Nov. 25, 1941. J. H. GLASHAN 2,264,024

VACUUM CONTROLLED CAUTION SIGNAL FOR AUTOMOBILES

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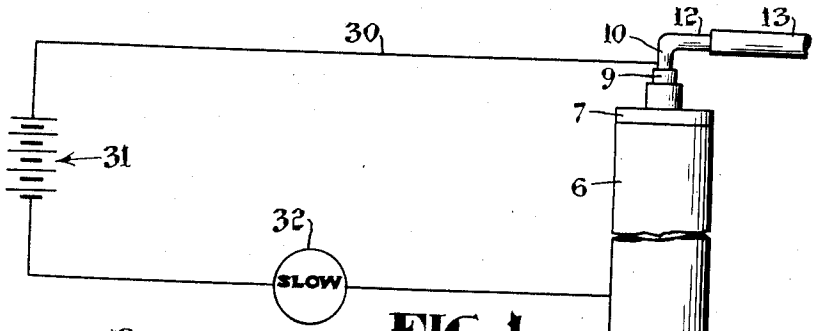


FIG. 1

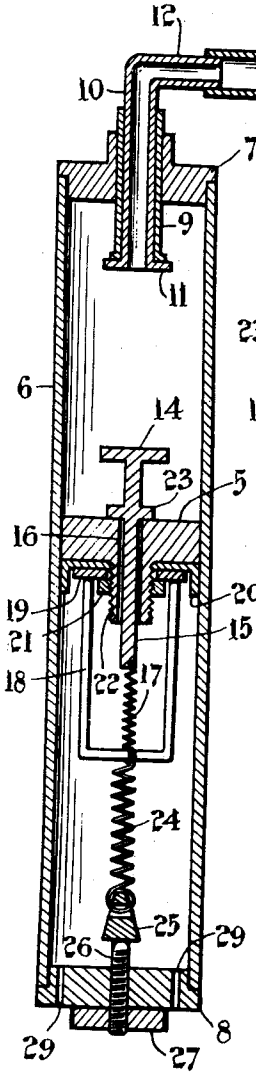


FIG. 2

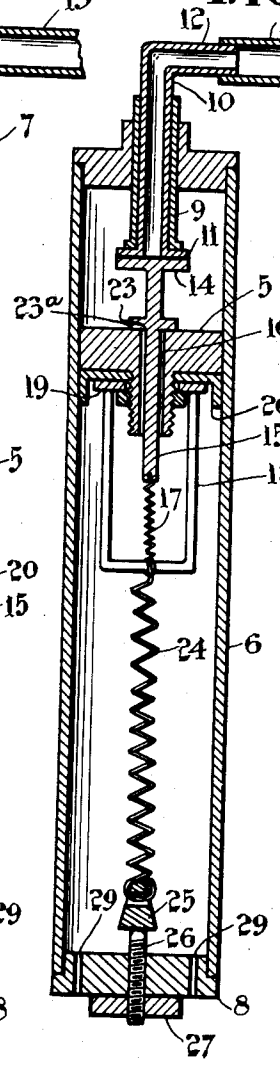


FIG. 3

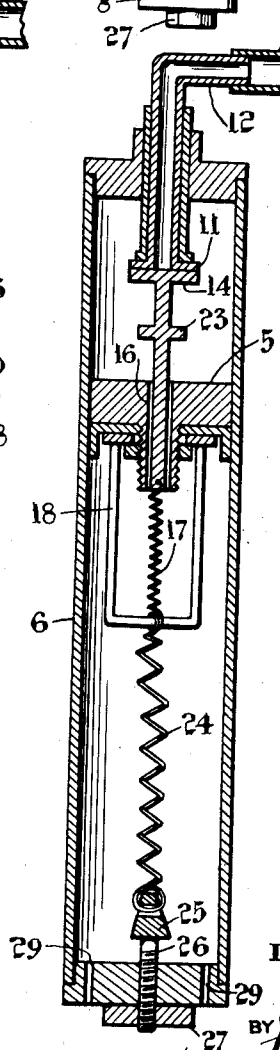


FIG. 4

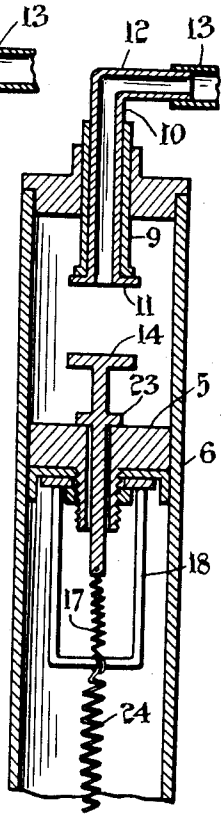


FIG. 5

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VACUUM CONTROLLED CAUTION SIGNAL FOR AUTOMOBILES

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3 Claims. (Cl. 200—82)

This invention relates to an improved vacuum operated switch mechanism for actuating a warning signal on an automobile.

