Dec. 8, 1959 W. C. EDDY ET AL 2,916,116

CONTROL MECHANISM FOR AN ENGINE

Filed Sept. 10, 1956 4 Sheets-Sheet 1

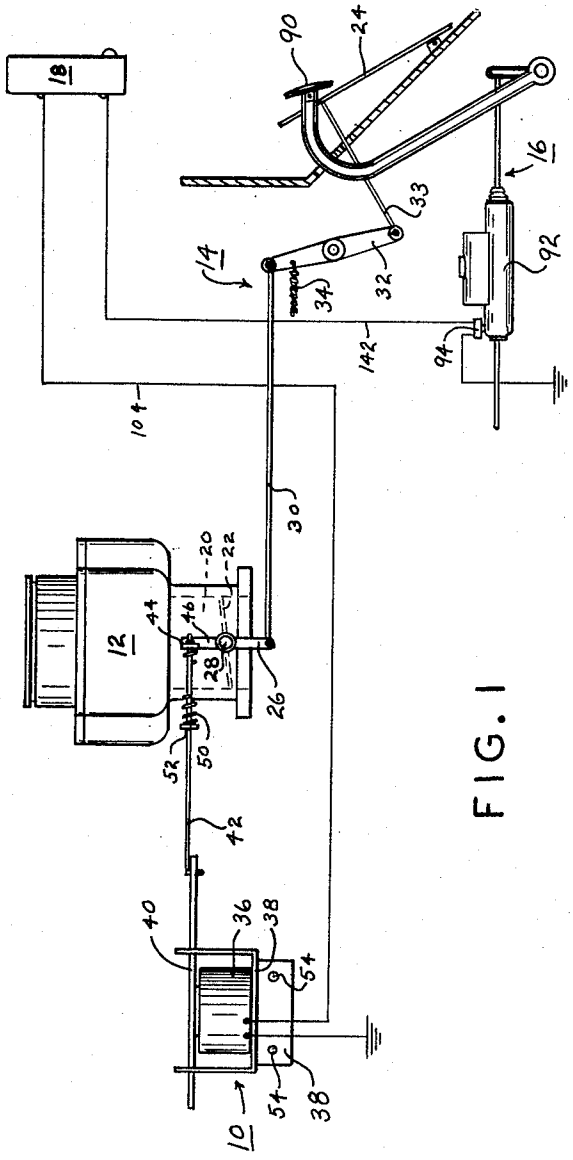


FIG. 1

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CONTROL MECHANISM FOR AN ENGINE

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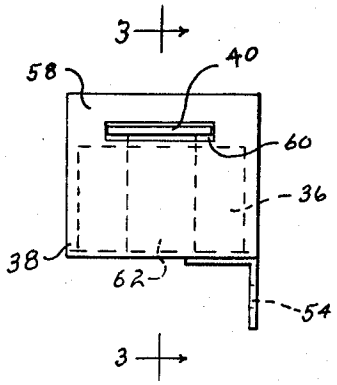


