

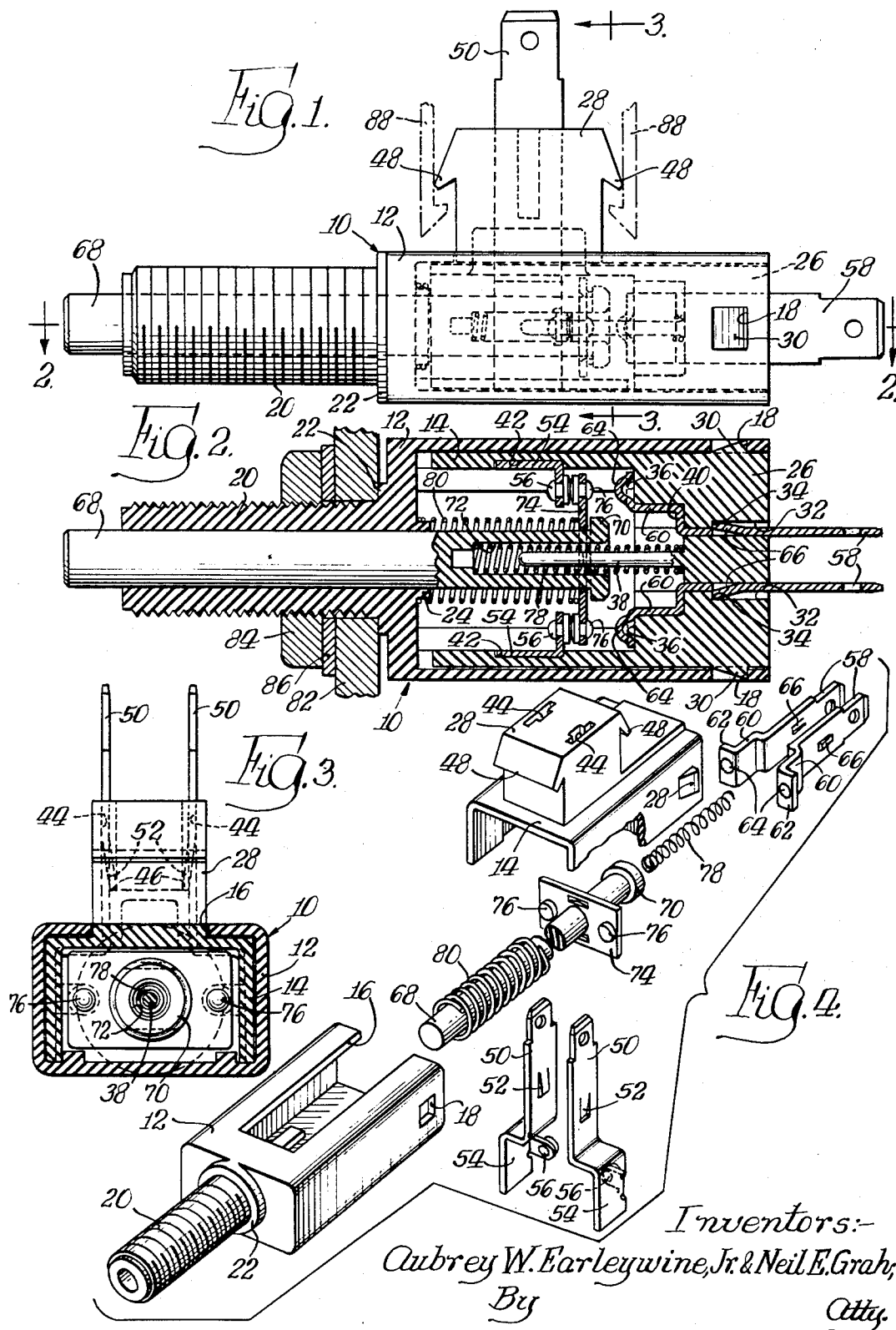
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BRAKE SWITCH

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BRAKE SWITCH

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ABSTRACT OF THE DISCLOSURE

A brake switch comprising spaced pairs of contact means, a movable contact carrier having contact means selectively engageable with either of the spaced pairs of contact means, and a rectilinearly movable plunger and cooperating spring means for effecting movement of the contact carrier.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention pertains generally to an improved brake switch which is adapted to be incorporated in an automobile for rendering the "cruise" or automatic speed control inoperative and energizing the brake lights when the brake pedal is actuated.