When an automobile is operating in traffic or is approaching an intersection at ordinary running speeds, it is frequently necessary for the operator to slow down the automobile by removing his foot from the accelerator pedal and permitting the throttle to close. This enables the operator to take advantage of the braking effect obtained when the engine is running on compression. It also causes an increase of the suction created in the intake manifold of the engine.

The present invention is designed to take advantage of the operating conditions existing when the engine is running on compression. It consists in the provision of a vacuum operated switch which is connected to the engine intake manifold so that the switch is repeatedly closed and opened by the increased suction created in the manifold when the accelerator pedal is suddenly released, the repeated opening and closing of said switch being utilized to effect repeated operation of a warning signal during the period that the suction in the intake manifold is above a predetermined value. In the preferred embodiment of the invention, the warning signal comprises a signal lamp which is connected in circuit with the switch and a suitable source of current so that the lamp is energized and deenergized as the switch is repeatedly closed and opened by the suction in the manifold. It will be understood, however, that the signal lamp may be replaced by any suitable form of electro-responsive mechanical signal capable of being operated in response to opening and closing of the vacuum operated switch.

Proceeding now to a more detailed description of this invention reference will be had to the accompanying drawing, in which—

Fig. 1 is a diagrammatic view showing the manner in which the vacuum operated switch is connected in circuit with the warning signal and the source of current.

Fig. 2 is a central longitudinal sectional view of the switch with the component parts thereof arranged in open circuit position.

Fig. 3 is a view similar to Fig. 2 but showing the component parts of the switch in a circuit closing position, and

Figs. 4 and 5 are views similar to Figs. 2 and 3 but showing the component parts of the switch in different positions.

As shown in the drawing my improved switch comprises a piston 5 working in a cylinder 6 provided with removable end heads 7 and 8. The head 7 is provided with a central opening in which is fitted a bushing 9 made of insulating material. A metal tube 10 extends downwardly through said bushing and is held against movement relative thereto. The lower end of the tube 10 is enlarged or flanged outwardly to form a stationary contact disc 11. The upper end of the metal tube is provided with a lateral extension 12 which is connected, by tubing 13, or in any other suitable manner, to the intake manifold (not shown) of an automatic engine. The stationary contact disc 11 is engaged, at times, by a movable contact disc 14 provided with a stem 15 which extends loosely through a central opening 16 of the piston 5. The lower end of stem 15 is connected, by a spring 17, to the bight portion of a U-shaped member 18 the side arms of which are fastened to a metal washer 19 which, in turn, is clamped against the piston washer 20 by means of the clamping nut 21 which is threaded onto a tubular extension 22 of the piston 5. The stem 15 of contact 14 is provided with an enlargement 23 which serves as a stop which bears against the piston 5 when the parts of the switch are arranged as shown in Figs. 2, 3 and 5.

A spring 24, which is stronger than the spring 17, is connected between the bight portion of the U-shaped member 18 and a spring tension adjusting member 25. The member 25 is provided with a threaded shank 26 which extends slidably through a central opening of the cylinder head 8 and is fitted with an adjusting nut 27. Obviously, by turning the nut 27 the spring adjusting member 25 may be moved toward or away from the cylinder head 8 to vary the initial tension of the spring 24. It may be noted here that the movable contact 14 is grounded through spring 17, U-shaped member 18, spring 24, member 25 and nut 27 to the cylinder 6. Contact 14 is also grounded to the cylinder 6 through the valve enlargement 23 of stem 15 and the metal piston 5. On the other hand, the stationary contact 11 is completely insulated from the cylinder head 7 by means of the insulating bushing 9.

As shown in Fig. 1, the metal tube 10 of the stationary contact 11 is connected, by conductor 30, to one terminal of a battery 31 or other suitable source of current, the remaining terminal of which is connected, through signal lamp 32, to the cylinder 6. It is thus obvious that the signal lamp 32 is energized whenever the movable switch contact 14 is engaged with the stationary switch

contact 11 and is deenergized when these contacts are separated.

