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2,906,834

FLOAT OPERATED SWITCH

Filed Feb. 14, 1958

2 Sheets-Sheet 1

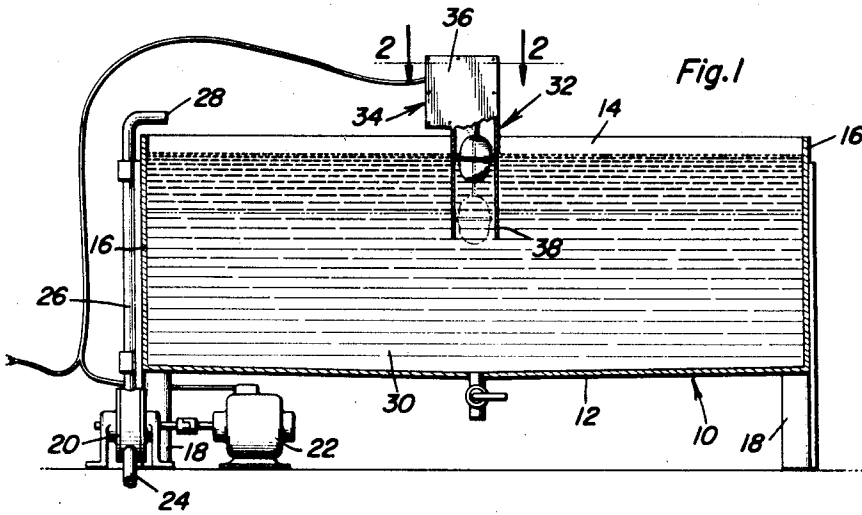


Fig. 1

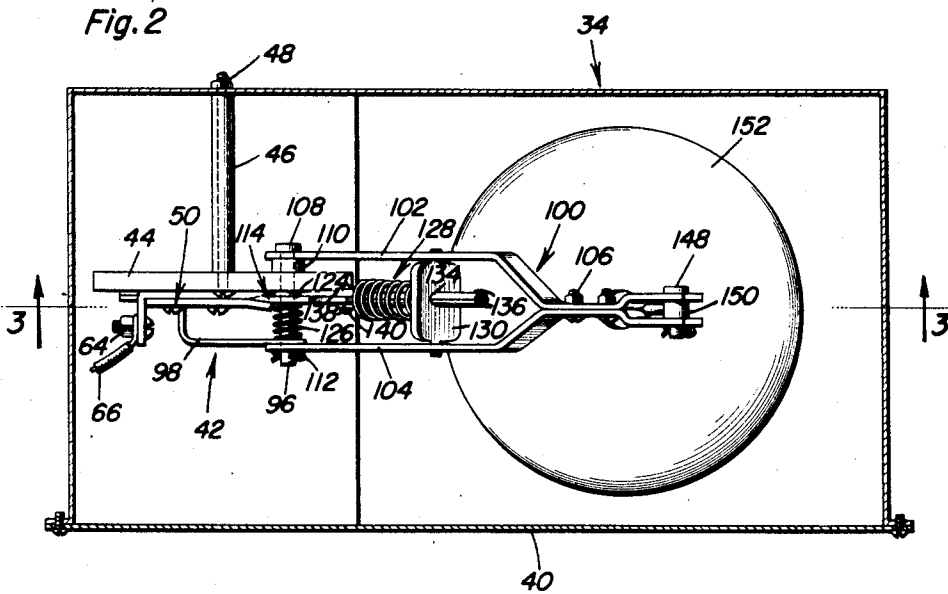


Fig. 2

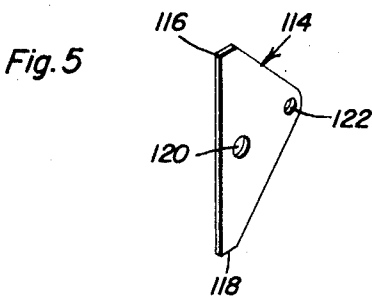


Fig. 5

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2 Sheets-Sheet 2

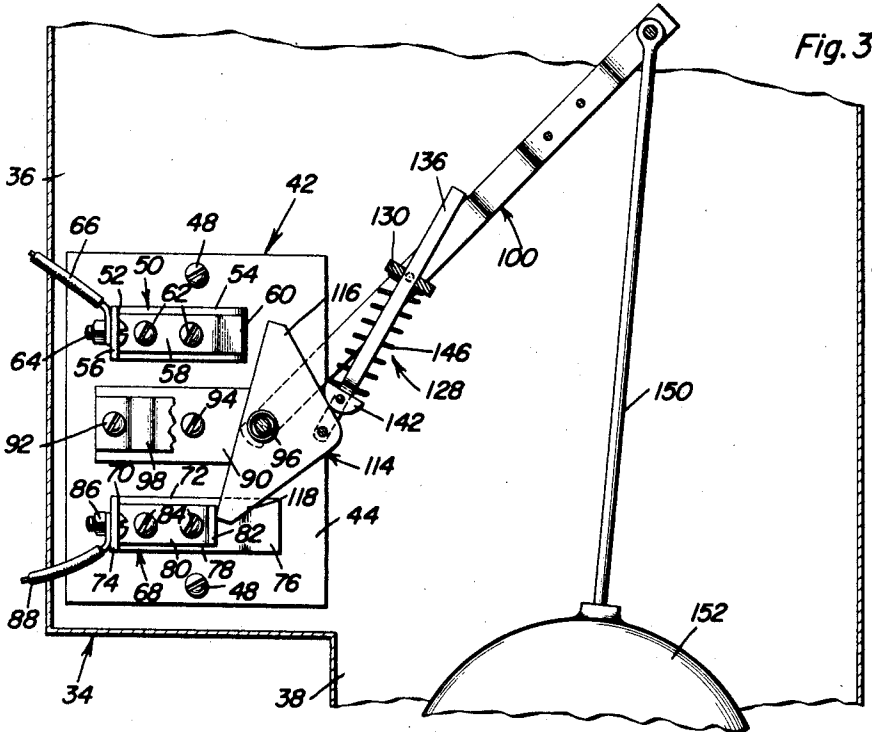


