Aug. 20, 1935. H. J. HAMMERLY 2,012,005

FUEL OIL SUPPLY

Filed Jan. 6, 1934 3 Sheets-Sheet 1

Fig. 1.

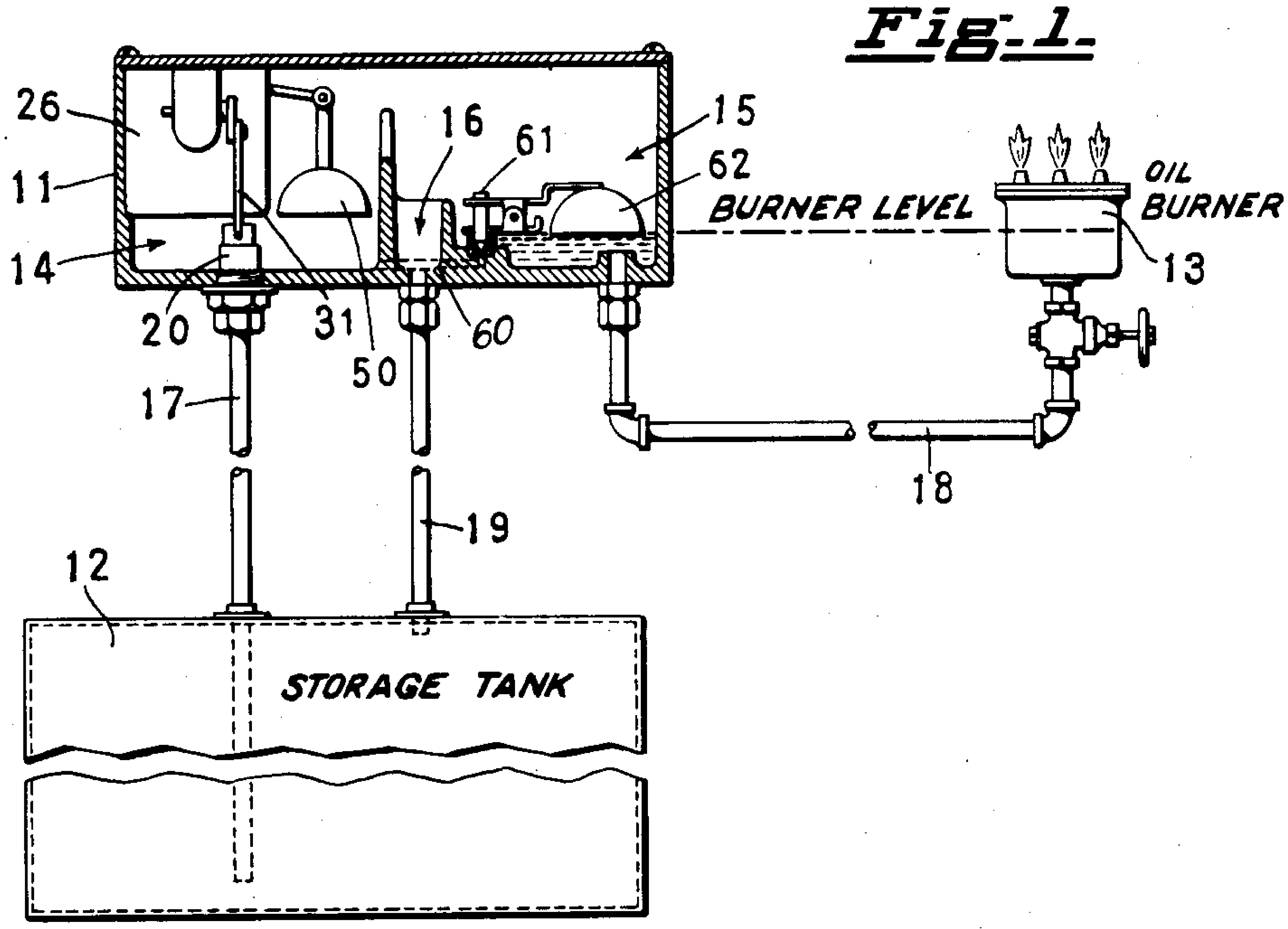


Fig. 2.

