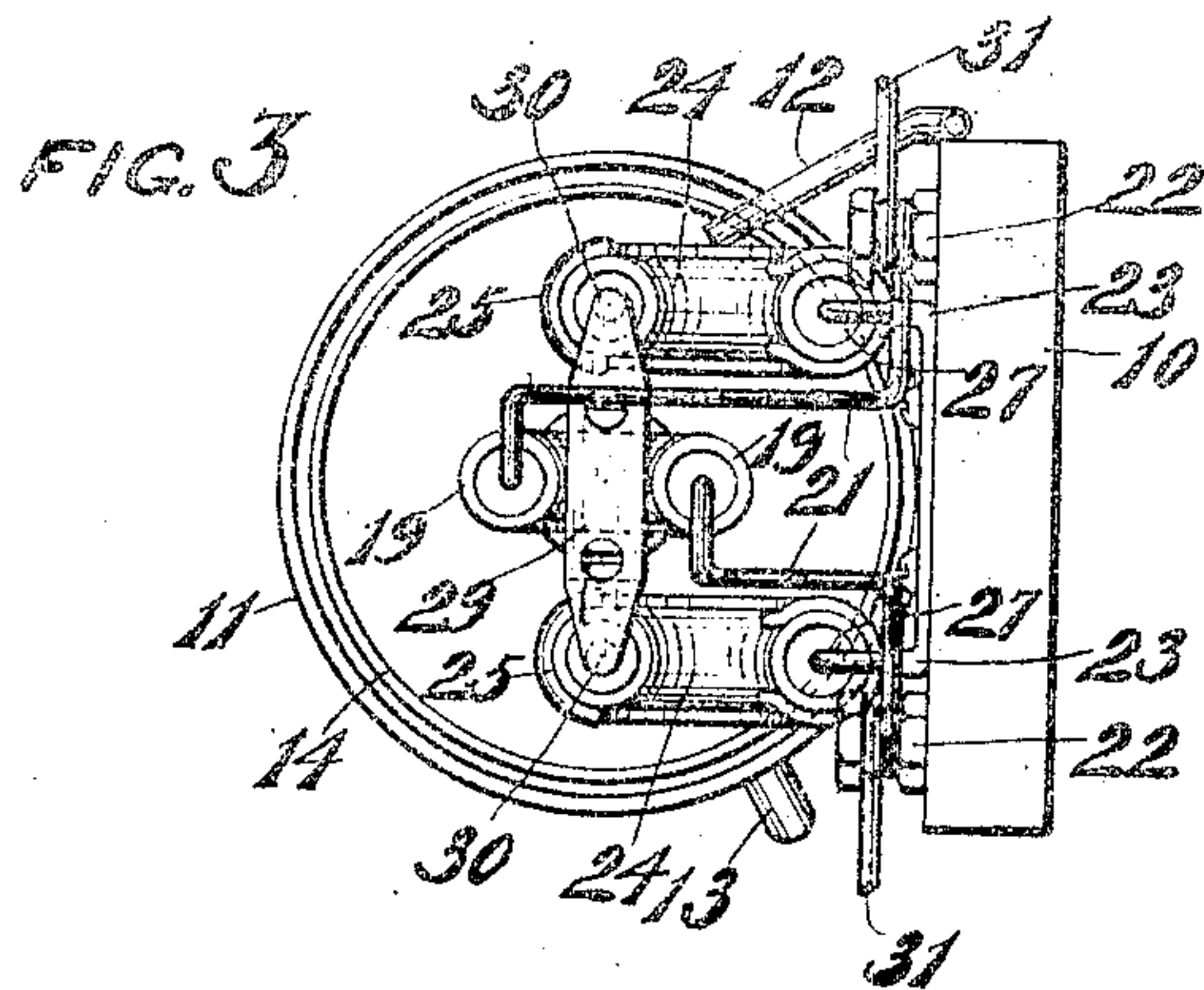
