opened and fuel mixed with air entering through the primary inlet openings will be ignited by the 15 pilot light as in ordinary practice.

Due to the alternate oblique arrangement of jets in the opposite chambers of the burner nozzles, the flames leading from the oblique nozzles will cross each other, but will be directed 20 into the path of flames leading from the lateral nozzles, thus causing impingement of the sets of streams against each other for breaking up the molecular structure of the fuel and producing an aspirating effect which will draw air through 25 the mixing nozzles into the center of the combining flames.

Should the amount of air thus commingled with the fuel be insufficient for most effective combustion, the door closing the secondary air 30 inlet may be opened and adjusted until the proper mixture is obtained.

The burner is preferably so mounted, in a furnace or other location, where it is to be used, that the flames will cross each other within the 35 combustion chamber to promote the aspirating effect and result in more rapid combustion.

What I claim and desire to secure by Letters Patent is:

1. A burner including rows of spaced series of 40 oblique nozzles alternately extending in opposite directions to effect crossing of flames from one row over the other row in alternate planes.

2. A burner including spaced series of oblique nozzles alternately extending in opposite directions to effect crossing of flames one above the 45 other in alternate planes, and spaced series of nozzles for directing fuel into the paths of said crossing flames.

3. A burner including rows of spaced series of 50 oblique nozzles alternately extending in opposite directions to effect crossing of the flames one over the other in alternate planes, and rows of spaced series of nozzles for directing fuel into the paths of said crossing flames.

4. A burner including upper and lower pairs of 55 horizontally aligned nozzles arranged to effect flow of fuel from one of said upper nozzles obliquely into the path or flow of its aligned nozzle and reverse oblique flow from one of said 60 lower nozzles into the path of flow of its aligned nozzle.

5. A burner including a plurality of vertically spaced pairs of nozzles alternately arranged to effect oblique flow of fuel from one nozzle into 65 the path of flow of the other nozzle of a pair.

6. A burner including a manifold, a series of nozzles extending laterally from said manifold, and a series of nozzles joining the manifold at an angle to effect flow of fuel obliquely into the 70 paths of fuel flowing from the first named series.

7. A burner including a manifold, a series of lateral and oblique nozzles on said manifold arranged to effect flow of fuel from the oblique nozzles into the paths of fuel flowing from the 75 lateral nozzles, and a second series of aligned

lateral and oblique nozzles arranged reversely to said first named series.

8. A burner including a housing having separate compartments, a manifold in said compartments, a jet in one compartment extending 80 laterally from the manifold, a jet in the other compartment extending obliquely from the manifold and directed toward the path of flow of fuel from the first named jet, and mixing nozzles in the housing in substantially concentric alignment with said jets. 85

9. A burner including a housing having separate compartments, a manifold in said compartments, a jet in one compartment extending 90 laterally from the manifold, a jet in the other compartment extending obliquely from the manifold and directed toward the path of flow of fuel from the first-named jet, mixing nozzles in the housing in substantially concentric alignment with said jets, and air inlets for the com- 95 partments.

10. A burner including a housing having spaced compartments to form an air inlet between the compartments, a manifold in said compartments, a jet in one compartment extending 100 laterally from the manifold, a jet in the other compartment extending obliquely from the manifold and directed toward the path of flow of fuel from the first named jet, mixing nozzles in the housing in substantially concentric 105 alignment with said jets, and means for adjusting the effective area of said inlet.

11. A burner including a housing having spaced left and right compartments to form an air inlet between the compartments, a manifold 110 in said compartments, an upper jet in the right compartment extending laterally from said manifold, a horizontally aligned jet in the left compartment extending obliquely from the manifold toward the right compartment, lower 115 horizontally aligned jets in the compartments arranged in reverse relation to the upper jets, nozzles in the housing in substantially concentric alignment with the jets, and means for adjusting the effective area of said inlet. 120

12. A burner including a housing having right and left compartments, a manifold in said compartments, an upper jet in the right compartment extending laterally from said manifold, a 125 horizontally aligned jet in the left compartment extending obliquely from the manifold toward the right compartment, lower horizontally aligned jets in the compartments in reverse relation to the upper jets, nozzles in the housing in substantially concentric alignment with the 130 jets, and individual air inlets for the compartments.

13. A burner including a housing having right and left compartments, a manifold in the compartments, a series of jets in the right compartment extending laterally from said manifold, a horizontally aligned series of jets in the 135 left compartment extending obliquely from the manifold toward the right compartment, parallel series of jets in the right and left compartments in reverse relation to said first-named aligned series, an individual air inlet for each 140 compartment, and a secondary air passage between the compartments.

14. A burner including a housing having right 145 and left compartments, a manifold in the compartments, jets on the manifold arranged to direct flames alternately from opposite compartments obliquely toward a transverse center line between the compartments, and nozzles in 150

the housing in substantially concentric relation with said jets.

toward the right compartment, parallel jets in the right and left compartments in reverse relation to said first named aligned jets, an individual air inlet for each compartment, means for adjusting the effective area of said individual air inlets, and means for adjusting the effective area of the inlet between said compartments.

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15	90
20	95
25	100
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45	120
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60	135
65	140
70	145
75	150