May 16, 1967 A. ARLAUSKAS 3,320,389

ELECTRIC SWITCH HAVING PIVOTING STRUCTURE ON FIXED CONTACT

Filed Nov. 23, 1964 2 Sheets-Sheet 1

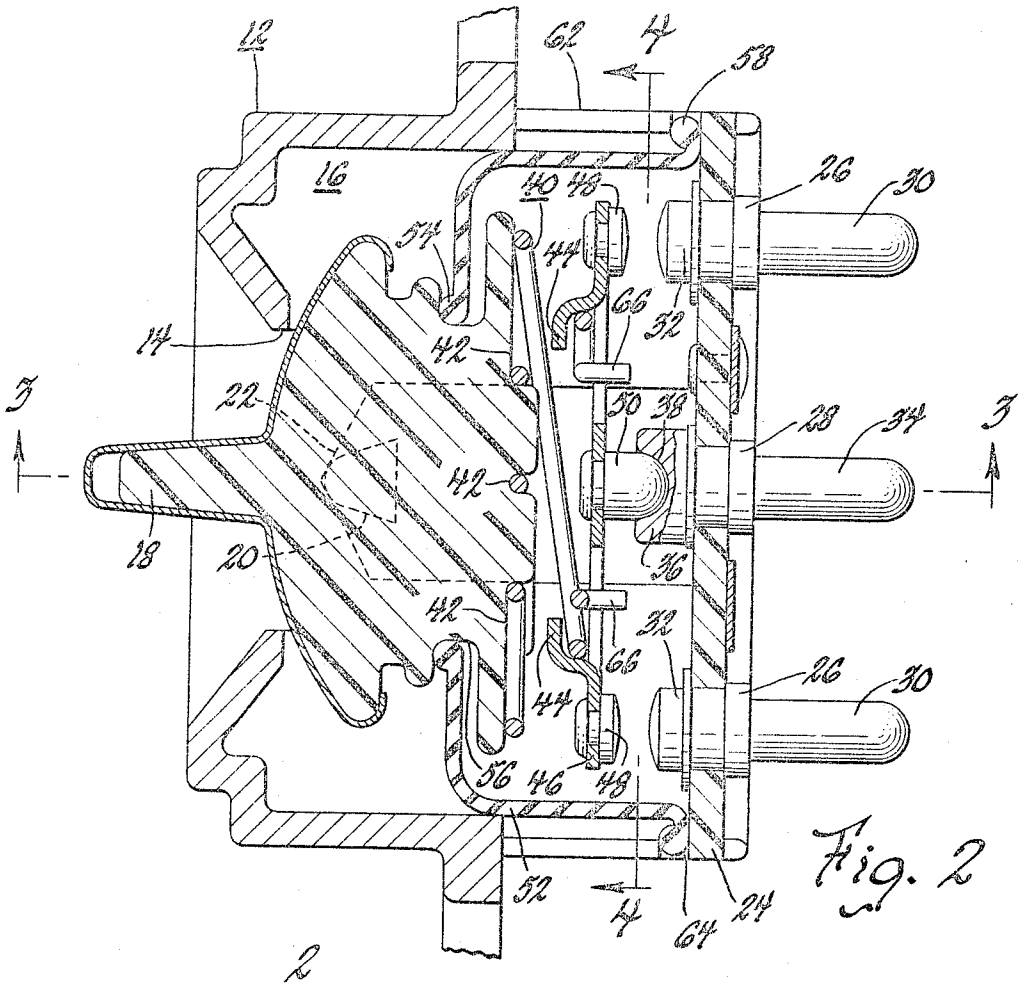

Fig. 2

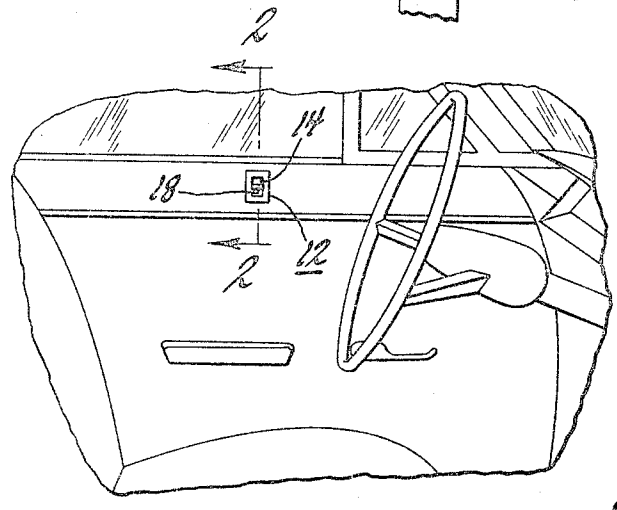

Fig. 1

INVENTOR.
Alfonsas Arlauskas
BY
Donald P. Selwicki
HIS ATTORNEY

May 16, 1967 A. ARLAUSKAS 3,320,389

ELECTRIC SWITCH HAVING PIVOTING STRUCTURE ON FIXED CONTACT

Filed Nov. 23, 1964 2 Sheets-Sheet 2

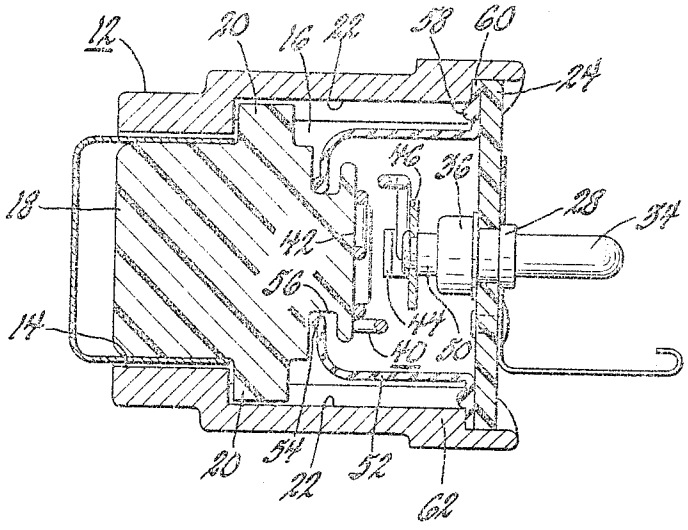

Fig. 3

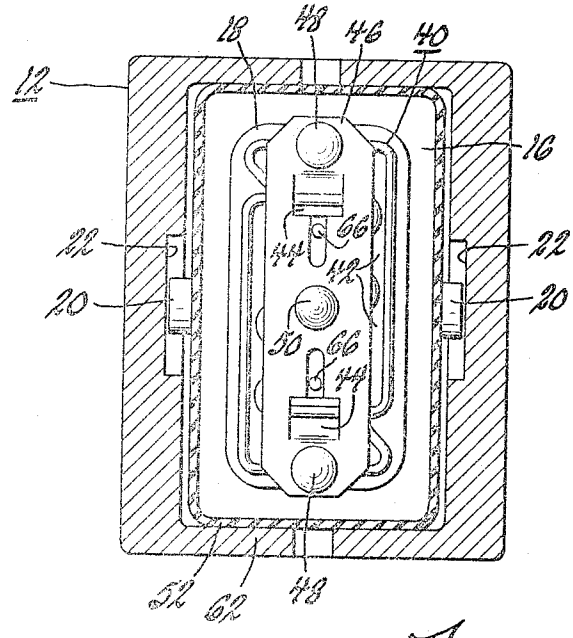

Fig. 4

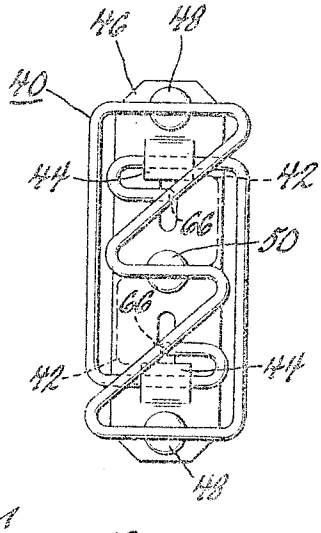

Fig. 5

INVENTOR.
Alfonsas Arlauskas
BY
Donald P. Sibenski
HIS ATTORNEY

United States Patent Office 3,320,389
Patented May 16, 1967

3,320,389

ELECTRIC SWITCH HAVING PIVOTING STRUCTURE ON FIXED CONTACT

Alfonsas Arlauskas, Livonia, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Nov. 23, 1964, Ser. No. 412,998
5 Claims. (Cl. 200—153)

This invention relates to electric switches and more particularly to an electric switch having a unitary centering and contact element.

It is an object of the present invention to provide an improved electric switch which is pivoted to several positions by use of a contact element which also serves to center the switch.

