July 11, 1961 F. W. MURPHY 2,992,303

AUTOMATIC SAFETY IGNITION SWITCH

Filed March 10, 1960

2 Sheets-Sheet 1

Fig. 1

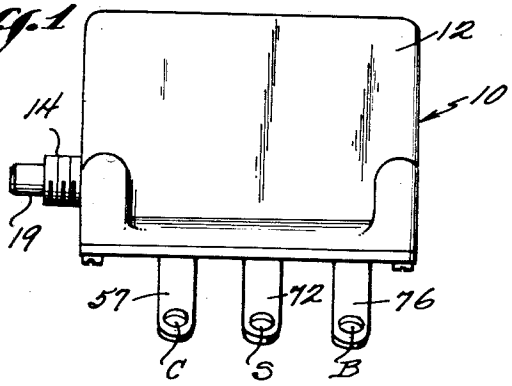


Fig. 2

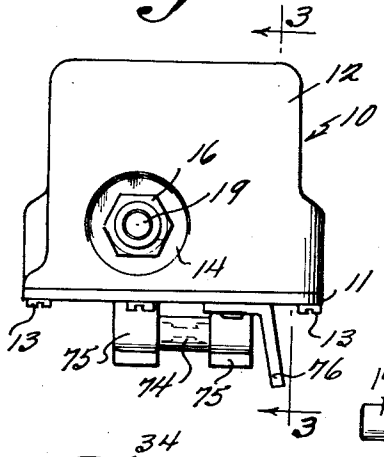


Fig. 3

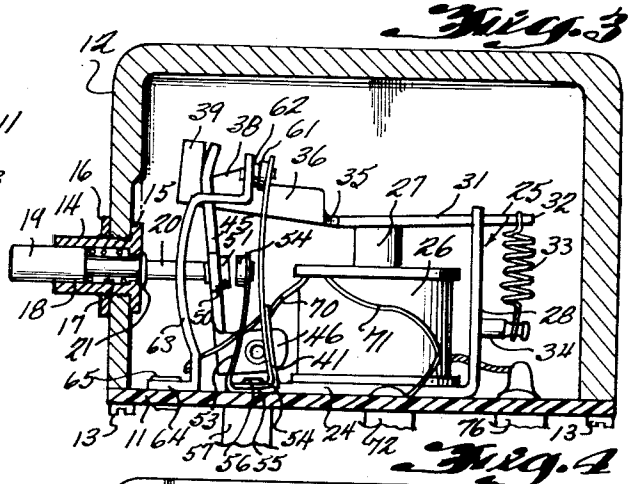


Fig. 4

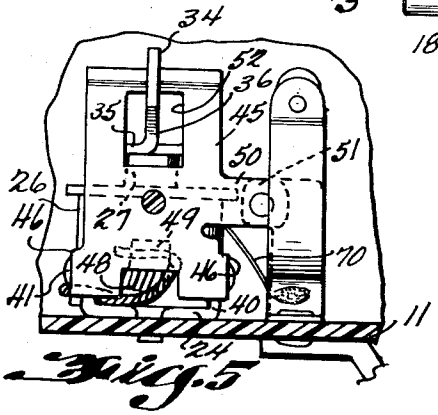


Fig. 5

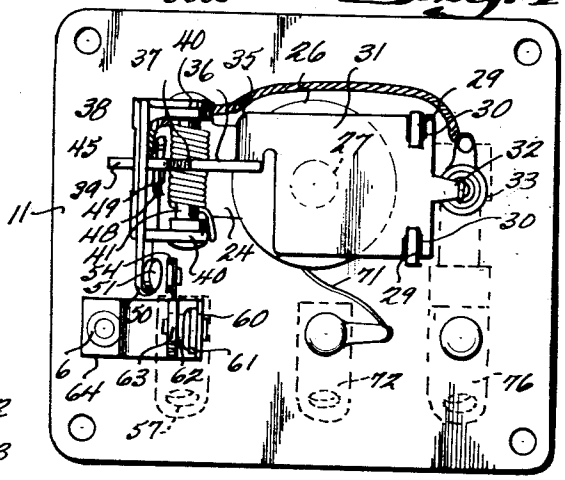
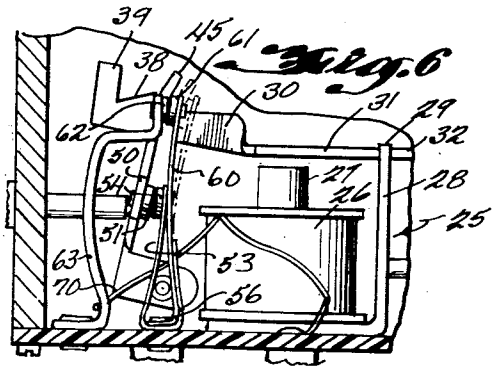


Fig. 6



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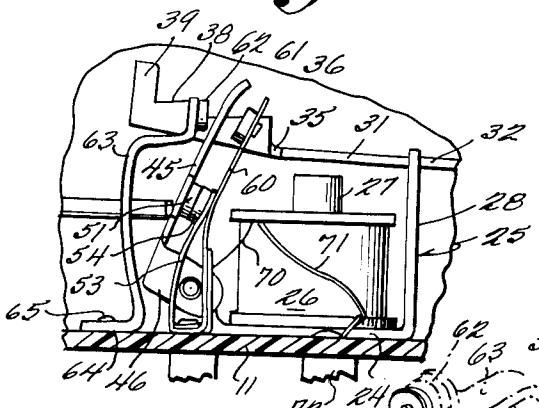
July 11, 1961 F. W. MURPHY 2,992,303

