June 17, 1952 C. J. KOCH, JR 2,600,659

COMBINED FLOAT AND MERCURY SWITCH

Filed Nov. 10, 1949

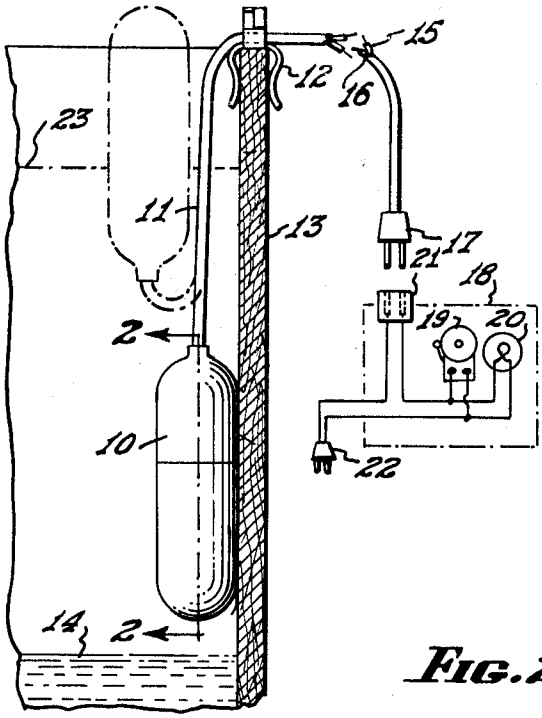


FIG. 1.

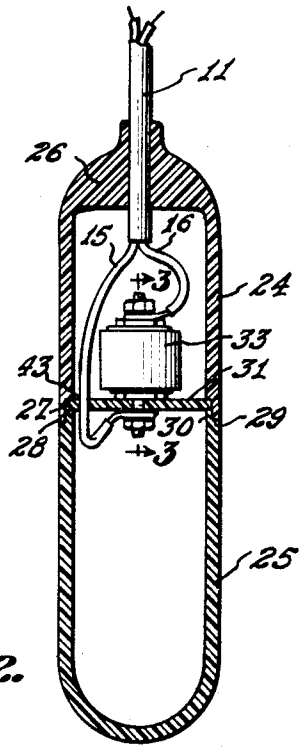


FIG. 2.

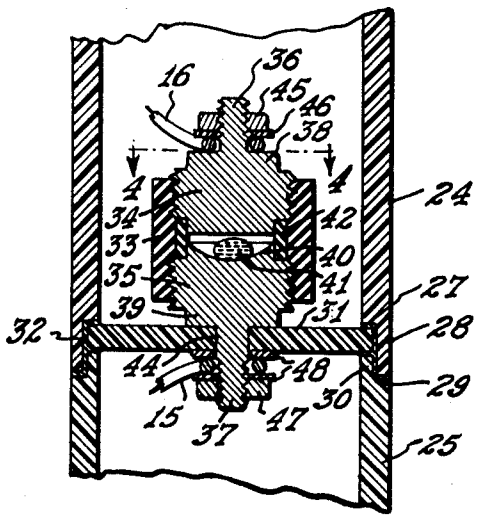


FIG. 3.

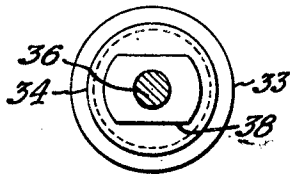


FIG. 4.

INVENTOR.
CHARLES J. KOCH, JR.,
BY
Allen & Allen
ATTORNEYS.

Patented June 17, 1952

2,600,659

UNITED STATES PATENT OFFICE

2,600,659

COMBINED FLOAT AND MERCURY SWITCH

Charles J. Koch, Jr., Cincinnati, Ohio

Application November 10, 1949, Serial No. 126,635

3 Claims. (Cl. 200—84)

1

My invention relates to an improved liquid level indicator comprising the combination of a float and a mercury switch.

It is the primary object of my invention to provide improved means for informing one that a predetermined level of liquid has been obtained in a vat which is being filled with said liquid.

Another object of my invention is to provide an improved combination float and mercury switch which is extremely simple to manufacture and assemble.

A further object of my invention is to provide an improved signaling device such that only a slight deviation of the device from its normal position will result in the warning signal being given.

Still another object of my invention is to provide a float which will not only give a warning signal when slightly deviated from its normal position but also one that will maintain such signal even though the float be moved through an arc of almost 360 degrees.

A further object of my invention is to provide a float of improved and simple construction as well as a novel and simple mercury switch which is easily mounted within said float.

