Aug. 13, 1929. I. C. JENNINGS 1,724,658

APPARATUS FOR BURNING OIL

Original Filed Feb. 20, 1925 2 Sheets-Sheet 1

Fig. 1.

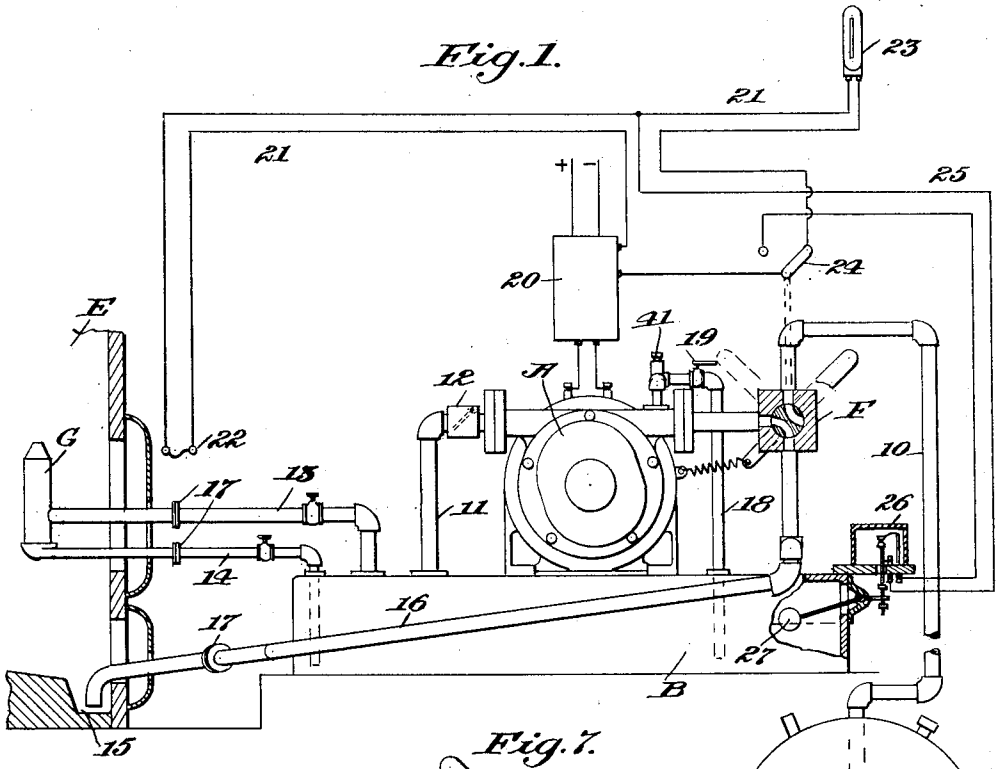
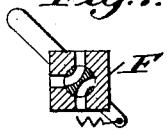


Fig. 7.



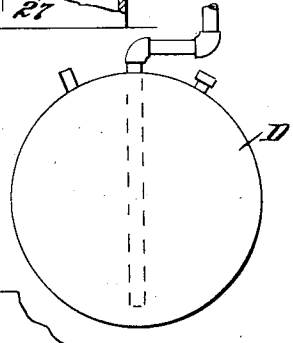


Fig. 2.

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Fig. 3.

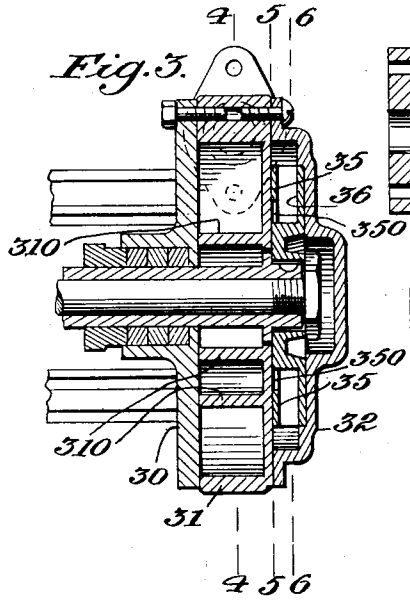


Fig. 4.

