July 28, 1959 A. R. DE VITO 2,897,326

ELECTRIC SWITCH

Original Filed Aug. 23, 1957

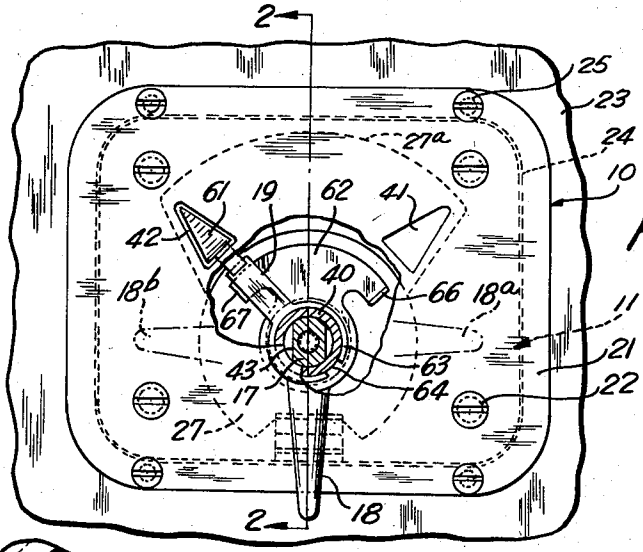


FIG. 1

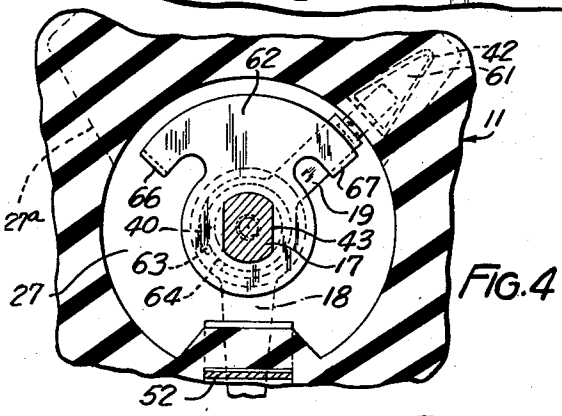


FIG. 4

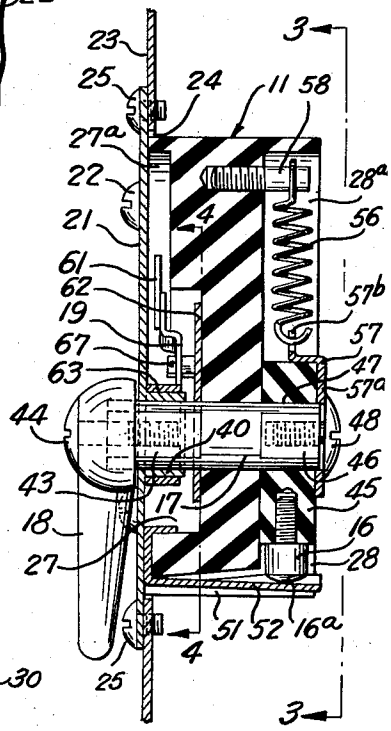


FIG. 2

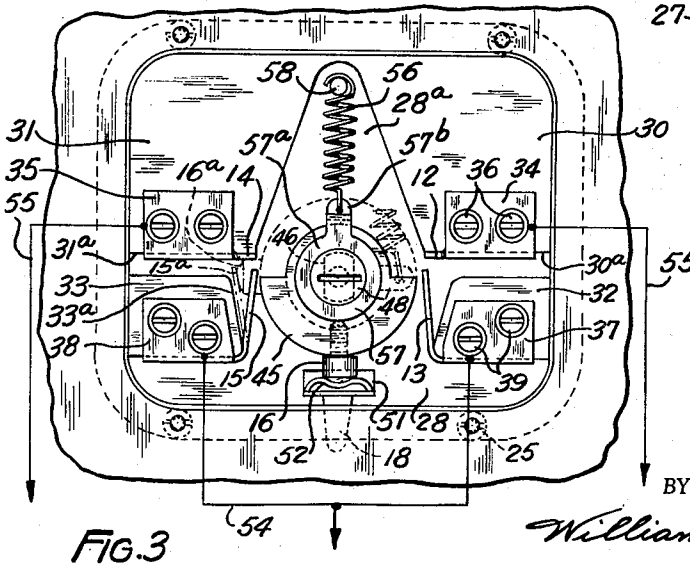


FIG. 3

INVENTOR.
ANGELO R. DEVITO
BY Hudson, Boughton, Williams, David & Hoffmann
ATTORNEYS

United States Patent Office 2,897,326
Patented July 28, 1959

2,897,326

ELECTRIC SWITCH

Angelo R. De Vito, Cleveland Heights, Ohio, assignor, by mesne assignments, to Lisle W. Menzimer, Rockford, Ill., as trustee

Original application August 23, 1957, Serial No. 679,968. Divided and this application November 22, 1957, Serial No. 698,158

9 Claims. (Cl. 200—167)

This invention relates to electric switches and, more particularly, to a switch of the position-indicating type.

An object of this invention is to provide a position-indicating electric switch of a simple and practical form of construction and in which the indication being given at any particular time is of the switch position to which the device was actuated just previously to its present switch position.

A position-indicating switch of this character can be applied to various different uses and can be used to particular advantage in electric locking systems for automobile doors. This application is a division of an earlier filed application disclosing such door lock systems, namely, application Serial No. 679,968 filed August 23, 1957.

Another object of the present invention is to provide a position-indicating switch in which an actuating means and an indicating means have cooperably engageable portions for producing a delayed-action movement of an indicating member, such that the indicating member will be temporarily left at a given indicating setting representative of a switch position to which the device was just previously actuated.

A further object is to provide such a position-indicating switch having a movable contact means movable from or through a switch-disengaged normal position to a selected switch-engaged position and back to the normal position, and in which the delayed-action means causes the indicating member to remain at the indicating setting corresponding with the selected switch-engaged position while the movable contact means is returned to the normal position.

