

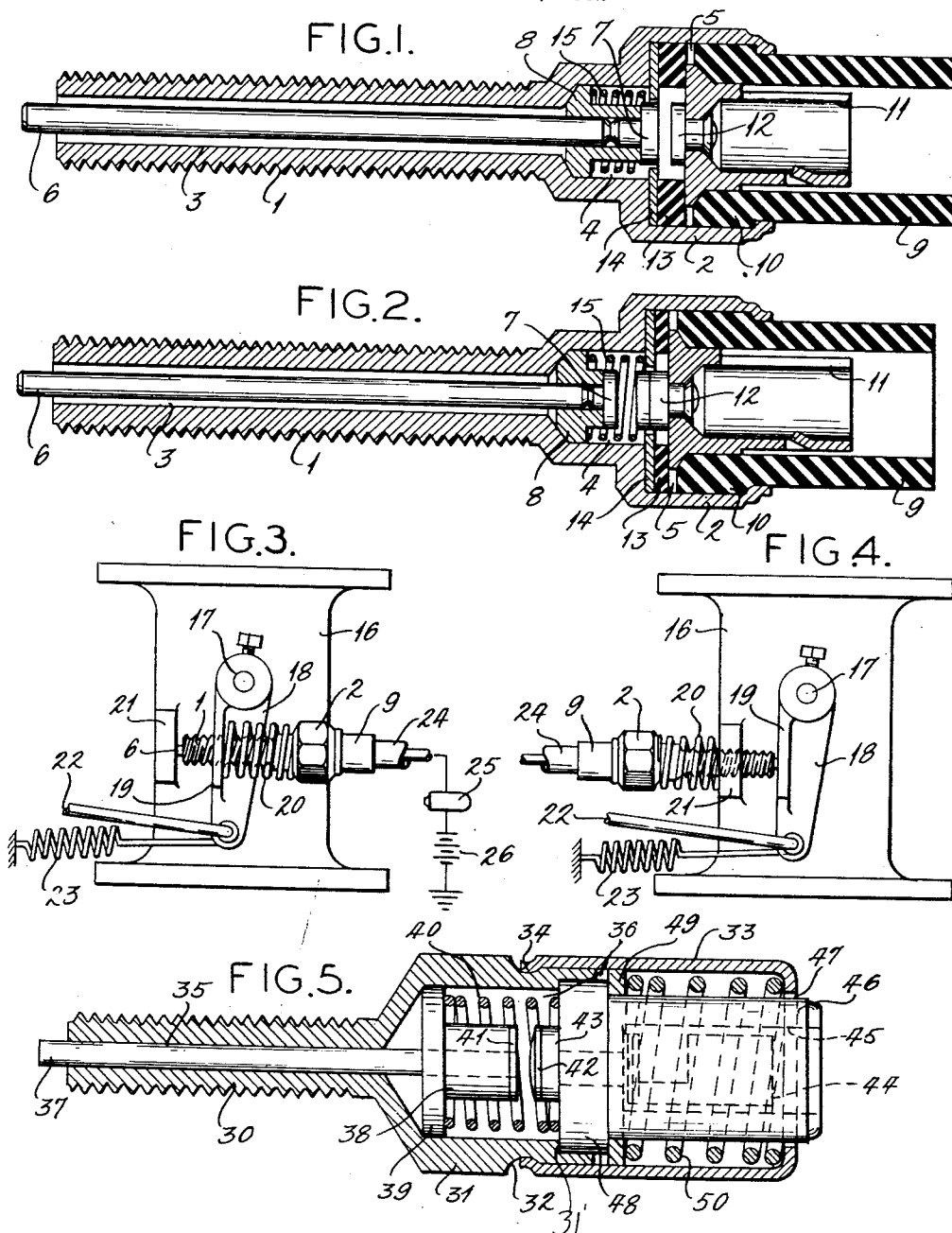
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OPERATOR CONTROLLED SWITCH FOR AUTOMOTIVE VEHICLES

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OPERATOR CONTROLLED SWITCH FOR
AUTOMOTIVE VEHICLES

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This invention relates to control devices for automotive vehicles and is more particularly directed to a switch operated in response to engine speed.

