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FLOAT-ACTUATED MAGNETIC SWITCH

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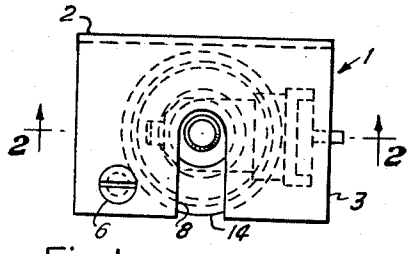


Fig. 1

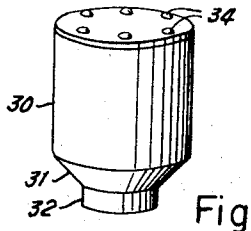


Fig. 5

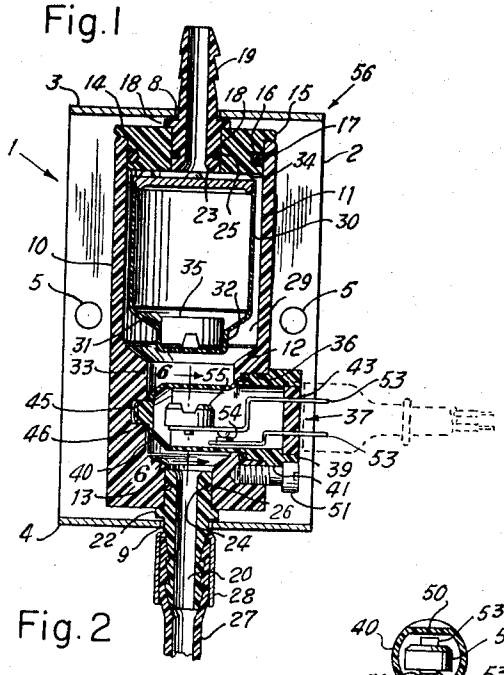


Fig. 2

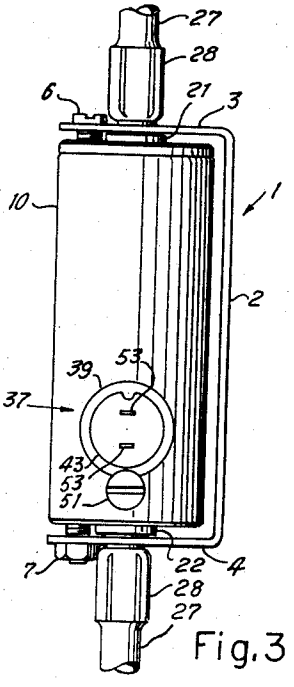


Fig. 3

Fig. 6

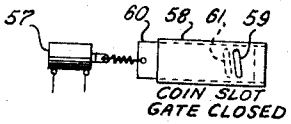


Fig. 8

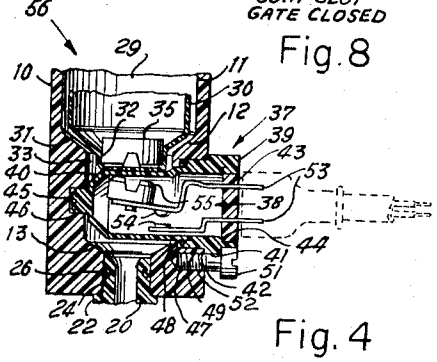


Fig. 4

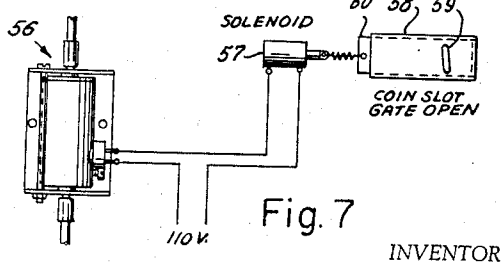


Fig. 7

INVENTOR

Jack J. Booth

William C. Branch

BY Cecil L. Wood

ATTORNEY

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FLOAT-ACTUATED MAGNETIC SWITCH

Jack J. Booth and William C. Branch, Dallas, Tex.

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8 Claims. (Cl. 200—84)

This invention relates to a float-actuated magnetic switch, and it concerns more particularly a float-actuated magnetic switch which is peculiarly adapted for use in a beverage-dispensing unit.