Still another object is to provide a position-indicating switch of the character mentioned above wherein the contact actuating means includes a pick-up means effective on a member of the indicating means for producing delayed-action movement of the indicating member to its different indicating settings, the indicating means preferably providing a visual indication by cooperating flag and window elements.

Additionally, this invention provides a position-indicating switch of the kind above referred to in which a contact actuating member and the indicating member are swingable about a common pivot axis, and in which the delayed-action means comprises sector and pointer parts connected with such members and carrying cooperably engageable portions.

Other objects and advantages of this invention will be apparent in the following detailed description, and in the accompanying drawing forming part of this specification and in which,

Fig. 1 is a front elevation, with portions broken away, showing a position-indicating switch embodying the present invention;

Fig. 2 is a vertical section taken through the switch on section line 2—2 of Fig. 1;

Fig. 3 is a rear elevation of the switch when viewed as indicated by the direction line 3—3 of Fig. 2; and

Fig. 4 is a fragmentary sectional view taken on section line 4—4 of Fig. 2.

The position-indicating switch 10 shown in the accompanying drawing represents one practical embodiment of this invention and comprises, in general, a body 11 of insulating material having pairs of stationary contacts 12, 13 and 14, 15 mounted thereon at spaced points, and a movable contact 16 which is selectively engageable with the pairs of stationary contacts. The switch 10 also comprises a pivoted actuating shaft 17 having a manually movable switch actuating member or handle 18 thereon, and an indicating member or pointer 19 which is responsive to the actuation of the movable contact by the shaft.

Although the movable contact member 16 and the indicating member 19 are swingably movable in the switch 10 disclosed herein, it will be recognized that the features and advantages of the invention are also applicable to similar switch devices in which one or both of these members have a rectilinear movement instead of an arcuate movement.