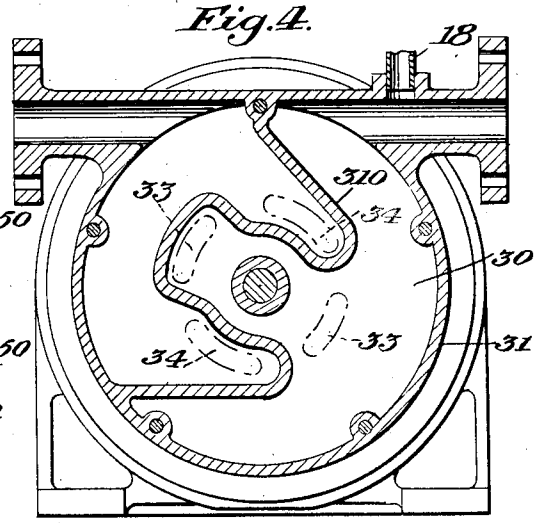


Fig. 5.

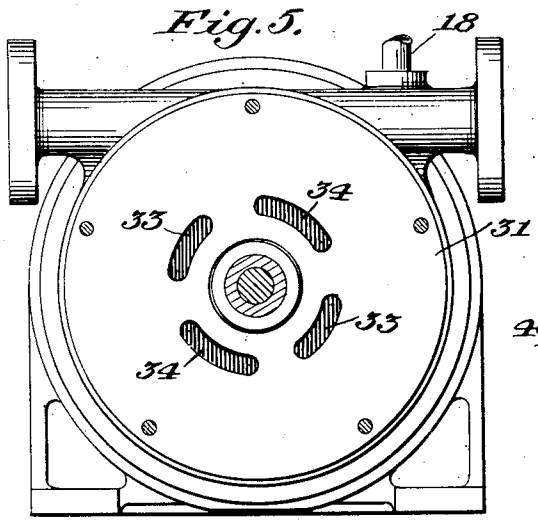


Fig. 6.

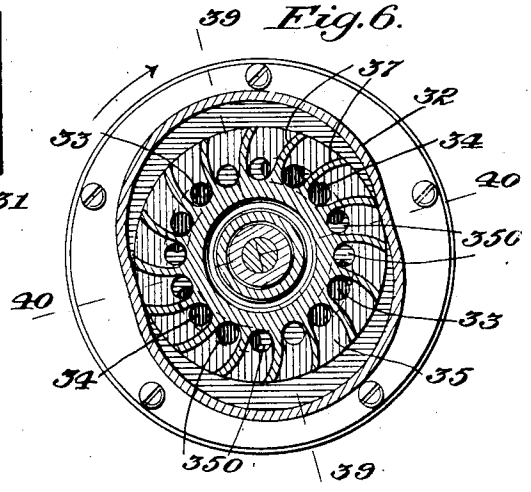
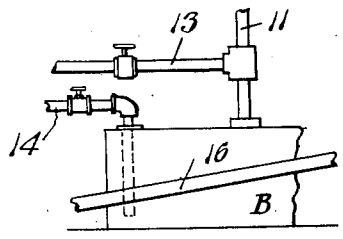


Fig. 1a



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Patented Aug. 13, 1929. 1,724,658

UNITED STATES PATENT OFFICE.

IRVING C. JENNINGS, OF SOUTH NORWALK, CONNECTICUT.

APPARATUS FOR BURNING OIL.

Application filed February 20, 1925, Serial No. 10,580. Renewed February 8, 1929.

The object of this invention is to provide a new and improved apparatus for burning oil.

The invention is preferably carried out by the use of an air pump constructed to use oil for its pumping action, the pump being employed both to carburet the air and to force the carburetted air and supply of oil to the burner.

The air pump is preferably combined with a separating tank, into which the pump discharges, in which the unvaporized oil is separated from the mixture, and from which the carburetted air and the separate supply of oil are forced to the burner.

