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Remaud

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[54] **CARBURETOR CONTROL SAFETY**

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[51] **Int. Cl.** **F02b 77/00**

[58] **Field of Search** ..... 123/198 D, 198 DB, 198 R

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[57] **ABSTRACT**

Safety device for controlling a carburetor, of the type comprising means for detecting the pressure exerted by the driver's foot on the accelerator pedal and means for controlling the carburetor throttle valve, wherein a first two-armed and pivoted lever has one arm connected at one end to a control cable sliding in a sheath provided with a fixed stop at one end and with a movable stop at the opposite end, said movable stop being constantly urged towards the carburetor by an auxiliary spring, against the retaining action of a member adapted to be released automatically by means sensing a possible jamming of said first lever, when no pressure is exerted on said pedal, said movable stop being then moved towards the throttle valve which can rotate towards its idling position under the combined action of its spiral spring and of a main return spring. This safety device is applicable more particularly to carburetor of internal combustion engines, notably of automobiles.

10 Claims, 2 Drawing Figures

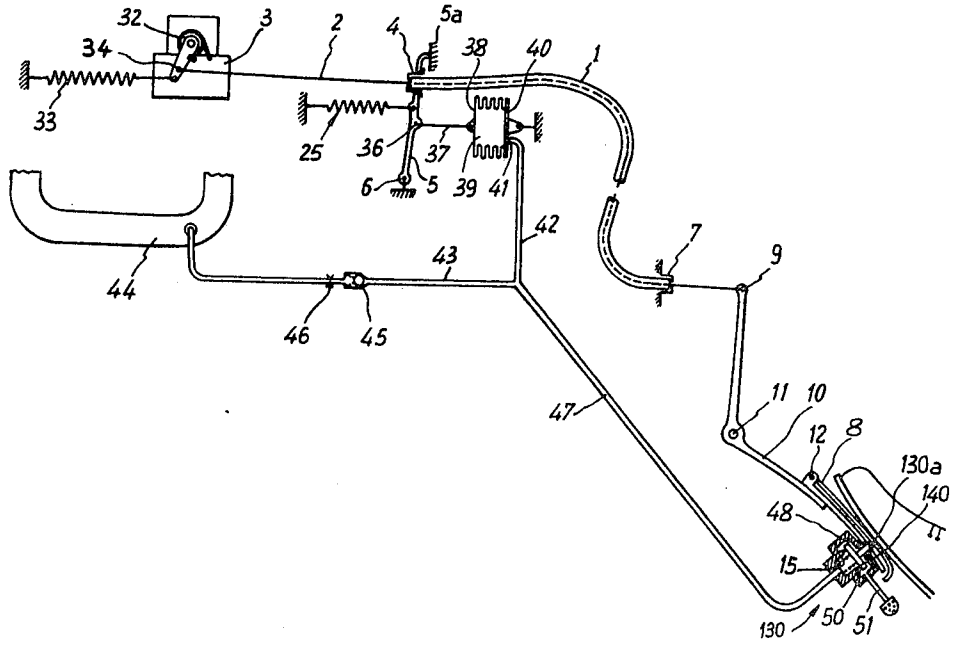

Fig.1

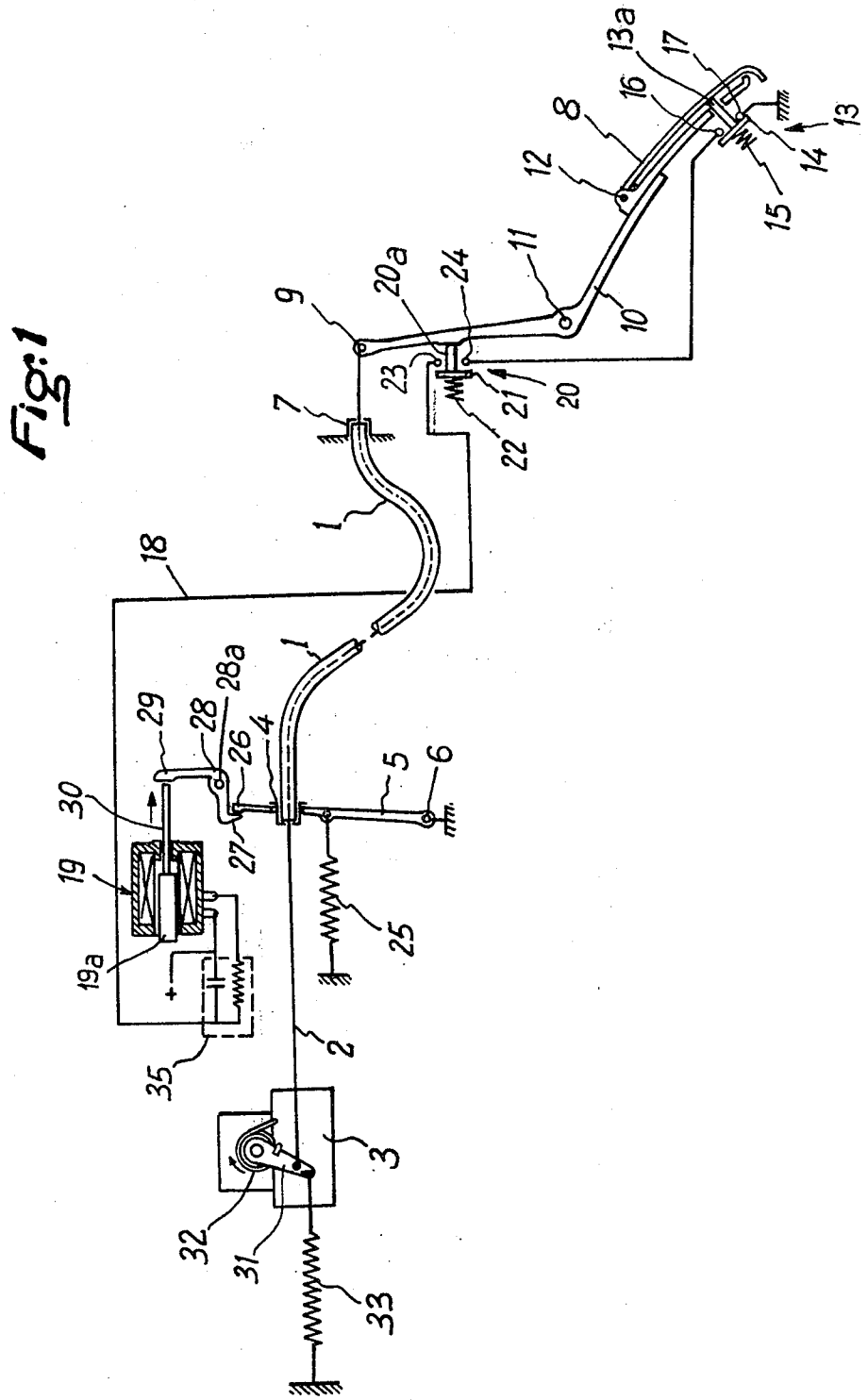
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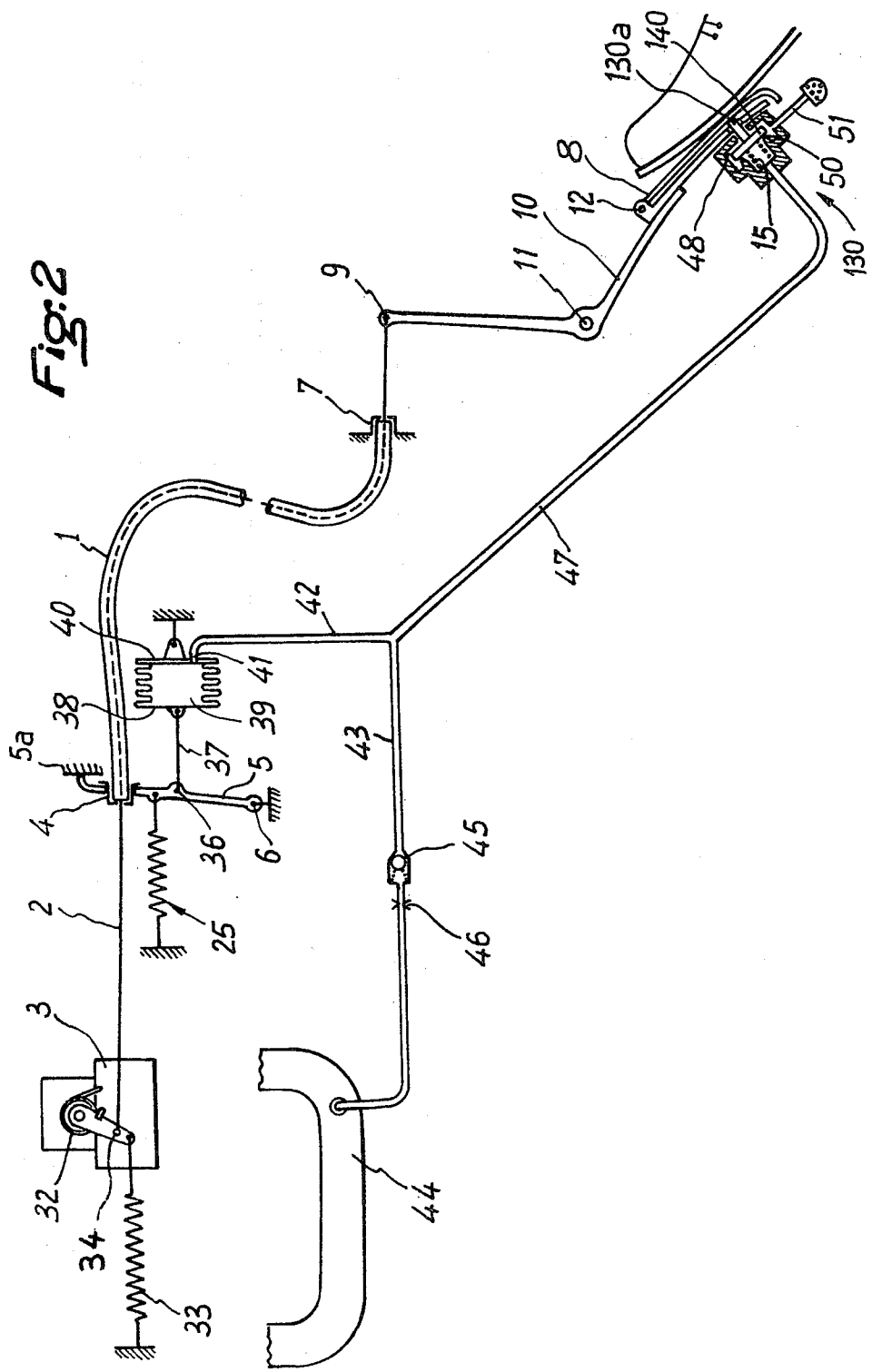
Fig. 2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CARBURETOR CONTROL SAFETY

