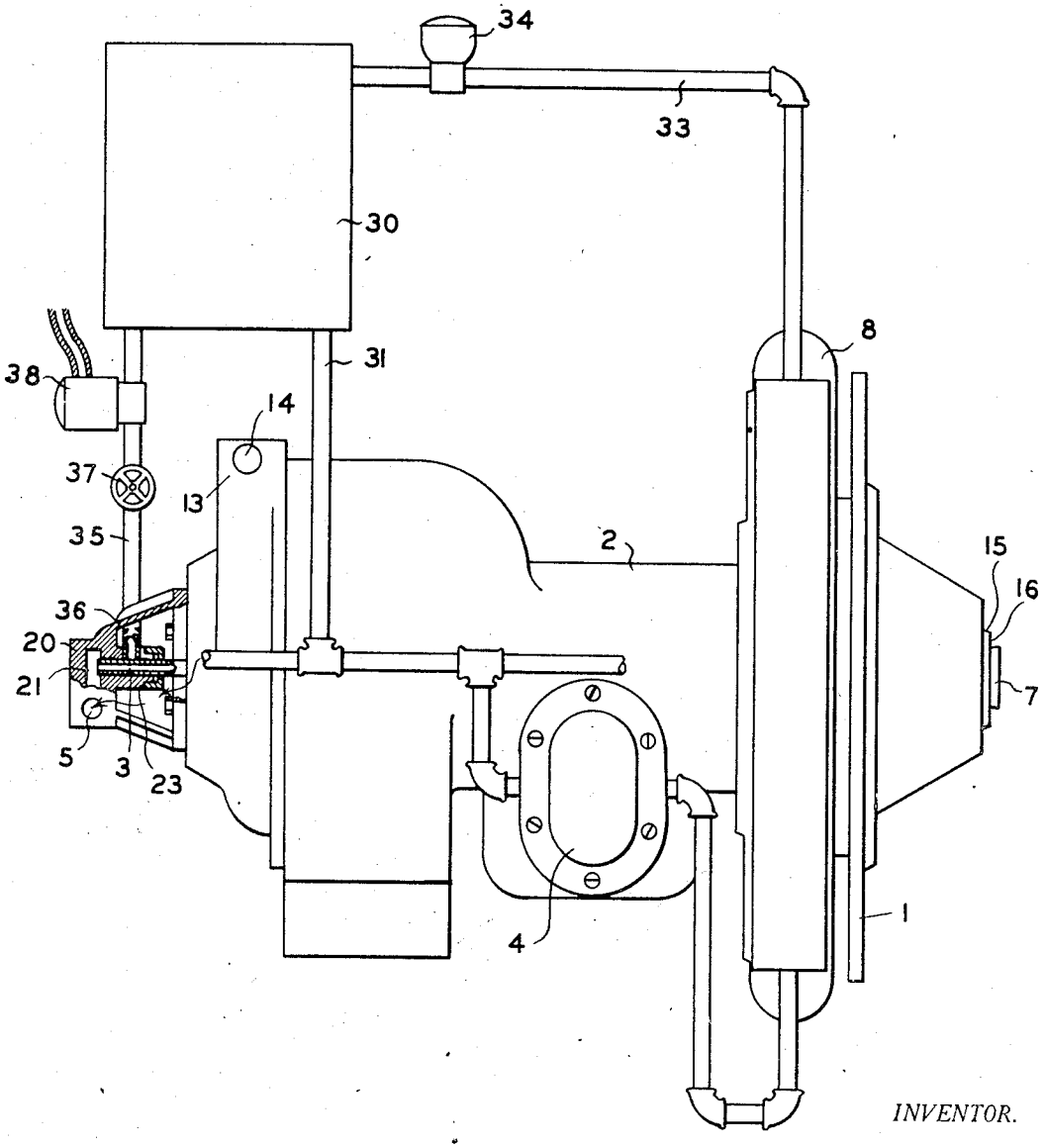
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OIL BURNER

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Fig. 1.




INVENTOR.

HARRY BARLEY

BY Baldwin & Wallace

ATTORNEY.

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Fig. 2.

