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SWITCH OPERATING MECHANISM

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Fig. 1

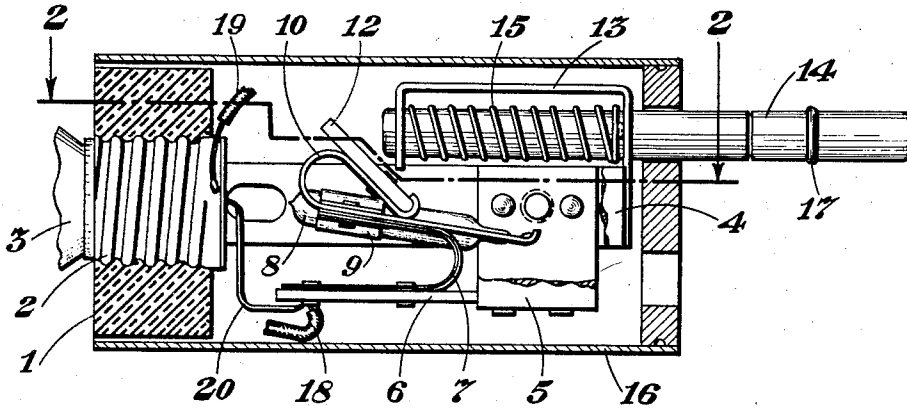
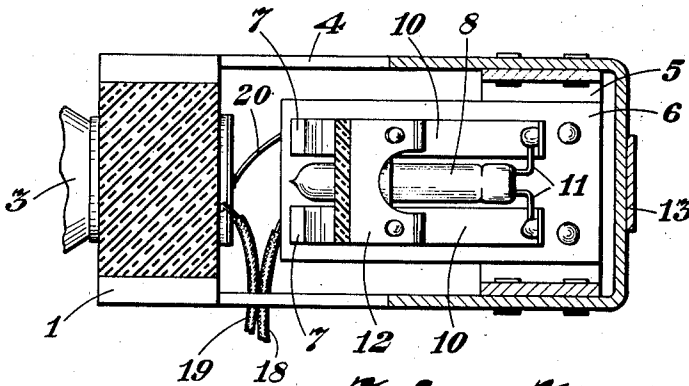


Fig. 2

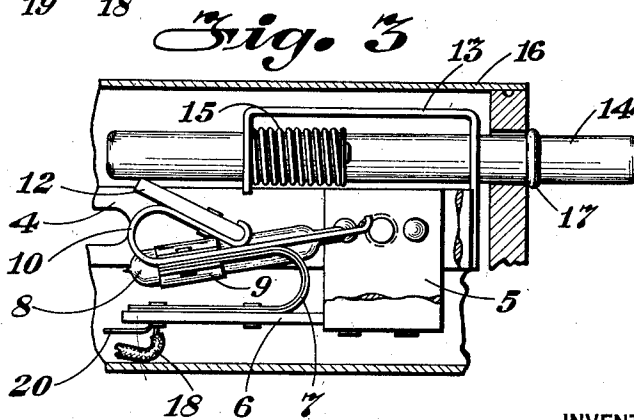


Fig. 3

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SWITCH OPERATING MECHANISM

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2 Claims. (Cl. 173—355)

The present invention relates to fluid flow switches, and more particularly to operating mechanism therefor.

A particular object of the invention is to provide a novel operating mechanism for a fluid flow switch. Another object of my invention is to provide a simple mounting means for a fluid flow switch. Another object of my invention is to utilize said mounting means as flexible leads for a switch. A further object of my invention is to provide means to produce a desired movement of the switch irrespective of an appreciable variation in the movement of the actuating means. Still other objects and advantages of my invention will appear from the following detailed specification, or from an inspection of the accompanying drawings.

The invention consists in a new and novel combination of elements, as hereinafter set forth and claimed.

Fluid flow switches of the tilting or oscillating type ordinarily require both a pivotal mounting means and flexible conductors. Furthermore, some means is also frequently employed to bias the switch to a predetermined position. These various elements obviously require considerable space, making it virtually impossible to use this type of switch in small housings such as are required for door switches and the like. I have now discovered that spring members of suitable shape and electrical conductivity may be utilized to perform these three functions of supporting the switch, biasing it to a given position, and conducting the current thereto. As a result I am now able to produce an extremely simple and compact structure which may be readily used as a door switch or the like. This simple structure is likewise extremely inexpensive. A further difficulty heretofore encountered in producing plunger operated switches results from the fact that the movement of the plunger may vary widely in different installations. I have now discovered that by using a novel cam arrangement the switch movement may be limited to any desired amount, irrespective of further movement of the plunger. Hence the switch operating mechanism may now be so designed as to operate without adjustment under the varying conditions encountered in different installations.

For the purpose of illustrating my invention I have shown a preferred embodiment thereof in the accompanying drawing, in which

Fig. 1 is a sectional elevation of a combined light and door actuated switch, showing the switch closed,

Fig. 2 is an irregular sectional view taken on the line 2—2 of Fig. 1, with the outer case removed, and

Fig. 3 is a sectional elevation of a portion of the device shown in Fig. 1, showing the switch in an open circuit position.

