United States Patent

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[73] Assignee **Marvin O. Frantz**
a fractional part interest

[54] **AXIS TRANSLATOR SWITCHING MECHANISM**
4 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **200/83,** 320/52
[51] **Int. Cl.** **H01h 35/34**
[50] **Field of Search** ..... 200/83, 83.51, 153.8, 153.20; 200/166.1, 83.5, 153.11; 74/55; 324/29.5; 320/46, 52 (Cursory); 324/295

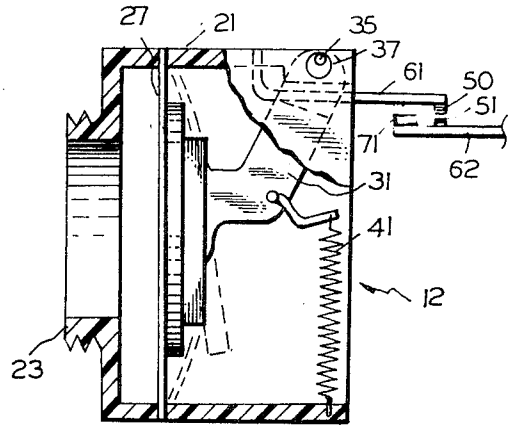
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ABSTRACT: The invention relates to a switch having a body with a contact arm supported by the body. A cam arm is loosely pivotally connected to the body and is adapted to close the contacts by camming the contact arm. Biasing means normally urge the cam arm in one direction to locate the cam arm in a first axis position and the switch actuator (which may comprise mechanical movement or fluid pressure) urges the cam arm in the opposite direction to a second axis position, which applies maximum force to the cam arm.



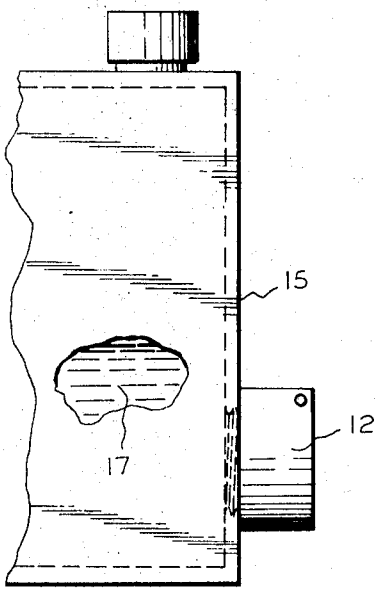


FIG. 1

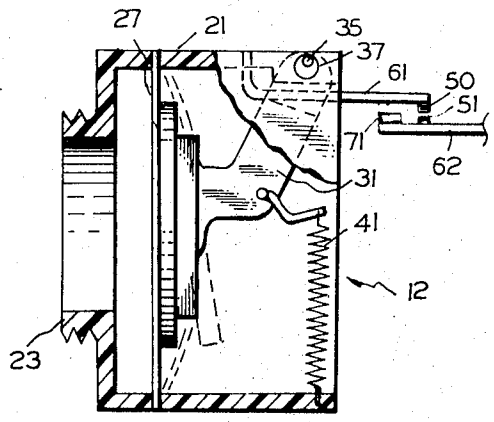


FIG. 2

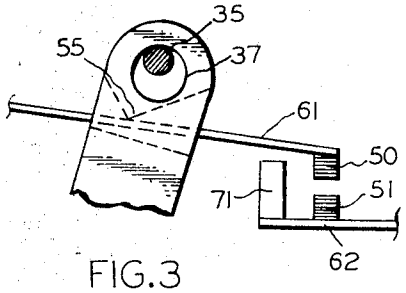


FIG. 3

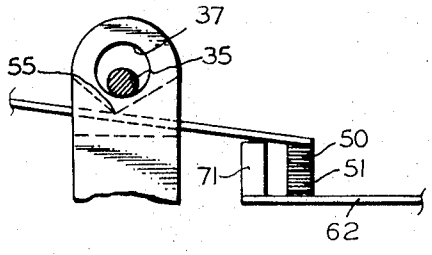


FIG. 4

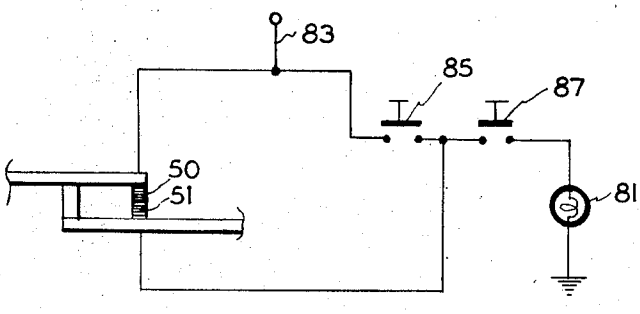


FIG. 5

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AXIS TRANSLATOR SWITCHING MECHANISM

The invention is capable of directional motion translation, and may best serve as a switch wherein pressure or motion may actuate electrical contacts; it may be added to or incorporated into a vehicular electrical system whereby a flexible diaphragm in the wall of the battery permits the diaphragm to be expanded or stretched outwardly of the battery against the pressure of a spring when the battery is charged such that the fluids therein become heavier. The diaphragm operates a cam arm from a first to a second cam arm axis position to cam a switch blade arm to close a set of contacts.

An electrical circuit for the vehicle lights may be opened as a result of charge being drained from the battery which permits the diaphragm to return to a flush or predetermined position as a result of the spring pressure. Maximum force is available to close the contacts because the cam arm axis is changed during the closing of the contacts. This is obtained by employing a loose pivotal connection of the cam arm with the body.