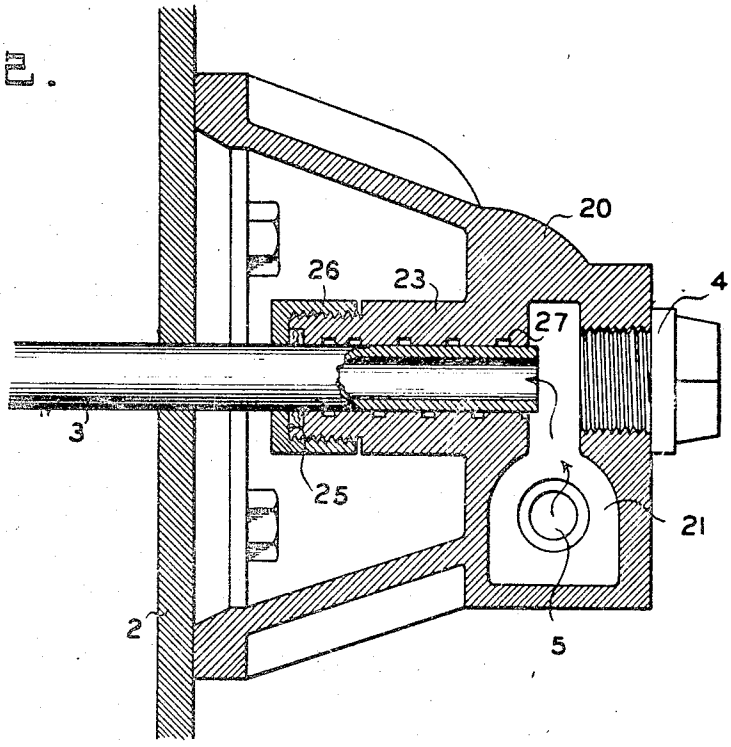
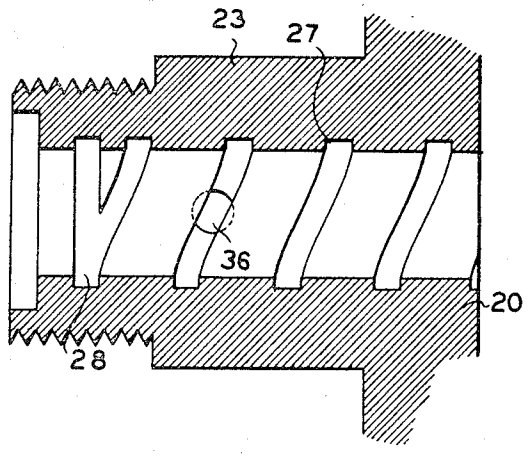



Fig. 3.




*INVENTOR.*

HARRY BARLEY.

*BY* Baldwin Hall

*ATTORNEY.*

Patented Nov. 3, 1931 1,830,186

# UNITED STATES PATENT OFFICE

HARRY BARLEY, OF SAN FRANCISCO, CALIFORNIA

## OIL BURNER

Application filed July 17, 1930. Serial No. 468,512.

This invention relates to improvements in oil burners and more particularly to motor driven oil burners.

Among the objects of the invention is to so combine and arrange the oil pressure and motor system that external leakage of oil is avoided in the burner feed system.

Another object is to eliminate compression stuffing boxes and glands where the oil feed joints the high speed shaft of the centrifugal fan for mechanically vaporizing the fuel.

A further object is to insure an initial feed of fuel oil when the motor starts and to maintain a constant and uniform presure on the oil fuel adjacent the burner.

Other objects and advantages will appear as the description progresses.

In this specification and the accompanying drawings the invention is disclosed in its preferred form. But it is to be understood that it is not limited to this form, because it may be embodied in other forms. It is also to be understood that in and by the claims following the description it is desired to cover the invention in whatsoever form it may be embodied.

In the two sheets of drawings:

Fig. 1 is a side elevation, partly in cross section, of an oil burner having this invention combined therewith, diagrammatically illustrating the supplementary fuel pressure system.

Fig. 2 is an enlarged side elevation, partly in vertical section, of the shaft packing assembly.

Fig. 3 is a further enlarged fragmentary detail showing in vertical section the helical fuel return groove in the packing gland of the motor shaft.

In detail the construction illustrated in the drawings comprises the furnace front 1, which will vary in different installations.

In general construction the oil burner comprises a tight housing 2, having the hollow shaft 3, mounted therein in suitable bearings. This shaft may be the armature shaft of a direct connected motor within the housing, for driving the shaft at high speed.

An oil pump 4 pumps fuel oil through the needle valve opening 5 and through the shaft 3, from whence it issues through suitable holes into the atomizing tip 7.

The fan housing 8 forms a part of the housing 2. A suitable fan is fixed on the shaft 3 and revolves at high speed within the housing 8. This fan has a hollow hub through which the fan creates a suction through the housing 2, at the intake 13. A butterfly valve 14 is installed in the intake 13 to regulate the volume of air admitted at 13. The air drawn through the housing 2 cools the motor and carries away any oil fumes originating in the housing 2.

The air blast created by the fan escapes from the fan housing 8 into the air nozzle 15 and is blown out as a forcible annular jet at 16, between the oil atomizer 7 and the air nozzle 15. This jet picks off the atomized oil issuing from the atomizer and expands it into a gaseous vapor, which expands laterally into a vortex flame when ignited and combustion is supported by proper admission of ventilation into the furnace, in the usual manner.

For further particulars regarding the fuel oil burner see my Patent Number 1,655,083 dated January 3, 1928.

This invention relates particularly to the juncture of the hollow shaft 3 with the fuel oil coupling 20, see Fig. 2. This coupling is flanged and bolted to the housing 2. It has an inner chamber 21, communicating with the end of the shaft 3. The fuel oil is led into this chamber thru the opening 5 and controlled manually by a suitable needle valve.

