Aug. 19, 1924. 1,505,607

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APPARATUS FOR ATOMIZING FUEL OILS, ETC

Filed Dec. 23, 1921 2 Sheets-Sheet 1

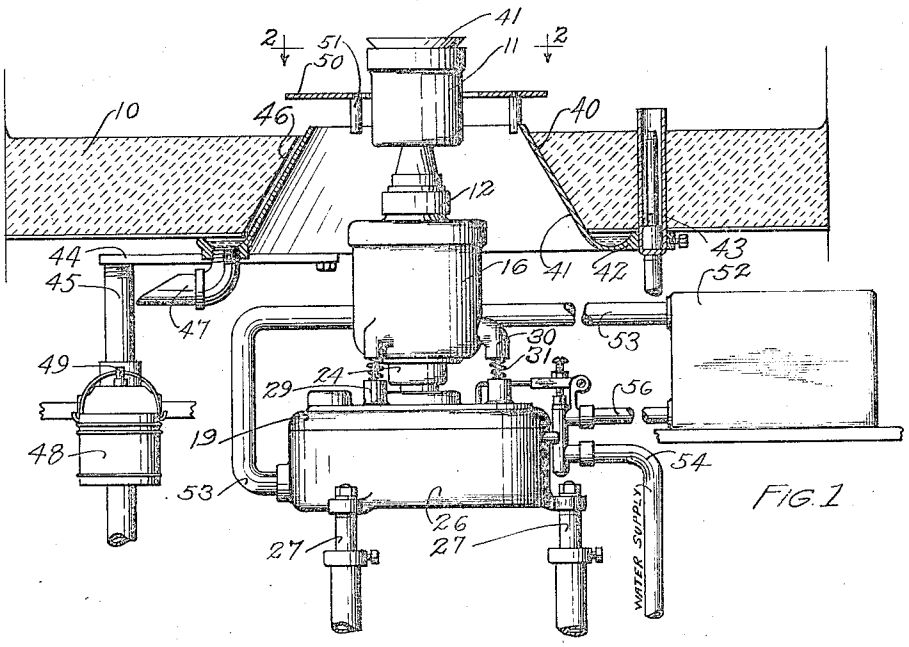

FIG. 1

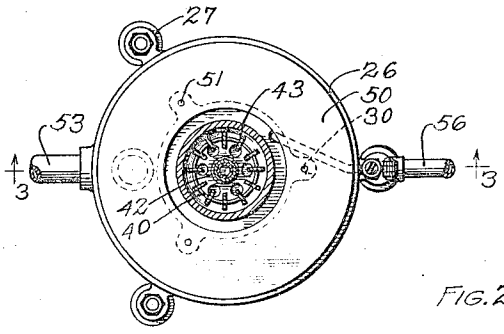

FIG. 2

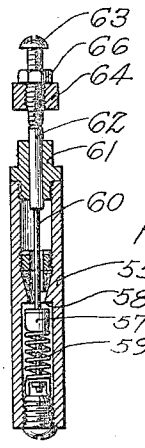

FIG. 5

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FIG. 3

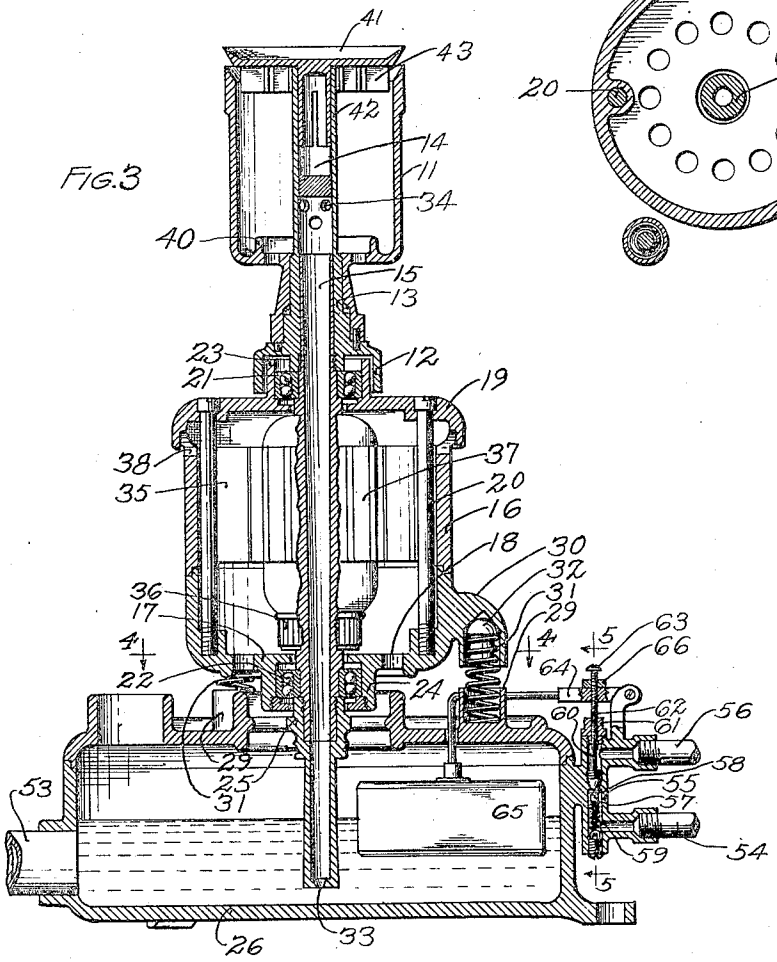
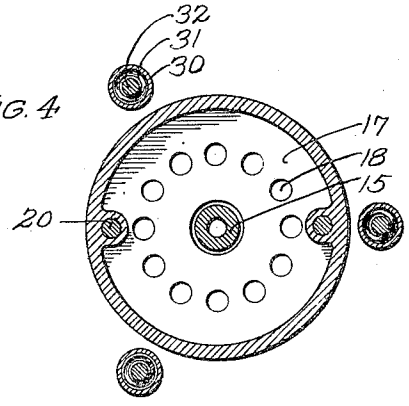


FIG. 4



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Patented Aug. 19, 1924. 1,505,607

UNITED STATES PATENT OFFICE.

OSCAR C. SCHROEDER, OF CHICAGO, ILLINOIS.

APPARATUS FOR ATOMIZING FUEL OILS, ETC.

Application filed December 23, 1921. Serial No. 524,558.

To all whom it may concern:

Be it known that I, OSCAR C. SCHROEDER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Atomizing Fuel Oils, Etc., of which the following is a specification.

My invention is concerned with a novel apparatus designed primarily for atomizing fuel oils, but which may be used for atomizing other liquids, and is designed to produce a centrifugal device of the class described that shall be extremely simple and compact, and which will operate with a very high degree of efficiency.

To this end it consists of an electric motor yieldingly supported so that its armature shaft, which constitutes its vertical axis, is free to shift so it can find its true axis of rotation, and carrying a centrifugal sprayer on the upper end of its hollow armature shaft, the lower end of which dips into a supply of oil carried up through the shaft by its rotation so as to be delivered to the sprayer.

Another feature of my invention resides in the use of a centrifugal sprayer-cup mounted on the top of the armature shaft, and provided with a cover rotating therewith and having internal vanes which act to create a draft through the cup to mix air with the oil as it is atomized.

Another feature of my invention resides in the employment with such a centrifugal sprayer of an annular member disposed in the path of the main flow of the air to support the combustion so as to direct the air to the flame in a manner which will cause the most efficient combustion of the fuel.

Another feature of my invention resides in the novel apparatus which I employ for keeping the supply of oil for the atomizer at the required level.

To illustrate my invention, I attach hereto two sheets of drawings, in which the same reference characters designate identical parts in all the figures, of which,—

Fig. 1 is a view, partly diagrammatical, showing the apparatus installed and provided with means for supplying it with oil;

Fig. 2 is a top plan view in section on the line 2—2 of Fig. 1;

Fig. 3 is a central vertical section, on an enlarged scale, showing the atomizer;

Fig. 4 is a plan view in section on the line 4—4 of Fig. 3; and

Fig. 5 is a view in section on the line 5—5 of Fig. 3, but on a larger scale.

