

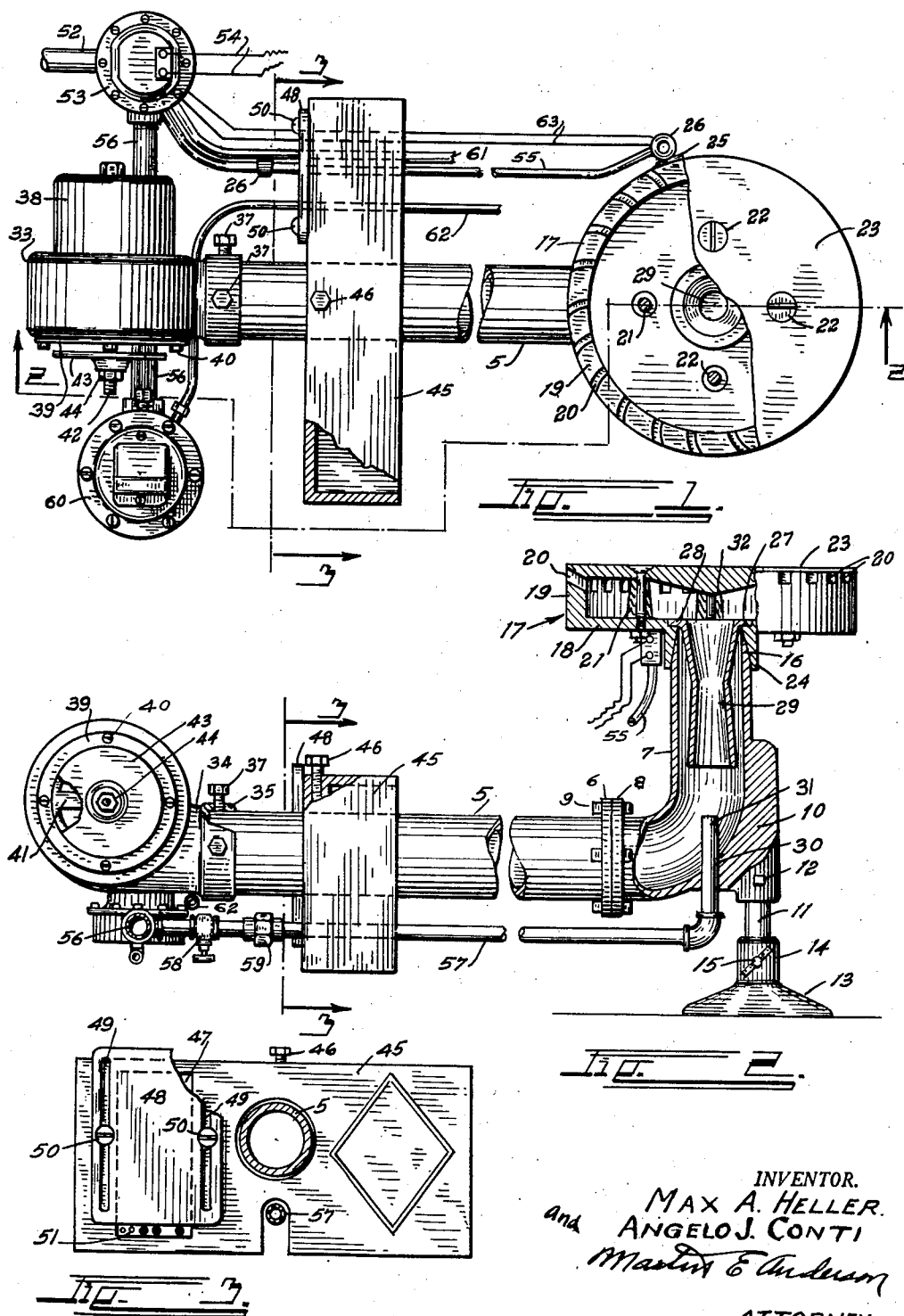
Feb. 21, 1950

M. A. HELLER ET AL

2,498,162

CONVERSION GAS BURNERS HAVING FORCED PRIMARY AIR

Filed Oct. 6, 1947



INVENTOR.
MAX A. HELLER.
and ANGELO J. CONTI
Martin E. Anderson
ATTORNEY.

UNITED STATES PATENT OFFICE

2,498,162

CONVERSION GAS BURNERS HAVING
FORCED PRIMARY AIR

Max A. Heller and Angelo J. Conti, Denver, Colo.

