

Jan. 11, 1966

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3,229,109

EMERGENCY SWITCH

Filed Nov. 30, 1962

5 Sheets-Sheet 1

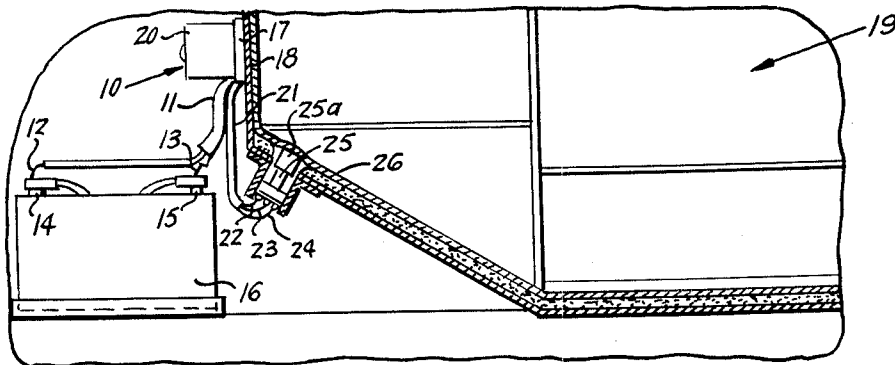


FIG. 1

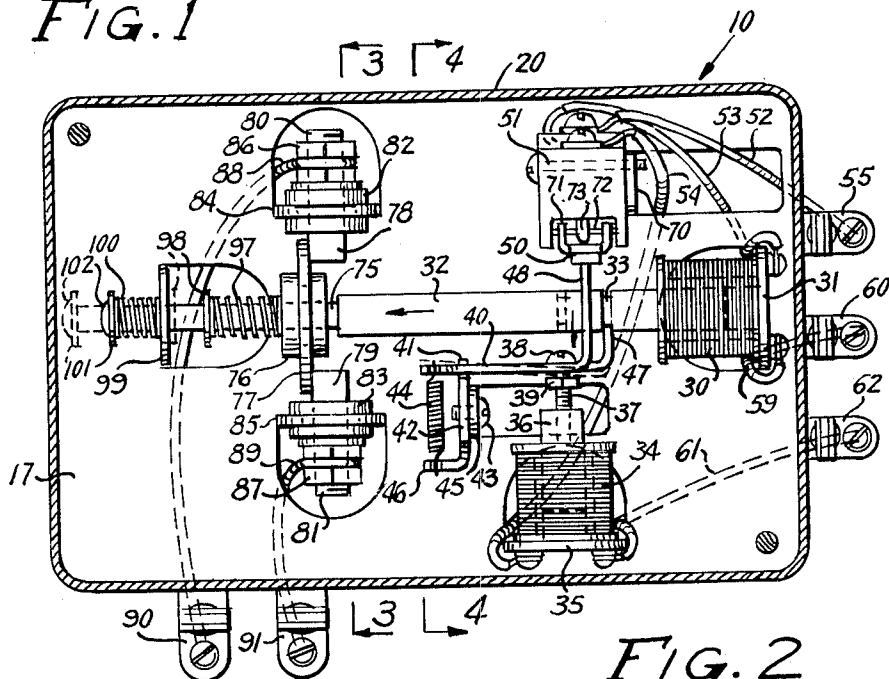


FIG. 2

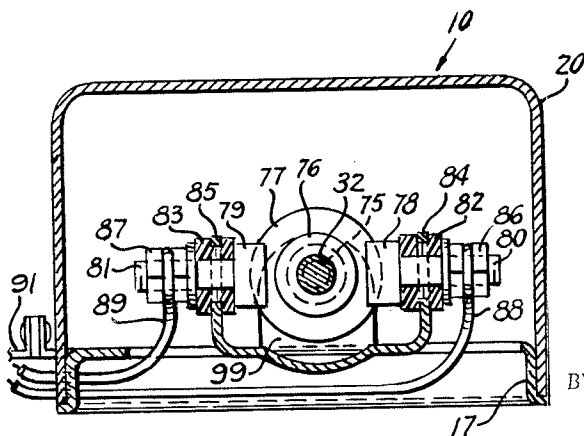


FIG. 3

