July 9, 1957 J. F. TEASDALE 2,798,436

OIL PUMPING APPARATUS

Filed March 4, 1954 3 Sheets-Sheet 1

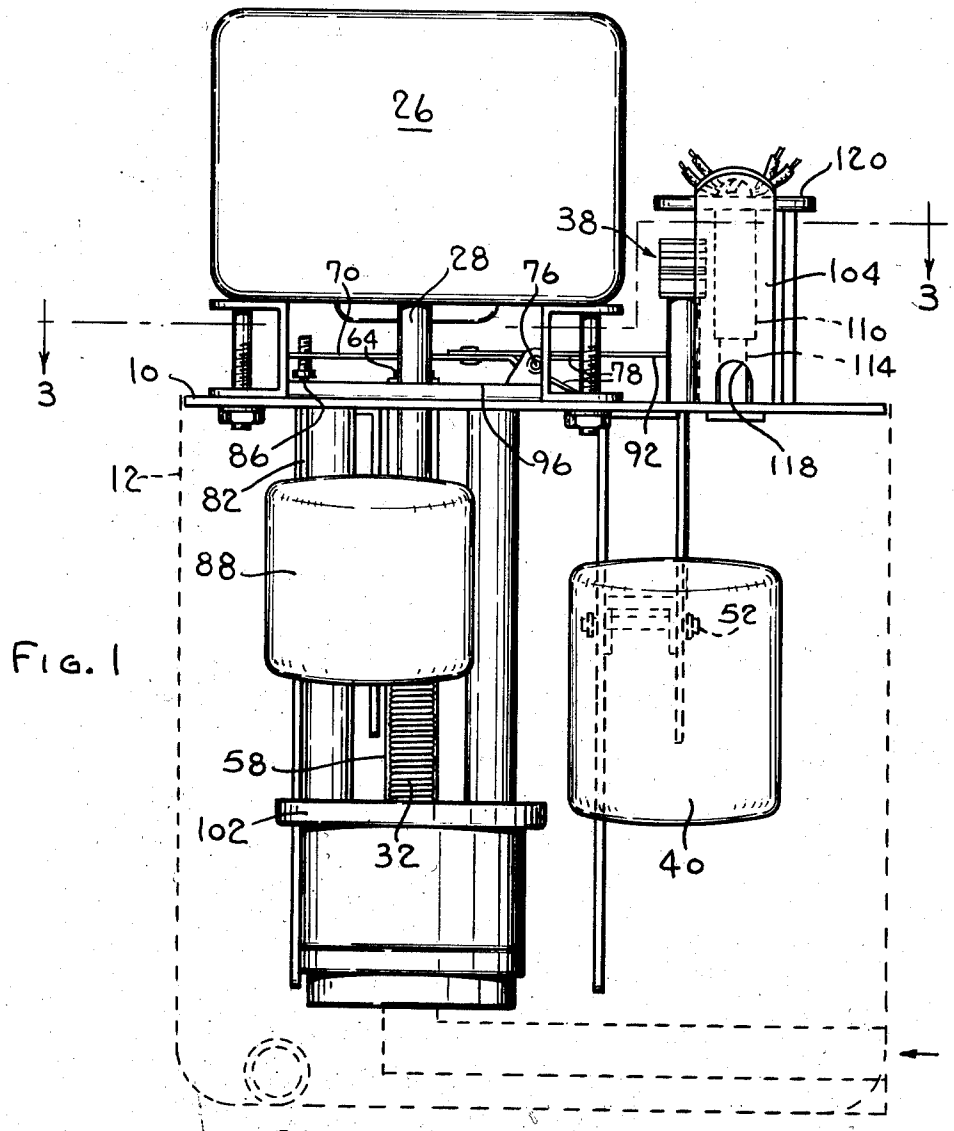


FIG. 1

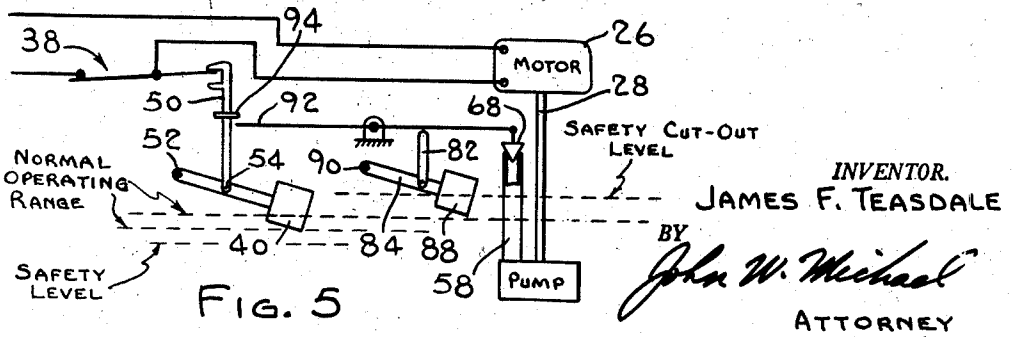


