

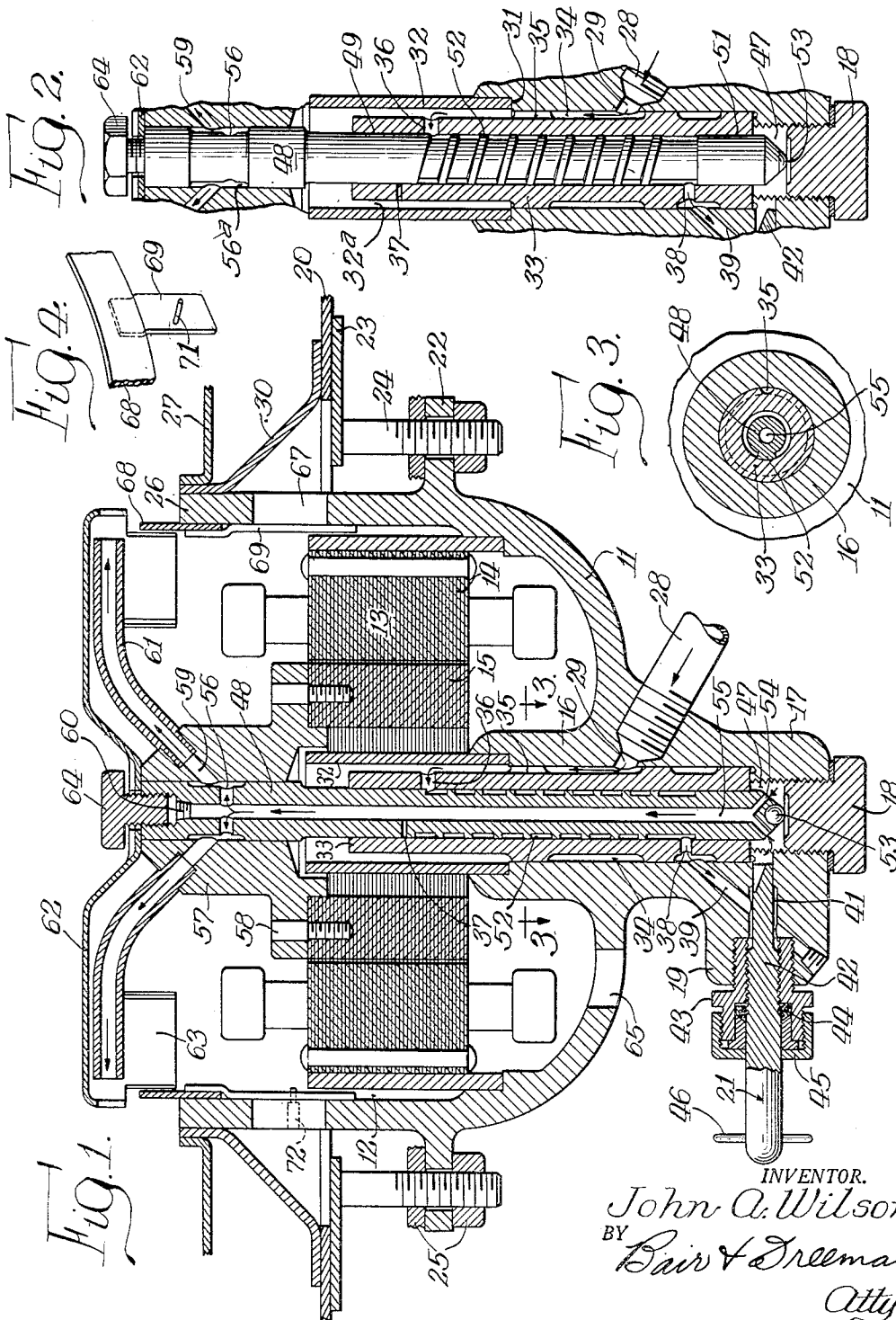
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PUMP ASSEMBLY FOR LIQUID FUEL BURNERS

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PUMP ASSEMBLY FOR LIQUID FUEL
BURNERS

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This invention relates to a pump assembly for liquid fuel burning apparatus and particularly to a pump assembly for use with a vertical rotary liquid fuel burner.

It is an object of the invention to provide a pump assembly for vertical rotary liquid fuel burners which is capable of pumping small quantities of oil where the requirements for heat are low, and which is also capable of pumping relatively large quantities of oil where more heat is required, and to furthermore prevent surging of the oil delivered, to inhibit pulsations in the flame and to provide for even distribution of air and oil.

It is another object of the invention to provide a pump assembly for vertical rotary liquid fuel burners which is compact and inexpensive to manufacture.

An additional object of the invention is to provide improved bearings for a pump assembly for a vertical rotary liquid fuel burner to reduce wear and wobble and to insure quiet operation.