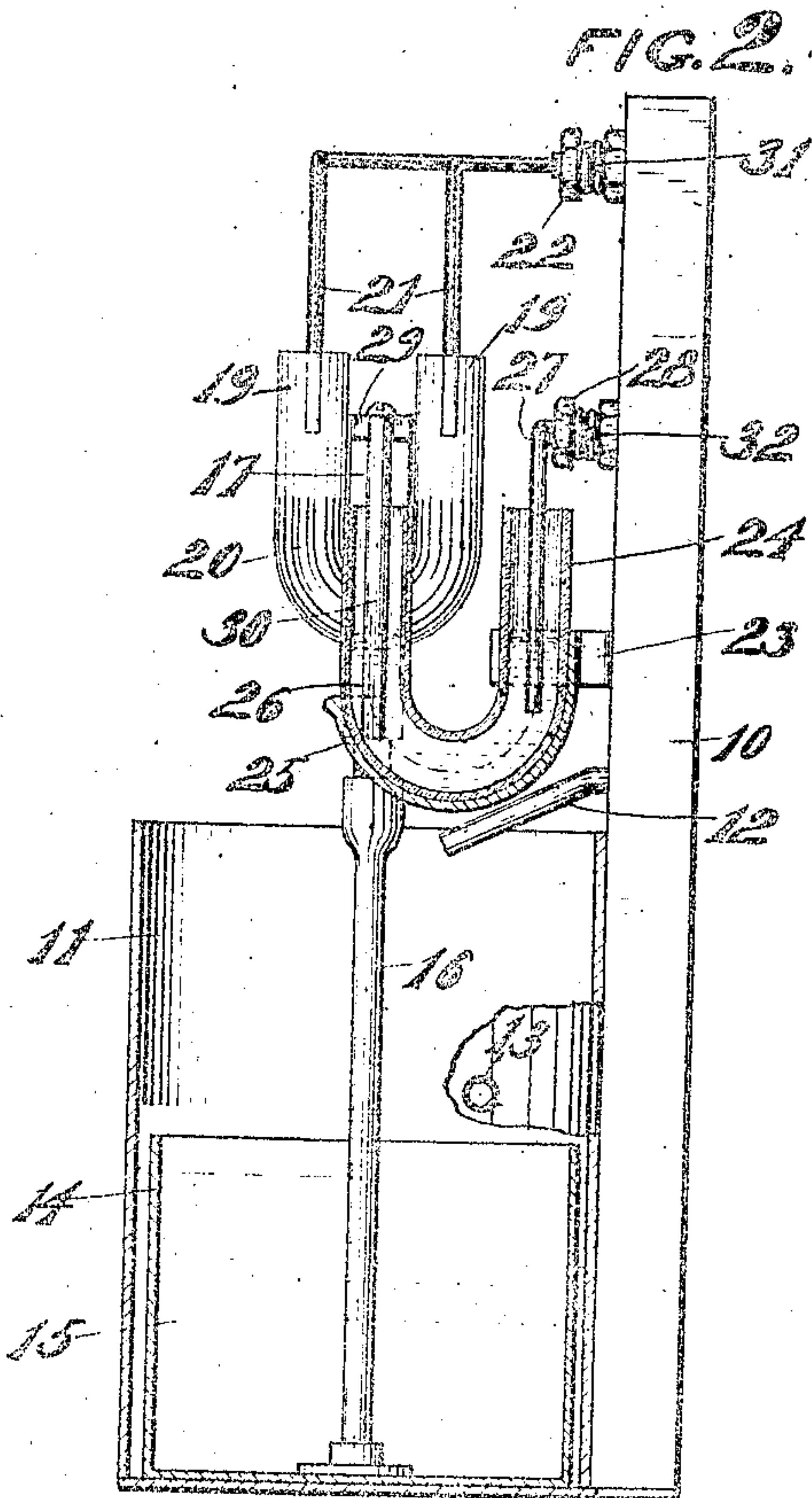