FIG. 5

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OIL PUMPING APPARATUS

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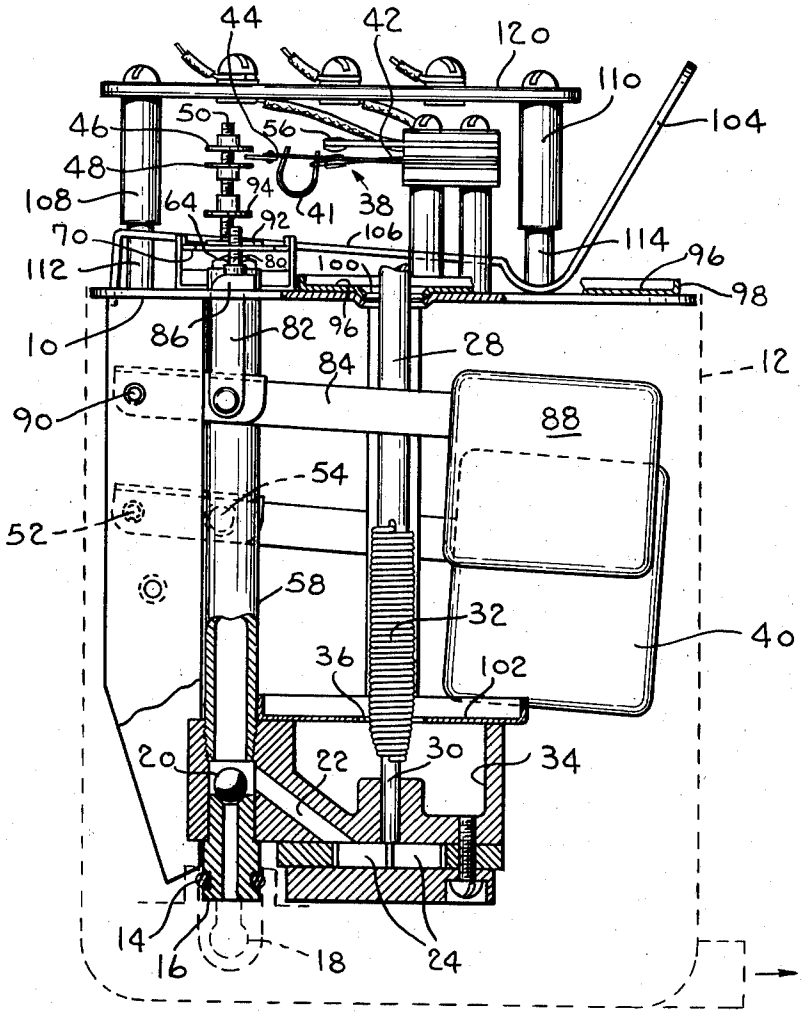