FIG. 2

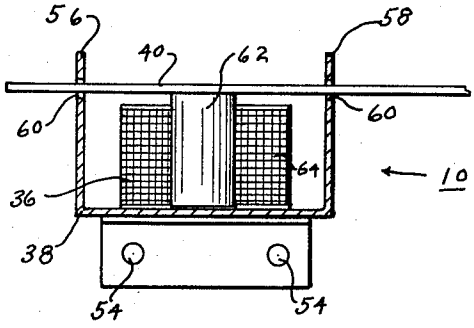


FIG. 3

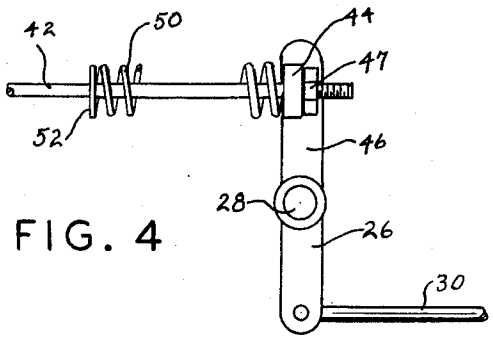


FIG. 4

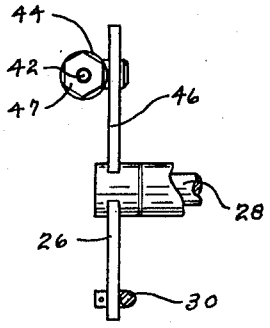


FIG. 5

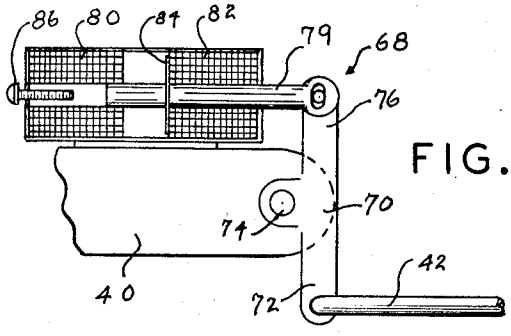


FIG. 6

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CONTROL MECHANISM FOR AN ENGINE

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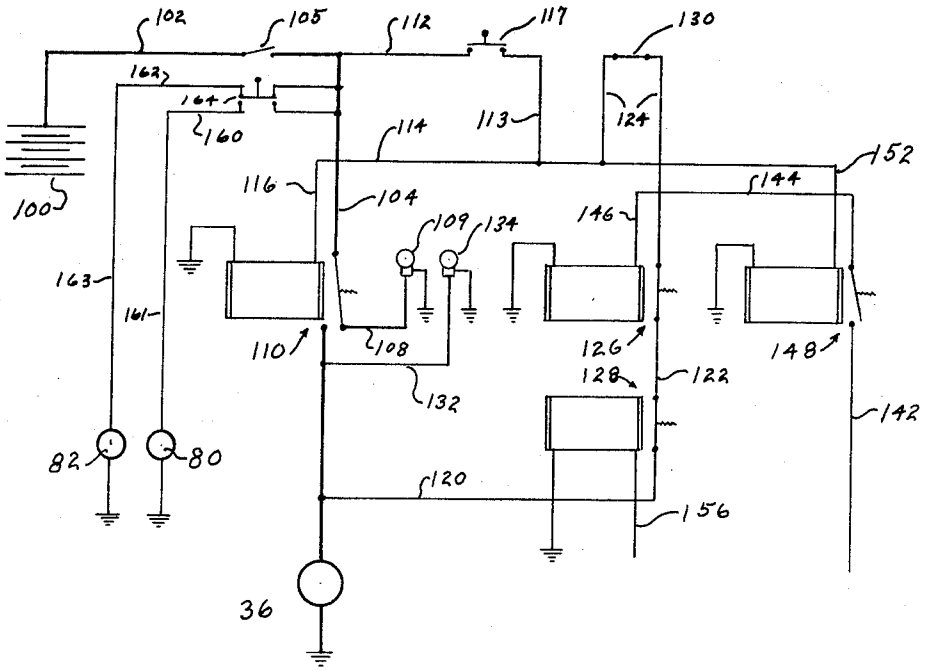


FIG. 7

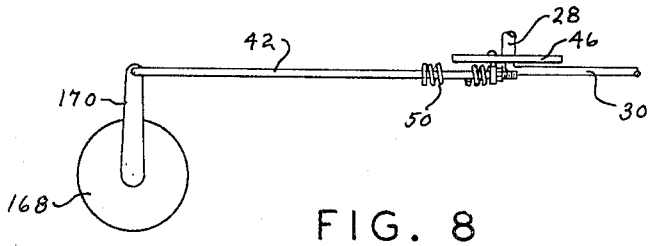


FIG. 8

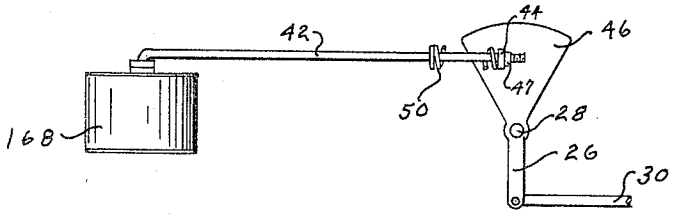


FIG. 9

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CONTROL MECHANISM FOR AN ENGINE

