Nov. 14, 1933. L. I. ALDRICH 1,935,221

FUEL BURNING DEVICE

Filed Dec. 30, 1929 3 Sheets-Sheet 1

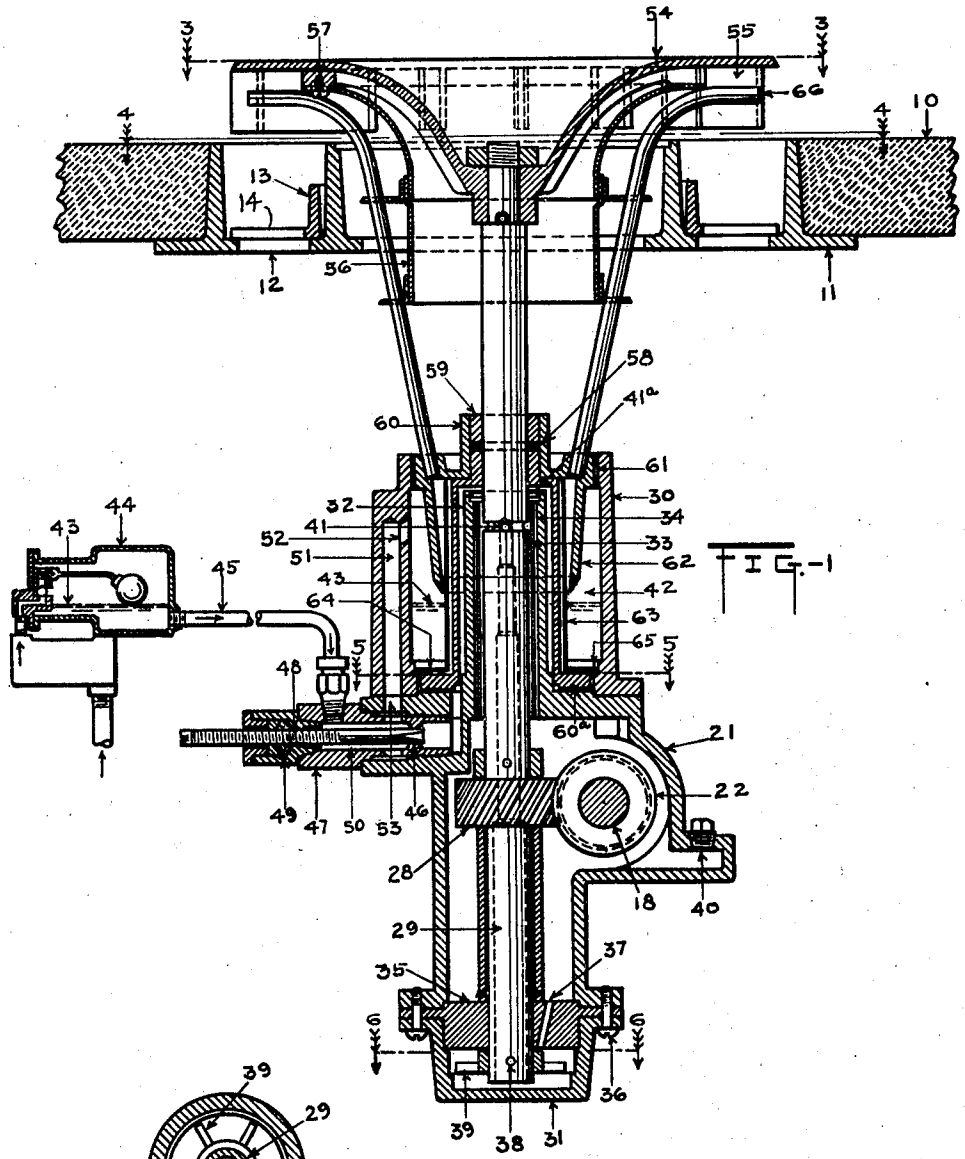


FIG.-1

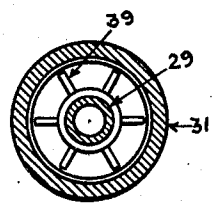


FIG.-6