It will be appreciated that the switch of this invention can be activated by mechanical movement derived from any force such as pressure increase, cams or linkage mechanism. Moreover, the principle contemplates the operation of more than a singular set of contacts and the invention may be a modular unit for attachment to a battery or may be incorporated in the battery as original equipment.

With the foregoing in mind, it is an object of the invention to provide a motion translating apparatus. Another object of the invention is to provide such apparatus capable of opening and closing electrical contacts, and holding the contacts rigidly closed.

A further object of the invention is the provision of a switch operable from a battery, as a result of changes in the battery charge.

A still further object of the invention is the provision of a switch having a cam actuating arm capable of shifting its axis upon opening and closing the contacts.

The invention will be further described in connection with the appended drawings wherein:

FIG. 1 is a view in side elevation of the invention as an attachment to a battery;

FIG. 2 is a view of the attachment of FIG. 1 in cross section;

FIG. 3 is a detailed view to show the position of the elements with the contacts open;

FIG. 4 is a view similar to FIG 3 but with the contacts closed; and

FIG. 5 is an electrical schematic diagram.

In FIG. 1, the switch 12 of the present invention is shown in an application applied to a battery 15, wherein the degree of charge of the fluids 17 thereof determined whether the switch is open or closed.

In the cross-sectional view of FIG. 2, the switch per se, is shown as comprising a cylindrical body member 21, of plastic or the like, having a threaded lip 23 for connection to the battery 15. It will be appreciated, of course, that the structure may be square shaped, rectangular or any other configuration. Secured in fluid tight relation with the cylinder 21, is a flexible diaphragm 27 of, for example, rubber. The diaphragm expands to the right when the battery 15 is highly charged and returns to the left when the battery charge has been dissipated. It does not matter whether the flexible diaphragm 27 returns to the position shown, or actually extends into the lip portion 23.

A cam arm 31 is loosely pivotally attached to the cylinder or body member 21 by a pin 35 freely located in hole 37, such that in the absence of fluid pressure on diaphragm 27, the spring 41 returns diaphragm 27 to its left-hand position. This opens contacts 50 and 51, by causing a cam surface, shown as the corner 55, forming the upper wall of a slot through cam arm 31, to cam against the switch contact arm 61 for upper contact 50 and force it to close against fixed contact 51 carried by lower arm. 62. A permanent magnet 71 is provided to insure positive opening and closing of the contacts 50 and 51.

In normal operation, the tension of spring 41 offsets the pressure applied to cam arm 31 by way of diaphragm 27. It should be pointed out that the switch need not be pressure actuated but may be otherwise mechanically actuated by changing the position of cam arm 31 with any suitable mechanical motion, such as a cam or linkage mechanism.

FIGS. 3 and 4 illustrate in detail the two predetermined conditions of contacts open and contacts closed determined by the relative strengths of the force of pressure as measured against the resiliency of spring 41. In FIG. 3 the contacts 50 and 51 are opened and the pin axis 35 is at its upper position because the density of the battery fluid is low and the safety circuit of FIG. 5 is opened.

However, in FIG. 4 the axis 35 of cam arm 31 is in its lower position with the contacts 50 and 51 closed because the density is high indicating a charged battery. Since the constants of battery fluid are known, adjustment from the open to close position is not required because design criteria permit the selection of, for example, a specific gravity of 1280 to 1250 as a typical opening point. In such an arrangement recontact is established in the range 1310—1350. Obviously, any other specific gravity gradations may be selected for controlling the operation of the switch. However, it is very important to note that with the switch in the position of FIG. 4 the maximum camming force is generated to apply the point (or rounded edge) of cam 35 against contact arm 61 to close and maintain closed the contacts. This is true because the axis 35 has been shifted to the other position with both the force of the spring 41 and the pressure effective on diaphragm 27 to cause the cam 55 to press downwardly on contact arm 61. The fact that arm 31 is permitted to move upwardly enables the maximum power to be transmitted downwardly on arm 61 allowing the increased pressure or weight of the battery fluid to push it into place readily.

In FIG. 5 a suitable vehicle electrical system is illustrated to show how the switch of this invention can protect the battery of the vehicle when the lights are inadvertently left on or when a malfunction is encountered. The normal electrical path to the vehicle lights 81 is from positive terminal 83, through ignition switch 85 and the light switch 87 to ground. However, if the light switch 87 is left closed, when the ignition switch 85 has been turned off or opened, the battery monitoring switching apparatus 12 assumes control. Once the battery charge level has dropped below the preselected level, the contacts 50 and 51 are opened. Therefore, if the vehicle owner inadvertently leaves the vehicle with the lights on and returns the next day he has a reliable charge in the battery sufficient to start the vehicle.

I claim:

1. A switch having contacts, comprising in combination a body; an arm connected to the body and carrying at least one of the contacts; an operating means loosely pivotally connected to the body with the pivotal axis arranged perpendicularly with respect to the operating means biasing means normally urging the operating means to a first pivot axis position; movable means for introducing mechanical movement to the operating means to overcome the biasing means and move the operating means to a second pivot axis position spaced from the first axis position; and cam means whereby said operating means cams said arm to close the contacts.

2. The switch of claim 1 wherein the means for introducing mechanical movement to the operating means comprise a fluid responsive flexible diaphragm.

3. The switch of claim 2 wherein said cam means comprises a camming surface oriented in different positions when the operating means is in the first axis position and in the second axis position.

4. The switch of claim 3 wherein the contacts are adapted for connection in a vehicular electrical system and the fluid responsive flexible diaphragm is adapted to be disposed in the wall of the vehicular battery whereby when the battery is connected to the switch and is discharged to a predetermined level the operating means is pushed to the position of said contacts.