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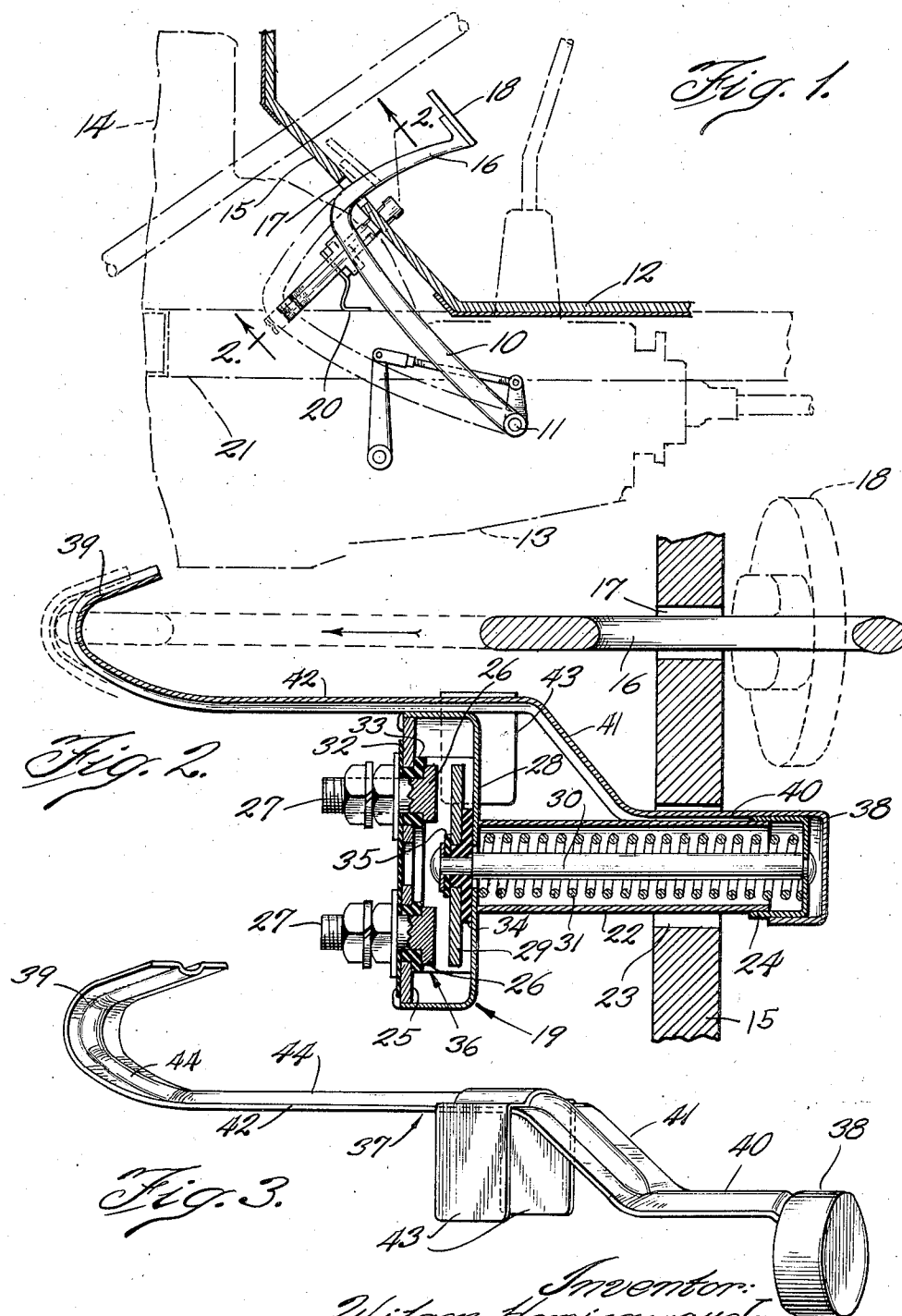
W. HEMINGWAY, JR

