April 5, 1932. L. A. COCKLIN 1,852,292

LIQUID FUEL BURNER

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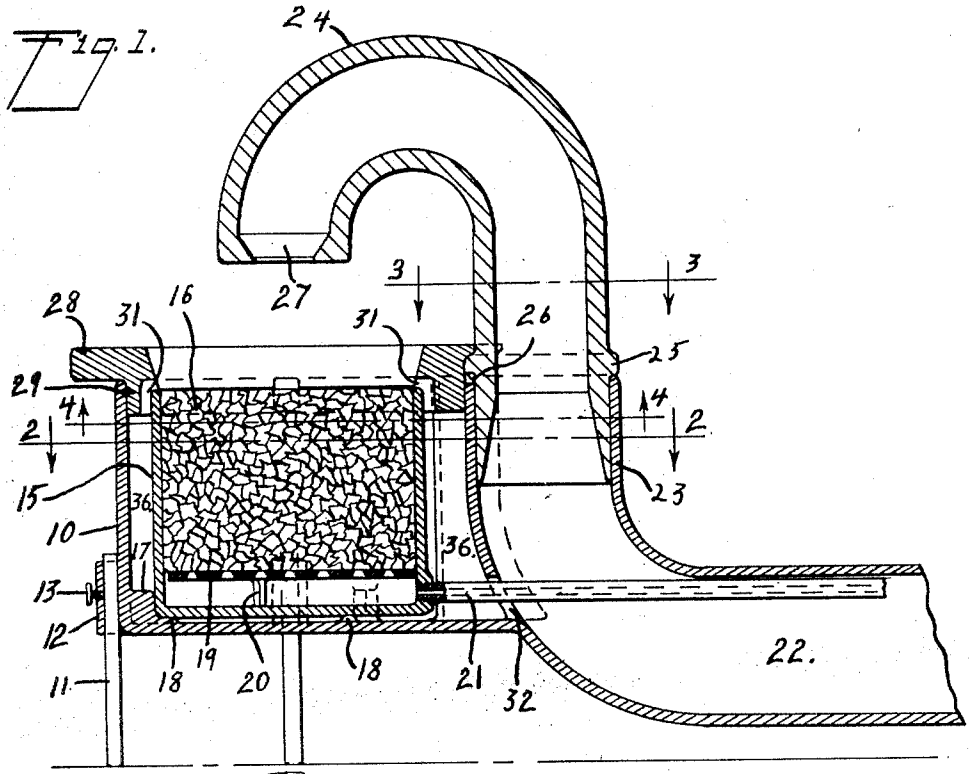
Fig. 1.



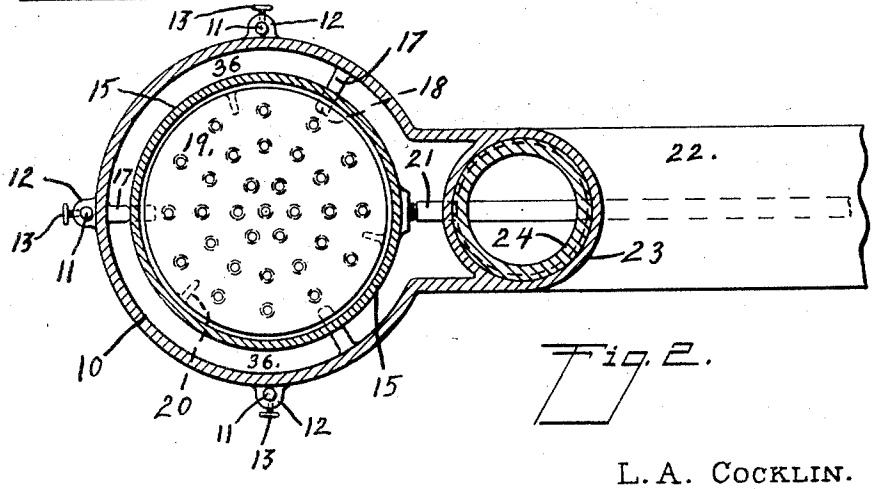


Fig. 2.

