Jan. 20, 1942. A. F. SANDBERG 2,270,608

CIRCUIT CONTROLLER

Filed May 22, 1941

Fig. 1.

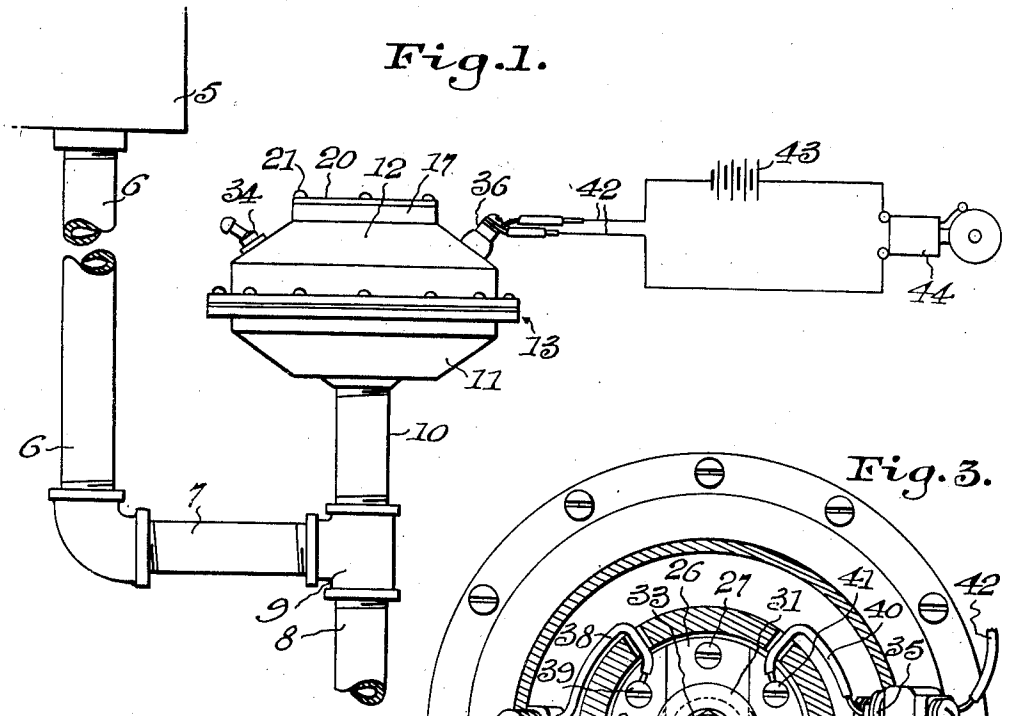


Fig. 3.