The switch 10 also includes a front cover or mounting plate 21, against the rear side of which the insulating body 11 is secured by means of suitable screws 22. The plate 21 provides a mounting means by which the switch 10 can be mounted on a suitable support, such as an instrument panel 23, with the body 11 extending into or through an opening 24 of the latter. The plate 21 can be suitably secured to the support 23 as by means of the attaching screws 25.

The insulating body 11 is provided with recesses 27 and 28 extending thereinto from the front and rear sides thereof and in which various components of the switch are located as will be explained hereinafter. The front recess 27 faces toward and is covered by the front plate 21 and includes an upwardly extending arcuate extension recess 27*a*. The rear recess 28 includes an upwardly-converging extension recess portion 28*a* extending above the axis of the shaft 17. The shape of the body 11 on the rear side thereof is such as to provide a pair of laterally spaced substantially flat upper mounting portions 30 and 31 on opposite sides of the extension recess 28*a* and a pair of laterally spaced lower mounting portions 32 and 33 having substantially flat top surfaces and located in the main recess 28 on laterally opposite sides of the shaft 17.

The upper contacts 12 and 14 of the pairs of stationary contacts are located on the upper mounting portions 30 and 31 of the body 11, and the lower stationary contacts 13 and 15 are located on the lower mounting portions 32 and 33. To facilitate the mounting of these stationary contacts, the upper pair of contacts 12 and 14 are provided with L-shaped bodies 34 and 35 which are secured against the mounting portions 30 and 31 by suitable attaching screws 36. Similarly, the lower pair of stationary contacts 13 and 15 are provided with L-shaped bodies 37 and 38 which are secured against the mounting portions 32 and 33 by suitable attaching screws 39.

The stationary contacts 12 and 14 are preferably in the form of finger projections of the L-shaped bodies 34 and 35 and lie against the edge faces 30*a* and 31*a* of the mounting portions 30 and 31. The stationary contacts 13 and 15 are springable finger projections of the L-shaped bodies 38 and 39 which extend toward the contacts 12 and 14 but have their free ends spaced from the latter contacts as shown in Fig. 3.

The plate 21 is provided with a rearwardly extending sleeve 40 which projects into the front recess 27 and forms a support bushing in which the shaft 17 is pivotally movable. The portion of the plate 21 which overlies

the arcuate extension recess 27*a* is provided with arcuately spaced openings or windows representing indicating stations, in this instance two such openings or windows 41 and 42, corresponding with two switch-engaged or closed-switch positions of the movable contact 16 as will be further explained hereinafter.

The shaft 17 extends through the insulating body 11 with the rear end of the shaft projecting into the rear recess 28 and the front end of the shaft extending across the front recess 27 and projecting through the bushing 40 of the front plate 21. The front end of the shaft 17 is a noncircular portion 43 by reason of its being provided with flat sides. The actuating handle 18 is secured on the noncircular projecting front end of the shaft 17, as by means of the screw 44, such that swinging of the handle produces pivotal movement of the shaft.

The movable contact 16 is carried by a movable insulating member 45 which is located in the rear recess 28 and is secured on the shaft 17 in a fixed relation thereto. The rear end of the shaft 17 is a noncircular portion 46 by reason of its having flat sides and engages in a correspondingly shaped noncircular opening 47 of the member 45. A screw 48 threadedly engaged in the rear end of the shaft retains the member 45 thereon.

The movable contact 16 is here shown as being formed by the head of a screw whose stem is threadedly engaged in the insulating member 45. This contact is of a cylindrical shape and has a rounded top 16*a*. The contact 16 is movable to a closed-switch position by swinging of the handle 18 from its intermediate or normal position to either of its switch-engaged positions 18*a* and 18*b* which are shown in broken lines in Fig. 1.

When the handle 18 is thus swung to a switch-engaged position, such as the position 18*a*, the rounded top 16*a* of the movable contact rides up onto the lower stationary contact 15 and the side of the movable contact comes into engagement with the upper stationary contact 14 as a stop for the swinging movement. As the movable contact 16 rides up on the stationary contact 15, it deflects the latter outwardly by a springing thereof to the position 15*a* shown in Fig. 3. This outward springing of the contact 15 is accommodated by the inclined side face 33*a* of the mounting portion 33 of the insulating body 11.

