Dec. 8, 1942. J. C. SMYTHE 2,304,608

ELECTRICAL CUTOUT FOR MOTOR VEHICLES

Filed July 23, 1941 2 Sheets-Sheet 1

Fig. 1.

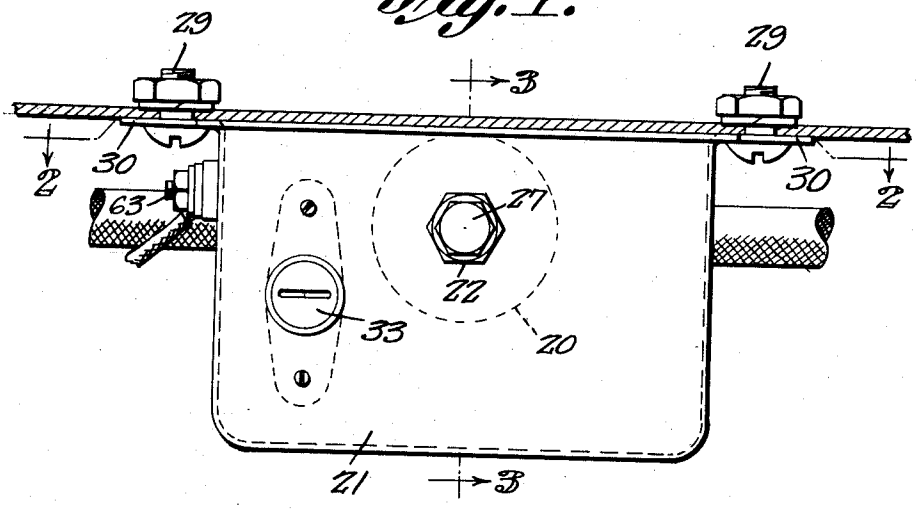
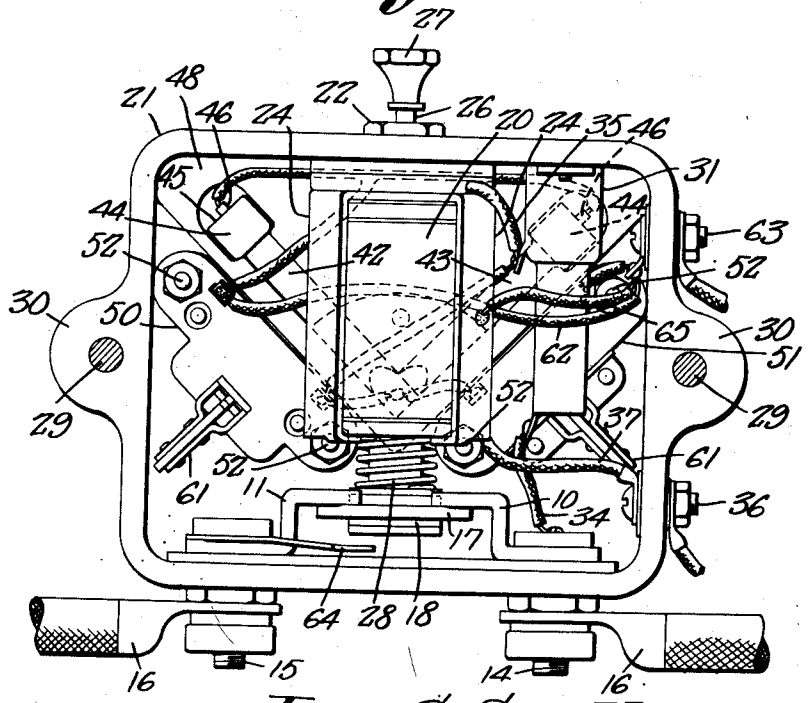


Fig. 2.



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Fig. 3.

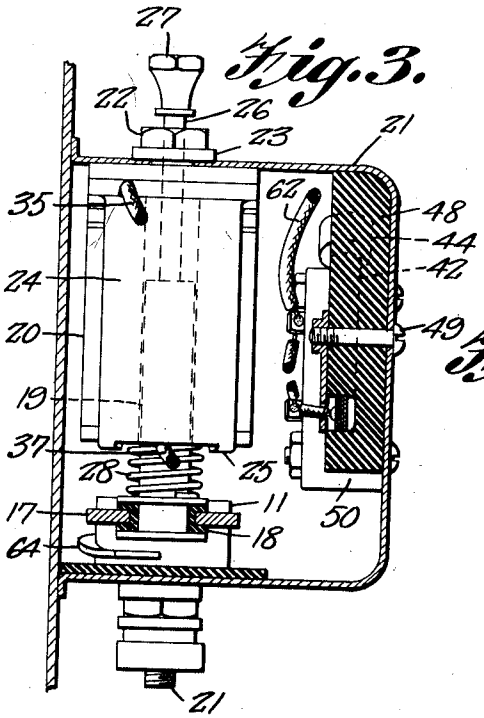


Fig. 4.