INVENTOR

L. A. COCKLIN.

BY David O. Barnell.

ATTORNEY.

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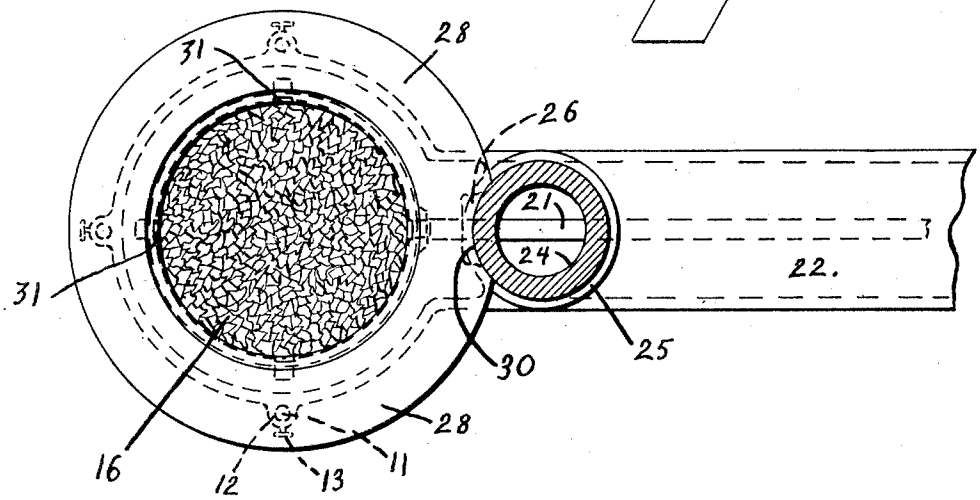
Fig. 3.



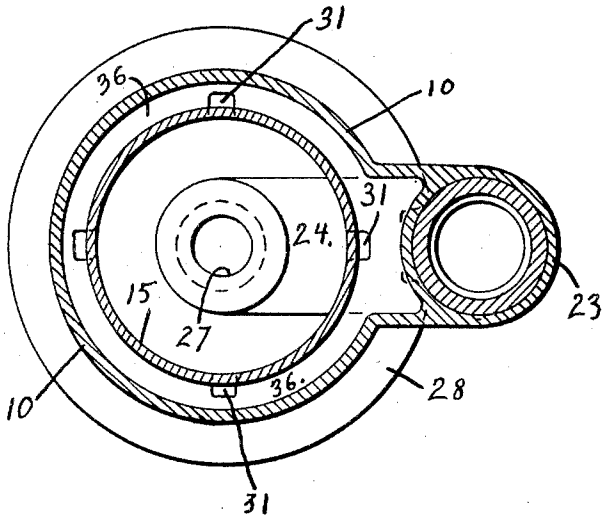


Fig. 4.

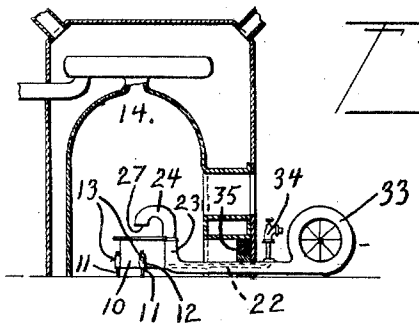


Fig. 5.

INVENTOR

L. A. COCKLIN.

BY David O. Darnell.

ATTORNEY

Patented Apr. 5, 1932 1,852,292

UNITED STATES PATENT OFFICE

LEWIS A. COCKLIN, OF GRISWOLD, IOWA

LIQUID FUEL BURNER

Application filed April 25, 1930. Serial No. 447,156.