Fig. 3

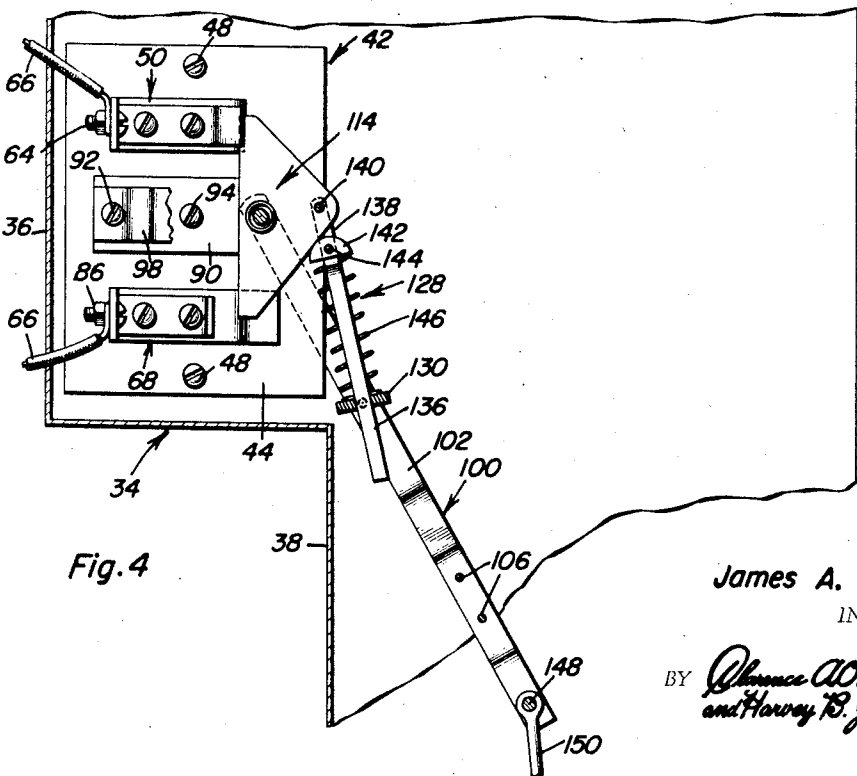


Fig. 4

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**FLOAT OPERATED SWITCH**

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2 Claims. (Cl. 200—84)

This invention relates in general to new and useful improvements in electrical switches, and more specifically to a float operated electrical switch.