2,104,159

STARTER SWITCH CONTROL

Filed Jan. 24, 1936

3 Sheets-Sheet 1



Inventor:
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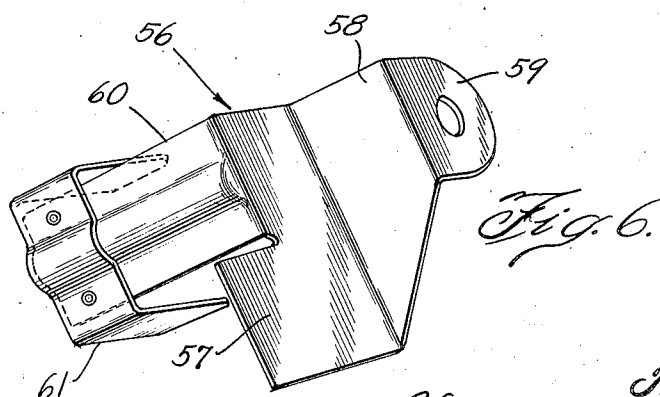
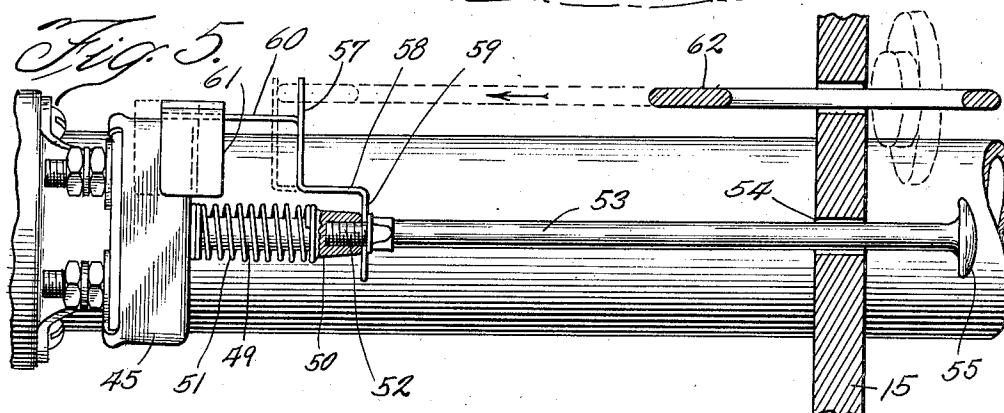
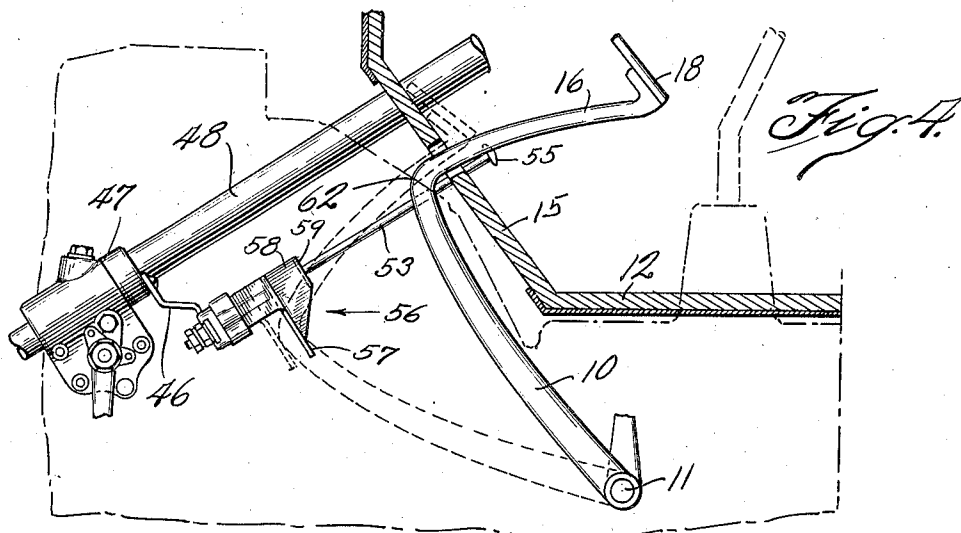
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STARTER SWITCH CONTROL