As shown in these drawings my novel apparatus, which is especially designed as a combined light and door actuated switch therefor for use in refrigerators or the like, has an annular block 1 of insulating material in which there is mounted a screw socket 2 which is adapted to contain an incandescent lamp 3. The ends of a U-shaped frame member 4 are set into suitable recesses on opposite sides of the insulating block 1. At a point near its closed end said frame member carries a stirrup 5 to which there is in turn affixed a substantially horizontal slab of insulating material 6. A pair of U-shaped spring members 7 are affixed to said slab with the open end of the U toward the insulating block 1. Said spring members are substantially parallel but are separated by a distance which is slightly greater than the diameter of the switch tube 8 which is supported at one end between the free ends of said spring members by an insulating yoke 9. Phosphor bronze or the like is preferably used for these spring members, due to the resilience thereof, and as shown in the drawings each spring member 7 is preferably laminated in order to obtain greater flexibility. A substantially rigid metal strap 10 is likewise attached to the end of each of the spring members 7, one end thereof extending along the switch tube 8 to a point slightly beyond the end thereof through which the inleads 11 are sealed, one inlead being soldered to each strap. The other end of each strap is turned up and back in a loop to provide a portion which extends downwardly at an angle of substantially 45° to the horizontal to a point in juxtaposition to the central portion of said strap. A cam plate 12 of insulating material, such as fiber or the like, is attached to this downturned portion of each of the straps 10. An upwardly extending bracket 13 in the form of an inverted U, one leg of which is attached to the frame 4 at the closed end thereof, forms a two point bearing for the plunger 14 which passes through suitable holes therein. A spring 15 is wound about said plunger 14, one end thereof bearing against the inner leg of said bracket 13, while the other end thereof bears against a suitable collar about said plunger, whereby said plunger is normally held out of engagement with the cam plate 12, as shown in Fig. 1. When said plunger 14 is pushed inwardly, however, it bears

against said cam plate 12 and forces it to move downwardly in a curved path, the springs 7 being flexed thereby. This causes the switch tube 8 to be tilted until the mercury or other fluid therein flows away from the inleads 11, opening the circuit through the switch. The cam plate 12 is made of such a size that as soon as the circuit through the switch is positively opened it passes beneath the plunger 14, so that further movement of the plunger does not produce any further movement of the switch tube 8, as clearly shown in Fig. 3. Thus due to this novel arrangement the switch tube 8 may be made to function without excessive movement irrespective of a considerable variation in the movement of the plunger 14. A tubular housing 16 which is carried by the insulating block 1 and the stirrup 5 has a closed end through which the plunger 14 passes. A ring 17 mounted in a suitable groove in the plunger 14 outside of said housing 16 serves as a stop for said plunger, as shown in Fig. 3. A suitable bracket (not shown) is attached to the side of the housing 16 for mounting said switch mechanism. Due to the symmetrical openings in the end of said housing 16 for the plunger 14 this bracket may be used for either right or left opening doors, by simply rotating said housing 180° on the insulating block 1.

An electrical conductor 18 is connected to one of the springs 7 through one of the rivets by which said spring is affixed to the insulating slab 6. Another electrical conductor 19 is connected to the sleeve of the socket 2, said conductors 18 and 19 being also connected to a suitable source of electrical energy. A third conductor 20 is connected at one end to the tip of the socket 2 while the other end thereof is connected to the second spring member 7 through one of the rivets by which it is affixed to the slab 6, or in any other suitable manner. The switch 8 is thus connected in series with the lamp 3, the current flowing to and from the switch tube 8 through the spring members 7. Said spring members 7 thus perform the three different functions of supporting said switch, biasing it to a predetermined position, and serving as flexible conductors thereto.

In the use and operation of the switch assembly described when the plunger 14 is pushed inwardly in any suitable manner from the position illustrated in Fig. 1 the inner end of said plunger engages the cam plate 12, whereupon the switch 8 is gradually tipped until the fluid therein

runs from the end adjacent to the inleads 11 to the opposite end of said switch. The circuit through said switch is thereupon interrupted, and the lamp 3 deenergized. Further movement of the plunger 14 then causes a slight further tipping of the switch 8, in order to assure positive opening of the circuit, after which the plunger passes over the edge of said cam plate 12 allowing further movement of the plunger without any change in the position of the switch 8, as shown in Fig. 3. When the pressure on the plunger 14 is released the spring 15 causes it to return again to the position shown in Fig. 1. The cam plate 12 is thereupon released, whereupon the spring members 7, which are now under stress, force said cam plate 12 upwardly and at the same time tip the switch 8 back to the initial position shown in Fig. 1. The conducting fluid within said switch 8 thereupon flows back into contact with the inleads 11, closing the circuit through said switch. The lamp 3 is thereby energized and operates until the plunger 14 is again pushed inwardly.

While I have thus described my invention by reference to a specific embodiment thereof it is to be understood that its utility is not limited thereto, but that various omissions, substitutions and changes within the scope of the appended claims may be made in the structure illustrated without departing from the spirit of my invention.

I claim as my invention:

1. In combination, a fluid flow switch having inleads sealed thereinto, a plurality of resilient conductors supporting said switch, each of said conductors being connected to an inlead of said switch, a cam plate rigidly connected to said conductors and to said switch, and a plunger engageable with said cam plate to tilt said switch.

2. In combination, a fluid flow switch having inleads sealed thereinto, a plurality of resilient conductors supporting said switch, each of said conductors being connected to an inlead of said switch, a cam plate rigidly connected to said conductors and to said switch, and a plunger engageable with said cam plate, said plunger being so disposed with respect to said plate that it passes over the edge thereof when said switch has been tilted through a given angle.

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