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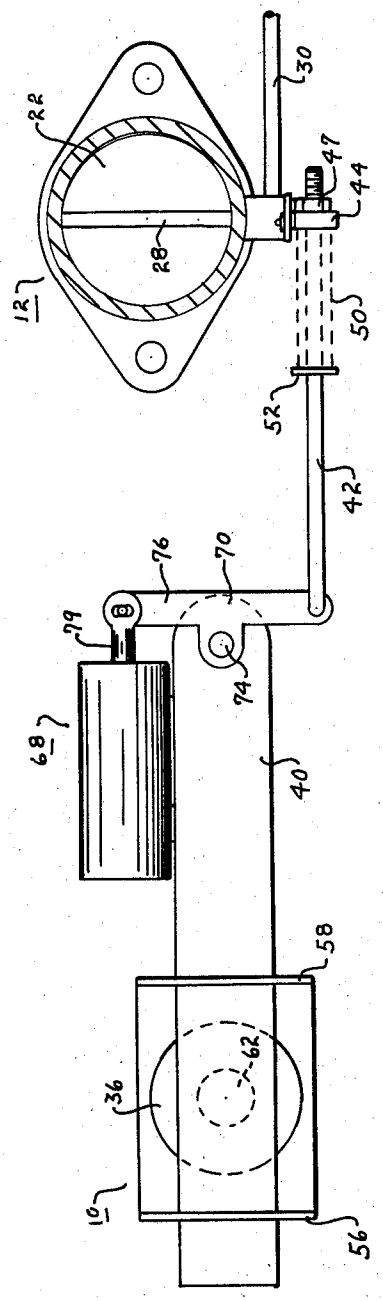


FIG. 10

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United States Patent Office 2,916,116 Patented Dec. 8, 1959

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CONTROL MECHANISM FOR AN ENGINE

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Application September 10, 1956, Serial No. 608,827

8 Claims. (Cl. 192—3)

The present invention relates to an engine control mechanism and more particularly to an auxiliary control mechanism for the throttle valve of an internal combustion engine.

In traveling long distances, particularly on the present day superhighways, the automobile, truck or bus driver is usually required to use the conventional accelerating pedal to maintain a constant speed over long periods of time, the constant speed being only occasionally interrupted for passing. This continued use of leg and foot to hold the pedal in a fixed position results in considerable fatigue to the driver. Various devices, including hand throttles or levers, have been used in the past to hold the throttle in a desired position and thus relieve the driver of that task, but those devices have certain inherent disadvantages which have made them unsuitable or unsafe. It is one of the principal objects of the present invention to provide a device which can be set to hold the throttle valve of an engine in any desired open position and which will immediately become inoperative and release the throttle in the event trouble develops in the control mechnism for the device, thus permitting full control of the throttle valve by the driver through the standard control mechanism. This latter feature is referred to as a fail safe characteristic of the device.

Another object of the invention is to provide a device for holding the throttle of an automobile engine in any selected minimum open position without interfering with acceleration of the vehicle by the driver or control of the throttle at any point beyond said minimum position.

Still another object of the invention is to provide an easily controlled and operated device of the aforesaid type which will be rendered completely inoperative immediately upon application of the brakes, horn and/or other manual control and which will remain inoperative until reactuated by the driver.

A further object is to provide a device for holding the throttle of an engine in a selected position, which can be momentarily rendered at least partially ineffective for temporary deceleration without disturbing the setting of said device at said selected position.

Another object of the invention is to provide a relatively simple and easily serviced device of the aforesaid type which can be readily installed on a vehicle without any substantial changes or modifications being required in the conventional throttle control mechanism of the vehicle.