Another object of the present invention is to provide an improved electric switch which is moisture-proof and has a minimum number of moving parts thereby making it economical to manufacture.

Still another object of the present invention is to provide an improved electric switch having a freely pivotable contact element constantly biased against a fixed contact by a unitary spring element held in an operative position by an actuator.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIGURE 1 is a view of the subject invention shown in its operative environment in the driving compartment of a vehicle;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1;

FIGURE 3 is a sectional view taken along line 3—3 of FIGURE 2;

FIGURE 4 is a sectional view taken along line 4—4 of FIGURE 2;

FIGURE 5 is a plan view of the movable contact means of the subject invention.

Referring to FIGURE 1, the body of an electric switch, generally designated by the numeral 12, is shown operatively positioned on the inner door panel of the motor vehicle. In this environment, the switch is utilized as an electric window controller.

Referring now to FIGURE 2, a switch body 12 has an aperture 14 through one wall thereof adapted to provide an opening from an inner compartment 16 of the switch body 12. An actuator 18 has a pair of outwardly extending lugs or flanges 20 adapted to cooperate with a pair of elongated slots or channels 22 for control of pivotal movement. The slots 22 are formed in an inside wall of the switch body 12 as best seen in FIGURE 3.

One wall of the compartment 16 is composed of a base portion 24 in which contacts 26 and a contact 28 are embedded. One portion of the contacts 26 form terminals 30 adapted to be engaged by external electrical circuitry, for example, a reversible electric motor, and contact heads 32 extending into the compartment 16. The contact 28 has a terminal portion 34, adapted to be engaged by an external electric power source, and a conductive head 36 including a pocket 38 extending into the compartment 16. It is then obvious that a bridging of the contacts 28 and 26 can be arranged to provide electrical power for operation of an electric motor in either of two directions. This would be the typical circuit arrangement when the subject switch is used in the operative environment of a circuit controller for automobile windows.

A preformed resilient spring member 40 is carried between complementary shaped portions 42 formed in the base of the actuator 18 and tabs 44 struck from a contact plate 46. The contact plate 46 carries a pair of contact rivets 48 positioned in proximity to the contact heads 32 and adapted to conductively engage the contact heads 32 when the contact plate 46 is pivoted in either of two directions. A conductive pivot 50 is riveted to the contact plate 46 in any well-known fashion and is seated in the pocket 38 of the conductive head 36. Therefore, it is seen that a conductive relationship always exists between the contact plate 46 and the terminal 34 from the power source. The relationship of the spring member 40 and the contact plate 46 is also clearly shown in FIGURES 4 and 5.

A resilient cup-shaped member 52, composed of any well-known elastomeric material, provides a dust and moisture-proof switching area for the subject switch. The member 52 has a resilient beaded portion 54 resiliently engaging the actuator 18 in a peripheral groove 56 formed thereon. An opposite end of the cup-shaped member 52 also comprises a peripheral beaded portion 58 and a flat extended portion 60 best seen in FIGURE 3. The flat extended portion 60 is compressed during assembly of the subject switch and retained between an outer wall 62 of the switch body and the base portion 24. This cooperation of parts is also best seen in FIGURE 3. Referring to FIGURE 2, it is seen that the beaded portion 58 is retained by compression in slots 64 formed along opposed ends of the switch body 12 between the wall 62 and the base 24. In this manner, the area in which the switching action takes place is kept substantially free of moisture and foreign material to minimize the oxidation build-up on the contact heads 32 and the contact rivets 48.

Referring to FIGURE 2, the spring member 40 includes upwardly extending legs 66 cooperating with the portion of the contact plate 46 vacated by the struck-out tabs 44 in order to provide lateral stability in the mounting of the contact plate 46 on the spring member 40. As previously stated, the upper portion of the spring member 40 is laterally stabilized in its mounting on the actuator 18 by its cooperation with complementary portions 42 formed on the underside of the actuator 18. It is clear then that the actuator 18 is operatively located in a centered position with respect to the aperture 14 by the biasing force of the spring member 40 holding the lugs 20 against the upper end of the slots 22. At the same time, the spring member 40 holds the conductive pivot 50 in firm engagement with the pocket 38.