The present invention relates to a safety device becoming operative in case the control member of a carburettor becomes locked in the engine acceleration position, for restoring the engine to its idling condition or stopping the engine completely.

Devices of this general type are already known which comprise sensing means responsive to the pressure exerted on the accelerator pedal and other means for controlling the carburetor and thus restore the idling speed of the engine when said pressure is discontinued.

These known devices mounted between the accelerator and the carburetor are responsive to electric or electromagnetic means, although hydraulic or pneumatic means are also utilized therefor, but their common inconvenience is that they tend to operate untimely, notably when the accelerator pedal is suddenly released by the driver.

It is the primary object of the present invention to avoid this inconvenience by providing a device comprising a twoarmed fulcrumed lever having a first arm operatively connected to one end of a control cable movable in a sheath comprising a fixed stop and a movable stop urged towards the carburetor by an auxiliary spring against a retaining device the action of which is neutralized automatically by means adapted to sense a possible locking or jamming of said lever when no pressure is exerted on the accelerator pedal, whereby the control cable moves towards the throttle control lever which can rotate to the idling position under the combined action of a spiral spring and of a main spring.

According to a preferred form of embodiment the safety device of the present invention is further characterised by the following features:

its pressure sensor comprises a pair of switches, namely a first switch associated with the accelerator pedal and adapted to close the circuit under the force of a return spring against the pressure exerted on said pedal, and a second switch carried by the first arm of a two-armed lever fulcrumed to a pivot point and having its other arm rigid with said pedal, said second switch being adapted to close the circuit under the force of a return spring against the action exerted by the first lever arm; its throttle-opening device comprises a lever controlling the throttle rotation under the antagonistic action of a spiral spring and a control cable connected to the free end of the lever arm and passing through a sheath attached with one end to a fixed stop and with the other end to a movable stop rigid with a lever urged towards the carburetor by a spring, said lever being pivotally mounted at one end to one point and having its opposite end adapted to be locked by the end of a lever having its other end adapted to be rotated for releasing said lever through the movement of a push-member responsive to an electromagnet.

the electromagnet energizing circuit adapted to be closed under the combined action of switch means comprises a delay action device providing a retard response of the order of 0.6 second.

According to another advantageous form of embodiment of this invention the safety device is further characterised by the following features:

its pressure sensing means comprise a small valve having a valve chamber connected to the surrounding atmosphere through a conduit and disposed under the accelerator pedal, said valve being adapted to close the inlet port of said body which is connected to a conduit under the influence of a pressure exerted on said pedal against the force of a return spring; the throttle opening device comprises a lever fulcrumed at an intermediate point and secured to the pedal at one end while its opposite end is connected to a cable extending through a sheath comprising a fixed stop and a movable stop rigid with another lever fulcrumed at one end urged at one end at an intermediate point by a spring against the action of a cable attached to the movable end wall of a pressure-responsive bellows having in its opposite fixed end wall an inlet port connected to a conduit opening in turn into another conduit and also into the conduit connected to the induction manifold or pipe of the engine, said cable being connected to the lever tending to rotate the throttle to its idling position by the force of a spiral spring and a main spring:

at the outlet end of the induction manifold or pipe a conduit comprising in series a jet and a non-return valve is provided.

The invention will now be described more in detail with reference to the accompanying drawings illustrating diagramatically the two forms of embodiment thereof broadly set forth hereinabove. In the drawings:

FIG. 1 illustrates the control circuit connecting the acceleration pedal to the carburetor and comprising a cable sheath stop responsive to an electromagnet; and

FIG. 2 is a similar view wherein the cable sheath stop is responsive to a pneumatic capsule or bellows.

In the form of embodiment illustrated in FIG. 1 the sheath 1 in which the cable 2 is slidably mounted is attached near the carburetor 3 to a first stop 4 hereinafter referred to as the movable sheath stop, which is rigid with one arm 5 of a lever fulcrumed to a pivot pin 6. At its opposite end the sheath 1 is attached to a fixed stop 7 adjacent the accelerator pedal 8. The cable 2 is attached by one end to the end 9 of a two-armed lever 10 fulcrumed at 11. The accelerator pedal 8 fulcrumed at 12 comprises at its lower portion a switch 13 having a push member 13*a* rigid with a contact-making disc 14 urged by a spring 15 towards a pair of contact studs 16 and 17 inserted in a conductor 18 connected at one end to the ground and at the other end to the negative terminal of the coil of an electromagnet 19. Another switch 20 responsive to the upper portion of lever 10 has the disc 21 of its push member 20*a* urged by a spring 22 towards the contact studs 23 and 24. The lever 5 is attracted towards the carburetor 3 by an auxiliary or additional spring 25 and its end 26 is adapted to be retained by the end 27 of the arm of lever 28 fulcrumed at 28*a* and responsive to a push member 30. The wire 18 is adapted to energize the electromagnet 19 having its positive terminal connected to the + terminal of a battery, and in its gap a core 19*a* rigid with said push member 30. The butterfly throttle (not shown) of the carburetor 3 is connected to a lever 31 urged by a spiral spring 32 and a main spring 33 for rotation in the clockwise direction towards its idling position. The cable 2 has its other end attached to the end of lever 31. A delay-action relay 35 is inserted in the circuit of wire 18 before the junction of this wire with the electromagnet 19.