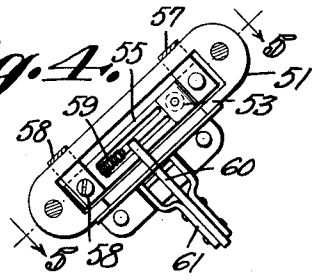


Fig. 6.

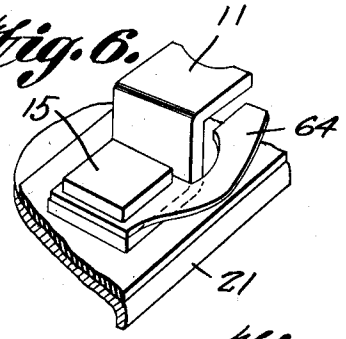


Fig. 5.

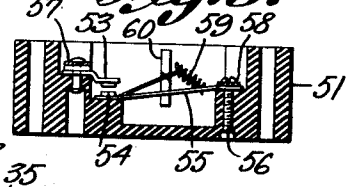


Fig. 7.

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ELECTRICAL CUTOUT FOR MOTOR VEHICLES

Jean C. Smythe, Charlotte, N. C., assignor to Solenoid Electric Products Co., Charlotte, N. C.

Application July 23, 1941, Serial No. 403,723

10 Claims. (Cl. 171—97)

The object of the invention is to provide a cut-out to be used as a part of the electrical equipment of motor vehicles where it is essential to absolutely cut-off the electrical source to preclude the hazards of fire in the event of collisions or the undue tilting or turning over of the vehicle; to provide a cut-out designed to positively and effectively operate by means which are not subject to the carrying of heavy currents and will yet render dead or inactive the heavy current source; and generally to provide a device of the kind indicated which is of simple form and susceptible of cheap manufacture but is, at the same time, strong, durable, and positively operating when called upon to function.

With this object in view, the invention consists in a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawings but to which the invention is not to be restricted. Practical application may dictate certain changes or alterations and the right is claimed to make any which fall within the spirit of the invention.

In the drawings:

Figure 1 is a top plan view of the invention.

Figures 2 and 3 are respectively sectional views on the planes indicated by the lines 2—2 and 3—3 of Figure 1.

Figure 4 is a top plan view of one of the impact switches.

Figure 5 is a sectional view on the plane indicated by the line 5—5 of Figure 4.

Figure 6 is a detail perspective view of one of the main contacts and its associated grounding leaf or contact.

Figure 7 is a diagrammatic view of the wiring of the cut-out.

If the battery be under the hood, as in some cases, close proximity of the device to the battery will call for its being mounted on the dash as indicated in the illustrated embodiment of the invention. Such mounting will place the main contacts 10 and 11 close to the battery 12 which, as in the conventional practice, is grounded, as indicated at 13, to the frame of the vehicle. In installing the invention, the battery cable leading from the positive side of the battery will be split and the battery connected portion of the same will be connected to the contact 10 through the instrumentality of the binding post 14. And the starter connected portion of the cable will be connected to the contact 11 through the instrumentality of the binding post 15, appropriate lugs, such as indicated at 16, having been connected to the split portions of the cable.

The contacts 10 and 11 constitute the principal contacts of the invention and circuit closing position is effected by bridging them with the bridger disk 17, the latter being loosely or floatingly mounted on an insulating bushing 18 which is carried at the lower end of the core 19 of a solenoid 20, the latter being wound on an appropriate sleeve in which the core moves and the solenoid being supported from the top of the case 21 by means of a nut 22 and washer 23, the former being threadedly engaged with the sleeve after the latter has been passed through an appropriate opening in the top wall of the case.

The winding of the solenoid is covered with a shield 24 formed with ears 25 turned under the lower end of the spool on which the winding of the solenoid is wound.

A stem 26 connects with the core 19 of the solenoid and passes through the upper end of the spool sleeve, being formed with a head 27 exterior to the case for manual control of the core if that should be necessary.

A light compression spring 28 surrounds the core and is compressed between the lower end of the solenoid spool and insulating bushing 18, this spring tending to move the bridger disk 17 out of contact engaging position.

By having the bridger disk floatingly mounted on the bushing, engagement with both contacts 10 and 11 is insured.

The case 21 is secured to the dash or other vehicle part by means of bolts 29 which pass through ears 30 with which the case is formed at the open side. The wall of the dash or part to which the case is connected operates as the closure for the case, except where the latter may necessarily have to be supported on a bar or the like when, of course, a separate closure may be applied and held in place by the mounting bolts 29.

