June 27, 1944.

E. R. KOPPEL

2,352,329

CAST IRON GAS BURNER

Filed Aug. 2, 1941

3 Sheets-Sheet 1

FIG. 1.

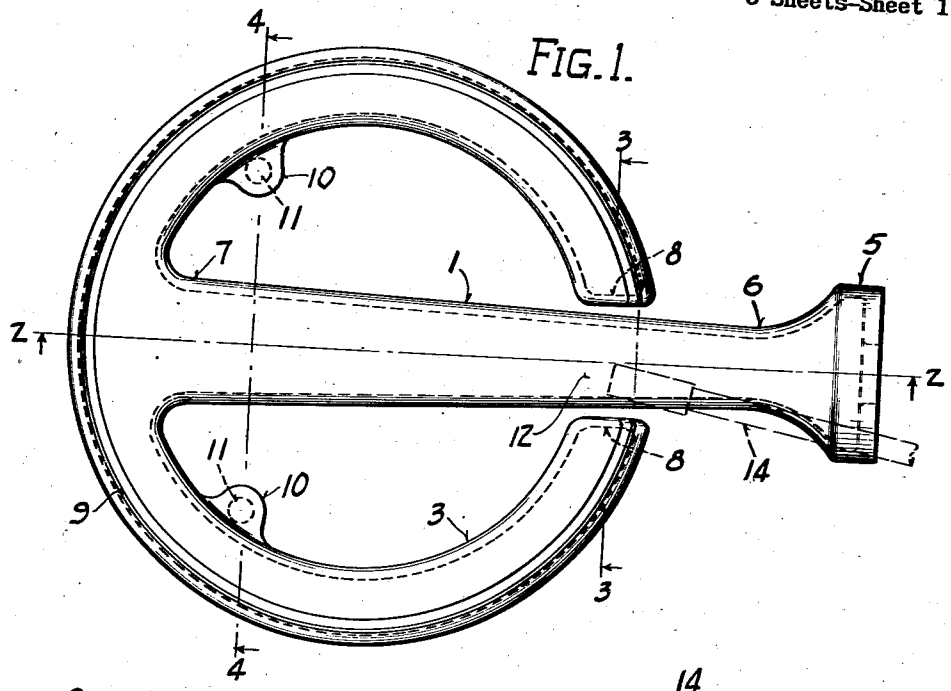


FIG. 2.

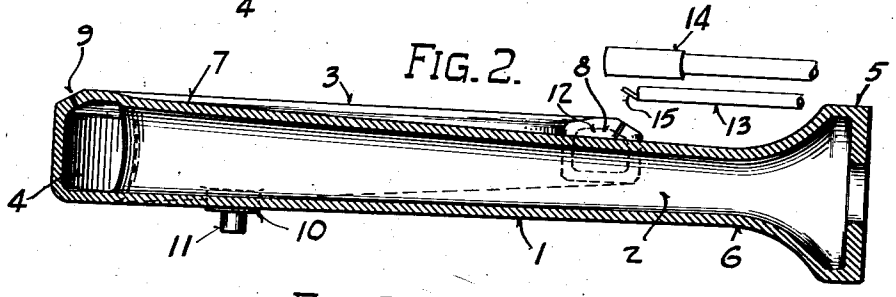


FIG. 3.

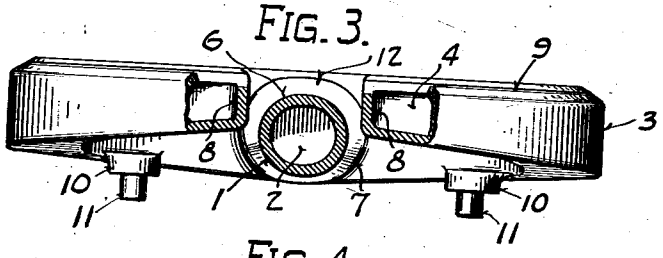
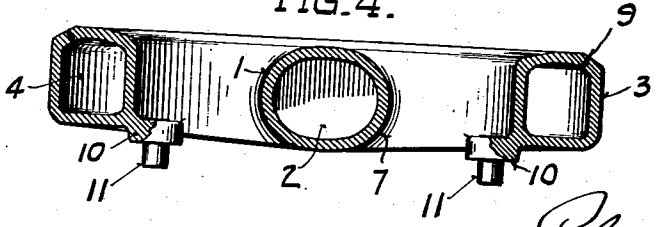


FIG. 4.



