Dec. 22, 1925. 1,566,489

H. C. LITTLE

LIQUID FUEL BURNER

Filed June 16, 1925

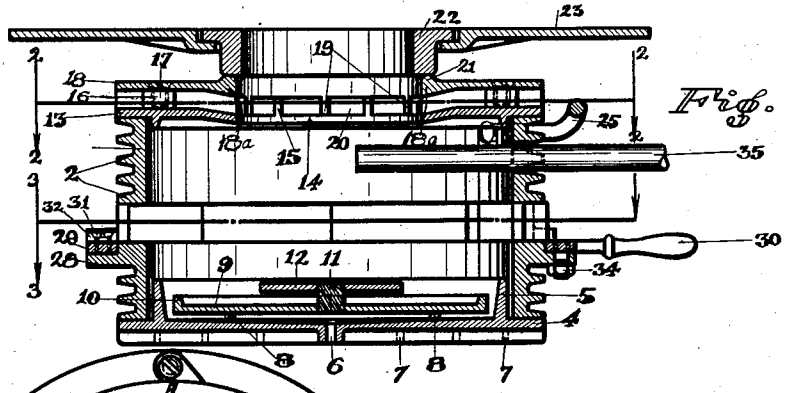


Fig. 1.

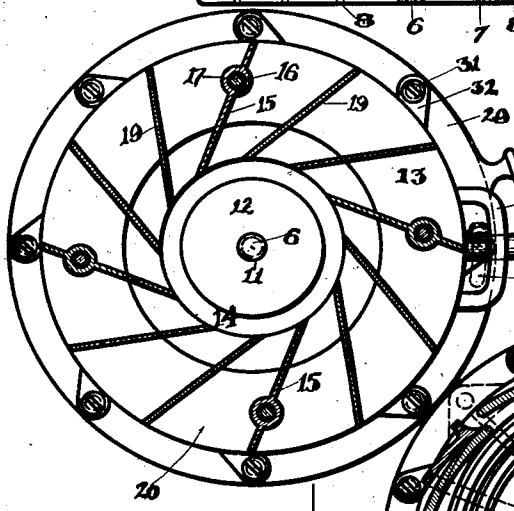


Fig. 2.

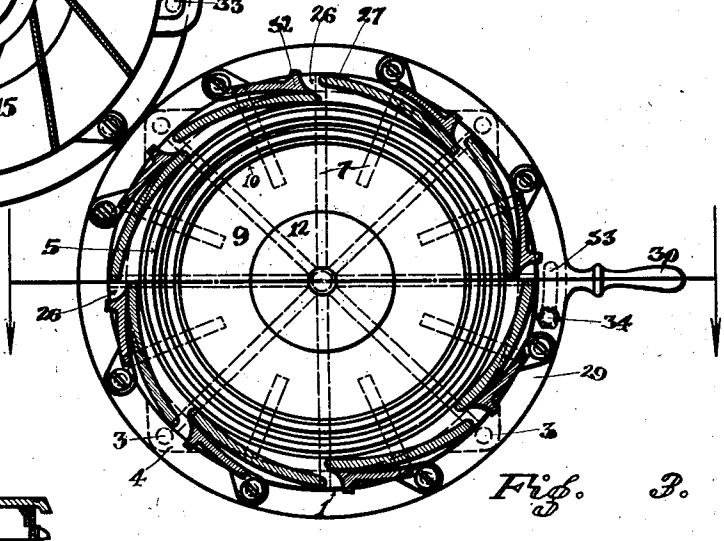


Fig. 3.

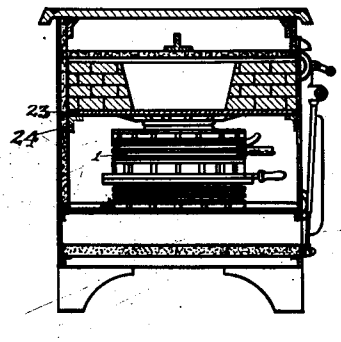


Fig. 4.

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Patented Dec. 22, 1925. 1,566,489

UNITED STATES PATENT OFFICE.

HARRY C. LITTLE, OF LARKSPUR, CALIFORNIA, ASSIGNOR TO ROTAIR BURNER CORPORATION, A CORPORATION OF NEVADA.

LIQUID-FUEL BURNER.

Application filed June 16, 1925. Serial No. 37,496.

To all whom it may concern:

Be it known that I, HARRY C. LITTLE, a citizen of the United States, residing at Larkspur, in the county of Marin and State of California, have invented new and useful Improvements in Liquid-Fuel Burners, of which the following is a specification.

