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GAS BURNER

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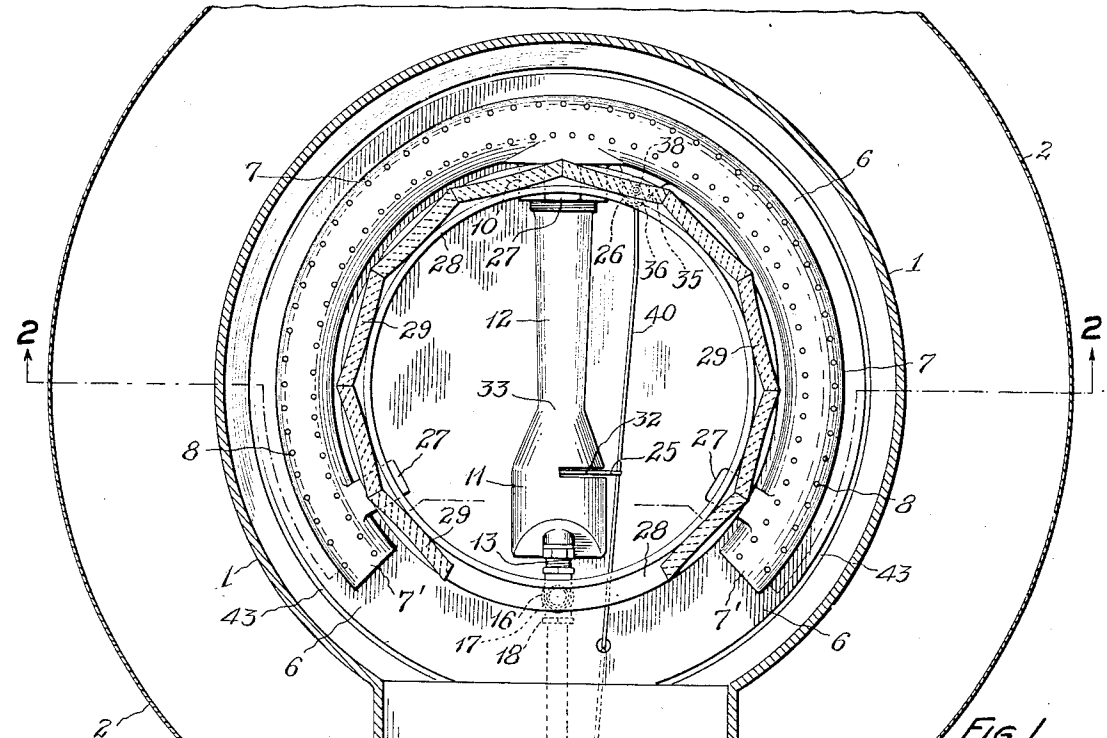