AUTOMATIC SAFETY IGNITION SWITCH

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Fig. 7



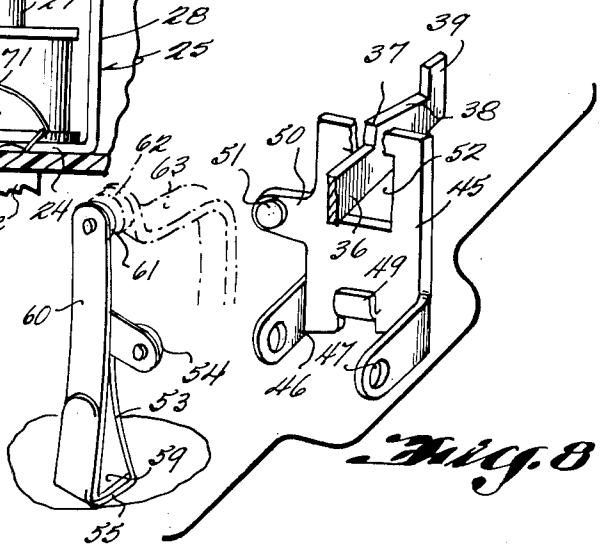


Fig. 8

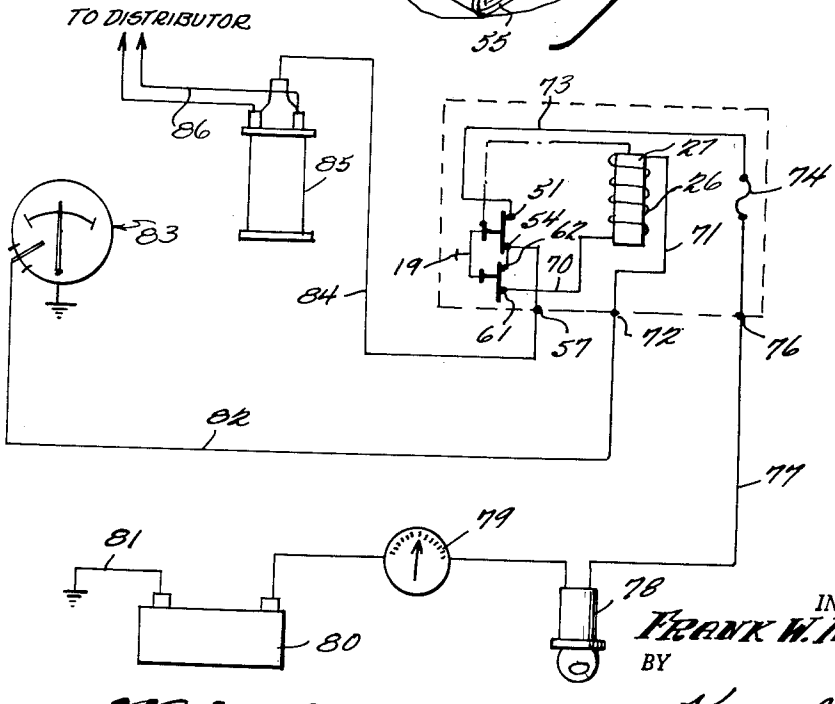


Fig. 9

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United States Patent Office 2,992,303 Patented July 11, 1961

2,992,303

AUTOMATIC SAFETY IGNITION SWITCH

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Filed Mar. 10, 1960, Ser. No. 14,096
4 Claims. (Cl. 200—87)

This invention relates to switches for automatically breaking the ignition circuit of an internal comustion engine or the like when the temperature drops to a predetermined low point, when the engine temperature rises to a predetermined high point, or when it is desired manually to shut down the engine by breaking the ignition circuit. The invention constitutes an improvement over my prior Patent No. 2,467,333, entitled Automatic Safety Ignition Switch, patented April 12, 1949.

A primary object of this invention is the provision of the safety cut-off switch of the character described having a switch with an electro-magnetic operator for opening the switch, and a manual reset button for closing the switch after initial opening, the reset button also opening the circuit to the electro-magnetic switch operator when the button is pushed to reset position so that the operator will not be biasing the switch to open position at the same time the button is attempting to close the switch.

An additional object of this invention is the provision of a switch of this kind wherein the manually operable switch is connected substantially in parallel to the relays for manually closing the switch operator when it is desired to stop the engine with the temperature and pressure relay switches in the open or normal position.

A further and more specific object of the invention is the provision of a switch of this character wherein pressure on the manual reset button initially closes a pair of contacts to close the circuit to the ignition coil, and additional pressure on the same reset button opens an additional pair of contacts which open the circuit to the electro-magnetic operator or solenoid coil for opening the switch.

