March 5, 1946. O. W. HAHN 2,395,868

GAS HEATING BURNER

Filed Jan. 12, 1942 2 Sheets-Sheet 1

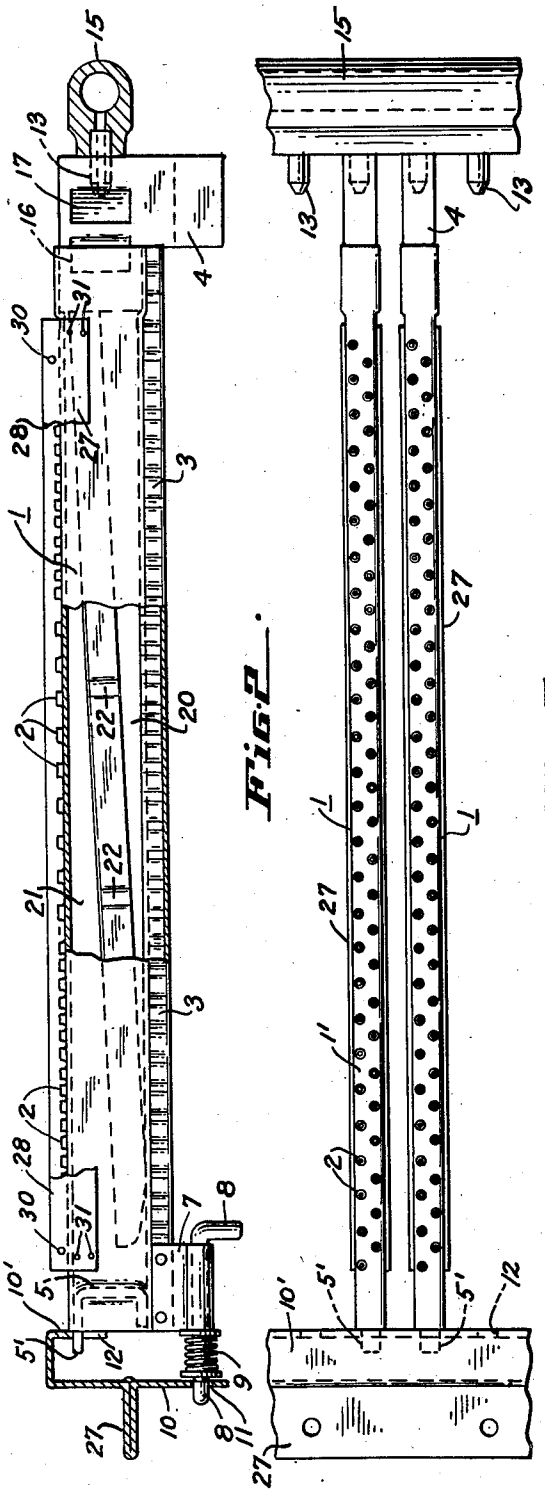


Fig. 1.

Fig. 2.

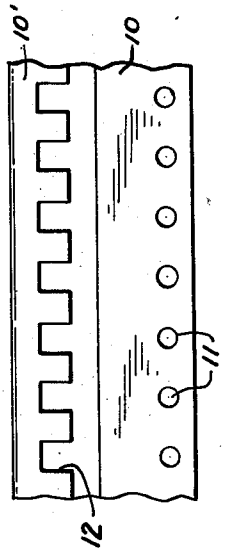


Fig. 3.

INVENTOR.
OTTO W. HAHN
BY
ATTORNEY.

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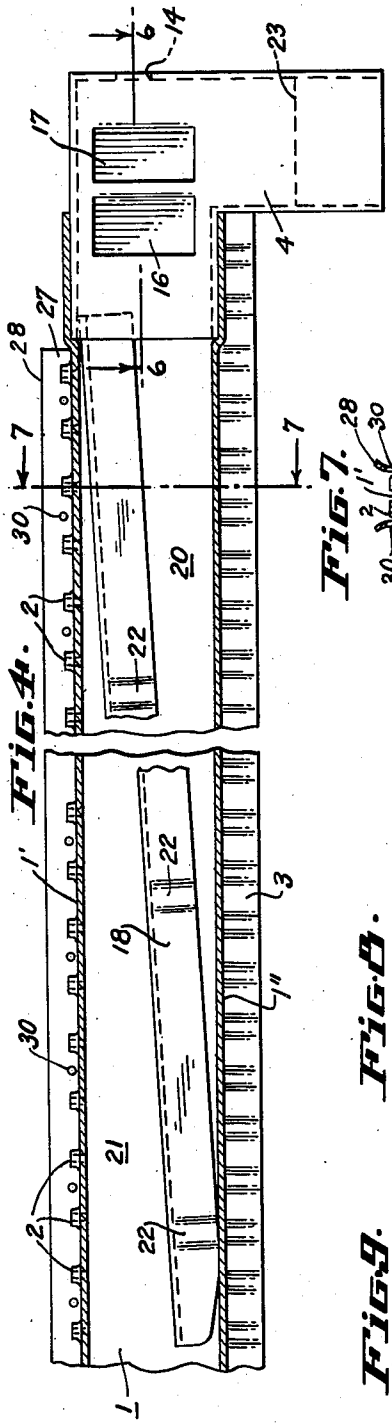


Fig. 4.