Other objects and advantages of my invention will become apparent to one skilled in the art during the course of the following description and with reference to the attached drawings in which like numerals are employed to designate like parts throughout the same and in which

Figure 1 is a partial section through a beer vat or the like showing the float in perspective as mounted within the vat and diagrammatically disclosing the signaling means,

Figure 2 is a section through the float taken on the line 2—2 of Figure 1,

Figure 3 is an enlarged sectional view taken on the line 3—3 of Figure 2 and showing the mercury switch in detail and its mounting within the float, and

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Referring now to Figure 1, I have indicated a float 10 suspended by its cable 11 and a spring clip 12 from the wall 13 of a beer vat or the like. The level of the beer 14, or other liquid within the vat 13, is indicated at 14. The cable 11 encloses the two leads 15 and 16 and is of conventional construction. This cable is shown as being provided with a conventional plug 17. Also shown in Figure 1, in diagrammatic form, is a portable kit 18 containing a bell 19 and light 20 and having a socket 21 adapted to receive the

2

plug 17, said kit being provided with a plug 22 by means of which it may be connected to a conventional 110 volt circuit or the like, not shown. I have shown in Figure 1, in dot-dash lines, the position the float 10 will assume when the level of the liquid has risen from the level 14 to the level 23.

Referring now to Figure 2, it will be noted that the float which was generally indicated at 10 in Figure 1 comprises two cylindrical portions 24 and 25. The upper portion 24 is shown as being provided with a thicker portion 26 which acts as weight for this end of the float. Although I have indicated the cylindrical portions 24 and 25, as well as the thicker portion 26, as being made of a plastic material it is to be understood that this does not constitute a limitation of my invention. It is to be further understood that rather than form the cylindrical portion 24 with the thicker portion 26, any conventional means of providing additional weight to the upper end of that portion may be used. The upper portion 24 is adapted to receive the cable 11 in such a way as to form a very tight fit therewith. If necessary, a suitable adhesive or some other binder may be used in order to secure such fit.

In order to simply and conveniently mount the mercury switch or the like within the float 10 I have provided the following construction, this being best seen in Figures 2 and 3. The upper portion 24 of the float 10 is provided with an internal shoulder 27 and flange 28 while the lower cylindrical portion 25 is formed with an external shoulder 29 and a flange 30. It will be noted that the flange 28 is of greater length than the flange 30 so that when a switch mounting disc 31 is positioned on the flange 30 and the shoulder 27 brought into contact therewith, the flange 28 will be almost flush with the shoulder 29. A suitable adhesive, indicated at 32 in Figure 3, may be provided in order to insure a tight connection between the cylindrical portions 24 and 25 and the switch mounting disc 31.

Referring now to Figures 3 and 4 the mercury switch which I have developed for use in connection with my improved liquid level indicator comprises a sleeve 33 which is internally threaded so as to receive the metal contact plugs 34 and 35. The member 34 is provided with a threaded extension 36 and the member 35 with a threaded extension 37. In order that the metal contact plug member 34 may be easily screwed into the sleeve 33, I have shown it as having a nut portion 38 formed integral therewith. The member 35 is formed with a similar nut-like extension 39.

The member 35 is formed with a cup portion 40 and it is into this cupped portion 40 that the globule of mercury 41 is placed. A spacer ring 42 serves to keep the members 34 and 35 the correct distance apart from each other. It is to be understood that the sleeve 33 and spacer ring 42 are formed of some dielectric material. The cupped portion 40 of the member 35 should be so constructed that it just nicely blends with the ring 42 so that there is substantially no ledge upon which bits of the mercury may come to rest. The cup 40 and spacer ring 42 are so arranged that when the switch is tilted just a slight bit from its normal vertical position the globule of mercury 41 will ride to outer edges of the cupped portion 40 and thus make contact between the plug members 34 and 35. As best seen in Figures 2 and 3, the disc 31 is provided with an opening 43 through which the lead 15 is passed in order to be connected to the extension 37, the extension 37 being itself passed through a hole 44 provided in this disc. If the leads 15 and 16 are suitably connected to a source of electric current, such tilting of the member 35 and movement of the mercury 41 will complete the circuit through the extensions 37, 36 and the members 34, 35. The nut 45 and washer 46 serve to properly attach the lead 16 to the extension 36 and the nut 47 and washers 48 serve to properly attach the lead 15 to the extension 37.

By way of construction then the member 35 may be screwed into the sleeve 33, the spacer ring 42 then dropped into contact with the member 35 and the mercury 41 placed in the cup portion 40 of this member 35. The member 34 will then be screwed into the sleeve 33 against the spacer ring 42. Following this the member 35 is positioned on the disc 31, the threaded extension 37 passing through the hole 34 of this disc. The disc 31 is then placed on the flange 30 of the cylindrical member 25 and the lead passed through the opening 43 and into contact with the extension 37 against which it is maintained by means of the nut 47 and washers 48. Similarly the lead 16 is attached to the extension 36. The cylindrical portion 24 is then positioned so that its shoulder 27 rests on the disc 31 and the flange 28 brought adjacent the shoulder 29 of the cylindrical portion 25. A suitable adhesive 32 insures a liquid-tight connection of the portions 24 and 25. In this manner the mercury switch is maintained on the disc 31 and the disc 31 maintained in the float 10.