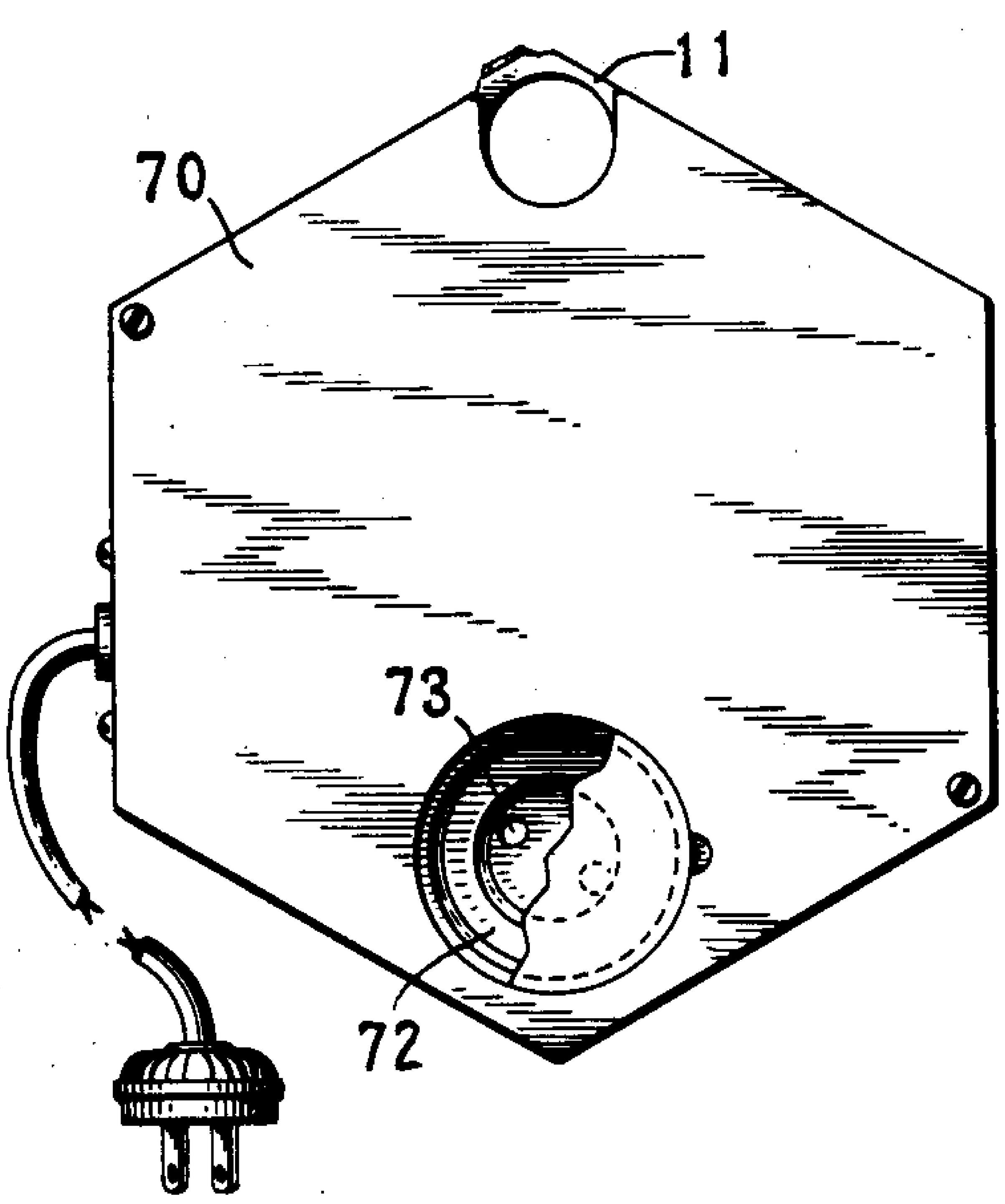
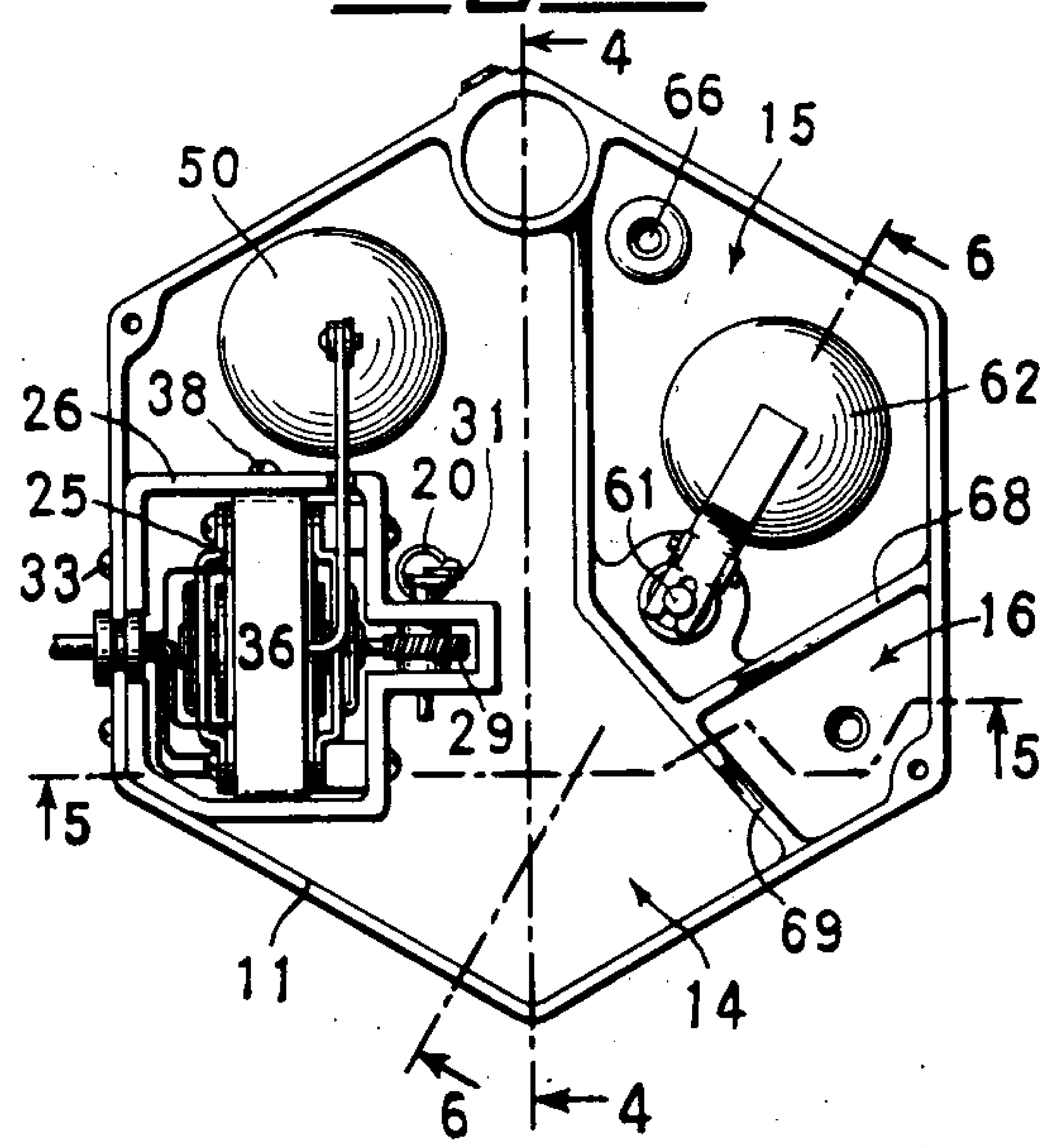


Fig. 3.