There are many instances where the level of tanks are controlled by a float actuated switch, the switch either controlling the operation of a valve or a pump. There are, however, numerous problems involved when the switch is controlled by means of a float. For one thing, it is not desired that the control means be operated for any minor variation in the water level. Therefore, it is believed desirable that the switch be of a design whereby the switch is not actuated unless the water level varies in the desired amount. Also, because of the fact that the switch of the type to which this invention relates is normally in the open, it soon becomes jammed and will not operate as desired.

It is therefore the primary object of this invention to provide an improved float operated switch, the switch being of the type which includes a pair of spaced contacts which are encased by a contacting bridging member, the contact bridging member being controlled as to its position by means of an actuator, and the actuator having extending between it and the contact bridging member an over-center spring urged member whereby the contact bridging member is pivoted only when the actuator has reached past a certain position and at that time it is spring-urged to its new position and retained in such new position by the over-center spring-urged member.

Another object of this invention is to provide an improved float operated switch, the switch being of extremely simple construction and being formed of readily obtainable materials whereby the manufacture thereof is economically feasible.

Still another object of this invention is to provide an improved float operated switch, the switch being positive in operation and being of such a construction whereby it is operated only after the float which controls the switch is moved a predetermined distance, at which time the switch is actuated quickly and precisely and is retained in the last assumed position until such time as the float controlling the switch is removed in the reverse direction a considerable distance.

A further object of this invention is to provide an improved float controlled switch, the switch including an actuator having connected thereto an over-center spring-urged member for effecting a snap action on a contact bridging member of the switch, the over-center spring-urged member including a buffer which is engaged with the contact bridging member to limit the relative pivoting between the over-center spring-urged member and the contact bridging member.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a vertical sectional view taken through a watering trough and shows mounted relative thereto the

float operated switch which was the subject of this invention, the switch being used to control the operation of a pump and to maintain a desired water level in the watering trough;

5 Figure 2 is an enlarged fragmentary horizontal sectional view taken substantially upon the plane indicated by the section line 2—2 of Figure 1 and shows the specific details of the float operated switch as viewed from above;

10 Figure 3 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 3—3 of Figure 2 and shows the details of the float operated switch as viewed in elevation, portion of the switch being broken away and shown in section, the switch being in an "off" position;

15 Figure 4 is an enlarged fragmentary sectional view similar to Figure 1 and shows the switch in an "on" position; and

Figure 5 is an enlarged perspective view of the contact bridging member.

20 Referring now to the drawings in detail, it will be seen that there is illustrated a watering trough which is referred to in general by the reference numeral 10. The watering trough 10 includes a bottom wall 12, side walls 14 and end walls 16. The trough 10 is supported in an elevated position by means of suitable legs 18 disposed at the corners thereof.

25 In order that water may be supplied to the watering trough 10, there is provided a pump 20 which is driven by means of an electric motor 22. The pump 20 has a pick-up line 24 and a discharge line 26. The discharge line 26 is secured to one of the end walls 16 and terminates in a discharge portion 28 for delivering water to the interior of the watering trough 10, the water being referred to in general by the reference numeral 30. It is to be understood that the position of the pump 20 and the electric motor 22 relative to the watering trough 10 may be varied as desired.

30 In order to automatically control the operation of the motor 22 and thus control the operation of pump 20, there is provided the float operated switch which is the subject of this invention, the switch being referred to in general by the reference numeral 32. The switch 32 includes a housing which is referred to in general by the reference numeral 34. As is best shown in Figure 2, 35 the housing 34 is generally rectangular in cross-section and, as is best shown in Figure 1, the housing 34 has an enlarged upper portion 36 and a narrower lower portion 38. The lower portion 38 extends down into the water 30 and functions as a guide. The housing 34 has a wall 40, which is best shown in Figure 2, which is removable to provide access to the interior thereof.