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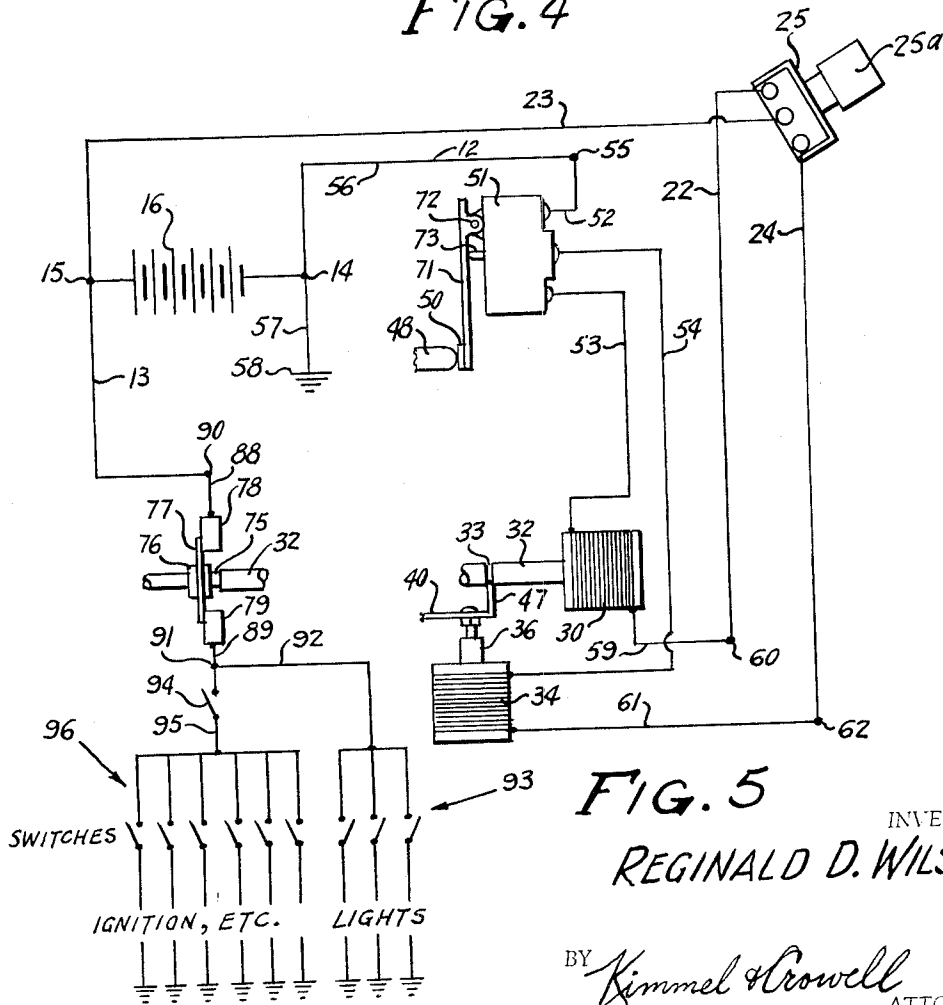
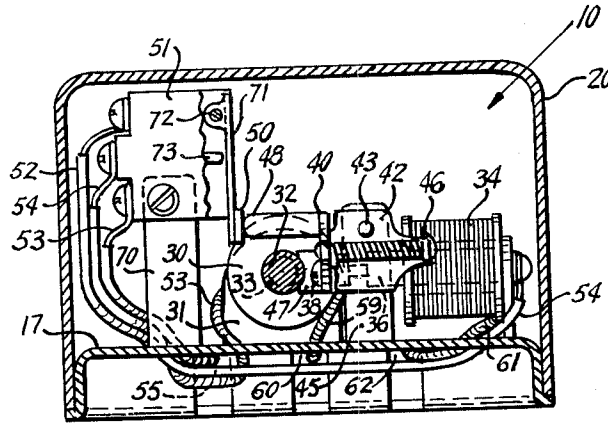
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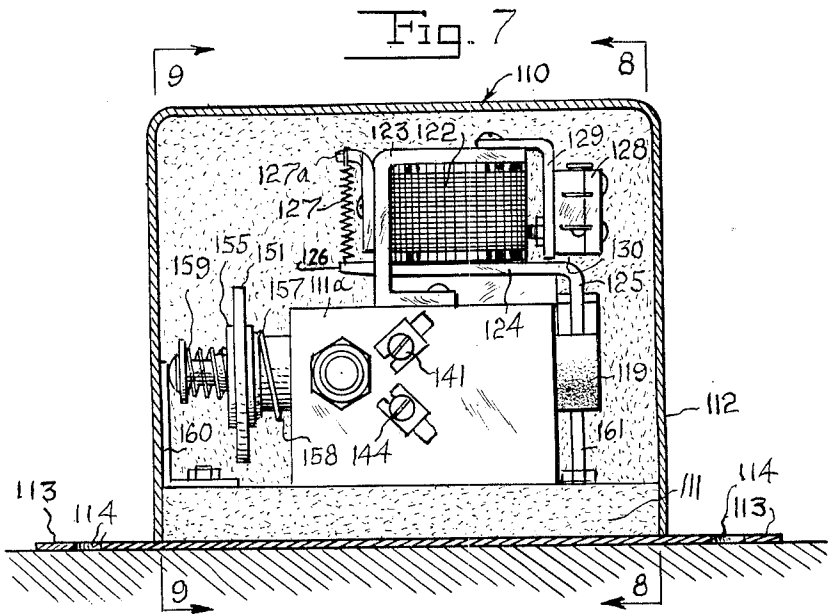
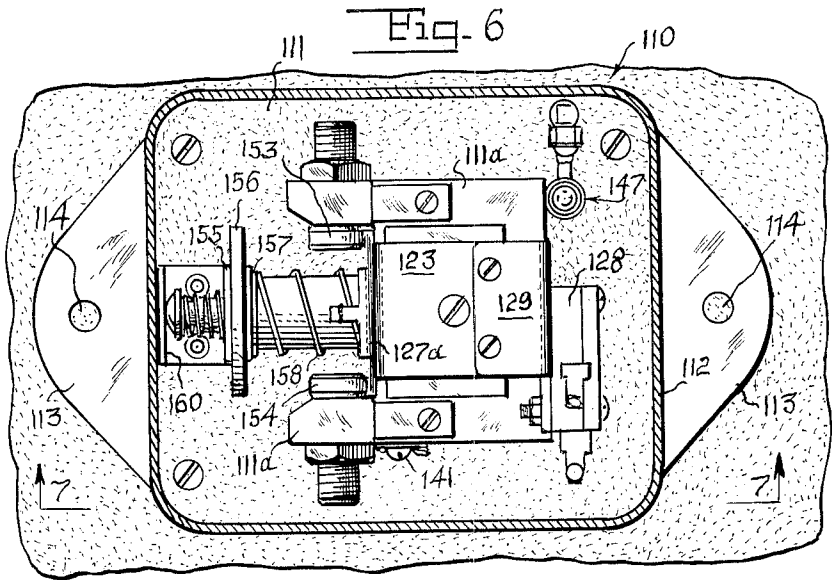
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Fig. 8

