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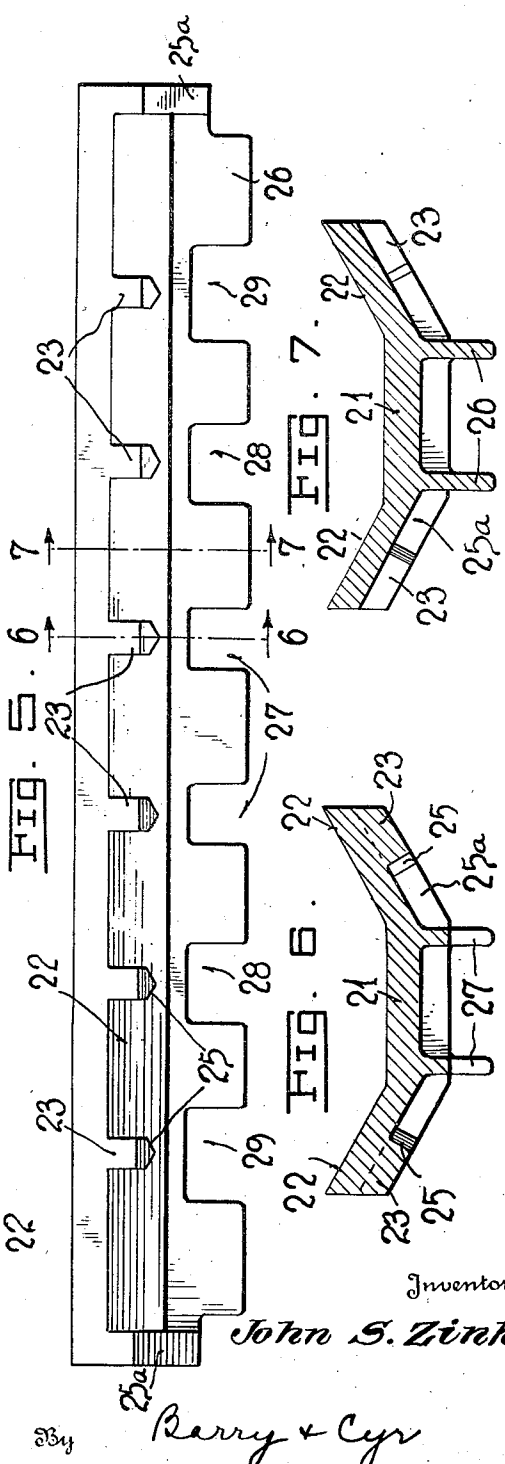
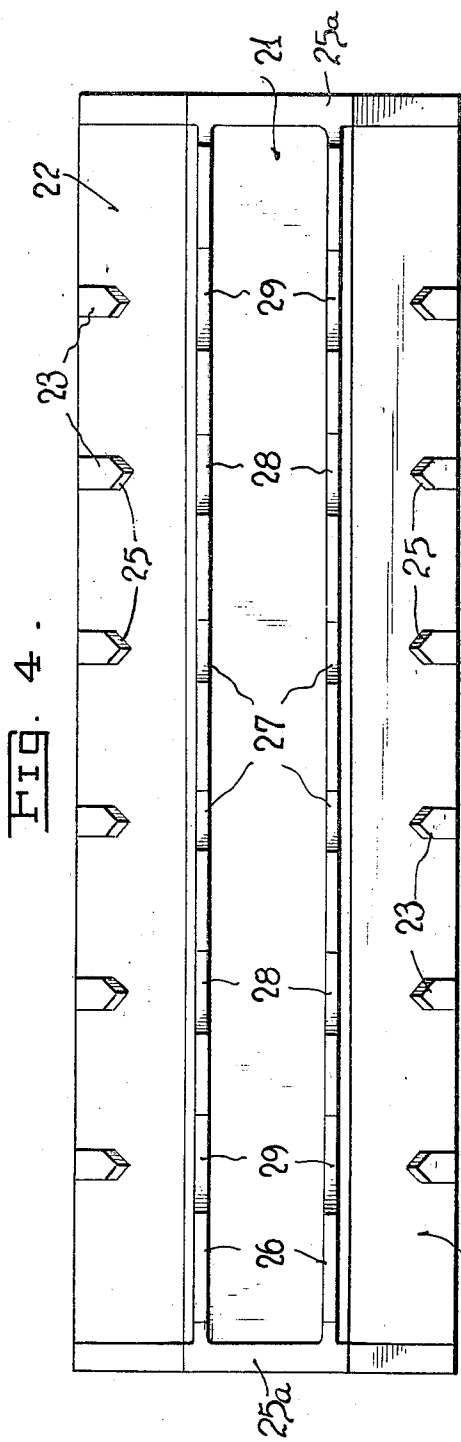
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GAS BURNING MEANS

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GAS BURNING MEANS

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13 Claims. (Cl. 158—99)

This invention relates to improvements in gas burners and more particularly to burners of the vertically fired type employed for boilers or the like.

