

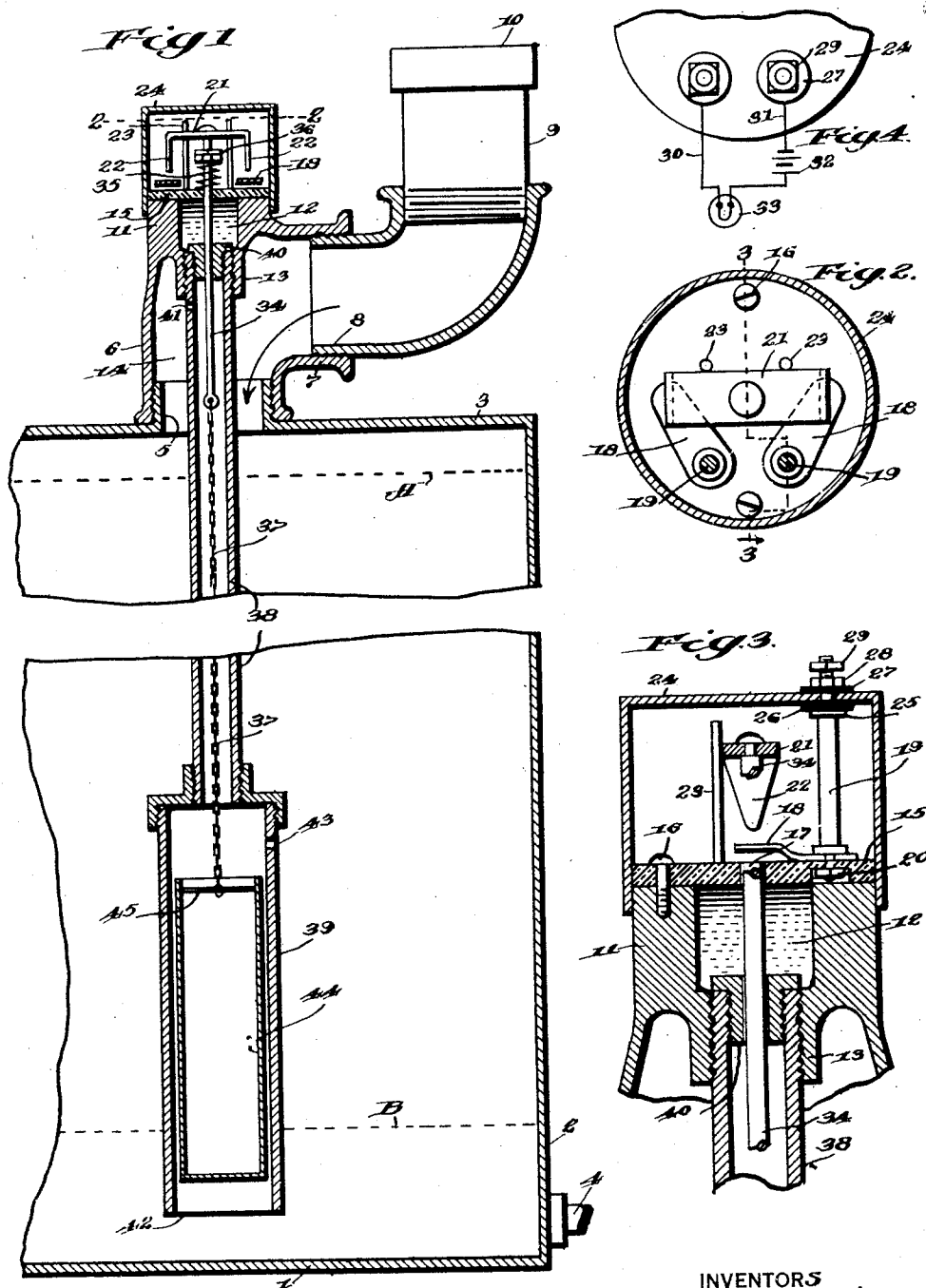
May 20, 1930.

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1,759,503

FLOAT SWITCH

Filed April 2, 1928



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FLOAT SWITCH

Application filed April 2, 1928. Serial No. 266,840.

The object of this invention is to provide a novel means for signaling an alarm when depletion of the liquid contents of a tank reaches a predetermined set minimum.

5 The device of this invention, while not essentially limited thereto, is especially designed for use in connection with fuel oil storage supply tanks and the most prevalent use is in connection with tanks of this nature
10 which are in private homes for supplying fuel oil to oil burners of furnaces.

The mechanism includes a normally open circuit in which is interposed any suitable form of a signaling or alarm device, together
15 with a circuit closer, and the invention involves a novel form of device for actuating the circuit closure and which device acts by gravity, responsive to a sufficient depletion of the liquid contents.

20 A further feature of the mechanism resides in a liquid filling and gravity acting circuit closing device which is normally submerged in the liquid and which is of such light weight construction that when said device is
25 immersed, it is to all intents and purposes, in an equilibrium of pressure, or other words, practically self sustaining so that only the slightest supporting stress is necessary to maintain said device in position.