INVENTOR

HERMAN J. HAMMERLY,

BY Robert S. Alley

ATTORNEY

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Filed Jan. 6, 1934 3 Sheets-Sheet 2

Fig. 4.

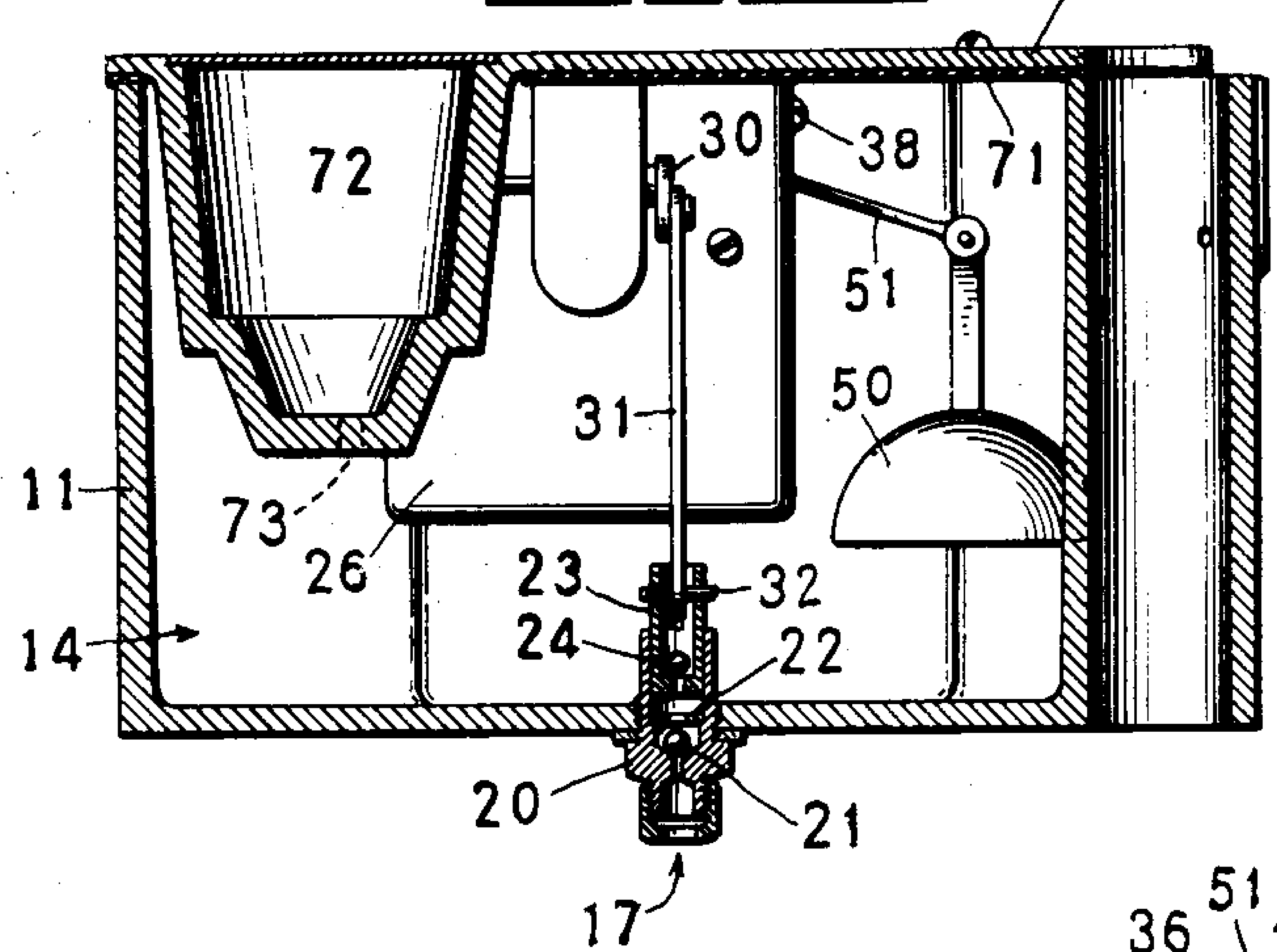


Fig. 5.