5 Some of the objects of the invention are to provide a short flame vertically fired gas burner that may be easily installed or removed from the fire box of a furnace; which will have a wide range of capacity and high efficiency; and which
10 will also require only a low first cost.

Another object is to furnish a burner having an improved mixing head which although of elongated form will evenly or uniformly discharge the gas throughout the length of the head.

15 A further object is to supply an elongated mixing head to create a constant velocity of the gas at all discharge points and thus provide an even distribution of the flame issuing from the burner.

A still further object is to provide improved means for supplying secondary air to be mixed
20 with the gas discharged from adjacent burners.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a side elevation partly in vertical section of a portion of a furnace provided with a plurality of my improved burners.

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1 and showing a pair of the burners in transverse vertical section.

Fig. 3 is a view similar to Fig. 2 but showing a modification.

Fig. 4 is an enlarged bottom plan view of a removable plate which forms a cover for the burner head.

Fig. 5 is a side elevation of the same.

40 Figs. 6 and 7 are transverse sectional views of the removable plate taken respectively on the lines 6—6 and 7—7 of Fig. 5.

Referring to Figs. 1 and 2 of the drawings, it is to be understood that my improved burners are to be arranged in any suitable furnace setting to which a gaseous fuel is supplied by pipes 8 located in the ash pit (not shown) of the furnace. At an elevation where the grate of the furnace is usually located, I arrange spaced plates 9 of metal or any other suitable material and such plates form rigid horizontal supports. Each plate forms rings 10 through which the down tube 11 of a burner may be inserted until its lower end 12 is brought to rest on one of the pipes 8,
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which pipe may serve as a support for the burner. The lower end of each tube is provided with a collar 13 which surrounds a nozzle 14 through which the fuel is discharged from pipe 8 into the tube 11. Said tube forms a Venturi throat 15, the restricted portion of which is arranged directly above the nozzle 14. Slots 16 at opposite sides of the tube 11 are preferably positioned below the upper end of the nozzle 14 and supply primary air to the burner.

10 Tube 11 terminates at its upper end in an enlarged flared head 17 forming an elongated substantially V-shaped groove or channel 18 that communicates with the interior of the tube 11. Such channel is partially formed by upwardly
15 diverging walls 19 arranged at opposite sides of the head 17.

A removable plate 20 forming an important feature of the invention cooperates with the head 17 to provide a mixing head. Such plate, as best
20 shown in Figs. 4 to 7 inclusive, consists of a flat medial portion 21 from which projects upwardly diverging wings 22 that are positioned parallel to the wall 19. Each wing is provided with a series of spaced depending lugs 23 which rest on
25 the walls 19 and space the wings 22 from these walls so as to provide each side of the burner head with a series of outlets or discharge passageways 24 (Fig. 2).

The inner end of each of the lugs is preferably
30 of V-shape, as shown at 25, to divide the fuel mixture discharged from the head into a number of streams.

Each plate is provided at its ends with substantially V-shaped depending flanges 25a to rest on
35 the ends of the head 17 and prevent the mixture from discharging through the ends of the head.

Each plate has a pair of parallel depending flanges 26 extending throughout the length thereof into the channel 18 and each flange is notched
40 as shown at 27, 28, 29, the notches increasing in width toward the ends of the plate. Consequently, the mixture flowing from the Venturi throat into the head portion of the burner at a constant velocity will strike the underside of the
45 central portion 21 of the plate and then spread throughout the upper end of the tube 11 and be discharged through the notches 27, 28 and 29. In order to create a constant velocity of the gas at all points and thus provide an even distribution of the flame coming out of the passageways
50 24, the varying spaces or notches function to effect uniform distribution. The spaces 27 being smaller than the spaces 28 and 29, decrease velocity at the medial portion of the head while the
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larger spaces increase the velocity at other points. The equally spaced lugs 23 further assist in the even distribution of the mixture in that if there is any variance in the volume of fluid coming through the spaces, the lugs divide the fluid and convert an uneven flow into an even one. The lugs 23 in conjunction with the ribs 26 eliminate any possibility of pulsation in the flame, i. e., variance in the flow of the mixture.

In practice, when a pair of such burners are arranged side by side, the mixture issuing from adjacent sides of two burners will come together along a central line between two of the burners and there the mixture can be ignited by means of a pilot burner 30. The latter preferably extends through metal plates 31 which are removably supported by ledges 32 at opposite sides of the plates 31, and the plates 31 are preferably provided with slots 33 to permit the upward flow of secondary air. Other openings or ports 34 for secondary air are formed by the rings 10.