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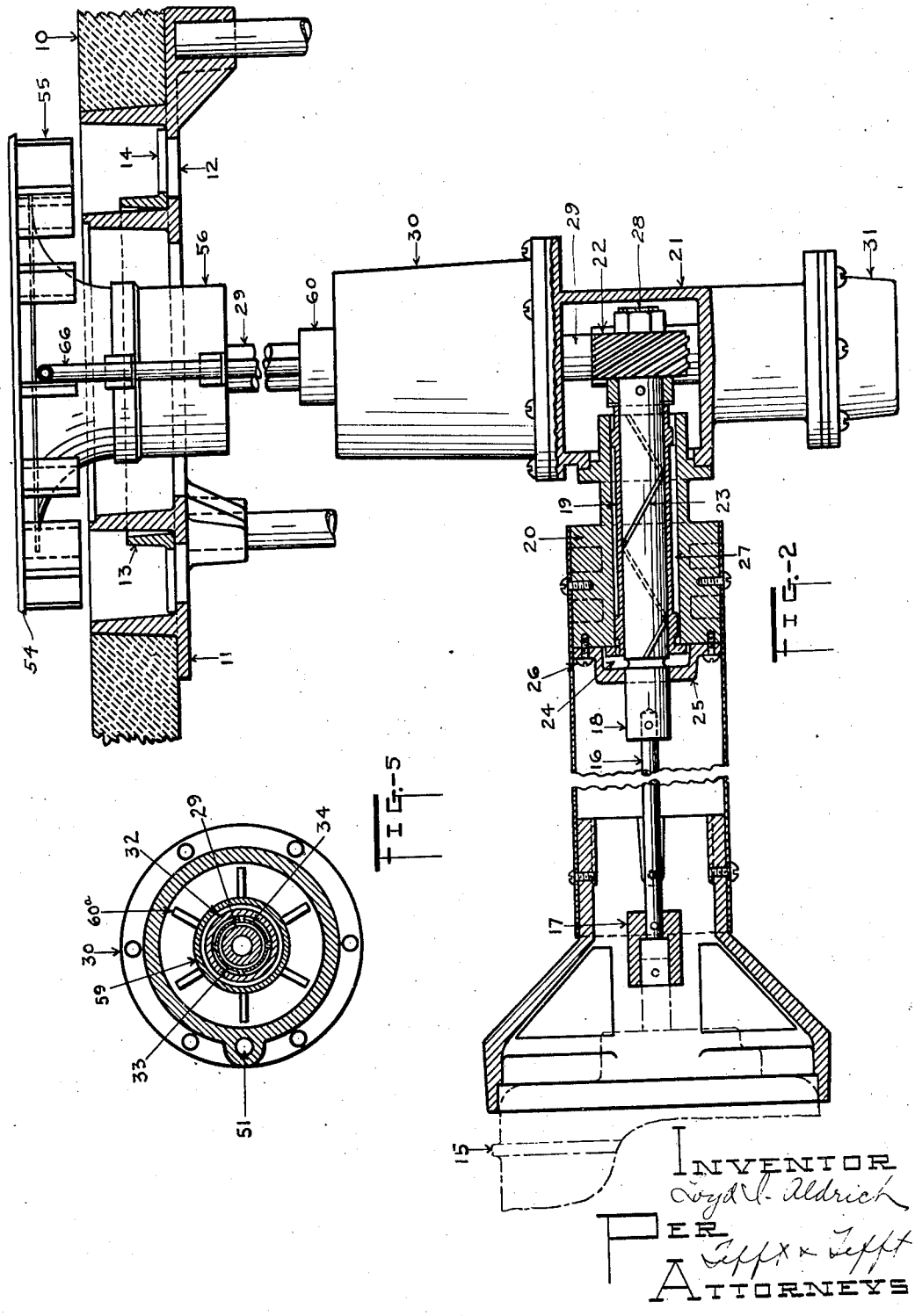


FIG.-2

FIG.-5

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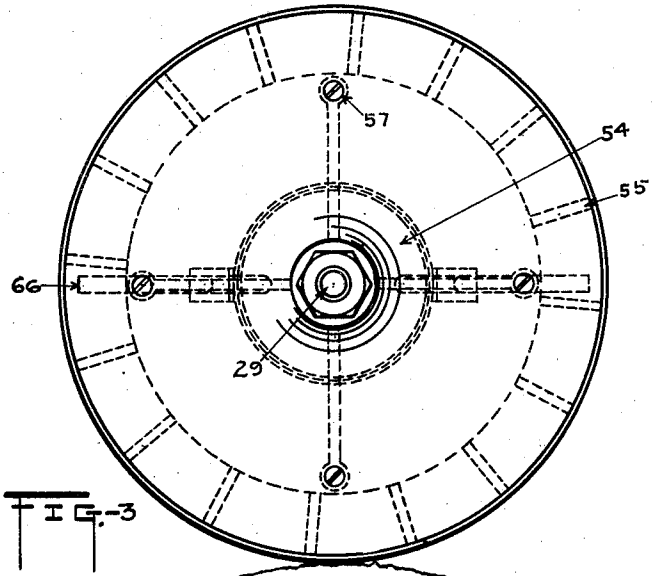