My invention relates to oil or liquid fuel burners of the type wherein the liquid fuel is delivered to a porous filler or wick contained within an open-topped retort, the combustion of the fuel occurring at the top of said retort, and the heat from the zone of combustion serving to vaporize the liquid fuel in the upper portions of the filler or wick. It is the object of my invention to provide a burner of this character of simple, durable and inexpensive construction wherein liquid fuel is supplied to the lower portion of the retort and a current of air is directed impingingly upon the surface of the filler. A further object of my invention is to provide in a burner of this class means for encasing or jacketing the body of the retort to shield the same from the heat within the combustion chamber in which the burner is disposed when in use, whereby to limit the transmission of heat from the zone of combustion to the fuel in the lower portion of the retort. A further object is to provide means for causing a limited circulation of cold air through the inclosed jacket-space about the retort and to provide means whereby any excess of the liquid fuel which may be supplied to the retort, so as to overflow therefrom, will be received into said jacket-space and conducted therefrom through the cold-air supply conduit to a point outside the combustion chamber.

I attain these objects by the device illustrated in the accompanying drawings in which:

Fig. 1 is a vertical longitudinal section through the burner.

Fig. 2 is a horizontal section on line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a horizontal section on line 4—4 of Fig. 1, the view being upward from the plane of section.

Fig. 5 is a diagrammatic vertical section through a furnace with the oil burner installed therein.

In carrying out my invention according to the illustrated embodiment thereof I provide a substantially cylindrical open-topped housing or casing 10 which is supported by rods 11 extending vertically through lugs 12 on the outside of the casing, said rods being adjustably secured in said lugs by set-screws 13. Two of the rods 11 are arranged at opposite sides of the casing, and one of them is disposed at the rearward end, said rods forming adjustable legs by means of which the casing may be levelled regardless of irregularities in the level of the floor or other surface upon which it is placed. A retort 15, for a filler or wick 16, is set in the casing and centered therein by lugs 17 having shoulders 18 that slightly raise the bottom of the retort from the bottom of the casing, thus providing an air-space between the walls and bottom of the retort and the corresponding parts of the casing. The filler or wick 16 comprises granular fragments of refractory mineral composition, of porous or spongy consistency, and having relatively low heat conductivity. Disposed in the lower part of the retort is a perforated circular disk 19, having downwardly extending lugs 20 which rest upon the bottom of the retort, whereby to provide a distributing chamber from which the filler material is excluded, and to which the liquid fuel is supplied through a suitable pipe 21. The disk fits loosely within the retort so that the fuel from the distributing chamber may flow about the edges thereof as well as through the perforations therein, and rise into the filler to a level determined by the fuel control devices associated with the burner. An air conduit 22 is formed integrally with the casing 10, the outwardly extending portion thereof being horizontal, and the inner end being turned upwardly and terminating in a substantially vertical portion 23 at the front side of the casing. In the arrangement of the burner shown in Fig. 5 the casing is disposed centrally in the lower portion of the combustion chamber 14 of the furnace. The horizontal portion of the conduit 22 extends through the lower door-opening of the furnace-body and said opening is closed about the conduit by means of brick 35 or other suitable material which may be cemented to substantially seal the opening and prevent

the admission of air to the combustion chamber except through the conduit, to the outer end of which a suitable blower 33 may be connected to provide forced draft. When the blower is provided, operation thereof may be discontinued at times, and air drawn through the blower casing by natural draft, said natural draft impelling the air through the conduit. Inserted removably in the upper end of the vertical conduit portion 23 is an inverted U-shaped air-flue 24 having a flange 25, which rests upon the upper end of the conduit 22. The latter is notched at its inner side to receive a lug 26 on the lower side of the flange 25, whereby the flue is prevented from swinging about the axis of the conduit, and the downwardly directed delivery end of the flue is kept centered above the retort. Said delivery end of the air-flue has a contracted orifice 27 for increasing the velocity of the air delivered to the retort when the burner is to be operated under low-draft conditions such that increased velocity of the air-stream at the delivery orifice becomes desirable. Removably seated upon the upper edge of the casing 10 is an extension ring 28, which has a downwardly extending flange 29 fitting inside the casing wall, and at one side said ring has a concave or re-entrant portion 30 fitting about the air-flue and over the flange 25, as shown. The inner side of the extension-ring 28, at its lower edge, is substantially in register with the inner side of the retort wall, and therefrom said inner side of the ring is inclined outwardly. The extension ring closes the upper end of the annular air-chamber 36 formed between the retort and casing, and the lower part of the ring is recessed to form a plurality of vents 31 which lead from the air-chamber upwardly and over the wall of the retort thus providing outlets from the air-chamber. Air is admitted to the chamber 36 in limited amounts through an aperture 32 in the common wall of the air conduit 22 and the casing 10. The aperture 32 also provides an opening through which the fuel supply pipe 21 extends into the conduit, said pipe passing through the conduit to a point outside of the furnace, thence extending laterally through the wall of the conduit to a control-valve 34 to which fuel is supplied from a suitable source.

