

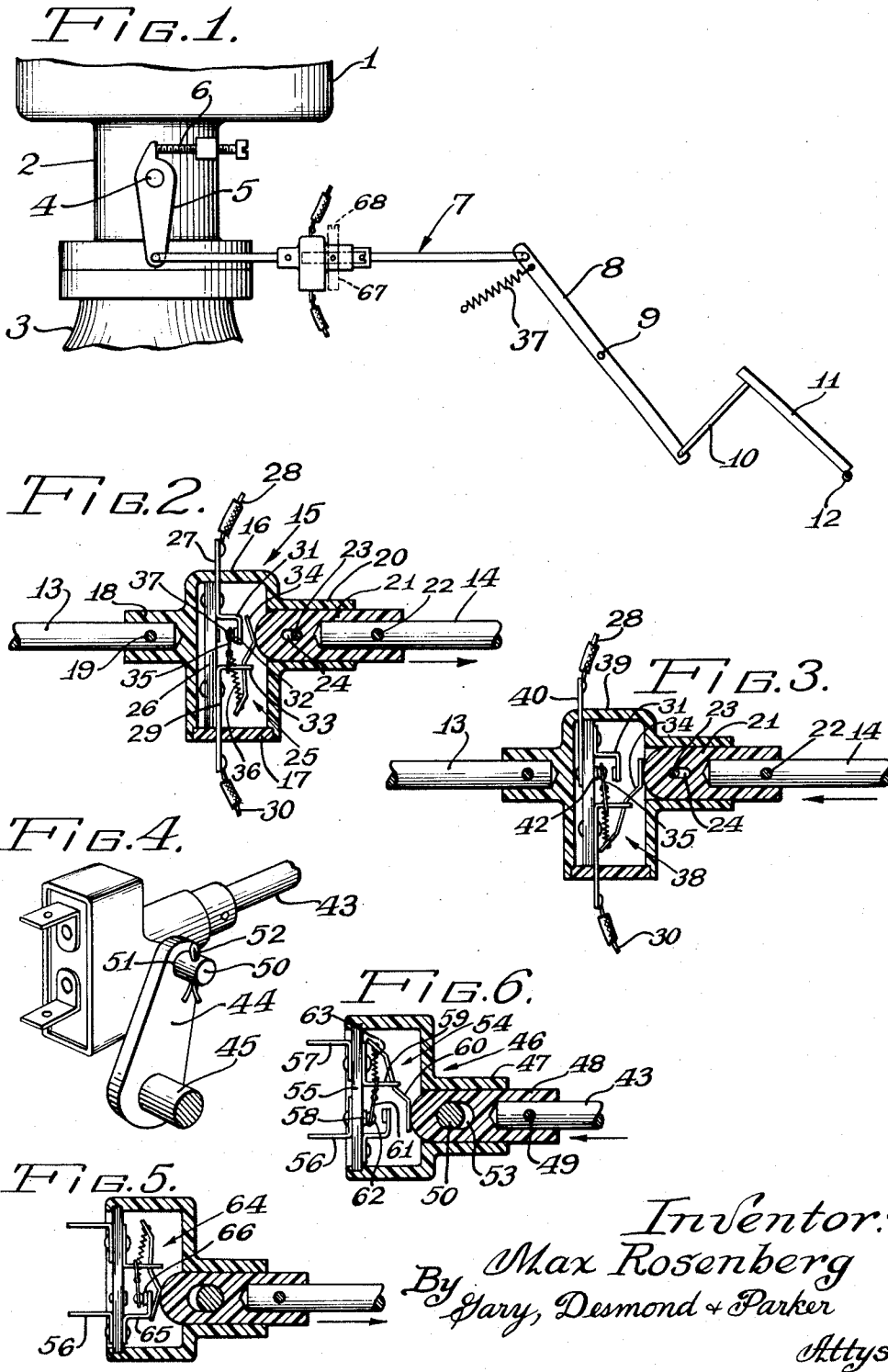
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ELECTRIC SWITCH FOR LINKAGES

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ELECTRIC SWITCH FOR LINKAGES

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1 Claim. (Cl. 260—61.89)

This invention relates to an electric switch which may be interposed in a mechanical linkage and which when the linkage is pushed or pulled may be actuated to energize or deenergize an electric circuit.