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FIG. 5.

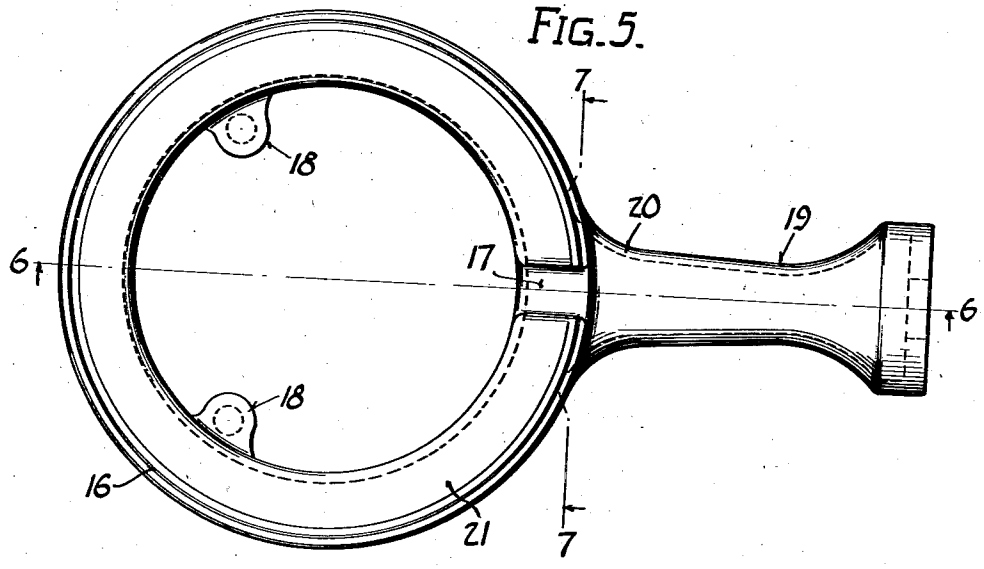


FIG. 6.

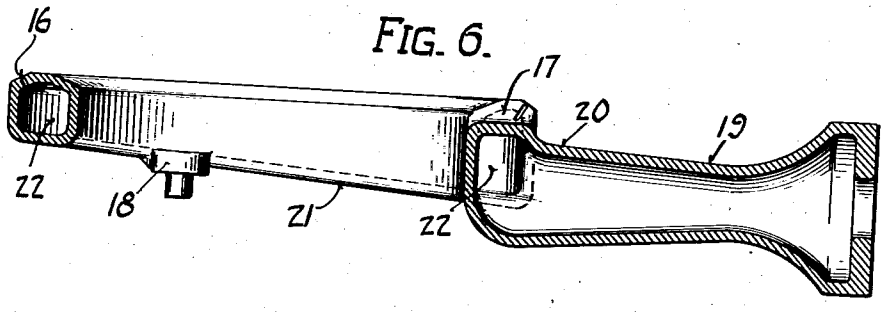
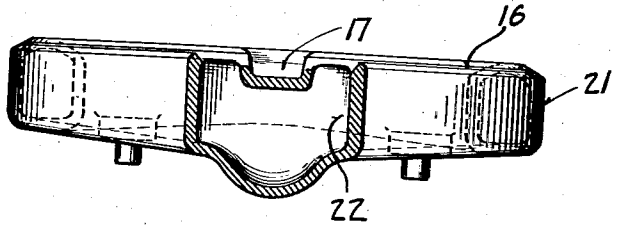


FIG. 7.



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FIG. 8.