The object of the invention is to provide a switch for an automotive vehicle that is closed during the time the engine is idling, the switch closing a circuit for an electrical device operable during the time that the engine is idling.

Another object of the invention is to provide a manually operated switch for the throttle of an internal combustion engine wherein the switch operation will lag the throttle operation so that the engine speed will not be directly and immediately responsive to the operator.

In the drawings:

Fig. 1 is a longitudinal sectional view of a switch incorporating the invention,

Fig. 2 is a longitudinal sectional view of a modified form of switch.

Fig. 3 is an elevational view of a throttle valve showing the invention applied thereto.

Fig. 4 is an elevational view of a throttle valve showing a different mode of applying the invention thereto; and

Fig. 5 is a longitudinal cross sectional view of a modified switch construction incorporating the invention.

This application is a continuation in part of applicant's prior application Ser. No. 154,063 filed April 5, 1950, and entitled Speed Responsive Switch for Automotive Vehicles, now abandoned.

The invention is embodied in the structure illustrated in the several views of the drawings in which the numeral 1 designates a longitudinally extended casing having an enlargement 2 at one end thereof. The casing 1 is provided with a bore 3 connecting with differently diametered bores 4 and 5 in the enlargement. A rod 6 is received in bore 3, one end of which projects from casing 1, the other end engaging a movable electrical contact member 7 fitted into a plunger 8 that is slidably received in bore 4. The rod 6 snugly fits within the plunger 8 so that it can move along with the plunger.

A tube of insulating material 9 is received in the enlargement 2, the outer end of the enlargement being spun over a shoulder 10 on the tube 9 so that it is locked therein. A connector 11 is received in the bore of tube 9 and an electrical contact member 12 is secured in the connector 11. An insulating washer 13 and another washer 14 are positioned in the bore 5, thus holding the connector in position in the tube 9 and spacing the electrical contact member 12 from the electrical contact member 7.

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The rod 6 and the electrical contact member 7 are movable in bores 3 and 4, respectively, and a spring 15 located in bore 4 maintains plunger 8 in the left hand end of bore 4. The spring 15 abuts washer 14 so that the reaction of the spring is against the plunger 8.

Figs. 1 and 2 illustrate substantially similar constructions, differing only in the length of the plunger 8 so that in Fig. 1 the electrical contact member 7 has a greater length than the same member in Fig. 2. The electrical contact member 12 in the Fig. 2 disclosure projects beyond the washer 14 into bore 4. The washers 13 and 14 serve the same function in each device, although in the Fig. 1 disclosure the insulating washer 13 has a greater thickness than that of Fig. 2 disclosure.

The devices illustrated in Figs. 1 and 2 are employed in connection with the butterfly valve housing 16 of the carburetor system. The valve therein (not shown) is secured to a shaft 17 rotatably mounted in housing 16. A lever 18 is secured to shaft 17 and is provided with a boss 19. The casing 1 is provided with threads and is adjustably mounted in the boss. A locking spring 20 is interposed between the boss and the enlargement 2 of casing 1. The casing is threaded into the boss 19 a sufficient distance to enable the movable rod 6 to engage a lug 21 integral with the housing 16. A rod 22 is pivotally secured to the outer end of lever 18 and forms a part of the foot pedal operating mechanism for the butterfly valve. A spring 23 is secured to lever 18 and is also suitably anchored to the frame of the motor vehicle. This spring 23 rotates shaft 17 in a clockwise direction upon release of the foot pedal, as viewed in Fig. 3, so that the valve secured thereto is in closed position. The spring 23 will bring the electrical contact members 7 and 12 into engagement with each other, thereby closing an electrical circuit connected thereto. This circuit consists of an insulated conductor 24 suitably secured to the connector 11 in insulating tube 9. An electrically-operated device 25 is connected to the circuit along with a source of electrical energy 26. The terminals of the circuit are grounded, as is customary in the art. The device 25 is preferably a solenoid mechanism suitable for operating an anti-creep device, or it may be a signal or any other mechanism to be operated while the engine of the motor vehicle is idling.

