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2,165,191

FUEL BURNER

Filed June 24, 1936

2 Sheets-Sheet 1

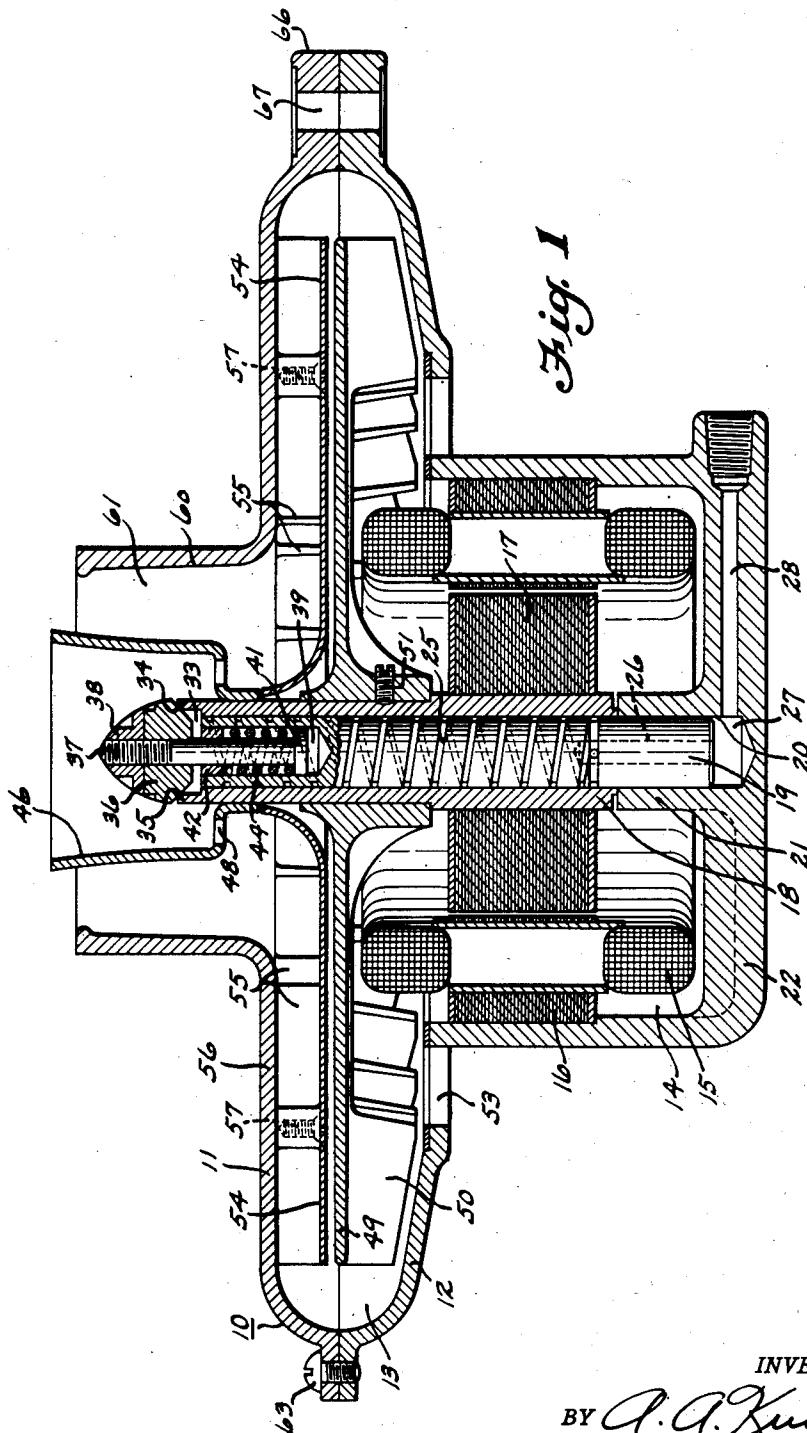


Fig. 1

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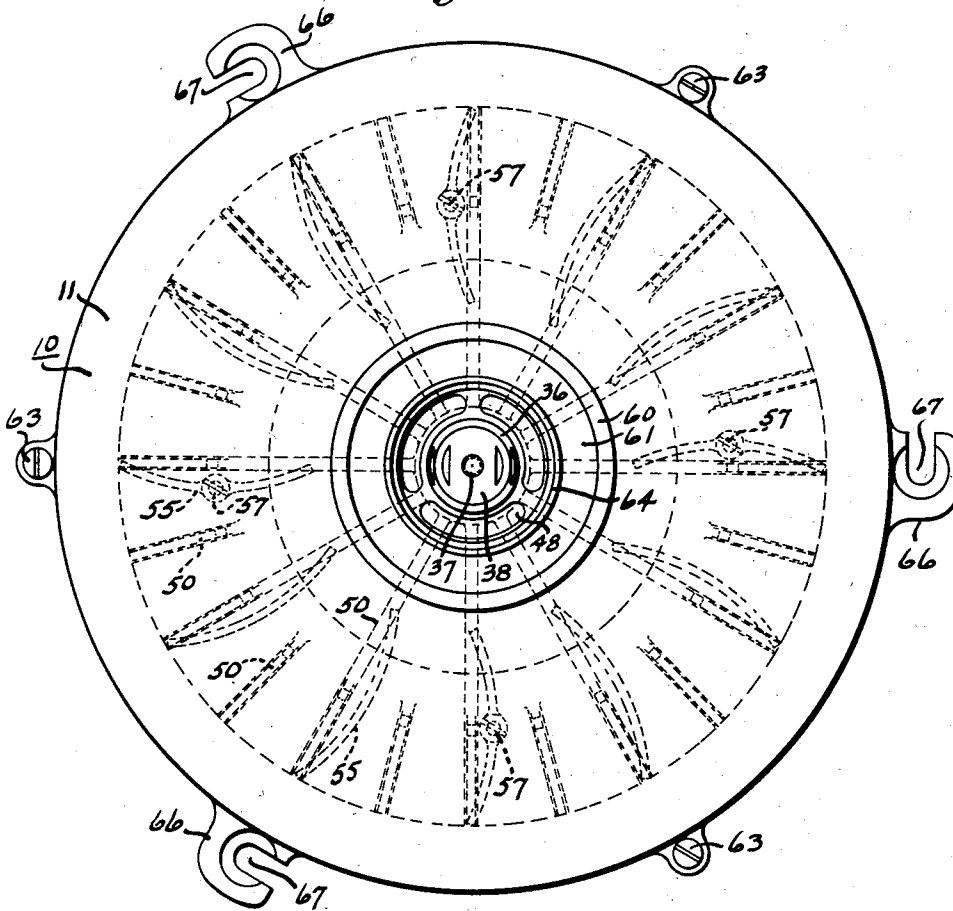
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Fig. 2



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FUEL BURNER

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7 Claims. (Cl. 158-77)

My invention relates to fuel burner assemblies particularly adapted to the burning of fuel such as oil.

The principal object of my invention is to provide an improved oil burner assembly. Incident to this principal object of my invention are numerous other more specific objects, the attainment of which all materially contribute to the achievement of the principal object. These more specific objects, all of which will be apparent from the following specification, claims and drawings, include the following:

1. To provide an improved burner assembly wherein a rotary pressure atomizer, located within a mixing chamber, causes primary atomization of the fuel entering the mixing chamber, and wherein further atomization of the fuel is affected by the walls of the mixing chamber.

2. To provide a novel arrangement of parts which lends to a small, compact unitary structure economical to manufacture and assemble.

3. To provide an improved burner assembly wherein the air impeller surrounds the fuel pump and both are driven from the same shaft.

4. To provide an improved fuel pump wherein the flow of fuel is caused by relative rotary movement of one cylindrical member with respect to another, and specifically wherein the fuel is forced through a spiral passage formed in one of the members.

5. To provide for atomization of the fuel in the mixing chamber by supplying fuel under pressure to a rotary atomizer.

Other more specific objects will become apparent from the following specification and claims taken with the accompanying drawings wherein

Fig. 1 is a vertical section through my improved burner assembly, and

Fig. 2 is a plan view of the apparatus illustrated in Fig. 1.