Still other objects of the invention reside in the combinations of elements, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawing wherein there is shown a preferred embodiment of this inventive concept.

Other objects will in part be obvious and in part be pointed out hereinafter.

In the drawings:

FIGURE 1 is a side elevational view of one form of switch embodying the instant inventive concept, shown in an associated housing;

FIGURE 2 is an end elevational view of FIGURE 1 as viewed from the left;

FIGURE 3 is an enlarged 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 top plan view of the switch mechanism of FIGURE 3 with the housing and its associated push button removed;

FIGURE 5 is a fragmentary end elevation of the structures of FIGURES 3 and 4 as viewed from the left with the housing removed;

FIGURE 6 is a fragmentary view similar to FIGURE 3 but showing the parts in the different positions of adjustment;

FIGURE 7 is a view similar to FIGURE 6 but showing the parts in still another position of adjustment;

FIGURE 8 is a fragmentary exploded perspective view showing certain of the operating elements; and

FIGURE 9 is a schematic wiring diagram of the apparatus.

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

Having reference now to the drawings in detail, the switch of the instant invention, generally indicated at **10**, includes a base plate **11** and a housing or cover **12** which is adapted to be secured in position on the base plate by means of screws **13** extending through suitable apertures.

The housing **12** has positioned in the front wall thereof a threaded stud **14**, which is secured in position by inner and outer clamping nuts **15** and **16**, respectively (see FIG. 3). The stud **14** has an internal bore **17**, in which is positioned the shank **18** of a push button **19**, the latter extending exteriorly of the bushing **14**. Shank **18** is hollow, and contains a rod **20** of insulating material, which is adapted to actuate the switch mechanism, in a manner to be more fully described hereinafter. The end of shank **20** is peened as at **21**, to prevent withdrawal of the operating button from the stud, and a coil spring **21** normally biases operating button **19**, and hence insulating rod **20** outwardly or towards inoperative position.