The neck 23 is concentric with the shaft 3 and is bored to accurately fit the shaft 3. The plug 24 is alined with the shaft and provides means for clearing the same of any obstructions that may lodge therein.

The inner end of the neck 23 is counterbored to receive the felt or similar washer 25, protected by the knurled nut 26 screwed onto the neck 23. It is not intended to compress the washer 25 to any considerable extent. It is not a compression packing in the usual sense, but merely a capillary baffle to stop the oil seepage by gravitation at this point.

Because of the relatively high speed of the shaft 3, it is undesirable to pack it at the point 25 with compression or similar stuffing boxes, which exert an undue frictional retard, tend to cut the shaft and throw it out of alinement and at best have a low efficiency even when carefully adjusted at frequent intervals. By the present invention a high packing efficiency and other advantages are attained with minimal attention.

Besides the waste and unmechanical effect of leakage at this point, it is a fire hazard with the types of fuels in use with burners of this class.

Practice has proved that a spiral groove or helix 27 internally cut in the neck 23 in the direction contrary to the direction of rotation of the shaft 3, will pump the film of oil within the neck in contact with the shaft 3, back toward the chamber 21, even against a considerable head press within this chamber. The obvious result is, no leakage past the washer 25.

The outer end of this helix 27 terminates in the annular groove 28, adjacent the felt washer 25, and the inner end in the chamber 21.

The displacing or pumping action of the helical groove 27 is further utilized in starting up the burner, see Fig. 1. The pressure tight tank 30 of about one gallon capacity is connected at 31 to the discharge line of the pump 4 and at 33 to the suction side of the pump or to the fuel tank (not shown).

The discharge 33 has the spring relief valve 34 therein set at about ten pounds to maintain that pressure on the tank 30. This tank is connected by the pipe 35 with a bypass 36, leading to the helical groove 27 near its outer end. The shut-off cock 37 and the automatic electrically operated valve 38 are interposed in the pipe 35 to control the flow therethrough in accordance with the legal regulations relating thereto.

When the motor is started there is an interval before the pump 4, driven by the motor shaft 3, picks up its load and delivers fuel to the chamber 21. In the meantime the burner is in operation, but not igniting or functioning for lack of fuel.

This disadvantage is overcome by the fuel in the auxiliary tank 30, flowing to the helical groove, from whence it is driven by the rotation of the shaft 3, into the chamber 21 and from thence through the hollow shaft 3 to the burner, simultaneously with the starting of the motor, and previous to the pump 4 operating to capacity.

The capacity operation of the pump puts the tank 30 under full pressure, as determined by the relief valve 34.

When the motor is shut off the automatic valve 38 closes and the pressure is retained in the tank 30 between the valves 34—38 until the motor starts again. The manual valve 37 may also be closed to stop the feed from the tank 30.

It is advantageous, especially with automatic ignition, to have fuel present in the burner before the motor and pump attain capacity R. P. M.

It has been proved in practice that this helical groove and rotary shaft combination acts as a pump capable of exerting a pressure of 25 pounds per square inch on fuels. The pressure rises or falls according to the gravity of the fuel being pumped.

Such a pump will supply several quarts of fuel an hour, sufficient to supply a small burner on a fuel supply system such as the auxiliary tank system by increasing the capacity of the tank or drawing from a source of sufficient capacity.

Having thus described this invention what I claim and desire to secure by letters patent is:

1. In combination with a rotary oil burner having a hollow shaft; a fuel connection to the open end of said shaft and having a neck encircling said shaft having a helical groove therein encircling said shaft in a direction opposite to the direction of rotation of said shaft and terminating in an annular groove; an absorbent packing encircling said shaft adjacent said annular groove; and a bypass fuel connection through said neck communicating with said helical groove intermediate its ends.

2. In combination with a rotary oil burner having a hollow shaft; a fuel connection to the open end of said shaft and having a neck encircling said shaft having a helical groove therein encircling said shaft in a direction opposite to the direction of rotation of said shaft and terminating in an annular groove; an absorbent packing encircling said shaft adjacent said annular groove; and a bypass fuel connection through said neck communicating with said helical groove intermediate its ends; and an auxiliary fuel tank connected with said bypass and a fuel supply.

3. In combination with a rotary oil burner having a hollow shaft; a fuel connection encircling said shaft and having an internal helical groove encircling said shaft contrawise to the direction of rotation of said shaft; a pump having a discharge connected with said fuel connection and said helical groove.

4. In combination with a rotary oil burner having a hollow shaft; a fuel connection encircling said shaft and having an internal

helical groove encircling said shaft contrawise to the direction of rotation of said shaft; a fuel line pump connected with said fuel connection; and an auxiliary fuel supply connected with said helical groove.

5. In combination with a rotary oil burner having a hollow shaft; a fuel connection encircling said shaft and having a chamber open to said hollow shaft and a helical groove encircling said shaft and discharging into said chamber; a fuel line connected to said chamber; an auxiliary fuel supply comprising a pressure tank connected with said fuel line and said helical groove.

In testimony whereof I have hereunto set my hand this 9th day of July, 1930.

HARRY BARLEY.