By the time that the lower stationary contact 15 has been deflected to the position 15*a*, the movable contact 16 will have come into engagement with the adjacent upper stationary contact 14 to produce a closed condition of the contacts 14 and 15. The engagement of the movable contact 16 with the stationary contacts 14 and 15 in this manner produces a switch-engaged or closed condition of the contacts for completing a desired electric circuit, such as that represented by the conductors 54 and 55 which are connected with the stationary contacts. The conductor 54 is here shown as being a common conductor such as a current supply conductor for both of stationary contacts 13 and 15, and the conductor 55 is shown as being a control conductor which may extend from the contact 14 to a solenoid or other device to be controlled. Another such control conductor 55 is connected with the stationary contact 12.

At a point between the lower pair of stationary contacts 13 and 15 the lower edge of the body 11 is provided with an axially extending slot 51. A holding member 52 mounted on the body 11 and lying in the slot 51 is engageable by the movable contact 16 when the latter is in the switch-disengaged or open switch position in which it is shown in full lines in Figs. 2 and 3. The rounded top 16*a* of the movable contact, and the portion of the holding member 52 which is engageable by such rounded top, constitute cooperating detent elements for releasably holding the movable contact 16 in such switch-disengaged position.

The actuating handle 18 is here shown as being mounted on the shaft 17 so as to extend in the same directional relation to the rotation axis of the shaft as the movable contact 16. Thus, when the movable contact 16 has been swung to its switch-disengaged intermediate or normal position in engagement with the holding member 52, the handle 18 will also be at an intermediate open-switch or off position in which it is shown in full lines in Fig. 1 and which lies substantially midway between two switch-engaged positions 18*a* and 18*b*.

The actuating means of the switch 10 also includes a tension spring 56 and a lever member 57 which are located in the rear recess 28 of the body 11 with the spring 56 extending upwardly into the extension recess 28*a*. The lever member 57 is provided with a disk portion 57*a* having a noncircular opening in which the noncircular rear end portion 46 of the shaft 17 is engaged, such that the disk portion is swingable by the shaft and is retained on the latter by the screw 48. The spring 56 has one end thereof attached to an arm portion 57*b* of the level member and has its other end attached to an anchor pin 58 which is mounted on the body 11 and projects into the extension recess 28*a*.

When the movable contact 16 is swung to either of its switch-engaged positions in engagement with a pair of the stationary contacts, for example the stationary contacts 14 and 15, the spring 56 is subjected to tension by the swinging of the arm portions 57*b* of the lever 57 to the broken-line position shown in Fig. 3. The force of the spring 56 is preferably such that when the movable contact 16 is swung to this switch-engaged position and the handle 18 is released, the lever member 57 will be swung in the opposite direction by the spring to thereby disengage the movable contact from the stationary contacts and return the movable contact to its intermediate open-switch normal position in engagement with the holding member 52. This action of the spring 56 is swinging the lever 57 also returns, or assists in returning, the handle 18 to its intermediate normal or released position shown in full lines in Fig. 1.

If desired, the construction of the parts of the switch 10 can be such that when the movable contact 16 has been swung to its engaged-switch position in engagement with a pair of the stationary contacts, it will be retained in this closed-switch position by the expansive thrust of the laterally deflected lower stationary contact resulting from the tendency of the latter contact to return to its released or full-line position shown in Fig. 3. When the construction of the parts is such that the movable contact 16 is thus retained in the engaged-switch position by the laterally deflected lower stationary contact, the spring 56 will be effective to return the movable contact to its open-switch position as soon as the movable contact has been started toward its open position by an initial manual return movement of the handle 18 toward the intermediate normal position of the latter.