One leg **24** of a generally L-shaped bracket, generally indicated at **25** is secured to the base **11**, and has mounted thereon, and insulated therefrom a solenoid coil **26**, which is provided with an operating core **27** projecting upwardly therefrom. The other leg **28** of bracket **25** extends upwardly to the rear of and above coil **26** and core **27**, and is provided with a pair of oppositely positioned upwardly extending ears **29**, which are recessed to receive cut-outs **30** positioned on opposite sides of a normally horizontal plate **31**. The plate **31** has a rearwardly extending tongue **32**, to which is secured one end of a coil spring **33**, the other end of which engages a stud **34** carried by the upright arm **28**, the spring **33** serving normally to bias plate **31** upwardly away from solenoid core **27**.

The end of plate **31** opposite tongue **32** is formed with a projection **35**, which is twisted to form a tongue **36** lying in a plane at right angles to the plate **31**. The tongue **36**, includes a notched detent portion **37**, at the termination of an upwardly inclined portion **38**, at the other end of which is a vertically extending stop portion **39**, the purpose of all of which will be more fully described hereinafter.

The lower end of leg **24** of L-shaped member **25** projects forwardly from the solenoid coil **26** and is provided with a pair of upturned oppositely disposed lugs **40**, which are apertured to receive a pivot pin **41**. A contact carrying plate **45** carries at its lower extremity a pair of rearwardly extending lugs **46**, which are apertured as at **47**, and positioned between the lugs **40** for the reception of the pin **41**, which thus pivotally mounts plate **45** thereon.

A coil spring **48** surrounding pin **41** has one end engaged by a lug **42** struck from plate **45** and normally biases plate **45** in a direction away from the solenoid coil **26**, and consequently forward toward insulating rod **20** of push button **19**. An offset portion **50** of plate **45** carries a contact **51**, the purpose of which will be more fully pointed out hereinafter.

The plate **45** is also provided with a centrally disposed opening **52**, through which the end of tongue **36** is adapted to project, with the stop **39** extending upwardly to limit the forward movement of plate **45**, and consequently contacts **51**.

The base plate **11**, which is of insulating material, also carries an upstanding resilient finger **53**, which carries a contact **54** which is opposed to contact **51**. Arm **53** has an inwardly turned portion **55**, through which extends a rivet **56**, which is an electrical association with a contact terminal **57** on the underside of base plate **11**. Stud or rivet **56** also secures an inturned portion **59** of a resilient arm **60**, which extends upwardly above contact **54**, and carries a contact **61**.

Contact **61** is adapted to engage an opposed contact **62**

which is carried by a rigid arm 63, having an outwardly turned portion 64, which is suitably secured to the base 11 as by means of a rivet 65 or the like.

From the portion of the mechanism so far described it will be seen that when the operating button 19 is moved inwardly from the position shown in FIGURE 3, which is the off position, that the parts will initially move to the position shown in FIGURE 6, with contact 51 engaging contact 54 to initially close a circuit to be more fully described hereinafter.

Additional pressure on the push button 19, which is the normal reaction in pushing in a button of this type will cause bending of the resilient arm 60 to move contact 61 away from contact 62 to the position as shown in FIGURE 7, which will break another circuit to be more fully described hereinafter. When the pressure on button 19 is relaxed, both contacts 61 and 62 will be engaged as well as contacts 51 and 54. This is the normal operating position of the mechanism when in on position. It will also be seen that with the parts in the position of FIGURE 3 with contacts 51 and 54 separated that the upper end of plate 45 is engaged by the stop member 59. Similarly as seen in FIGURES 6 and 7 the detent 37 of arm 36 will have engaged the top edge of opening 52 to hold the plate 45 inwardly in circuit closing position.