It should be noted that the construction of the member 35 and its cup 40 and its relation to the member 34 through the spacer ring 42 is such that just a very slight tilting of the disc 31 results in the mercury 41 effecting an electrical contact between the members 34 and 35. It should be further noted that this contact will be maintained through substantially 360 degrees of movement of the switch for the globule of mercury 41 will ride between the members 34 and 35, against the spacer ring 42, until the switch again assumes the upright position indicated in Figure 3. Thus, not only is an electrical connection obtained by a very slight tilting of the float 10 but also such contact is maintained through a very large swinging movement of this float.

In operation, a float constructed in the manner just described is suspended by means of its cable 11 and conventional spring clip 12 from the wall 13 of a beer vat or the like. I refer to a beer vat because it is in the beer industry that my invention will be particularly useful. I understand that it is now the common practice in the filling of beer vats to simply check them from time to time, by means of a stick or other such object, in order to determine whether or not the tank is substantially full. Many of the vats or tanks having been in existence for a great many years, it is quite often not possible to supply the tank with presently known liquid level indicators without the expenditure of a great deal of time and money. The results of all this is that very often these vats are allowed to overflow with a resulting waste of expensive material. As above indicated, my float will simply be positioned with respect to the vat wall 13 at any desired distance into the vat. It is contemplated that one of these floats 10, cable 11 and plug 17 will be provided for each vat. A kit containing a socket 21, bell 19 and light 20 in series one with the other can then be plugged into a source of electrical current by the member 22. Two or three of such kits 18 will probably suffice to service a brewery. The portable kit 18 is simply taken to the vat which is being filled, plugged into an electrical source and then the plug 17 inserted into the socket 21. When the level of the beer rises within the vat to such an extent that the float 10 is tilted slightly, contact is made in the manner above described and the circuit is completed through the members 34, 35, leads 15, 16 and the bell 19 and light 20 to the electrical source, the bell 19 and light 20 thus serving to warn the operator that the vat has been filled to the desired level.

In order to insure that my float will be sensitive in operation, I have provided the upper end thereof with the weighted portion 26 and also, I have arranged the portions 24 and 25 in such manner that the disc 31, on which the switch is mounted, is located towards this upper weighted end of the float 10. By such arrangement my float 10 will be caused to tilt by liquid striking the portion 25 much more easily than if the upper portion 24 were not weighted and the switch located more nearly towards the center of the float 10.

When a vat is to be filled with beer, the operator will see that the float 10 is suspended at the correct distance, bring his portable kit 18 to that tank and plug it into a suitable source of electricity, and then insert the plug 17 into the socket 21. In this manner I have provided a very simple and convenient means for the proper servicing of a large number of vats within a brewery so that the waste now incurred due to an operator's lack of knowledge of the liquid content of a particular vat is eliminated. Not only does a slight movement of the float then result in the alarm being given, but also such alarm is not broken when the float is given a still greater movement. Thus, when the float assumes its extreme position, as happens when the liquid level is as shown in Figure 1 at 23, the contact between the plates 34 and 35 by the mercury 41 will still be maintained.

It is to be understood that modifications may be made in my invention without departing from the spirit or intent thereof, and it is to be further understood that I do not intend to be limited by the structure of the specific embodiment herein shown and described except insofar as that structure is set forth in the subjoined claims. Having thus described my invention what I claim as new and desire to protect by United States Letters Patent is:

1. In a liquid level indicator the combination of a float and a mercury switch, said float com-

prising two substantially cylindrical portions having interengaging flanges and shoulders, said switch being mounted within said float on a disc engaged by said flanges and shoulders, and a lead carrying cable fixed in an end of one of said cylindrical portions so as to suspend said float and switch therefrom, said cable being connected through its leads to terminals provided for said switch and to a source of electricity.

2. In a liquid level indicator the combination of a float and a mercury switch, said float comprising two substantially cylindrical portions having interengaging flanges and shoulders, said cylindrical portions being of substantially different lengths, the shorter of said portions being weighted at its end opposite from the said interengaging flanges and shoulders, a disc mounted within said float by means of said interengaging flanges and shoulders, said switch being mounted on the side of said disc nearest said weighted end, and a lead carrying cable fixed in said weighted end so as to suspend said float and switch therefrom, said cable being connected through its leads to terminals provided for said switch and to a source of electricity.

3. The device of claim 2 in which said float is suspended from said cable in a vertical position when not in contact with a body of liquid, said switch being then in open position, whereby a slight tilting of said float caused by its contact with a said body of liquid will actuate said switch to closed position.

CHARLES J. KOCH, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
842,082	Clayton	Jan. 22, 1907
1,129,051	Crooks	Feb. 16, 1915
1,244,634	Neff et al.	Oct. 30, 1917
2,107,525	Derby	Feb. 8, 1938
2,127,422	Phaneuf	Aug. 16, 1938
2,240,880	Bennett	May 6, 1941
2,298,178	Staley	Oct. 6, 1942
2,311,808	Bacon	Feb. 23, 1943
2,507,986	Liss	May 16, 1950