July 25, 1944. B. E. SHAW 2,354,282

FLOAT SWITCH

Filed March 3, 1942 2 Sheets-Sheet 1

Fig. 1.

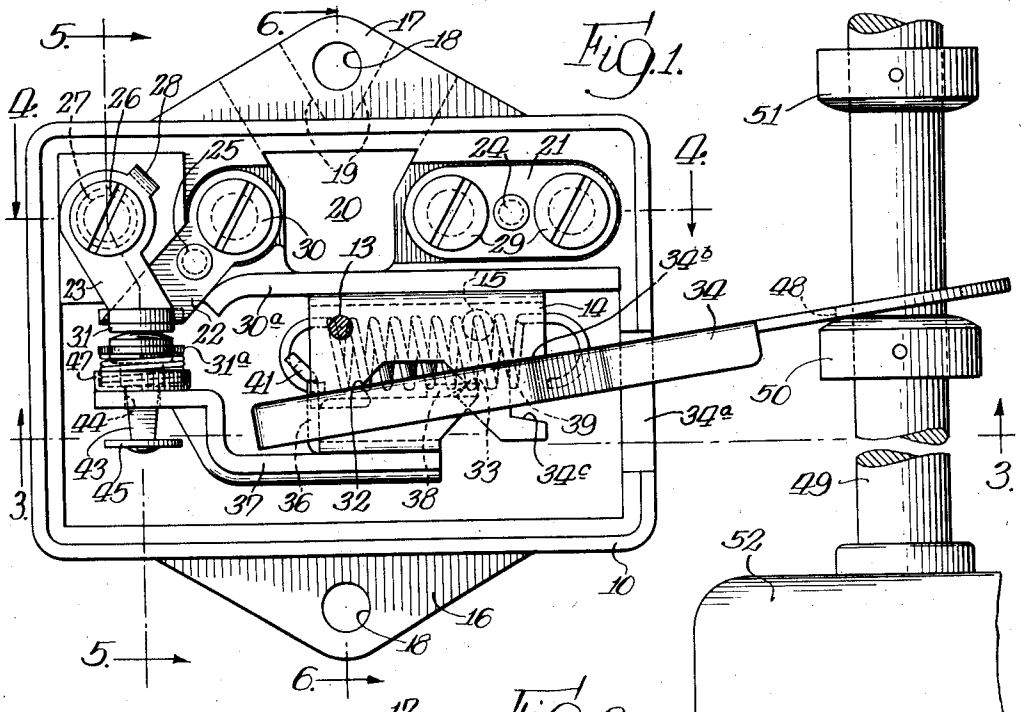
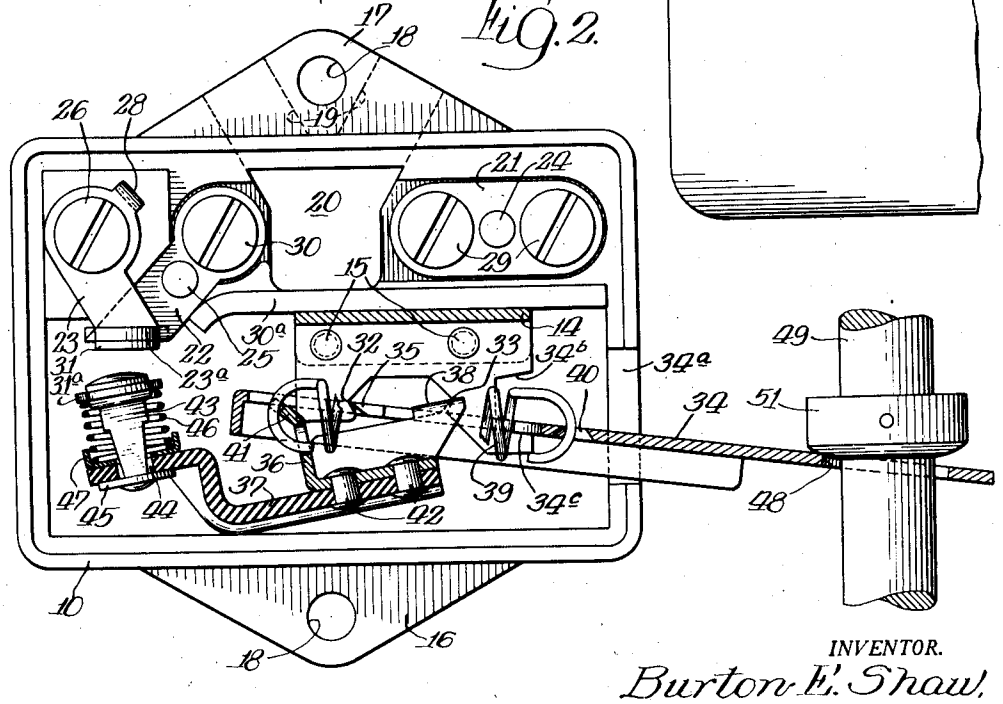