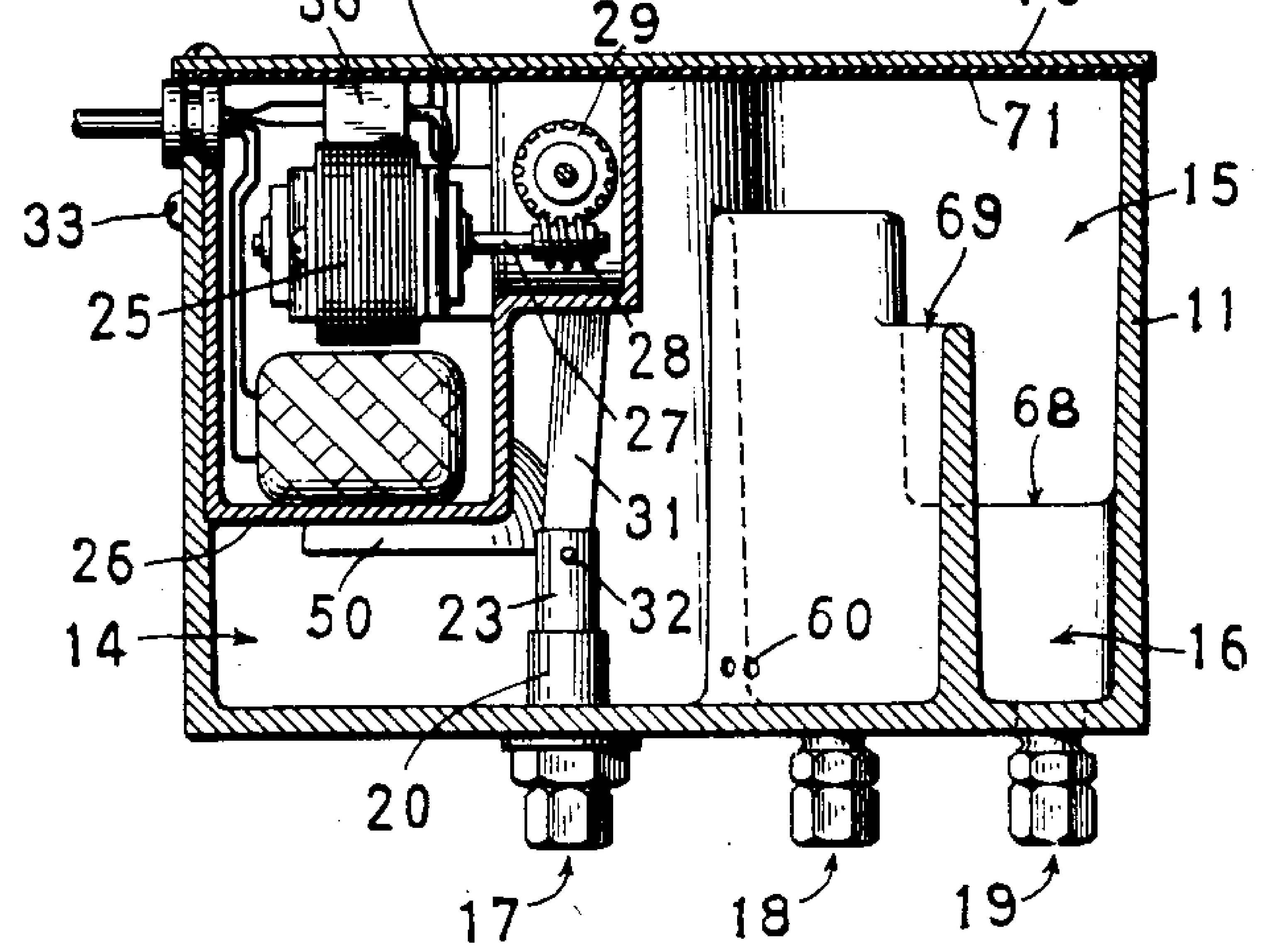
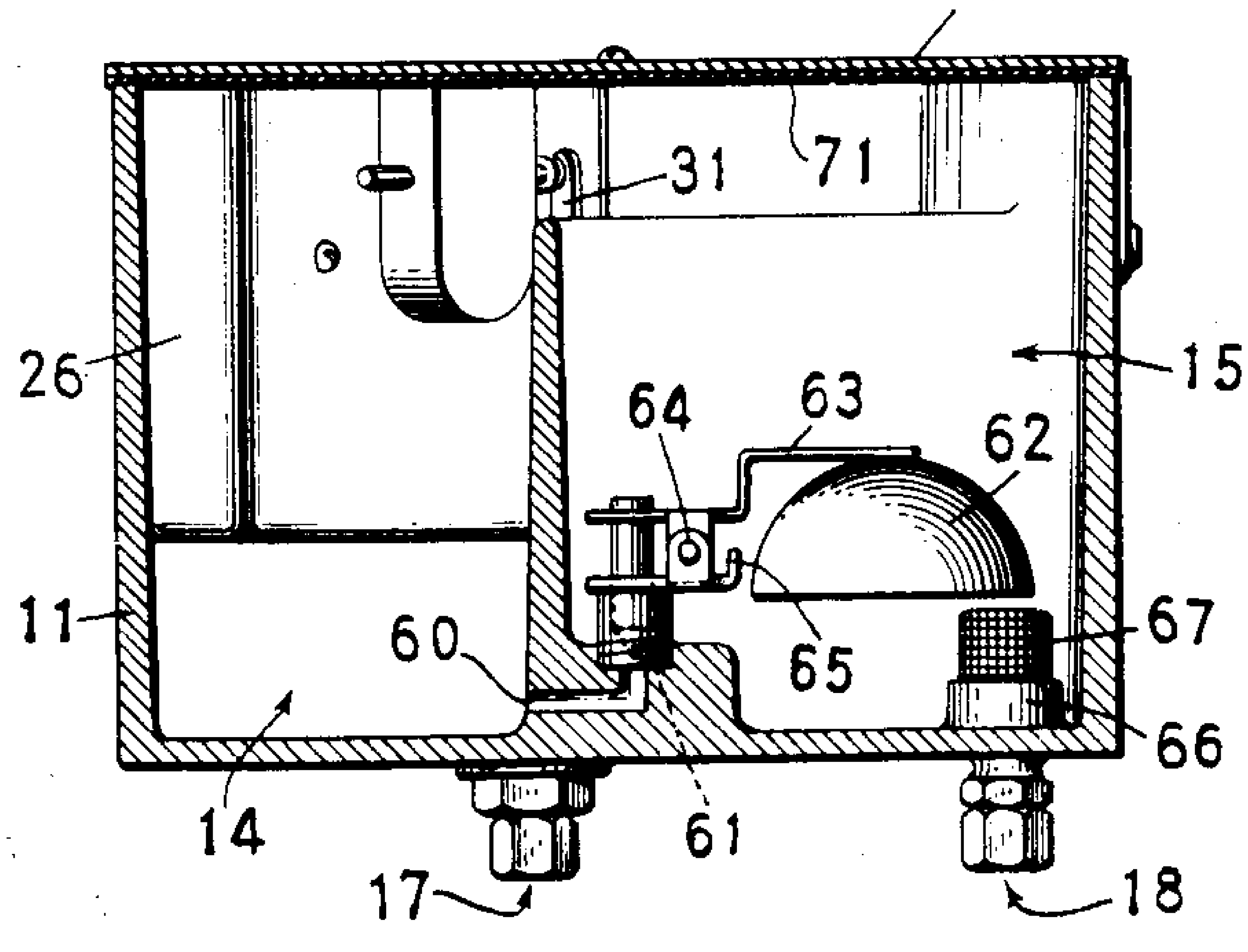


Fig. 6.



