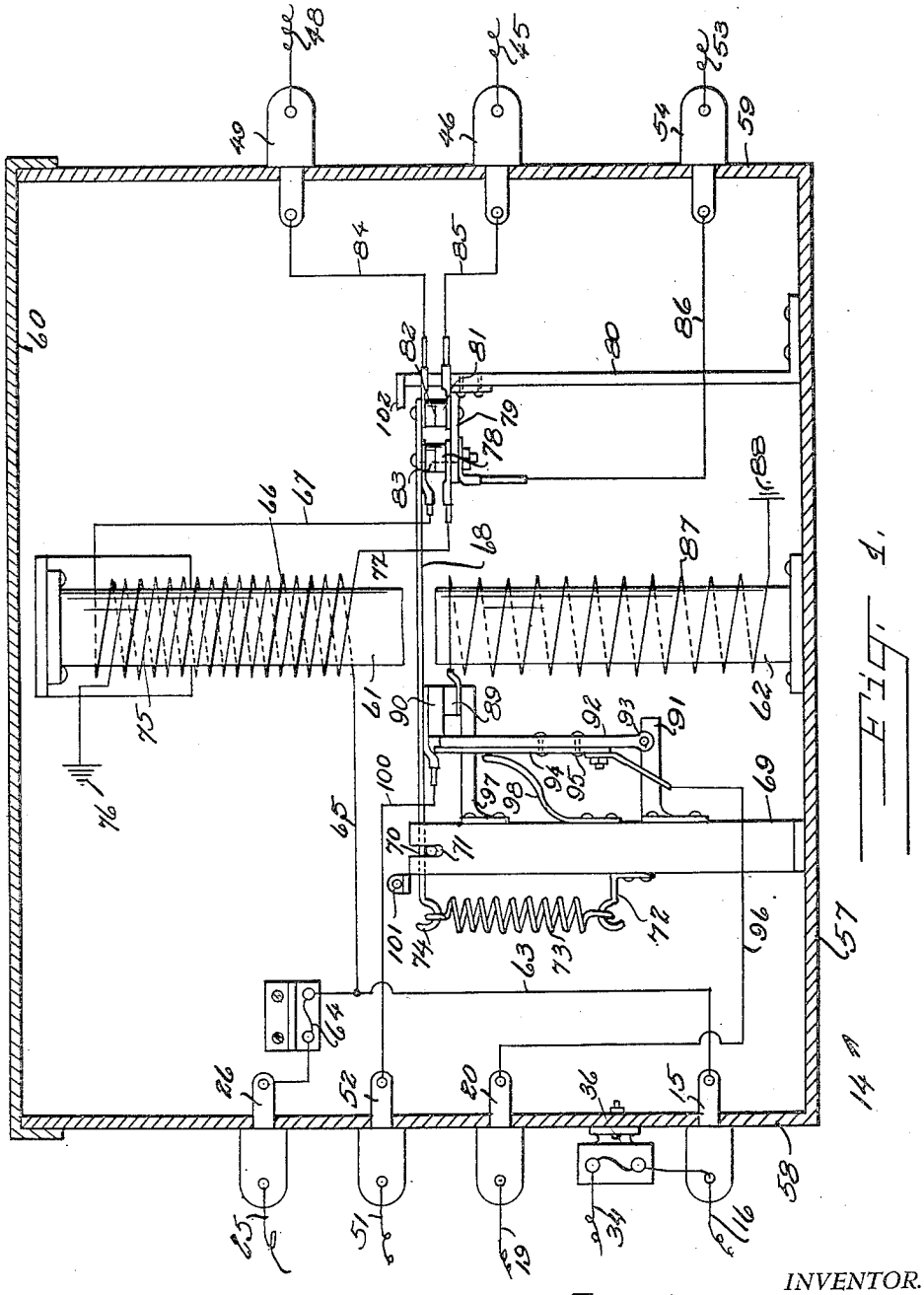
Dec. 18, 1956 F. A. SHRADER 2,774,842

AUTO ELECTRIC FIRE STOPPER SWITCH

Filed April 27, 1954 2 Sheets-Sheet 1



INVENTOR.
Frank A. Shrader

BY Victor J. Evans & Co.