940,408.

Patented Nov. 16, 1909.



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# UNITED STATES PATENT OFFICE.

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## DOUBLE-ACTING SWITCH.

940,408.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed December 7, 1908. Serial No. 466,380.

*To all whom it may concern:*

Be it known that I, CLARENCE J. SPELLMAN, residing in Wauwatosa, in the county of Milwaukee and State of Wisconsin, have  
5 invented new and useful Improvements in Double-Acting Switches, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

10 This invention has for its object to provide an automatic switch to be operated by a change of conditions, such as the relative buoyancy of a float when empty and when  
15 liquid bath to complete an electrical circuit and at the same time move a liquid bath from stationary contacts to break an electrical circuit.

Another object of the invention is to improve upon details of construction of an automatic double acting switch of this type.

With the above and other objects in view the invention consists in the automatic double acting switch herein described and  
25 claimed, its parts and combinations of parts, and all equivalents.

Referring to the accompanying drawings in which like characters of reference indicate the same parts in the different views; Figure  
30 1 is a front elevation partly in section of a double acting switch constructed in accordance with this invention; Fig. 2 is a sectional elevation thereof; and Fig. 3 is a plan view thereof.

35 In these drawings 10 indicates a base which may be of any desirable insulating material on which a receptacle 11 is mounted, there being a supply pipe 12 for discharging a liquid, such as water, into the  
40 receptacle and an overflow 13 to prevent the liquid rising above a predetermined level therein. An open float 14 is supported by the liquid 15 in the receptacle and is in position to receive the liquid discharged from  
45 the supply pipe 12 so that when the liquid is admitted it serves to fill the float which therefore loses its buoyancy and sinks to the bottom of the receptacle as shown in Fig. 2.

A stem 16 is carried by the float 14 and has  
50 mounted on its upper end a yoke 17 which may be of metal, there being an insulating block 18 between the yoke and the stem. The yoke 17 embraces the bend of a U-shaped glass tube 19 containing a quantity  
55 of mercury 20 or other liquid to form a con-

tact bath, there being a pair of contact wires 21 supported by binding posts 22 on the base 10 and depending into the end of the tube 19 to dip into the bath 20 when the float is in its upper position, as shown in Fig. 1, and  
60 to clear the bath when the float is in its lower position as shown in Fig. 2.

Metal clips 23 are fastened to the base 10 in any desirable manner and embrace the rear arms of a pair of U-shaped glass tubes 24, there being curved strips 25 extending  
65 forwardly from the clips to form concave pockets or seats into which the tubes 24 fit to be held firmly in place. There is a quantity of mercury 26 or other liquid to form a  
70 contact bath in each of the tubes 24 and stationary contact wires 27 mounted on binding posts 28 of the base project into this bath in the rear arms of the tubes 24. A  
75 cross piece 29 is mounted on the upper ends of the yoke 17 and has downwardly extending contact arms 30 entering the front arms of the U-shaped tubes 24 and clearing the mercury therein, as shown in Fig. 1, when  
80 the float is in its upper position, but dipping into the mercury when the float is in its lower position, as shown in Fig. 2.

The binding posts 22 have connecting wires 31 leading from them constituting the terminals of an electrical circuit which is  
85 normally closed and the binding posts 28 have connecting wires 32 leading from them and constituting the terminals of a normally open electrical circuit. The normally closed electrical circuit 31 may in-  
90 clude a signal which will be operated upon the circuit being opened or it may include any operative device such as a motor for pumping water into a tank from which the pipe 12 is the overflow. Likewise the nor-  
95 mally open electrical circuit 32 may include a signaling means to be operated upon the float being lowered to give an alarm requiring the presence of an attendant to restore the parts to their normal position and to  
100 render such other attention as the apparatus with which the invention is associated may require.

