June 18, 1935. N. T. BRANCHE 2,005,252

GAS BURNING APPARATUS

Filed Feb. 29, 1932

Fig. 1.

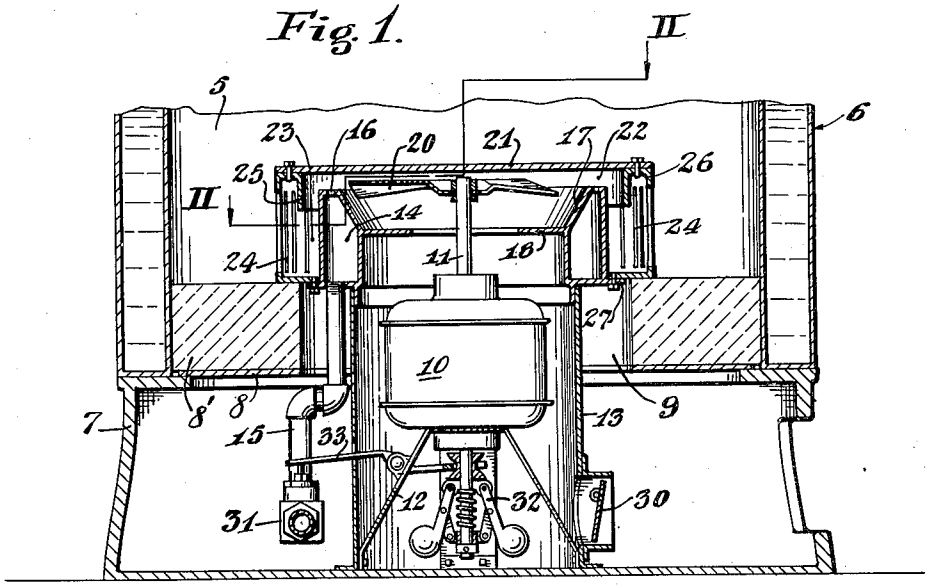


Fig. 2.

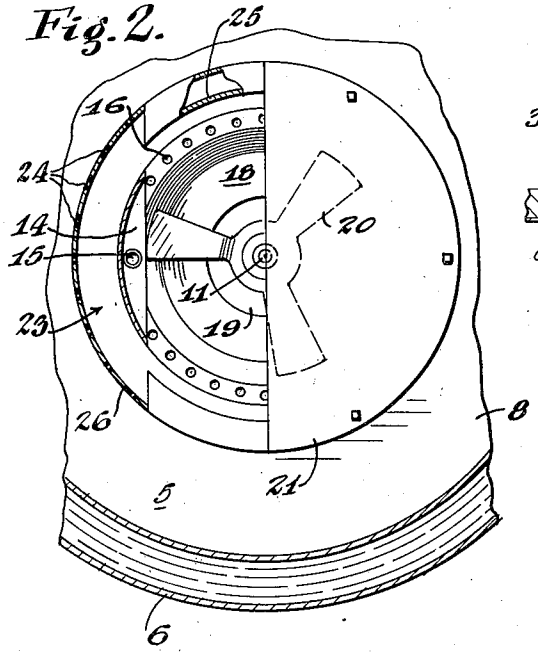
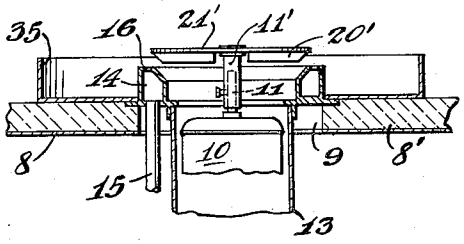


Fig. 3.



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GAS BURNING APPARATUS

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Application February 29, 1932, Serial No. 595,712

10 Claims. (Cl. 158—109)

This invention relates to improvements in ways and means for forming and burning combustible gaseous mixtures.

The invention has among its objects to provide a gas burning apparatus wherein the combustible mixture shall be formed by directing a blast of air across the path of flow of gas issuing from an annular supply chamber; to provide ways and means for burning the mixture formed in the manner indicated; and withal to provide a gas burning apparatus of the character indicated which shall be particularly well adapted for use with house heating furnaces.

