

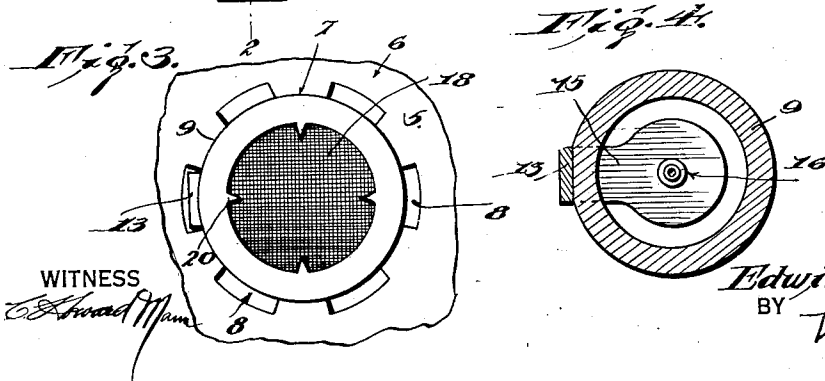
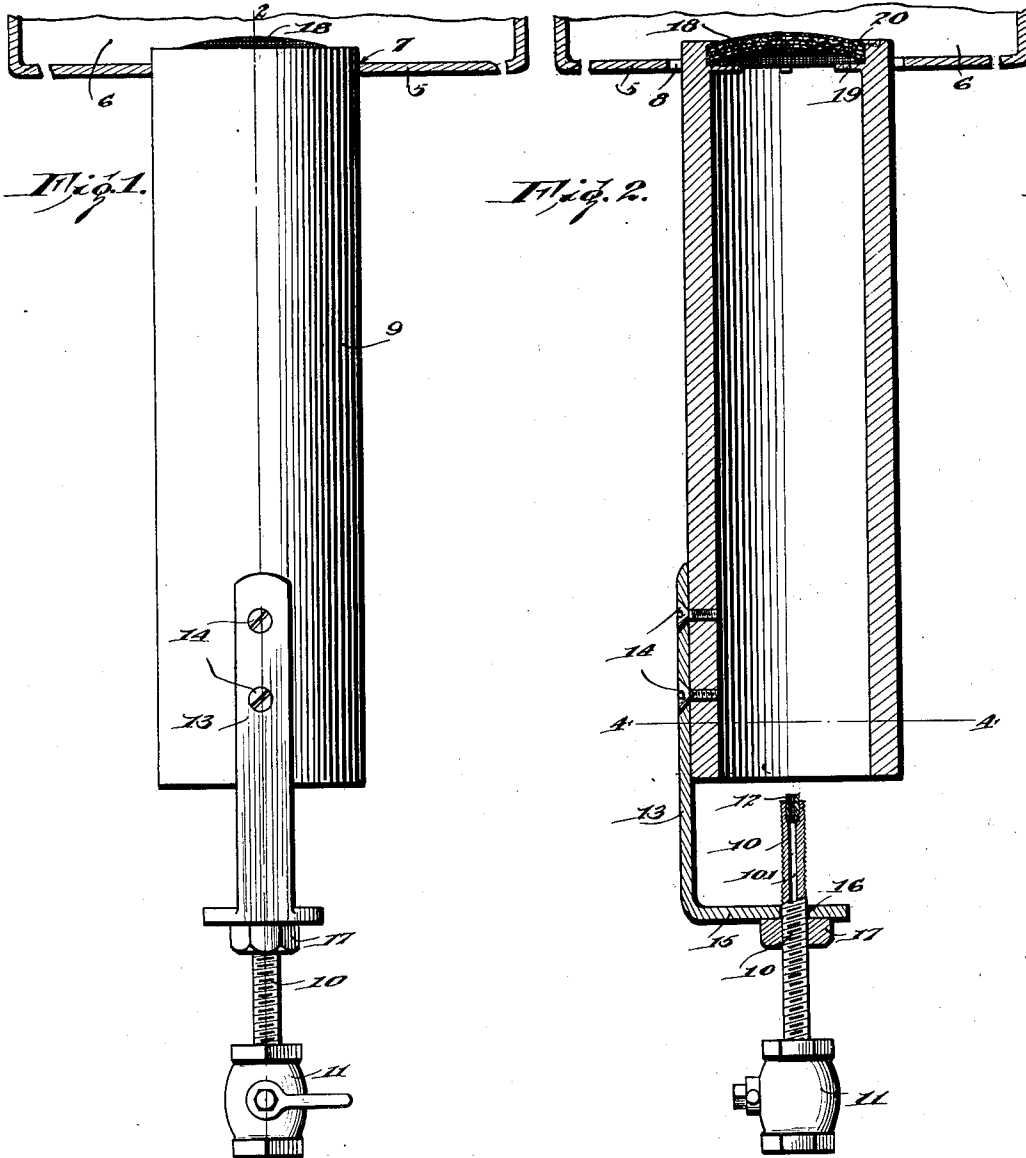
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1,945,902