When the automobile to which my invention is applied is running at ordinary operating speeds, the suction created in the engine manifold is insufficient to close the switch. When, however, the operator removes his foot from the accelerator the increased suction created in the manifold acts, through the flexible tubing 13 and the metal contact tube 10, to move the piston 5 and the movable contact 14 from the circuit opening position shown in Fig. 2 to the circuit closing position shown in Fig. 3. The movable contact 14 is thus brought into engagement with the stationary contact 11 and the spring 24 is stressed to a considerable degree. No relative movement takes place between the piston 5 and the contact 14 as these parts travel from the position shown in Fig. 2 to the position shown in Fig. 3. In this connection it will be understood that the suction or vacuum created in the upper end of the cylinder acts mainly on the upper surface of the piston 5 owing to the fact that the area of said surface is considerably greater than the area of the movable contact 14. When the movable contact 14 reaches the position shown in Fig. 3, it closes off the lower end of the bore or passage of tube 10 and thus disrupts the connection between the switch cylinder and the intake manifold. When this occurs the vacuum in the portion of the piston above the cylinder is relieved by reason of the fact that a certain amount of air entering the lower portion of the cylinder through the air vents 29 passes through the piston opening 16 and groove 23*a* of stop 23 into the portion of the cylinder above the piston and this permits the spring 24 to effect a return movement of the piston 5 from the position shown in Fig. 3 to approximately the position shown in Fig. 4. During this travel from the position shown in Fig. 3 to the position shown in Fig. 4 the piston 5 moves downwardly independently of the contact 14 which is still held to the contact 11 by the suction acting through the bore or passageway of the metal tube 10. When, however, the piston 5 reaches the position shown in Fig. 4 the spring 17 is stretched to such an extent that it exerts a downward pull on the contact 14 which is sufficient to return said contact to its initial position with respect to piston 5 as shown to advantage in Fig. 5. As soon as the contact 14 is snapped back from the position shown in Fig. 4 to the position shown in Fig. 5 the suction through tube 10 causes the piston 5 and the contact 14 to immediately return to the circuit closing position shown in Fig. 3. This alternate opening and closing of the switch continues until the automobile has slowed down to the point where the suction in the manifold drops below the value required to operate the switch. From this it will be seen that the switch acts as a flasher switch since it causes the the warning signal to be energized and deenergized a number of times immediately following the releasement of the accelerator pedal.

The leakage of air upwardly past the piston 5 when the parts are in the position shown in Fig. 2 breaks the vacuum in the upper portion of the cylinder sufficiently to enable the spring 24 to start the downward movement of the piston. As soon as the piston has made a slight downward movement the upper end of the central opening of the piston is uncovered and permits a greater volume of air to rush into the upper portion of the cylinder to facilitate further downward movement of the piston by the spring 24.

Having thus described what I now consider to be the preferred embodiment of this invention it will be understood that various modifications may be resorted to within the scope and spirit of the invention as defined by the appended claims.

Having thus described my invention, what I claim is:

1. A vacuum operated switch of the character described comprising a cylinder, a piston operating therein, a spring normally arranged to urge said piston in a switch opening direction, a tube through which suction is applied to move the piston in a switch closing direction against the resistance of said spring, a travelling contact carried by said piston and a stationary contact against which the travelling contact is moved when suction is applied to move the piston against the action of said spring, means whereby the application of suction through said tube is discontinued when the contacts of the switch are brought into engagement with each other and means for supplying air to said cylinder to break the vacuum previously created therein by the suction applying means so that said spring thereupon becomes effective to return the piston and piston carried contact to a circuit-opening position.

2. A switch as set forth in claim 1, in which, following the breaking of the vacuum in the cylinder and the return of the piston to a circuit-opening position, the vacuum is immediately reestablished in the cylinder to effect a further movement of the piston to a circuit-closing position.

3. A vacuum operated switch of the character described comprising a cylinder, a tube extending into said cylinder through one end thereof, a stationary contact positioned at the inner end of the tube and insulated from said cylinder, means for connecting the outer end of the tube to the intake manifold of an engine, a piston working in said cylinder, a spring connected between the piston and the end of the cylinder remote from said tube, a movable contact slidably arranged in an opening in said piston and a spring connection between said movable contact and said piston, the arrangement being such that the suction in the engine manifold acts through said tube to move the piston in the direction of the tube until the movable contact is brought into engagement with the stationary contact, said movable contact then serving to block the inner end of the bore or passage of said tube and to thereby disrupt communication between the cylinder and the engine manifold so that the first mentioned spring becomes effective to move the piston in a switch opening direction, the movable contact remaining stationary until the spring connection between this contact and the piston is sufficient to overcome the suction acting to hold the movable contact engaged with the stationary contact.

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