In operation, the actuator 18, as viewed in FIGURE 2, is pivoted either to the left or to the right as viewed therein. The pivoting results in a movement of the lug 20 relative to the slot 22 and causes either of the contact rivets 48 to be tilted into conductive engagement with the appropriate contact head 32. When either of the contact rivets 48 engage a contact head 32, power is routed through the contact plate 46 to either of the output terminals 30. It is seen that a pivoting movement of the actuator 18 causes the conductive pivot 50 to slide in the pocket 38 in a clockwise or counterclockwise fashion maintaining a conductive relationship therewith while operatively retaining the contact plate relative to the spring member 40. The spring member 40, being a resilient member and shaped in zigzag fashion, as best seen in FIGURE 5, compresses on one side driving one of the contact rivets 48 downwardly and extends on another side driving the other contact rivet 48 upwardly in the compartment 16. It is obvious that the movements of the rivets 48 are in the opposite direction when the actuator 18 is oppositely pivoted.

The switch herein described therefore accomplishes a very positive pivoting movement wherein movable contacts are made to selectively engage fixed contacts when a pivoting force is exerted on the actuator 18. When the

pivoting force is removed, the spring member **40**, being resilient, tends to assume its free form thereby returning the actuator **18** to a centered position. Therefore, an electric switch is provided which utilizes a spring member and a pivotable conductive plate alone to control a pivoting movement of an actuator to bring about a switching action and controllably centers the actuator after a switching action without the need for sophisticated structure to bring about the desired result. In addition, the subject switch is provided with a protective shroud **52** which maintains the area in which the switching action takes place dirt and moisture free. The inventive objects therefore are carried out with the minimum number of moving parts to achieve a positive and effective switching action with the use of very few parts and, consequently, maintenance free operation.

While the embodiments of the present invention, as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. An electric switch comprising: a switch body having a compartment formed therein and an aperture through one wall of said switch body from said compartment, said switch body having a series of channels formed in opposed walls thereof; actuator means pivotally disposed in said compartment and having a portion extending through said aperture and means cooperating with said series of channels to pivotally support said actuator means; a series of terminals carried in one wall of said switch body and including heads exposed to the inside of said compartment serving as fixed contacts for said switch and a head having a pocket therein; biasing means carried by said actuator means for centering said actuator means in the aperture in the switch body; and contact means carried by said biasing means and being pivotable in the pocket formed in said contact head in response to a pivoting movement of said actuator to selectively engage said contact means and said fixed contacts.

2. An electric switch according to claim **1** wherein the contact means includes a preformed resilient member adapted to engage said actuator means; a conductive plate carrying contact heads and having struck out tabs arranged to engage said preformed resilient member; and a conductive pivot carried in the center of said conductive plate and arranged as a complementary surface to said pocket of said terminal head wherein said conductive plate is pivotable in response to a pivoting movement of the actuator means.

3. An electric switch according to claim **1** wherein a plurality of outwardly extending flanges of said actuator means cooperates with the series of channels formed in opposite walls of said switch body to form a pivotal mounting arrangement for said actuator means, said actuator being biased towards the base of said channels by said biasing means.

4. An electric switch comprising: a switch body having a hollow interior forming a compartment therein and an aperture lending access into said compartment, said switch body having recessed portions formed in opposed wall portions in said compartment; actuator means pivotally supported in the recessed portions of said switch body and having a peripherally formed groove; fixed contacts carried in one wall of said switch body with contact heads disposed in the compartment, at least one of said fixed contacts having a pocket formed in the head thereof; movable contact means pivotally carried by the pocket in said fixed contact and biased between said pocket and said actuator means by a resilient portion; and an elastomeric member peripherally engaging the actuator means in said groove and having another portion peripherally engaging an inside periphery of said compartment thereby maintaining the portion of the compartment in which the switching action takes place dirt and moisture free.

5. An electric switch according to claim **4** wherein the movable contact means includes a pivot contact frictionally moving on a fixed contact to minimize oxidation build-up therebetween normally attending the interaction of two contacts having electrical current passing therebetween.

References Cited by the Examiner

UNITED STATES PATENTS

2,025,981	12/1935	Getty.	
2,424,773	7/1947	Rieber	200—6
2,439,410	4/1948	Mitchell	200—172 X
2,758,255	3/1957	Elliott	200—153
2,808,476	10/1957	Elliott	200—153 X
2,909,624	10/1959	Colautti	200—153 X
3,182,161	5/1965	Winter	200—67 X

ROBERT K. SCHAEFER, *Primary Examiner.*

H. HOHAUSER, *Assistant Examiner.*