FIG.-3

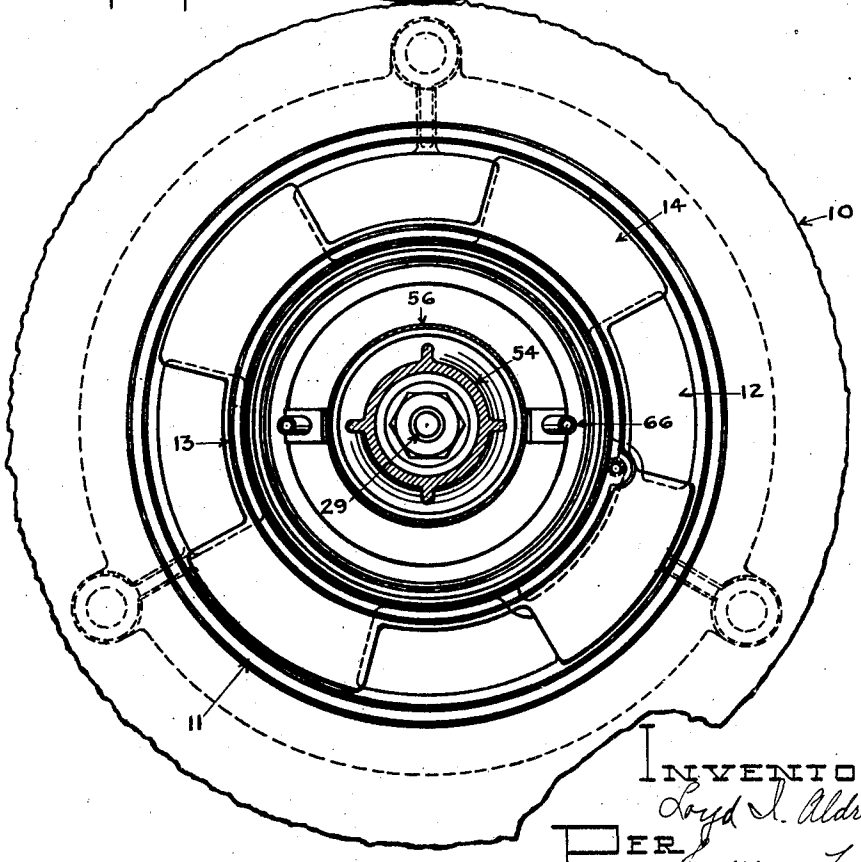


FIG.-4

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FUEL BURNING DEVICE

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Application December 30, 1929
Serial No. 417,376

2 Claims. (Cl. 158—77)

This invention relates to fuel burning devices.

One of the objects of the invention is in the provision of a spinner type burner having a novel fuel feed mechanism comprising a means for elevating a volume of fuel directly into the rotating fuel feed mechanism of the burner.

Another object lies in the provision of a simplified and efficient fuel feeding means for a spinner type fuel burner, said means including a sump having a normal fuel level, which upon being replenished, is adapted to rise and thereby furnish fuel directly to a rotating fuel feeding mechanism in connection with the burner.

Still another object lies in the provision of a fuel feeding mechanism for a fuel burner which contemplates the normal maintenance of a certain volume of fuel which when elevated, provides a fuel feeding means for the burner, there being also included a means for by-passing the fuel in case of failure of fuel feed at the fuel delivery end of the burner.

A further object lies in the provision of a fuel burner of the rotating cup type, said cup being provided with means for insuring a volume of cool air against the rotating plate sufficient to prevent warping of said plate, the same being exposed directly to the fire in the combustion chamber.

A still further object lies in the provision of a fuel burning device of the rotating cup type, the cup for said burner being provided with an air inductor mechanism capable of compressing a volume of cool air immediately adjacent the under side of the plate to prevent same from warping, as well as an auxiliary air passage insuring proper cooling of the fuel delivery tubes to prevent carbonization of oil therein.