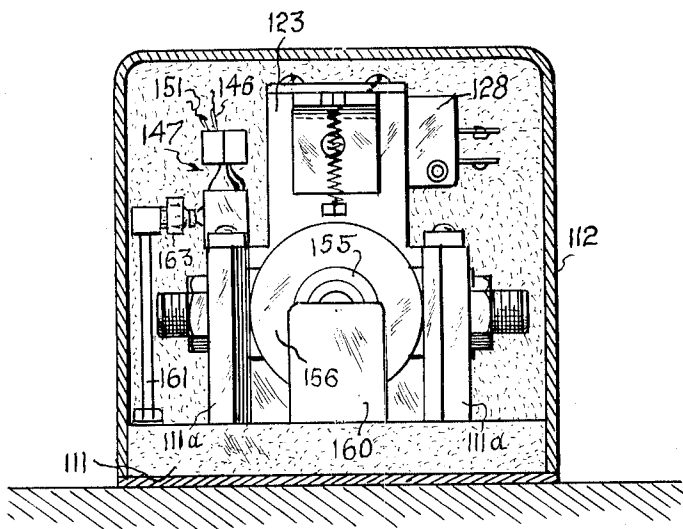
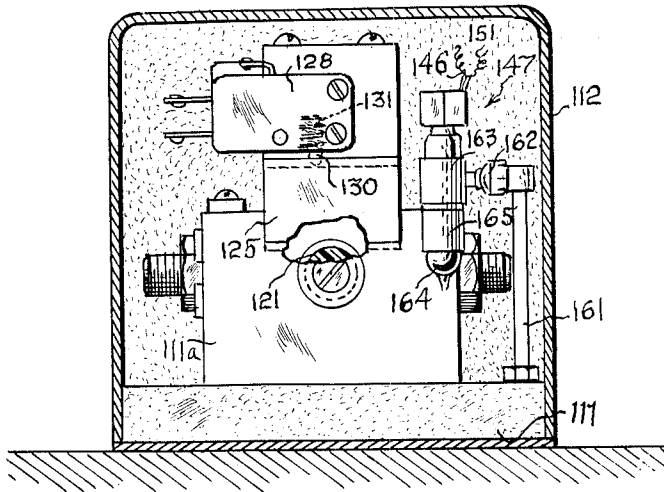


Fig. 9

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Fig. 10

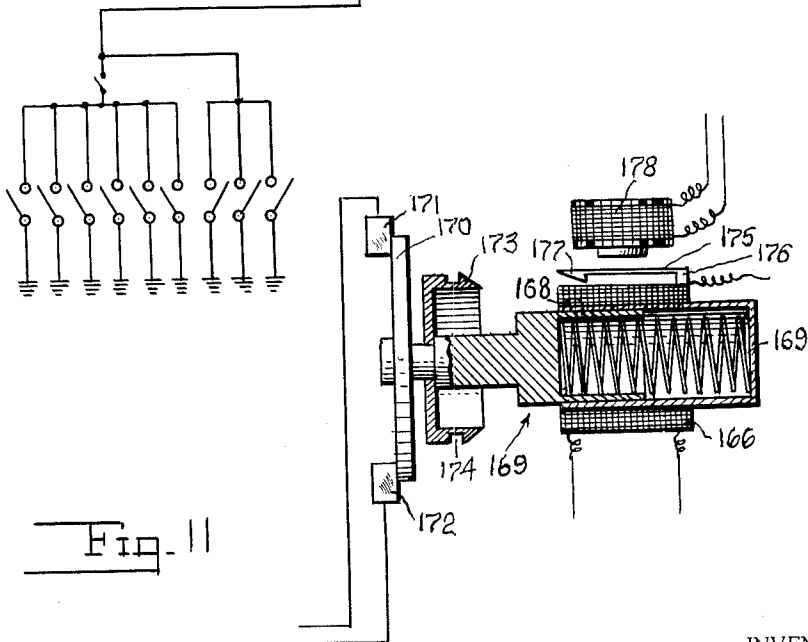


Fig. 11

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EMERGENCY SWITCH

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Filed Nov. 30, 1962, Ser. No. 241,432
2 Claims. (Cl. 307—10)