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3 Sheets-Sheet 2



Inventor:
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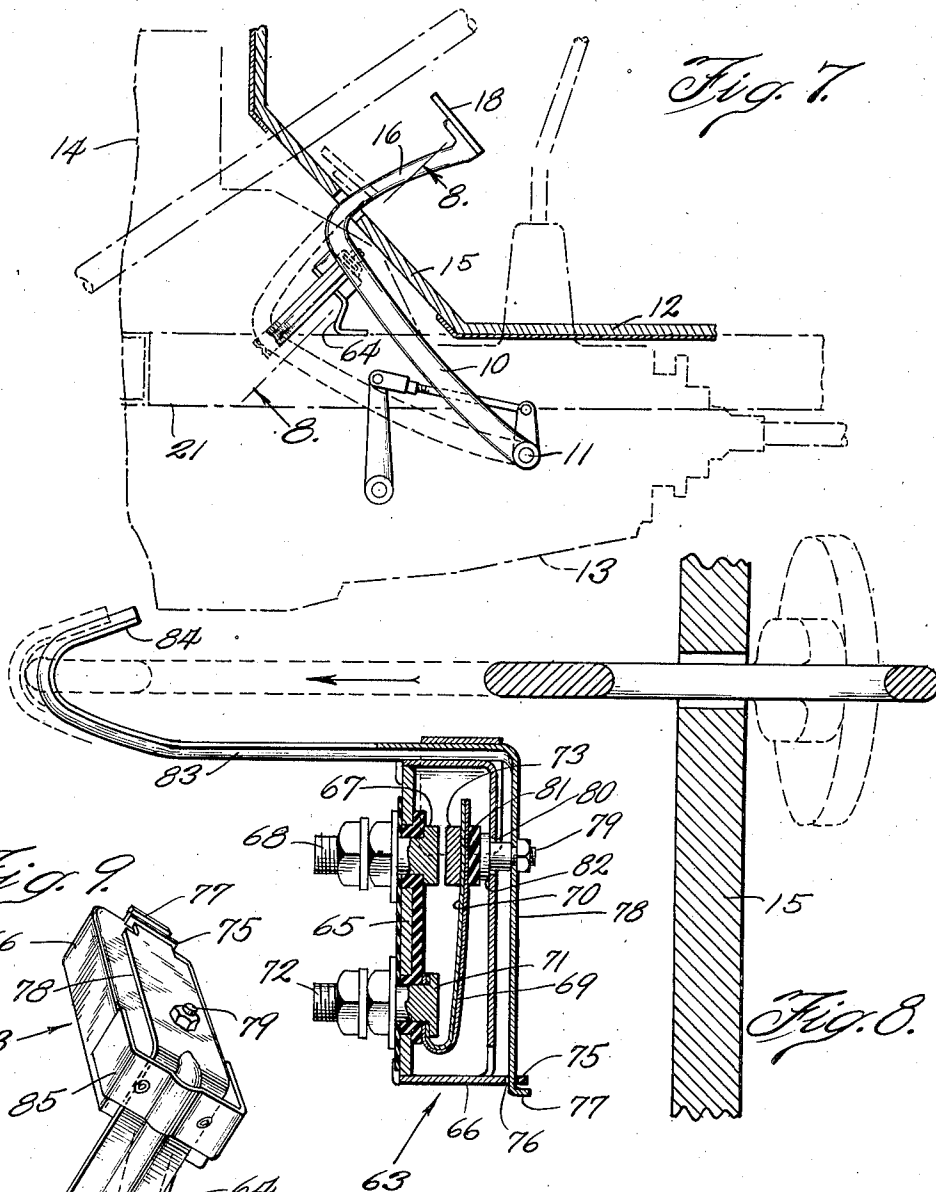
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STARTER SWITCH CONTROL

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,104,159

STARTER SWITCH CONTROL

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Application January 24, 1936, Serial No. 60,679

5 Claims. (Cl. 192—.02)

My invention relates to starter switches for automobiles and the like wherein a clutch controls the transmission of power from an internal combustion engine which is started by an electric motor and my invention has reference more particularly to a construction wherein the starter switch is actuated by the clutch operating facilities in a manner to insure release or disengagement of the clutch when the switch is closed to cause operation of the starter motor. More particularly, my invention contemplates the provision of the starter switch with actuating means which is arranged with respect to the clutch operating facilities so that extreme movement of said facilities beyond that required and ordinarily employed for declutching is necessary to close the starter switch and the ordinary and usual declutching operations accordingly do not affect the starter switch.