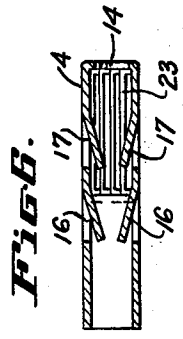


Fig. 6.

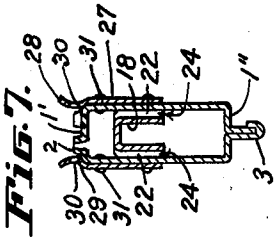


Fig. 7.

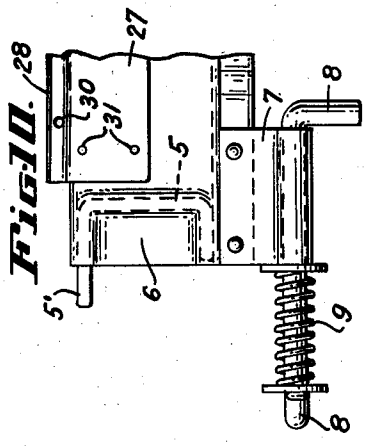


Fig. 10.

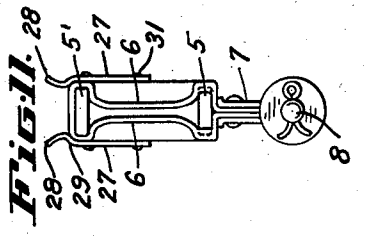


Fig. 11.

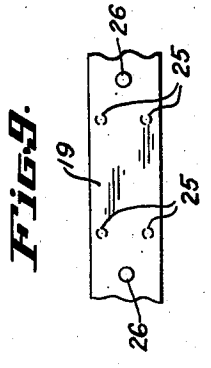


Fig. 9.

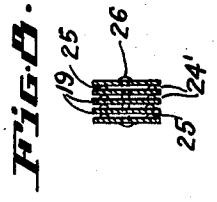


Fig. 8.

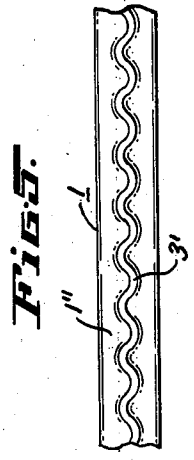


Fig. 5.

INVENTOR.
OTTO W. HAHN
BY A. A. Bried
ATTORNEY.

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GAS HEATING BURNER

Otto W. Hahn, San Francisco, Calif., assignor to Industrial Research Laboratories, Ltd., San Francisco, Calif., a corporation of Nevada

Application January 12, 1942, Serial No. 426,412

6 Claims. (Cl. 158—104)

This invention relates to gas burners and the principal objects of the invention are to provide improvements in the type of gas burners as used in hot water heaters and other heating equipment where a relatively large amount of heat must be generated over a given area, and a close group of burner tubes is used. Other objects and specific features and advantages of the improvement will appear in the following description and accompanying drawings.

In the drawings:

Fig. 1 is a side elevation of my improved gas burner supported at opposite ends as in a fire box of a heater.

Fig. 2 is a plan view of Fig. 1 showing two of the burner tubes or units so supported.

Fig. 3 is a front elevation of the special supporting bracket at the left end of the burner tube.

Fig. 4 is a substantially full size, broken, side elevation of most of the burner tube showing more clearly the air and gas inlet and the combined pressure controller and back-fire guard.

Fig. 5 is a bottom view of a portion of the burner tube of Fig. 4.

Fig. 6 is a cross section of the gas and air inlet member of the burner as seen from the line 6—6 of Fig. 4.

Fig. 7 is a cross section of Fig. 4 as seen from the line 7—7 thereof.

Fig. 8 is a cross section of an optional construction of the combined pressure controller and back-fire guard.

Fig. 9 is a side view of the device of Fig. 8.

Fig. 10 is a substantially full size side elevation of the extreme left-hand end of the burner tube showing the manner of its closing.

Fig. 11 is an end view of the showing of Fig. 10.