Description of the prior art

Various forms of brake switches have been proposed for the purpose outlined above. In general, these switches have had one or more of the following disadvantages: the make and break of circuits by the switch is not instantaneous, the switch is subject to internal shorts, the switch does not accommodate full travel of the switch plunger with the result that the switch contact members are easily damaged, the switch is not arranged for adjustable mounting relative to the brake pedal, and/or the several stationary components of the switch are staked together which contributes to high assembly and fabrication costs.

SUMMARY OF THE INVENTION

The present invention contemplates the provision of a brake switch comprising first and second pairs of spaced stationary contact means, and a third pair of contact means on a contact carrier located intermediate of the first and second pairs of contact means and slidably mounted on a plunger having an enlarged inner end portion. The brake switch further includes a first spring means for biasing the enlarged inner end portion of the plunger into engagement with the contact carrier and thereby engaging the third pair of contact means with the first pair of contact means. Additionally, second spring means is provided for biasing the contact carrier toward the second pair of contact means whereby when the plunger is moved inwardly of the switch and the enlarged inner end portion of the plunger is moved away from the contact carrier, the third pair of contact means are disengaged from the first pair of contact means and engaged with the second pair of contact means. The described arrangement of the plunger, contact carrier and spring means effects instantaneous make and break of the circuits of the first and second pairs of contact means, and accommodates overtravel of the plunger relative to the contact carrier during movement inwardly of the switch to prevent distortion of or damage to the contact carrier and associated contact means.

Further, the first and second pairs of contact means are provided on the inner ends of pairs of terminal members which extend generally normal to each other, and the described components of the switch are incorporated in a

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two-part housing. The terminal members are secured in one part of the housing, and the two parts of the housing are secured together, by means of cooperating ears or tabs and shoulders. By reason of this arrangement, the switch may be conveniently and inexpensively assembled by merely positioning certain of the components in place and snapping the remaining components together. Thus, staking of the components is completely obviated. Within the housing, spring means are guided to prevent internal shorts; and the housing is provided with an exteriorly threaded tubular portion which serves as a guide for the switch plunger and which permits the switch to be adjustably mounted relative to the brake pedal of an automobile.

When mounted within an automobile, the first pair of contact means of the switch are connected in the circuit of a "cruise" or automatic speed control system, while the second pair of contact means are connected in the circuit of the automobile brake lights. As the brake pedal is depressed for applying the vehicle brakes, the switch plunger is moved inwardly of the switch housing, and by reason of movement of the contact carrier as described above, the third pair of contact means are moved out of engagement with the first pair of contact means for opening the circuit of the speed control system and thus rendering the latter inoperative, and are substantially instantaneously moved into engagement with the second pair of contact means for closing the circuit of the brake lights and thus energizing the latter. Upon release of the brake pedal, the first spring means and the enlarged inner end portion of the plunger return the contact carrier to its normal position for opening the circuit of the brake lights and conditioning the circuit of the speed control system for operation.

Brief description of the drawing

FIGURE 1 is a side elevational view of the improved brake switch of the present invention;

FIGURE 2 is a longitudinal sectional view of the brake switch of FIGURE 1, taken substantially along the line 2—2 in FIGURE 1, looking in the direction indicated by the arrows;

FIGURE 3 is a transverse sectional view of the brake switch of FIGURE 1, taken substantially along the line 3—3 in FIGURE 1, looking in the direction indicated by the arrows; and

FIGURE 4 is an exploded view of the components of the brake switch of FIGURE 1.

Description of the preferred embodiment

Referring now to the drawing, there is indicated generally by the reference numeral 10 the housing of the improved brake switch of the present invention. The housing 10 comprises first and second housing sections 12 and 14.

As viewed in the drawing, the right end of the first housing section 12 is open, and the upper wall of the section is slotted as at 16, to receive the second housing section 14. The side walls of the section 12 adjacent the open end are formed with apertures that define shoulders 18. The left end of the section 12 is provided with an integral exteriorly threaded tubular extension 20, an annular exterior boss 22 at the base of the extension, and an annular interior boss 24 concentric of the inner end of the extension. The axis of the tubular extension 20 coincides with the longitudinal axis of the housing 10.