HEAT GENERATING UNIT

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HEAT GENERATING UNIT

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1 Claim. (Cl. 158—99)

This invention relates to burners and is more particularly concerned with a burner adapted for use with low pressure gas and designed for proper proportionate premixture of gaseous fuel and air and for high heat of combustion in proportion to surface area, as well as safety in operation and simplicity in construction.

One object of the invention is the provision of a burner unit incorporating these features which will have a relatively small ignition area and permit a relatively large combustion chamber area in proportion, with the premixture of a relatively large amount of air or oxygen with the fuel gas, thereby permitting the use of gas, such as natural gas, at low pressure, and combustion under conditions resembling the burning of coal in grates under atmospheric pressure.

A further object is the provision of a burner tube in which the high heat of combustion is concentrated at the burner end of the tube leaving an area of cool premixed gas and air therebelow which is resistant to the expansion of the gases in the combustion area and prevents extension of the combustion area.

Further provision is made in the mounting of the burner tube in the combustion chamber for the cooling of the burner tube inwardly of or below the combustion area at its ignition (upper) end through the passage of cooling air thereover, which air constitutes a secondary supply of air to the combustion chamber area created by suction responsive to and in proportion to the expansion of combustion in said chamber.

Another object of the invention is the construction of a burner unit, including a burner tube, providing for the premixture with the gaseous fuel in the burner tube inwardly of the combustion end, of a relatively large amount of oxygen-supplying air proportioned to the pressure and volume of gaseous fuel flow.

A further object is the construction of a burner tube providing a premixing chamber inwardly of its ignition end and having its ignition end formed to prevent inward expansion of the combustion area and thereby prevent ignition of the premixture and raw gaseous fuel inwardly of said ignition end.

These and other features of the invention will be more clearly apparent from the following detailed specification which is to be read in conjunction with the accompanying drawing forming part thereof and in which:—

Fig. 1 is a view in elevation of a burner unit representing a preferable embodiment of the invention, the lower portion of a combustion cham-

ber in which the upper ignition end of the burner tube extends being shown in section;

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1;

Fig. 3 is a top plan view of the burner tube as it appears in Fig. 1;

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 2 and showing the centering support for the burner tube.

The burner unit forming the subject of the invention is intended for use in the combustion chamber of any suitable heating appliance, the number of units used being proportioned to the desired maximum heat for the area of its combustion chamber.

In the drawing, Figs. 1—3, the base or bottom wall 5 of such a combustion chamber indicated generically by the numeral 6, is formed with a circular aperture 7 therein for the insertion therethrough of the upper end of each burner tube, these apertures having a diameter substantially coincident with that of the tube. The aperture 7 is edged by notches 8 providing air inlet opening to the combustion chamber edging the ignition area of the upper ignition end of the burner tube 9.

Centrally below the aperture 7 a distance approximating the length of the burner tube extending below the chamber base 5, is fixedly supported an externally threaded gaseous fuel supply tube or nipple 10 upstanding from and threading at its lower end into the casing of a valve 11. The upper end or nozzle of the fuel supply tube is provided with a nozzle tip in the form of a sleeve 12 threaded thereon and having a fuel passage therethrough of restricted diameter relatively to that of the fuel passage 101 of the supply tube 10.

The burner tube 9 has a cross-sectional area substantially greater than that of the fuel nozzle to permit a large amount of oxygen-supplying air to enter it at its open lower end. This end is positioned and supported over the fuel nozzle and centered relatively thereto by means of a supporting arm 13 attached at its upper end to the external face of the tube 9 adjacent its lower end as by the screws 14 and depends below the lower end of the tube to terminate in a lateral offset 15 having a centering opening 16 therein in line with the axis of the tube and of a diameter to fit closely over the fuel tube or nipple 10, the base of the offset resting upon and being supported in vertically adjustable relation to the fuel nozzle on the upper face of a support such as the nut or washer 17 threading on and

adjustable vertically of the fuel tube 10. The lower or intake end of the burner tube is thus supported and centered relatively to the fuel nozzle and its upper or ignition end is guided 5 and maintained substantially in the vertical by the base edging 5 of the aperture 7.