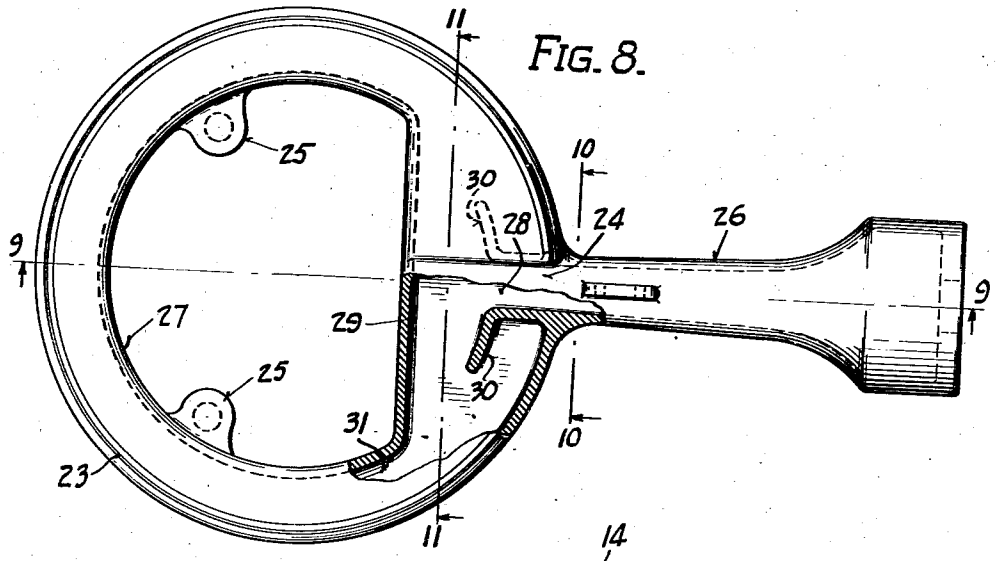


FIG. 9.

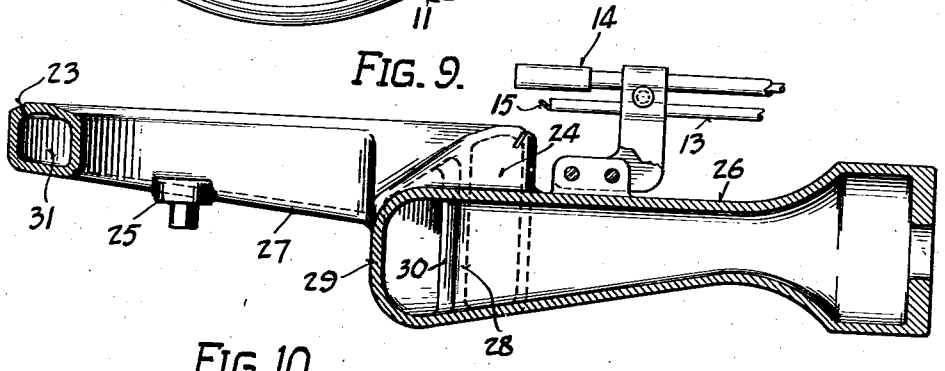


FIG. 10.

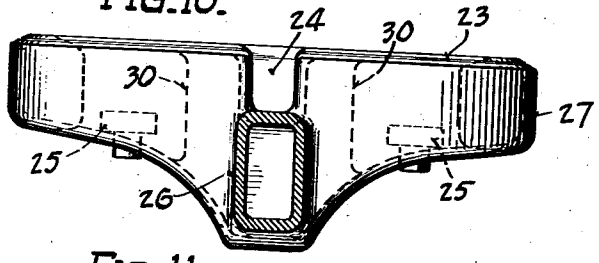
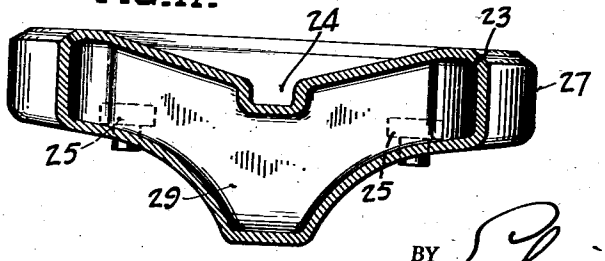


FIG. 11.



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UNITED STATES PATENT OFFICE

2,352,329

CAST-IRON GAS BURNER

Ernst R. Koppel, Wauwatosa, Wis., assignor to A. O. Smith Corporation, Milwaukee, Wis., a corporation of New York

Application August 2, 1941, Serial No. 405,172

3 Claims. (Cl. 158—115)

This invention relates to a cast iron gas burner and more particularly to a burner cast in an integral piece that may be employed in a stove or any kind of gas heater.

The presently known burners of cast iron require the performance of numerous operations in their construction that result in considerable expense.

The object of the present invention is to provide a one-piece cast burner that is less expensive to construct.