In carrying out my invention, I have shown it as applied to a furnace 10 of any desired construction, and with the centrifugal sprayer-cup 11 projecting up through a suitable aperture in the floor of the furnace, which will be covered with fire brick or other similar material in a customary manner. The cup 11 is preferably furnished with a hollow stem 13 shown as pinned on to the inverted cup-shaped lower portion 12 of the sleeve 14 that extends up through the stem 13 to the top of the cup 11. This sleeve is threaded at its lower end onto the reduced upper end of the armature shaft 15 of the motor, the casing 16 of which is preferably composed of the cylindrical lower portion having the bottom 17 thereof provided with the apertures 18 and having the top 19 thereof secured thereto by screws 20 passed through said top, and threaded into the bottom of the casing. The ball bearings 21 and 22 of the armature shaft are of any desired type, the bearings 21 being interposed between the armature shaft and the annular flange 23 projecting up from the top 19 of the casing, and the bearings 22 are interposed between the adjacent portion of the armature shaft and the flange 24 projecting downwardly from the bottom 17 of the casing. The hollow armature-shaft is provided with an extension 25 threaded thereon and co-operating with a shoulder on the armature shaft to hold the ball bearings 22 in place. This extension 25 carries the armature shaft down to nearly the bottom of the oil holder 26, which may be of any desired construction, and which I have shown as conveniently provided with the plurality of legs 27 adjustably secured in the pipes 28, which will be supported from the floor of the room in which the burner is located, so that the cup 11 can be adjusted at any desired height relative to the floor of the fire-pot.

In order that the armature shaft of the motor may be free to find its true axis of rotation, I mount the casing 16 yieldingly upon the top of the oil holder 26, and for this purpose I prefer to employ the three cup-shaped lugs 29 on the top of the holder with the opposed cup-shaped lugs 30 projecting outwardly and downwardly from

the bottom of the side of the motor casing 16. In these opposed cups I place the helically-coiled expanding springs 31, and I preferably employ in connection therewith the plug 32, which has the semi-spherical upper portion co-operating with the bottom of the recess in the lug 30 and which is provided with a reduced portion adapted to be surrounded by the spring 31 so that the plug 32 is supported by the spring yieldingly against the bottom of the lug 30. I have found that this flexible bearing gives the desired possible movement of the motor casing relative to the oil holder so that the armature shaft of the motor can rotate freely and find its true axis of rotation, thus resulting in its running smoothly and noiselessly with a minimum expenditure of power. The hollow armature-shaft has its bottom closed except for a small aperture 33 in the plug secured therein, and when the holder 26 is filled with oil and the motor is rotated by current applied thereto, the oil is carried up by the centrifugal force through the extension 25, the hollow armature-shaft 15 and the sleeve 14, to the apertures 34 formed in the sleeve 14, from which point it flies outward to the inner wall of the cup 17, and is carried up on said inner wall until it reaches the top and overflows, as it were, the edge, from which it is thrown out tangentially in a finely divided condition.

It will be noted that the area of the apertures 34 greatly exceeds the area of the aperture 33 in the plug, and this is essential in securing the automatic rise of the oil through the hollow shaft. It will further be noted that the aperture 33 is in the bottom of the shaft and concentric therewith, as it is impossible to draw oil into the shaft through radially extending apertures, as the centrifugal action of the rotating shaft prevents it, but facilitates its rising through the small aperture in the center of the bottom of the shaft.

It will be understood that the current is carried to the field coils 35 of the motor, and to the commutator 36 of the armature 37, by suitable connections, which need not be described, as they are part of all motors.

The upper portion of the casing 16 is provided with the apertures 38, so that air can pass up through the apertures 18, past the armature and out through the apertures 38, to keep the motor cool. The bottom of the cup 12 is provided with a plurality of apertures 39 arranged in a circle and inside of the annular flange 40 projecting up from the bottom of the cup. The cup is preferably provided with a disk-shaped cover 41, which has the split stem 42 by which it is held yieldingly in the top of the sleeve 14. The under side of this cover is provided with a plurality of radially-extending vanes 43, seen in section in Fig. 2, which vanes operate to create a draft of air up through the apertures 39 and out over the spray of oil that is caused by the rotation of the cup, thus introducing air for purposes of combustion above the oil. The flange 40 serves to prevent such residuum of the oil as does not leave the cup from running down through the apertures 39.