This invention relates to an emergency switch and is a continuation-in-part of a preceding application for Letters Patent, Serial No. 181,549, now abandoned, filed March 22, 1962.

The primary object of this invention is the provision of a single switch which, when actuated, will immediately disconnect from the battery all electrical apparatus associated with a motor vehicle so as to render all circuits immediately inoperative.

A further object of the invention is the provision of a device of this character which, when actuated in the event of a collision or the like, will substantially reduce the fire hazard incident thereto by the immediate disconnection of all electrical circuits.

Another object of the instant invention is to provide such a switch which will be automatically actuated to immediately de-energize all of the electrical circuits in the event that the car turns over as the result of a collision or the like.

A further object of the invention is the provision of such a device which may be reclosed substantially instantaneously to restore electrical connection between all the vehicle circuits, in the event that the necessity for de-energizing the circuits is eliminated.

An additional object of the invention is the provision of one embodiment of a device of this character which may be actuated by a conventional foot operated switch, such as is used for headlight dimmers, whereby a first pressure on the switch will serve to de-energize the electrical circuits and a second pressure to re-energize the same, each alternate pressure on the actuating switch following the same sequence.

Still another object of the invention is the provision of such a device wherein the actuating switch may be concealed beneath the carpet or mat covering the vehicle floor, and which is in readily accessible position for use by the operator, in the event of a holdup or similar contingency, so that the driver may, by pressure on the switch, immediately cut off all electrical circuitry in the vehicle, thus stopping the vehicle at a place of his own choosing, without any apparent action on his part.

Still another object of the invention is the provision of a device of this character which may be readily installed in such a position as to render the operating components thereof inaccessible, as for example, on the fire wall of the vehicle beneath the hood, the arrangement thus being such that even if the ignition switch is jumped by a car thief the circuits to the components of the vehicle will remain de-energized, if set by the operator previous to leaving the vehicle.

Another object of the instant invention is to provide another embodiment of such a device which may be actuated by a conventional toggle switch which, when thrown in one direction will render all the circuits immediately inoperative and when thrown in the other direction will re-energize all of the electrical circuits.

Still another object of the invention is the provision of a device of this character which is sturdy and durable in construction, reliable and efficient in operation, and relatively simple and inexpensive to manufacture, assemble, and install.

Still other objects reside in the combinations of ele-

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ments, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawings wherein there is shown preferred embodiments of this inventive concept.

In the drawings:

FIGURE 1 is a fragmentary view partially in elevation and partially in section showing the location of one embodiment of the mechanism on the fire wall of a motor vehicle, together with the positioning of its actuating switch and its connection with the battery.

FIGURE 2 is a plan view of one form of device embodying the instant inventive concept, the casing being shown in section.

FIGURE 3 is a sectional view taken substantially along the line 3—3 of FIGURE 2 as viewed in the direction indicated by the arrows.

FIGURE 4 is a sectional view taken substantially along the line 4—4 of FIGURE 2 as viewed in the direction indicated by the arrows.

FIGURE 5 is a schematic wiring diagram showing the connections of the apparatus in the embodiment of FIGURES 1—4.

FIGURE 6 is a plan view of another form of the device embodying the instant inventive concept, the casing being shown in section.

FIGURE 7 is an elevational view taken substantially along the line 7—7 of FIGURE 6 as viewed in the direction indicated by the arrows.

FIGURE 8 is a right end view taken substantially along the line 8—8 of FIGURE 7 as viewed in the direction indicated by the arrows.

FIGURE 9 is a left end view taken substantially along the line 9—9 of FIGURE 7 as viewed in the direction indicated by the arrows.

FIGURE 10 is a schematic wiring diagram showing the connections of the apparatus of the embodiment of FIGURES 6—9; and

FIGURE 11 is a fragmentary elevational view, partially in section, of a further embodiment of a device embodying the instant inventive concept.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Having reference now to the drawings in detail and more particularly to FIGURES 1—5 wherein one embodiment of the device of the instant invention is generally indicated at 10, a conduit or cable 11 contains wires 12 and 13 extending to the opposite terminals 14 and 15 of a conventional vehicle battery 16.