With reference to Figs. 1 and 2, I have shown my improved burner assembly as including a casing generally designated at 10, comprising upper and lower shells 11 and 12 cooperating to form the enclosed chamber 13. The lower shell 12 is provided with a sump 14 housing a motor 15, the stator 16 of which is firmly pressed into position between the walls of the housing 14. The motor rotor 17 is secured to a hollow shaft 18 rotatably mounted upon the vertical shaft 19 supported in a vertical position in the socket 20 formed by the annular lip 21 in the lower wall 22 of the shell 12. The upper surface of the lip 21, likewise, forms a bearing for the hollow shaft 21.

The movement of the hollow shaft 18 with respect to the shaft 19 is utilized to pump fuel from its source of supply through a rotary pressure atomizer to a mixing chamber. To this end the fixed shaft 19 is provided with a spiral passage 25 in its peripheral surface, communicating at its lower end with a vertical passage 26 terminating in a chamber 27 communicating with a source of fuel supply through the passage 28 and a conduit, not shown, adapted to be threaded to the end of the conduit or passage 28.

At its upper end the spiral passage 25 terminates in a chamber 33 formed at the top of the fixed shaft 19 by a short extension 34 of the hollow shaft 18. The top of the annular extension 34 forms an annular valve seat 35 cooperating with a valve 36 removably mounted on a valve stem 37 by means of the nut 38 threaded on the end thereof. The valve stem 37 is slidably mounted for limited vertical movement in the depression 39 formed in the fixed shaft 19. A guide 41 is secured to the lower end of the valve stem 37 and a guide ring 42 surrounding the valve stem is secured into the upper end of the depression 39. A spring 44 surrounds the valve stem 37 and is located between the two guides 41 and 42 and therefore tends to urge the valve 36 towards its seat. The tension of the spring 44 determines the pressure of fuel required to lift the valve off its seat. This tension may be regulated by rotating the screw threaded nut 38.

The valve 36 taken with its seat 34 constitutes a rotary pressure atomizer as more fully described hereinafter. It should also be noted that the spring 44, acting against the guide 41, causes the valve 36 to exert a constant pressure downwardly on the shaft 18 against the top surface of the lip 21.

The valve 36 also constitutes a discharge valve from the fuel pump from which valve the fuel flows to a mixing chamber. Such a mixing chamber is shown at 46 and comprises the cup 47 secured to and carried by the hollow shaft 18. This cup is provided with the three arcuate openings 48 in its lower wall through which openings air is forced into the mixing chamber by a blower or impeller now to be described.

The rotary movement of the hollow shaft 18 with respect to the stationary shaft 19 is likewise utilized to force the air to the chamber 46. To this end, a blower or impeller consisting of an annular plate 49 having depending blades 50 is fixed to the hollow shaft 18 by means of screw 51. In the lower wall of the bottom shell 12 is

provided a plurality of openings 53 each controlled by a damper for regulating the opening thereof for the admission of air to the blower or impeller.

5 Above the impeller plate 49 a plate 54 provided with the radially extending vanes 55 is secured to the horizontal wall 56 of the upper shell 11 by means of the screws 57. This plate and its associated vanes 55 constitute means for directing the currents of air discharged from the im-
10 peller or blower and passing to the mixing chamber 46.

As heretofore described, the chamber 46 constitutes the mixing chamber for the oil and air.
15 To form the secondary air supply, the upper wall 56 of the shell 11 is extended upwardly as shown at 60 to form a passage open at its top and surrounding the chamber 46. This passage, indicated at 64, constitutes the passage for the secondary air being delivered to a combustion
20 chamber above.

To complete the burner assembly, the shells 11 and 12 are secured together by means of the screw bolts 63 and means in the form of lugs 66 having the slots 67 formed therein for suspending the unitary assembly from a furnace or the like.