The bottom of the fire-pot 11 is preferably provided with a truncated, conical-shaped opening 40, into which fits the hollow casting 41 of the same shape as the opening, and which is provided with the trough-shaped lower rim 42, which has at one point the pilot light 43 supported therefrom. This rim is preferably supported from three places by bars 44 secured to the under side thereof and supported by pipes 45 extending down to the floor. The aperture 40 has a plurality of channels 46 formed therein for the following purpose: If the pilot light 43 should at any time be extinguished and the motor started up, the oil that would then be thrown out on the floor of the fire-pot would flow down through the channels 43 into the trough 42, which has the discharge spout 47 to discharge the oil into a bucket 48 hung upon a lever 49 connected to the electric switch controlling the current to the motor, so that in the event that it is operating without the oil burning, as soon as the bucket 48 is filled to the desired extent, the switch-lever 49 will be moved by the weight of the oil in the bucket to open the circuit and stop the motor.

I find that to insure the most perfect combustion of the oil thus delivered, it is necessary to place above the aperture 46 an annular plate 50, which, as clearly seen in Fig. 1, is placed a short distance from the cup 11, and has its edges extending out over the top of the aperture 40. This plate is conveniently supported from the casting 41 by the three legs 51 having the recessed ends which fit over the top of the casting. The effect of this plate is to divide the current of air sucked up through the aperture 40 and to deliver it where it operates most effectively in securing perfect combustion of the oil sprayed thereby.

To secure a proper level of the oil in the holder 26 at all times, I provide the mechanism illustrated partially diagrammatically in Fig. 1, where 52 represents the oil-supply tank, which has a pipe 53 leading from the top thereof and opening into the bottom of the holder 26. A water pipe 54, which may be connected to the city mains or any other source of water under pressure, is let into the valve casing 55, and another pipe 56 leads from the valve casing to the bottom of the tank 52. The valve 57,

which may be like an ordinary air valve for tires, in the casing co-operates with a valve seat 58, and is normally held closed by the helically-coiled expanding spring 59 co-operating therewith. The valve stem 60 passes up to and is engaged by the plug 62 sliding through the snugly-fitting bearing 61 in the top of the valve casing, and has its upper end engaged by the set screw 63 threaded through the bell-crank lever 64, which is fulcrumed to the valve casing, and has its other end connected to the float 65 in the holder 26. A lock nut 66 serves to hold the screw 63 in any desired adjustment which serves to regulate the height at which the oil brings the float 65 into operation. It will be understood that when there is a sufficient supply of oil in the holder, the spring 59 holds the valve closed, but when the oil gets low, the height of the float 65 acting against the spring opens the valve 58 and allows the water to flow past the valve and into the tank 52, displacing the oil above it and causing it to flow into the holder 26 until it reaches the desired level, when the float 65 is raised so that the spring 59 is free to act again and close the valve.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it will be understood that it is capable of modifications and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. In an apparatus of the class described, the combination with an electric motor having a vertically disposed hollow armature-shaft, of a support for the motor casing, connections between the support and the motor casing permitting the latter to swing to adjust itself automatically to the true axis of rotation of the armature, a liquid holder beneath the casing into which the lower end of the armature-shaft dips, a centrifugal atomizer on the upper end of the shaft, and means for maintaining liquid in the holder.

2. In an apparatus of the class described, the combination with an electric motor having a vertically disposed hollow armature-shaft, of a support for the motor casing, a liquid holder beneath the casing into which the lower end of the armature-shaft dips, connections between the support and the motor casing permitting the latter to swing to adjust itself automatically to the true axis of rotation of the armature, a centrifugal atomizer on the upper end of the shaft, and means for maintaining liquid in the holder, the armature-shaft having a small orifice in its lower end and a larger one in its upper end.

3. In a centrifugal atomizer, the combination with a liquid holder having a plurality of spring-engaging members arranged in a circle on the top thereof, of a motor with its casing having a corresponding plurality of spring-engaging members, an atomizer carried by the top of the hollow armature-shaft, the lower end of which projects into the basin, and helically-coiled expanding springs interposed between the opposed pairs of spring-engaging members.