It is a further object of the invention to provide a pump assembly for a vertical rotary liquid fuel burner which may have the amount of liquid fuel delivered by the pump readily adjustable and easily controlled by an adjustment at the outlet side of the pumping element.

It is still another object of the invention to provide a pump for vertical rotary liquid fuel burners in which the pumping element forces liquid downwardly into a small chamber and then upwardly to oil distributing finger tubes.

It is also an object of the invention to provide a pump assembly for vertical rotary liquid fuel burners in which the parts are easy to machine and assemble, particularly the main drive shaft which forms a part of the pumping element and also conveys liquid under pressure to the finger tubes.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in the claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a sectional view of the improved pump assembly with parts of the supporting structure and hearth shown for the sake of completeness;

Figure 2 is a detailed view, partially in section and partially in elevation showing the pumping element of the assembly;

Figure 3 is a sectional view taken on line 3-3 of Figure 1; and

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Figure 4 is a partial detail view of the air shutter.

Referring specifically to the drawing for a detailed description of the invention, numeral 11 designates generally a main casting for the body of the pump, which casting is cup shaped and forms a housing 12 for a motor generally indicated at 13. The motor is of the induction type and includes a rotor 15 and a stator 14. At the bottom of the cup shaped casting 11, an upwardly extending boss 16 is provided. Also, a downwardly extending boss 17 is formed on the casting 11. The composite boss formed by the parts 16 and 17 is hollow and the bottom thereof is closed by a screw threaded plug 18.

A horizontally extending projection 19 is formed on the lower boss 17 for the reception of a valve generally indicated at 21, which valve is used for a purpose hereinafter described.

The main casting 11 is provided with a plurality of ears or lugs 22 by which the entire assembly is supported from horizontal supporting lugs 23 through the medium of studs 24 and nuts 25. The lugs 23 are secured to a plate 20 preferably by welding. The casting 11 extends upwardly, as shown at 26, and it engages with a supporting collar 30 a hearth plate 27, only a portion of which is shown, which may be formed of metal or refractory material, and extends outwardly from the supporting collar 30.

The casting 11 near the bottom central portion thereof is provided with an inlet conduit 28 and has an inlet passage 29 bored therein in communication with the inlet conduit 28. The boss 16 is shouldered, as shown at 31, and a tubular sleeve 32 abuts the shoulder 31 and extends upwardly a considerable distance from the boss 16 forming an open chamber 32a.

A bearing member generally indicated by the numeral 33, is pressed into the bosses 16 and 17 and is thus rigidly secured thereto. The bearing member 33 is provided with a vertically extending machined passage 35. The bearing member 33 is also provided with a horizontally bored passage 36 adjacent the upper end thereof and with a small passage 37 for conveying liquid to the upper bearing surface 49 to lubricate the same. The bearing member 33 is so formed that when assembled into boss 16, it provides an inlet passage 34 which communicates with the space surrounded by the tubular sleeve 32. The bearing 33 is furthermore provided with a bored outlet passage 38 adjacent the bottom thereof which communicates with a bored outlet conduit 39 in the projection 19 and a threaded valve 42 including a slotted valve stem 41 which

A bearing member generally indicated by the numeral 33, is pressed into the bosses 16 and 17 and is thus rigidly secured thereto. The bearing member 33 is provided with a vertically extending machined passage 35. The bearing member 33 is also provided with a horizontally bored passage 36 adjacent the upper end thereof and with a small passage 37 for conveying liquid to the upper bearing surface 49 to lubricate the same. The bearing member 33 is so formed that when assembled into boss 16, it provides an inlet passage 34 which communicates with the space surrounded by the tubular sleeve 32. The bearing 33 is furthermore provided with a bored outlet passage 38 adjacent the bottom thereof which communicates with a bored outlet conduit 39 in the projection 19 and a threaded valve 42 including a slotted valve stem 41 which

extends therethrough. A threaded stationary valve member 43 receives the valve 42. A packing 44, retained in place by a packing nut 45, prevents the leakage of oil or fuel from the valve. The valve 42 is provided with a handle 46 so that the valve stem 41 may be screwed in and out to provide a larger or small orifice for the passage of oil from the conduit 39. The screw plug 18 forms a small oil chamber 47 in the boss 17 below the bottom of the bearing member 33.

The main drive shaft and pumping element is generally shown at 48 and is provided with upper bearing surfaces 49 and lower bearing surfaces 51, which are supported by the bearing 33. This construction provides bearing surfaces at two points, thus providing a rigid structure which is not subject to excessive wear. It will be noted particularly from Figure 2 that the shaft 48 is provided with a spiral or screw threaded pumping element 52 and that there is no contact between the thread 52 and the bearing between the bearing surfaces 49 and 51. The shaft is also provided with a ball 53 at the bottom thereof, which is in engagement with the plug 18 and provides a vertical thrust bearing for the shaft 48.

