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W. M. S. KILGOUR

2,291,237

SWITCH

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Fig. 2.

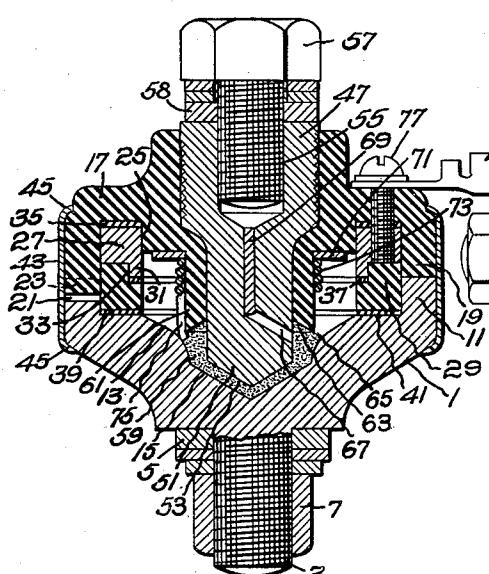


Fig. 1.

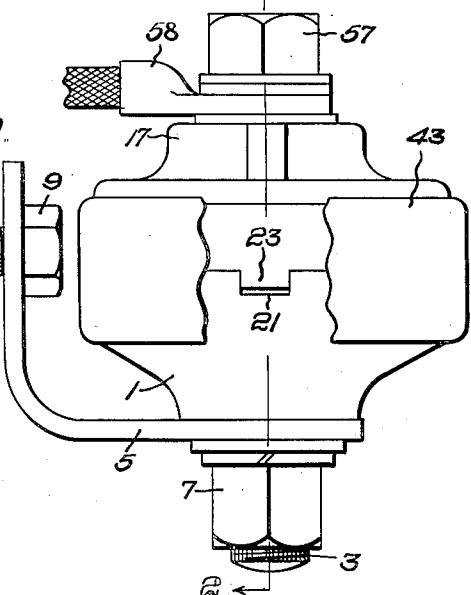


Fig. 3.

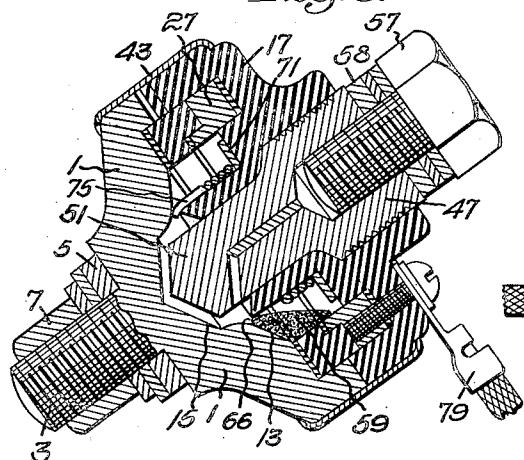
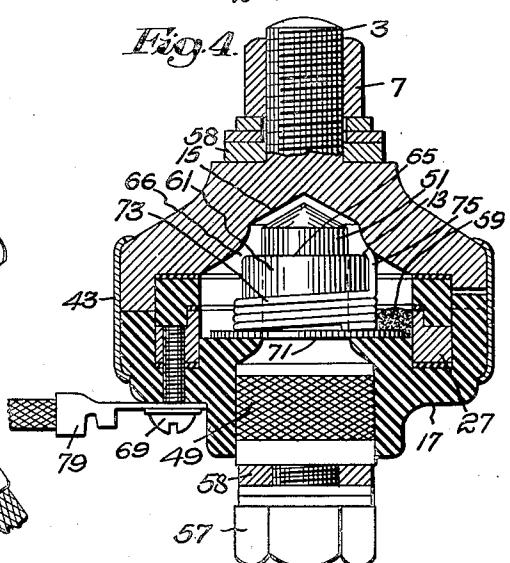


Fig. 4.



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UNITED STATES PATENT OFFICE

2,291,237

SWITCH

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Application November 13, 1940, Serial No. 365,547

15 Claims. (Cl. 200—52)

My invention relates to switches operated by tilting them or by tilting a part to which they are attached, switches according to the invention being particularly adapted for use in connection with the electrical systems of vehicles driven by internal combustion engines.

The invention, which comprehends an improvement in the switch shown in applicant's Patent 1,588,459, issued June 15, 1926, will be best understood from the following description when read in the light of the accompanying drawing of an embodiment of the invention, the scope of which latter will be more particularly pointed out in the appended claims.