The second housing section 14 has a body portion 26 at the right end thereof, and an upwardly projecting extension 28 adjacent the left end thereof. The sides of the body portion 26 are provided with lateral ear portions 30 that engage the shoulders 18 for securing the second

housing section 14 within the first housing section 12. The body portion 26 is formed with parallel slots 32 which are arranged on opposite sides of the longitudinal axis of the housing and which have enlarged areas to define intermediate shoulders 34. The body portion 26 also presents inner shoulders 36, and is provided with a central inwardly extending guide pin member or portion 38 and a concentric annular recess 40. The sides of the section 14 are internally recessed as at 42. The extension 28 is formed with parallel slots 44 which extend perpendicular to the longitudinal axis of the housing on opposite sides thereof and which have enlarged areas to define intermediate shoulders 46. The extension 28 further has opposed downwardly and outwardly flaring arm portions 48.

Projecting through the extension slots 44 are terminal members 50 having deformed tab portions 52 that engage the shoulders 46 for securing the terminals 50 within the extension 28. The inner ends of the terminal members 50 are laterally offset as at 54, are seated in the recesses 42, and support a first pair of contacts 56. In a similar manner, terminal members 58 extend through the slots 32 of the body portion 26. The terminals 58 have laterally offset portions 60 that seat in the recess 40, inner lateral end portions 62 that seat against the shoulders 36 and are dimpled to define a second pair of contacts 64, and deformed tab portions 66 that engage the shoulders 34 for securing the terminals 58 within the body portion 26. The second pair of contacts 64 are spaced from and in alignment with the first pair of contacts 56 lengthwise of the longitudinal axis of the housing, and the pairs of terminals 50 and 58 are arranged in general intersecting relation to facilitate connection in dual circuits.

Rectilinearly movable in the tubular extension 20 is a plunger 68 having at the inner end thereof an abutment or enlarged annular portion 70 and a central boss 72 which receives the pin portion 38. Slidably mounted on the plunger 68 is a transverse contact carrier 74 having a third pair of contacts 76 at the ends thereof in lengthwise alignment with the first and second pairs of contacts 56 and 64. A first coil spring 78 is disposed between the body portion 26 and the bottom of the plunger bore 72, while a second coil spring 80 is disposed between the end wall of the first housing section 12 and the contact carrier 74. The first spring 78 biases the enlarged plunger end portion 70 into engagement with the contact carrier 74 and thereby normally engages the third pair of contacts 76 with the first pair of contacts 56. The second spring 80, which is weaker than the first spring 78, biases the contact carrier 74 toward the second pair of contacts 64 whereby, when the plunger 68 is depressed or moved inwardly of the housing 10 and the enlarged end portion 70 is moved away from the contact carrier 74, the third pair of contacts 76 are disengaged from the first pair of contacts 56 and engaged with the second pair of contacts 64.

The housing sections 12 and 14, and the plunger 68, are fabricated of a non-conductive material such as Delrin, while the terminals 50 and 58, contacts 56 and 76, and the contact carrier 74 are fabricated of conductive metal. In assembling the components of the brake switch, the terminals 50 are inserted through the extension slots 44 until the tabs 52 snap past and engage the shoulders 46, and the terminals 58 are inserted through the slots 32 in the body portion 26 until the tabs 66 snap past and engage the shoulders 34. Then the plunger 68, contact carrier 74 and springs 78 and 80 are positioned in operative relation relative to the first housing section 12, and the second housing section 14 is slid into the section 12 until the ears 28 snap past and engage the shoulders 18. The brake switch may thus be completely assembled by merely positioning certain of the components in place and snapping the remaining components together.

With the brake switch assembled, the first spring 78 is guided within the plunger bore 72 and on the guide pin 38, while the second spring 80 is centered on the interior

boss 24 and guided by the plunger 68. By thus separately guiding the springs 78 and 80, internal shorting of the brake switch is prevented. Also, make and break of the two circuits of the double-pole single-throw switch is effected by the action of the two springs 78 and 80 which provides substantially instantaneously switch operation, it being appreciated that one circuit is opened before the other is closed. In addition, because the described spring arrangement permits overtravel of the plunger 68 relative to the contact carrier 74, the plunger may be fully depressed without causing distortion of or damage to the contact carrier and associated contacts. The current carrying capacity of the switch may be varied by changing the various contacts, and the operating force of the switch may be altered by changing the springs 78 and 80.