40 The float operated switch 32 also includes a switch mechanism which is referred to in general by the reference numeral 42. The switch mechanism 42 is mounted 45 in the upper part 36 of the housing 34 and includes a mounting plate 44. The mounting plate 44 is spaced from the housing by means of elongated tubular spacers 46 which are carried by mounting bolts 48 which are used to secure the mounting plate 44 in place. Thus 50 the switch mechanism 42 is centered relative to the housing 34.

55 The switch mechanism 42 includes an upper contact assembly which is referred to in general by the reference numeral 50. The upper contact assembly 50 includes an L-shaped contact member 52 which has an elongated leg 54 and an outwardly projecting short leg 56. Overlying the elongated leg 54 is a contact member 58 which terminates remote from the leg 56 in an outwardly projecting end portion 60. The elements of the contact assembly 60 50 are secured together and to the mounting plate 44 by means of fasteners 62. The end portion 60 and the leg 54 combine to form a wedge-shaped receptacle area. The

short leg 56 also functions as a terminal and carries a bolt 64 which is used for the purpose of securing a wire 66 to the contact assembly 50.

Spaced from the contact assembly 50 is a contact assembly 68. The contact assembly 68 includes an L-shaped contact member 70 which has an elongated leg 72 and a short outwardly projecting leg 74. The leg 72 terminates in an outwardly projecting end portion 76 remote from the leg 74. Overlying that portion of the leg 72 adjacent the leg 74 is a second L-shaped member 78 which includes an elongated leg 80 and a short leg 82. The elongated leg 80 overlies the leg 72 and the leg 82 is disposed remote from the leg 74 and projects outwardly parallel to the leg 74. The members 70 and 78 are secured together and to the mounting plate 44 by means of fasteners 84.

The short leg 74 also functions as a terminal. Carried by the leg 74 is a fastener 86 to which there is connected a wire 88.

Carried by the mounting plate 44 intermediate the contact assemblies 50 and 68 is a bearing plate 90. The bearing plate 90 is secured to the mounting plate 44 by means of fasteners 92 and 94. Extending through the right-hand end of the bearing plate 90 and journaled therein is a pivot pin 96. The pivot pin 96 projects forwardly from the bearing plate 90, as viewed in Figure 3, and is braced at its forward end by means of a brace 98 which is secured in place at its opposite ends by means of the fastener 92.

Carried by the pivot pin 96 is a float controlled actuator 100. The actuator 100 is bifurcated and includes a pair of legs 102 and 104 whose left ends, as viewed in Figure 2, are spaced a considerable distance apart and whose right ends, are spaced apart a slight distance and whose central portions are in abutting relation and are secured together by means of fasteners 106.

The float control actuator 100 is so mounted on the pivot pin 96 whereby the leg 102 is disposed on one side of the mounting plate 44 and the leg 104 is disposed on the opposite side thereof. The pivot pin 96 includes a head 108 which engages the leg 102. The leg 102 is spaced from the mounting plate by means of a spacer 110. The leg 104 is disposed intermediate the brace 98 and the opposite end of the pivot pin 96. The leg 104 is retained in place by means of a cotter pin 112.

Also carried by the pivot pin 96 for pivotal movement is a contact bridging member which is referred to in general by the reference numeral 114. The contact bridging member 114 is generally triangular in outline and includes end portions 116 and 118. Disposed intermediate the end portions 116 and 118 is an opening 120 for the pivot pin 96. Formed in the third corner of the contact bridging member 114 is an opening 122 whose purpose will be described in more detail hereinafter.

The contact bridging member 114 is mounted on the pivot pin 96 closely adjacent the mounting plate 44. The contact bridging member 114 is spaced from the mounting plate 44 by means of a spacer 124 carried by the pivot pin 96. Disposed intermediate the contact bridging member 114 and the brace 98 is a spring 126, carried by the pivot pin 96. The spring 126 serves to position the contact bridging member 114 and at the same time resiliently mounts it so that it may properly engage the contact assemblies 50 and 68.