In the drawing—

Fig. 1 is an elevation of a switch according to the invention;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Figs. 3 and 4 are sections corresponding to Fig. 2, with the switch in different operative positions, Fig. 4 showing parts in elevation.

Referring to the drawing, the switch comprises a body 1 of conductive material such as aluminum, steel, or the like. As illustrated, the body is integrally formed with a downwardly projecting terminal lug 3 to which may be secured, for example, a bracket 5 by means of a nut 7 screw-threaded on the lug. A bolt 9 may be employed to attach the bracket to the chassis frame of a motor vehicle so that the body 1 of the switch will be in electrical communication with the chassis, that is to say, grounded.

As shown, the body 1 of the switch is interiorly recessed to provide an annular side wall 11 and a bottom 13 of generally conical shape, the apex portion of the bottom being recessed to form a well as shown at 15.

On the annular side wall 11 of the metallic body 1 is shown a cover 17 of insulating material such as Bakelite. This cover, as shown, is recessed to provide an annular side wall 19 aligned with the annular side wall 11 of the body 1. Conveniently, the annular side wall 11 is formed with a notch 21 into which fits a lug 23 formed on the side wall 19 of the cover so as to aid in properly positioning the parts.

In the present embodiment of the invention the cover 17 adjacent the side wall 19 thereof is formed with an annular groove or recess 25 which receives a metallic ring contact 27, this ring contact projecting into the chamber formed by the metallic body 1 and cover 17. Abutting with the ring contact 27 is a ring 29 of insulating material which fits the interior surface of the side wall 11 of the body 1. As shown, the ring

contact 27 is provided at its inner side with a downwardly projecting annular flange 31 which fits an annular groove 33 on the inner side of the adjacent portion of the ring 29.

As illustrated, an annular packing gasket 35 of rubber or other resilient material is placed between the ring contact 27 and the bottom of the annular groove 25. An annular packing gasket 37 of like material is placed between the abutting surfaces of the annular flange 31 of the ring contact 27 and the annular groove 33 of the insulating ring 29, while a further gasket 39 of like material is placed between the insulating ring and the annular bottom surface portion 41 of the recess in the body 1.

Surrounding the body 1 and cover 17 is, as illustrated, a metal sleeve 43 opposite edges 45 of which are spun or otherwise forced over corresponding shoulder portions on said body 1 and cover 17 for holding in assembled relation the parts hereinbefore enumerated. Preferably the parts are clamped together during the spinning operation on the sleeve 43 so as to compress the gaskets 35, 37 and 39, or the spinning operation is such that it will compress them, and as a result the interior chamber of the switch is hermetically sealed.

As shown, the cover 17 carries a metallic plug-like part having a head 47 which is exteriorly knurled, as indicated at 49 (Fig. 4), to cause it to be rigidly secured in a fluid tight manner to the cover when the latter is moulded about the plug-like part during manufacture of the device. The plug-like part, as shown, has a shank 51 projecting through the cover into the recess in the body 1, this shank having a conical end 53 opposed to the conical surface of the bottom of the well or recess 15 in the body 1. As illustrated, the head 47 is formed with a tapped recess 55 for receiving the shank of a terminal bolt 57 to which, for example, may be connected the terminal lug 58 of the ground wire of the battery of an internal combustion engine driven vehicle. In the well 15 of the body 1 is a globule 59 of mercury which normally places the plug in electrical communication with the body 1, which body, as above explained, may be grounded to the chassis of the vehicle, so that when the ground wire of the battery is connected to the plug the ground wire will be normally electrically connected to the chassis.

In the present embodiment of the invention the cover 17 is integrally formed with a downwardly projecting sleeve 61 surrounding the shank 51, the lower end 63 of the sleeve being

shown as conically recessed so as to provide a more or less sharp edge 65 opposed to the bottom surface 13 of the body 1. The parts are so proportioned that the space between the edge 65 and the surface 13 forms an annular, somewhat restricted passage 66 (Fig. 4). Further, the end 63 of the sleeve acts as a baffle to prevent undue movement of the mercury when the vehicle bounces or is jarred while passing over rough roads and the like.