Yet another object lies in the provision of housing mechanism for the driving connection between the power means and the driving mechanism for the burner.

Other objects will appear in the following specification taken in connection with the annexed drawings, in which—

Fig. 1 is a sectional view taken in side elevation, showing the various portions of the burner and the manner of mounting same;

Fig. 2 is an elevational view, partially in section, showing the driving connection between the electric motor and the burner;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 1; and

Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig. 1.

Referring specifically to the drawings, the disclosure in Figs. 1 and 2 is such as will identify said burner mechanism as a fuel burner of the so-called rotating cup or spinner type, adapted to have the rotatable cup portion mounted within the furnace or boiler, there being built up, however, about the cup portion which is exposed to the combustion, a cement or brick flame or fire receiver 10, which usually comprises a horizontal surface with upstanding vertical portions against which the fuel is thrown and upon which the fuel burns.

This combustion surface 10 is sufficiently conventional to negative description thereof other than in general terms, the same obviously being constructed within the furnace or boiler chamber. In closer proximity to the burner itself, later to be described, is a metal ring 11 either connected to or forming a part of the combustion chamber or surface 10, said ring providing draft means for the entrance of air necessary for combustion purposes. This ring 11 is apertured as at 12 and there is disposed in the ring 11 a rotatable plate 13 having intermittently spaced projecting portions 14 capable upon rotation thereof to cover the apertures 12 in the ring 11 to any degree desired. Obviously, the above described mechanism provides adjustable draft means.

Now, with respect to the burner itself, an electric motor 15 is disposed at a point removed from that portion of the burner which is exposed to the combustion flame, the same being mounted in a horizontal manner and connected to the burner by means of a self aligning coupling 16 connected at one end to the electric motor shaft at 17 and at the other end to a stub drive shaft 18. This stub drive shaft 18 rotates in a bushing 19, which in turn is carried by a supporting portion 20 which in turn is either attached to or forms a part of a vertically disposed housing portion 21. The stub shaft has mounted upon its driving end the worm 22 which furnishes power transmission means for the burner drive shaft, and mechanism later to be described.

The stub drive shaft 18 is provided with the spirally formed oil grooves 23 so arranged thereon as to carry oil from within the housing 21 to a point adjacent the outer end of the stub shaft, said oil being thrown into the chamber 24 formed by means of a cap member 25 secured to the portion 20 by means of the plural screws 26. Oil or

lubricant is permitted to return to the housing 21 by means of the plural grooves 27 formed upon the outer side of the bushing 19. It is apparent from the above description that the means for lubricating the stub shaft is automatic in its principle of operation. The worm 22 transmits power to a worm gear 28 secured to a vertically disposed drive shaft 29 supported within the intermediate housing 21, upper housing 30 and lower housing 31. The housing 21 has an intermediate upwardly extending part 32 which provides an intermediate bearing support for the vertical shaft. Pressed into this bearing support is a bushing 33, within which the vertical shaft rotates.

It will be noted at this time, however, that the bushing 33 has a plurality of oil grooves formed upon its outer surface, the same being designated 34, said oil grooves, as will be later described, permitting return of an overflow of oil or lubricant for the vertical shaft. The lower bearing support for the vertical shaft is provided in the member 35, which in turn is secured to the housing 21 by means of the plural screws 36, which also act as a supporting and attachment means for the before described housing 31. It will be noted that the member 35 has a passageway 37 therein for the lubricant.

Upon the lower end of the vertical shaft 29 is secured as at 38, a lubricant impeller 39. At 40 is shown a threaded lug permitting entrance of a lubricant into the housing 21 which is adapted to contain a considerable volume of lubricant. The housing is filled with lubricant to a level sufficient to be picked up by the spiral grooves on the stub shaft 18, the automatic oiling of said member having already been described.

The impeller 39 forces oil upwardly through the interior of the hollow vertical drive shaft to a point intermediate its length wherein a plurality of oil apertures 41 open directly into the upper bearing. The oil supplied to this upper bearing is adapted to pass by gravity downwardly within the bushing, finally falling directly into the housing 21. However, in case of an excess supply of lubricant being forced through the above described opening, it will be forced upwardly to a point above the bushing, there being permitted return of said excess lubricant to the housing 21 by means of the plural passages 34 previously described formed upon the outer surface of the bushing. A washer 41^a prevents any possible exodus of the lubricant upwardly.