An object of the invention is to provide, in a coin-operated beverage dispensing unit having a fluid conduit for dispensing beverages therefrom and coin-operable means controlling the discharge of beverages from the unit through the conduit, the coin-operable means including a coin receiving slot, a solenoid actuated gate in the coin receiving slot adapted to prevent the insertion of coins therein, and an electrical circuit including the solenoid and a float actuated magnetic switch, operable in response to the presence of liquid in the conduit, adapted to break the circuit whereby the solenoid is de-energized, and the gate in the coin-receiving slot is closed, in the absence of liquid in the conduit.

The invention will be readily understood by referring to the following description and the accompanying drawing, in which:

Figure 1 is a top plan view of a float-actuated magnetic switch embodying the invention;

Figure 2 is a sectional elevational view taken on the lines 2—2 of Figure 1, showing the switch in its closed position;

Figure 3 is a side elevational view;

Figure 4 is a fragmentary view similar to Figure 2, showing the switch in its open position;

Figure 5 is a perspective view of the float;

Figure 6 is a fragmentary sectional elevational view taken on the lines 6—6 of Figure 2;

Figure 7 is an electrical diagram of the switch as applied to a coin-operated beverage dispensing unit, showing the gate in the coin receiving slot in its open position; and

Figure 8 is a fragmentary view similar to Figure 7, showing the gate in its closed position.

Referring to Figures 1 to 6 of the drawing, the numeral 1 designates a bracket which advantageously may be formed in one piece of sheet metal characterized by its resilience. The bracket 1 has a vertically disposed intermediate portion, indicated by the numeral 2, and horizontally disposed top and bottom portions which are numbered 3 and 4, respectively. The intermediate portion 2 has a pair of openings 5 therein for the insertion of fastening devices whereby the bracket 1 may be attached to a supporting surface.

The bracket 1 may be attached to an inner wall of the cabinet of a beverage-dispensing unit, for example. A bolt 6 is inserted through aligned openings provided therefor in the top and bottom portions 3 and 4, in parallel, spaced relation to the intermediate portion 2, and has a nut 7 applied thereto, whereby the top and bottom portions 3 and 4 are prevented from being spread apart.

U-shaped indentations 8 and 9 are formed in the top and bottom portions 3 and 4, respectively, beginning at

the edges thereof opposite the intermediate portion 2, for use as hereinafter described.

A switch housing includes a vertically disposed cylinder 10 has a central bore 11. The diameter of the bore 11 at its upper end approaches the outside diameter of the cylinder 10. The diameter of the bore 11 is reduced below the mid-point of the cylinder 10 to form an upwardly and outwardly tapered, upwardly facing internal shoulder 12. The diameter of the bore 11 is further reduced adjacent its lower end to form an upwardly and outwardly curved, upwardly facing internal shoulder 13.

A plug 14 is received in the upper end of the bore 11. The plug 14 has a radially outwardly extending peripheral flange 15 which engages the upper end of the cylinder 10 to limit the downward movement of the plug 14 relative to the cylinder 10. A peripheral groove 16 is formed in the plug 14 below the flange 15. A resilient O ring 17, which is received in the groove 16, yieldably engages the wall of the bore 11 and forms a seal between the cylinder 10 and the plug 14.

A central bore 18 is formed in the plug 14. The diameter of the bore 18 is the same as that of the lower end of the bore 11, below the internal shoulder 13. A tubular fitting 19 has an end portion which is received in the bore 18, and extends upwardly therefrom. A tubular fitting 20 has an end portion which is received in the lower end of the bore 11, and extends downwardly therefrom.

The tubular fittings 19 and 20 have radially outwardly extending peripheral flanges 21 and 22, respectively, intermediate their ends. The under side of the flange 21 engages the top side of the plug 14 to limit the downward movement of the fitting 19 relative to the plug 14. The top side of the flange 22 engages the lower end of the cylinder 10 to limit the upward movement of the fitting 20 relative to the cylinder 10.

Peripheral grooves 23 and 24 are formed in the fittings 19 and 20, below the flange 21 and above the flange 22, respectively. Resilient O rings 25 and 26, which are received in the grooves 23 and 24, respectively, yieldably engage the walls of the bores 18 and 11, respectively, and form seals between the fitting 19 and the plug 14, and between the fitting 20 and the cylinder 10, respectively.