The principal objects of my invention are to insure disengagement of the clutch when the starter motor is operated; to actuate the starter motor switch by means of the facilities which effect the release of the clutch; to arrange the starter switch so that it is unaffected by the ordinary and usual declutching operations; and to provide simple, convenient and dependable clutch actuated starter switch operating means which may readily be incorporated as a part of the switch assembly or furnished as an attachment that is readily applicable to existing starter switches,—these and other objects being accomplished as explained hereinafter and shown in the accompanying drawings, in which

Fig. 1 is a sectional view through the floor board of an automobile showing an existing type of starter switch arranged for operation by the clutch pedal, the location of other parts of the automobile being indicated in connection therewith;

Fig. 2 is an enlarged sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the starter switch attachment of Figs. 1 and 2;

Fig. 4 is a view similar to Fig. 1, but showing a different form of starter switch and operating attachment;

Fig. 5 is an enlarged bottom view of the starter switch and attachment of Fig. 4 with certain parts in section;

Fig. 6 is a perspective view of the starter switch attachment of Figs. 4 and 5;

Fig. 7 is a view similar to Fig. 1 but showing a starter switch constructed for operation by the clutch pedal;

Fig. 8 is an enlarged sectional view taken on the line 8—8 of Fig. 7; and

Fig. 9 is a perspective view of the starter switch of Figs. 7 and 8.

My invention is adapted for use with prevailing forms of automobiles which are operated by an internal combustion engine through a clutch which provides a releasable connection between the engine and the conventional transmission, and the clutch, which is normally engaged to maintain a driving connection between the engine and transmission, is arranged for release or disengagement by depression of a pedal which is conveniently located for operation by the automobile operator. An electric motor is provided for starting the engine, and the automobile is equipped with a battery which is connected with the starter motor through a switch which is temporarily closed to operate the motor and start the engine.

On all of the drawings the reference numeral 10 indicates the clutch lever which is pivoted at 11 in the usual manner under the floor board 12 to the housing 13 for the transmission which has a clutch connection with the crank shaft of the engine 14. This clutch lever extends upwardly and forwardly under the toe board 15 and terminates at the upper end in an integral angularly disposed arm 16 which projects through an opening 17 in the toe board and is provided at its outer end with the pedal 18 which is positioned to be conveniently engaged and depressed by the foot of the operator to swing the lever 10 downwardly on its pivot 11 and thereby release the clutch connection between the crank shaft of the engine 14 and the transmission in the housing 13.

One present make of automobile has a starter switch 19 mounted by means of a bracket 20 on a frame member 21 of the car as shown in Figs. 1 and 2 so that the switch extension 22 projects freely through the toe board 15 near the location of the clutch pedal 18, an opening 23 of ample size being provided for this purpose, and this extension 22 has a cap 24 at the upper end which may be depressed to close the starter switch 19 through which current is supplied from the battery to the starter motor.

This switch 19 comprises a bottom plate 25 which may be a part of the bracket 20, and this bottom plate 25 has a pair of contacts 26 secured thereto in an insulated manner with outside terminals 27 to which electrical conductors are connected so that the switch controls the supply of current from the battery to the starter motor. A cover shell 28 is secured to the bottom plate

25 to enclose the contacts 26 and a switch bar 29 which is mounted in the shell 28 in an insulated manner and normally held away from the contacts 26, is depressible by the cap 24 to engage the contacts 26 and thereby establish electrical connection therebetween. The switch bar 29 is secured in an insulated manner to the end of a stem 30 which extends outwardly through the switch extension 22, which is of tubular form, and this stem 30 is secured at its outer end to the cap 24 which closes and slides freely on the outer end of the tube 22. A spring 31 in the tube 22 is compressed between the top wall of the shell 28 and the cap 24 so as to hold the switch bar 29 away from the contacts 26 and in this position the cap 24 is extended outwardly on the end of the tube 22 so that said cap is capable of sufficient depressive movement to insure closing of the switch bar 29 against the contacts 26.

The contacts 26 and stems thereof which constitute the terminals 27 are insulated from the base plate 25 of the switch casing by a facing 32 of insulating material on the outer face of the base plate 25 and the flanged bushings 33 of insulating material which line the holes in the plate 25 through which the stems 27 extend and the switch bar 29 is insulated from the shell 28 and stem 30 by the insulating disks 34 and 35, the former of which has a hub portion surrounding the reduced inner end of the stem 30 and lining the hole of the bar 29 through which this reduced inner end of the stem 30 extends. The side walls of the shell 28 which hold the switch bar 29 in proper alignment with the contacts 26 and prevent rotation of said switch bar and its supporting stem 30 have an insulating lining 36 which prevents contact of the switch bar with the side walls of the shell.