Further objects and advantages will become apparent from the following description and accompanying drawings, wherein:

Figure 1 is a side elevational view of our throttle control mechanism showing it operatively connected to the conventional throttle control mechanism of a standard internal combustion engine for an automobile;

Figure 2 is an end elevational view of our throttle control mechanism;

Figure 3 is a vertical cross sectional view of our throttle control mechanism, taken on line 3—3 of Figure 2;

Figures 4 and 5 are enlarged detail views of the connection between our mechanism and the conventional throttle control mechanism of the vehicle;

Figure 6 is a partial cross sectional and top plan view of an additional feature which may be included in our control mechanism;

Figure 7 is a wiring diagram of the electrical system of the throttle control mechanism;

Figures 8 and 9 are top plan and elevational views, respectively, of a modified form of our control mechanism; and

Figure 10 is a top plan view of the linkage including the feature shown in Figure 6.

Referring more specifically to the drawings and to Figure 1 in particular, numeral 10 designates our throttle control mechanism, 12 a conventional carburetor mounted on an internal combustion engine (not shown), 14 a conventional throttle control linkage, 16 a portion of a standard hydraulic brake system of the vehicle, and 18 the relay box of the electrical system for controlling mechanism 10. Carburetor 12 contains an induction passage 20 having mounted therein a throttle valve 22 connected to accelerating pedal 24 by linkage 14 consisting of a lever 26 mounted on throttle shaft 28, rod 30, pivoted lever 32 and rod 33. A spring 34 connected to lever 32 and anchored on the engine or at some other suitable point in the engine compartment constantly urges the throttle control mechanism in the direction to close the throttle valve.

The auxiliary throttle control mechanism 10 consists of an electrical magnet 36 mounted on a bracket 38 and a sliding iron or steel bar 40 connected to throttle lever 26 by a rod 42 slidably journalled in a trunnion 44 mounted on an arm 46 of the throttle lever. A nut 47 threaded onto the end of rod 42 forms a one way connection between the arm of the throttle lever and rod 42. The trunnion is normally held against the nut by a spring 50 mounted on rod 42 and reacting between the trunnion and a fixed collar 52 on said rod. The effective length of rod 42 can be varied to suit requirements by screwing the nut either to the right or left as shown in Figure 4.

Bracket 38 on which magnet 36 is mounted is rigidly secured by bolts in holes 54 to some part of the engine or other part of the vehicle which will give it unyielding support. Two upstanding members 56 and 58 are integrally joined to the bracket on either side of the magnet and are provided with slots 60 for guiding and retaining bar 40 in proper place over the magnet, said slots being sufficiently large to permit free movement of the bar in said slots when the magnet is deenergized. The magnet is a conventional electrical unit having an iron core 62 surrounded by a copper coil 64 and is rigidly secured to the base of bracket 38. The core is preferably of pure iron or other material which will become demagnetized immediately upon de-energizing of the coil and is adapted to support bar 40 as the latter reciprocates with the movement of the throttle valve when the magnet is de-energized and to hold said bar firmly in an immovable position whenever the coil is energized. Members 56 and 58, bracket 38 and bar 40 complete the electrical field for the magnet.

In order to permit the driver to decelerate the vehicle temporarily without disturbing the setting on the auxiliary control mechanism, a relaxation mechanism 68 such as that shown in Figures 6 and 10 may be employed. In this arrangement, instead of connecting rod 42 directly to bar 40, there is inserted between said rod and bar a T-shaped lever 70 having one arm 72 connected to rod 42, the center 74 pivotally connected to bar 40 and the other arm 76 connected to a solenoid mechanism by a plunger 79. This mechanism contains two solenoids 80 and 82 rigidly mounted on bar 40 for alter-

nately moving plunger **79** and an integral plate **84** to the left and right, respectively, to rotate lever **70** in the directions to lengthen and shorten the linkage. When one or the other solenoid is energized plate **84** is moved against the end of the energized solenoid which holds the plunger and plate firmly in that position until de-energized. Thus the linkage consisting of bar **40**, T-shaped lever **70** and rod **42** are in a contracted or shortened position when solenoid **82** is operative and during this time the linkage operates as if the relaxation mechanism were not present in the linkage. When solenoid **80** is energized, plate **84** and plunger **79** are moved to the left rotating lever **70** counter clockwise and causing rod **42** to move in the throttle valve closing direction. When solenoid **80** is de-energized, and solenoid **82** re-energized, the relaxation mechanism is returned to its normal position. A set screw **86** may be placed in the end of solenoid **80** to permit the stroke of the relaxation mechanism to be adjusted within a limited range. Instead of plate **84** being held against the end of solenoid **80** when it is energized the end of plunger **79** is held firmly against the end of the set screw.