The fittings 19 and 20 are received in the U-shaped indentations 8 and 9 of the top and bottom portions 3 and 4, respectively, of the bracket 1. The top side of the flange 21 and the under side of the flange 22 are yieldably engaged by the top and bottom portions 3 and 4 on opposite sides of the indentations 8 and 9, respectively, whereby the cylinder 10 is retained in the bracket 1.

The cylinder 10, the plug 14, and the tubular fittings 19 and 20 advantageously may be formed of transparent plastic material. The ends of the tubular fittings 19 and 20 opposite the plug 14 and the lower end of the cylinder 10, respectively, are knurled for engagement by adjoining sections of a fluid conduit 27, which advantageously may be formed of flexible plastic material and may be employed in a beverage dispensing unit, for example, for dispensing beverages therefrom. Ferrules 28 are applied to the joints between the tubular fittings 19 and 20 and the conduit 27.

The upper portion of the bore 11, above the internal shoulder 12, comprises a float chamber 29. A float 30, which is a hollow, cylindrical body, closed at its ends, having a shape conforming generally to that of the chamber 29, but of smaller dimensions, is received in the chamber 29. The float 30 is substantially shorter, and of smaller diameter, than the chamber 29, so that a fluid passage is provided through the chamber 29, around the float 30.

An upwardly and outwardly tapered, downwardly

facing external shoulder 31 is formed on the lower end of the float 30 for engagement with the upwardly facing internal shoulder 12 in the lowermost position of the float 30. A depressed central portion 32, which is formed on the lower end of the float 30, extends downwardly below the external shoulder 31 and is receivable in the reduced intermediate portion of the bore 11, between the internal shoulders 12 and 13, which is indicated by the numeral 33.

The diameter of the depressed central portion 32 of the float 30 is substantially smaller than that of the intermediate portion 33 of the bore 11, so that a fluid passage is provided through the intermediate portion 33, around the depressed portion 32.

A plurality of circumferentially spaced projections 34 extend upwardly from the top of the float 30, for engagement with the under side of the plug 14 in the uppermost position of the float 30. The projections 34 serve as spacers whereby a fluid passage is provided between the under side of the plug 14 and the top of the float 30.

A downwardly facing horseshoe magnet 35, which has a shape conforming generally to the shape of the depressed central portion 32 of the float 30, is received in the depressed portion 32, for use as hereinafter described.

A transverse bore 36, which is formed in one side of the cylinder 10, communicates with the intermediate portion 33 of the bore 11. A capsule or switch enclosure 37, which contains a switch 38, as hereinafter described, is inserted in the transverse bore 36 and extends into the intermediate portion 33.

The capsule 37 consists of a substantially cylindrical element 39, closed at its inner end 40, which is thin walled, and thickened at its outer end 41, which is flanged at 42 for engagement with the peripheral surface of the cylinder 10 and has a disc-like closure 43 received therein. The peripheral surface of the closure 43 frictionally engages the inner wall of the element 39, and the inner face of the closure 43 abuts an outwardly facing internal shoulder 44 formed on the inner wall of the element 39 to thereby limit the inward movement of the closure 43 relative to the element 39.

A lug 45, which is formed on the inner end of the element 39 and comprises a longitudinal extension thereof, is received in a socket 46 provided therefor in the inner wall of the intermediate portion 33.

A resilient O ring 47 surrounds the inner end 40 of the element 39, and is positioned between an outwardly facing internal shoulder 48, which is formed in the transverse bore 36, and an external shoulder 49 formed by the thickened outer end 41 of the element 39.

The inner end 40 of the element 39 is flattened on its upper side, as at 50, for use as hereinafter described.

A set screw 51, which is received in a threaded opening 52 provided therefor in the side wall of the cylinder 10, engages the flange 42 whereby the element 39 is secured in the transverse bore 36.

The switch 38 includes a pair of metal strips 53, characterized by their resilience, which are disposed one above the other within the capsule 37. The strips 53 are bent angularly intermediate their ends and have horizontally disposed end portions and vertically disposed intermediate portions. The respective end portions and intermediate portions are disposed in parallel spaced relation to each other along the longitudinal center line of the capsule 37.