Another object is to provide a burner with a continuous slot in its tubular ring portion that will produce a uniform flame throughout its circular extent.

Another object is to provide a burner that is specifically adapted to be used with a pilot burner.

Other objects will become apparent from the following description and accompanying drawings in which:

Figure 1 is a top plan view of the burner embodying the invention;

Fig. 2 is a vertical section taken on line 2—2 of Figure 1 and also showing a pilot burner;

Fig. 3 is a section taken on line 3—3 of Figure 1;

Fig. 4 is a section taken on line 4—4 of Figure 1;

Fig. 5 is a top plan view of a modified burner embodying the invention;

Fig. 6 is a vertical section taken on line 6—6 of Fig. 5;

Fig. 7 is a section taken on line 7—7 of Fig. 5;

Fig. 8 is a top plan view of another modified form of burner embodying the invention;

Fig. 9 is a vertical section taken on line 9—9 of Fig. 8;

Fig. 10 is a section taken on line 10—10 of Fig. 8; and

Fig. 11 is a section taken on line 11—11 of Fig. 8.

The preferred embodiment illustrated in Figure 1, comprises a venturi 1, with an internal passage 2, cast integrally with a circular tubular member 3, having an internal channel 4 connecting with the passage 2.

The venturi 1 is generally tubular in shape with a bell like inlet end 5, a throat or central portion 6 and an outwardly flared outlet end 7.

The bell like inlet end 5 is adapted for suitable connection to a supply of gas and for receipt of the primary air necessary to develop the gas and air mixture desired. The throat 6 is constricted to mix the gas and air, and the outlet end 7 is outwardly flared and has its inner corners gradually curved, to properly effect distribution of the mixture to the annular channel 4 extending co-extensively within the circular tubular member 3.

The tubular member 3 containing the internal channel 4 is prevented from making a continuous ring by the dead ends 8 cast at its circumferential extremities in the form of a dam.

A slot 9 which may have angular or perpendicular sides is preferably located circumferentially in the upper surface of the tubular member 3 and has a continuous extent in such surface from one dead end 8 to the other dead end 8. The slot 9 thus provides for continuous uniform jet of the burning gas throughout the length of the upper circumferential surface of the tubular member 3.

The front of the burner is shallower than the rear causing the channel 4 to gradually decrease in cross-sectional area from the rear to the front to better maintain uniform pressure of the gas with decrease in its volume toward the front. The larger cross section of channel 4 at the rear minimizes the resistance to gas flow where the volume of gas flowing is greatest.

The ears 10, disposed on the inner rear surfaces of the tubular member 3 are provided with depending lugs 11 for suitably securing the burner on a supporting structure.

The venturi 1 is positioned between the dead ends 8 of the tubular member 3 and is lower at this point than the top surface of the tubular member 3 to form a valley like space 12 as shown by Fig. 3 without increasing the general height of the burner.

The space 12 thus provided adapts the burner illustrated to use in combination with pilot burners which have the pilot tube 13 disposed below the thermo element 14 and with an end baffle 15 disposed to spread the pilot flame adjacent the slot 9 at at least one of the dead ends 8 of the tubular member 3.

In such combination the pilot tube 13 and thermo element 14 are horizontally positioned over the venturi 1 between the dead ends 8 in the space 12. The placing of the pilot burner in this manner prevents its elements from being exposed to the direct heat of the main burner due to the shielding effects of the dead ends 8 of the tubular member 3. Also in this location undisturbed air is available to the pilot burner and the burner lights cannot be extinguished by puffs or explosions caused in turning the main burner on and off.

The modification of the invention shown by Fig. 5 contains the principal features of the preferred embodiment such as the slot 16 and the space 17, corresponding to slot 9 and space 12 of Figure 1. Ears 18 similar to ears 10 of Figure 1 are also provided for securing the burner on a supporting structure.

The venturi 19 in this embodiment is cast integrally at its outlet end 20 to the front of the tubular member 21 instead of traveling to the rear of the burner as in the preferred embodiment.

The space 17 is here obtained by depressing the front of the tubular member 21 where it is joined by venturi 19 as shown by Fig. 6 and Fig. 7 and in the space thus provided a pilot burner can be located similarly to the preferred embodiment and with the advantages previously described as present in Figure 1. Thus the gas passing through venturi 19 flows directly into the annular channel 22 at the juncture of the venturi with tubular member 21.