The above-described switch of the present invention is especially adapted to be incorporated in an automobile adjacent the brake pedal thereof. More particularly, the tubular extension 20 is adapted to be inserted through a mounting panel 82 and secured in place by a lock nut 84 and washer 86. In this connection, the threaded extension 20 permits the switch to be adjustably mounted relative to the brake pedal, the exterior boss serves to prevent bottoming of the panel against the housing and possible resultant damage, and the plunger 68 is rotatable for more efficient switch operation. The pairs of terminals 50 and 58 are snapped into connectors and are thereby respectively connected in the circuit of a "cruise" or automatic speed control system and in the circuit of the brake lights. With the switch components in the position shown in FIGURE 2, the speed control system is conditioned for operation and the brake light circuit is open. As the brake pedal is depressed and the plunger thereby moved inwardly of the housing, the circuit of the speed control system is opened and the circuit of the brake lights is closed. Release of the brake pedal permits the plunger to return to its normal position and the brake light circuit is again opened while the speed control system is conditioned for operation. As a safety feature, the extension 28 with its arms 48 is arranged to accept a connector having locking members 88.

While there has been shown and described what is believed to be a preferred embodiment of the present invention, it will be understood by those skilled in the art that various rearrangements and modifications may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A brake switch comprising a housing having a longitudinal axis, a first pair of contact means mounted in said housing on opposite sides of said longitudinal axis, a second pair of contact means mounted in said housing and being spaced from said first pair of contact means in lengthwise alignment therewith, a plunger slidably mounted in said housing on said longitudinal axis and having abutment means at the inner end thereof, a contact carrier extending transversely of said longitudinal axis intermediate of said first and second pairs of contact means and being slidably mounted on said plunger, a third pair of contact means on said contact carrier in lengthwise alignment with said first and second pairs of contact means, first spring means between said housing and said plunger for biasing said abutment means into engagement with said contact carrier and thereby engaging said third pair of contact means with said first pair of contact means, and second spring means between said housing and said contact carrier for biasing the latter toward said second pair of contact means whereby when said plunger is moved inwardly of said housing and said abutment means is moved away from said contact carrier said third pair of contact means are disengaged from said first pair of contact means and engaged with said second pair of contact means.

2. The brake switch of claim 1 wherein said first spring means is a first coil spring, and said plunger is

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formed with a bore and said housing is formed with a stationary pin member both on said longitudinal axis for guiding said first coil spring.

3. The brake switch of claim 2 wherein said second spring means is a second coil spring located concentrically of said plunger and guided by the latter.

4. The brake switch of claim 1 wherein said first pair of contact means are located at the inner ends of a first pair of terminal members secured in said housing, and said second pair of contact means are located at the inner ends of a second pair of terminal members.

5. The brake switch of claim 4 wherein said first pair of terminal members extend in a direction perpendicular to said longitudinal axis, and said second pair of terminal members extend in a direction parallel to said longitudinal axis.

6. The brake switch of claim 4 wherein said housing is comprised of first and second housing sections, said second housing section has a plurality of shoulders formed therein, said first and second pairs of terminal members have tab portions engageable with said shoulders to secure said terminal members in said second housing section, one of said housing sections has other shoulders formed therein, and said other housing section has ear portions thereon engageable with said other shoulders to secure said housing sections together.

7. The brake switch of claim 1 wherein said housing includes an exteriorly threaded tubular extension which serves both to guide said plunger and to accommodate adjustable mounting of said brake switch.

8. A brake switch comprising first and second housing sections each formed of electrically insulating material and each having a longitudinal axis, a plurality of shoulders formed in said second housing section, a first pair of terminal members in said second housing section extending external to said housing generally parallel to the respective longitudinal axis, a second pair of terminal

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members in said second housing extending external to said housing in a direction perpendicular to said respective longitudinal axis, each terminal member having a respective tab portion engageable with a respective one of said shoulders to secure said terminal members in said second housing section, other shoulders formed in one of said housing sections, ear portions on the other of said housing sections and engageable with said other shoulders in response to said housing sections being moved towards each other with said longitudinal axes in alignment to secure said housing sections together to define a cavity therebetween, contact means on each of said terminals located in said cavity with the contact means on each terminal of one pair being generally coplanar with the contact means on a respective terminal of the other pair, a contact carrier of electrically insulating material in said cavity, means supporting said contact carrier on said second housing for reciprocating movement in said cavity along said axes, and a pair of contacts carried by said contact carrier engaging the contact means on said one pair of terminals in response to movement of said contact carrier in one direction and engaging the contact means on said other pair of terminals in response to movement of said contact carrier in the opposite direction.

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