30 A further feature of the invention resides in novel means for shielding the circuit closing device from the violent agitation of the tank's contents while the contents thereof is being replenished.

35 A further feature of the invention consists in a novel structure combining the shielding feature and affording means whereby the tank can be filled through the same opening through which the actuating
40 mechanism extends.

The invention has many other objects and features which will be more fully described in connection with the accompanying drawing
45 and which will be more particularly pointed out in and by the appended claims.

In the drawing:—

50 Fig. 1, is a vertical sectional view of a fuel tank equipped with the preferred form of the device of this invention.

Fig. 2, is an enlarged sectional view on line 2—2 of Fig. 1.

Fig. 3, is a sectional view on line 3—3 of Fig. 2.

Fig. 4, is a fragmentary top plan view and
55 a partial diagrammatic view of the circuit.

Like characters of reference designate similar views throughout the different figures of the drawing.

A tank is shown having suitable bottom, side and top walls 1, 2 and 3, respectively,
60 which may be of any form or size and which may be suitably located in practical communication with the oil burner of a furnace or any other receiving deposition. For mere
65 purposes of illustration, we have shown a draw-off pipe at 4.

Said top wall 3 is conventionally shown as having a filling bung 5, that is exteriorly threaded. A fitting 6 is shown threaded on
70 bung 5, and said fitting has a branch 7 into which the end 8, of a filling pipe 9, or section thereof, is threaded, and the pipe 9 is suitably provided with a cap 10. However, some
75 tanks have special filling openings different from that shown.

In the novel fitting shown, the same is provided with a reducer or reduction branch 11 having a bore 12, the purpose of which will later appear. The web structure of said fitting is formed into an internally threaded
80 nipple 13, that projects downwardly into the interior of the fitting, as shown, and when a connection is made with said nipple, as will be presently explained, the chamber
85 12, is divided off from the remainder of the interior of the fitting which I will designate at 14, and which may be termed the filling channel.

The electrical portion of the mechanism
90 will next be described in detail.

The top of the reducer is shown closed by a lid 15, which is preferably of insulating material such for instance as fiber, of disc-like form. We have shown the same secured
95 by means such as screws 16, to the fitting 6. This disc 15 closes the chamber 12, except for an aperture 17 preferably centrally disposed therein. A circuit closer is mounted on said disc 15 and the same may include 100

spring contact terminals 18 anchored to disc 15 by the lower ends of rods 19 and nuts 20, wherein one of said rods is fully shown in Fig. 3. A contact yoke of substantially U-shaped form and of inverted disposition has a bight 21 and limbs 22, the lower ends of the latter being adapted to close circuit through terminals 18, as will be obvious from the drawing. Guides 23, suitably mounted in disc 15, serve to prevent rotation of the contact yoke irrespective of the position of the latter.

We will next briefly describe the diagrammatic electrical circuit for signaling depletion of the tank's contents.

The rods 19, actually function as binding posts and to lock a protecting cover, which is in the form of a cap 24, that encloses a circuit closer. As shown in Fig. 3, said posts extend up through the top wall of said cap and provided with shoulders 25, between which and the cap a suitable insulation 26 may be interposed. A like insulating disc 27, is disposed above the cap 24 and a nut 28 serves to rigidly hold the cap 24 in position. A nut 29, acts as a binding post nut, in the usual manner. Thus, we can connect the leads 30 and 31, to the posts 19, as now clearly shown, outside the cap 24. We have indicated a source of electric current at 32, and a lamp 33, both interposed in the circuit portion shown in Fig. 4.

It will now be clear that the circuit will be open when the limbs 22 are out of contact with the terminals 18, as shown in Figs. 1 and 3. As the specific character of electrical means is not claimed, it is believed that the disclosure thereof herein made will be amply sufficient to enable anyone skilled in the art to make and use the same.

A description will next be made of the means for actuating the circuit closer.

A supporting line, which in part is shown in the form of a rod or spindle 34, has its upper end suitably and rigidly secured to the bight 21, of said circuit closer and said spindle 34 extends upwardly through said opening 17, in disc 15, with a free working clearance. An actuating spring 35 surrounds said spindle 34, and is interposed between an adjustable nut 36, and disc 15 and normally acts to elevate the yoke and its limbs 22, out of contact with terminals 18. A lower portion or section of the supporting line is shown in the form of a chain 37, which will later be more fully described.

The invention involves a shield structure which as shown is in a tube section 38 and a cup section 39. Said tube section 38 is threaded into nipple 13 and a gland nut 40, is shown threaded into the upper end of tube 38. This gland nut 40, has a bore that affords passage of spindle 34 and permits the latter to freely slide therein. Said nut 40 and disc 15, close chamber 12, and in order to prevent any dan-

ger of sparks reaching the contents of the tank, we pack the chamber 12, and in practice, we preferably use a grease that also serves to lubricate the spindle and facilitate sliding movement of the latter through nut 40 and disc 15. This packing, of whatever nature, complies with regulations for safety even when the tank contains liquid fuel. A small air vent 41, is disposed in tube 38, not only at a high point therein but on that peripheral side remote from the path of the incoming liquid, as indicated by the arrow.