Instead of making the plates 31 flat (Fig. 2) they may be of inverted V-shape, as shown at 31a in Fig. 3.

From the foregoing it will be understood that the substantially V-shaped throats of the burner heads are to provide a flame at a central location between two burners, and this flame will combine with the secondary air passing through the openings 33 and 34. It is essential to have this V-shape construction to cause the mixture passing out of the sides of the burners to be combined with secondary air, especially upon the burning of mixed gases in order to increase the combustion in a short flame, since an even combustion is practically impossible with a strictly upright flame discharging from a Venturi tube.

Many modifications of the invention will be apparent to those skilled in the art without departing therefrom or from the scope of the claims, and since the foregoing disclosure has been given by way of example for clearness and understanding, no unnecessary limitations should be understood, and the appended claims should be construed as broadly as the state of the art permits.

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

1. In a burner of the character described, an elongated head provided with a substantially V-shape throat, means obstructing the throat and cooperating with the head to form a series of diverging passageways at opposite sides of the head, tubular means for supplying a gaseous fuel mixture to the throat, and other obstructions cooperating with said tubular means and with the throat to evenly distribute the mixture from the tubular means lengthwise of the throat.

2. In a burner of the character described, an elongated head provided with a substantially V-shape throat, means obstructing the throat and cooperating with the head to form a series of diverging passageways at opposite sides of the head, tubular means for supplying a gaseous fuel mixture to the throat, and other obstructions cooperating with said tubular means and with the throat to evenly distribute the mixture from the tubular means lengthwise of the throat, the first-mentioned obstructions having pointed inner ends.

3. In a burner of the character described, an elongated head provided with a substantially V-shape throat, means obstructing the throat and cooperating with the head to form a series of diverging passageways at opposite sides of

the head, tubular means for supplying a gaseous fuel mixture to the throat, and other obstructions cooperating with said tubular means and with the throat to evenly distribute the mixture from the tubular means lengthwise of the throat, said other obstructions including spaced ribs having notches of different widths gradually increasing in size from the central portion of the head to the ends of the latter.

4. In a burner of the character described, a vertically disposed Venturi tube having means at its lower end for the entrance of a gaseous fuel and combustion air, upwardly diverging elongated walls provided at the upper end of the tube, an elongated substantially V-shape plate forming a cover for the tube and having upwardly diverging wings arranged substantially parallel to said walls and spaced from the latter, means obstructing the spaces between the walls and wings to provide a multiplicity of diverging passageways at opposite sides of the tube, and notched means depending from said plate and forming means within the burner for evenly distributing a gaseous fuel mixture from the tube to said passageways.

5. In a burner of the character described, a vertically disposed tube provided at its lower end with means for the admission of a gaseous fuel and combustion air into the tube, upwardly diverging opposite elongated walls arranged at the upper end of the tube, the tube being rigidly united with the medial portions of said walls, a substantially V-shaped plate having upwardly diverging wings arranged substantially parallel with said walls and spaced from the latter, lugs arranged between the walls and wings for spacing them and forming a multiplicity of upwardly diverging passageways at opposite sides of the burner, and substantially parallel ribs arranged beneath the plate and extending lengthwise thereof inwardly of said walls, said ribs having notches of varying widths which increase in size from the tube toward the ends of the plate.

6. In a burner of the character described, a vertically disposed Venturi tube provided at its lower end with means for the admission of a gaseous fuel and combustion air into the tube, upwardly diverging opposite elongated walls arranged at the upper end of the tube, the tube being rigidly united with the medial portions of said walls, a substantially V-shaped plate having upwardly diverging wings arranged substantially parallel with said walls and spaced from the latter, lugs arranged between the walls and wings for spacing them and forming a multiplicity of upwardly diverging passageways at opposite sides of the burner, and substantially parallel notched ribs arranged beneath the plate and extending lengthwise thereof inwardly of said walls, said ribs forming an inverted elongated trough at the bottom of the plate.

7. In a structure of the character described, a plurality of vertically disposed Venturi tubes arranged side by side and in spaced relation to one another, each tube being provided at its lower end with means for admitting a gas fuel and combustion air into the tube, each tube being provided at its upper end with upwardly diverging elongated walls, one wall of one tube converging toward the opposite wall of the other tube, the upper end of each tube being rigidly united with the medial portion of its walls, a substantially V-shaped plate closing the upper end of each tube and provided with upwardly diverging wings which are arranged substantially parallel to the

walls of its tube and spaced from said walls, spaced lugs positioned between the walls of each tube and the wings with which the walls are associated to provide a series of upwardly diverging passageways at opposite sides of each burner, the passageways at one side of one burner converging toward the passageways at the adjacent side of the other burner, and spaced ribs arranged in each burner and having notches of varying widths which increase in size from the tube toward the outer ends of the walls of the tube to evenly distribute the mixture from the Venturi throat into said passageways.