Fig. 2.



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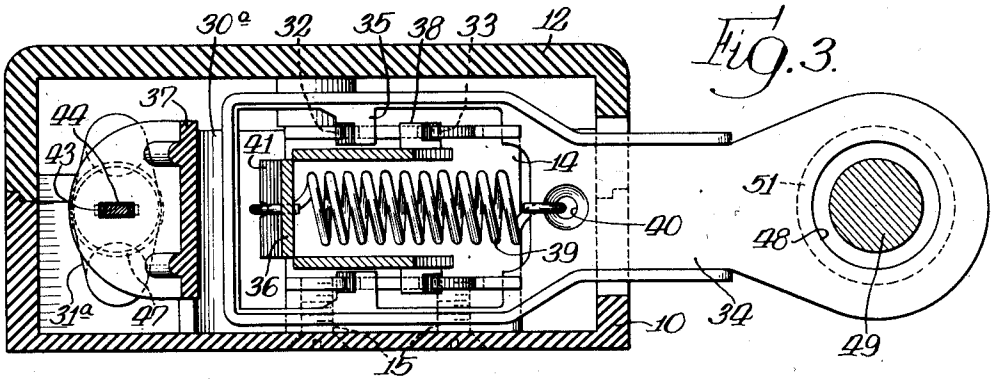

Fig. 3.

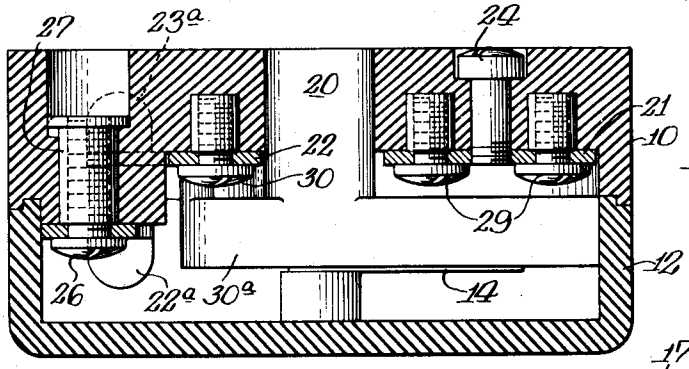

Fig. 4.

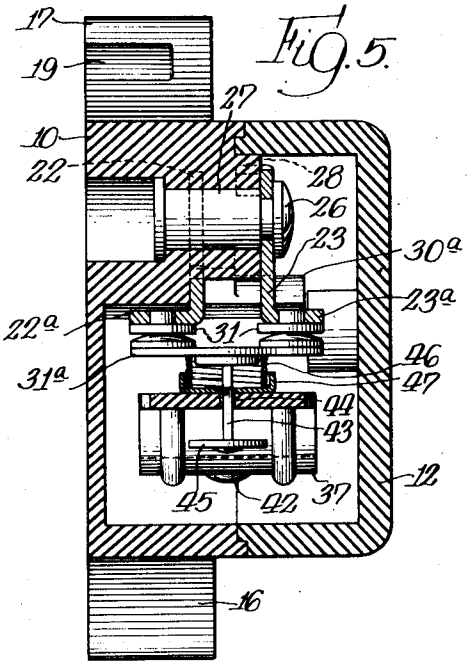

Fig. 5.