For operating the above starter switch by means of the clutch lever, I have provided an attachment or adapter, shown in perspective in Fig. 3, which is readily applicable to the switch without any alteration or dismantling of the switch. This adapter which is indicated as a whole at 37, has a cap member 38 at one end which is of suitable shape and size to fit snugly over the cap 24 of the switch and at the other end is formed with a hook 39 which, when the adapter is mounted on the switch 19 is located in the path of movement of the clutch lever 10 so that when the clutch pedal 18 is fully depressed the outer end of the lever 10 engages the hook 39 and depresses the fitting 37 sufficiently to close the starter switch 19. Only a slight depression of the fitting 37 is required to close the switch 19 and the fitting 37 is constructed so that when mounted on the switch 19, the hook 39 will not be engaged by the clutch lever 10 until the latter is almost fully depressed and the starter switch accordingly will be operated only in the final movement of fully depressing the clutch lever.

Clutch pedals are usually arranged so that release of the clutch occurs upon partial depression of the pedal and in the normal declutching operations the clutch pedal is not ordinarily depressed to the full extent. Therefore since the adapter 37 is effective to close the starter switch only when the clutch lever is close to its fully depressed position, the starter switch is not affected by the normal declutching operations. Moreover since the tension of the starter switch spring imposes a noticeable resistance to the final depression of the clutch pedal that is necessary to depress the fitting 37 and close the starter switch, the feel of this added resistance serves as

a precautionary influence to prevent depression of the clutch to the extent to accidentally or unintentionally close the starter switch. Such accidental or unintentional closing of the starter switch is unlikely to occur when the engine is not running and would in such case merely "turn the engine over" as in the normal operation of starting whereas if the engine were running, the starter motor, which at that time is disconnected from the engine, could not engage the running engine and in any event therefore, the only consequence of accidental or unintentional closing of the switch would be a possible wastage of battery current.

The adapter 37 is formed as shown in Figs. 1, 2 and 3 with a portion 40 which is preferably curved transversely to conform to the tubular shape of the switch extension 22 and of a suitable length to extend up through the starter switch opening 23 of the toe board 15, which said opening is of ample size to accommodate this part 40 of the adapter 37 as well as the switch extension 22 and this fitting is formed with an offset 41 so that the leg portion 42 of the adapter will extend along the end of the switch casing 28 as shown in Fig. 2 at which place the adapter is formed or provided with a yoke 43 which straddles the casing 28 and cooperates therewith to hold the adapter in place and guide it in its switch operating movement, and it will be observed that this yoke 43 is arranged on the adapter 37 so that when engaged with the switch casing 28 there is sufficient clearance between the yoke and the switch mounting bracket 20 to permit the necessary movement of the adapter for closing the switch. The adapter is preferably made of sheet metal which may be stamped with a center bead 44 for stiffening purposes and this bead is preferably arranged on the inner face of the hook 39 to provide a rounded surface where the clutch lever 10 engages with the hook.

For installing the adapter 37 so as to convert the switch 19 to a clutch operated starting switch, it is merely necessary to raise the toe board 15 above the cap 24 of the starter switch, whereupon the cap 38 of the adapter is applied over the switch cap 24 and the yoke 43 engaged with the proper end of the switch casing 28 and the toe board 15 returned to its proper place. In the automobiles for which the adapter of Figs. 1, 2 and 3 is designed, the toe board is constructed with a separate plate at the location where the clutch and brake pedals and starter switch project therethrough and in applying my adapter it is merely necessary to release and lift this plate sufficiently to apply the adapter cap 38 over the cap 24 of the switch.

In Figs. 4, 5 and 6, I have shown another well known arrangement of starter switch with a modified form of adapter for permitting operation of the starter switch by the clutch pedal. The starter switch 45 in this case is of substantially the same internal construction as the switch of Fig. 2, but is mounted by means of the bracket 46 on the support 47 for the steering column 48. In this switch, however, the switch bar thereof, which corresponds to the switch bar 29 of Fig. 2, is secured in an insulated manner on the end of the stem 49 which projects through the top wall of the switch casing and this stem 49 has a head 50 on the outer end between which and the top wall of the switch casing a coil spring 51 is compressed to hold the switch bar in the retracted position in the same manner as the switch bar 29 of Fig. 2. The head 50 has a threaded open-

ing 52 for the threaded end of the stem 53 which projects through an opening 54 in the toe board 15 of the automobile and is provided with a head 55 for engagement by the operator's foot for closing the starter switch 45.