Extending between the float controlled actuator 100 and the contact bridging member 114 is an over-center spring-urged assembly which is referred to in general by the reference numeral 128. The assembly 128 includes a mounting block 130 which extends between the legs 102 and 104 and is pivotal relative thereto. Slidably extending through a bore 134 in the mounting block 130 is a pair of semi-circular rods 136. The rods 136 combine to form a circular cross sectional member. The opposite ends of the rods 136 are separated to provide a bifurcated end 138 which receives the third corner of the contact

bridging member 114, the bifurcated end 138 having a pin 140 which extends through the opening 122 and pivotally connects the members 136 to the contact bridging member 114.

Also disposed between the bifurcated end portions of the bifurcated end 138 is a semi-circular plate which functions as a buffer 142. The buffer 142 is pivotally mounted by means of a pin 144.

Telescoped over the members 136 is a coil spring 146. The coil spring 146 has one end abutting against the mounting block 130 and the opposite end thereof abutting against the buffer member 142 to retain the buffer member 142 in a transverse position.

The ends of the legs 102 and 104 remote from the pivot pin 96 have extending therebetween a pivot pin 148. Pivotaly carried by the pivot pin 148 is the upper end of a float rod 150. It is preferred that the float rod 150 be formed of an insulating material in order that the switch assembly 42 may be insulated from the water 30. The lower end of the float rod 150 carries a float 152 which is guided in the lower portion 38 of the housing 34.

Because of the relation between the portions 60 and the leg 54, when the contact engaging portion 116 of the contact bridging member 114 engages the contact assembly 50, there is a wedging action and a positive engagement. Also, because of the fact that the portion 76 is raised up, there is a positive contact between the contact engaging portion 118 and the contact assembly 68. Also, the short leg 82 functions as a stop to limit pivoting of the contact bridging member 114.

At this time it is also pointed out that the buffer 142 engages the contact bridging member 114 in either of its two final positions illustrated in Figures 3 and 4 so as to limit relative pivotal movement between the over-center spring-urged assembly 128 and the contact bridging member 114 and at the same time to further urge the contact bridging member 114 into its final position. Thus a positive engagement or disengagement of the contact bridging member 114 is assured.

It is to be understood that the wiring for the switch assembly 42 is a simple one and that the switch assembly 42 is mounted with only one lead wire for the motor or the like. The other lead wire will be uninterrupted and when the contact assemblies 50 and 68 are bridged, current will flow to the motor or other article being controlled. On the other hand, when the circuit between the wires 66 and 88 is broken, the motor or other electrical appliance will not be energized.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A switch comprising a mounting plate, spaced contacts carried by said mounting plate, a pivot pin disposed intermediate said contacts and carried by said mounting plate, a float controlled actuator, said actuator being bifurcated and including a pair of legs pivotally mounted on said pivot pin in spaced relation, a contact bridging member pivotally mounted on said pivot pin intermediate said legs and in alignment with said spaced contacts, a mounting block extending between said legs remote from said pivot pin, an over center member slidably extending through said mounting block and pivotally connected to said contact bridging member, and a spring on said over center member and bearing against said mounting block to position said contact bridging member in response to pivoting of said actuator and to retain said contact bridging member in a last assumed position.

2. A switch comprising a mounting plate, spaced con-

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tacts carried by said mounting plate, a pivot pin disposed intermediate said contacts and carried by said mounting plate, a float controlled actuator, said actuator being bifurcated and including a pair of legs pivotally mounted on said pivot pin in spaced relation, a contact bridging member pivotally mounted on said pivot pin intermediate said legs and in alignment with said spaced contacts, a mounting block extending between said legs remote from said pivot pin, an over center member slidably extending through said mounting block and pivotally connected to said contact bridging member, a spring on said over center member and bearing against said mounting block to position said contact bridging member in response to pivoting of said actuator and to retain said contact bridging member in a last assumed position, and a buffer pivot-

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ally mounted on said over center member intermediate said contact bridging member and said spring, said buffer engaging said contact bridging member and limiting relative pivoting between said contact bridging member and said over center member.

## References Cited in the file of this patent

## UNITED STATES PATENTS

1,939,698	Henning -----	Dec. 19, 1933
1,949,371	Dillman -----	Feb. 27, 1934
2,198,277	Schellenger -----	Apr. 23, 1940
2,257,348	Rickmeyer -----	Sept. 30, 1941
2,279,065	Schellenger -----	Apr. 7, 1942
2,354,282	Shaw -----	July 25, 1944