FIG. 1

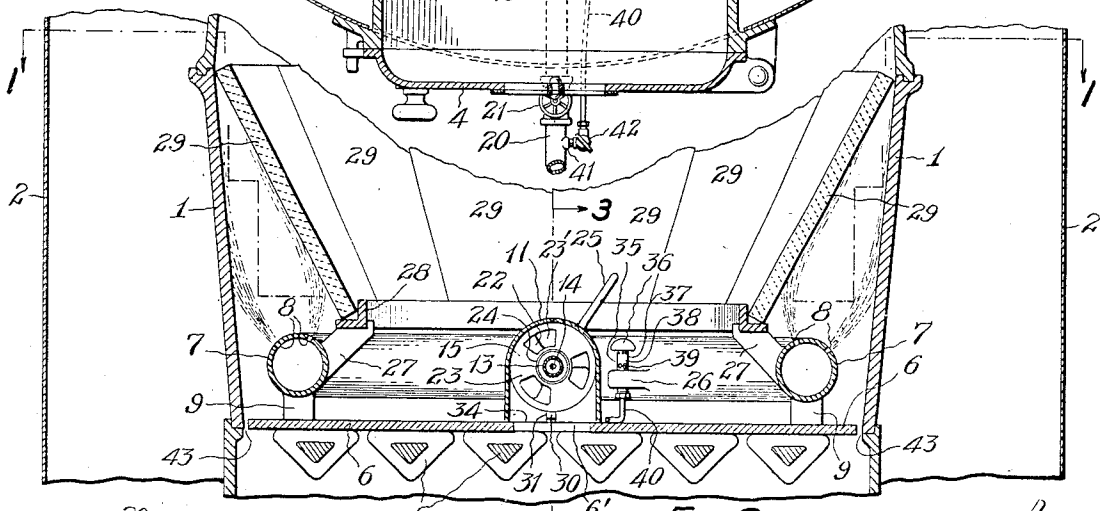


FIG. 2

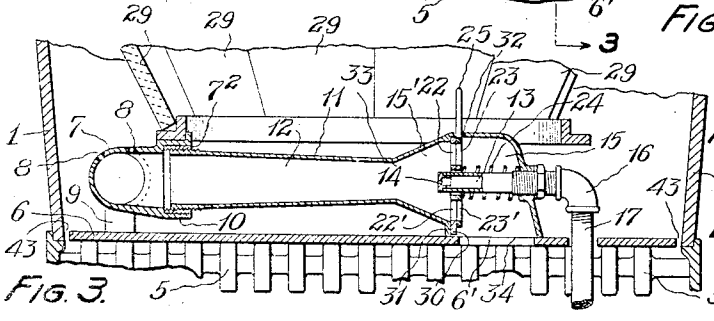


FIG. 3

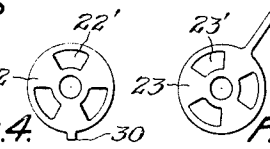


FIG. 4

FIG. 5

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GAS BURNER

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9 Claims. (Cl. 158—104)

My invention particularly relates to improvements in gas burner construction which provide convenient means for quickly rearranging a furnace designed to burn solid fuel into a furnace for burning gas, and for changing back to solid fuel. The improved burner construction is such as to permit its ready insertion through a fuel-receiving opening of a coal or coke furnace where the largest dimension across the opening is smaller than the diameter of the burner. Quick installation of the burner in the furnace is also provided for, without disturbing the usual coal grate. My invention also relates to improved mixture tubes and improved pilot light assemblies for gas burners.

The annexed drawing and the following description set forth in detail certain means embodying my invention, such disclosed means constituting, however, only one of the various forms in which the principle of the invention may be embodied.

In said annexed drawing:

Figure 1 is a plan section of my improved burner assembled in a solid fuel furnace of standard construction, the section being taken in the planes indicated by the line 1—1, Figure 2;

Figure 2 is a vertical section of the elements shown in Figure 1, the section being taken in the planes indicated by the line 2—2, Figure 1;

Figure 3 is a vertical section taken in the plane indicated by the line 3—3, Figure 2; and

Figures 4 and 5 are elevational views of two air control plates, respectively, forming part of my improved mixture tube.

Referring to the annexed drawing in which the same parts are indicated by the same respective numbers in the several views, inner and outer standard furnace casings 1 and 2, respectively, are provided with the fuel-receiving opening 3 covered by the door 4, the furnace being provided with a grate 5 of standard construction upon which any desired suitable solid fuel may be burned.

In order to change the furnace over from a solid fuel burning type to a gas burning type, for use therewith of my improved gas burner, a flat metal plate 6 is laid upon the grate 5 and upon this plate 6 my improved burner construction is eventually placed. The various steps involved in placing the complete burner upon the plate 6 will be hereinafter fully described.

A tubular burner ring 7 is formed with ports 8. Two concentric rows of ports 8 are shown in the accompanying drawing, for purposes of illustration only. The burner ring 7 is of substantially circular formation, with a material portion of the circle removed, and of a diameter greater than any dimension of the door opening 3 and only slightly smaller than the inner diameter of the furnace casing 1. A burner ring of the size described provides the gas flame near the outer edge of the grate and adjacent the furnace casing 1, where it is most effective. The circular construction of the burner 7, with a material portion of the circle removed, permits its insertion through the comparatively small fuel-receiving opening 3 of the furnace. Depending upon the actual sizes of the fuel-receiving opening 3 and the ring 7, the manipulation of the latter in order to effect its entry to the furnace varies somewhat, but for standard sizes of furnaces and fuel-receiving openings, the ring 7 will be inserted in the opening 3 and adjacent diagonally opposite corners of the latter, and in such position that an end 7′ thereof can be turned toward the casing 1 as soon as it passes through the fuel-receiving opening 3 and thus permit the passage of the remainder of the ring 7 through the opening 3.

In some cases, dependent upon the particular design of the terminals 7′ of the burner ring 7, and the size of the opening 3, a mixture tube 11, hereinafter fully described, can be secured to the burner ring 7 before the latter is inserted in the furnace, and then the combined burner ring and mixture tube assembly so manipulated as to permit the insertion of this entire assembly in the furnace. Normally, however, after the ring 7 is inserted in the furnace, the balance of the burner is assembled, consisting of a mixture tube 11, and the connections to the gas main.