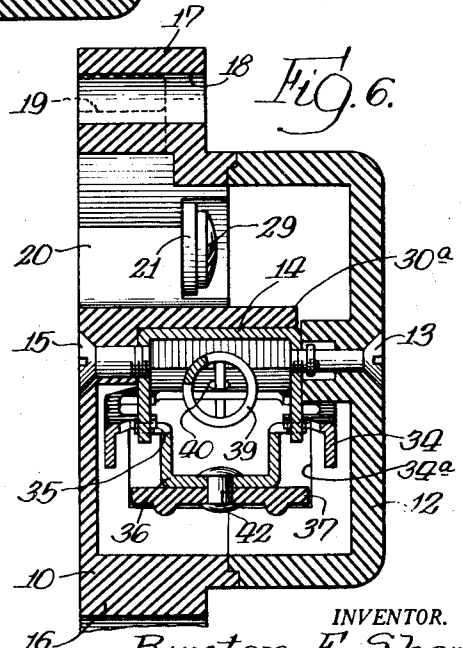

Fig. 6.

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Patented July 25, 1944 2,354,282

UNITED STATES PATENT OFFICE

2,354,282

FLOAT SWITCH

Burton E. Shaw, Bristol, Ind., assignor to Penn Electric Switch Co., Goshen, Ind., a corporation of Iowa

Application March 3, 1942, Serial No. 433,167

3 Claims. (Cl. 200—67)

My present invention relates to a relatively simple and inexpensive switch which may be used in a number of installations, such as in connection with a float, thereby constituting a float switch.

One object of the invention is to provide a small, compact switch of this character adapted to control relatively heavy current, such as that for an electric motor operating a pump for pumping water from a sump, automatically in response to the level of the water in the sump.

Another object is to provide a switch which gives positive snap action and good contact pressure, with relatively few parts in the assembly, and also a switch structure wherein the relation of the parts is such that they may be ruggedly formed, yet contained within a small housing, with sufficient spacing between the electrical parts to adequately meet underwriters' requirements.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in the claims and illustrated in the accompanying drawings in which:

Figure 1 is an enlarged front elevation of a switch embodying my invention, showing the cover for the base removed and the switch in closed position;

Figure 2 is a similar view partly in section, showing the switch in open position; and

Figures 3, 4, 5 and 6 are sectional views on the lines 3—3, 4—4, 5—5 and 6—6, respectively, of Figure 1.

On the accompanying drawings I have used the reference numeral 10 to indicate a base member, and 12 a cover therefor. The base 10 and cover 12 are preferably formed of insulating material and together constituting a housing for the switch mechanism. The cover 12 is retained in position with respect to the base member 10 by a screw 13 passing through the cover and threaded into a bracket 14 The bracket 14, in turn, is held in position with respect to the base member 10 by a pair of screws 15.

The base member 10 has a pair of attaching feet 16 and 17, suitably perforated, as at 18, to receive screws for attaching the switch housing to a wall or the like. One of the feet 17 has a pair of grooves 19 communicating with a through space 20 in the base member 10 so that the electric wiring may be brought into and led out from the switch terminals. There are three of these terminals, a bridging terminal 21 and a pair of switch contact terminals 22 and 23. The bridging terminal 21 is retained in position as by a screw 24 (see Figure 4) while the switch contact terminal 22 is similarly held in position by a screw 25 (see Figure 2). The switch contact terminal 23 is retained in position by its terminal screw 26 which is threaded into a flanged sleeve 27 embedded in the base member 10. The switch contact terminal 23 is retained against rotation by a lug 28 thereon embedded in the base member 10.

The terminals 21 and 22 are provided with terminal screws 29 and 30, respectively. The switch contact terminals 22 and 23 are provided with right-angled extensions 22^a and 23^a which, as shown in Figure 5, extend away from each other and carry stationary switch contacts 31. The contacts 31 are adapted to be bridged at times by a bridging contact 31^a.

The base member 10 has a barrier 30^a formed therein, which divides the housing 10—12 into upper and lower compartments. The terminals 21, 22 and 23 are mounted in the upper compartment, as shown in Figure 1, with the terminal extensions 22^a and 23^a projecting into the lower compartment.