Application October 6, 1947, Serial No. 778,098

11 Claims. (Cl. 158—99)

1

This invention relates to improvements in gas burners of the type employed in connection with the heating of residences and other buildings by means of natural or artificial gas and has reference more particularly to a burner designed for use in converting coal burning furnaces and boilers to gas.

Gas is recognized as the most desirable fuel for heating residences, and wherever natural gas is available, the owners of coal heating plants are, as a rule, converting to gas operation.

It is the object of this invention to produce a simple and substantial gas burner that can be readily installed in an ordinary coal burning furnace or boiler and which shall be of such construction that a very thorough mixture of gas and air will be obtained to effect the most thorough combustion of the fuel.

Another object of the invention is to produce a burner of the type indicated in which the primary air is introduced under a slight pressure by means of an electrically operated fan and in which a considerable volume of air is provided between the fan and the point where the gas is admitted so as to prevent any back flow of gas in case the fan, for any reason, should become inoperative.

Another object of the invention is to produce a gas burner of such construction that the pilot burner and the burner itself can be readily detached from the fuel and air conveying pipes to permit cleaning and adjustment and to permit ready inspection and repair.

A further object of the invention is to produce a gas burner of such construction that it can be readily adjusted vertically, as well as transversely to the end that it may be located in the most desirable position.

A further object of the invention is to produce a gas burner having a slidable closure member attached to the air pipe for the purpose of closing the opening into the ash chamber of the furnace and which is provided with an adjustable opening for the admission of secondary air.

The above and other objects that may become apparent as this description proceeds are attained by means of a construction and an arrangement of parts that will now be described in detail and for this purpose reference will be had to the accompanying drawing in which the invention has been illustrated in its preferred form, and in which:

Figure 1 is a top plan view of the burner showing the two control valves and the pilot burner

2

in place thereon, portions having been broken away to better disclose the construction;

Figure 2 is a side elevation, partly in section taken on line 2—2, Figure 1; and

Figure 3 is a section taken on line 3—3, Figures 1 and 2.

In the drawing reference numeral 5 designates the air pipe which may be of any suitable length and which is provided at its inner end only with a flange 6. A combined elbow and mixing chamber 7 has its horizontal portion provided with a flange 8 that fits against flange 6 and which is secured to the latter by means of bolts 9. Mixing chamber or riser pipe 7 is provided with an enlargement or boss like that indicated by reference numeral 10, having a vertical opening for the reception of a short length of pipe 11. This pipe is held in place by means of a set screw 12. A base 13 has an upwardly extending tubular hub 14 for the reception of the lower end of pipe 11, which is held in adjusted position therein by means of a set screw 15. The upper end of the vertical section of part 7 is tapered as indicated at 16. Supported by the inclined surface 16, is a burner 17 which is preferably circular as shown in Figure 1. The burner has a bottom 18 and a vertical wall 19 that is provided on its upper surface with a number of angularly spaced grooves 20 that extend helically upwardly and outwardly as shown in Figures 1 and 2. Extending upwardly from the upper surface of bottom 18 are supporting lugs 21 that are perforated for the reception of bolts 22 by means of which the cover 23 is held in position.

Bottom 18 is provided with a downwardly extending hub 24 whose inner surface is tapered to fit the taper 16. The angle of these tapers is so selected that after the burner is in position, it is held with sufficient friction to prevent accidental rotation and at the same time be readily removable.

Extending downwardly from the wall 19 is a bracket arm 25 to which the pilot burner 26 is connected. It will now appear that when the burner 17 is removed, it will carry with it the pilot burner and since this can be readily detached by means of a coupling 26, the burner, including the pilot, can be readily removed for inspection, testing or repairing. Bottom 18 is provided with a central opening surrounded by a rabbet 27 which serves to receive the flange 28 of an hour glass shaped or Venturi tube 29. The curved part of member 7 is provided with an opening 30 through which the end 31 of the

gas pipe extends. The gas pipe terminates below the lower end of the Venturi tube as shown more particularly in Figure 2. It will be apparent that when gas is introduced under the usual pressure, it is directed into the lower end of the Venturi tube, thereby producing a suction which tends to entrain air from pipe 5. It has been found that when the Venturi tube 29 is in position, a more thorough mixture of the gas and primary air is effected than when the Venturi tube is absent. The mixture of air and gas that enters the chamber in burner 17 is flared outwardly by the downwardly extending conical portion 32.