Figure 1 shows a part of a conventional hydraulic brake mechanism including a brake pedal **90**, master cylinder **92** and the brake light switch **94**. The electrical control for our mechanism is connected into the brake light circuit in such a manner that the mechanism is rendered inoperative immediately when the driver applies the vehicle brakes.

Figure 7 shows a diagram of a suitable electrical control circuit for our auxiliary throttle control mechanism. The main circuit for energizing magnet **36** consists of a storage battery **100**, leads **102** and **104** in which are respectively included a manually operated main off-on control switch **105** and double pole relay **110**. When the relay is de-energized the circuit including lead **108** to a green light **109** is closed, thus indicating that the auxiliary throttle control mechanism is on, but inoperative. The relay **110** which completes the circuit to magnet **36** is initially energized through leads **112**, **113**, **114** and **116** controlled by push button switch **117**. When relay **110** is energized by closing switch **117** thus energizing magnet **36**, a second or holding circuit for said relay is simultaneously completed. This circuit consists of leads **120**, **122**, **124** and **114** and contains two relays **126** and **128** and a manually operated switch **130**, all three switches normally being closed. The second circuit to relay **110** keeps said relay energized after the primary circuit to the relay has been opened by the driver removing his finger from push button switch **117** and hence keeps magnet **36** energized indefinitely until one of switches **126**, **128** or **130** has been opened. When one of the latter switches has been opened relay **110** becomes de-energized and remains so until push button switch **117** is again momentarily closed by the driver. When relay **110** closes the circuit to magnet **36** the circuit to green light **109** is opened and a circuit consisting of lead **132** is simultaneously closed to red light **134** thus indicating to the driver that the auxiliary throttle mechanism is in operation.

Relay **126** is controlled from the brake light circuit by a circuit consisting of leads **142**, **144** and **146**, having therein a relay **148** which is closed through lead **152** at the time relay **110** is energized. Relay **148** is included in the circuit to prevent relay **126** from being energized every time the brake light switch is closed regardless of whether the auxiliary throttle control mechanism is being used or not. In practice relays **110** and **148** would be incorporated into one double-pole double throw relay, thus eliminating the need for lead **152**. It is seen from the diagram that whenever the driver operates the vehicle brakes, if our mechanism is in operation, relay **126** becomes energized, breaking the shunted or holding circuit for relay **110** and thus de-energizing the entire throttle control mechanism. Switch **130** is included in the same control circuit as relay **126** so that the driver can manually de-energize the entire mechanism quickly whenever the need arises. Relay **128** is controlled through lead **156** from the circuit for the vehicle horn. This latter arrangement is an optional feature and may be omitted if desired, or instead, the circuit therefor may be connected to a switch actuated by the clutch or accelerating pedal or to a "dead man's" switch on the vehicle steering wheel.

The circuit for the solenoids of relaxation control **68** is substantially independent of the remainder of the control circuits and consists of leads **160** and **161** to solenoid **80** and leads **162** and **163** to solenoid **82**, controlled by push button switch **164**. When the driver wishes to use the relaxation control, he merely manually pushes the button for switch **164** thus opening the circuit to solenoid **82** and closing the circuit to solenoid **80** and holds it in that position as long as operation of the relaxation control is required.

In the operation of the automobile having one of the present auxiliary throttle control mechanisms installed thereon, the driver operates the vehicle in the usual manner until he manually brings the mechanism into operation by closing off-on switch **105** and momentarily closing push button switch **117**. Until this is done the throttle valve of the carburetor is controlled exclusively by the acceleration pedal **24**. As the pedal is pushed toward the floor board, throttle control linkage **14** rotates throttle lever **26** and arm **46** in a counter clockwise direction, as viewed in Figures 1 and 4, opening the throttle valve and simultaneously sliding rod **42** and bar **40** to the left. Spring **50** is not compressed and trunnion **44** and nut **47** move together since until magnet **36** is energized bar **40** moves freely in slots **60** and on core **62** and there is no resistance to the movement of rod **42**.