The various features of novelty and invention will more fully appear from the detailed description taken in connection with the accompanying drawing wherein the preferred form of the invention is shown and wherein:—

Fig. 1 shows the improved burner apparatus installed in a house heating furnace of conventional design, the lower portion only of the furnace being shown, the burner apparatus being in vertical axial section, parts being in elevation;

Fig. 2 is a horizontal section corresponding to line 2—2 on Fig. 1, and

Fig. 3 shows a modified form of the invention, only so much of the apparatus being shown as will enable its application to be understood.

For the purpose of illustrating the application of the invention, there is shown a fire box or combustion chamber 5 of a house heating furnace 6, shown as a hot water boiler, supported on a chambered base 7 which ordinarily constitutes the ash pit chamber of the furnace. To adapt the furnace to the present invention, the grates, with which the furnace is ordinarily provided, are removed and an annular plate 8 disposed across the top of the chamber 7, there being supported on said plate an annular refractory bed 8' which may be made of fire brick. The central opening through the plate and bed or bottom of the combustion chamber is indicated at 9.

10 indicates an electric motor having its shaft 11 arranged vertically. The motor is supported in any suitable manner as on a bracket 12 secured to the side walls of an upright casing 13 wherein the motor is housed.

At the upper end of the casing 13 is an annular gas supply chamber 14 to which gas is delivered by a gas pipe 15. The gas flows from the chamber through a ring of ports 16 in its top wall. The inner wall 17 of the chamber 14 preferably slopes outwardly to facilitate the flow of air outwardly over the ports 16. A radial flange 18 may be provided to partially restrict the passage above the motor 10.

Secured to the top of the motor shaft 11 is a fan 20 of the radial blade or vane type for producing a blast of air. In order that the air from the fan may be directed radially outward over the top of the chamber 14, there is disposed above the fan a plate 21 in such spaced relation with respect to the top of the chamber 14 as to provide a relatively restricted passage 22 therebetween.

Surrounding the gas chamber 14 is a chamber 23 formed by a wall 26 shown as provided with vertical slots 24, the top of the wall extending inwardly for an appropriate distance and then downwardly below the level of the top wall of the gas chamber 14 whereby to form an annular baffle 25. The plate 21 is supported by the wall 26 and forms, as it were, a cover for the space encompassed by said wall. The lower end of the wall 26 is directed inwardly and secured to a flange 27 extending from the bottom wall of the chamber 14.

The admission of air into the casing 13 may be controlled by gravity damper 30 so hung as to open pneumatically under suction of the fan, the primary purpose of the damper being to prevent the free flow of air into the furnace when the fan is not running.

It is desirable to provide means for automatically cutting off the flow of gas to the chamber 14 when the motor is not running. To this end there is provided in the gas pipe 15 any suitable valve 31 which normally tends to stay closed. To open the valve there may be provided on the motor shaft a fly-ball device 32 adapted to actuate a valve opening lever 33, the valve remaining open as long as the motor is running.

The operation of the apparatus thus far described may be described as follows. When current is supplied to the motor 10, the fan 20 will rotate and draw air into the casing 13 through the damper-controlled opening therein. As the motor attains speed the fly ball device 32, through the lever 33, will open the gas valve 31 whereupon gas will flow into the chamber 14 from which the gas immediately escapes through the ports 16. The blast of air from the fan is directed radially outward over the top of the chamber 14 by the plate 21 with the result that the air and gas become thoroughly mixed. The gas admitted to the chamber 14 need not be under high pressure and in fact may be under very low pressure inasmuch as the blast of air directed across the ports 16 tends to induce a flow of gas through the ports. The initial mixture of air and gas strikes the annular baffle 25 with the result that the mixture fills the chamber 23 completely before escaping from the vertical outlet ports 24. The mixture of air and gas burns around the outside of the wall 26. It is of no particular consequence that the ports 24 are vertically arranged and they may be arranged as desired.

Ordinarily the mixture will contain air and gas in such proportions as to insure complete combustion of the gas. Such mixtures burn with great rapidity and tend to burn with considerable

noise. It is primarily with the idea of reducing the noise of burning to a minimum that the mixture after being formed as aforesaid is caused to strike the baffle **25** and thereafter allowed to escape from the chamber **23**. By allowing the mixture to strike the baffle **25** and fill the chamber **23**, the highly turbulent state of the mixture as initially formed is reduced to a minimum and the mixture burns with greatly reduced noise after passing through the slots **24**.