It is frequently desirable to control a secondary operation in timed relationship to a predetermined control of a primary operation. The present invention is directed to an electric switch which may control the secondary operation when the primary operation is controlled by a linkage of pivoted levers or links.

As a specific example of the present invention, but not as a limitation thereof, it may be desired to control a secondary operation in connection with an automotive vehicle when the throttle linkage is manipulated or released, and for purposes of description the present invention will be explained in this environment.

The objects and advantages of the present invention will be apparent from the accompanying drawing and following detailed description.

In the drawing,

Fig. 1 is a diagrammatic view of a throttle linkage of an automobile with which an embodiment of the present invention may be used.

Fig. 2 is a sectional view of a linkage switch for operation intermediate a predetermined link of a linkage, the switch being normally open and being closed by compression of the link.

Fig. 3 is a view similar to Fig. 1 showing a normally closed switch which may be opened by compression of the link.

Fig. 4 is a modified form of switch which may be employed at the pivoted end of a link.

Fig. 5 is a sectional view of a normally open switch which may be closed by inward movement of the link end and may be released to normal position by outward movement of the link end.

Fig. 6 is a view similar to Fig. 5 showing a normally closed switch which may be opened by inward movement of the link end.

Referring in detail to the drawing, 1 indicates a conventional carburetor usually referred to as the down-draft type, the lower portion of the carburetor being connected by means of tube 2 to intake manifold 3. Throttle shaft 4 extends diametrically through the tube 2 and within said tube carries a throttle valve (not shown). The shaft 4 is manipulated by throttle arm 5, the position of said arm being fixed by a screw 6 for proper idling speed of the internal combustion engine. When arm 5 is rotated in a counterclockwise direction the throttle is moved to open position. When the arm is in the position illustrated in Fig. 1 the throttle is in idling position as determined by the setting of screw 6.

Throttle arm 5 is pivotally connected to link 7, the opposite end of which is pivotally connected to lever 8 pivoted intermediate its length at pivot point 9. The opposite end of lever 8 is pivotally connected to a connecting link 10 which, in turn, is pivotally associated with accelerator pedal 11 which, in conventional prac-

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tice, is pivotally mounted as at 12 to the floorboard of the automobile (not shown).

Link 7 comprises two sections, namely links 13 and 14, said links being in substantial axial alignment. Interposed between the ends of the links 13 and 14 is an embodiment of my improved switch, designated generally by reference numeral 15.

The device 15 comprises a housing 16 provided with a closure 17 at its bottom. An apertured boss 18 extends from one side of the housing and is adapted for the reception of an end portion of the link 13 which is rigidly secured in the boss 18 by means of pin 19. A relatively larger boss 20 extends from the opposite side of the housing 16 and is adapted for the reception of a plunger 21 which is slidably movable in said boss. The plunger 21 is carried upon an end portion of link 14 and is rigidly secured to said link by means of pin 22. To limit the axial movement of the plunger 21 within the apertured boss 20 a pin 23 extends diametrically through the boss 20 and also extends through a slot 24 provided in the plunger 21.

A conventional electric switch 25 is carried within the housing 16 and comprises a plate 26 constructed of an insulating material. A terminal 27 is mounted upon plate 26 and extends outwardly through the top of housing 16 and is adapted for connection to conductor 28. A second terminal 29 is mounted upon plate 26 and extends downwardly through the closure 17 and is adapted for connection to conductor 30. Conductors 28 and 30 at their opposite ends may be connected to a desired control mechanism or circuit (not shown) which is to be actuated by the switch 25. The switch 25 also comprises a contact carrying arm 31 which comprises essentially an extension of the terminal 27, said contact arm carrying a contact point 32. The terminal 29 also terminates in an arm 33 upon which a lever 34 is pivotally mounted upon arm 33 and a coil spring 36 is anchored upon the lower end of arm 34 and an intermediate portion of the contact carrying arm 35.

The switch 25, per se, is of conventional construction and does not in itself constitute any part of the present invention. The switch illustrated is of the normally open type, that is, contact point 37 carried by arm 35 is normally spaced from contact point 32 carried by the arm 31, the two contacts being maintained open by the tension of spring 36.