When the driver reaches a long, uninterrupted stretch of highway where little or no change in the throttle setting is required for extended periods of time, he can relieve himself of the constant manual operation of the accelerating pedal by actuating the auxiliary throttle control mechanism. This is done by first selecting with the accelerating pedal the desired opening of the throttle valve and then closing switch **105** and switch **117**, the latter only momentarily. This energizes magnet **36** thus pulling bar **40** firmly against the upper end of core **62** with sufficient force that the bar can not be moved by either spring **34** or spring **50**. Hence the throttle valve is held in the selected partially open position against the force of spring **34** tending to return the valve to its closed position.

If the driver wishes to accelerate to pass another vehicle, he merely pushes the accelerating pedal further toward the floor board causing linkage **14** to rotate lever **26** further in the counter clockwise direction to open the throttle the desired amount. As lever **26** is rotated arm **46** being integrally joined thereto is likewise rotated; however, since bar **40** is held firmly by magnet **36**, trunnion **44** which is attached to arm **46** slides on rod **42** toward the left, as seen in Figures 1 and 4, compressing spring **50**, thus leaving bar **40** set in its preselected position on magnet **36**. When the driver wishes to return to the initially preselected speed, he merely removes his foot from the accelerating pedal and the throttle valve is returned to its partially opened position as determined by the position of the bar **40** on magnet **36**.

Whenever the driver applies the vehicle brakes relay **126**, which is controlled from the brake light circuit, opens the circuit to relay **110** thus breaking the circuit to magnet **36** which thereupon releases bar **40**. When this bar is released spring **34** immediately returns the throttle valve to its closed position. If the driver at any time wants to render the auxiliary control mechanism inoperable he merely momentarily opens switch **130** which de-energizes relay **110**. Once the mechanism is rendered inoperable in either of the foregoing ways, switch **117** must again be closed to reactuate the mech-

anism after a desired part throttle position has been established.

If the relaxation mechanism has been included in the auxiliary throttle control mechanism, the driver can momentarily decelerate the vehicle without cutting out the control mechanism by pressing the button controlling switch **164**. This de-energizes solenoid **82** and energizes solenoid **80** which rotates lever **70** in the direction to lengthen the linkage consisting of said lever, bar **40** and rod **42** to permit the throttle to move toward closed position. Whether the throttle would be completely closed or only partially closed would depend upon the position of bar **40** on magnet **36**. As the driver removes his finger from push button switch **164**, solenoid **80** is de-energized and solenoid **82** re-energized which rotates lever **70** to its original position, thus again opening the throttle valve to the desired setting.

A modified form of the present invention is illustrated in Figures 8 and 9 wherein the same numerals are used to designate like parts referred to previously herein. The same type of spring loaded one-way connection between the throttle lever and rod **42** is employed in this embodiment as in the previously described embodiment; however, instead of using the magnet and a sliding bar, a magnetic rotary clutch **168** of conventional design is used. Arm **170** is connected at one end to the rotatable core of the magnet and at the other end to rod **42**. The operation of the auxiliary throttle control mechanism containing this type of magnetic clutch is the same as the operation of the first control mechanism described herein. Whenever the coil of the clutch is energized, arm **170** is held rigidly in the position assumed at the time of energization and thus forms a minimum setting for part throttle operation.

From the description herein it is seen that the present auxiliary throttle control mechanism can be readily installed on a vehicle with only minor changes being required in the standard equipment or mechanisms, and, in view of its simplicity and easy accessibility, it can be readily serviced.

In the present throttle control mechanism, whenever the electrical system for the mechanism develops trouble, or in any way interrupts its operation, the power to magnet **36** is immediately interrupted, thus freeing bar **40** and permitting the throttle to return to its closed position. This is an important safety feature of the present mechanism.

While only two modifications of our mechanism have been described herein, various changes and arrangements and substitution of equivalent parts and means may be made without departing from the scope of the present invention.