This embodiment comprises a base 17 which is mounted in any desired location, as, in the instant illustration, on the fire wall 18 of a motor vehicle fragmentarily indicated at 19. The base 17 carries various components which will be hereinafter described in detail, and is provided with a case or closure 20. A cable 21 containing three wires 22, 23, and 24 leads to a two-position actuating switch 25 of conventional construction, the switch being of the same three-wire type customarily used for alternately dimming and brightening the headlights of the vehicle.

If desired, the switch 25 may be mounted in any convenient location underneath the floor covering 26 of the vehicle so as to be concealed, whereby in the event that the driver wishes for any reason to stop the vehicle without indicating to an unauthorized passenger the fact that he is doing so, the actuating button 25 may be pressed in an unobvious manner.

Having reference now to the emergency switch 10 per se, the device includes a solenoid coil 30 which may be carried by a tongue 31 struck from the material of base 13, the coil 30 being provided with an elongated core 32 which has a circumferential groove 33 therein, at an intermediate point.

A second solenoid coil 34 is also positioned on base 17 and mounted on a tongue 35 which may also be struck from the material of the base, and includes a core 36. Core 36 is provided at its end with a threaded aperture into which extends a bolt 37 having a head 38 and a locking nut 39 thereon. The head 38 and nut 39 are positioned on opposite sides of a plate 40 which is pivotally mounted on the reduced end 41 of a right angularly disposed support 42. The support 42 is secured as by means of a screw 43 to a tongue 45 which may also be struck from the material of the base 17. One end of plate 40 beyond its pivotal connection to the member 41 is secured to a coil spring 44, the other end of the spring 44 being secured to the end 45 of a flange member extending from support 42 in right angular relation thereto, the arrangement being such that the spring 44 normally biases the plate 40 in a direction towards solenoid core 32.

Plate 40 carries a right angularly disposed detent 47 which engages in groove 33 in solenoid core 32 when solenoid coil 34 is de-energized, for a purpose to be more fully pointed out hereinafter.

An arm 48 also extends from plate 40 and engages a contact arm 50 carried by a microswitch 51. Microswitch 51 may be of any desired conventional type such, for example, as that shown in U.S. Patent No. 2,854,540 to L. L. Cunningham, issued Sept. 30, 1958, entitled Electric Switch, (FIG. 2). Microswitch 51 is provided with three terminals from which extend wires 52, 53, and 54. Wire 52 extends to a terminal 55, from which wire 12 extends directly to the terminal 14 of battery 16, it being pointed out that a line 57 extends from terminal 14 to a ground 58.

Wire 53 extends to one end of solenoid coil 30, from the other end of which a wire 59 extends to a terminal 60, to which is connected wire 22.

Wire 54 extends to one end of solenoid coil 34, from the other end of which a wire 61 extends to a terminal 62 to which is also connected wire 24.

It may here be pointed out that microswitch 51 is mounted on a tongue 70, which may be struck from the material of base 17, if desired, and that contact 50 is carried by a pivotally mounted arm 71 pivoted as at 72 to the switch casing, the arm 71 engaging an actuator 73 to control microswitch 51.

Referring back now to rod 32 which comprises the core of solenoid coil 30, the end of rod 32 is reduced as at 75, and carries an insulating bushing 76 upon which is mounted a contact disc 77 of copper or the like. While a disc is herein shown and described, it is to be understood that a simple bridging arm will suffice, since the function of the disc 77 is to make or break contact between opposed contact members 78 and 79. Contact members 78 and 79 are substantially identical, and each includes a conductive head and stem 80 and 81, respectively. The stems are carried by insulating bushings 82 and 83 which in turn are mounted on upstruck portions 84 and 85 of base plate 17. The ends of stems 80 and 81 are threaded and carry opposed clamping nuts 86 and 87 which serve clampingly to engage wires 88 and 89.

Wires 88 and 89 extend to terminals 90 and 91, respectively.

As best seen in FIGURE 5, terminal 90 is connected by the wire 13 to the terminal 15 or battery 16.

Wire 92 extends from terminal 91 to a plurality of switches schematically indicated at 93 which normally actuate the lights of the vehicle, independently of the main

ignition switch 94, which is connected in line 95 extending from terminal 91. From the wire 95 leads, generally indicated at 96, extend to suitable switches which control the ignition circuit, the heater, the cigarette lighter, the interior lights, and such other electrical circuits as are normal to the operation of a motor vehicle.

Referring back now to rod 32 and the reduced end portion thereof, it will be seen that a light coil spring 97 is positioned between the insulating bushing 76 and a washer 98, and serves to hold contact disc 77 in tight engagement with its associated contact 78 and 79 to prevent chattering thereof, when the solenoid 30 is de-energized. An upstruck tongue 99 is provided with an opening through which the end of reduced portion 75 extends, the extending portion being surrounded by a compression spring 100 which is held in position by a washer 101 secured as by a head 102 on the end of reduced portion 75.