In general, depending upon the nature of the linkage employed, link 7 will normally be under compression or tension. For instance, in the throttle linkage illustrated in Fig. 1, the link 7 may be under compression if spring 37 is employed to return the throttle arm 5 to idling position in contact with screw 6. However, were throttle arm to be rotated in a clockwise direction to open the throttle, the link containing the switch may normally be under tension. In this latter case, however, a linkage arrangement different from that illustrated in Fig. 1 would be employed. In general, however, the link which carries the electric switch, when the linkage is in inoperative position may be under compression or tension. This will hereinafter be referred to as the "normal position." When the linkage is in operative position the condition of the link carrying the switch will be reversed, that is, if normally in compression, it will change to tension, and if normally in tension, will change to compression.

This change from inoperative to operative will cause movement of plunger 21 in boss 20, the movement being controlled by the length of the slot 24. As mentioned hereinbefore, the link 7 in Fig. 1 is normally in compression and hence, as illustrated in Fig. 2, the normally open switch 25 is closed by contact of plunger 21 with arm 34, and the circuit to which conductors 28 and 30 are connected is energized. When the accelerator

pedal 11 is depressed, the link 7 is tensioned and, hence, plunger 21 moves outwardly and switch 25 returns to its normally open position thereby deenergizing the external circuit.

Referring particularly to Fig. 3, a normally closed switch 38 is illustrated as being carried in housing 39. The switch 38 is substantially the same as switch 25 and without further description the same reference numerals will be applied to identical parts, new reference numerals only being applied to those parts of switch 38 which differ from those of switch 25. The only distinction between the switches is that terminal 40 of switch 38, connected to conductor 28, instead of being connected to arm 31, is connected to contact point 42, and, hence, when the spring-biased contact-carrying member 35 is in its normal position, the circuit, comprising conductors 28 and 30, is closed.

In Fig. 3, if the link comprising members 13 and 14 is normally in tension, the switch 38 will be closed and will be opened when the linkage is operated, that is, the condition of the linkage will change to compression and plunger 21 will actuate arm 34.

Thus, the switch comprising the present invention may be employed under four different conditions. If a normally closed switch is employed in a link which is normally under compression, actuation of the linkage will close the switch. If a normally open switch is employed in a link normally under compression, actuation of the linkage will open the switch. If a normally closed switch is employed in a link which is normally under tension, actuation of the linkage will open the switch. If a normally open switch is employed in a link which is normally under tension, actuation of the linkage will close the switch.

In all cases in the use of the present invention the tension of the spring tending to restore the linkage to its normal position will be greater than the tension of the switch spring and the resistance of the frictional load of the linkage will be greater than the tension of the switch spring. In other words, whenever a portion of the linkage moves when the switch is in its normal position, the tension of the switch spring will be overcome before the remaining portion of the linkage moves, and conversely, if the switch is in its displaced position (that is, not its normal position) the switch spring will not create sufficient force to overcome the linkage spring or more the linkage against its load or frictional resistance.

Referring in detail to Figs. 4, 5 and 6, a modification of the present invention is illustrated. In the form of the invention illustrated in Figs. 4, 5 and 6 the switch, embodying the concepts of the present invention, may be interposed at a pivotal joint of a pair of links or arms comprising the linkage. Referring particularly to Fig. 4, 43 indicates a link upon which compression or tension may be exerted to rock arm 44, the arm being rigidly secured to a shaft 45 which is to be rotated by the movement of the link 43. For instance, the link 43 may comprise a portion of an automobile throttle linkage and the arm 44 may comprise the throttle arm, the throttle being secured to the shaft 45.

Housing 46 may be interposed between link 43 and arm 44, said housing having an apertured boss 47 adapted for the slidable reception of a plunger 48 which is rigidly secured by means of pin 49 to link 43. A pin 50 may be rigidly secured to the boss 47 and may extend outwardly therefrom and engage in aperture 51 provided at the end of arm 44. A cotter pin 52 may be positioned in pin 50 to prevent unintended removal of the pin from the aperture 51. Plunger 48 may be provided with a slot 53 through which pin 50 extends, the arrangement being such that plunger 48 may move a limited distance axially within the apertured boss 47 governed by the length of the slot 53.