INVENTOR

HERMAN J. HAMMERLY,

BY

ATTORNEY

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Filed Jan. 6, 1934 3 Sheets-Sheet 3

Fig. 7.

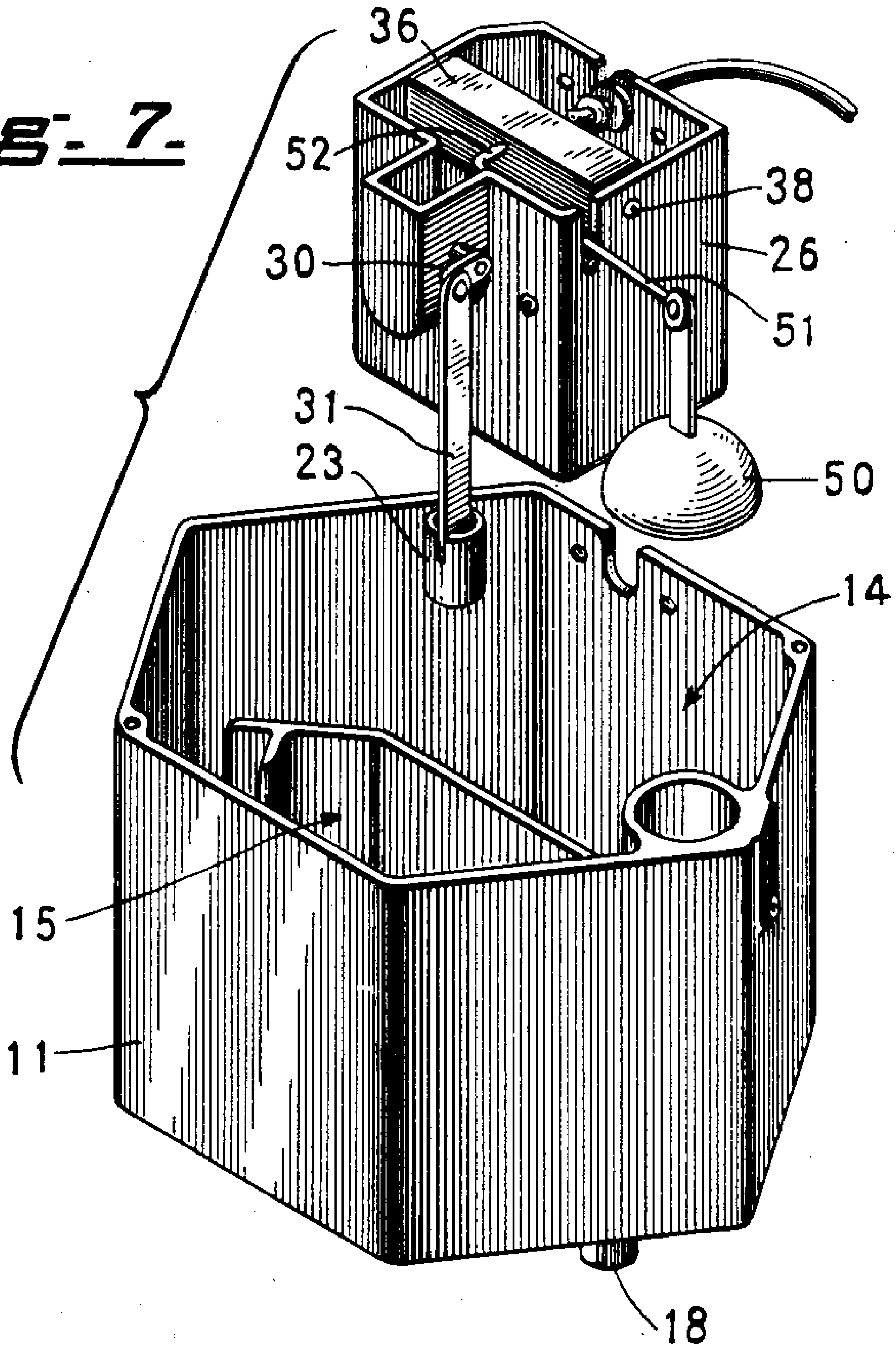


Fig. 8.