4. In a centrifugal atomizer, the combination with a liquid holder having a plurality of spring-engaging members arranged in a circle on the top thereof, of a motor with its casing having a corresponding plurality of opposed spring-holding recesses, an atomizer carried by the top of the hollow armature-shaft, the lower end of which projects into the holder, helically-coiled expanding springs having their lower ends engaging the spring-engaging members on the holder and their upper ends extending into the recesses, and bearing plugs with semispherical upper ends engaging the bottoms of the recesses and with reduced lower ends surrounded by the upper ends of the springs in the recesses.

5. In an apparatus of the class described, the combination with a vertically-disposed hollow shaft, of means for rotating the same, a liquid holder supplying liquid to the bottom of said shaft, an atomizing cup secured on the top of the shaft with openings thereinto from the shaft, and a cover rotating with the cup and provided on its inner surface with vanes inside of the cup, for the purpose described.

6. In an apparatus of the class described, the combination with an electric motor having a vertically-disposed hollow armature-shaft, of a support for the motor casing, a liquid holder beneath the casing into which the lower end of the armature shaft dips, an atomizing cup secured on the top of the armature-shaft, and a cover rotating with the cup and provided on its inner surface with vanes, for the purpose described.

7. In an apparatus of the class described, the combination with a fire pot having a truncated conical aperture opening into the bottom thereof, of a centrifugal atomizing cup projecting up through said aperture and discharging its fuel tangentially above the bottom of the pot, and an annular plate having three or more pins extending downward from the under side thereof surrounding the atomizer between its delivery plane and the bottom of the pot, said pins being supported on the top of the walls of the aperture.

8. In an apparatus of the class described, the combination with a centrifugal atomizer having a hollow vertical shaft, of a liquid holder into which it dips, a tank for oil, a

pipe connecting the top of the tank with the bottom of the holder, a water pipe connected with a source of water under pressure and opening into the tank, a valve in said water pipe, and connections to said valve operated by the level of the oil in the holder to open the valve when the oil supply therein gets too low and to close it when it gets too high.

9. In an apparatus of the class described, the combination with a centrifugal atomizer having a hollow vertical shaft, of a liquid holder into which it dips, a tank for oil, a pipe connecting the top of the tank with the bottom of the holder, a water pipe connected with the source of water under pressure and opening into the tank, a valve in said water pipe, and connections to said valve operated by the level of the oil in the holder to open the valve when the oil supply therein gets too low and to close it when it gets too high, said connections consisting of a spring tending to close the valve, a float in the holder, and connections from the float to the valve so that the weight of the float opposes the spring and opens the valve.

10. In an apparatus of the class described, the combination with a centrifugal atomizer having a hollow vertical shaft, of a liquid holder into which it dips, a tank for oil, a pipe connecting the top of the tank with the bottom of the holder, a water pipe connected with the source of water under pressure and opening into the tank, a valve in said water pipe, and connections to said valve operated by the level of the oil in the holder to open the valve when the oil supply therein gets too low and to close it when it gets too high, said connections consisting of a spring tending to close the valve, a float in the holder, and connections from the float to the valve so that the weight of the float opposes the spring and opens the valve, said last-named connections consisting of a bell crank secured to one end to the float and pivoted at the other end adjacent the valve casing, a plunger sliding through the top of the valve and engaging the valve stem, and a set screw in the bell crank co-operating with the top of the plunger, substantially as and for the purpose described.

11. In an apparatus of the class described, the combination with an electric motor having a vertically disposed hollow armature shaft, of a support for the motor casing, a liquid holder beneath the casing into which the lower end of the armature shaft dips, a centrifugal atomizer on the upper end of the shaft, and means for maintaining liquid in the holder, the armature shaft having a small orifice in the bottom of its lower end and a larger one in its upper end.

12. In a liquid fuel burner, the combination with a liquid holder, of a vertical hollow shaft extending into the holder having a small axially extending concentric orifice in its bottom and a larger discharge area at its top, an atomizer element on the top of the shaft rotating therewith, bearings for the shaft, and means for rotating the shaft.

13. In a liquid fuel burner, the combination with a liquid holder, of a hollow shaft extending downwardly into the holder having a relatively small axially-extending concentric orifice in its bottom and a larger discharge area at its top, an atomizer element on the top of the shaft rotating therewith, and means for rotating the shaft.

In witness whereof, I have hereunto set my hand and affixed my seal, this 10th day of November, 1921.

OSCAR C. SCHROEDER.

Witness:
JOHN HOWARD MCELROY.