The shaft 48 is provided with bored inlet openings 54 at the bottom thereof, which communicate with a bored central passage 55 extending completely through the shaft 48. At the top of the shaft 48, outlet passages 56 and relief spaces 56a are provided. A metal head 57 is secured to the shaft 48 by a pressed fit and is, therefore, rigidly secured thereto. The head 57 is provided with bolts 58 which support the rotor 16 of the electric motor 13. Outlet passages 59 are bored in the head 57 and have oil distributing or flinger tubes 61 secured thereto. A fan plate 62, having fan blades 63 fastened thereto, is secured to the head 57 by a cap screw 64. Passage 55 is closed at its upper end by headless set screw 60.

The bulk of air for combustion enters through opening 67 and is controlled as to volume by vertical rotative movement of an air shutter 68. Three lugs 69 are attached to shutter 68. The lugs 69 have slanting slots 71 which ride on pins 72, projecting inwardly through casting 11. Rotative movement by an air adjusting means or handle (not shown) causes shutter 68 to rotate and rise in front of the fan blades 63 and reduces the volume of air delivered therefrom. Opening 65 provides ventilation for the motor parts and permits any oil leakage to drain from casting 11. During operation a small quantity of air enters through opening 65, passes up around the motor parts and is also projected outwardly by the fan.

Liquid, usually oil, is supplied to the pump assembly from a reservoir (not shown), positioned above the level of the pump assembly. The liquid enters the inlet conduit 28, passes through the bore 29, into the chamber 34, passage and into chamber 32a. The liquid level is maintained in chamber 32a above the inlet opening 36 by gravity flow. The liquid is drawn into the bore 33, when the pump starts operating and is then pumped downwardly along the outside of the shaft 48 by the spiral pump 52. Oil under pressure then is forced out through the outlet passage 38, outlet conduit 39, past valve stem 41 and into reservoir 47 from whence it is forced into the passages 54 in the shaft 48 and upwardly through the vertical passage 55, through the outlet passages 56, spaces 56a and outlet passages 59, into the flinger tubes 61. The bulk of the air for combustion is drawn inwardly through open-

ing 67 and then forced outward through the space between air shutter 68 and the fan top 62, to thereby support combustion. The space between air shutter 68 and the fan top 62 will be varied by adjustment of the air shutter depending on the volume of air required.

It will be apparent that the amount of oil delivered by the pump may be accurately metered by the valve 21, which is at the outlet or pressure side of the pump, without effecting the operation of the pump in any way and without starving the pump. The pump is self-priming and will deliver small quantities of oil or will deliver large quantities of oil, depending upon the adjustment of valve stem 41.

From the foregoing it will be apparent that I have provided an extremely compact pump assembly for wall flame type oil burners, which has a wide capacity for pumping oil and in which the oil may be metered accurately.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope without sacrificing any of the advantages thereof.

I claim as my invention:

1. A liquid fuel pumping and projecting device comprising a vertical shaft, means for conveying fuel to an intermediate portion of the exterior of said shaft, bearing means for said shaft, a screw threaded portion on the exterior of said shaft arranged to pump fuel supplied thereto downwardly, an axial passage formed in said shaft adapted to convey fuel upwardly, means affording communication between the bottom of the screw and the bottom of said axial passage, means for metering the fuel disposed between the bottom of the screw and said axial passage, fuel distributing tubes in communication with said axial passage adjacent the top thereof and motor means for rotating said shaft and fuel distributing tubes.

2. A liquid fuel pumping and projecting device comprising a vertical shaft, means for conveying fuel to an intermediate portion of the exterior of said shaft, bearing means for said shaft, a screw threaded portion on the exterior of said shaft arranged to pump fuel supplied thereto downwardly, an axial passage formed in said shaft adapted to convey fuel upwardly, means affording communication between the bottom of the screw and the bottom of said axial passage, means for metering fuel disposed between the bottom of the screw and said axial passage, said metering means comprising a manually adjustable valve, fuel distributing tubes in communication with said axial passage adjacent the top thereof and motor means for rotating said shaft and fuel distributing tubes.

3. A liquid fuel pumping and projecting device comprising a vertical shaft, upper and lower bearing means for said shaft, a screw threaded portion on said shaft between the bearing means arranged to pump fuel downwardly along the exterior of said shaft, means for conveying fuel to said screw threaded portion adjacent the upper part thereof, a vertical passage formed throughout substantially the entire length of said shaft and adapted to convey fuel upwardly therethrough, means affording communication between the shaft adjacent the bottom of said screw and the bottom of said vertical passage, fuel dis-

tributing tubes in communication with said vertical passage adjacent the top thereof, and motor means for rotating said shaft and fuel distributing tubes.