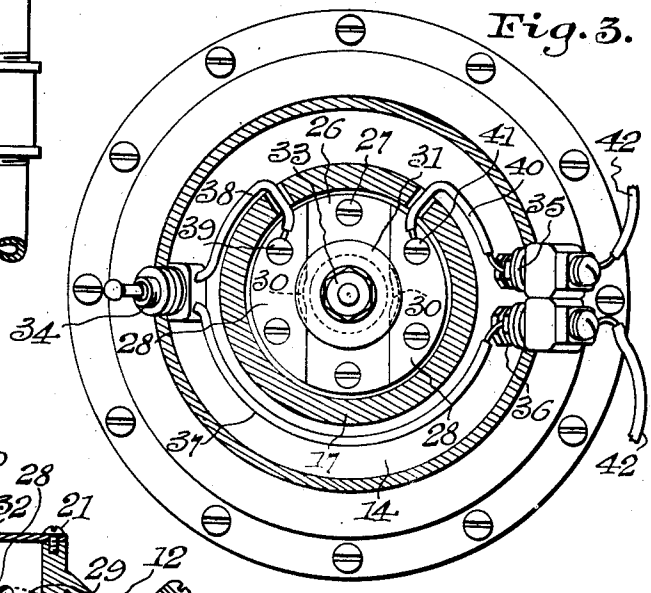
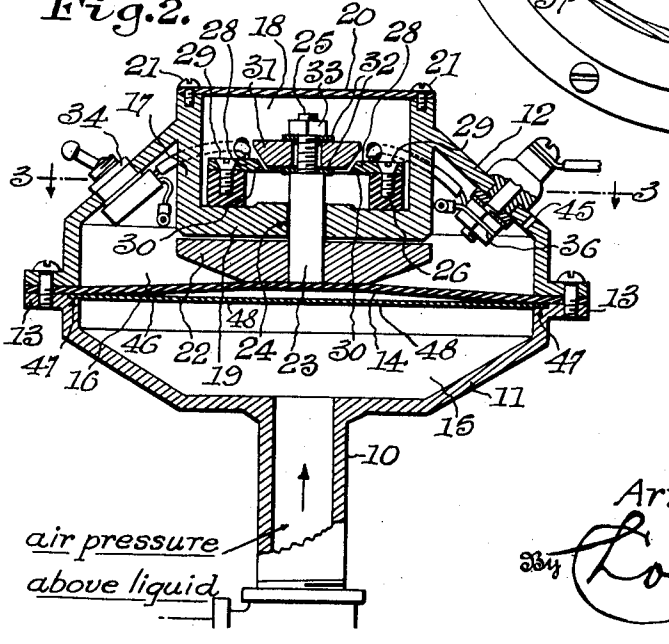


Fig. 2.



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CIRCUIT CONTROLLER

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6 Claims. (Cl. 200—83)

The invention relates generally to make and break switch equipments or electrical circuit controllers and it primarily seeks to provide certain new and useful improvements in the particular type of controller equipment illustrated in U. S. Letters Patent 2,199,677, issued on May 7, 1940, to Arthur F. Sandberg.

While the invention is, of course, adapted to many and varied other uses, it is particularly designed for use in connection with machinery employed in filling measured quantities of flavoring syrup into soda beverage bottles and operates in combination with an alarm and a connected electrical circuit controlled thereby to warn an operator of the necessity of refilling the syrup feed source, the alarm being given a sufficient time in advance of complete evacuation of the feed line to enable the operator to refill the supply without interfering with the continued filling of the bottles with the desired mixture of syrup and water.

In the case of such machines, the bottles are passed along in regular succession and are automatically fed the desired amount of soda water and syrup, and in the event that the syrup line should suddenly run dry, a number of bottles will have passed on containing only the soda water without any syrup, before the operator has discovered the error, whereupon he must stop the machine, refill the syrup supply, and discard the bottles which have been filled with water alone. The present invention, as above-mentioned, overcomes these defects.

In its more detailed nature the invention resides in providing a novel, pressure operated circuit controller comprising a casing composed of upper and lower sections having a diaphragm clamped therebetween and movable upwardly by fluid pressure in the syrup supply system and acting upwardly thereagainst, an encasing well formed integrally in the upper section, fixed and movable contact means mounted in the well, means for connecting the contact means in an alarm circuit, and a stem carrying the movable contact means and movable with the diaphragm for breaking or making the alarm circuit accordingly as the diaphragm is lifted or lowered in response to fluid pressure.

Another object of the invention is to provide a novel controller structure of the character stated in which the fixed contact means comprises a pair of parallel spaced plates having partially coniform seats in the opposed edges thereof, and said movable contact means comprises a coniform head loosely carried by the stem for self-seating engagement with said seats.

Another object of the invention is to provide a novel controller structure of the character stated in which the stem carries a large area weight body at its lower end and rests upon but is not secured to said diaphragm.

With the above and other objects in view which will more fully appear, the nature of the invention will be more clearly understood by following the description, the appended claims, and the several views illustrated in the accompanying drawing.

In the drawing—

Figure 1 is a somewhat diagrammatic side elevation illustrating the invention connected in a liquid supply line and with an audible alarm.

Figure 2 is an enlarged detail central vertical section illustrating the invention.

Figure 3 is a horizontal section taken on the line 3—3 on Figure 2.