This invention relates to liquid fuel burners constructed and designed to vaporize the fuel, whereby more complete combustion and efficiency is obtained.

The primary object of this invention is to provide a liquid fuel burner of novel construction whereby the vaporization and more complete combustion of the fuel is obtained without the usual accumulation of soot and carbon.

Another object of this invention is to provide a liquid fuel burner of novel construction and design adapted to produce more complete combustion of the cheaper grades of fuel oil.

Another object of this invention is to provide a liquid fuel burner which may be conveniently used in ranges, furnaces and heating systems without change or alteration in the construction thereof.

A further object of the present invention is to provide a liquid fuel burner in which the damaged or worn out parts may be conveniently replaced without discarding or replacing the other parts, thereof.

Further advantages and objects, more or less apparent, will be pointed out hereinafter, reference being made to the accompanying drawings in which like numerals of reference indicate the same parts throughout the several views:

Fig. 1 is a transverse section view through a liquid fuel burner embodying my invention;

Fig. 2 is a sectional view of the liquid fuel burner taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view of the burner taken on the line 3—3 of Fig. 1; and

Fig. 4 is a side elevation of the liquid fuel burner installed in a range.

The numeral 1 represents a cylinder of any suitable size having a plurality of fins or projections 2 extending circumferentially around it. Attached to the cylinder 1 by means of bolts 3 is a detachable bottom 4 upon the upper surface of which is an annular projection 5, suitable in size to fit around the lower inside edge of the cylinder. The bottom 4 is provided with a hole 6 which allows the unburned fuel to escape. The bottom 4 is further provided with a plurality of radial projections 7 which are located on the bottom surface thereof and serve as a means for preventing the bottom from becoming overheated.

Resting on the upper surface of bottom 4 and supported thereon by lugs 8 is a combustion plate 9 which is provided on its outward edge with a raised portion 10 extending circumferentially around the same.

The raised portion 10 serves as a means for holding the oil on the combustion plate 9 in the event it is not burned readily. The combustion plate is also provided with a projection 11 to which is secured a circular disc 12, that serves as a means to vaporize the fuel when the disc becomes heated.

Resting on the cylinder 1 is a top 13, having a large central opening 14. The top 13 is so shaped that the part thereof adjacent opening 14, extends slightly downwardly into the combustion chamber. Located on the upper surface of top 13 are a plurality of tangential fins 15 which extend outwardly from the large central opening 14 and serve to provide openings for admitting air to large central opening 14. The fins 15 are provided with threaded holes 16, suitable in size to receive screws 17 which serve as means for securing plate 18 to top 13. The plate 18 is provided with, on its underneath surface, a plurality of tangential fins 19 which are equal in number and size to the fins 15. The plate 18 is provided with a large central opening corresponding in size and shape to the large central opening 14 in top 13, and with a downwardly projecting part 18ª located around the large central opening therein. The fins 19 are located in such a position on the plate 18 that when the plate is secured to top 13 by screws 17, one of the fins 19 is positioned between two of the fins 15, thus providing openings 20 for admitting air to opening 14 in a series of tangential jets, thereby causing a whirling and turbulent motion of air to be set up in opening 14. The top 13 and plate 18, being disposed downwardly around the large central openings therein, causes the air admitted through openings 20 to assume a course slightly downwardly from the horizontal. The plate 18 is provided around its large central opening with a raised portion

21, upon which rests a circular flanged ring 22 the inside circumference of which is slightly smaller than opening 14. The circular flanged ring 22 rests on a top plate 23 which is supported in the furnace, range or heating system by angle irons 24, as shown in Fig. 4. The cylinder 1 is provided with a handle 25 which serves as a convenient means for removing the burner from the inside of the furnace, range or heating system.

The cylinder 1, near its central part, is provided on its sides with a plurality of vertical slots or openings 26 which are located at approximately equal distances from each other. Adjacent the slots 26 and extending vertically beside the same are a plurality of projections 27, equal in number to the slots, and located on a tangent with the walls of the cylinder 1. The slots 26 serve to admit air to the inside of the cylinder at the sides thereof, while the projections 27 provide a means for causing the admitted air to circulate along the inside circumferential edges of the cylinder. The projections 27 are inclined in an opposite direction to the position of fins 15 and 19, thereby causing the air admitted to the inside of the cylinder through slots 26 to assume a whirling motion in a direction opposite to the air admitted between the fins through openings 20.