Adjacent end portions of the respective strips 53 extend outwardly through openings provided therefor in the closure 43, for engagement by lead wires, shown in dotted lines, whereby the switch 38 may be connected in an electrical circuit, as hereinafter described. A pair of mutually opposed electrical contacts 54, which are normally closed, are formed on the inner end portions of the respective strips 53.

An upwardly facing horseshoe magnet 55, which is circular in horizontal section, is attached to the top side of the uppermost strip 53 adjacent its inner end. The magnet 55 is positioned directly below the magnet 35, and the arrangement is such that the magnet 55 is attracted by the magnet 35, in the lowermost position of the float 30, whereby the adjacent end of the uppermost strip 53 is deflected upwardly, and the contacts 54 are disengaged whereby the electrical circuit in which the switch 38 is connected is broken.

In the operation of the float-actuated magnetic switch above described, fluid is passed upwardly through the conduit 27, the tubular fittings 19 and 20 and the bore 11, whereby the float 30 rises in the chamber 29 and the magnet 35 is retracted relative to the magnet 55, and the magnet 55 is released, to thereby close the contacts 54.

Referring to Figures 7 and 9 of the drawing, the float-actuated magnetic switch above described, which is indicated generally by the numeral 56, is connected in an electrical circuit which includes a solenoid 57. The numeral 58 indicates an element having a coin-receiving slot 59 therein.

A gate 60, which is slidable relative to the element 58 and has a slot 61 therein adapted to register with the slot 59, is operatively connected to the armature of the solenoid 57 whereby the slots 59 and 61 are movable in registration with each other, to thereby permit coins to be inserted therein, upon energizing the solenoid 57.

In a beverage-dispensing unit having a fluid conduit, such as the conduit 27, for dispensing beverages therefrom, and a coin-receiving slot such as the slot 59, the float-actuated magnetic switch 56 advantageously may be used, in combination with the solenoid-operable gate 60, to prevent the insertion of coins in the slot 59 in the absence of fluid in the conduit 27 sufficient to lift the float 30.

The invention may be modified in various way without departing from the spirit and scope thereof.

What is claimed is:

1. A float-actuated magnetic switch including, a sealed housing having a float chamber therein, a float in the chamber, a magnet carried by the float, a liquid inlet to the chamber, a liquid outlet from the chamber, a sealed switch enclosure removably positioned in the float chamber, a magnetic switch in the switch enclosure, and electrical leads extending from the switch enclosure externally of the sealed housing.

2. A float-actuated magnetic switch as set forth in claim 1 wherein the switch enclosure extends transversely of the float chamber and projects laterally and externally of the sealed housing, and means for maintaining the switch enclosure in position within the housing.

3. A float-actuated magnetic switch as set forth in claim 1 wherein the sealed housing includes an upper closure member having a slip fit with the upper end of the housing and a sealing ring between the closure member and the housing.

4. A float-actuated magnetic switch as set forth in claim 1 wherein the liquid inlet comprises a first nipple projecting from one end of the housing and having a slip fit therewith, the liquid outlet comprises a second nipple projecting from the other end of the housing and having a slip fit therewith, and sealing rings between the first and second nipples and the housing.

5. A float-actuated magnetic valve as set forth in claim 4, and means for clamping the nipples to the housing.

6. A float-actuated magnetic valve as set forth in claim 4, and a mounting bracket for the switch having a pair of spaced top and bottom portions engaging the first and second nipples, the clamping means including means for urging the top and bottom portions of the bracket toward one another to clamp the nipples to the housing.

7. A float-actuated magnetic valve as set forth in claim 6, wherein the sealed housing includes an upper closure member having a slip fit with the upper end of the housing and carrying one of the nipples, and a sealing ring between the closure member and the housing, the closure

member being clamped to the remainder of the housing by the means for urging the top and bottom portions of the mounting bracket toward one another.

8. A float-actuated magnetic valve as set forth in claim 6 wherein the top and bottom portions of the mounting bracket are formed with transverse notches for receiving the nipples so as to permit lateral withdrawal of

the housing and nipples from the bracket with only partial loosening of the clamping means.

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