ATTORNEYS

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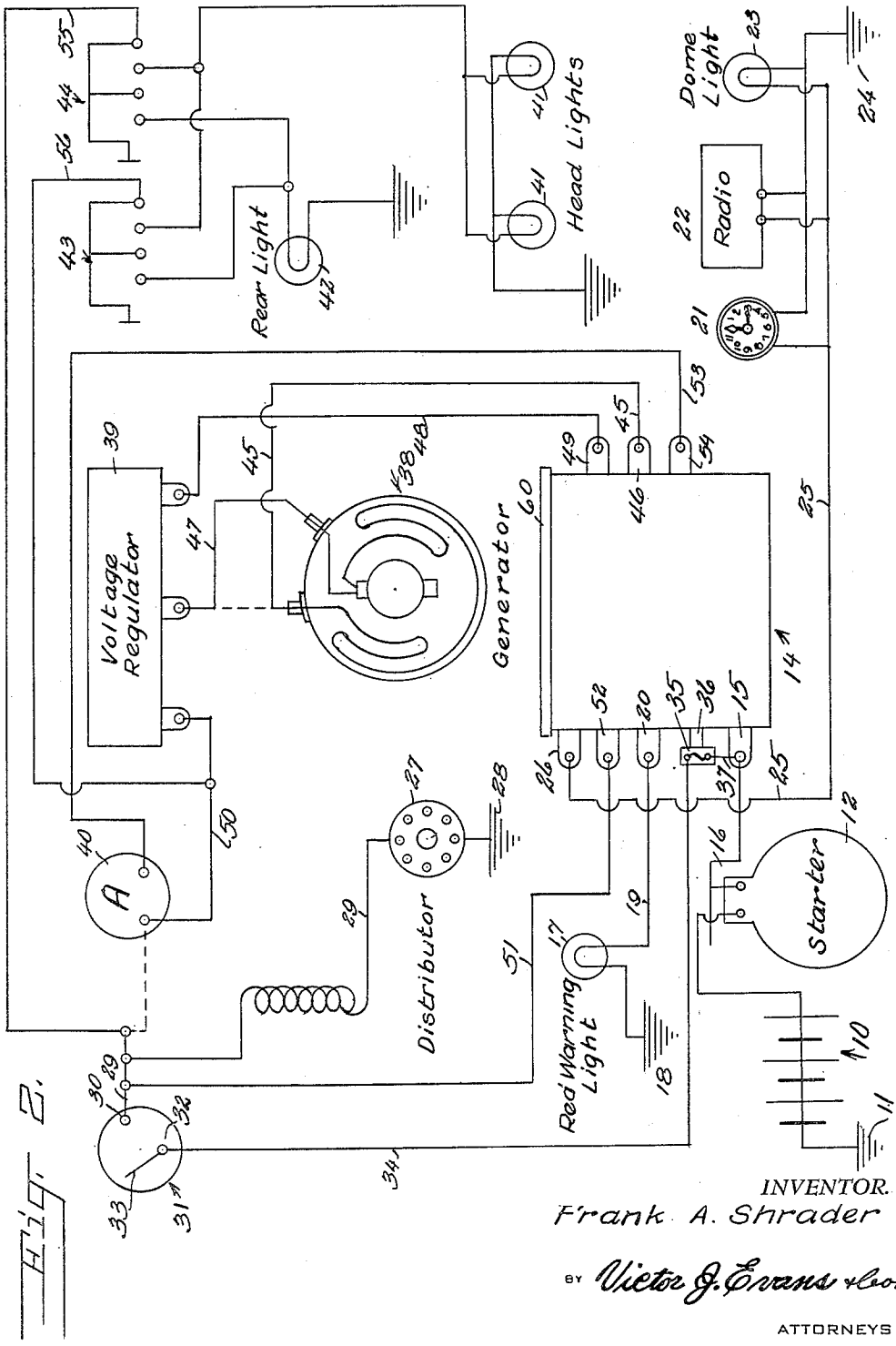


FIG. 2.

INVENTOR.
Frank A. Shrader

BY Victor J. Evans & Co.

ATTORNEYS

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AUTO ELECTRIC FIRE STOPPER SWITCH

Frank A. Shrader, Reseda, Calif.

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1 Claim. (Cl. 200—102)

This invention relates to a vehicle, and more particularly to a safety switch for a vehicle wiring system.

The object of the invention is to provide a safety switch and hook-up therefor which will prevent any of the installations or components of the vehicle from becoming burned out in the event that a short circuit develops in any part of the wiring system.