This modification of the invention is further distinguished from the primary embodiment by the fact that the front portion of the burner is deeper than the rear causing the channel 22 in tubular member 21 to travel towards the rear of the gas burner in gradually decreasing cross-sectional area.

Fig. 8 represents another modification of the invention but is similar to the preferred embodiment in that it contains the slot 23 and the space 24 corresponding to the slot 9 and the space 12 of Figure 1. It also has ears 25 positioned like ears 10 of Figure 1 to provide means for securing the burner on a support.

In this modification the venturi 26 is integrally cast with the tubular member 27 at the front of the burner. Fig. 10 shows that the space 24 is formed by depressing the front of the tubular member 27 and that the venturi 26 passes directly beneath the space 24.

The outlet 28 of the venturi 26 flares outwardly into an internally hollow segment 29 disposed at the front of the burner and cast integrally to the inner side of tubular member 27. This segment serves to give additional length to the venturi 26 and provides for a better mixture of air and gas before the mixture reaches the burner head proper, over that of the modification illustrated by Fig. 5, since in this modification the length of the constricted throat portion is greater than that of the first modification of the invention to better adapt the burner to use with high pressure gas. In this respect this modification is similar to the preferred embodiment.

Baffles 30 are internally disposed in the outlet end 28 of the venturi 26 to direct the flow of the gas around the burner as it passes from the venturi 26 into the channel 31 of the tubular member 27.

As in the first modification of the invention illustrated by Fig. 5, the front of the burner shown in Figs. 8 to 11 is deeper than the rear and thus the channel 31 journeys rearwardly in gradually decreasing cross-sectional area.

This embodiment similarly to the embodiments previously described is also readily adapted to use in combination with a pilot burner, as the space 24 is present therein corresponding to space 12 of Figure 1 and space 17 of Fig. 5 and thus this modification has all the advantages previously stated to be present in the other embodiments of the invention.

The slots extending in the circumferential surfaces of the tubular members in all of the embodiments illustrated are obtained by a cutting operation which is more readily performed than the drilling of numerous orifices to form gas jets. In cutting the slot the cutter enters the space 12 in the preferred embodiment and the spaces 17 and 24 in the respective secondary embodiments and is rotated in a circular path to travel it around the upper surface of the burner coming out again at the spaces 12, 17 and 24 in the respective embodiments. The burner may be rotated relative to the cutter and the slot may be cut or milled either in one pass of the tool or in several passes.

The making of the gas jet in this manner combined with the casting of the burner in one piece presents an invention which is an improvement over previous burners because of its light structure and its less expensive manner of construction. The uniform continuous slot for gas provides a very efficient and well shaped flame for the burner.

I claim:

1. A gas burner comprising a tubular member disposed in generally circular shape with its upper surface interrupted at one side and with its cross-sectional area decreasing from one side to the other, a tubular supply member connected thereto at the side having the larger cross-sectional area and cast integrally therewith, said first-named tubular member having a slot cut through the upper surface thereof and extending around the member from one side of said interruption to the other side of the same, and a pilot burner disposed in the space formed by said interruption directly above said supply tube and having means to direct a starting flame to said slot.

2. A gas burner comprising a tubular member having a slot cut through the walls thereof and walls of substantial thickness to prevent deformation of said slot, dead ends disposed in said tubular member to form a space therebetween, a supply tube passing through said space to the opposite side of the burner at a height in said space lower than the upper surface of the tubular member, and a pilot burner disposed in the space formed by said dead ends and directly above said supply tube to direct a starting flame to said slot.

3. A gas burner comprising a circular tubular member and a supply tube integrally cast therewith in one piece, a hollow segment horizontally disposed at the front of said burner and integrally cast to the inner surfaces of said tubular member and to the supply tube, the said supply tube containing a passage that merges with the internal channel of the tubular member through baffles vertically placed in the outlet end of said supply tube to direct the flow of the gas, and the said tubular member being depressed at the front thereof to form a space above the supply tube, a pilot burner disposed in said space directly above the supply tube, a slot in the upper surface of the tubular member with continuous extent from one side of said space to the other side thereof to form a jet for the gas, and the internal channel of said tubular member gradually decreasing in cross-sectional area in its travel from the front to the rear of the burner to maintain the pressure of the gas with decrease in volume.

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