It will now be clear that the tube 38 is secured in the fitting 6, which is also a filling channel, and depends therefrom down into the tank and thereby protects and shields the chain 37, from interference by the violent agitation caused by filling the tank, and allows said chain to work freely.

Said cup section 39, is slightly enlarged in diameter with respect to the tube 38 and may be connected at its upper end in full communication with the lower end of said tube, as shown. Said section 39, is preferably cylindrical in cross section and has an open bottom 42, in full communication with the contents of the tank and may also have one or more openings 43. Thus, at any rate, the liquid level in the shield structure will always be the same as in the tank, and section 39 is disposed near the bottom 1, of said tank.

In section 39, is disposed what will be termed an actuator which, in the present case is in the form of a cup 44 having imperforate bottom and cylindrical walls and an open top. A slight rod 45, or the like, may be provided for connection with the lower end of chain 37, as shown. While the cup 44, is slidable in section 39, there is only a slight working clearance, and the cup is relatively elongated and has a considerable capacity. Further, it is a feature to make this actuating cup of very light weight material so that its weight will be reduced to a minimum. Thus, when the level in the tank is above the cup 44, and the latter is submerged, the cup will almost be in an equilibrium of pressure and hence the spring 35, may be very light because the load is so light that it carries.

Describing the operation of our invention, it will be clear that when the level is at A, or at any point above the cup 44, the latter will not only be full of liquid, but will be submerged in liquid exteriorly as well. The spring 35, will support the cup 44, which need not weigh more than a few ounces even including the supporting line comprising sections 34 and 37. The circuit will be open, as indicated in Fig. 1. Now as the level descends so that buoyancy of the cup will fail to support the latter, say at level B, or before this has been reached, the weight of the contents of cup 44 will quickly overcome spring 35, and as the limbs 22 only have a fraction of an inch to travel before contacting with ter-

minals 18, the circuit will be quickly closed, and maintained closed, as long as the level is thus depleted. This will cause the lamp 33, to glow, or energize any suitable signal or alarm to indicate that the level of the tank has descended to such an extent that the tank should be re-filled.

As the tank is being re-filled, and as the liquid level ascends above the cup 44, the weight of the latter will be reduced to the actual weight of the cup and the supporting line, and consequently, the spring 35 will be adequate to restore the parts to the position shown in Fig. 1.

It will now be clear that by having an actuating cup of relatively large capacity, even though it is of minimum weight, we can very quickly and positively operate the circuit closer by a gravity acting device which is devoid of springs except for restoration purposes, which is an ideal function for springs.

It is believed that the device of our invention will be fully understood from the foregoing description, and while we have herein shown and described one specific form of our invention, we do not wish to be limited thereto except for such limitations as the claims may import.

We claim:

1. In a device for signaling depletion of liquid in supply storage, a tank adapted to contain a supply of liquid and having a lower draw-off pipe and an upper filling fitting, a shield tube secured in and depending from said fitting into said tank and being substantially out of communication with the entering liquid passing through said fitting, a cup shield near the bottom of said tank and open at its lower end to the contents thereof and having its upper end secured in open communication with the lower end of said tube whereby the liquid level in said tank and shield tube and cup shield will always be the same, a light weight signal actuating cup freely slidable in said cup shield and having an open top and adapted to contain a quantity of liquid to lower said cup when the level in said tank descends below the top of said cup, a circuit closing device in said fitting adapted to energize an alarm, a supporting line connected with said circuit closing device and with said cup, and a spring normally holding said circuit closing device in a circuit open position and supporting said cup in a predetermined position when said cup is immersed.

2. In a device for signaling depletion of liquid in supply storage, a tank adapted to contain a supply of liquid and having a fitting thereon, a shield tube of relatively reduced diameter secured to and depending from said fitting downwardly into said tank, a cup shield of relatively enlarged diameter near the bottom of said tank and open thereto

and being detachably connected in open communication with said tube shield, a light weight signal actuating cup having an open top freely slidable in said cup shield and normally immersed and filled with liquid thereby being devoid of buoyancy, a circuit closing device on said fitting adapted to energize an alarm, a flexible supporting line connected with said circuit closing device and said cup, and a light tensioned spring normally holding said circuit closing device in a circuit closing position and acting through said device to support said cup in a predetermined position in said cup shield when said cup is immersed.

3. In a device for signaling depletion of liquid in supply storage, a tank adapted to contain a supply of liquid and having a filling fitting structure provided with a filling channel, a laterally extending filling pipe delivering to said channel, a tubular shield mounted in said fitting structure and extending downwardly through said filling channel into said tank and being substantially out of communication with the liquid passing through said channel and being open to said tank below said fitting, a normally open circuit closing device having a minimum of movement from a circuit open to a circuit closing position, a weighted actuator in said tubular shield pendently connected with said device to close circuit therethrough and said actuator being normally in an equilibrium of pressure until the liquid level has descended to a predetermined point, and being thereafter adapted to move said device into and retain it in a circuit closing position.

In witness that we claim the foregoing as our own, we hereby affix our signatures.

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