A conventional snap switch 54 may be positioned with-

in the housing 46 and may comprise an insulating plate 55 which may function as a closure for the housing. The plate 55 may carry terminals 56 and 57 which may be connected to an external circuit (not shown) which is adapted to be controlled by the switch 54.

Terminal 56 is connected through the plate 55 to a contact point 58 and terminal 57 may be connected through the plate 55 to a supporting member 59. A lever arm 60 is pivotally mounted upon the arm 54 and an end portion thereof is positioned in the path of travel of the plunger 48. A contact-carrying arm 61 is also pivoted upon the support 54 and carries contact point 62. A coil spring 63 is anchored at the end of arm 60 and is also anchored at its opposite end at an intermediate portion of the contact carrying arm 61.

Switch 54 is of substantially the same construction as switches 25 and 38 hereinbefore described and said switch can be of the normally open type, as illustrated in Fig. 5, or may be of the normally closed type as illustrated in Fig. 6. If a normally open type of switch is employed, the switch mechanism designated by numeral 64 in Fig. 5 is substantially the same as the switch mechanism illustrated at 54 in Fig. 6 except that terminal 56 instead of being connected to contact point 58 is connected to an arm 65 which carries a contact point 66. Except for this modification, switches 54 and 64 are identical.

In the use of the invention illustrated in Figs. 4, 5 and 6 said switch may be employed under substantially the same conditions as contemplated for switches 25 and 38, that is, the link 43 may be normally under compression or may be normally under tension. If the link 43 is normally under compression and a normally open switch is contained in the housing 46, such as switch 64, actuation of the link 43 will cause the plunger 48 to move outwardly with respect to the switch and hence the switch will return to its normal open position. If the normally closed switch illustrated in Fig. 6 is employed with a link 43 which is normally under tension, actuation of the link 43 will cause plunger 48 to move inwardly and thus move the switch from its normally closed position to open position. It can readily be seen that, as has been hereinbefore described in conjunction with switches 25 and 38, by the appropriate selection of switches, four different conditions of use may be accommodated. In all cases, spring 63 will not be sufficiently strong to overpower the spring which biases the linkage, nor will said switch spring be sufficiently strong to move the linkage against its load or against its frictional resistance.

It can readily be seen that the switch mechanisms hereinbefore described may be used in many environments. However, one use to which the present invention is ideally adapted is in conjunction with the throttle linkage of an automobile wherein actuation of the accelerator pedal of an automobile may function through actuation of the interposed switch to control an anticreep device which may be carried upon the automobile or may be used to control a signal light which may be carried by the vehicle.

In the event that it is desired to render the switch 25 or 38 inoperative a rigid link may be connected between pins 22 and 23 which will thus prevent relative movement of the link 14 with respect to the housing 15. Such a link is illustrated at 67 in Fig. 1 in phantom, the link 67 being pivotally connected intermediate its length on pin 23 and being provided with a notch 68 at its end which may engage in a projection of pin 22. When the switch is to be rendered operative the link 67 may be disengaged from pin 22 and swung to a position transverse to the boss 20.

The same arrangement (not shown) may be employed with the switches illustrated in Figs. 4, 5 and 6. However, in this case the rigid link will tie together pin 49

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and pin 50 thereby preventing relative movement of the link 43 relative to the housing 46.

I claim as my invention:

An electric switch member comprising a portion of a linkage which comprises, a link comprising a portion of the linkage, a housing rigidly secured to said link, a snap switch having a resiliently biased actuating arm carried in said housing, a second link comprising a portion of said linkage disposed in substantially axial alignment with said first-mentioned link, a plunger carried at an end of said second link, a sleeve carried by said housing for the slidable reception of said plunger whereby the end portion of said plunger may move through said sleeve, a pin and slot engagement between said sleeve and plunger limiting movement of said plunger through said sleeve in and out of said housing, the actuating arm of said

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switch being disposed in resilient contact with the end of said plunger whereby movement of said plunger in said sleeve relative to said housing controls movement of said actuating arm to actuate said switch.

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