In operation of my improved burner assembly, the rotor 17 of the motor 15 causes the hollow shaft 18 to rotate with respect to the stationary
30 shaft 19, thereby forcing oil upwardly from its source of supply through the spiral passage 25 to the chamber 33 below the valve 36. The pressure at which the valve 36 is lifted from its seat is determined by the tension of the spring 44.
35 When the pressure of the oil within the chamber 33 reaches this predetermined pressure, the valve is lifted from its seat and the oil is sprayed and atomized outwardly in the form of a fine mist into the mixing chamber 46. This constitutes the
40 primary atomization of the fuel.

This primary atomization of the fuel is enhanced by reason of my improved rotary pressure atomizer wherein the fuel under pressure is whirled outwardly against the walls of the mixing
45 chamber by reason of the relative rotary movement of the valve 36 with respect to its seat. The atomized fuel and air mixture impinges upon the walls of the rotating cup 47, thereby further atomizing the fuel. At the same time, the rotation of the hollow shaft 18 causes a rotation of the air impeller 49, thereby drawing air inwardly through the openings 53 and forcing the air through the passages formed between the vanes 55 to the mixing chamber 46. The air and fuel oil mixture formed in the mixing chamber 46 is entrained with the secondary air delivered through annular passage 64 to form a combustible mixture to be burned beyond the annular opening of chamber 64.

60 It should be understood that while I have not disclosed automatic controls common in the art, such controls could be used to control the motor, dampers, pilot light, etc., as well known to those skilled in this art. Further, in place of the valve 36, other atomizing means could be substituted therefor without departing from the spirit of my invention.

An important aspect of my improved burner assembly is the arrangement of the parts, and particularly the concentric and coaxial arrangement thereof with respect to a common vertical axis. In this connection, it should be noted that all of the parts including the motor, fuel pump,
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air impeller, directing plate and vanes, mixing chamber and air passages are all arranged coaxially with respect to a common vertical axis and that a fuel pump is formed out of the shaft and bearings necessary to any motor. This results in an apparatus that is particularly easy to assemble and manufacture.

While I have shown a pump comprising but a single spiral passage formed in the stationary shaft 19, it should be understood that the detail
10 dimensions of its spiral passage and the number of such passages are determined by the quantity and pressure of fuel desired.

What I claim is:

1. A fuel burner comprising in combination, 15 a mixing chamber, a fuel pump for pumping fuel to said chamber, a blower for forcing air to said chamber, a single motor for driving both said pump and said blower, all of said elements including the chamber, pump, blower and motor having a common axis, and said pump being arranged within said blower.

2. A fuel burner comprising in combination, a mixing chamber, walls forming an air passage, a fuel pump for pumping fuel to said mixing chamber, a blower for forcing air through said chamber and said passage, a single motor for driving both said pump and said blower, all of said elements including the chamber, said walls, pump, blower and motor having a common vertical axis.

3. A fuel burner comprising in combination, a mixing chamber, walls forming an air passage, a fuel pump for pumping fuel to said chamber, a blower for forcing air through said chamber and said passage, a single motor for driving both said pump and said blower, said motor surrounding said pump, all of said elements including the chamber, the walls, pump, blower and motor having a common axis.

4. A fuel burner comprising in combination, a mixing chamber, a fuel pump for pumping fuel to said chamber, a blower for forcing air to said chamber, a single motor for driving both said blower and said pump, a casing housing said chamber, said pump, blower and motor, all of said elements including the casing, the chamber, the pump, the blower, and the motor having a common vertical axis.

5. A fuel burner comprising in combination a mixing chamber, a fuel pump for pumping fuel to said chamber, a blower for forcing air to said chamber, a single motor for driving said blower and pump, said motor surrounding said pump and being arranged coaxially therewith.

6. A fuel burner comprising in combination a mixing chamber, a pump for pumping fuel to said chamber, a blower for forcing air to said chamber, a single motor for driving said blower and pump, said blower and motor both surrounding said pump and arranged coaxially therewith.

7. A fuel burner assembly comprising in combination a mixing chamber, a pump for forcing fuel to said chamber, said pump including a stationary cylindrical bearing member and a cylindrical member surrounding said bearing member and rotatable with respect thereto, a motor having an armature shaft surrounding and fixed to said rotatable cylindrical member, a spiral passageway in one of said members, and a blower, driven by said motor, for forcing air to said mixing chamber.

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