In the example of embodiment of the invention herein illustrated, there is shown a syrup or other liquid supply tank 5 from which the liquid flows through a vertical pipe 6 and a horizontal pipe 7 into another vertical delivery pipe 8, the pipes 7 and 8 being connected by a T-coupling 9, to the upper or vertically disposed tap or internally threaded end of which is removably threaded the lower end of a stand pipe 10 forming part of the novel circuit controller comprising the present invention.

The novel circuit controller includes the stand pipe 10 and a casing composed of lower and upper generally coniform casing sections 11 and 12 including opposed flange portions removably secured together as at 13. A flexible diaphragm 14 of rubber or other suitable flexible material is clamped between the casing section flanges in the manner clearly indicated in Figures 1 and 2 of the drawing and serves to divide the casing into a lower pressure chamber 15 and an upper chamber 16.

The upper casing section 12 has a well 17 formed integrally therein, and this well depends into the upper casing chamber 16 in the manner illustrated in Figure 2. The well forms a switch chamber 18 and is defined at its bottom by a bottom wall 19, and at its top by a closure plate 20 removably secured thereon as at 21.

Within the space above the diaphragm 14 and beneath the well bottom wall 19, there is mounted a large area weight body 22, said body being affixed to the lower end of a stem 23 which is vertically slidable in a bore 24 formed in the

bottom wall 19, the upper end of the stem thus being movable within the switch chamber 18. It will be noted that the lower extremity of the stem and the weight body 22 rest upon but are not attached to the diaphragm 14.

The upper extremity of the stem 23 is reduced and externally threaded, as at 25, and the end of the portion of the stem which extends into the switch casing 18 is surrounded by an insulator ring 26 which is secured, as at 27, to the well bottom wall 19. See Figures 2 and 3. Two contact bars or plates 28 are secured, as at 29, in parallel spaced relation upon the ring 26, and the opposed edge portions of these contact plates or bars are provided with partially coniform seats 30. The seats 30 are engageable by a coniform movable contact head or ring 31 which is loosely mounted upon the stem portion 25 between insulator washers 32, this loose assembly being secured by a nut 33.

A manually operable toggle switch 34 is removably secured to the upper casing section 12 at one side thereof, and two contact members 35 and 36 are removably secured to the casing at the opposite sides thereof to facilitate connection of the controller unit in a suitable alarm circuit. A conductor wire 37 joins one of the contacts 36 with one terminal of the switch 34 and the other terminal of the switch 34 is connected by a conductor wire 38 with one of the contact plates or bars 28, the connection being made as at 39. The other contact plate 28 is connected, as at 41, with a conductor wire 40 which in turn is connected with the other of the contacts 35.

Suitable conductor wires 42 connect the contacts 35 and 36 with a source of current 43 and an audible alarm 44. It will be obvious that when the switch 34 is set to open electrical communication through the wires 37 and 38 and whenever the movable contact member 31 is lowered to contact with the contact plates 28, the audible alarm 44 will be sounded. It will be equally obvious that when the circuit has been thus completed to effect a sounding of the audible alarm 44, manual actuation of the switch 34 to break the circuit through the wires 37 and 38 will discontinue the sounding of the alarm despite the fact that the contact member 31 might still be in contact with the contact plates 28.

So long as a proper supply of liquid is contained in the tank 5 and the supply lines 6, 7 and 8, air pressure will be trapped and maintained in the stand pipe 10 and the pressure chamber 15 beneath the diaphragm 14. This pressure is normally effective to lift the diaphragm in the manner illustrated in Figure 2 and thus hold the movable contact member 31 out of contact with the plates 28, thereby to break the alarm circuit. Whenever the supply of liquid falls below a desired level, the air pressure in the chamber 15 will be relieved to an extent for permitting the weighted stem 23 to move downwardly and permit the movable contact member 31 to engage the contact plates 28 and complete the alarm circuit thereacross in the manner hereinbefore described. The alarm thus initiated will continue to sound until the supply of liquid is replenished in the tank 5 or the operator shifts the switch 34 to break the alarm circuit in the manner aforesaid.