Having reference now particularly to FIGURE 9 it will be seen that a wire 70 extends from contact 62, to one end of solenoid coil 26, from the other end of which a wire 71 extends to an external terminal 72. Similarly a wire 73 extends from contact 51 through a fuse 74, which, as shown in FIGURE 2 is supported by spring clips on the underside of base plate 11, the spring clips being designated 75, to an external terminal 76. From the terminal 76 a wire 77 leads through an ignition switch 78 and an ammeter 79 to the battery 80, which is grounded as by means of a wire 81.

From the terminal 72 a wire 82 extends to a suitable limit control switch generally indicated at 83, which may be of any desired type, and responsive to any desired condition or series of conditions, such as low pressure, high pressure, or temperature, in accordance with which it is desired to control the operation of the internal combustion engine. Similarly from the terminal 72 a wire 84 leads to the ignition coil 85 of the engine, from which wires 86 lead to the distributor in the conventional manner.

From the foregoing the operation of the device should now be readily understandable. When the motor is to be energized, the switch 78 is turned on, and, with the parts in the position shown in FIGURE 6 a circuit is established through the wires 77 and 73 and the contacts 51 and 54 and the wire 84 to the ignition coil 85. This circuit may obviously be broken manually by pushing in the push button 19.

A similar circuit is established through the solenoid coil 26 from contacts 61 and 62, and wires 71 and 82 to the condition responsive switch 83. As long as the condition to which switch 83 is responsive remains normal, the solenoid coil is de-energized. However, promptly upon the achievement of a condition to which switch 83 is responsive a circuit is established to energize the coil 26, whereupon the core 27 acting upon the plate 31 causes the plate to move downwardly, and thus releases the engagement of detent 37 with the opening 52 in plate 45, whereupon spring 48 causes the plate to move to the position disclosed in FIGURE 3, at which time contacts 51 and 54 are separated, and the circuit to the ignition coil 85 is broken thus de-energizing the engine.

When it is desired to reactivate the engine, pressure on push button 19 serves to close contacts 54 and 51 in the manner previously described, but in order to insure that at the same time the solenoid coil 26 is de-energized further pressure exerted on spring finger 60 causes movement of the contact 61 away from the contact 62, thus positively precluding energization of the solenoid coil at this time.

From the foregoing it will now be seen that there is herein provided an improved safety ignition switch 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, and it is to be understood that all matter herein is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

1. An automatic safety ignition switch comprising a base plate, a battery terminal on said base plate insulated therefrom, an insulated coil terminal on said base, a ground terminal on said base insulated therefrom, an electro-magnet fixed on said base including a core and windings thereabout, a spring-biased armature positioned above said core normally biased out of engagement with said core, a cover for said switch fixed on said base, a reset button carried by said cover, a plate pivotally mounted adjacent said electro-magnet, spring means biasing said plate outwardly toward said reset button, a contact carried by said plate electrically connected to said battery terminal, a resilient finger mounted on said base, a contact carried by said spring finger aligned with said contact on said plate, an electrical connection between said contact on said spring finger and said coil terminal, whereby closure of said contact on said plate and said contact on said spring finger by movement of said reset button closes a circuit to said coil, a second spring finger, a third contact carried by said second spring finger, an electrical connection between said third contact and said coil terminal, a fourth contact in opposition to said third contact, an electrical connection between said fourth contact and said windings of said electromagnet, and a connection between the windings of said electro-magnet and said ground terminal, said first-mentioned spring finger being aligned with said second-mentioned spring finger, whereby pressure exerted by said reset button will first close said first and second-mentioned contacts, and continued pressure will open said third and fourth contacts.

2. The structure of claim 1 wherein said plate carrying said first-mentioned contact has an aperture therein, and said armature plate carries a detent adapted to engage with an edge of said aperture to hold said first-mentioned plate in contact closing position.

3. The structure of claim 1 wherein a fuse is carried by said base electrically interposed between said contact carried by said plate and said battery terminal post.

4. The structure of claim 2 wherein said armature plate carries a stop member for limiting outward movement of said plate carrying said first-mentioned contact.

No references cited.