The mixture tube 11 is an elongated substantially cylindrical member and is formed with an externally-threaded Venturi section 12 at one end which is connected to an internally-threaded boss 10 extended inwardly from the ring 7 and formed centrally thereof. This connecting together of the ring 7 and the mixture tube 11 is made while holding the ring 7 up in the furnace at about the level of the opening 3. If the ring 7 and mixture tube 11 are formed of such materials as to make probable the sticking together of these parts so as to prevent their easy disconnection, I provide suitable means for obviating this condition. I illustrate such means in the accompanying drawing by an internally-threaded brass bushing 7^2 which is fastened in the boss 10 and adapted to accommodate the externally-threaded end of the tube 11. Extended into the opposite end of the tube 11 is a gas pipe sec-

tion 13 provided with a gas port 14 at its inner end and externally-threaded at its outer end for adjustable connection with the front wall of the tube 11. To the front end of the gas pipe section 13 is secured an elbow 16. The mixer tube 11 is also provided with two opposed plates 22 and 23 which control the admission of primary air for the combustible mixture. These plates 22 and 23 form a partition in the front end of the mixer tube 11, subdividing this end, which is an enlarged section of the tube 11, into chambers 15 and 15'. The bottom of the chamber 15 is formed with an opening 34 through which air enters and passes to and through apertures 22' and 23' formed respectively in opposed plates 22 and 23 and adapted to register more or less by reason of the possible adjustment of the plates 22 and 23 relatively to each other. This adjustment of the plates 22 and 23 is made possible by reason of the fact that the plate 22 is non-rotatably held in the wall of the tube 11 by means of a lug 30 formed on the plate and seated in a recess 31 formed in the outer wall of the chamber 15, and the plate 23 is formed with an adjusting handle 25 extended outwardly of the chamber 15 through an elongated slot 32 formed in the upper wall of the chamber 15. The plates 22 and 23 are mounted upon the gas supply pipe 13, and the plate 23 is rotatable, so that it is evident that the plate 23 can be manipulated through the medium of the handle 25 to vary the amount of registration between the plate apertures 22' and 23'. The plate 23 is held to position flush with the plate 22 by a spring 24 which is coiled around the gas pipe section 13 and bears at one end against the forward inner wall of the chamber 15 and at the other end against the plate 23. The gas supply pipe 13 discharges into the chamber 15' upon the rear side of the air valve 22—23 and there the gas mixes with the primary air coming through the apertures 22' and 23'. The mixture passes through the restricted neck portion 33 of the mixture tube 11 into the Venturi section 12 and thence passes into the burner ring 7 through the tubular boss 10.

When the burner 7 and the complete mixture tube have been connected together in the top of the furnace at about the level of the opening 3, the parts thus assembled are laid upon the plate 6, supporting legs 9 being formed upon the burner casting 7 to insure holding the burner at the proper level. The gas pipe section 13 is then connected to a second gas pipe section 17 by means of the elbow 16, the section 17 being extended upwardly between sections of the grate 5. The gas pipe section 17 is then connected to a pipe section 19 by means of a second elbow 18, the section 19 being connected to an exterior pipe 20 communicating with the gas main and controlled by a valve 21. The pipe section 17 may be inserted through the usual poker door in the front of the furnace, or through the fuel opening 3, and then passed downwardly through the grate 5 and connected to the elbow 16.

The primary air is derived through the grate 5 but is controlled by means of an opening 6' in the plate 6 which registers with the opening 34 in the bottom of the chamber 15, this opening 34 being adjacently in front of the plane of the control plates 22 and 23. The secondary air to support combustion comes up through the grate 5 and passes the plate 6 through the annular passage 43 formed between the plate 6 and the furnace casing 1.

The burner ring 7 is formed about midway of its length with a tapped upwardly-extended boss 26, which forms a rigid support for a pilot fixture 35, and throughout its length with a number of spaced angular lugs 27. These lugs 27 form supports for an annular angular ring 28 upon which may be loosely mounted a deflector comprising outwardly inclined refractory tiles 29 which rest against the inner face of the casing 1 and serve to deflect the heat from the burner ring 7 against the casing 1. Thus the heat from the burner is applied where it will be most effective for heating the air in the chamber between the furnace casings 1 and 2.