4. A liquid fuel pumping and projecting device comprising a vertical shaft, upper and lower bearing means for said shaft, a screw threaded portion on said shaft between the bearing means arranged to pump fuel downwardly along the exterior of said shaft, means for conveying fuel to said screw threaded portion adjacent the upper portion thereof, a vertical passage formed throughout substantially the entire length of said shaft and adapted to convey fuel upwardly therethrough, means affording communication between the shaft adjacent the bottom of said screw and the bottom of said vertical passage, means for metering the fuel disposed between the bottom of the screw and said vertical passage, fuel distributing tubes in communication with said vertical passage adjacent the top thereof, and motor means for rotating said shaft and fuel distributing tubes.

5. A liquid fuel pumping and projecting device comprising a vertical shaft, a bearing member for said shaft providing upper and lower main bearings therefor, a screw threaded exterior portion on the shaft between said bearing surfaces and arranged to pump the fuel downwardly, means provided on the exterior of the bearing member for conveying fuel to said shaft adjacent the top of the screw threads, an axial passage formed in said shaft adapted to convey fuel upwardly, means for conveying fuel from the bottom of the screw threads to said axial passage, fuel distributing tubes in communication with said axial passage adjacent the top thereof and rotatable by said shaft, and motor means for rotating the shaft to effect pumping of the fuel.

6. A liquid fuel pumping and projecting device comprising a main cup shaped housing member, an upwardly extending boss disposed centrally of the bottom of the housing member, a vertical shaft, a bearing member for said shaft supported by said boss and extending upwardly therefrom, a screw thread formed on the exterior of said shaft and arranged to pump fuel downwardly, means for conveying fuel through said housing and to the top of the screw threads, said shaft having a vertical passage extending substantially completely therethrough and closed at the top, means for conveying fuel pumped by said screw threads from adjacent the bottom thereof to said vertical passage, said last means being partly formed in said housing, fuel distributing tubes in communication with said vertical passage adjacent the top thereof for receiving fuel forced upwardly through said vertical passage, and a motor for rotating said shaft and distributing tubes.

7. A liquid fuel pumping and projecting device comprising a vertical shaft, a bearing member for said shaft providing upper and lower main bearings therefor, a screw threaded exterior portion on the shaft between said bearing surfaces and arranged to pump the fuel downwardly, means provided on the exterior of the bearing member for conveying fuel to said shaft adjacent the top of the screw threads, an axial passage formed in said shaft adapted to convey fuel upwardly, means for conveying fuel from the bottom of the screw threads to said axial passage, a relief pas-

sage between said axial passage and the upper bearing for lubricating the latter, and motor means for rotating the shaft to effect pumping of the fuel.

8. A liquid fuel pumping and projecting device comprising a main cup shaped housing member, an upwardly extending boss disposed centrally of the bottom of the housing member, a vertical shaft, a bearing member for said shaft supported by said boss and extending upwardly therefrom, a screw thread formed on the exterior of said shaft and arranged to pump fuel downwardly, means for conveying fuel through said housing and to the top of the screw threads, a downwardly extending boss disposed centrally of the housing member, a portion of said fuel conveying means being formed by said downwardly extending boss, said shaft having a vertical passage extending substantially completely therethrough and closed at the top, means for conveying fuel pumped by said screw threads from adjacent the bottom thereof to said vertical passage, said last means being partly formed in said downwardly extending boss, fuel distributing tubes in communication with said vertical passage adjacent the top thereof for receiving fuel forced upwardly through said vertical passage, and a motor for rotating said shaft and distributing tubes.

9. A liquid fuel pumping and projecting device comprising a main cup shaped housing member, an upwardly extending boss disposed centrally of the bottom of the housing member, a vertical shaft, a bearing member for said shaft supported by said boss and extending upwardly therefrom, a screw thread formed on the exterior of said shaft and arranged to pump fuel downwardly, means for conveying fuel through said housing and to the top of the screw threads, a downwardly extending boss disposed centrally of the housing member, a portion of said fuel conveying means being formed by said downwardly extending boss, said shaft having a vertical passage extending substantially completely therethrough and closed at the top, means for conveying fuel pumped by said screw threads from adjacent the bottom thereof to said vertical passage, said last means being partly formed in said downwardly extending boss, fuel distributing tubes in communication with said vertical passage adjacent the top thereof for receiving fuel forced upwardly through said vertical passage, said screw threads and bearing being partially encompassed by both of said bosses, and a motor for rotating said shaft and distributing tubes.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,129,419	Noller	Feb. 23, 1915
1,655,016	Laughlin et al.	Jan. 3, 1928
1,751,703	Long	Mar. 25, 1930
1,889,822	Clapp et al.	Dec. 6, 1932
2,012,037	Drew	Aug. 20, 1935
2,181,249	Powers	Nov. 28, 1939
2,207,002	Doeg	July 9, 1940
2,313,909	Arnold	Mar. 16, 1943