Fig. 4 illustrates a different mode of operation of the device than that shown in the Fig. 3 disclosure. The casing 1 is threaded into lug 21 a sufficient distance so that the rod 6 may engage

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the boss 19. The locking spring 20 is interposed between enlargement 2 and lug 21. The operation of the Fig. 3 disclosure is the same as in the disclosure of Fig. 4.

The opening and closing of the switch illustrated in Figs. 1 and 2 is dependent upon the idling or the running speed condition of the engine. In certain types of automotive vehicles there is a tendency of the vehicle to creep during idling periods of the engine. In order to prevent this condition, mechanism is provided for holding the vehicle at rest. The operation of this mechanism is controlled by an electrically-operated device 25. When the operator of the vehicle releases the foot pedal for the butterfly valve, spring 23 will move the throttle valve to closed position, thereby idling the engine. When the valve is closed, rod 6 is in engagement with lug 21 (Fig. 3) or with the boss 19 (Fig. 4). The spring 23 has a strength greater than that of spring 15 so that electrical contact members 7 and 12 may be brought into engagement with each other, thereby closing the electrical circuit. Various other devices, as indicated above, may be substituted for the device 25 that is operative only during idling periods of the engine.

An important advantage of the use of this type of mechanism is that it replaces the idling adjustment screw currently used on carburetors. The switch mechanism performs the same function as the idling screw as well as controlling the circuit for the device 25.

Figure 5 discloses a modified form of the invention in which there is shown a casing member 30 having a threaded portion at its one end as shown in the figure and having an enlarged portion 31 at its other end. A circumferential groove 32 is formed in the outer surface of the enlargement 31 that serves as a means for securing a sleeve or cup-shaped closure 33 to the casing member 30 by staking the left-hand end of the closure into the groove 32 as more definitely shown at 34.

The casing member is provided with a small axial bore 35 in communication with a bore 36 in the enlargement 31. A switch actuating rod 37 is slidably mounted in the bore 35 and extends into the bore 36. The rod has secured thereto a contact holding member 38 the mode of securement being made by any well-known means. The contact supporting member has an enlarged portion 39 secured thereto which member is slidably received in the bore 36 and acts as an aligning or guide means for the contact supporting member 38. The enlarged portion 39 also provides an abutting surface for a spring 40 that normally biases the contact supporting member 38 to the position illustrated. An electrical contact 41 is mounted on the contact-supporting member 38. This contact is preferably made of silver stock or an alloy of silver and cooperates with the contact 42 mounted on contact-supporting member 43 and is axially aligned with the contact-supporting member 38 and the contact 41 thereon. The contact-supporting member 43 is electrically secured to a connector 44 received in a bore 45 in the insulator 46. The insulator is slidably received in the closure or sleeve 33 and extends through an opening 47 in the closure. A collar 48 is formed on the insulator 46 that forms an abutment for a washer 49, the collar abutting a shoulder 31' in the enlargement. A biasing spring 50 engages the washer and also engages the radially intumed end of the closure 33. The spring 50 has a greater strength or higher spring

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rate than the spring 40 and acts to normally hold the insulator 46 in position as well as the contact-supporting member 43 and the connector 44 in the position illustrated.

The operation of the switch illustrated in Figure 5 is best explained by assuming that the switch replaces the one illustrated in Figure 4 of the drawing secured to the throttle valve housing 16. The modified switch operates somewhat differently from the switch defined in the above structure in that it is less sensitive to initial or opening movements of the throttle under the control of the operator by means of the accelerator pedal not shown. The operation except for the initial stages thereof is substantially identical with that defined above.