From the foregoing the operation of the devices of FIGURES 1-5 should now be readily understandable. With the parts in the position shown in FIGURES 2 and 5, contact disc 77 bridging contacts 78 and 79 completes all of the circuits from battery 15 to the conventional ignition, lights, and other electrical appliances normally found in a motor vehicle. At this time both the solenoid coils 30 and 34 are de-energized, and the rod 32 is held in retracted position with contact disc 77 bridging contact members 78 and 79, by the engagement of detent or tongue 47 in groove 33 of rod 32. This is the normal operating condition for the vehicle, and remains until such time as the actuating button 25a of switch 25 is pressed. At this time a circuit is established from battery 16 through wire 23, switch 25, wires 24 and 61, to solenoid coil 34, the circuit being completed through wire 54, microswitch 51, and wires 52 and 12, energizing the coil 34. Such energization immediately retracts tongue or detent 47 from groove 33 and spring 100 forces rod 32 outwardly of its associated coil 30 into a position where disc 77 is removed from contact with members 78 and 79 instantly and simultaneously breaking all of the electrical circuits of the vehicle. Simultaneously, the release of pressure of the arm 48 on contact 50 and its associated arm 71 reverses the position of microswitch 51, through actuating member 73, so that upon the next pressure on operating button 25a of switch 25, a circuit is established from battery 16 through terminal 15, wire 23, switch 25, wires 22 and 59 to solenoid coil 30, which circuit is completed by wire 53, microswitch 51, and wires 52 and 12 back to battery terminal 14.

Energization of coil 30 immediately retracts rod 32 which, as previously stated, comprises the solenoid core, against the pressure of spring 100 until disc 77 is in contact engaging position, and groove 33 is aligned with detent or tongue 47. At this time the spring 44 forces tongue 47 into groove 33, thus latching the core or rod 32 in a position with contact disc 77 bridging the contacts 78 and 79 to reactuate all the circuits of the vehicle. At the same time the engagement of tongue 48 with contact 50 through actuating button 73 reverses the position of microswitch 51, so that upon the next pressure against operating head 25a the solenoid coil 34 will again be energized.

Referring now particularly to FIGURES 6-10 the reference character 110 generally indicates a modification of the device of FIGURES 1-5. A comparatively heavy base 111, preferably made of an insulating material such as nylon or the like, is preformed to have upstanding walls 111a which carry various components which will be hereinafter described in detail. A case or closure 112 is provided similar in form and function to the element 20 hereinbefore described with reference to the embodiment of FIGURES 1-5. A pair of outstanding end portions 113 may be provided on the case 112 or the base 111 having apertures 114 or the like therethrough to assist in mounting the device on the vehicle.

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A control switch 115, shown in FIGURE 10, is connected to the components within the case 112 through a cable (not shown) and may be mounted in any position convenient to the operator and preferably concealed from ordinary view. For example, this switch 115 may be placed in the glove compartment of the vehicle which can be locked by the owner after setting the device to open the circuit from the battery to the accessories thereby avoiding any unauthorized use of the vehicle.

Referring now to the emergency switch 110 per se, this embodiment includes a solenoid coil 116 (note particularly FIGURE 10) mounted within the walls 111a of the base 111. The coil 116 is provided with an elongated core 117 having a metal portion 118 and an insulated portion such as nylon or the like 119 secured together by any conventional means indicated generally by 120 in FIGURE 10. The insulated portion 119 carries a circumferential groove 121 similar to the groove 33 in the embodiment of FIGURES 1-5. The core 117 is formed in two parts for a reason to be more fully described hereinafter.

In place of the second solenoid coil 34, this embodiment includes an electromagnet 122 secured above the coil 116 by an upstanding right angularly disposed support 123. Pivotaly mounted at one end in the support 123 is a plate 124 carrying a right angularly disposed detent 125 similar to the plate 40 and detent 47. The end 126 of the plate 124 extends through a hole in the support 123 and may be secured to a coil spring 127, the other end of the spring 127 being secured to a flange member 127a.

A microswitch 128 which may be substantially identical to previously described microswitch 51, is mounted above the detent 125 on a downwardly extending support 129 and is similar to the microswitch 51 described hereinbefore. The actuator button 130 is spring pressed as indicated in dashed line at 131 in FIGURE 8 to normally bias the plate 124 in a direction towards the solenoid coil 116. The spring means 131 are strong enough so that whenever the solenoid coil 116 is energized to retract the core 117 so that the groove 121 is aligned with the detent 125, the plate 124 will be pivoted to engage the detent 125 with the groove 121 thereby holding the core 117 in its retracted position. With this arrangement of the microswitch 128 and its spring pressed actuator button 130 the flange member 127a and the coil spring 127 may be deleted. In view of the emergency aspects of this device, the additional spring 127 may be used to insure the operation in case the microswitch spring 131 becomes weakened after extended use.

Microswitch 128 is provided with three terminals from which extend wires 132, 133, and 134. The connections of the wires are not shown in FIGURES 6-9 for illustrative convenience but in FIGURE 10 it will be seen that wire 132 extends directly to one of the spaced contacts 153 from which a wire 152 extends to one of the terminals 137b of the battery 137, the wire 138 extending from the other terminal 137a to ground at 139. The connection of the other spaced contact 154 to the vehicle accessories is the same as the relationship of the contact 79 in the embodiment of FIGS. 1-5.