It is particularly advantageous to provide the well structure 17, 19, 20, for by this means the circuit controlling elements are protected against collection of dust and dirt and yet are readily accessible through the removable cover plate 20. It is also quite advantageous to provide the particular form of movable contact member 31 herein illustrated and to loosely mount the same so that it can have free, self-seating contact with the seats 30 on the contact members 28. The particular formation and positioning of the large weight body 22 makes it possible for this body and the stem to rest upon the diaphragm without connection thereto, and the life of the diaphragm is thus increased and leakage about the usual stem connection is entirely eliminated.

The upper chamber 16 is open to atmosphere through a venting aperture 45 so as to permit a measure of breathing incident to the movements of the diaphragm and the resultant variations in the capacity of said chamber.

Upward movement of the diaphragm, effective to break the alarm circuit as hereinbefore described, is limited by the positioning of the large area weight body 22. It is also desirable that downward movement of the diaphragm be limited because if this diaphragm were to be drawn down an excessive amount its return to its normal position might result in entry of the syrup or other liquid into the lower chamber 15, which would be objectionable. Therefore a supporting element is disposed beneath the diaphragm to limit its downward movement. An example of such a support is illustrated in Figure 2 in which a plate 46 is disposed horizontally beneath the diaphragm on a seat 47 provided therefor in the lower casing section 11. The plate is perforated as at 48 so as to allow the air under pressure in the lower chamber 15 to control and lift the diaphragm. Obviously other forms of diaphragm supporting means can be provided within the scope of the invention.

It is of course to be understood that the details of structure and arrangement of parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim:

1. A pressure operated circuit controller comprising a casing composed of upper and lower sections, a diaphragm secured between the sections and dividing the casing into an upper chamber and a lower pressure chamber the pressure wherein normally tends to lift the diaphragm, a casing well formed in the upper section and depending into the upper chamber and defined at its bottom by a bottom wall wholly within the chamber and spaced above the diaphragm and at its top by a removable cover plate, fixed contact members mounted in spaced relation in said well and on said bottom wall and adapted to be connected in an electrical circuit, said well bottom wall having a bore therethrough, a stem slidable in said bore and engaging the diaphragm at its lower end and having its upper end extended into the well, and a contact making and breaking head movable with the stem in the well for closing the circuit across the fixed contacts or breaking the same accordingly as the diaphragm is lowered by failure of normal pressure in the pressure chamber or raised by presence of said normal pressure.

2. A pressure operated circuit controller as defined in claim 1, in which said fixed contacts include partially coniform seats in opposed edge portions thereof, and in which said contact making and breaking head comprises a coniform ring loosely mounted on the stem so as to be free to have self-seating engagement in said seats.

3. A pressure operated circuit controller as defined in claim 1, in which a large area weight

is affixed to the lower end of the stem and with said stem rests upon but is not attached to said diaphragm.

4. A pressure operated circuit controller as defined in claim 1, in which said fixed contacts include partially coniform seats in opposed edge portions thereof, in which said contact making and breaking head comprises a coniform ring loosely mounted on the stem so as to be free to have self-seating engagement in said seats, and in which a large area weight is affixed to the lower end of the stem and with said stem rests upon but is not attached to said diaphragm.

5. A pressure operated circuit controller as defined in claim 1, in which a large area weight is affixed to the lower end of the stem and with said stem rests upon but is not attached to said diaphragm, and in which means supported by said lower casing section is disposed close beneath the diaphragm and limits downward movement thereof by gravity action of said weight upon failure of said normal pressure.

6. A pressure operated circuit controller as defined in claim 1, in which a large area weight is affixed to the lower end of the stem and with said stem rests upon but is not attached to said diaphragm, and in which a perforated plate supported by said lower casing section is disposed close beneath the diaphragm and limits downward movement thereof by gravity action of said weight upon failure of said normal pressure.

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