The upper housing 30 forms a fuel reservoir 42 in connection with the upwardly projecting portion 32 of the housing 21. The fuel is normally maintained in this reservoir at a point indicated by the dotted lines 43 in Fig. 1.

Means for maintaining the oil at a determined level is provided by means of an exteriorly disposed and conventional float mechanism 44.

A fuel pipe 45 transmits fuel from the float mechanism into a fuel control mechanism now to be described. This fuel control mechanism comprises a valve seat 46 into which is adapted to be placed in adjustable relationship a valve member 47. Means permitting adjustment of the valve 47 is provided in a threaded fashioning 48 of the opposite end thereof and the conventional support and packing mechanism 49 therefor.

Means for by-passing fuel from the fuel supply chamber 42 to a chamber 50 surrounding the valve 47 is provided in an opening 51 communicating, as at 52, with the fuel supply chamber 42 and as at 53 with the valve. Such by-passing of the fuel is merely for safety purposes and under ordinary circumstances would be useful only in case of a plugging of the fuel delivery lines later to be described, which would result in a backing up of the fuel, which in turn, due to the above described means for by-passing, would therefore accomplish merely a distribution of the oil into the fuel chamber through the by-pass and a continuous rotation through the valve. The by-pass 51 is adapted to take care of any oil which may be displaced if the impeller portion 64 causes the oil level in chamber 42 to rise above the lower edge of opening 52.

Upon the upper end of the vertical shaft 29 is secured a rotating cup 54 having a series of air inducing blades 55 disposed upon the under surface thereof. These blades are, upon rotation of the cup, adapted to induce a flow of air upwardly. In view of the fact that the cup 54 is exposed to the combustion flame, and therefore is subject to distortion, due to constant exposure to extremely high temperatures, there is provided in the following described mechanism a means for supplying a constant volume of air to the under side of the cup to prevent such possible distortion.

This means is provided in a surrounding spaced metal enclosure 56, secured to the cup in the plural manner by the spaced attachment members 57. It will be noted that this enclosure member at its lower point has an opening of considerable diameter and that as said member approaches the cup the air passage is considerably decreased with the result that air which is induced by the blades 55 upwardly, flows over the underside of cup 54, thereby exerting a cooling action upon the cup.

The vertical shaft 29 has attached thereto at a point 58 above the lubricating openings 41, a cylindrical portion 59, extending downwardly about the interiorly, upwardly projecting portion of the housing 21, said cylinder being flared outwardly as at 60^a at its lowermost end.

Secured to the upper end of the cylindrical portion 59 is a fuel delivery portion 60, so arranged that in rotation its outer edge 61 has a working fit with the upper end of the housing 30. This fuel delivery portion has for its operating member a downwardly and inwardly projecting frusto-conical sleeve 62, said sleeve having its lower edge lying adjacent a vertically disposed tubular member 63 which is either secured to or forms a part of the fuel delivery casing or member 60. The tube 63 has an impeller portion 64 formed at its lower edge, said impeller portion being disposed immediately above the flared portion 60^a of the cylinder 59.

It is apparent that fuel is permitted to pass from the before described valve about the flared portion 60^a and into the path of the impeller 64, which is perforated adjacent its periphery, in the plural manner shown at 65. This impeller, which rotates with the vertical shaft, elevates the level of the fuel contained in the reservoir 42 to such point where the fuel is picked up by the rotating tapered sleeve 62 and due to the downward convergence of this sleeve the fuel obviously travels upwardly along the sides thereof, finally being ejected into the plural fuel delivery tubes 66, which have their final delivery ends disposed somewhat adjacent the peripheral edge of the rotating cup 54.

As respects the operation of the present rotating cup or spinner type fuel burner, the fuel is delivered from a conventional container to the

float chamber 44, the float within this chamber obviously controlling the flow of fuel to the fuel burner. In operation, fuel in the float chamber flows to the chamber 50 surrounding the adjustable valve 47. From this chamber the fuel flows past the valve in a measured quantity, finally passing about the flared portion 60a and thence through the plural apertures in the impeller, directly into the fuel reservoir 42.