FIG. 2

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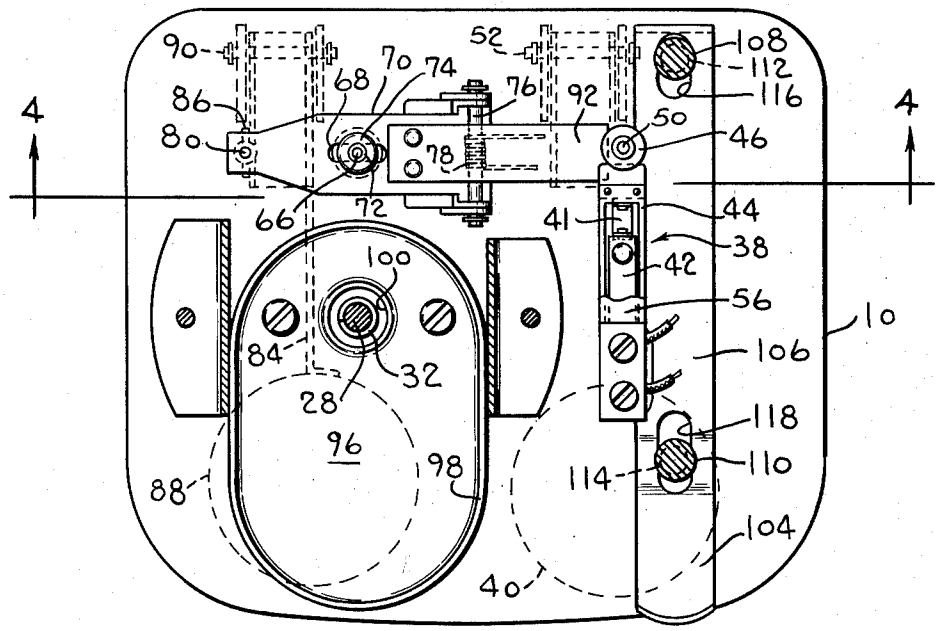


FIG. 3

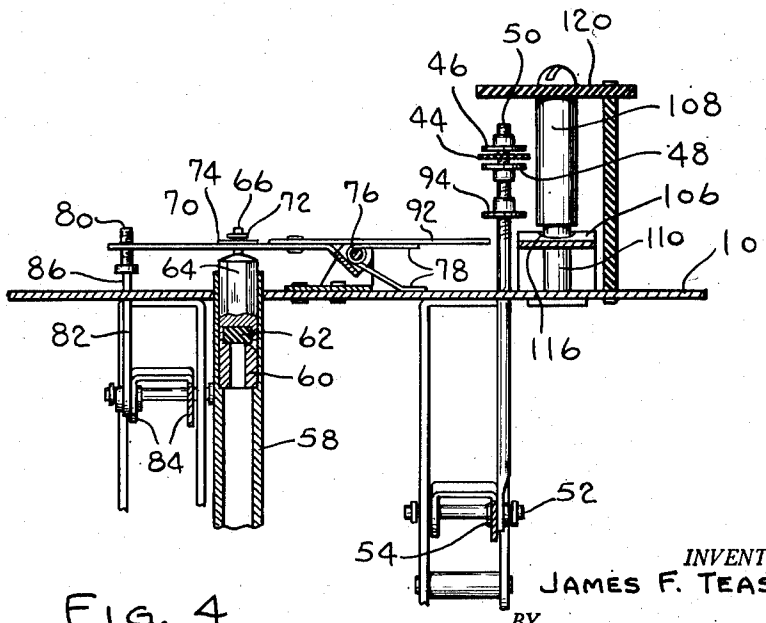


FIG. 4

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OIL PUMPING APPARATUS

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Application March 4, 1954, Serial No. 414,107

5 Claims. (Cl. 103—12)

This invention relates to fuel oil pumping apparatus and particularly to the safety control for oil pumping apparatus of the type used to pump oil from a remote supply into a casing in which the fuel level is maintained substantially constant for withdrawal to a burner.

Fuel pumping apparatus of this type is customarily employed in connection with pot type burners and the like to provide a constant level chamber near the burner while permitting the fuel tank to be located at a remote point. The pump motor is generally regulated by a float in the chamber. In order to insure safe operation of the fuel pumping apparatus two conditions in particular must be safe-guarded. The first condition is continued operation of the pump motor after the desired level has been reached. This can be caused by failure of the switch to open or by the float jamming. The second condition is a decrease in the level below a predetermined minimum level indicative of the leaking of the line connecting the fuel chamber to the pot type burner or the pump losing its prime. In these conditions the pump would continue to operate if not provided with additional controls to insure against continued operation. In the past it has been customary to provide costly switching apparatus alone or in combination with valving apparatus requiring the use of a return line to the fuel supply tank. The present invention eliminates costly switching arrangements and eliminates the need for a return line to the fuel tank. As a result of this invention the cost of the fuel pumping apparatus and the controls therefor has been greatly reduced without sacrificing safe operation.

The principal object of this invention is to provide completely safe control for fuel pumping apparatus of the type described.

Another object of this invention is to provide low cost, completely safe control for fuel pumping apparatus.