Before describing the drawings in detail, it may be stated that the burner in its most useful form is an elongated flat sheet metal tube of oblong cross section and with one or more rows of flame apertures arranged along the edge of the tube. The tube is closed at one end, and gas is admitted to the opposite end where it is mixed with some air, and the delivery of the gas and air mixture to the flame apertures is controlled by an elongated angularly disposed guard strip which substantially cuts the long burner tube space into two chambers, a lower feeding and mixing chamber and an upper supply chamber for the burner apertures separated by a plurality of narrow slits between the guard walls of relatively considerable depth to thus both control the gas pressure and its even distribution to the burner apertures and also guard against back-fire.

This inner guard structure is preferably secured to a changeable "head" or gas and air inlet member so that various heads and/or guards may be interchangeably used in a burner tube to suit the particular gas being used, whether it be manufactured gas, natural gas, butane, propane, etc. The other important features of the burner will be described as the detailed specification proceeds.

In the drawings 1 designates one of the flat shaped sheet metal burner tubes, having one or more rows of flame apertures along its upper edge with extruded necks 2. The burner tube is of substantially rectangular oblong cross section as shown best in Fig. 7 and wherein its side walls are shown bent over to form the upper 1' and bottom 1'' walls and closed on the bottom by a crimped flange 3 which may be soldered, brazed, or cement filled. This flange is also crimped in a special manner to give it an undulating or wavy form transversely of its length as shown at 3' (see Fig. 5), and which makes the burner tube very stiff so that it has no tendency to warp or deflect from heat.

The right hand or inner end of the burner tube proper is open to slidably or telescopically receive the gas and air inlet head 4 and the left hand or outer end is closed and sealed as best shown in Figs. 10 and 11, wherein a U shaped piece of bar metal 5 is indicated as positioned within the tube with one end longer and projecting at 5' while the sheet metal of the tube is pressed inward tightly at both sides of the U bar as at 6, as well as substantially closed over the shorter end so as to make a tight joint. Solder or cement may also be used in the joint, though if properly made this is not necessary.

Under the U bar sealing strip and secured to the crimped flange 3, is a strip of metal 7 formed to provide a tubular socket for a bolt 8 normally urged outward by a coiled compression spring 9, and which bolt together with the projecting portion 5' of the U bar cooperate to support the outer end of the burner tube on a supporting bracket 10. This bracket is an elongated metal strip generally of the cross section of an inverted L formed with an anchoring flange 27 and with a row of spaced holes 11 in its long leg, and a row of similarly spaced notches 12 in the edge of its short leg 10'. Each notch receives the projecting bar 5' of a burner, and the hole below it receives the spring urged bolt, while at the extreme opposite end the burner is supported on one of a row of gas inlet nipples 13 which projects into a hole 14 in the end wall of the inlet head 4. The gas inlet nipples are spaced along a gas manifold or sup-

ply pipe 15 in line with the notches 12 so that a group or battery of burners may be supported in spaced relation as shown by the two in Fig. 2, and thus a very great amount of heat may be generated in a relatively small space. To remove any burner, it suffices to pull back its bolt 8, drop this end of the burner to free 5' from its notch, and slide the burner outward to drop from nipple 13.

Inlet head 4 is a flat hollow right-angled or L shaped tubular member, and with the short leg made of a size to telescope tightly within the inner or inlet end of the burner tube 1. A round hole 14 is provided in the outer edge of the head member to slide over one of the gas supply nipples 13, and at both sides of the horizontal run may be inwardly bent louvres 16, 17, formed about as shown best in Fig. 6, so as to concentrate the inflowing gas stream to a vertical band and entrain secondary air from the louvres at the sides of the head to add to primary air drawn in from the lower open end of the L shaped head. This lower end preferably has its interior partitioned into a plurality of narrow vertical passages by means of a grid of thin spaced plates 23, as shown in Figs. 4 and 6. These plates are secured in place by friction or any desired means, and are preferably about 1/16 or 3/32 of an inch in thickness and similarly spaced so as to provide very narrow flat passageways for incoming air. This is found to eliminate flash ignition of the gases in the mixing chamber of member 4.

The number, size, or entire absence of louvres will be indicated by the nature of the gas being burned and accordingly, in practice, several interchangeable inlet heads with different size louvres are provided.

Secured to and projecting into the burner tube 1, is the gas pressure, or flow control, and anti-back-firing guard 18. This device may take the form of a long channel or inverted trough as best shown in Fig. 7, or the form of a grid of spaced strips as shown at 19 in Figs. 8 and 9, which provides more gas channels.