Projecting outwardly from the cylinder 1 and extending circumferentially around the same is a projection 28 which serves to support a circular damper ring 29 having secured thereto a handle 30. Secured to the damper ring 29 by means of the screws 31 are a plurality of damper segments 32, which serve as a means, when the handle 30 is manipulated, to regulate the amount of air admitted into cylinder 1 through slots 26. The damper ring 29 is provided with a slot 33 through which a set screw 34 extends into a suitable threaded hole in projection 28. The slot 33 and set screw 34 serve as a means for securing the damper ring 29 in a fixed position when the proper amount of air to be admitted through slots 26 has been once determined.

Extending inside the cylinder 1 through a hole in the wall of the same is a feed pipe 35 which is connected to a source of liquid fuel. The feed pipe 35 serves as a means for delivering liquid fuel to the combustion chamber.

The operation of my improved liquid fuel burner may be described briefly as follows: The entire unit as shown is inserted in the ash pit of the heating apparatus to be heated, as illustrated in Fig. 4 of the drawing, care being taken that means for providing a suitable supply of air exists therein.

Liquid fuel is admitted through the feed pipe 35 from a source to the center of cylinder 1 where it falls on disc 12. The vapor from this fuel is ignited by touching a match to a bit of scrap paper thrown into the cylinder. The heat of this combustion causes a draft which very readily starts the oil vaporizing and combustion process. The disc 12, by reason of its being elevated above the combustion plate 9 and because it is located in the center of the cylinder 1, becomes highly heated and the liquid fuel falling thereon is instantly changed to a gaseous state. To withstand the high temperature it reaches, the combustion plate 9 and disc 12 are preferably made from a special high temperature steel alloy.

Air induced by the natural draft of the heating apparatus, furnace or range, or by other means enters the cylinder 1 through the openings 20 and 26. The amount of air entering cylinder 1 through openings 26 is regulated by the manipulation of handle 30, connected to ring 29 and segments 32. The air passing into the large opening 14 through openings 20 located between fins 15 and 19, whirls in a counter clock wise direction while the air entering through openings 26 assumes a whirling clock wise direction inside the cylinder. The two means for admitting air to the inside of the cylinder causes a turbulent action of air to be set up inside the cylinder thereby producing a more complete combustion of the fuel with the production of a high degree of temperature. The air admitted through openings 20 in the top, assumes a course within the combustion cylinder opposite to the course of the air admitted through the openings 26, thereby arresting and stopping the rotation of the gases of combustion just before they pass through the large central opening 14. The air entering the openings 20 in a tangential direction opposite to the course of the air admitted through openings 26, materially aids combustion within the cylinder for the reason that the rotating movement of the gases therein is stopped before they pass through the large opening 14, thus enabling the incoming air to thoroughly mix with the burning oil vapors within the chamber and thereby completing the process of combustion.

The combustion gases formed inside the cylinder 1, passing out through the large opening 14 causes the air outside the cylinder 1 to be drawn inside thereof through openings 20 in a series of tangential jets, thereby setting up a whirling, turbulent action of air at this point. The air drawn in through openings 26 whirls around the sides of the cylinder and tends to keep them cool, as well as to cause the fuel within the cylinder to more completely burn.

Although I have shown and described the combustion chamber of the apparatus to be cylindrical in shape, it is evident that other

suitable forms may be utilized with equal satisfaction. Therefore, I do not desire to be limited to the cylindrical shape of the combustion chamber, nor to the shapes of the various parts fitting on the same.

While I have shown and described the liquid fuel burner as embodying certain details of construction now best known to me, it will be understood that this is for illustrating the important principles of the invention, and that modifications and changes may be made in the details of the construction without departing from the spirit of the invention. Therefore, I do not wish to be understood as limiting myself except as required by the following claims when construed in the light of the prior art.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A liquid fuel burner having a combustion chamber, provided with a top and a bottom, adjustable means for admitting air to the central part of the chamber in a tangential direction, means located in the top for admitting air into the combustion chamber in a tangential direction opposite to the course of the air admitted to the central part of the chamber, whereby the rotary movement of combusted gases generated within the chamber is stopped before emerging from the chamber, and means for delivering liquid fuel to the combustion chamber.

2. A liquid fuel burner having a combustion chamber, provided with a top and a bottom, means located in the walls of the combustion chamber, for causing air to be admitted therein in a tangential direction, separate means located in the top for causing air to be admitted into the combustion chamber in a tangential direction, substantially opposite to the course of the air admitted through the walls of the chamber, whereby the rotary movement of the combusted gases is stopped before passing from the combustion chamber, and means for delivering liquid fuel to the combustion chamber.