8. In a structure of the character described, a plurality of vertically disposed Venturi tubes arranged side by side and in spaced relation to one another, each tube being provided at its lower end with means for admitting a gas fuel and combustion air into the tube, each tube being provided at its upper end with upwardly diverging elongated walls, one wall of one tube converging toward the opposite wall of the other tube, the upper end of each tube being rigidly united with the medial portion of its walls, a substantially V-shaped removable plate closing the upper end of each tube and provided with upwardly diverging wings which are arranged substantially parallel to the walls of its tube and spaced from said walls, spaced lugs positioned between the walls of each tube and the wings with which the walls are associated to provide a series of upwardly diverging passageways at opposite sides of each burner, the passageways at one side of one burner converging toward the passageways at the adjacent side of the other burner, and spaced ribs arranged in each burner and having notches of varying widths which increase in size from the tube toward the outer ends of the walls of the tube to evenly distribute the mixture from the Venturi throat into said passageways, and means for admitting secondary air to the mixture discharged from the passageways.

9. In a structure of the character described, a plurality of vertically disposed Venturi tubes arranged side by side and in spaced relation to one another, each tube being provided at its lower end with means for admitting a gas fuel and combustion air into the tube, each tube being provided at its upper end with upwardly diverging elongated walls, one wall of one tube converging toward the opposite wall of the other tube, the upper end of each tube being rigidly united with the medial portion of its walls, a substantially V-shaped removable plate closing the upper end of each tube and provided with upwardly diverging wings which are arranged substantially parallel to the walls of its tube and spaced from said walls, spaced lugs positioned between the walls of each tube and the wings with which the walls are associated to provide a series of upwardly diverging passageways at opposite sides of each burner, the passageways at one side of one burner converging toward the passageways at the adjacent side of the other burner, and spaced ribs arranged in each burner and having notches of varying widths which increase in size from the tube toward the outer ends of the walls of the tube to evenly distribute the mixture from the Venturi throat into said passageways, and a plate positioned between said tubes and provided with

means for admitting secondary air to the mixture discharged from said passageways.

10. In a structure of the character described, a plurality of vertically disposed Venturi tubes arranged side by side and in spaced relation to one another, each tube being provided at its lower end with means for admitting a gas fuel and combustion air into the tube, each tube being provided at its upper end with upwardly diverging elongated walls, one wall of one tube converging toward the adjacent wall of the other tube, the upper end of each tube being rigidly united with the medial portion of its walls, a substantially V-shaped plate closing the upper end of each tube and provided with upwardly diverging wings which are arranged substantially parallel to the walls of its tube and spaced from said walls, spaced lugs positioned between the walls of each tube and the wings with which the walls are associated to provide a series of upwardly diverging passageways at opposite sides of each burner, the passageways at one side of one burner converging toward the passageways at the adjacent side of the other burner, and spaced ribs arranged in each burner and having notches of varying widths which increase in size from the tube toward the outer ends of the walls of the tube to evenly distribute the mixture from the Venturi throat into said passageways and a plate of substantially inverted V-shape positioned between the burners and provided with means for furnishing secondary air to the fuel mixture discharging from opposed passageways of the burners.

11. In a gas burner, an elongated removable head plate comprising a substantially flat medial portion from which projects upwardly diverging wings, each wing having a series of spaced lugs depending therefrom, and depending parallel ribs projecting downwardly from the medial portion of the plate and extending lengthwise of the latter, said ribs being provided with spaced notches and the notches increasing in width from the medial portions of the ribs toward the ends of the latter.

12. In a gas burner, an elongated removable head plate comprising a substantially flat medial portion from which projects upwardly diverging wings, each wing having a series of spaced lugs depending therefrom, and depending parallel ribs projecting downwardly from the medial portion of the plate and extending lengthwise of the latter, said ribs being provided with spaced notches and the notches increasing in width from the medial portions of the ribs toward the ends of the latter, and substantially V-shaped flanges depending from the ends of the plate and arranged at right angles to said ribs.

13. In a burner of the character described, an elongated head provided with a substantially V-shape throat, means obstructing the throat and cooperating with the head to form a series of diverging passageways at opposite sides of the head, a vertically disposed Venturi tube connected to the medial portion of said head for supplying a gaseous fuel mixture to the throat, and other obstructions cooperating with the Venturi tube and with the throat to distribute the mixture from the tube lengthwise of the throat.