Mounted in the top wall of the case and at one side of the solenoid is a fuse case 31, this fuse case being of conventional form and adapted to receive a replaceable fuse 32 by the simple operation of removing the cap 33 and substituting a good fuse for the blown one. One end of the fuse is electrically connected with the contact 10 by means of a conductor 34 and the opposite end connects with one end of the solenoid winding through a conductor 35. The opposite end of the solenoid winding connects with a ground post 36 through a conductor 37, the ground post being designed for a positive ground connection with some part of the vehicle frame. But, in the preferred embodiment of the invention,

through a manual control switch 38, the latter being of conventional form with a pilot light 39 mounted in common therewith but not under direct control of the switch except to have the common ground connection 40 with the latter. The positive terminal of the pilot light is connected to the contact 11 by means of a conductor 41. Thus when the switch is turned on the pilot light 39 will be illuminated but only by reason of the fact that the solenoid then functions to have the contacts 10 and 11 bridged by the bridger disk 17.

The switch 38 serves as a manual control whereby the battery may be positively cut-out of circuit without the necessity for having to disconnect the battery cable, as when a mechanic is engaged in his work and wants the entire electrical system dead.

Being designed to function in the event of collisions or of the equipped car turning over, impact and tilt switches are provided. The tilt switches are indicated at 42 and 43 and are in the form of metal tubes of which each has an enlarged upper end 44 closed with an insulating disk 45 in the center of which is a contact 46. The tubes contain mercury, indicated at 47, of a quantity sufficient to rise approximately half the height of the tube. As long as the tubes are in positions not greater than 45° from the vertical, there is no contact between the mercury contact and the contact 46 and the tilt switch will thus be in open position. In fact the tilt switch can tilt further than a 45° position from the vertical without functioning but not to any great extent beyond the 45° position.

The two tilt switches are mounted in channels in a block of insulating material 48 secured to the back wall of the casing by a bolt 49, and their relative angular positions are 90° but they are so disposed that they normally stand in intermediate positions between the vertical and horizontal which would mean a position 45° either from a vertical or horizontal plane.

The lower ends of the tubes are electrically connected together as are the contacts 46 of the two, this arrangement placing these two switches in parallel. And they are designed to be connected in parallel with the impact switches 50 and 51, each of which consists of a block of insulating material formed with mounting holes so that the blocks may be secured to the back wall of the case by means of bolts 52. The impact switch 50 is mounted directly below the tilt switch 42 and the impact switch 51 correspondingly mounted with respect to the tilt switch 43.

The impact switches are of conventional construction and each comprises a fixed contact 53 and a movable contact 54, the latter being carried on the free end of a leaf spring 55 anchored to the block by a bolt 56 with which the lug 57 is connected, the latter being designed for soldering to a conductor as is also the lug 58 mounted in common with the contact 53.

The center leg of the leaf spring 55 is separated at one end from the remainder of the spring and is shorter than the two outside legs, a compression spring 59 having one end connected with the free end of the center leg and the other end with the body of the leaf spring adjacent the mounting bolt.

A yoke of insulating material 60 is engaged with the center leg of the leaf spring 55 and is mounted in common with the rocker 61 which has a swinging or pivotal mounting on the switch block. If the rocker be moved in one direction, the yoke will deflect the center leg of the leaf and compress the spring 59. After the spring passes the point of greatest compression it expands on the opposite side of the leaf and thus will swing the leaf to move the contact 54 away from the contact 53 or to move it into engagement with the contact 53, depending on the direction of movement of the rocker.

The rockers 61 are intended to operate by impact—that is, if the vehicle be suddenly stopped, the inertia of the rocker will result in its being swung, thus operating the yoke to effect movement of the leaf 55.

The two switches 50 and 51 are normally in open position and one is set to move to closed position by a forward impact to which the equipped vehicle is subjected, while the latter is set to function on a rear impact—that is, to be moved to closed position on a rear impact.

The switches 42, 43, 50 and 51, as aforesaid, are connected in parallel and one terminal of the group is connected by means of a conductor 62 with a ground post 63. The other terminal of the group is connected by means of a conductor 63 with that end of the fuse connecting with the solenoid winding.

In installing the appliance, a suitable ground connection from the vehicle frame to the binding post 63 is effected.

The contact 11 has mounted in common therewith a leaf contact 64 which is engaged with the lower end of the core 19 when the solenoid is deenergized. The purpose of this contact is to ground the generator of the electrical equipment when the master switch is in open position; and to make this ground effective, a conductor 65 is carried from the shield 24 of the solenoid to the binding post 63.