The pilot fixture 35 which is preferably made of brass comprises a tubular member having a mushroom head 36 and a plurality of ports 37 adjacent the lower edge of the head 36. The stem 38 of the pilot 35 is formed with spaced ports 39 for primary air and is externally threaded at the bottom for attachment to the boss 26. Detachably secured to and beneath the boss 26 is a section of copper tubing 40 which extends forwardly through the furnace interior and passes outwardly of the furnace for connection to a boss 41 formed upon the gas pipe section 20 and provided with an angle cock 42 to control the pilot.

The following advantages attach to my improved burner construction:

A furnace may be quickly changed over from solid fuel to gas fuel, or vice versa, without disturbing the grates and without any inconvenient or arduous labor incident to the installations;

The primary air is all drawn from below the burner but is controlled, and the mixture tube is provided with an air shutter adjustable from above;

A burner of a form and size is provided which applies the heat from the burning gas adjacent the furnace casing where it will be most effective;

The pilot fixture is in the direct line of vision through the furnace opening 3 and is conveniently accessible; and

The secondary air to support combustion is obtained from an annular passage formed between the burner support and the furnace casing

What I claim is:

1. A gas burner adapted to be mounted removably in a furnace having a fire pot and a door opening whose largest dimension across the opening is smaller than any horizontal straight-line interior dimension of the part of the fire pot near the door opening, said burner comprising a unitary tubular member of an incomplete substantially annular formation and of such size that the largest dimension across the door opening is smaller than any horizontal straight-line exterior dimension of said tubular member, and the break which causes the substantially annular formation of said tubular member to be incomplete being sufficient in extent to permit insertion of said tubular member through the door opening into the fire pot.

2. A gas burner adapted to be inserted removably in a furnace having a fire pot substantially circular in cross section and a door opening whose largest dimension across the opening is smaller than the interior diameter of the fire pot at the door opening, said burner comprising a unitary tubular member substantially in the form of an incomplete ring which extends substantially less than a full circle and the exterior diameter of

which is larger than the largest dimension across said door opening.

3. A gas burner adapted to be mounted removably in a furnace having a fire pot substantially circular in cross section and a door opening whose largest dimension across the opening is smaller than any diameter of the fire pot, said burner comprising a unitary hollow member substantially in the form of an incomplete ring which extends substantially more than a semicircle and substantially less than a full circle and the exterior diameter of which is larger than the largest dimension across said door opening and smaller than any diameter of the fire pot.

4. A gas burner according to claim 2, in which said tubular member has an inlet substantially midway between its ends and discharge ports between said inlet and the ends of the member.

5. A gas burner according to claim 2, in which the cross sections in radial planes of said tubular member are circular.

6. A gas burner comprising a tubular member substantially in the form of an incomplete ring, said tubular member having an inlet in its mid-portion and a series of discharge ports, a fuel mixture tube detachably connected to said inlet, a pilot fixture detachably secured to said tubular member near said inlet, and a gas supply pipe communicating with said pilot fixture, said tubular member being adapted to be mounted removably in a furnace with its mid-portion near the inner wall of the furnace opposite to an opening in the furnace walls.

7. In combination with a furnace having a fire pot substantially circular in cross section and a door opening whose largest dimension across the opening is smaller than the interior diameter of the fire pot at the door opening, a gas burner removably mounted in the fire pot and comprising a continuous tubular member substantially in the form of an incomplete ring which is substantially less than a full circle but substantially more than a semicircle and which throughout its length lies near the walls of the fire pot, said tubular member having an inlet and discharge ports, and a fuel mixture tube connected to said inlet.

8. In combination with a furnace having a fire pot substantially circular in cross section and a door opening whose largest dimension across the opening is smaller than any interior diameter of the fire pot, a gas burner in the fire pot comprising a unitary tubular member substantially in the form of an incomplete ring the exterior diameter of which is larger than the largest dimension across said door opening, said tubular member being adapted to be inserted into the fire pot through said door opening and having an inlet and discharge ports, and a fuel mixture tube detachably connected to said inlet.

9. In combination with a furnace having a fire pot substantially circular in cross section and a door opening whose largest dimension across the opening is smaller than any interior diameter of the fire pot, a gas burner in the fire pot comprising a unitary tubular member substantially in the form of an incomplete ring the exterior diameter of which is larger than the largest dimension across said door opening, said tubular member being adapted to be inserted into the fire pot through said door opening and having an inlet in its mid-portion and a series of discharge ports, the mid-portion of said tubular member being opposite to said door opening, a fuel mixture tube detachably connected to said inlet, and means near said inlet for igniting the fuel mixture.

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