The apparatus for practicing the invention is illustrated in the accompanying two sheets of drawings in which,

Figure 1 is a diagrammatic elevation partly in section, illustrating the apparatus;

Fig. 1a is a detail view showing a slightly modified form of connection herein referred to;

Fig. 2 is a plan view thereof;

Fig. 3 is a longitudinal sectional elevation of the pump which is employed;

Figs. 4, 5 and 6 are cross sectional views thereof on the lines 4—4, 5—5, and 6—6 of Fig. 3; and

Fig. 7 illustrates a detail hereafter referred to.

I preferably employ an air pump of the so-called hydro-turbine type. This type of pump is well-known in the art and is illustrated in the patent granted to me March 18, 1919, No. 1,297,692.

Pumps of this type, which can be employed, are also illustrated in patents to Scheurman, No. 993,346, dated December 9, 1909; to Gibson, No. 1,099,921, dated June 16, 1924; to Ray, No. 1,172,555, dated February 22, 1916; to Skidmore, No. 1,390,390, dated September 13, 1921; and in British patent to Trane, No. 15,603, of 1911.

The pump which I have illustrated as employed in my apparatus is a modification of the one shown in my said Patent No. 1,297,692, and I will describe this pump in detail hereafter, understanding, of course, that practically any hydro-turbine pump, which can be constructed to use oil for its pumping action can be employed to carry out my invention.

Referring to the drawings and in detail, A designates the hydro-turbine pump. The same is mounted on a hollow base or separating tank B and the rotor of the pump is driven by an electric motor C. The oil to be burned is placed in a storage tank D, which preferably is arranged at some distance from the pumping apparatus, as under the ground outside of the building in which the furnace E is contained. The tank D is connected by a supply pipe 10 to a valve F. The valve is connected to the inlet of the pump A. The outlet of the pump A is connected by a pipe 11 to the tank B, a forwardly opening check valve 12 being preferably arranged in this pipe.

An air pipe 13 connects from the top of the tank B to the burner G and an oil pipe 14 also connects from the tank B to the burner, the pipe 14 being carried down in the tank nearly to the bottom thereof.

A well or basin 15 is arranged under the burner G to catch any oil that may drip from or that may be forced out through the burner. An air pipe 16 extends from this well to the valve F. The valve F normally stands as shown in Fig. 1 so that this air pipe connects to the inlet of the hydro-turbine pump A. Screens 17 may be placed in any or all of the pipes 13, 14 and 16, if desired, to prevent any back-firing through the same.

The inlet of the pump A is further connected by a pipe 18 to the bottom of the tank. This pipe 18 may have an adjusting valve 19 in the same, if desired. The purpose of this pipe is to supply the hydro-turbine pump with the make-up oil that is necessary for its operation.

The electric motor C preferably is controlled by a magnetic starter 20. A controlling circuit 21 extends from the starter and this circuit preferably includes a fusible plug 22 arranged near the furnace so that in case of overheating or fire from the furnace the plug will be melted and the pump cut out of operation.

This circuit 21 also includes one or more thermostats 23, arranged to control the operation of the motor, starting the same in operation when heat is desired and cutting the same out of operation when the necessary degree of heat is obtained. The circuit 21 is connected back to the magnetic starter through a switch 24 which is connected to the valve F as by being arranged on the shaft thereof or connected thereto by suitable linkwork so that the valve F and the switch 24 will move together and which nor-

mally stands in the position shown in full lines in Fig. 1.

A shunt circuit 25 is led from the circuit 21 to an electric cut-out 26 controlled by a float 27 in the tank B. This shunt circuit 25 is connected to the other pole of the switch 24. This shunt circuit 25 is normally cut-out of operation, but when the valve 19 is thrown to the position indicated in Fig. 7, the shunt 25 is connected with the magnetic starter and the circuit 21 is cut out for a purpose hereinafter described.