Other objects and advantages will be pointed out in, or be apparent from, the specification and claims, as will obvious modifications of the single embodiment shown in the drawings, in which:

Fig. 1 is a front elevation of the pump motor and control assembly which is adapted to be mounted in a casing shown in dotted line;

Fig. 2 is a side elevation partly in section of the apparatus shown in Fig. 1 with the motor removed to better show the controls;

Fig. 3 is a top plan view taken as indicated by line 3—3 in Fig. 1;

Fig. 4 is a section taken as indicated by line 4—4 in Fig. 3; and

Fig. 5 is a schematic showing of the apparatus.

Considering the drawings now in detail, the entire assembly (Figs. 1 and 2) is carried on mounting plate 10 to permit the apparatus to be assembled as a complete unit prior to mounting within casing 12. When mounting plate 10 is secured in the casing the O-ring

seal 14 on the nipple 16 fits within the cooperating inlet conduit 18 in the casing 12. The inlet 16 leads to the ball check valve 20 and is connected to the inlet 22 of the rotary vane pump 24 which is driven by motor 26 through shaft 28, pump shaft 30, and the connecting coil spring 32 which absorbs shocks. The pump 24 discharges into the well-like cavity 34 which communicates with the interior of casing 12 through port 36. When the pump is started the suction draws fuel through the inlet, past the ball check valve 20, and discharges into the casing. Upon deenergization the ball check seats to hold the prime.

Energization of motor 26 is controlled by snap switch 38 operated by the main float 40. Any number of switch constructions, snap or otherwise, may be used in this control. The illustrated snap switch (Figs. 1, 2, 3, and 4) has a U-shaped toggle spring 41 having one end bearing against the switch-carrying element 42 and its other end bearing against the operating arm 44. This operating arm projects between shouldered members 46, 48 adjustably mounted on the threaded upper stem of rod 50 actuated by the main float 40 which is pivoted at 52 and connected to rod 50 at pivot 54. As the level in the casing 12 increases the float will rise until shoulder 48 moves the operating arm 44 upwardly sufficiently to snap the toggle spring 40 over center and move the contact 42 away from the stationary contact 56. As oil is drawn from casing 12 the float 40 will drop and shoulder 46 will engage the tip of arm 44 to close the contact. This provides the simple "on-off" operation of the motor 26.

A vent pipe 58 (Figs. 2 and 4) is connected to the pump assembly between the ball check valve 20 and the pump inlet 22. The upper end of the vent pipe is provided with a valve seat insert 60 on which the face 62 of valve 64 normally seats. It will be appreciated that if this valve is opened the pump inlet is vented. This will cause the ball check to seat immediately and the pump will merely pump air. Since the ball check valve is seated the prime on the pump will not be lost.

The vent valve is opened in response to an abnormally high or an abnormally low level in the casing 12. The top of the valve is provided with a short stem 66 (Figs. 3 and 4) which passes through a cooperating slot 68 in lever 70 and is provided with a collar 72 which holds washer 74 between the collar and the lever 70 so that upward movement of the lever will act to raise the valve. The lever 70 is pivotally mounted on pivot 76 and is urged by spring 78 in a counterclockwise direction (Fig. 4) to hold the adjustable screw 80 mounted in the left-hand end of the lever (Figs. 3 and 4) against the top of hook 82 which passes through a cooperating slot in the mounting plate 10 and is pivotally connected to float arm 84. The hooked portion 86 of the arm 82 overlies the top of base plate 10 to limit the downward movement of the safety float 88. As the level in the casing rises to an abnormal height the float 88 will rise about pivot 90 (Figs. 2 and 3) to raise arm 82 and rotate lever 70 clockwise to lift the vent valve.

Lever 70 is provided with an extension 92 which projects to the right (Fig. 4) of pivot 76 and underlies the collar of member 94 adjustably mounted on the push pin of the main float 40. If for any reason the level in the casing 12 drops to an abnormally low point the main float 40 drops to a position in which the collared member 94 moves the righthand end 92 of the lever downwardly and causes the lever 70 to lift the vent valve 64 from seat 60 to again vent the pump to the atmosphere.

The present control provides for "on-off" operation of the pump motor in the normal course of events. When

an abnormal condition is reached, that is, when the level in the casing is abnormally high or abnormally low, the suction line to the pump is vented so the pump will pump air while the ball check prevents loss of the prime on the pump. If the abnormal condition is an excessively high level the pump will continue to pump air until the switch operates correctly after which the level in the casing will drop to normal. When the level returns to normal the safety float **88** moves down to seat valve **64** whereupon the pump will establish a suction pressure, unseat the ball check **20** and draw fuel from the tank. If the motor switch again fails to operate properly the pump will again be vented when the level reaches an abormal high condition.