In the operation of the burner, the gravitational level of the liquid fuel in the retort varies according to the rate at which the fuel is supplied thereto, and some of the liquid is carried above the gravitational level, or to the upper portion of the wick material, by the capillary action of said material, due to the porosity thereof above mentioned. After operation of the burner has been started by igniting the fuel at the top of the retort, the upper portions of the wick material quickly become heated to a temperature such as to cause vaporization of the liquid as it approaches the upper surface, and the resulting gas or vapor rising from the wick becomes mixed with the air emerging from the orifice of the air-flue. The impinging air-current, sweeping across the upper surface of the filler or wick material, carries the flame radially outward and at the outer edge of the retort the flame is directed upwardly by the extension ring 28. By reason of the radial spreading of the flame outwardly from the central portion of the filler surface, the flame at one side of the retort will strike and heat the ascending portion of the air-flue, so that the incoming air will be slightly preheated. The extension ring 28, in directing the flame upwardly, serves as a deflector or baffle to limit the lateral spreading of the flame, and will become intensely heated. The heat radiated inwardly from the ring tends to raise the temperature of the upper portions of the filler or wick material, to more effectively vaporize the oil in said upper portion.

By reason of the low conductivity of the porous granular wick material, the heat from the upper portion or vaporization zone thereof is transmitted very slowly to the lower portion of the retort, and cooling of the latter is effected continuously by circulation of air through the chamber 36 about the retort. Said air-circulation through the chamber 36 is caused by air from the conduit 22 entering the chamber through the aperture 32 and emerging from the vents 31 above the upper edge of the retort-wall, at which points there is thus provided an auxiliary air-supply for supporting combustion of the fuel.

Should the flame of the burner become extinguished while the liquid fuel is being supplied to the retort, or should the fuel supply be turned on without igniting the burner, or if an excessive quantity of fuel be supplied to the retort at any time, so that the liquid level in the retort would rise to the top thereof, the excess liquid may flow over the upper edge of the retort through the vents 31 into the casing. Thence it will pass into the conduit through the aperture 32 and flow along said conduit to a point outside of the furnace, where it may be received by suitable well known means. The air circulating in the conduit and air-space and through the vents, being cold, will cool the overflowing fuel which flows counter to the direction of the air and will lower its temperature below its vaporization temperature thereby preventing it from igniting in the casing or in the conduit.

Having thus described my invention what I claim is:

In a liquid fuel burner, a casing open at the top, an open-topped retort of substantially the same height as the casing and having its walls spaced therefrom within the casing to provide an air-space between them, means for supplying liquid fuel to the lower portion of

the retort, a wick of refractory porous granular material disposed in the retort and substantially filling the same, an air-flue having a delivery orifice positioned centrally above the retort and adapted to direct air onto the surface of the wick material therein, an extension-ring seated upon the upper edges of the retort and casing to close the upper end of the air-space, said ring having vents extending from the air-space about the upper edge of the retort and directed inwardly over the wick therein, an air-conduit connected with said air-flue for delivering air thereto, said conduit extending horizontally at a level below the bottom of the casing, and there being a limited opening connecting said conduit with the lowest portion of the air-space about the retort, whereby air from said conduit may pass through said air-space to said vents, and liquid fuel overflowing the wall of the retort will be conducted through said vents and air-space to the bottom of the casing and thence through said opening to the horizontal air-conduit.

LEWIS A. COCKLIN.