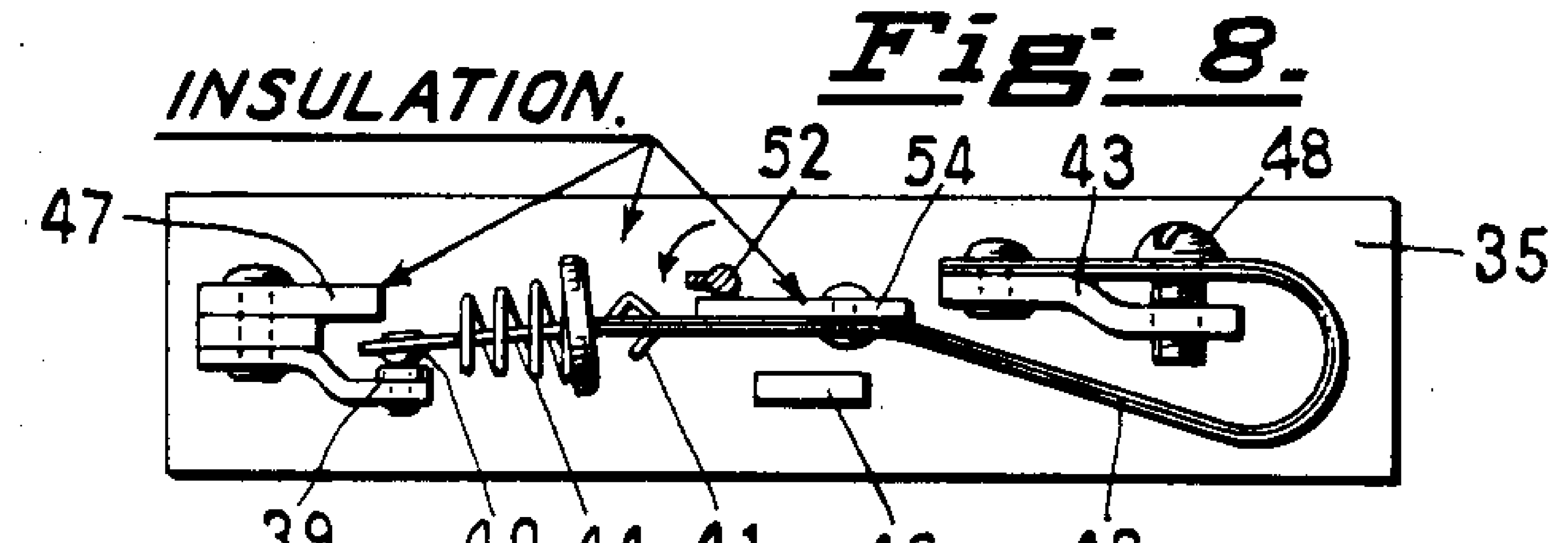


Fig. 9.

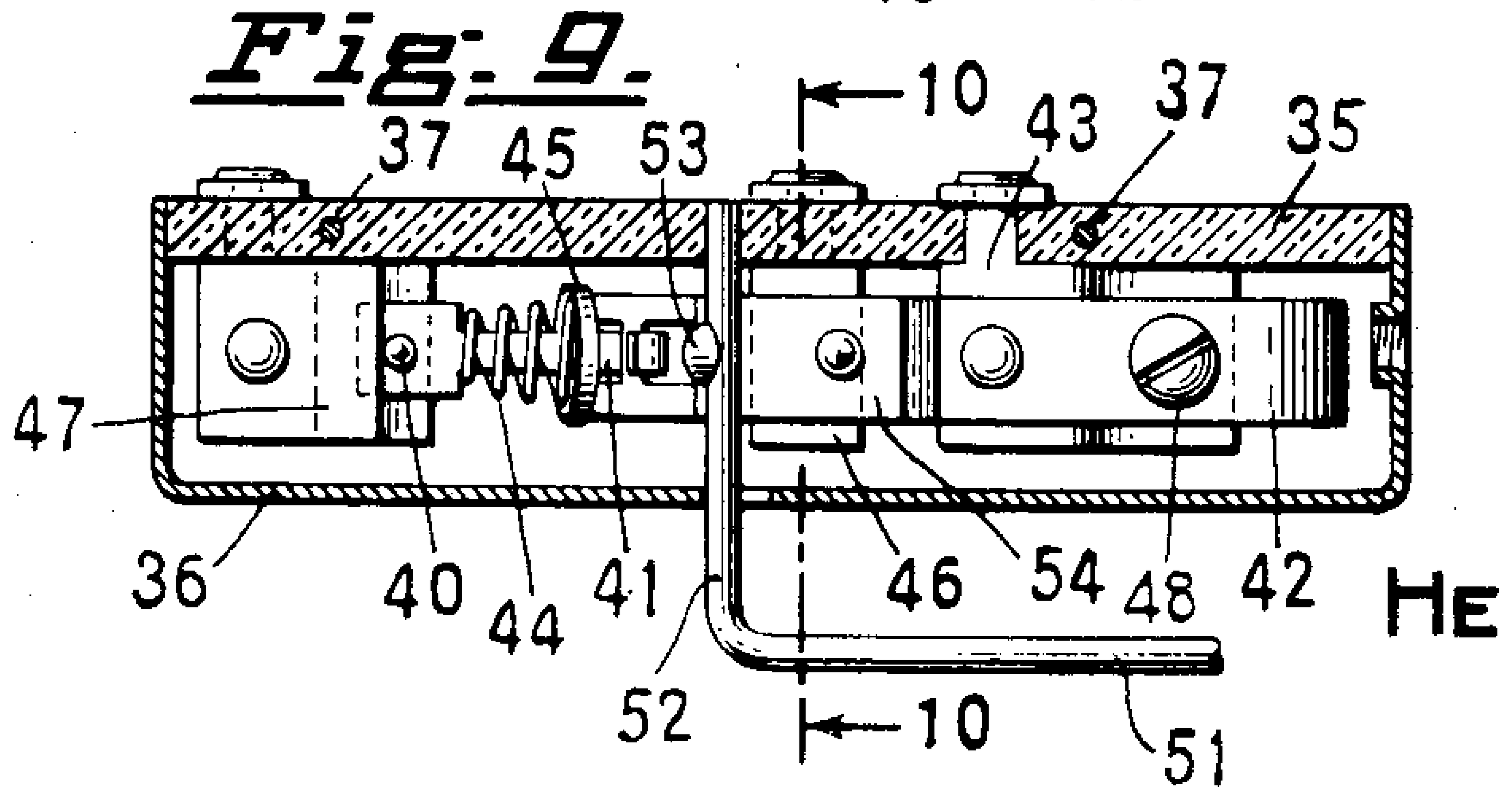
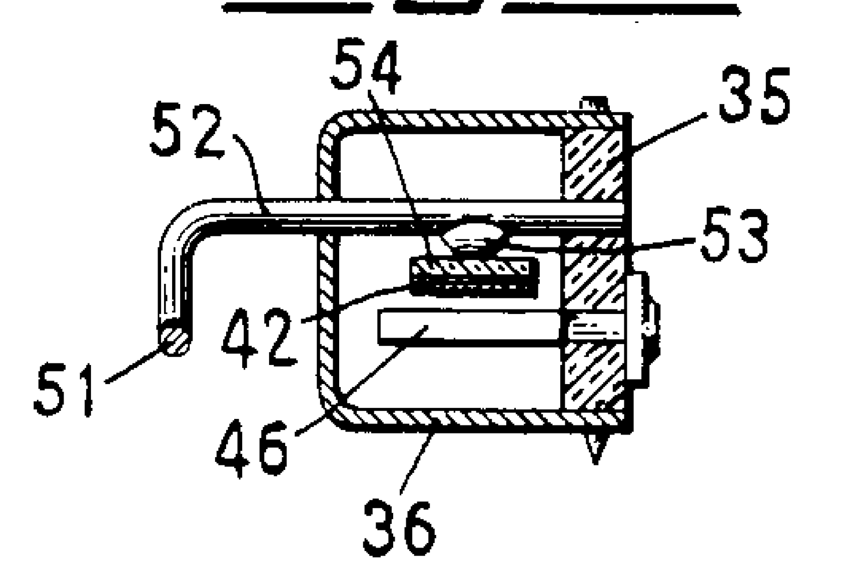


