UNITED STATES PATENT OFFICE

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AUTOMATIC ELECTRIC SAFETY SWITCH

Application filed April 23, 1930. Serial No. 446,879.

This invention relates to electric switches and especially to one particularly designed for use in connection with the ignition circuit of a motor vehicle engine.

The principal object of our invention is to provide a switch for the purpose so designed as to eliminate the possibility of exhausting the battery of the car in the event that the ignition switch is left on after the engine has stopped or is turned on by mistake, and which will automatically open and thus break the ignition circuit in the event that the car assumes a dangerously tilted position or actually turns over. In the latter contingency the engine is therefore stopped before the car has completely turned over and eliminates the possibility of a fire being caused by reason of the engine continuing to run under the above conditions, as sometimes happens.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a sectional elevation of our improved switch shown in its open or contact breaking position.

Fig. 2 is a similar view showing the switch closed.

Fig. 3 is a diagram showing the switch as connected to the intake manifold and ignition circuit of a gas engine.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes a cylindrical tubular body, which may be of glass or metal as conditions may require. Heads or caps 2 and 3 engage with the upper and lower ends respectively of the body; the cap 2 being of insulation material and having an air-tight seal with the body by reason of a suitable gasket 4 interposed therebetween. The lower cap however has a freely open air vent therethrough which is preferably in the form of a tubular headed screw 5.

Disposed in the body between the heads is a plunger 6 having a running fit with the walls of the body. This plunger is formed with an interior chamber or pocket 7 in which a small quantity of mercury 8 is retained. A vertical passage 9 leads from the chamber 7 to the top of the plunger, the walls of the passage projecting down, below the top of the chamber, to a point short of the normal level of the mercury in the form of a circular skirt spaced from the side walls of the chamber. This provides a non-spill arrangement for the mercury, since if the device is turned to a horizontal or inverted position, the mercury will not flow out through the passage but will be caught in the deep groove or recess formed in the plunger between the chamber 7 and the adjacent portion of the passage 9.

Conducting posts 10 depend from the head 2 in spaced and insulated relation to each other, these posts projecting into the passage 9 but not far enough to reach the bottom of the same or contact with the mercury when the plunger is at its lowermost position and is resting on the head 3. The posts extend to terminal sockets 11 provided in the opposite sides of the head 2, with which sockets wires 12 of the ignition circuit are connected; our switch being preferably disposed in the circuit between the coil C and the usual hand operated switch S of said circuit.

The head 2 is provided with a vertical passage 13 through the same, a hose connecting nipple 14 being rigidly secured to the head and projecting above the same and forming an extension of this passage. If desired a ball check 15 may be mounted in the passage below the nipple, the ball closing the passage
when at rest. A flexible hose or tube 16 is engaged with the outer end of the nipple and extends thence to a suitable connection with the intake manifold M of the engine or with any other part in which a negative or vacuum pressure exists when the engine is turning over.

The switch structure is mounted in an upright position in connection with any suitable fixed part P of the chassis by a suitable bracket. In the present instance this bracket is shown as being of heavy wire. It comprises a vertical portion 17 behind the body and provided with transversely spaced eyes for the reception of holding screws; and outwardly turned horizontal portions 19 ar ranged to frictionally engage the outer ends of the heads 2 and 3 to hold the latter against the body, and surrounding the adjacent ends of the nipple 14 and the screw 5 so as to prevent slipping of the bracket from place. Any other suitable form of bracket may however be used instead, depending on the particular construction of the switch structure as a whole.

The operation of the switch is extremely simple and entirely automatic, depending for its functioning, to close the circuit, upon the establishment of a pressure in the engine. Such a pressure is of course always created in said engine immediately upon the same being turned over. As soon as the engine is turned over, as by the starter or crank handle, a suction or negative pressure is created in the manifold M, which pressure communicates with the interior of the body above the plunger by reason of the tube 16. The ball valve and the plunger immediately lift, since the holding-down pressure on these relatively light parts due to the action of gravity is much less than the vacuum pressure. The plunger will therefore lift until it engages the head 2, at which position of the plunger the posts 10 engage the mercury, thereby closing the circuit.

Since this vacuum pressure is constant as long as the engine is running the plunger will always remain lifted, and the circuit will be held closed. If, however, the car should turn over or should tilt to a dangerous angle while the engine is still running the mercury, which remains on a level, will disengage from one or the other of the contact posts, immediately breaking the ignition circuit and stopping the engine.

The same results may of course be obtained by means of a positive pressure applied against the bottom of the plunger, as for instance the oil pressure generated in the oiling system, by the operation of the oil pump. We believe however that the vacuum or negative pressure arrangement above described is the most practicable one to use, since sufficient pressure for operating the switch is obtained with only a quarter turn of the crankshaft of the engine.

The purpose of the ball check is as follows: Said check being above the plunger, it will of course be actuated before the plunger. Some engines backfire frequently, and the check valve, being in the path of the back pressure, closes and prevents such pressure acting on the plunger to lower the same and break the circuit. Also, the engine vacuum ceases for an instant if the throttle is suddenly opened wide from an idling position. The ball check will then drop to a closed position, again preventing the plunger from likewise dropping to a circuit breaking position.

Though we have particularly designed this switch for use in connection with motor vehicles and have so described the same, its use is not limited to motor vehicles, and there may be many fields in which it may be of value.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described our invention what we claim as new and useful and desire to secure by Letters Patent is:

1. An electric switch for interposition in the ignition circuit of a motor vehicle including a vertical tubular body adapted to be mounted in a fixed position on the vehicle, spaced contacts depending into the body from the upper end of the same, an open topped hollow plunger slidable in the body below the posts, mercury in the plunger to engage the posts only when the plunger is raised from a predetermined position, a passage leading to one end of the body and adapted for connection to a source of pressure to thus move the plunger, and means incorporated with the plunger to cause the mercury, if the switch is tilted laterally beyond a certain angle to the perpendicular while the plunger is still in a raised position, to disengage one of the posts without a tendency to flow from the upper end of the plunger.

2. An electric switch for interposition in the ignition circuit of a motor vehicle including a vertical tubular body adapted to be mounted in a fixed position on the vehicle, spaced contacts depending into the body from the upper end of the same, a plunger slidable in the body below the posts and formed with a chamber open to the top, mercury in the bottom of the chamber, a circular skirt formed with the plunger and depending into the chamber in spaced relation to the side walls thereof and terminating above the normal level of the mercury, the upper end of
the skirt having unbroken connection with the plunger about the circumference of the same; the posts being positioned to depend into the chamber to engage the mercury when the plunger is raised a predetermined distance from its normal position, and means to thus raise the plunger.

In testimony whereof we affix our signatures.

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