Secured to the outer end of pipe 5 is a fan housing. This housing has a cylindrical housing chamber 33 terminating in an outlet opening 34 that, in turn, is provided with a collar 35 whose opening is of the proper diameter to receive the end of pipe 5. The fan housing is secured in position by means of set screws 37. An electric motor 38 is connected with the fan housing and the end of the shaft within the housing is provided with a fan, preferably of the type usually referred to by the name of "Serracco". The side of the fan housing opposite from the motor has secured thereto a ring 39 that is held in place by means of screws 40. This ring has a diametrical member 41 from which bolt 42 projects outwardly. A plate 43 is threaded to the bolt so that its distance from ring 39 may be adjusted by turning it relative to the bolt. A lock nut 44 holds plate 43 in adjusted position. Plate 43 serves to control the inlet opening to the fan and the amount of primary air can be adjusted to a nicety by rotating this plate on the threaded bolt by means of a lock nut that is held against accidental rotation.

Attention is called at this point to the fact that the opening between plate 43 and ring 39 is in a vertical plane so that any solid particles that may drop down will not necessarily pass into the fan housing. When the fan is rotating, a stream of air is caused to flow inwardly through pipe 5 and to mix with the gas in the Venturi tube. Since the gas is admitted at a point above the center of pipe 5, it has no tendency to flow outwardly through pipe 5 in case the fan should stop for any reason and this assures that no serious accident can take place due to an accidental failure of fan operation.

Slidably mounted on pipe 5 is a rectangular closure member that has been designated in its entirety by reference numeral 45. This member is of a size suitable for closing the ash removal opening in the ordinary furnace. When the change is made from coal to gas, the ash door is usually removed, and in some instances, the burner is blocked in position by means of bricks or other solid material. By means of the closure 45 the clean-out or ash removal opening is closed and the burner held firmly in position, as this is a rigid member of considerable strength. A set screw 46 serves to hold the closure member, which is provided with an opening 47 that may be closed by means of a plate 48. This plate has two slots 49 along each edge for the reception of screws 50. By adjusting the plate upwardly an opening like that indicated by reference numeral 51 is provided and this serves to admit secondary air to the furnace. By adjusting the position of the plate, the amount of secondary air can be adjusted to obtain the optimum combustion condition. The gas line has been designated by reference numeral 52 and this connects with a

gas control valve 53 of usual construction. Wires 54 extend to the thermostat in the room whose temperature is to be controlled. A tube 55 extends from the control valve 53 to the pilot burner. Of course it is understood that gas will always flow to the pilot regardless of whether or not control valve 53 permits gas to flow into pipe 56. From pipe 56, a pipe 57 extends to the gas nozzle 31 as shown in Figure 2. A valve 58 controls the amount of gas and pipe 57 is usually provided with a coupling 59. Pipe 56 connects with a pressure control valve 60 that, in turn, controls the current to the motor 38. Tubes 61 and 62 extend from control valves 53 and 60, respectively, for the purpose of discharging any leakage gas into the furnace in case the diaphragms with which such valves are usually provided should break or become leaky. Two wires 63 extend from the pilot burner 26 to the gas control valve 53.

Since this invention does not relate in any way to the control valves or to the construction of the pilot burner, these parts will not be described in detail. However, they have been shown so as to give a better idea of the relative arrangement and position of the parts.

From the above description it will be apparent that the burner that forms the subject of this invention and which has been described above, is of a substantial construction; that it is provided with a burner head connected by means of a tapered joint in such a way that it can be readily removed and that a very thorough mixture of gas and primary air is effected by means of the Venturi tube construction shown.

Particular attention is called to the fact that the gas nozzle 31 terminates above the inner wall of pipe 5 and directly underneath the Venturi tube so as to discharge the gas in a position where it will have practically no tendency to flow outwardly through pipe 5 in case the movement of air therein should be interrupted by accidental stoppage of the motor.

Particular attention is also called to the fact that the tubes 55, 61 and 62 and wires 63 all pass through the opening 51, which is of sufficient size when plate 48 is removed, to permit the workman to insert his hand or arm in case this should be necessary. It is therefore possible to disconnect the pilot burner both mechanically and electrically so as to permit it and the burner head to be removed as a unit.