Fig. 10.



INVENTOR
HERMAN J. HAMMERLY,
BY Robert S. Harper
ATTORNEY

UNITED STATES PATENT OFFICE

2,012,005

FUEL OIL SUPPLY

Herman J. Hammerly, New Britain, Conn., assignor to The Trumbull Electric Manufacturing Company, Plainville, Conn., a corporation of Connecticut

Application January 6, 1934, Serial No. 705,541

4 Claims. (Cl. 103—26)

My invention relates particularly to the automatic supply of fuel oil for what are termed range oil burners. Such burners frequently employ what is known as kerosene or fuel oil No. 1. Such oil is customarily stored in tanks or barrels located at a safe distance from the burner. The usual procedure is to feed the burner from a portable bottle or receptacle containing a comparatively small amount such as 2 or 3 gallons. It is therefore necessary to refill this bottle from time to time, frequently several times a day.

To avoid this difficulty and trouble I have provided automatic apparatus for a supply of the fuel oil to the burner from the storage tank or barrel. My apparatus involves the use of a small casing containing a fuel oil pump and float controlled means for maintaining a substantilly constant level of oil so as to deliver oil to the burner at a substantially constant head.

This casing has a main reservoir which is supplied with oil by means of an electrically driven pump. The casing also contains a separate constant level chamber which is fed by gravity from the main reservoir and from which the oil flows by gravity to the burner. The operation of the pump is controlled partly by the changes in level of the oil in the main reservoir and partly by a thermostatic safety device and the method of operation will be understood hereinafter.

Fig. 1 is a section and diagrammatic view of apparatus embodying my invention showing its relation to a storage tank and a burner.

Fig. 2 is a plan view of one form of apparatus embodying my invention, part of the cover plate being broken away.

Fig. 3 is a plan view with the main cover plate removed.

Fig. 4 is a vertical sectional view on the plane of the line 4—4 of Fig. 3.

Fig. 5 is a vertical sectional view taken generally on the plane of the line 5—5 of Fig. 3.

Fig. 6 is a vertical sectional view taken generally on the plane of the line 6—6 of Fig. 3.

Fig. 7 is a perspective view showing the main casing and the float controlled pump unit removed.

Fig. 8 is a detail side view and partial section showing the circuit controlling thermostatic switch.

Fig. 9 is a section and plan of the same.

Fig. 10 is a transverse section on the plane of the line 10—10 of Fig. 9.

The main casing 11 derives its supply of oil from the storage tank 12 and delivers oil to the burner 13.

The casing is provided with partitions which divide it into a main reservoir 14, a constant level chamber 15 and an overflow chamber 16. The main reservoir 14 of the casing is connected to the storage tank by a suction pipe 17 and the constant level reservoir 15 is connected to the burner by a discharge pipe 18. The overflow or return pipe 19 connects the overflow chamber 16 with the storage tank.

The pump member has a body portion 20 with an inlet controlled by the ball valve 21. The vertical movement of this ball is limited by a perforated washer 22 which fits tightly in the main passage of the pump cylinder. The piston 23 fits in the cylinder and has an inlet controlled by the ball valve 24. The electric motor 25 is supported in the motor casing 26 and suitably connected to the pump piston, for instance, by the motor shaft 27, the worm 28, worm gear 29, crank shaft 30, connecting rod 31 and pin 32. The connecting rod 31 is preferably formed of non-metallic material such as a strip of fibre or reinforced phenolic condensation product to silence the operation. This pump operates at a moderate speed of say 350 R. P. M. and requires only a very small motor.

The motor casing 26 is detachably secured in the main casing, for instance by one or more screws such as 33 so that the entire motor and control unit may be readily inserted into the casing or removed therefrom for the purpose of inspection or repair.

The casing 26 not only contains the motor for driving the pump but also contains the switch for starting and stopping the motor. This switch is mounted in a separate enclosure consisting of an insulating base 35 and a housing 36, the parts of which are suitably secured together for instance by one or more pins 37 and the housing itself is detachably secured in the casing 26 in a suitable manner for instance by one or more screws such as 38.

The switch has a stationary contact 39 and a movable contact or switch member 40. The movable contact is preferably carried by a member 41 which is hinged to the tip of a warping bimetallic thermostatic arm 42, the other end of which is supported by a post 43.

A spring 44 on the member 41 presses against the movable end of the arm or strip 42 or against the washer 45 which may be interposed between the spring and the tip of the arm to assure the quick action of the switch and to assist in holding the parts in their proper position. This specific form of thermostatic switch is claimed in application #701,714 filed December 9, 1933 and is broadly covered by United States Patent Number 1,928,484.

The stop 46 limits the movement of the arm 42 in one direction and an abutment 47 limits the movement of the contact tip 40 of the switch away from the stationary contact 39. This switch is designed to normally close the circuit through the motor at normal atmospheric temperature but when the motor has been running for a predetermined maximum period the heat of the motor is sufficient to actuate the thermostatic switch and automatically open the circuit.