Should the fuel line between the pumping apparatus and the burner be broken to let fuel run out of the fuel pumping apparatus at a rate greater than the capacity of the pump, the level will drop until the main float operates on the lever to open the vent valve **64** whether or not the motor is shut off. The check valve prevents loss of prime under any conditions.

In order to place this apparatus in operating condition it is, of course, necessary to prime the pump. This may be done easily by pouring oil into the oval, shallow pan **96** (Figs. 1, 2 and 3) which has a short peripheral edge **98** and is centrally apertured at **100** to drain down the pump shaft and motor shaft into the shallow pan **102** on the top of the pump where it drains through aperture **36** into the outlet well **34** (Fig. 2) of the pump. The pump is now ready to start except for the fact that the main float is at its lowermost position in which it has operated to open the pump vent valve **64**. This may be closed by pushing inwardly and upwardly (Fig. 2) on the angularly inclined end **104** of lever **106** and to raise the lever and lift collared member **94** to lift the main float **40** up while allowing lever **70** to return the vent valve to its seat. The main float is held until the pump has raised the level in casing **12** to a point where the vent valve operating mechanism will not operate due to insufficient level. At this point the lever **106** may be released to return by gravity to the position shown in the drawings. The lefthand end of lever **106** projects through a cooperating slot in the base plate **10** and the lever is held from falling out of its mounting in the base plate (which constitutes the fulcrum or pivot point) by the shoulders **108**, **110** on pins **112**, **114**, respectively, which pass through cooperating apertures **116**, **118** in the lever **106** to limit movement of the lever between the base plate and the undersides of the shoulders **108**, **110**. Pins **112**, **114** are additionally employed to support terminal board **120**.

The righthand end (Fig. 2) **104** of lever **106** may be actuated by means of a simple push pin bearing on the lever and moving inwardly with a generally horizontal action. As the pin moves in it will, of course, cam the end **104** of lever **106** upwardly to pivot the lever **106** about its fulcrum connection to the base plate at the lefthand end of the lever **106**. End **104** of lever **106** can, if desired, be exposed for direct manual actuation.

It will be noted that the lever mechanism **104**, **106** is useful only when starting the pump. If the level within

the casing has risen to an abnormally high position causing the vent valve to open, actuation of the lever **104**, **106** has no effect and the casing must be drained or allowed to empty as the burner requires additional fuel.

Although but one embodiment of the present invention has been illustrated and described it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. Oil pumping apparatus comprising, a casing, a pump in the casing, a motor for driving the pump, a switch for regulating said motor, valve means operable to vent the pump inlet to the atmosphere when opened, a lever directly connected to the valve means, a main float operatively connected to said switch to regulate the pump motor to maintain a constant level in the casing and having a one-way connection to said lever to open the valve means when the level in the casing is abnormally low, an auxiliary float having a one-way connection to said lever and operative to open the valve means in response to an abnormally high level in the casing, manually operable means to raise the main float, means biasing the valve means closed to close when the main float is raised by said manual means.

2. Apparatus according to claim 1 including a check valve in the pump inlet upstream of the point of connection of the vent valve means to the pump inlet.

3. Oil pumping apparatus comprising, a casing, a pump in the casing and having an inlet, a check valve in the pump inlet operable to open only when the pump creates suction pressure in the inlet between the check valve and the pump, a motor for driving the pump, a switch for controlling operation of the pump, a main float operably connected to the switch to operate the switch to energize the motor to maintain a constant level in the casing, normally closed valve means in the pump inlet between the check valve and the pump for venting the pump inlet to the atmosphere, said float being operably connected to said vent valve means to open the vent valve means in response to an abnormally low level in the casing, and a safety float operably connected to said vent valve means in response to an abnormally high level in the casing, said check valve closing whenever the vent valve opens with the motor running to prevent loss of prime at the pump.

4. Apparatus according to claim 3 including manually operable means for seating the vent valve means when the main float is acting to open the vent valve means.

5. Apparatus according to claim 4 in which said manual means are inoperative to seat the vent valve means when the safety float is acting to open the vent valve means.

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