In this first form of embodiment of the invention the safety feature consists in releasing the movable stop 4 of sheath 1 whereby the sheath and cable assembly 1, 2 is restored to the left, as seen in the figure, by the

main spring 33 and the additional spring 25 attached to the movable stop 4 (as in case of jamming of the cable 2 in its sheath 1 or in case of jamming of the pivotal mounting of the accelerator pedal proper). This leftward movement of the sheath and cable assembly provides a stroke sufficient for restoring the carburetor throttle to its idling position.

The light spiral spring 32 associated with the shaft of the carburettor throttle valve is sufficient for restoring the latter to its closed or idling position in case of breakage of the cable 2 or the main spring 33.

A faulty operation is detected by the selective pedal 8 provided with a switch 13 adapted to open its contact immediately when the driver's foot actuates the pedal. The other switch 20 is a limit switch preventing any actuation of the safety device when the engine is idling, without exerting any action on said selective pedal 8.

The above-described safety device operates as follows:

Under normal operating conditions the pressure exerted by the driver's foot on the accelerator pedal 8 keeps the switch 13 open, thus preventing the operation of the safety device.

In case of breakage of the cable 2 or main spring 33, or simply in case of jamming of the cable 2 in its sheath 1, or of the pedal pivot pin 11, or any other jamming occurring in the transmission, the pedal 8 is not returned to its normal release position. When the driver removes his foot from the pedal 8, switch closes the contact 14, 16 and 17, whereby current flows through the contacts 21, 23 and 24 of the then closed other switch 20, thus energizing the electromagnet 19.

The core 19*a*, by means of its push member 30, rotates the cranked lever 28 in the clockwise direction to release the arm 5, so that this arm 5 is urged to the left by its additional spring 25, assisted or not by the main spring 33, this movement being followed by the sheath and cable assembly 1, 2, so that the carburetor throttle valve can be closed by the spiral spring 32 (assisted or not by the main spring 33).

When the engine is idling and the pedal 8 is depressed, switch 13 is closed but the limit switch 20 is open (as shown in FIG. 1) and the safety device cannot be released.

The function of relay 35 is to provide a retard of the order of 0.6 second to avoid any untimely or undesired operation of the device as may be caused by a sudden release of the accelerator pedal.

After a release operated by the energization of a plunger-core type electromagnet, the device must be reset.

The main spring 33 is sufficient for returning the pedal 8 by causing the cable 2 to slide in its sheath 1, and constitutes the normal control member of a carburetor

In case of breakage of the additional spring 25, the main spring is sufficient for returning the complete assembly (comprising lever 5 and throttle control lever 31) to the idling position.

The spiral spring 32 is sufficient for restoring the carburetor throttle valve to its idling position in case of untimely operation of the device as a consequence of the breakage of the main spring 33; the spiral spring 32 is not strong enough to restore the pedal 8 by causing the cable 2 to slide in its sheath 1, but when the cable and sheath assembly has been released, the force of spring 32 is sufficient for restoring the carburetor throttle valve to its idling position.

In the modified form of embodiment of the device illustrated in FIG. 2 the same or similar elements as those illustrated in FIG. 1 are designated by the same reference numerals.