As shown, a passage 67 formed in the shank 51 leads from the bottom of the recess 55 to the exterior of the shank below the sleeve 61. Upon removal of the bolt 57 this passage may be employed as a filling orifice for entering the mercury into the interior chamber of the switch, after which a suitable plug 69 may be forced into the passage for sealing it.

Surrounding the sleeve 61 is shown an annular, plate-like, contact member 71 held against the cover by a compression spring 73 which also surrounds the sleeve. This spring has a depending portion 75 abutting with the lower surface of the recess in the body 1. In this way the spring holds the contact 71 in position and places it in electrical communication with the body 1.

The ring contact 27 may be connected by a binding screw 11 to a terminal lug 79 from which leads a conductor to such terminal of the vehicle charging generator cut-out switch that upon grounding of that terminal the generator will be rendered inoperative to supply energy to the vehicle wiring. Thus, if the vehicle tilts to such angle as causes the surface 13 and bottom surface of the well 15 to pass the horizontal and thus permit the globule of mercury to discharge as a body through the restricted passage 66, not only will the electrical connection between the shank 51 and body 1 be broken, but the body 1 will be placed in electrical communication with the ring contact 27, as illustrated in Fig. 3. This not only will automatically disconnect the battery from the chassis and render the battery inoperative to supply energy to the wiring of the vehicle, but, as above explained, will render the generator inoperative to supply energy to the wiring. Should the vehicle entirely overturn the globule of mercury will move to such position that it will rest against the ring contacts 27 and 71, as indicated in Fig. 4, under which conditions the ground wire of the battery will still be disconnected from the chassis and the generator will be rendered inoperative in the same way as before because the spring 73 places the contact 71 in electrical communication with the grounded body 1.

It will be understood that, within the scope of the appended claims, wide deviations may be made from the form of the invention herein described without departing from the spirit of the invention.

I claim:

1. A tilting switch having, in combination, means providing a chamber having a lower contact, a contact in spaced relation to said lower contact, a body of mercury in said chamber normally placing said contacts in electrical communication, an upper contact normally out of contact with said body of mercury, said contacts and the walls of said chamber being so shaped and disposed as to cause said body of mercury to interrupt electrical communication between the two first mentioned contacts when said chamber is tilted and establish electrical communication between said lower and upper contacts.

2. A tilting switch having, in combination, means providing a chamber having a bottom wall portion shaped to confine thereon a body of mercury and to release the latter when said chamber is tilted, a contact above said bottom wall portion normally in contact with said body, and means forming a contact above said body adjacent the side walls of said chamber, whereby upon tilting of said chamber said body will flow from in contact with the first mentioned contact into contact with the last mentioned contact while remaining in contact with said bottom wall portion and without division of said body.

3. A tilting switch having, in combination, means forming a chamber having a bottom wall portion of conductive material shaped to confine thereon a body of mercury and to release the latter when said chamber is tilted, a contact above said bottom wall portion in spaced relation to the side walls of said chamber, which contact is normally in contact with said body, and means providing a contact above said bottom wall portion adjacent the side walls of said chamber, which contact is normally out of contact with said body, whereby upon tilting of said chamber said body will flow from in contact with the first mentioned contact into contact with the last mentioned contact while remaining in contact with said bottom wall portion and without division of said body.

4. A tilting switch according to claim 2 in which the bottom wall portion is so shaped that the body of mercury will be released when the chamber is tilted in any direction, and the contact above the bottom wall portion adjacent the side walls of said chamber extends substantially entirely around said chamber.

5. A tilting switch according to claim 2 in which the bottom wall portion is substantially conical in shape, the first mentioned contact of claim 2 being above the apex of said portion, and the second mentioned contact of claim 2 extending substantially entirely around the side walls of the chamber.

6. A tilting switch according to claim 2 in which the bottom wall portion is of conductive material and is substantially conical in shape, the first mentioned contact of claim 2 being above the apex of said portion, and the second mentioned contact of claim 2 being a ring surrounding the axial line of the first mentioned contact.

7. A tilting switch having, in combination, a chamber having a conical bottom wall, means dividing said chamber into upper and lower portions in fluid communication with each other through a restricted passage, a movable body of mercury in said chamber adapted to rest on said conical bottom wall thereof when the apex of the latter is pointed downward, a pair of spaced contacts in said lower portion of said chamber in contact with said body when the apex of said bottom wall is so pointed, and a third contact in the upper portion of said chamber adjacent its side walls adapted to be placed in electrical communication with one contact of said pair of contacts by said body when the latter moves to interrupt electrical communication between said pair of contacts upon tilting of said chamber.