To convert this switch arrangement for operation by the clutch pedal an adapter 56 is provided which has a ledge portion 57 with an angularly disposed extension 58 at one side with a laterally extending apertured lug 59 at the top, which is adapted to be interposed between the head 50 of the starter switch 45 and the operating stem 53. A leg 60 depends from the ledge portion 57 and has at its lower end a yoke 61 which straddles the casing of the switch 45 so that when the lug 59 is clamped between the switch stem 53 and head 50 and the yoke 61 is engaged with the switch casing, the adapter 56 is depressible from the full line position of Fig. 5 to the dotted line position and in such movement depresses the stems 49 and 53 against the tension of the spring 51 and closes the switch. When so mounted the ledge portion 57 is in the path of movement of the nose 62 of the clutch lever 10 of Figs. 4 and 5 which engages the said ledge portion 57 as the clutch lever 10 is nearly depressed to the full extent and the final depressive movement of the clutch lever 10 of Figs. 4 and 5 thus may be utilized in the same manner as in the structure of Figs. 1 and 2 to close the starter switch 45 for operating the starter motor of the engine 14.

Referring now to Figs. 7, 8 and 9 which show a starter switch and operating member constructed as a unit which may be used in place of the combined starter switch and adapter of Figs. 1 and 2, the reference numeral 63 indicates the starter switch as a whole which may be mounted by means of the bracket 64 on the frame member 21 of the automobile in the same manner as the switch 19 of Figs. 1 and 2. This switch comprises a housing consisting of the base plate 65 and cover shell 66, the former of which is provided with an insulated contact 67, the stem 68 of which projects out through the base plate 65. A plate spring 69 with lamination 70 of a material of high electrical conductivity has a forked end secured under the head 71 of a headed stem 72 which projects out through the base plate 65, the headed stem 72 and spring 69—70 being insulated from the base plate 65 and shell 66. The other end of the laminated spring 69—70 which extends over the contact 67, has a contact lug 73 thereon arranged in opposed relation to the contact 67 and normally held by the spring 69—70 out of contact therewith and which may be pressed against the contact 67 to provide an electrical connection between the stem 62 and the contact 63 of the stem 68. The wall of the shell 66 at one end has an extension 75 with a slot 76 to receive the hooked end tongue 77 of a lever 78 to provide a pivotal connection, and this lever extends longitudinally over the top of the switch casing and has a stem 79 attached thereto and projecting through an aperture 80 in the top wall of the casing 66 so as to engage a block 81 of insulating material at the free end of the laminated spring 69—70. The laminated spring acts through the insulating block 81 to normally force the stem 79 outwardly and the stem 79 is provided

within the casing 66 with a head 82 which by its engagement with the casing wall serves as a stop to limit separation of the contact lug 73 from the contact 67.

The lever 78 is continued downwardly at one end of the switch as indicated at 83 and terminates in a hook 84 which is positioned to be engaged by the clutch lever sufficiently before the latter reaches its limit of depression so that the final depressive movement of the clutch pushes the lever arm 83 downwardly and closes the switch 63, and said lever is guided in its operation by a yoke 85 which loosely embraces the end of the switch casing 78.

While I have shown and described my invention in preferred forms and as applied to certain makes of cars, it is to be understood that it is not limited thereto and that various changes and modifications may be made without departing from the principles of my invention, the scope of which is to be determined by the appended claims.

I claim as my invention:

1. In an automobile or the like having a toe board with a clutch releasing lever thereunder and a starter switch with operating means extending through the toe board, the combination of an adapter attached to said switch operating means and having an obstruction under the toe board in the path of movement of and operable by the clutch releasing lever to close the switch.

2. In an automobile or the like having a toe board with a clutch releasing lever thereunder and a starter switch with operating means extending through the toe board, the combination of an adapter extending through the toe board and attached to the switch operating means, said adapter having a part under the toe board in the path of movement of and operable by the clutch releasing lever to close the switch.

3. In an automobile or the like having a toe board with a clutch releasing lever thereunder and a starter switch with operating means including a stem which has a threaded connection with the switch and extends through the toe board, the combination of an adapter attached to the switch by the threaded stem and having a part under the toe board in the path of movement of and operable by the clutch releasing lever to close the switch.

4. In an automobile or the like having a starter switch and a clutch releasing lever, the combination of an operating member disposed in the path of movement of and operable by the clutch releasing lever to close the switch, said operating member having guide means which slidably embrace the switch.

5. In an automobile or the like having a clutch releasing member, the combination of a switch including a casing with a switch element therein having an attached stem projecting outside the casing, a rocker arm mounted on the casing and engaged with said stem and projecting into the path of movement of and operable by the clutch releasing member to close the switch, the rocker arm having guide means which slidably embrace the switch casing.

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