The action of the switch is also controlled by the float 50. This float is connected to the outer end of an arm 51 which extends at right angles to the shaft 52. This shaft is pivotally mounted in the housing of the switch and is provided with an offset or eccentric portion 53 so constructed and arranged that the parts are in the position shown in Fig. 8 when the main reservoir is empty and the float 50 is down. When the float rises the shaft 52 rotates in the direction of the arrow in Fig. 8 and the eccentric or offset portion 53 presses against the thermostatic arm 42 (or interposed bearing plate 54) and carries the tip of the arm 42 across the center line so as to snap the movable switch contact away from the stationary contact by toggle action and open the circuit when the float has reached a predetermined height, thus stopping the motor regardless of the temperature.

Liquid passes from the main reservoir 14 into the constant level chamber 15 through a passage 60, the outlet of which is controlled by a needle valve 61. A float 62 has an arm 63 which is hinged at 64 and connected loosely to the upper end of the needle valve 61 so that when the float rises to a predetermined point it closes the valve. A projection 65 may be provided to limit the descent of the float and arm.

The discharge outlet 66 is preferably protected by a suitable screen 67 which may be detachable for cleaning purposes in the usual manner. This float 62 and its valve 61 are arranged to operate to maintain a substantially constant level in the chamber 15 at or closely adjacent the overflow weir 68. When the level of the liquid gets much below this weir the float descends and opens the valve and allows liquid to flow in from the reservoir 14. In case the valve 61 does not close properly, any liquid which overflows into the chamber 16 runs back into the storage tank 12.

The apparatus is designed and intended to keep a sufficient supply in the reservoir 14 so that there will be enough head to keep the chamber 15 substantially full but in case the pump is not shut off in time any excess supply of the liquid will flow over the weir 69 into the chamber 16 and thus back into the storage tank.

The top of the casing is preferably closed by a cover 70 and a gasket 71 to maintain a substantially tight enclosure. This cover 70 also has a pocket or cup 72 open at the top and discharging through small outlets 73 into the main reservoir 14 so that in case of failure of the automatic pump or failure of the source of supply a portable bottle or other filling device may be inserted into the pocket 72 to fill the reservoir 14 independently of the action of the pump.

With the reservoir 14 substantially empty and the float 50 down, as shown in Fig. 4, the parts of the switch are as shown in Figs. 8 and 9.

In this position the circuit of the motor is closed and the pump should operate and fill the main reservoir 14 so that the float 50 rises, turns the shaft 52 with its cam or eccentric 53 and moves the flexible arm 42 so as to snap the switch member 41 to the OFF or open circuit position thus stopping the motor. In the particular device illustrated approximately one half pint of fuel should be pumped in from one to two minutes depending upon the lift of the pump etc. In case the float becomes damaged and fails to work or if a pipe line should become broken or leak the pump would run continuously. To prevent this I have provided the thermostatic arm 42 which is designed so that after a period of approximately thirty minutes the heat of the motor will warp the thermostatic arm and open the switch and stop the motor independently of the action of the float.

This thermostatic device may be automatically reset as in the form shown or may embody any suitable manually resettable device with a reset knob or button outside of the case which may serve as an indicator.

The burner is fed automatically from the constant level chamber 15 which from time to time receives sufficient fuel from the reservoir 14 past the needle valve 61 to maintain a substantially constant head.

The main reservoir 14 preferably holds several times as much fuel as the constant level chamber for instance in the ratio of two and one half pints to one half pint.

It will be seen that the motor and switch parts are all enclosed in a single housing and that the pump piston and switch actuating float are all connected to this housing so that they can be readily removed as a unit for inspection and repair. This is very important as it assures to the householder a simple and quick means for replacement and is convenient for the service man. In the event of failure of any part of the combined motor, switch and pump unit, the service man would simply remove the defective unit by taking out the screws 33, 33 and immediately replacing the defective unit with one which is known to be in perfect operating condition and would of course take the defective unit away with him for any necessary repairs under much more advantageous working conditions. In fact the construction and assembly is so simple that a person having only a slight degree of mechanical or electrical knowledge could easily substitute a perfect unit for a defective one.

I claim:

1. A fuel supply apparatus including a tank, a pump for supplying fuel to said tank, at a rate substantially faster than any normal discharge of fuel from the tank, a motor for driving said pump, said motor being of a type for intermittent operation and adapted to heat after running longer than is required to fill said tank, means for controlling the normal intermittent operation of said motor and pump, and a delay action safety means for stopping the motor in response to its heating when run for more than its normal period of time and under no more than normal loads.

2. A fuel supply apparatus including a tank, a pump for supplying fuel to said tank, an intermittently operable motor for driving said pump, float controlled means for stopping and starting said motor and pump in response to the liquid

level in said tank, and a safety means for stopping the motor in the event of the failure of said float controlled means, said safety means being independent of the liquid level in said tank and being responsive to heating of the motor when run for substantially longer than its normal period of operation, under no more than substantially normal load.

3. In a fuel supply system having a tank, a pump for supplying fuel to said tank and an intermittently operable electric motor for driving said pump, the combination of means controlled by the level of fuel in said tank to stop said motor when the fuel reaches a predetermined level, and thermostatic means to stop the motor when its temperature reaches a predetermined point above the temperature to which the motor will be heated during normal operation of the system, whereby a rise in temperature of the motor produced by its excessive continued operation after it has supplied the demands of the system and caused by failure of said first means to stop the motor, will cause the motor to stop.

4. A fuel supply apparatus including a tank, a pump for supplying fuel to said tank, a motor for intermittently operating said pump, a switch controlling the motor circuit, a float for actuating said switch when the fuel level rises and falls to predetermined levels, and a thermostat for opening said switch in response to heating of the motor when run for substantially longer than its normal period of operation under no more than substantially normal load.

HERMAN J. HAMMERLY.