We claim:

1. A mechanism for controlling the throttle valve of a carburetor, comprising a means for operating said throttle valve, a magnetic attractable movable member, a linkage movable with said member for connecting said member with said means, a magnetic means for holding said member in preselected positions and the throttle valve in a desired opened position, a one-way spring-loaded connection in said linkage adapted to yield only to pressures tending to open the throttle valve, an electrically operated means for increasing and decreasing the length of said linkage to permit at least partial closing of the throttle valve without disturbing the setting of said magnetic means, and an electrical control circuit for said magnetic means having a relay controlled by a holding circuit with a manually controlled switch therein.

2. An auxiliary mechanism for controlling the throttle valve of a carburetor, comprising a movable member, a linkage for connecting said member with the throttle valve, a magnetic means for holding said member in preselected positions and the throttle valve in a desired opened position, a means in said linkage adapted to yield to pressures tending to open the throttle valve, a means in said linkage for increasing and decreasing the effective length of said linkage to permit at least partial closing of the throttle valve, and an electrical control circuit for said magnetic means de-energized by a manually controlled switch.

3. For use in a vehicle having a brake actuating means and a carburetor with a throttle valve, an auxiliary mechanism for controlling the throttle valve, comprising a magnetic attractable movable member, a linkage movable with said member for connecting said member with the throttle valve, a magnetic means for holding said member in preselected positions and the throttle valve in a desired opened positon, a one-way spring-loaded connection in said linkage adapted to yield to pressures tending to open the throttle valve, an electrical control circuit for said magnetic means, and a relay controlled by a holding circuit de-energized by the operation of the vehicle brake.

4. For use in a vehicle having a brake actuating means and a carburetor with a throttle valve, a mechanism for controlling the throttle valve, comprising a magnetic attractable movable member, a linkage movable with said member for connecting said member with the throttle valve, a magnetic means for holding said member in preselected positons and the throttle valve in a desired opened position, a one-way spring-loaded connection in said linkage adapted to yield only to pressures tending to open the throttle valve, an electrically operated means for increasing and decreasing the effective length of said linkage to premit at least partial closing of the throttle valve, an electrical control circuit for said magnetic means, and a relay in said circuit controlled by a holding circuit de-energized by the operation of the vehicle brake and a manually operated switch.

5. For use in a vehicle having a brake actuating mechanism and a carburetor with a throttle valve, an auxiliary mechanism for controlling the throttle valve, comprising a magnetic attractable movable member, a means movable with said member for connecting said member with the throttle valve, a magnetic means for holding said member in preselected positions and the throttle valve in a desired opened position, a one-way yieldable connection in said first mentioned means, an electrical control circuit for said magnetic means, and a relay controlled by a holding circuit de-energized by the brake mechanism and a separate manually controlled switch.

6. A mechanism for controlling the throttle valve of a carburetor, comprising a movable member, a linkage movable with said member for connecting said member with the throttle valve, a magnetic means for holding said member in preselected positions and the throttle valve in a desired opened position, a means in said linkage adapted to yield to pressures tending to open the throttle valve, and a means in said linkage for increasing and decreasing the effective length of said linkage to permit at least partial closing of the throttle valve.

7. In a vehicle having a brake actuating mechanism, a mechanism for retaining the throttle valve of a carburetor in any selected partially opened position, comprising an electrically operated means for controlling the throttle valve, a circuit for energizing said means, a relay for closing said circuit, a circuit for energizing said relay, another circuit for energizing said relay connected to said first mentioned circuit and adapted to be closed when said first mentioned circuit is closed and to remain closed after said second mentioned circuit has been opened, and a relay in said last mentioned circuit for breaking said circuit when said brake actuating mechanism is operated.

8. In a mechanism for retaining the throttle valve of a carburetor in any selected partially opened position, an electrically operated means for controlling the throttle valve, a circuit for energizing said means, a relay for closing said circuit, a circuit for energizing said relay, another circuit for energizing said relay connected to said first mentioned circuit and adapted to be closed when said first mentioned circuit is closed and to remain closed after

said second mentioned circuit has been opened, and a switch for breaking said last mentioned circuit.

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