In the operation of the invention, the impact switches 50 and 51 are set to open position and the tilt switches will obviously assume such position when the appliance is mounted. Upon closing the switch 38, current will flow from the battery 12 to the contact 10, thence over the conductor 34, through the fuse 32, the solenoid winding 20, the conductor 39, switch 38 and ground back to the battery. The winding being thus energized, the core 19 will be raised, causing the bridger disk to engage the contacts 10 and 11 and thus place the electrical system of the equipped vehicle in circuit with the battery, so that the starting motor may be operated and the other electrical equipment function as usual.

If, there now be a collision, either forward or rear, one of the impact switches will be shifted to closed position and battery current which has reached the fuse 32 will flow over the conductor 63, through the closed switch, over the conductor 62, binding post 63 and back to the battery through the ground, thus short-circuiting the battery through the fuse and resulting in its being blown. The solenoid will thus be deprived of current and the bridger disk will be shifted out of engagement with the contacts 10 and 11 by reason of the dropping of the core 19 which, contacting with the leaf 64, will ground the generator.

Before the apparatus can again be placed in operative position a new fuse will be necessary and the resetting of the actuated switch to open position will be required.

As the device functions in response to operation of an impact switch, so will it function in response to the actuation of a tilt switch, as

where the machine will turn over or assume a dangerously inclined position.

The invention having been described, what is claimed as new and useful is:

1. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally disposed in non-bridging position, an electro-magnet for shifting the movable element into contact bridging position, and means forming an independent circuit with the battery and including a serially connected manual switch controlling the electro-magnet to retain the movable element in contact bridging position.

2. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally disposed in non-bridging position, an electro-magnet for shifting the movable element into contact bridging position, and means forming an independent circuit with the battery and controlling the electro-magnet to retain the movable element in contact bridging position, the last said means including a fuse between the positive terminal of the battery and the electro-magnet and a switch between the low potential end of the fuse and the negative terminal of the battery.

3. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally disposed in non-bridging position, an electro-magnet for shifting the movable element into contact bridging position, and means forming an independent circuit with the battery and controlling the electro-magnet to retain the movable element in contact bridging position, the last said means including a fuse and a manual switch in series with the electro-magnet from the positive terminal of the battery and a plurality of automatic switches grouped in parallel with the group serially connected from the low potential side of the fuse with the negative terminal of the battery.

4. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally disposed in non-bridging position, an electro-magnet for shifting the movable element into contact bridging position, and means forming an independent circuit with the battery and controlling the electro-magnet to retain the movable element in contact bridging position, the last said means including a fuse and a plurality of switches of which one is manual and the others automatic, the automatic switches being in parallel and short-circuiting the battery through the fuse when any one is closed.

5. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally in non-bridging position, a fuse, an electro-magnet actuating said movable element and connected across the battery in series with the fuse, and an automatic switch connected across the battery in series with the fuse and short-circuiting the battery through the fuse when closed.

6. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally in non-bridging postion, a cut-out, an electro-magnet actuating said movable element and connected across the battery with its circuit controlled by the cut-out, and a plurality of automatic switches connected in parallel with the group of switches connected across the battery and controlling the operation of the cut-out so as to effect opening of the latter upon the closing of any switch.

7. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally disposed in non-bridging position, a fuse, an electro-magnet actuating said movable element and connected across the battery in series with the fuse, a plurality of automatic switches connected in parallel with the group of switches connected across the battery in series with the fuse to short circuit the battery through the fuse when any switch is closed, and a manual switch interposed in the circuit of the electro-magnet.

8. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally in non-bridging position, a fuse, an electro-magnet actuating said movable element and connected across the battery in series with the fuse, an impact switch, and a tilt switch, the tilt and impact switches being connected in parallel but across the battery in series with the fuse for short-circuiting the battery through the fuse upon closing of either switch.

9. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally disposed in non-bridging position, a fuse, an electro-magnet actuating said movable element and connected across the battery in series with the fuse, a manual switch included in the circuit of the electro-magnet, and a plurality of automatic switches of which some are impact and the others tilt switches, the tilt and impact switches being connected in parallel but across the battery in series with the fuse to short-circuit the battery through the fuse upon closing of any one.

10. An electrical cut-out for motor vehicles comprising a master switch having spaced contacts arranged for interposition in the battery lead adjacent the battery, a movable element bridging said contacts and normally in non-bridging position, a fuse, an electro-magnet actuating said movable element and connected across the battery in series with the fuse, a plurality of automatic switches connected in parallel with the group connected across the battery in series with the fuse and short-circuiting the battery through the fuse when any one is closed, and means for grounding that one of the spaced contacts remote from the battery when the movable element is in non-bridging position.

JEAN C. SMYTHE.