Where noise of operation is not an important factor, the mixture may be burned immediately after being formed. In such case the apparatus may take the form shown in Fig. 3. In this figure, the parts corresponding to Fig. 1 are identified by the same reference characters. The fan **20'** is shown as comprising radial vanes secured beneath a plate 21' which is provided with a sleeve **11'** which is telescoped over and non-rotatably secured to the motor shaft **11**. The plate **21'** obviously directs the blast of air from the fan radially outward across the top of the gas supply chamber **14** in substantially the same manner as in Fig. 1 with resultant thorough mixing of the air and gas. In order to prevent the flame from extending too far away from the chamber **14** the latter may be surrounded by an upright baffle **35** against which the flames impinge.

In view of the fact that the gas is not utilized to entrain air but on the contrary merely flows into a stream or blast of air which flows past the gas discharge ports, it will be readily appreciated that the burner can be operated even when the gas pressure is lower than would be required if the gas were utilized to entrain air, and hence the invention has utility in cases where ordinary gas burners operating on the air entraining principle would be useless. It will therefore be readily appreciated that the present invention has special utility in connection with house heating furnaces since heat may be produced in circumstances where ordinary burners would not function due to lack of gas pressure.

While the invention has been described with considerable particularity as to detail, it will however be understood that no limitations are intended except as expressed in the appended claims.

What I claim is:

1. In a gas burner, the combination of a fan for producing a blast of air, means for directing said blast radially outwardly from the axis of rotation of the fan, means for discharging gas into the blast of air to form a combustible mixture, and a circumferentially apertured annular chamber whereinto the mixture is received and wherefrom it is discharged as formed.

2. In a gas burner, the combination of a fan for producing a blast of air, means for directing said blast radially outwardly from the axis of the fan, annular means in the path of the blast for discharging gas into said blast to form a combustible mixture, and means surrounding said annular means in radially spaced relation to form a baffle against which said mixture impinges.

3. In a gas burner, the combination of an annular gas chamber the top of which is apertured for the discharge of the gas, a wall overlying said chamber in spaced relation, means for supplying the gas to said chamber without previous admixture with air, and movable means for producing a stream of air between said wall and said chamber for mixing with the gas discharged from the latter.

4. In a gas burner, the combination of an annular gas supply chamber the top of which is apertured for the discharge of the gas, and means for projecting a sheet of air outwardly and directly above and across the top of the chamber whereby to produce a combustible mixture of air and gas, the said means including a wall arranged at a level above the said chamber and a fan arranged below the said wall.

5. In a gas burner, the combination of a fan for producing a blast of air, a plate carried by the fan for directing said blast radially outwardly from the axis of the fan, annular means in the path of the blast for discharging gas into said blast to form a combustible mixture, and means surrounding said annular means in radially spaced relation to form a baffle against which said mixture impinges.

6. In a gas burner, the combination of a fan for producing a blast of air, a plate overlying the fan in spaced relation for directing said blast radially outwardly from the axis of the fan, annular means in the path of the blast for discharging gas into said blast to form a combustible mixture, and means surrounding said annular means in radially spaced relation to form a baffle against which said mixture impinges.

7. A burner unit, for use with a heater having a combustion chamber with heat absorbing side walls surrounding the same and having a bottom closure with a central opening, comprising a gas chamber disposed above said closure and around said opening in spaced relation with respect to the side walls of the heater and having a top which is apertured for the discharge of gas, means for supplying gas to said chamber without previous admixture with air, and means including a fan for drawing air through the opening in the closure and forcing it directly above and across the top of said chamber for mixing the gas issuing therefrom.

8. In a gas burner, the combination of a fan for producing a blast of air, a plate carried by the fan for directing said blast radially outwardly from the axis of the fan, means in the path of the blast for discharging gas into said blast to form a combustible mixture, and means surrounding said means in spaced relation to form a baffle against which said mixture impinges.

9. In a gas burner, the combination of a fan for producing a blast of air, means for directing said blast radially outwardly from the axis of the fan, means in the path of said blast for discharging gas into said blast to form a combustible mixture, and means surrounding said means in spaced relation to form a baffle against which said mixture impinges.

10. In a gas burner, the combination of a fan for producing a blast of air, a plate overlying the fan in spaced relation for directing said blast radially outwardly from the axis of the fan, means in the path of the blast for discharging gas into said blast to form a combustible mixture, and means surrounding said means in spaced relation to form a baffle against which said mixture impinges.

NELSON T. BRANCHE.