The indicating member 19 is here shown as being a finger-like member or pointer and forms a part of an indicating means which includes the indicating stations or windows 41 and 42. The indicating means of the switch 10 also includes a signal member or flag element 61 carried by the pointer 19 and a pick-up means comprising a sector member 62 mounted on the shaft 17. The pointer 19 has a hub portion 63 rotatably mounted on the bushing 40 so as to provide for swinging of the pointer about the axis of the shaft 17. The hub portion 63 is axially split at one point thereof, as indicated at 64, so that it will have a frictional drag on the bushing 40 by which the pointer will be retained against accidental shifting and will remain at the indicating station to which it is moved until it is forcibly shifted therefrom.

The flag element 61 is of a size and shape in relation to the windows 41 and 42 that it will be visible through the window to which it is moved during the actuation of the movable contact 16 to a corresponding switch-engaged position in engagement with a pair of the stationary con-

tacts. If desired, the flag element **61** can have a colored surface which is in contrast with the color of the front plate **21** so as to be readily visible when the flag element has been moved into alignment with one of the windows.

The sector member **62** is located in the front recess **27** and is mounted in a fixed relation on the shaft **17** by being provided with a noncircular opening in which the noncircular front end portion **43** of the shaft is engaged. The sector member **62** carries a pair of arcuately spaced pick-up lugs **66** and **67** lying on opposite sides of the pointer **19** and engageable with the latter in response to swinging of the sector member by a switch-actuating movement of the handle **18**.

From the construction of the switch **10** as above described, it will be understood that when the handle **18** is swung from its intermediate or normal position to the position **18***a*, the movable contact **16** will be brought into a closed-switch engagement with the stationary contacts **14** and **15**. The rotation of the shaft **17** produced by this swinging of the handle **18** causes the pick-up lug **66** of the sector member **62** to engage the pointer **19** and swing the latter counterclockwise to the position thereof shown in Fig. 1 in which the flag element **61** will be located at the indicating station in which it will be visible through the window **42**. Upon the release of the handle **18** by the operator, the spring **56** will return the movable contact **16** and the handle **18** to their normal or switch-disengaged position, thereby causing the sector member **62** to be swung in a clockwise direction as seen in Fig. 1 to move the pick-up lug **66** away from the pointer **19** and, at the same time, bringing the other pick-up lug **67** to a position at or in engagement with the opposite side of the pointer. The flag element **61** is thus left at the window **42** to indicate the closed-switch position **16***a* to which the movable contact was just previously moved.

If the handle **18** is next swung from its intermediate position to the switch-engaged position **18***b*, the movable contact **16** will be shifted into engagement with the stationary contacts **12** and **13** and the pointer **19** will be swung clockwise by the pick-up lug **67** to move the flag element **61** to an indicating position at the window **41**. The release of the handle **18** will again result in the return of the movable contact **16** to its switch-disengaged position while the flag element **61** is left at the window **41** to indicate the switch-engaged position to which the contact **16** was just previously moved. If the handle **18** is swung by one continuous movement from the position **18***a* to the position **18***b*, the lug **67** will come into engagement with and pick up the pointer **19** as the handle passes through its intermediate position and will swing the flag element **61** to the window **41** where it will be left when the handle is permitted to return to its intermediate position.

It will thus be understood that the functioning of the indicating means of the switch **10** is such that the pointer **19** and the flag element **61** will always be temporarily left at the indicating station corresponding with the engaged-switch position to which the movable contact **16** was just previously moved, and that the flag element will remain in that indicating position until the movable contact is subsequently shifted to another switch-engaged position.

From the accompanying drawing and the foregoing detailed description it will now be readily understood that this invention provides a position-indicating electric switch of a simple and practical construction and in which the indicating means comprises cooperably engageable portions constituting a delayed action pick-up means for moving an indicating member to an indicating station and temporarily leaving the indicator member at such station as an indication of the switch-engaged condition to which the movable contact was just previously moved.

Although the position-indicating electric switch of this invention has been illustrated and described herein to a somewhat detailed extent, it will be understood, of course, that the invention is not to be regarded as being limited correspondingly in scope but includes all changes and modifications coming within the terms of the claims hereof.