The modified switch is threaded into the lug 21 integrally associated with the valve housing 16. A conductor similar to 24 is inserted into the connector 44 and is secured thereto by any of the methods well-known to the art. The lever 18 (Fig. 4) which is actuated by the accelerator pedal through linkage rod 22 is shown in position wherein the spring 23 maintains the lever in such position whenever the accelerator pedal is in the released position and is depressed by the operator. In the released position the lever 18 exerts a force on the rod 37 (Fig. 5) to move the rod inwardly of casing 30 compressing the spring 40 and placing the contacts 41 and 42 in engagement with each other, thereby completing the electrical circuit at this point. The switch is so positioned with respect to the lever 18 (Fig. 4) in its released position as to permit the lever to force the rod 37 to the left a sufficient amount to compress the slightly stronger spring 50 while still maintaining electrical contact between the contacts 41 and 42. At this stage in the operation of the device the operator may rest his foot upon the accelerator pedal and may even depress the pedal slightly without breaking the connection between the contacts 41 and 42. Assuming that the operator does permit a slight leftward movement to the rod 22 (Fig. 4) the lever 18 will be pivoted slightly to the left in accordance with the movement of the rod 22 thus permitting the rod 37 to also move toward the left. In this instance a slight leftward movement of the rod 37 will permit a similar movement of the internal parts of the switch by reason of the action of the spring 50 while still maintaining electrical connection between contacts 41 and 42. The engagement between these contacts will be maintained as long as the rod 37 does not continue to move leftwardly after the insulator 46 and the contact-supporting member 43 carried thereby have reached the original position illustrated. Relative movement of the rod 37 with respect to the contact supporting member 43 will open the circuit by breaking the connection between the contacts 41 and 42.

If it is the intention of the operator to break the connection between the contacts it follows that it is a natural reaction to depress the accelerator pedal a substantial amount to accelerate the vehicle which depression would be more than sufficient to yield the leftward movement of the rod 37 that would result in breaking the connection between the contacts 41 and 42.

What I claim is:

1. A manually operated throttle switch comprising a casing member having a bore and counterbore therein, an electrical insulating member held in one end of the bore, a connector in said electrical insulating member, a sleeve

fitted over said electrical insulating member and secured to said casing member, a throttle contacting element slidable in said counterbore, a switch contact secured to said element and slidable in said bore, a switch contact connected to said connector and secured to said insulating member; a spring for normally holding said contacts out of engagement; and a second spring stronger than the first mentioned spring for holding said insulating member in said bore and opposing the motion of the slidable element.

2. A manually actuated throttle switch comprising a casing member having a bore provided with a shoulder and counterbore therein, a throttle lever contacting element slidable in said counterbore, a head slidable in said bore and secured to said element, an insulating member having a connector therein and abutting the shoulder in said bore, a sleeve surrounding said insulating member and secured to said casing member, an electrical contact mounted on said head, a complementary contact carried by said insulating member and connected to said connector; a spring opposing sliding of said lever contacting element for holding the contacts out of engagement; and a second spring stronger than the first mentioned spring positioned to bear on said insulating member and said sleeve for resisting movement of said insulating member by said lever contacting element.

3. An automotive vehicle operator responsive switch comprising a casing having an enlarged bore adjacent one end, a switch actuating rod extending through said casing from the opposite end thereof, a first contact element connected with said rod for movement in said enlarged bore, a member movable in said enlarged bore, a second contact on said member facing said first contact, said member being formed of dielectric material, spring means urging said contacts apart, and other spring means normally fixing the position of said member in said enlarged bore, but yielding said normally fixed position

of said member to the continued travel of said rod beyond the point of contacting of said first and second contacts to complete a circuit, continued travel of said rod maintaining the circuit and causing yielding movement of said members in said enlarged bore.

4. An automotive vehicle operator responsive throttle switch comprising a casing having a bore, a pair of contact elements in said bore, a member slidable in said bore and supporting one of said contact elements, a guide in said bore supporting the other contact element, a spring in said bore normally holding said member and guide apart to maintain said contact elements separated, a switch actuating rod slidable in said casing with one end exposed to an external control force and the opposite end connected with said guide to move the latter for bringing said contact elements together against the force of said spring, and other spring means bearing upon said slidable member to retain said contact elements in contact and yield to over travel of said switch actuating rod, whereby said guide and slidable member move as a unit with said switch actuating rod, and said contact elements remain in contact.

5. The automotive vehicle operator responsive switch set forth in claim 4, wherein said member is formed of insulator material and a circuit connector is disposed therein free of contact with said casing and electrically connected with the contact element supported by said member.

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