The pump consists of a back plate 30, which contains a bearing for the shaft extending from the electric motor. A port shell 31 and a rotor casing 32 are attached by screws to the pump back. The pump inlet and the pump outlet are preferably formed integrally with the port shell 31. The port shell is divided by a partition 310, into two compartments, into one of which the inlet connects and from one of which the outlet extends. The port shell 31 has two inlet ports 33—33, and two outlet ports 34—34 formed in its side wall as illustrated in Fig. 5, which ports are arranged concentrically relatively to the axis of the pump. The pump rotor consists of a member having side walls 35 and 36 between which are arranged ribs or partitions 37 so that a series or plurality of displacement chambers is formed therein.

Holes 350 are bored through the wall 35 into each displacement chamber. These holes are arranged to coincide concentrically with the ports 33—33 and 34—34. The rotor casing 32 is made eliptical as shown in Fig. 6, so that the same has two operating lobes, the long and the short axes of the pump casing being indicated by the lines 39—39 and 40—40 of Fig. 6.

Suppose the pump casing is partly filled with liquid, then when the rotor is revolved at high speed the liquid will turn around with the rotor and by centrifugal force will follow the contour of the rotor casing. Thus the liquid contained in the pump will move outwardly and inwardly in the displacement chambers and the suction and displacement action of the liquid in the chambers of the rotor will create a powerful pumping effect whereby a suction will be obtained so that fluid or liquid can be drawn into the inlet of the pump, put under pressure in the pump, and then forced out of the outlet thereof.

I employ this action of a hydro-turbine pump to carburet air for the burner by using the oil to effect the pumping action and by leading air to the pump. The operation of my invention is as follows:

The pump is first partly filled with the oil through a plug 41 which is arranged in the pump inlet. The valve F, which is normally in the position shown in Fig. 1, is thrown over to the position shown in Fig. 7. This movement will also throw over the switch 24 and will start the motor in operation through shunt circuit 25. The pipe 10 is now connected to the pump inlet. As the hydro-turbine pump has the capacity for handling a liquid as well as a fluid, the pump will now operate as a liquid pump, and the oil will be drawn from the tank D and forced by the pump through pipe 11 into the separating tank B. As soon as the separating tank B is filled to the desired level, the float 27 operates the electric cut-out 26, opens the circuit 25, and thus stops the motor. This automatic cut-out of the pump prevents flooding. Now the handle is released and the apparatus is ready for normal action. If the thermostat 23 now closes the circuit 21, the motor will be started in operation and the pump will draw air in through the pipe 16. If any oil has dropped from the burner down into the well 15, the same will first be drawn up by the pump. The pump will then operate as an air pump. As the air passes through the pump it will be thoroughly commingled with the oil to be burned and will be carburetted to a considerable degree, depending on the quality of the oil, by the agitation of the same in connection with the oil in the pump and by the action of oil in the pump in putting the air under pressure.

The carburetted air will be forced by the pump, through the pipe 11, into the separating tank B, and a considerable body of air will thus be put under pressure in the top of the separating tank B. As more or less of the oil to be burned is used in carburetting the air, and passes along through the pipe 11, the necessary make-up oil or oil needed to keep the pump in operation will be supplied through the pipe 18, the valve 19 being adjusted to supply just the proper amount to the pump inlet. The carburetted air is led from the top of the storage tank through the pipe 13 to the burner, and a supply of oil to be burned is led from the bottom of the storage tank B to the burner through pipe 14.

The burner may be provided with any of the ordinary pilot lights or electric appliances for keeping the same in operation.

While the pipe 11 might be connected directly to the pipe 13 as indicated in Fig. 1a, the preferable arrangement is to connect the pipe 11 to the tank at some distance from the pipe 13 as shown in plan in Fig. 2, so that all the carburetted air will pass through the top of the separating tank. This will allow any unvaporized oil in the carburetted air or mixture to separate out from the mixture delivered by the pump.