The construction of the means for operating the switch herein shown and described  
105 is such that it may not be restored to its normal condition after having been operated by filling the float with water until the float is raised and the water therein is removed by  
110 a suction pump of any desirable construc-



tion, the water being preferably drawn from the float and returned to the receptacle 11. When this has been accomplished the float will remain in its upper position and again maintain the contacts in their normal relations, with the electrical circuit 31 closed and the electrical circuit 32 open until the recurrence of the abnormal conditions which cause a flow of liquid through the pipe 12 and into the float, when the circuit 31 will be again opened and the circuit 32 closed to perform their intended functions.

The waste pipe 13 carries off all surplus liquid and maintains the predetermined level of liquid in the receptacle 11, and should the liquid in the receptacle 11 have its level lowered by evaporation or through a leak, the lowering of the float will cause the operation of the respective switches to give the alarm and require the presence of an attendant who can make the necessary repairs.

Obviously the invention does not depend upon the particular means shown and described for operating the switches, as a diaphragm or a tight working piston may be substituted for the float, it being only necessary that the switch parts are automatically given the desired movement to accomplish their functions upon the occurrence of abnormal conditions, whether by producing a flow of liquid or otherwise, and other variations may be made in the details of construction without departing from the spirit and scope of the invention.

What I claim as my invention is:

1. A double acting electric switch, comprising a pair of stationary mercury cups, a suitably operated member carrying a third mercury cup and depending contact arms to dip within the pair of mercury cups, and stationary contacts to dip within the third mercury cup when the member is moved to withdraw the contact arms from contact with the mercury in the pair of cups.

2. A double acting electric switch for controlling two electric circuits, closing one circuit when it opens the other, comprising a pair of stationary mercury cups, a suitably operated member, a U-shaped mercury cup carried by the member, stationary contacts forming terminals of an electric circuit and projecting into the ends of the U-shaped mercury tube to be connected by the mercury therein when the member is raised, a pair of contact arms carried by the member and extending into the pair of stationary mercury cups to be dipped into the mercury thereof when the member is lowered, and contacts making connection with the mercury in the pair of mercury cups and forming the terminals of another electric circuit.

3. A double acting electric switch for controlling two electric circuits, closing one circuit when it opens the other, comprising a pair of stationary U-shaped mercury cups, a suitably operated yoke member, a U-shaped mercury tube carried in the crotch of the yoke member, stationary contacts forming terminals of an electric circuit and projecting into the ends of the U-shaped mercury tube to be connected by the mercury therein when the yoke member is raised, a cross bar mounted on the ends of the yoke member and forming depending contact arms extending into one arm of each of the stationary U-shaped mercury cups to be dipped into the mercury thereof when the yoke member is lowered, and contact wires dipping into the mercury in the other arms of the pair of U-shaped mercury cups and forming the terminals of another electric circuit.

4. A double acting electric switch for controlling two electric circuits, closing one circuit when it opens the other, comprising a base, spring clips thereon having curved projecting tube seats, a pair of U-shaped tubes fitting in the clips and on the tube seats and constituting mercury cups, a terminal wire dipping into the mercury in one arm of each of the mercury cups, a receptacle, means for supplying liquid to the receptacle and for drawing the liquid from the receptacle at a predetermined level, a float within the receptacle, a stem on the float, a yoke member carried by the stem and insulated therefrom, a U-shaped mercury cup carried in the crotch of the yoke member, a cross piece mounted on the ends of the yoke member and forming depending contact arms extending into the other ends of the pair of U-shaped tubes and dipping into the mercury thereof when the float sinks, and a pair of contact wires extending into the ends of the U-shaped mercury cup to be connected by the mercury therein when the float is in its upper position and to be out of contact with the mercury when the float sinks.

5. A double acting electric switch, comprising a stationary mercury cup, a suitably operated member carrying a second mercury cup and a depending contact arm to dip within the first mercury cup, and a stationary contact to dip within the second mercury cup when the member is moved to withdraw the contact arm from contact with the mercury in the first mercury cup.

In testimony whereof, I affix my signature, in presence of two witnesses.

CLARENCE J. SPELLMAN.

Witnesses:

C. H. KEENEY,

ANNA F. SCHMIDTBAUER.