Having described my invention, I claim:

1. An electric switch comprising, first and second stationary contact means located at spaced points, a movable contact means selectively movable in opposite directions to closed-switch positions in engagement with said stationary contact means and having a normal open-switch position intermediate said closed-switch positions, actuating means operable for producing a forward movement of said movable contact means for moving the latter from said normal position to one of said closed-switch positions, spring means subject to being stressed during said forward movement and effective for imparting a return movement to said movable contact means for returning the latter to said normal position, indicating means including an indicator member movable to different indicating settings representative of said closed-switch positions of said movable contact means, pick-up means operable to move said indicator member to said indicating settings during said forward movement of said movable contact means and being ineffective on said indicator member during said return movement of said movable contact means, said pick-up means comprising a pick-up member movable relative to said indicator member by said actuating means, a pair of spaced abutment portions carried by one of the two last-mentioned members, and an engageable portion carried by the other of said two last-mentioned members and extending between and engageable by said abutment portions.

2. An electric switch comprising, first and second stationary contact means located at spaced points, a movable contact means selectively swingable in opposite directions about a pivot axis to closed-switch positions in engagement with said stationary contact means and having a normal open-switch position intermediate said closed-switch positions, actuating means operable for producing forward swinging of said movable contact means for moving the latter from said normal position to one of said closed-switch positions and including spring means subject to being stressed during said forward movement and effective for imparting return swinging movement to said movable contact means for returning the latter to said normal position, spaced indicating stations, an indicating member swingable about said axis for movement to said indicating stations, a sector member connected with said actuating means and swingable thereby about said axis and relative to said indicating member, and spaced pick-up elements on said sector member in straddling relation to said indicating member and selectively engageable with the latter.

3. An electric switch as defined in claim 1 in which said indicating member and said pick-up means are swingable about a common axis.

4. An electric switch as defined in claim 1 and including a pivotally movable shaft as a part of said actuating means, and in which said indicator member is swingable about the axis of said shaft and said pick-up means is connected with said shaft and swingable thereby for pick-up co-operation with said indicator member.

5. An electric switch as defined in claim 1 and wherein said indicator settings comprise windows and said indicator member includes a flag member having visible indicator positions adjacent said windows.

6. An electric switch comprising; a shaft providing a rotation axis; first and second stationary contact means located at angularly spaced points about said axis; a movable contact means rotatably movable in opposite directions about said axis from a normal open-switch intermediate position for selective closed-switch engagement with said stationary contact means; a manually actuatable first member having an intermediate rest position and being rotatably movable in opposite directions about said

pivot axis from said rest position for causing the selective closed-switch engagement of said movable contact means with said stationary contact means; spring means subject to being stressed during the rotative movement of said movable contact means to closed-switch position by said first member and effective to return said movable contact means to said intermediate position and to also return said first member to said rest position; indicator stations at angularly spaced points about said axis; an indicator member rotatably movable in opposite directions about said axis from one to another of said stations to indicate the closed-switch positions of said movable contact means; a sector member rotatably movable about said axis and connected with said first member for rotative movement with the latter in opposite directions; and spaced pick-up elements on said sector member in lost-motion straddling relation to said indicator member and selectively engageable with the latter for moving the same to, and temporarily leaving the same at, said stations.

7. An electric switch as defined in claim 6 and wherein said indicator stations are windows and said indicator

member is a flag member having visible indicating positions adjacent said windows.

8. An electric switch as defined in claim 6 and wherein said pivot shaft is rotatable by manual movement of said first member away from said rest position; and wherein the rotative movement of said indicator member is a free movement and said sector member is fixed on said shaft to be driven thereby.

9. An electric switch as defined in claim 6 and which includes detent means engageable by said movable contact means when the latter is in its open-switch position for releasably holding said first member in said rest position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,878,602	Ringbloom	Sept. 20, 1932
2,648,728	Bollhoefer	Aug. 11, 1953
2,662,942	Winkler	Dec. 15, 1953