The wire 133 extends to one end of the solenoid coil 116, from the other end of which a wire 140 is connected to a terminal 141 from which the wire 142 extends to one of the contacts of the control switch 115.

The wire 134 leads from the microswitch 128 to one end of the electromagnet 122, from the other end of which a wire 143 extends to a terminal 144 located on the side of the wall 111a of the base 111. From the terminal 144 a wire 145 is connected to a second of the contacts in the control switch 115 and a wire 146 extends to one contact of a mercury switch 147 for a purpose to be described further hereinafter.

To complete the circuitry, a wire 148 extends from the

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third contact in the control switch 115 to ground at 149 and another wire 151 extends from the other contact of the mercury switch 147 to the same contact of the microswitch 128 to which the wire 132 is connected.

Referring back now to the core 117 of the solenoid 116, one end is reduced to carry an insulating bushing 155 upon which is mounted a contact disc 156 similar to element 77 described hereinabove. An outwardly extending stop member 157 is fixed to the larger diameter portion of the core 117 and a spring means 158 normally biases the contact member 156 to the left as seen in FIGURES 6, 7 and 10. On the reduced portion of the core 117 a second spring means 159 weaker than the spring means 158 serves to hold the contact disc 156 in tight engagement with its associated contacts 153 and 154 when the solenoid 116 is energized. An upstanding stop 160 limits the movement of the core 117.

Due to the particular mounting of the device shown in this embodiment it is not necessary to pass the core 117 through a support such as tongue 99 in the embodiment of FIGURES 1-5 since the core is comparatively short and will be supported within the solenoid 116 by the insulated portion 119 even when it is biased to its de-energized position by the spring means 158.

The mercury switch 147 is supported in a vertical position by means of the standard 161 to which is connected, by a universal joint 162, a bracket 163 which slidably supports the switch. The top of the switch 147 has the connections to the wires 146 and 151 and internally, spaced contacts (not shown) depend. At the bottom of the switch 147 a small quantity of mercury 164 is provided which on tilting the switch 147 will bridge the aforementioned contacts and complete the circuit. A stop means of any conventional form 165 may be slid on the bottom of the switch 147 to hold the same in the bracket 163.

It will now be apparent how the embodiment of FIGS. 6 to 10 will operate. When the control switch 115 is actuated by throwing the toggle in one direction current is provided to the solenoid coil 116 and the core 117 is retracted against the tension of the spring means 158 to bring the contact disc 156 into tight engagement with the terminals 153 and 154 thereby completing the circuit from the battery 137 to all the conventional elements such as the ignition, lights, and other electrical appliances found in a motor vehicle. In the withdrawn position the detent 125 on the plate 124 will be engaged in the circumferential groove 121 by the pivoting action of the spring means 131 behind the actuating button 130 on the microswitch 128. This is the position shown in dashed lines in FIGURE 8. The detent 125 will maintain the core 117 in the retracted position and the microswitch 128 will, when the actuating button 130 is extended, prepare to direct current to the electromagnet 122 through the wire 134 when the control switch 115 is actuated in the other direction. When this occurs the electromagnet 122 is energized thereby withdrawing the detent 125 and the spring means 158 moves the core 117 out of the coil 116 breaking contact between the disc 156 and the terminals 153 and 154. The current flowing to the electrical circuits throughout the vehicle will thus be instantly and simultaneously stopped. The actuating button 130 of the microswitch 128 will be depressed against the force of the spring 131 by the plate 124 when it is retracted by the electromagnet 122. This will reverse the microswitch 128 so that current will be again directed to the solenoid coil 116 when the control switch 115 is actuated in the original direction.

If the vehicle turns over when the core 117 is in its retracted position and the microswitch 128 is prepared to direct current to the electromagnet, that is the position when all of the ordinary accessories of the vehicle are receiving current, the quantity of mercury 164 in the mercury switch 147 bridges the contacts (not shown) therein and the electromagnet 122 is automatically energized to withdraw the

plate 124 and its associated detent 125 thereby allowing the spring means 158 to move the contact disc 156 away from the terminals 153 and 154 thereby breaking the circuit from the battery to the accessories.

If the car were to roll back to its upright position, with a normal dimmer switch, such as used in the embodiment of FIGURES 1-5, when the mercury bridge between the contacts in the mercury switch 147 was broken, the current would again flow to the solenoid coil 116 and the circuit would be closed when the core 117 was withdrawn. In most accident situations this would be extremely undesirable and defeat the purpose of the emergency switch of the instant invention. Therefore, a control switch of the type described hereinbefore and indicated at 115 is provided in order that the solenoid coil 116 cannot be re-energized until the toggle switch is thrown from its normal neutral position to pass current to the coil 116.