Another object of the invention is to provide a safety switch which will prevent a short circuit from burning the vehicle ignition wires, instruments or components of the vehicle such as the clock, radio or lights, the switch being automatic in operation so that the driver of the vehicle can keep on driving the vehicle until the short circuit can be eliminated.

A further object of the invention is to provide a vehicle safety switch which is extremely simple and inexpensive to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are used to designate like parts throughout the same:

Figure 1 is a sectional view taken through the safety switch of the present invention.

Figure 2 is a wiring diagram showing a vehicle ignition system with the safety switch of the present invention installed therein.

Referring in detail to the drawings, the numeral 10 designates a source of electrical energy such as a vehicle battery, Figure 2, and the battery 10 may be grounded as at 11. The numeral 12 designates a vehicle starter which is connected to a terminal 15 of the safety switch 14 of the present invention by means of a wire 16. A warning light 17 may be arranged on any suitable part of the vehicle, as for example on the dashboard of the vehicle and the warning light 17 may be colored red. The light 17 is grounded at 18, and a wire 19 connects the warning light 17 to a terminal 20 on the switch 14.

The numerals 21, 22 and 23 designate respectively the vehicle clock, radio, and dome light, and these components are connected in parallel and grounded at 24. A wire 25 leads from the clock 21 to a terminal 26 on the switch 14. The vehicle distributor is indicated generally by the numeral 27, and the distributor 27 is grounded at 28, there being a wire 29 leading from the distributor 27 to the vehicle ignition switch 31. The ignition switch 31 includes a movable member 33 and a pair of fixed contacts 30 and 32. A wire 34 connects the terminal or contact 32 of the switch 31 to a fuse 35, and the fuse 35 may be supported outside of the switch housing by means of a block 36. A wire 37 connects the fuse 35 to the terminal 15.

There is further provided the usual generator 38, voltage regulator 39, ammeter 40, and headlights 41. The vehicle rear light is indicated by the numeral 42, and an auxiliary light switch by the numeral 44, while the regular light switch is indicated by the numeral 43, the auxiliary

light switch 44 being controlled through the switch key circuit.

A wire or line 45 leads from the generator 38 to a terminal 46 on the switch 14. The generator 38 is also connected to the voltage regulator 39 by means of a wire 47. The voltage regulator 39 is connected to a terminal 49 on the switch 14 by means of a wire 48, and the voltage regulator 39 is also connected to the ammeter 40 by means of a wire 50. A wire 51 leads from a point adjacent to the ignition switch 31 to a terminal 52 which projects from the switch 14, and a wire 53 leads from the ammeter 40 to a terminal 54 on the switch housing. Wires 55 and 56 connect the switches 44 and 43 into the circuit as shown in Figure 2.

Referring in detail to Figure 1 of the drawings there is shown a vertical sectional view taken through the safety switch 14. The safety switch 14 includes a bottom wall 57, end walls 58 and 59 and a top wall or cover 60. Mounted within the safety switch 14 is an upper solenoid core 61 and a lower solenoid core 62, and these cores are secured in place in any suitable manner. A wire 63 interconnects the terminals 26 and 15 together, and a fuse 64 is interposed in the line or wire 63. A wire 65 leads from the wire 63 to a heavy field winding 66 which surrounds the upper core 61, and a wire 67 leads from the heavy winding 66 to a movable armature 68.

For movably supporting the armature 68, there is arranged in the safety switch housing a support member 69 which can be made of any suitable insulated material. The support member 69 is provided with a slot 70 adjacent its upper end, and a guide pin 71 projects into the slot 70 and is secured to the armature 68. A coil spring 73 has its lower end connected to a clip 72 which is secured to the support member 69, and the upper end of the coil spring 73 is arranged in engagement with a hook or curved portion 74 on the end of the armature 68.

Also surrounding the upper solenoid core 71 is a fine winding 75 which is grounded at 76. A line 77 connects the fine winding 75 to a contact 78 which is mounted on an insulated shelf 79. The shelf 79 is secured to an insulated bracket 80 which is secured within the switch housing. Also mounted on the shelf 79 is a lower contact 81. Mounted above the lower contacts 81 and 78 and adapted to engage these contacts are a pair of upper contacts 82 and 83, and these upper contacts 82 and 83 are carried by or secured to the armature 68. A wire 84 connects the contact 82 to the terminal 49, and a wire 85 connects the contact 81 to the terminal 46. The terminal 54 is connected to the contact 78 by means of a wire 86.