The bracket 14 is mounted in the lower compartment and is channel-shaped, each of its flanges being provided with V-seats 32 and 33. A yoke-shaped actuating arm 34 has knife edges 35 seated in the V-seats 32, whereas a switch arm 36—37 has a pair of knife edges 38 seated in the V-seats 33. The knife edges are retained in the V-seats by a toggle spring 39. The spring 39 has its opposite ends hooked through an opening 40 of the actuating arm 34 and around an ear 41 of the switch arm bracket 36. The arm 34 extends through an opening 34^a in the housing 10—12 and stops against shoulders 34^b and 34^c of the bracket 14.

The bracket 36 has the insulating part 37 of the switch arm secured thereto, as by rivets 42. The bridging contact 31^a has a flat extension 43 through a slot 44 of the switch arm 37. A washer 45 is riveted thereon, and a spring 46 is interposed between the bridging contact and a spring cup 47, seated against the switch arm 37.

The outer end of the actuating arm 34 is perforated, as at 48, for coaction with any suitable actuating device, such as a float rod 49. The float rod 49 extends loosely through the perforations 48 and is provided with a pair of collars 50 and 51 and with a float 52.

Practical operation

Any control device connected with the actuating arm 34, such as the float mechanism illustrated on the accompanying drawings, may move the actuating arm 34 from closed circuit position of Figure 1 to open circuit position of Figure 2, or vice-versa. Starting with the Figure 1 position, the collar 51, when it engages the upper side of the actuating arm 34, will swing the actuating arm downwardly. At an intermediate position the toggle spring 39 snaps across center with relation to the knife edges 35 and 38 and the V-seats 32 and 33, causing the switch arm 37 to snap to the position of Figure 2. During the switch opening movement the spring 46 is permitted to keep the bridging contact 31a in engagement with the stationary contacts 31 until some momentum has been attained, whereupon the switch arm 37 engages the washer 45 to quickly separate the contacts with a hammer break, thereby effecting a quick extinguishment of the arc.

As the float rod 49 rises, the collar 50 will engage the under side of the actuating arm 34 to swing the switch arm 37 back to closed circuit position of Figure 1 when the toggle spring passes dead center. This will effect engagement of the bridging contact 31a with respect to the stationary contacts 31, and thereafter compression of the spring 46 from its expanded position to its compressed position of Figure 1, whereupon the contacts are held in engagement by the toggle spring 39 in its over-center position.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure, or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. In a switch structure, a base of insulating material and an insulating cover therefor, said base and cover constituting a switch housing, a barrier therein formed on said base and of the material of said housing, said barrier dividing the switch housing into two compartments, a pair of switch terminals in offset parallel planes in one of said compartments, said switch terminals having contact carrying extensions projecting through said barrier into the other of said compartments, said extensions having portions at right angles to said offset planes and arranged in substantially a common plane, stationary switch contacts thereon, a supporting bracket in said other compartment, an actuating arm and a switch arm mounted on said bracket, an operative connection between said actuating arm and said switch arm and a bridging contact carried by said switch arm and adapted in one position of the switch arm to bridge said stationary contacts.

2. In a structure of the character disclosed, a base of insulating material having attaching feet thereon, a cover of insulation for said base which with the base form a switch enclosing housing, switch mechanism in said housing, one of the attaching feet of said base having grooves terminating at the outer surface of said foot to receive the wires to and from said switch mechanism, said switch mechanism comprising stationary switch contacts, a supporting bracket in said housing, an actuating arm and a switch arm having pivotal connection therewith, a toggle spring connecting said arms for imparting snap action to said switch arm resulting from movement of said actuating arm, and a bridging contact carried by said switch arm said bridging contact in one position of the switch arm being adapted to engage said stationary contacts under the bias of said toggle spring.

3. In a switch of the character disclosed, a base of insulating material having attaching feet thereon, a cover for said base which together with the base form a switch housing, switch mechanism in said housing, one of said attaching feet being grooved to receive the wires to and from said switch mechanism, said switch mechanism including a switch arm, an actuating arm and an operative connection between said arms for imparting action from one arm to the other one, said bridging contact in one position of the switch arm being adapted to engage said stationary contacts.

BURTON E. SHAW.