When the desired degree of heat has been obtained, the thermostat 23 will open the circuit 21 and will stop the motor. The

compressed air in the storage tank B will continue to flow out through the pipe 13 until practically atmospheric pressure is reached in the tank. The check valve 12 in the pipe 11 presents the compressed air after the pump is stopped from flowing backwards through the pump and blowing out the make-up oil therein.

When the thermostat 23 again closes the circuit 21, the operation is repeated, and thus the space which is to be heated is kept substantially at a constant temperature.

The only attention which the apparatus requires is that the valve 19 be thrown over to the position shown in Fig. 7 from time to time, as may be necessary, to keep the separating tank filled with oil. It will also be seen that when the separating tank is filled by the pump, it is impossible to overload or flood the apparatus by reason of the employment of the cut-out 26. Thus the apparatus can be attended by unskilled persons.

The details and arrangements herein shown and described may be greatly varied by a skilled mechanic without departing from the scope of my invention, as expressed in the claims.

Having thus fully described my invention, what I desire to claim and cover by Letters Patent, is:

1. A pumping apparatus for an oil burner comprising an air pump constructed to use oil for its pumping action for carburetting the air and means whereby the carburetted air from the pump will be led to the burner and whereby the air will force a separate supply of oil to the burner.

2. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action for carburetting the air and for putting oil in the tank under air pressure and means whereby air from the pump will be led to the burner and will force oil to the burner comprising, an oil connection from the tank, and an air connection, to the burner.

3. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action for carburetting the air and for putting oil in the tank under air pressure, an oil connection and an air connection from the tank to the burner, and a valve and a connection arranged so that oil can be drawn from a supply by the pump and discharged into the tank.

4. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action for putting fuel oil in the tank under air pressure, an air connection and an oil connection from the tank to the burner, a well arranged to catch any oil dropping from the burner, and an air connection from the well to the pump arranged to pick up any oil in the well.

5. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action and to carburate the air, a connection from the pump to the tank having a check valve opening towards the tank, and an air connection and an oil connection from the tank to the burner.

6. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action and connected to carburet the air and to put oil in the tank under pressure, connections whereby the carburetted air from the pump will be led to the burner and whereby the air will force a separate supply of oil to the burner, a connection from an oil supply to the pump, and a valve arranged so that oil can be drawn by the pump and discharged into the tank.

7. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action connected to put oil in the tank under pressure, connections whereby air from the pump will be led to the burner and whereby the air will force a separate supply of oil to the burner, and a pipe connecting the tank and the pump for supplying the pump with make-up oil.

8. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action and to carburet the air, a connection from the pump to the tank, a connection from the tank to the burner arranged at some distance from the connection from the pump to the tank, and a connection from the tank to the burner so that the air will force a separate supply of air to the burner.

9. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action and to carburet the air, a connection from the pump to the tank, connections whereby the air from the pump will be led to the burner and whereby the air will force a separate supply of oil to the burner, an air inlet to the pump, an oil inlet to the pump, a valve arranged so that either air or oil can be led to the pump, an electric motor for driving the pump, a circuit having a thermostat for controlling the operation of the motor, a separate circuit for controlling the motor when the pump is to be used to force oil to the tank, and a switch connected to said valve and arranged so that said separate circuit will be connected when the pump is to be used to force oil to the tank.

10. A pumping apparatus for an oil burner comprising a closed tank, an air pump constructed to use oil for its pumping action and to carburet the air, a connection

from the pump to the tank, connections whereby the air from the pump will be led to the burner and whereby the air will force a separate supply of oil to the burner, an air inlet to the pump, an oil inlet to the pump, a valve arranged so that either air or oil can be led to the pump, an electric motor for driving the pump, a circuit having a thermostat for controlling the operation of the motor, a separate circuit for controlling the motor when the pump is to be used to force oil to the tank, a switch connected to said valve and arranged so that said separate circuit will be connected when the pump is to be used to force oil to the tank, an electric cut-out for this second circuit, and a float in the tank controlling this cut-out.

In testimony whereof I have hereunto affixed my signature.

IRVING C. JENNINGS.