Surrounding the lower solenoid core 62 is a winding 87 which is grounded at 88, and a stationary contact member 89 is connected to the upper end of the winding 87. A second contact member 90 of greater size than the contact member 89 is carried by the armature 68, and the contact member 90 is mounted for movement into and out of engagement with the contact member 89. Secured to the support member 69 in any suitable manner is a horizontally disposed body member 91, and an insulated arm 92 has its lower end pivotally connected to the body member 91 by means of a pin 93. A metal conducting strip 94 is secured to one side of the arm 92 in any suitable manner, as for example by means of rivets 95, and a wire 96 connects the metal strip 94 to the terminal 20. The contact member 89 may be supported on a shelf 97 which is secured to the support member 69. A spring member 98 has one end secured to the support member 69 in any suitable manner, as for example by means of rivets 99, and the spring member 98 has its upper end curved and abutting the metal strip

94 on the arm 92. A wire 100 connects the terminal 52 to the upper contact member 90.

From the foregoing it is apparent that there has been provided a safety switch and method for installing the same in a vehicle charging circuit whereby damage to the various parts will be prevented in the event that a short circuit occurs. In use, the switch 14 is installed as close to the starter 12 as possible and it can be secured to any suitable supporting structure. The switch 14 is grounded at 18 and the main line 16 that leads from the starter 12 is connected to the terminal 15. The wire 34 extends from the battery terminal 32 of the ignition switch 31 to to the fuse 35 and the small red light bulb 17 can be installed in any suitable place on the vehicle such as on the dashboard. One end of the bulb 17 is grounded at 18 and the other end of the bulb is connected by means of a line 19 to the terminal 20. The dotted line above the generator 38 in Figure 2 indicates where the field wire that comes out of the generator 38 is cut and a line 45 leads from the generator 38 to the terminal 46. The voltage regulator is connected to the terminal 49. Then, the car can be operated in the usual manner. Thus, it is only necessary to turn on the ignition switch, step on the starter and the car will operate in the same manner as any other vehicle except that the present invention will prevent any heavy short circuit from burning wires, instruments, or the entire vehicle. The present invention is wholly automatic and the driver of the car does nothing to stop it since the car can be driven until the short circuit can be repaired or eliminated. The circuit that leads to the ignition switch 31 is protected by the fuse 35 if desired. The clock 21, radio 22, and dome light 23 are always connected to the source of supply of current, and the fuse 64 protects these components. Except for these two circuits, there is no possible chance for current to leave the battery 10 and run down the battery by either the lights being left on, the stop light switch, or by the electric windshield wiper or through a defective horn relay.

The heavy current carrying points or contacts 78, 81, 82, and 83 are separated at certain times as later described in this application.

Initially the ignition key can be turned on in the switch 31 so that current will flow through the switch 31 to the distributor 27 and current will also flow to the terminal 52. The current from the terminal 52 will flow through the line 100 to the contact member 90 which normally is arranged in engagement with the contact member 89. This current then flows through the winding 87 around the lower solenoid core 62 to the ground 88.

The magnetic pull in the solenoid 62 will pull the armature 68 down and thereby close the contacts 83 and 78 to thus allow current to flow to the terminal 54 and then to the ammeter 40 through the line 53, so that regular operation of the electric system can be effected. At the same time contacts 82 and 81 have been closed. The small winding 75 of the upper soleniod 61 is in direct contact with the insulated lower contact 78 and a magnetic current can now flow to this upper winding 75 but it is weaker than the lower solenoid magnetic field due to a predetermined method of manufacturing the same. Now, the generator 38 starts charging and sends a current through the heavy current winding 66 of the solenoid 61 but as the heavy charging current is going through the coil 66 in a reverse direction, of the current in the fine winding, the two opposing windings 66 and 75 will hold the magnetic pull of the solenoid 61 below the strength of the lower solenoid 62. This attraction can be regulated by varying the size and amount of winding on the solenoid, and spring tension of member 73.

Let it be supposed that a heavy short occurs in a vehicle such as in the emergency brake operating leverage through the insulation. Immediately, the current will flow from the battery 10 in the same direction as the current in the fine winding 75 of the upper solenoid 61 and as soon as the danger point is reached when the insulation of the rest of the wire or connecting instrument will burn, the magnetic pull in the upper solenoid 61 will be stronger than the magnetic pull of the lower solenoid 62. The armature 68 will then be drawn up and the point or contact 83 will move away from the contact 78, while the contact 82 will move away from the contact 81.