3. A liquid fuel burner having a combustion chamber provided with a detachable top and a detachable bottom, adjustable means for admitting air therein in a tangential direction, separate means located in the top for admitting air into the combustion chamber in a tangential direction, opposite to the course of the air admitted through the first mentioned means, whereby the rotary movement of the gases of combustion is stopped before they pass from the combustion chamber, and means for delivering fuel to the combustion chamber.

4. A liquid fuel burner having a combustion chamber therein, a bottom and a top cover, a plurality of openings in the walls of the chamber whereby air is admitted into the chamber in a tangential direction, a plurality of openings in the top for admitting air in the chamber in a tangential direction, opposite to the course of air admitted through the openings in the said walls, whereby the tangential movement of the gases generated in the chamber is stopped before they merge therefrom, means for adjusting the size of one or more of the openings in the walls of the chamber, and means for delivering oil to the chamber.

5. A liquid fuel burner, comprising a combustion cylinder, a top on the cylinder provided with a central opening, a plurality of openings located in the walls of the combustion cylinder, a plurality of tangential projections located on the said walls adjacent the last named openings whereby air is admitted to the inside of the cylinder in a tangential direction, a plurality of tangential fins located on the top, a plurality of openings located between the fins, whereby air may be admitted into the combustion chamber in a tangential direction opposite to the course of the first mentioned air, thereby arresting the rotary movement of the gases within the chamber before they pass through the top, and means for delivering liquid fuel to the inside of the cylinder.

6. A liquid fuel burner, comprising a combustion cylinder, having a top and a bottom, a large central opening in the top, a plurality of separated tangential fins located on the upper surface of the top, a plate having a large central opening and a plurality of separated tangential fins located on its underneath surface, a plurality of openings located between the said fins whereby air may be admitted to the inside of the cylinder in a tangential direction, a plurality of tangential projections located on the walls of the cylinder, a plurality of openings in the walls of the cylinder located adjacent the projections whereby air may be admitted to the inside of the cylinder in a tangential direction, means for regulating the size of the last named openings, and means for delivering liquid fuel to the inside of the cylinder.

7. A liquid fuel burner, comprising a combustion cylinder having a top comprised of two separated plates and a bottom, a plurality of tangential projections located on the walls of the cylinder, a plurality of openings located in the walls of the cylinder adjacent the projections whereby air may be admitted to the inside of the cylinder, means for regulating the size of the openings, a plurality of tangential fins located in the top between the two plates thereof, a plurality of openings located between the fins whereby air may be admitted to the inside of the cylinder in a tangential direction, and means for delivering liquid fuel to the inside of the cylinder.

8. A liquid fuel burner, comprising a combustion cylinder having a top and a bottom, a plurality of projections located on the walls of the cylinder, a plurality of openings located in the said walls adjacent the projections whereby air may be admitted to the inside of the cylinder, in a tangential direction, means whereby the size of the openings may be regulated, means located within the top for admitting air to the inside of the cylinder in a tangential direction, opposite to the course of the air admitted through the first named openings, whereby the rotary movement of gases generated inside the cylinder is stopped near the top of cylinder, and means for delivering liquid fuel to the inside of the cylinder.

9. A liquid fuel burner, comprising a combustion cylinder having a bottom and a top comprised of two plates and provided with a central opening, a plurality of openings located in the walls of the cylinder whereby air may be admitted into the combustion cylinder in a tangential direction, a plurality of openings between the two plates of the top for admitting air into the combustion chamber, in a tangential direction opposite to the course of the air admitted through the first mentioned openings, whereby the tangential movement of the gases generated inside the combustion cylinder may be stopped before they pass through the central opening of the top, and means for delivering fuel to the inside of the cylinder.

10. A liquid fuel burner, comprising a combustion cylinder having a bottom and a top comprised of two separated plates provided with a central opening, a plurality of openings in the walls of the combustion chamber for admitting air therein, a plurality of tangential projections located on the walls of the combustion cylinder for causing the air admitted through the said openings to assume a tangential course within the cylinder, a plurality of openings located between the two plates of the top for admitting air into the combustion chamber in a tangential direction opposite to the course of the air admitted through the openings in the walls of the cylinder, whereby the tangential movement of the gases generated within the cylinder is arrested at a point in the combustion cylinder before they pass therefrom through the central opening in the top, and means for delivering liquid fuel to the combustion cylinder.

HARRY C. LITTLE.