Having described the invention what is claimed as new is:

1. In a gas conversion burner for heating furnaces used in buildings, comprising, a horizontal air pipe adapted to extend through an opening in the side of the furnace, an elbow connected to the inner end of the pipe having a vertical riser pipe, a hollow cylindrical burner head having a plurality of circumferentially disposed openings and an imperforate top plate, said burner head being removably seated on the top of the riser pipe, a Venturi tube solely supported by its upper end and depending into the riser pipe, a combustible gas delivery pipe axially aligned with the Venturi tube and extending through the elbow, the end thereof being spaced from the lower mouth of the Venturi tube, and means for delivering air to the outer end of the horizontal pipe at a pressure above atmospheric, the construction being such that the air and gas initially mix in the riser pipe in the portion between the end of the gas pipe and mouth of the venturi

5

and more intimately mix as the combustible mixture passes through the Venturi tube.

2. A gas burner in accordance with claim 1 wherein the axis of the openings in the burner head extend helically upwardly and outwardly, whereby the flame and products of combustion will have an upwardly spiralling direction of movement in the furnace.

3. A gas burner in accordance with claim 1 wherein said top plate is provided with a downwardly extending conical shaped portion, the apex of the conical shaped portion being axially aligned with the Venturi tube, and the openings in the burner head are adjacent the lower surface of the plate, whereby the combustible mixture has a stream line flow against said conical shaped portion, along the under side of said plate, and out through said openings.

4. A gas burner in accordance with claim 1 wherein the burner head is provided with a depending hub having a female taper adapted to rest on a male taper on said top of the riser pipe, a circular counterbore adjacent the top of the female taper, and a flange seating in said counterbore, said flange being connected to the upper end of the Venturi tube.

5. A gas burner in accordance with claim 1 wherein the burner is supported at its inner end by a vertically adjustable support member secured to the elbow by an integral boss thereon disposed inwardly from the portion of the elbow through which the gas pipe extends.

6. A gas burner in accordance with claim 1 wherein the horizontal pipe is adapted to be supported intermediate its length by a closure member slidable thereon and constructed to overlie and close said opening in the furnace, whereby the burner may be adjusted to various positions in the furnace and said opening closed in any of the positions.

7. A gas burner in accordance with claim 6 wherein the closure member is provided with a valve for regulating the amount of secondary air which may enter the fire box of the furnace.

8. A gas burner in accordance with claim 6 wherein a gas supply pipe, a pilot light supply pipe, leakage pipes from control valves, and electric wires from the pilot light to external controls, all extend through the closure member.

9. A gas burner in accordance with claim 1 wherein the means for delivering air comprises an electrically driven fan secured to the outer end of the horizontal pipe.

10. A gas burner in accordance with claim 9 wherein the fan is provided with an air suction opening and an imperforate plate adjustably

6

movable toward and from the opening to regulate the quantity of air which enters the fan.

11. A gas conversion burner for heating furnaces used in buildings, comprising, a horizontal air pipe extending through an opening in the side of the furnace having a flange at its inner end, a flanged elbow secured to the flange aforesaid and forming a continuation of the horizontal pipe, said elbow having a vertical riser pipe tapered at its upper end, a hollow cylindrical burner head resting on the tapered end and having a plurality of circumferentially disposed openings having axes which extend helically upwardly and outwardly, an imperforate plate closing the top of the burner, the plate having a frusto-conical portion on its lower side centrally disposed thereon, a Venturi tube supported by the burner head and depending into the riser pipe, a gas supply pipe extending through the elbow in axial alignment with the Venturi tube, the end of the supply pipe being in spaced relation to the lower mouth of the Venturi tube, thus forming a mixing chamber therebetween, means for supporting the elbow for vertical adjustment, closure means adjustable along the horizontal air pipe intermediate its length for closing said opening in the furnace and also for supporting the pipe, an adjustable air valve on said closure for regulating the amount of secondary air which may enter the fire box of the furnace, an electrically driven fan secured to the outer end of the horizontal pipe, said fan having a suction opening, and means for regulating the effective size of the suction opening for regulating the amount of primary air which is delivered to the burner.

MAX A. HELLER.
ANGELO J. CONTI.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,330,048	Baker	Feb. 10, 1920
1,567,830	Blanchard	Dec. 30, 1925
1,986,311	White	Jan. 1, 1935
2,037,496	Bryant	Apr. 14, 1936
2,040,147	McKee	May 12, 1936
2,077,424	Levey	Apr. 20, 1937
2,183,836	Gordon	Dec. 19, 1939
2,215,983	Smith	Sept. 24, 1940
2,263,170	Haedike	Nov. 18, 1941
2,400,030	Stainbrook	May 7, 1946