A free upflow of a large volume of oxygen-supplying air with the upflow of gaseous fuel is thus permitted at the large open lower end of the burner tube which also thus constitutes a 10 mixing chamber in which the air and gas are pre-mixed before reaching its upper ignition end. The burner tube 9 is preferably formed of wrought iron tubing to prevent cracking from 15 differences in temperatures at its opposite ends.

The upper end of the burner tube 9 is closed by a plurality of perforate baffle plates of heat 20 inducing material which may, for example, take the form of circular disks of twelve mesh fine iron wire cloth or other similar material withstanding high temperatures laid flatwise on top of each other in closely adjacent relation and re- 25 tained between a lower series of lugs or tangs 19 and an upper series of tangs 20 which may be struck out from the sides and top edge of the burner tube at its upper end. These screens serve as baffles and to preheat the premixed air and gas passing to the uppermost screen 18 and 30 ignited there. The lowermost screen, being most distant from the combustion point, is obviously the cooler and the close proximity of the screens not only baffles and slows down the pas- 35 sage of the mixed gas and air therethrough to the combustion plane at the top, thereby providing for complete oxidation and combustion, but concentrates the ignition and combustion area at the top of the baffle screens and progres- 40 sively heats the air and gas passing to the top-most screen. The burner tube 9 is proportioned to provide a relatively long travel of the ascend- 45 ing air and gas before contacting the baffle screens, thereby providing for thorough admixture of the air and gas before reaching the screens.

The short distance of travel of this premixed air and gas through the baffle screens to the com- 50 bustion area causes sudden combustion and expansion of the mixture at the top of the screen layers. The strata of premixed air and gas next below the screen baffles being cooler, resists expan- 55 sion downwardly into the tube and prevents the combusting gases from expanding down into the tube to cause ignition of the lower strata of pre-mixed air and gas and of raw gas at the fuel nozzle.

The expanding products of combustion being 60 lighter rise upwardly and create a suction or partial vacuum directly below or behind the combustion area. As a result, air for the prevention of such a vacuum and as a secondary supply for 65 the combustion area, is drawn up through the openings or slots 8 edging the tube opening 7, this air passing over the outside of the burner tube 9 below the baffle screens and maintaining the lower or mixing portion of the burner tube at a lower 70 temperature.

The combustion chamber 6 will be closed to air except through the burner tubes and auxiliary air intake slots 8, the size of which is sufficient to pre- 80 vent the creation of vacuum by the upward expansion of gas combustion and to furnish an adequate secondary supply of air at the full or maximum heat operation of the burner unit, the indrawn supply of oxidating air being propor- 85 tioned and responsive to the force of upward expansion and travel of the expanding gases of combustion toward the outlet or flue of the combustion chamber.

The vertical adjustment of the lower end of the burner tube 9 relatively to the fuel nozzle or jet not only provides for adjustment of the upper 90 ignition end of the burner tube relatively to the plane of the base 5 of the combustion chamber but is useful in positioning the gaseous fuel pipe nozzle relatively to the intake end of the burner tube to secure a desired pressure flow in the tube to the ignition point. The supply of air for pre- 95 mixture and this adjustment will depend upon the volume and pressure flow of the gaseous fluid from the nozzle, the proper proportionate amount of air being indrawn and automatically determined by the flow rate and volume of gas upwardly in the burner tube. Preferably the surfaces of the supporting members 13, 14, 15 and 16 are rounded 100 to reduce interference to upflow of air into the lower end of the burner tube whose cross sectional area will be proportioned to permit the necessary maximum amount of air inflow.

The thickness and breadth of the arm 13 out- 105 wardly of the burner tube is such as to permit the tube with its arm to be withdrawn bodily upwardly through the aperture 7 in the combustion chamber base, the arm 13 being alined with and passing through one of the air inlet notches 8.

The construction disclosed and described, while representing a preferable form of the invention, 115 is intended as illustrative rather than restrictive thereof and is subject to modification and adaptation to different conditions of manufacture and use within the scope of the invention and of the appended claim.

I claim:— 120

Burner apparatus comprising a combustion chamber having a base provided with an aperture having peripheral notches, a burner tube of sub- 125 stantially uniform diameter from the lower to the upper end, having the upper end fitted in said aperture to project slightly beyond the base, a supply tube and nozzle tip centered with and below the lower end of said burner tube and being rela- 130 tively small in comparison with the burner tube to leave a large area for the influx of atmospheric air, means to support the supply tube with respect to the burner tube, a plurality of perforate baffle plates at the upper end of the burner tube, the uppermost plate defining an ignition zone 135 which is supplied with atmospheric air through said notches, and means to support the baffle plates in the upper end of the burner tube.

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