It is to be noted that the pin 71 and slot 70 provide a floating joint for the armature 68 so as to permit the magnetic field to pull the armature 68 up against armature stops 101 and 102.

Since the contact members 90 and 89 are normally closed, the insulated arm 92 has its upper end resting on the upper contact member 90 as shown in Figure 1, due to the provision of pressure exerted by the spring member 98. It will be noted that the lower contact member 89 is smaller than the contact member 90 and is spaced from an end thereof. Now, as soon as the armature 68 is lifted up, the insulated arm 92 will be forced by the constant pressure of spring member 98 below the contact member 90, since the arm 92 is just long enough to rest a few thousandths of an inch above the lower face of contact member 90. Thus, with the armature 68 lifted up the arm 92 will be forced beneath the contact member 90 but the arm 92 will not touch the lower contact member 89 since the metal strip 94 has its upper end projecting slightly above the arm 92 so that the metal strip 94 will engage the projecting end of the contact member 90. The upper contact point 90 is always connected with the battery circuit and therefore will carry current to the insulated metal strip 94 which is connected to the terminal 20 by means of a wire 96. The terminal 20 is connected to the red warning light 17.

It also is to be noted that since the insulated arm 92 now holds the contact members 90 and 89 separated, no current can flow through these contact members so that the lower relay is electrically dead. Then, without touching the ignition key, the current now goes only to the coil terminal for the necessary operation of the ignition. The contacts 83 and 78 are the main current carrying points in the charging or discharging line and when open will cut off all current in the electric system except what is going through the terminal 15 and fuse 36 and fuse 64 and terminal 26 if on. The pair of points 83 and 78 are the very points that will stop the heavy flow of current into the short which is the main purpose of the invention. The contacts 83 and 78, and the contacts 82 and 81 are also held apart by the spring 73 and the field circuit of the generator 38 is broken so that the generator will not be burned out if the car is operated. The car can also be operated at night since provision has been made for the use of the tail light and the lower headlight beam. However, the regular headlight switch should be turned off before turning on the emergency light switch that has been installed as extra equipment.

The slot 70 and pin 71 permit the armature 68 to slide straight up so that the various contacts can be broken. The contact member 90 is larger than the contact member 89 so that when the spring member 98 forces the arm 92 beneath the contact member 90, the metal strip 94 will contact or engage the member 90. After the arm has been forced below the contact member 90, this arm will hold the contact members separated, cutting off all current also in the upper solenoid and disconnecting the battery from the short.

I claim:

In a safety switch, a housing, a first, second, third, fourth, fifth, sixth, and seventh terminal extending from said housing, an upper and lower solenoid core positioned in said housing and spaced from each other, a support member secured to said housing and provided with a slot in its upper end, an armature movably mounted between said cores and including a guide pin positioned in said slot, a clip secured to said support member, resilient means extending between said clip and arma-

ture, a wire connecting said armature to said seventh terminal, a bracket mounted in said housing, an insulated shelf secured to said bracket, a first and second lower contact secured to said shelf, a wire connecting said first contact to said sixth terminal, a fine winding surrounding said upper core and having one end connected to said second contact and its other end grounded, a wire connecting said second contact to said fifth terminal, a third and fourth spaced apart contact carried by said armature and mounted for movement into and out of engagement with said first and second contact, a heavy winding surrounding said upper core and connected to said fourth contact, a wire connecting said heavy winding to said first terminal and to an eighth terminal, a fine winding surrounding said lower core, a lower contact member connected to the winding on said lower core, an upper contact member connected to said armature and to said third terminal, a body member secured to said support member, an insulated arm having its lower end pivotally connected to said body member and having its upper end adapted to engage said upper contact member, a conducting strip secured to one side of said arm and electrically connected to said fourth terminal, and a spring

member secured to said support member and arranged in engagement with said conducting strip, the magnetic attraction of said lower solenoid core being greater than the magnetic attraction of the upper solenoid core until a short circuit occurs whereby the magnetic pull of the upper solenoid core will then be greater than the magnetic pull of the lower solenoid core to thereby cause said armature to move upwardly, whereby when said armature is lifted upwardly, said spring member will force said insulated arm away from said support member so that the upper end of said conducting strip will engage said upper contact member which is connected to the armature.

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