In either construction the elongated device, which reaches almost to the outer end of the burner space, extends slantingly downward from adjacent the top wall of the burner tube to the bottom so as to virtually divide the space into two reversely tapered gas mixture spaces 20 and 21, for the length of the burner but joined at the outer end around the extreme end of the flow control device 18, and forces most of the gas mixture to rise from the lower chamber 20 to the upper one 21 through the narrow flat channels 24 (or channels 24' also if the construction of Figs. 8 and 9 is used where lugs 25 and rivets 26 form the spacing elements).

In the first form the channel is a trifle narrower than the inside of the burner tube, and is accurately spaced therefrom as by slight outwardly projecting ribs 22 stamped in its sides so as to provide narrow slots or ribbon-like channels between its outer sides, and the inside walls of the burner tube for the gas and air mixture to rise to the burner outlet apertures.

A feature of the invention is the quick removability of the gas inlet head 4, and the flow control device 18 (or 19) so that others may be slid in place having greater or smaller gas mixture channels, and/or modified louvres, so as to quickly fit the burner for the particular gas being used.

In use, the inlet head, louvre, and grid arrangement insures complete mixing and control of the combustible gas mixture, and the tapered lower space 20 of the burner and tapered upper space 21 separated by the flow control device 18 or 19 insures a gradual drop off in volume of gas to the final flame apertures, which are in the illustrated construction nearest to the inlet end or head 4 of the elongated burner tube, though the burner tube itself is preferably of parallel walled uniform cross section, a form quickly and cheaply produced by simple folding operations.

When such burners are used in groups spaced about as shown in Fig. 2, under certain conditions of gas and pressure, the draft of secondary or tertiary air drawn over the outer sides of the tubes is too violent for proper burning of the flames and to overcome this I provide plates 27 which extend along opposite sides of the burner tube, and above the top of the tube to a point preferably above the necks 2 of the flame apertures as at 28. These plates are secured to the outer sides of the burner tubes as by welding or riveting as at 31, and are preferably bent or channelled inwardly over the burner as at 29 and then outward again to the upper edge 28, and along the chanel thus formed I preferably provide a row of small holes 30 to limit the flow of auxiliary air to the base of the flames. The number and size of these air apertures for best results will vary somewhat for the particular gas used.

My improved burner tubes may of course be of any size or length, and while I show them as straight tubes, they need not necessarily be straight, but may be elongated tubes any shape permitting the incorporation of the improvements above described.

Having thus described my improved gas heating burner and its mode of operation, I claim:

1. A gas heating burner comprising an elongated sheet metal tube adapted to extend horizontally and with flame apertures along its upper side, said tube closed at one end and open at the other, and a tubular gas inlet and mixing head fitted to the open end of the tube and provided with an air admitting opening and a grid of closely spaced flat plates covering said opening.

2. In a structure as set out in claim 1 said mixing head being substantially L shaped with one leg fitted to the burner tube, and the grid screened air inlet at the end of the other leg, and a gas inlet through the wall opposite the end of the tube.

3. A gas heating burner comprising a sheet metal tube of oblong cross section, flame apertured along one edge and with a gas air mixture admitting member at one end and closed at the other end by means of a U shaped bar fitted within the tube with its legs extending toward the adjacent end of the tube and the metal of opposite walls of the tube crimped together and tightly about the bar.

4. A gas heating burner comprising a sheet metal tube of oblong cross section, flame apertured along one edge and with a gas air mixture admitting member at one end and closed at the other end by means of a U shaped bar fitted within the tube and the metal of the tube crimped tightly about the bar, one leg of said U shaped bar protruding beyond the closed end of the tube adjacent its flame apertured edge, and a bolt slidably secured to the opposite edge of the tube cooperating with said leg of the U shaped bar to support the burner on a bracket.

5. A plurality of elongated tubular gas burners adapted to be used in horizontal extension, a pin projecting from one end of each burner adjacent its upper edge and a bolt similarly projecting at

its lower edge, a supporting bracket for spacing the burners presenting a horizontal row of spaced notches each adapted to receive the projecting pin of one burner, and a lower row of similarly spaced holes each adapted to receive the bolt of the burner.

6. A gas heating burner comprising an elongated burner tube with a row of flame apertures, said tube being closed at one end, and provided with a gas inlet at the other end, and partition means extending lengthwise within the tube substantially dividing the tube space lengthwise with the flame apertures on one side and the gas inlet space on the other side, said partition means arranged to provide a plurality of narrow gas passage slots of relatively great depth between the partitioned tube spaces substantially for the length of the partition, and the partition means extending slantingly in the burner tube from one end to the other so as to gradually enlarge the tube space under the flame apertures from a minimum at the gas inlet end of the tube to a maximum at the opposite or closed end.

OTTO W. HAHN.