It can be seen that with the instantly described arrangement, the mechanism cannot be burnt out by continuously holding the toggle of the control switch 115 in one direction or the other because the microswitch 128 will instantly reverse the direction of the current once the desired function is effected thereby requiring the toggle to be thrown in the other direction before anything further occurs.

The modification of FIGURE 11 functions similarly to the embodiments of FIGS. 1-5 or 6-10 but is structurally arranged in a slightly different manner to avoid the necessity of passing the core of the solenoid coil between the terminals from the battery to the accessories, thereby avoiding the possibility of any sparking or gapping between these elements. In this embodiment the solenoid coil 166 surrounds a core 167 having a rear sleeve portion 168 recessed internally to receive a spring means 169 normally urging the same so that the contact disc 170 bridges the terminals 171 and 172. Fixed to the core 167 adjacent the contact disc 170 is a locking ring 173 having a circumferential groove 174 and a tapered rim. When the core 167 is withdrawn by energizing the solenoid coil 166, a locking element 175, pivotally supported at 176 and formed of a spring steel material having a forward inclined surface and a detent 177, engages the groove 174 in the ring 173 to lock the same against the urging of the spring means 169. On actuation of an electromagnet indicated at 178 the locking element 175 is withdrawn so that the ring 173 is released and the spring means 179 again forces the contact disc 170 into bridging engagement with the terminals 171 and 172.

The circuitry for the embodiment of FIGURE 11 will be substantially the same as that hereinbefore described with regard to FIGURES 6-10 and may include a mercury switch control, if desired.

From the foregoing it will now be seen that there is herein provided an improved emergency battery disconnect switch which immediately upon actuation breaks all of the electrical circuits of a motor vehicle or the like, thus rendering the vehicle completely inoperative, but which on the next actuation of the control button, re-energizes all of said circuits simultaneously, which accomplishes all of the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense. It is to be further understood that the term "motor vehicle" as used herein is intended to be generic and includes boats and other motor driven carriers.

I claim:

1. A safety switch for use with a motor vehicle having

a battery, a cable leading from said battery, a first line contact connected to said cable, a second line contact, and a plurality of vehicle and accessory operating electrical circuits connected to said second line contact, said safety switch comprising a contact bridging member positioned between said first and second line contacts, a reciprocable rod carrying said bridging member and comprising a first solenoid core, a first solenoid coil surrounding said rod, a latching notch in said rod, energization of said first solenoid coil moving said contact bridging member to line contact bridging position to energize said plurality of circuits from said battery; first spring means connected to said rod normally biasing said contact bridging member out of engagement with said first and second line contacts, a second solenoid coil mounted adjacent said first solenoid coil, a second solenoid core in said second coil, latch means engageable with said latching notch connected to said second solenoid core. second spring means normally biasing said latch means into engagement with said latching notch, a microswitch having an input terminal and two output terminals mounted adjacent said solenoid coil, said microswitch being movable to close a circuit to one or the other of said output terminals, an energizing wire leading from said first line contact to said input terminal of said microswitch, a line extending from one microswitch output terminal to said first solenoid coil, a line extending from the other microswitch output terminal to said second solenoid coil, a spring pressed microswitch operating button normally biasing said microswitch toward said first solenoid energizing position, and located adjacent said latch means, said button being held in first solenoid coil energizing position by said latch means when disengaged from said groove, movement of said latch means into groove engaging position releasing said button to move said microswitch to second solenoid coil energizing position, thus de-energizing said first solenoid coil, energization of said second solenoid coil moving said latch means to engage said button, and move said switch to first solenoid coil energizing position thus de-energizing said second solenoid coil, a manual switch mounted adjacent said microswitch and having a pair of terminals, said manual switch being movable to close a circuit to either one of said pair of terminals and having a neutral position, a line extending from said first solenoid coil to one of said terminals, a line extending from said second solenoid coil to the other of said terminals whereby movement of said manual switch to one position will close a circuit from said battery to said first solenoid coil to bridge said line contacts, and movement of said manual switch to its other position will, through said microswitch, instantly break the circuit to said first solenoid coil and close the circuit to said second solenoid coil, releasing said latch means, permitting said first spring means to move said line contact bridging member to non-bridging position, instantly de-energizing all of said vehicle and accessory operating circuits, and simultaneously de-energizing said second solenoid coil by movement of said microswitch and establishing a circuit through the microswitch to said first solenoid coil ready to be energized upon movement of said manual switch.

2. The structure of claim 1 wherein a by-pass line extends from said microswitch input contact to the line extending from said second solenoid coil to said manual switch, and a tilt responsive circuit closure device is interposed in said by-pass line, whereby excessive tilting of said circuit closure device instantly energizes said second solenoid coil and de-energizes said first solenoid coil and breaks the circuit between said first and second line contacts to de-energize all of said vehicle and accessory operating circuits without actuation of said manual switch, movement of said latch means immediately de-energizing said second solenoid coil through said microswitch button after release of said latch means from said

groove whereby all electrical circuits of said vehicle are de-energized.

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