As previously described, when the apparatus is inoperative a quantity of fuel is always maintained in the fuel reservoir at a determined height therein, as indicated by the dotted lines in Fig. 1, such dotted lines obviously being level with the level of the fuel in the float chamber.

During operation, however, the incoming fuel increases the volume in the reservoir due to the rapid rotation of the impeller 64 elevating the fuel into the path of the rapidly rotating lower edges of the fuel delivery mechanism. The fuel is thus picked up by the rotating fuel delivery member 62, due to the sloping formation thereof, the fuel travelling up the sides of this portion and directly into the fuel delivery tubes 66, the fuel obviously being thrown by centrifugal force rapidly from the open ends thereof. Auxiliary air necessary for combustion is controlled by means of the adjustable member 13 lying within the draft ring 11. The mixture of fuel and air may be ignited in any conventional type of ignition member such as an electric spark or gas pilot light (not shown) of any form desired.

During the operation of the burner, the rotating cup obviously is exposed to terrific temperatures and unless means is provided for cooling same, it would soon become distorted and therefore prevent further satisfactory operation of the burner in view of the fact that the vertical shaft would be improperly balanced and the supporting mechanism would be incapable of resisting the strain. In order to overcome this main disadvantage to this well known type of burner, applicant has provided a surrounding air inductor portion, through which the rotating blades 55 induce a blast of cool air from beneath the cup. A current of air is projected against the under surface of the cup at all times.

This manner of cooling the cup prevents it from attaining such temperatures as would distort it and therefore not only increases the life of the cup but also the efficiency of the burner. These blades extend below the upper periphery of member 56 so as to also induce an auxiliary blast of air upwardly about the fuel delivery tubes 66. This auxiliary blast obviously operates to satisfactorily cool the fuel delivery pipes which are also exposed, although not as directly, to the combustion flames. Experience has shown that the fuel in the delivery pipes of this general type of burner often becomes carbonized and prevents the efficient flow of fuel mixture therethrough. In the present instance this auxiliary blast of air operates to maintain these fuel delivery pipes at such temperature as will prevent carbonization of fuel therein.

As respects the oiling system for the present burner, a volume of lubricant is contained within the housing 21 at such a level as will permit the stub shaft 18 to carry oil by means of the spiral grooves 23 thereon outwardly to the chamber 24, the return of the oil from this chamber being accomplished through grooves 27 formed upon the outer side of the bushing 19 supporting the stub shaft. The oil is thus forced outwardly and returned in an automatic, uninterrupted manner to the housing 21.

Means for oiling the vertical shaft, which of course operates at a high speed, is accomplished by means of the impeller 39, which forces the oil upwardly through the interior of the hollow vertical shaft to a point within its upper bearing, whence the lubricant is thrown by centrifugal force out the apertures 41, the oil then either passing by gravity downwardly within the bushing 33 into the housing or upwardly over the bearing, thence passing by gravity down the plural grooves 34 formed upon the outside of the bushing 33 directly into the housing.

Attention is further called to the manner of covering the connection between the electric motor and the driving mechanism of the burner. The usual practice contemplates such connection without a surrounding casing. Applicant herein actually provides a cover for this connection which not only improves the appearance of the burner but also permits electric connections usually exposed to be also carried therein.

What I claim is:

1. A fuel burning device comprising in combination a rotatable cup member exposed to combustion flames, means for driving said cup including a vertical shaft, bearing supports for said shaft, means for spraying the fuel including fuel tubes attached to and rotating with said cup, a fuel reservoir in which a volume of fuel is normally maintained, a frusto-conical portion connected with the fuel delivery tubes and projecting into the fuel reservoir and an impeller mechanism connected to and rotating with the vertical shaft for elevating fuel within the reservoir to such a height and in such manner that said fuel will be automatically picked up and elevated by the centrifugal movement of the fuel delivery mechanism.

2. A fuel burning device comprising in combination a rotating cup, means for driving same including a vertical shaft, means for feeding and spraying fuel comprising a fuel line and valve, fuel delivery tubes attached to and rotating with said cup, a fuel reservoir normally containing a volume of fuel, mechanism for elevating the fuel from the reservoir to the tubes by the rotary movement of the shaft and means for by-passing excess quantities of fuel to the fuel line and valve and an impeller mechanism connected to and rotating with the vertical shaft for elevating fuel within the reservoir to such a height and in such manner that said fuel will be automatically picked up and elevated by the centrifugal movement of the fuel delivery mechanism.

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