The lever 5 is connected at 36 via a small cable 37 to the movable end wall 38 of a pressure-responsive capsule or bellows 39 having formed in its fixed end wall 40 a port 41 connected to one end of a conduit 42 having its other end connected to the induction manifold 44 of the engine (not shown). More particularly, this conduit 42 is connected to a branch conduit 43 leading to the induction manifold 44 and having inserted therein a non-return valve 45 and a jet 46. Another branch section 47 of conduit 43 leads into a valve chamber or hollow body 48 of a small valve 130 having its valve member 140 adapted, when depressed by the accelerator pedal 8 through the valve stem or push-rod 130*a*, to engage its seat 50, thus closing the port normally connecting the valve chamber 48 to the surrounding atmosphere via a pipe 51. The vacuum thus created in the capsule or bellows 39 will urge the lever 5 with force against a bearing surface or stop 5*a*.

When the driver releases the pedal 8, the valve 140 urged by spring 15 moves away from its seat 50 and opens the branch section 47, thus connecting this section to the external atmosphere via pipe 51. If, for any reason, the lever 10 fails to resume its inoperative position so that the cables 2 remains tensioned, the venting of the capsule 39 to the atmosphere prevents the movement of lever 5 under the force of auxiliary spring 25 and therefore the movement of stop 4 and cable 2 towards the carburetor 3, thus causing the rotation of the butterfly or throttle valve, due to the combined action of spiral spring 32 and main spring 33, to its idling position.

Under normal driving conditions, when the driver releases the accelerator pedal 8 the lever 10 resumes its inoperative position in which the cable 2 is not retained, so that the throttle valve can rotate towards its idling position.

When the driver depresses the pedal 8, the cable 2 opens the throttle valve, the small valve 130 is closed and due to the suction prevailing in the induction manifold 44*a* vacuum is created in the capsule 39, so that its volume is reduced and the lever 5 is pulled by the cable 37. The safety device is again ready to operate as such, i.e. in case the cable 2 remained jammed or locked after the accelerator pedal 8 has been released.

A throttling device or jet 46 is provided for limiting the air flow when the valve 140 associated with the pedal 8 is open. A fluid-tight non-return valve 45 enables the vacuum created in the capsule 39 to preserve a sufficient value, for example when driving on relatively long distance at high speed, for instance on motorways.

Of course, the delay action is provided by the loss of pressure produced in the piping.

This device is more economical than the preceding one (FIG. 1) and does not require any resetting.

Although two specific forms of embodiment of this invention have been described hereinabove and illustrated in the accompanying drawings, it will readily occur to those skilled in the art that various modifications and changes may be brought thereto without de-

parting from the scope of the invention as set forth in the appended claims.

What is claimed is:

1. In a vehicle having an internal combustion engine, an accelerator pedal, a carburetor having a throttle valve, and means for controlling the throttle valve of the carburetor, a safety device for the control linkage of the carburetor comprising:

means for biasing said means for controlling the throttle valve of the carburetor to an engine idling position,

a lever pivotable about an axis, said lever having a first arm,

a fixed stop and a movable stop,

a sheath, one end portion of said sheath being attached to said movable stop and the other end portion of said sheath being attached to said fixed stop,

a control cable movable in said sheath, one end portion of said cable being connected to said first arm and the other end portion of said cable being connected to said means for controlling the throttle valve of the carburetor,

means for sensing the jamming of said cable in said sheath and the jamming of the pivotable movement of said lever when no pressure is exerted on the accelerator pedal,

a releasable retaining member for releasably holding said movable stop against movement toward the carburetor, the holding action of said retaining member being releasable automatically by said means for sensing when it senses the jamming of the cable in the sheath or the jamming of the pivotable movement of said lever when no pressure is exerted on the accelerator pedal and,

means for biasing said movable stop toward the carburetor against the holding action of said retaining member so that when said sensing means senses the jamming of said cable in said sheath or the jamming of the pivotable movement of said lever when no pressure is exerted on the accelerator pedal said releasable retaining member releases its holding action on said movable stop and said means for biasing said movable stop toward the carburetor moves said movable stop theretoward and said means for biasing said means for controlling the throttle valve of the carburetor to an engine idling position moves said controlling means to its engine idling position.

2. A safety device as claimed in claim 1 wherein:

said means for biasing said movable stop toward the carburetor against the holding action of said retaining member comprises a spring.