8. A tilting switch having, in combination, a chamber having a conical bottom wall, means dividing said chamber into upper and lower portions in fluid communication with each other through a restricted passage, a movable body of mercury in said chamber adapted to rest on said conical bottom wall thereof when the apex of the

latter is pointed downward, a pair of spaced contacts in said lower portion of said chamber in contact with said body when the apex of said bottom wall is so pointed, a third contact in the upper portion of said chamber adjacent its side walls adapted to be placed in electrical communication with one contact of said pair of contacts by said body when the latter moves to interrupt electrical communication between said pair of contacts upon tilting of said chamber, and a fourth contact in said upper portion of said chamber spaced from said third contact in electrical communication with said contact of said pair of contacts which is so placed in electrical communication with said third contact, said fourth contact being adapted to be placed in electrical communication with said third contact by said body upon further tilting of said chamber.

9. A tilting switch having, in combination, a chamber having a conical bottom wall of conductive material, means cooperating with said bottom wall dividing said chamber into upper and lower portions in fluid communication with each other through an annular restricted passage, a body of mercury in the lower portion of said chamber, a contact in said lower portion of said chamber above said bottom wall normally in contact with said body, an annular contact in the upper portion of said chamber adjacent its side walls adapted to be placed in electrical communication with said bottom wall upon said body flowing through said passage into said upper portion of said chamber, and a second annular contact in said upper portion of said chamber in electrical communication with said bottom wall adapted to be placed in electrical communication with the first mentioned annular contact upon said chamber being inverted.

10. A tilting switch having, in combination, means forming a chamber having a conical bottom providing adjacent its apex and edges contact means in electrical communication, an annular contact above said edges adjacent the side walls of said chamber, an annular contact adjacent the top wall of said chamber in electrical communication with said contact means, a contact opposed to said apex normally placed in electrical communication with said contact means by a body of mercury on said conical bottom at said apex, baffle means cooperating with said bottom dividing the portion of said chamber having said body of mercury from the portion thereof containing said annular contacts while establishing fluid communication between said portions through a restricted annular passage; whereby tilting said chamber in any direction to invert it will cause said body to flow from the lower portion of said chamber through said passage into the upper portion of said chamber and progressively interrupt electrical communication between said contact means and contact opposed to said apex, establish it between said contact

means and the first mentioned annular contact, and establish it between the first and second mentioned annular contacts.

11. A tilting switch according to claim 10 in which the baffle means is formed of a sleeve of insulating material which is carried by the top wall of the chamber and projects toward the conical bottom thereof coaxially of the latter, the contact opposed to the apex of said bottom extending through said sleeve, and two annular contacts surrounding said sleeve.

12. A tilting switch according to claim 10 in which the baffle means is formed of a sleeve of insulating material which is carried by the top wall of the chamber and projects toward the conical bottom thereof coaxially of the latter, the contact opposed to the apex of said bottom extending through said sleeve, and two annular contacts surrounding said sleeve, there being spring means surrounding said sleeve for placing the annular contact adjacent the top wall of said chamber in electrical communication with the contact means provided by said bottom.

13. A tilting switch having, in combination, a closed chamber adapted to contain a body of mercury, contact means projecting through the walls of said chamber from its exterior into its interior, and a filling orifice for entering the mercury into said chamber formed in said contact means.

14. A tilting switch having, in combination, a metallic body having a recess, a cover of insulating material for the recess of said body, which cover is carried by said body and has a recess aligned with the recess of said body, a ring of insulating material carried by said body adjacent the interior side walls of the recess therein, a ring contact of metallic material carried by said cover adjacent the interior side walls of the recess therein and abutting said ring of insulating material, and means securing said cover and body together for holding the enumerated parts in assembled relation.

15. A tilting switch having, in combination, a metallic body having a recess, a cover of insulating material for the recess of said body, which cover is carried by said body and has a recess aligned with the recess of said body, a ring of insulating material carried by said body adjacent the interior side walls of the recess therein, a ring contact of metallic material carried by said cover adjacent the interior side walls of the recess therein and abutting said ring of insulating material, a second ring contact of metallic material abutting said cover at the inner side thereof, a compression spring abutting said second ring contact and the interior of said metallic body, and means securing said cover and body together for holding the enumerated parts in assembled relation.

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