3. In a vehicle as claimed in claim 1 wherein:

said means for controlling the throttle valve of the carburetor comprises a throttle lever pivotable about a pivot axis, and

said means for biasing said means for controlling the throttle valve of the carburetor to an engine idling position comprises:

a first spring connected to one end portion of said throttle lever, and

a second spiral spring wound about said pivot axis.

4. A safety device as claimed in claim 1 further comprising:

a second lever pivotable about an axis, said movable stop being rigidly connected to said second lever, and said releasable retaining member releasably holds said second lever and thereby releasably holds said movable stop which is rigidly connected to said second lever.

5. A safety device as claimed in claim 1 wherein:

said sensing means comprises a first switch and a second switch,

said first switch being associated with the accelerator pedal,

means for biasing said first switch into its closed position against pressure exerted on said accelerator pedal,

said second switch being actuable by said first arm,

means for biasing said second switch into its closed position against force exerted thereon by said first arm,

an electromagnet having a core movable upon energization of said electromagnet, said electromagnet being energized when said first and second switches are closed,

a control rod rigidly connected to said core so as to be movable therewith,

said lever having a second arm rigidly connected to said accelerator pedal,

said releasable retaining member comprising:

a retaining lever pivotable about an axis, one end portion of said retaining lever being movable by said control rod for pivoting said retaining lever about its said axis and the other end portion of said retaining lever being adapted to releasably hold said movable stop against movement toward the carburetor so that when said sensing means senses the jamming of said cable in said sheath or the jamming of the pivotable movement of said lever when no pressure is exerted on the accelerator pedal said first switch and second switch are biased by their respective said biasing means into their closed position, the electromagnet is energized, and the core thereof and the control rod move and said control rod moves said one end portion of said retaining lever and pivots it about its said axis and the other end portion of said retaining lever releases its holding action on said movable stop and said means for biasing said movable stop toward the carburetor moves said movable stop theretoward and said means for biasing said means for controlling the throttle valve of the carburetor to an engine idling position moves said controlling means to its engine idling position.

6. A safety device as claimed in claim 5 wherein:

said means for biasing said first switch into its closed position comprises a spring, and

said means for biasing said second switch into its closed position comprises a spring.

7. A safety device as claimed in claim 6 wherein:

a delay-action device is connected to said electromagnet, said delay action device being adapted to delay the operation of the safety device for a time of the order of 0.6 second so as to avoid any untimely or undesired operation of the safety device which may be caused by a sudden release of the accelerator pedal.

8. A safety device as claimed in claim 1 wherein:

said sensing means comprises a valve positioned beneath the accelerator pedal, said valve having a chamber vented to atmosphere in an open position thereof,

means for biasing said valve into its open position,

said releasable retaining member comprising a pressure-responsive capsule having a fixed end wall and a movable end, said movable end wall being connected by connecting means to said means for biasing said movable stop toward the carburetor, a port in said fixed end wall, said port being fluidly communicable with said valve chamber and an induction manifold of the engine so that when said valve senses the jamming of said cable in said sheath or the jamming of the pivotable movement of said lever when no pressure is exerted on the accelerator pedal said valve is biased to its open position by its said biasing means and the atmospheric pressure in said valve chamber is fluidly communicated with said pressure-responsive capsule through the port in said fixed end wall and said means for biasing said movable stop toward the carburetor moves said movable stop toward the carburetor and said means for biasing said means for controlling the throttle valve of the carburetor to an engine idling position moves said controlling means to its engine idling position.

9. A safety device as claimed in claim **8** wherein:

said means for biasing said valve into its open position comprises a spring,

said valve chamber has a port therein, and said valve chamber is vented to atmosphere by a conduit connected to the port therein,

said connecting means comprises a cable, and

said means for biasing said movable stop toward the carburetor comprises a spring.

10. A safety device as claimed in claim **8** wherein:

a conduit fluidly communicates said port with the induction manifold of the engine,

a jet in said conduit,

a non-return valve in said conduit, and

said non-return valve is positioned in the conduit between the port and said jet.

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