Dec. 12, 1950 J. H. PATTERSON 2,533,836

THROTTLE OPERATING MECHANISM

Filed Aug. 5, 1949

FIG. 1.

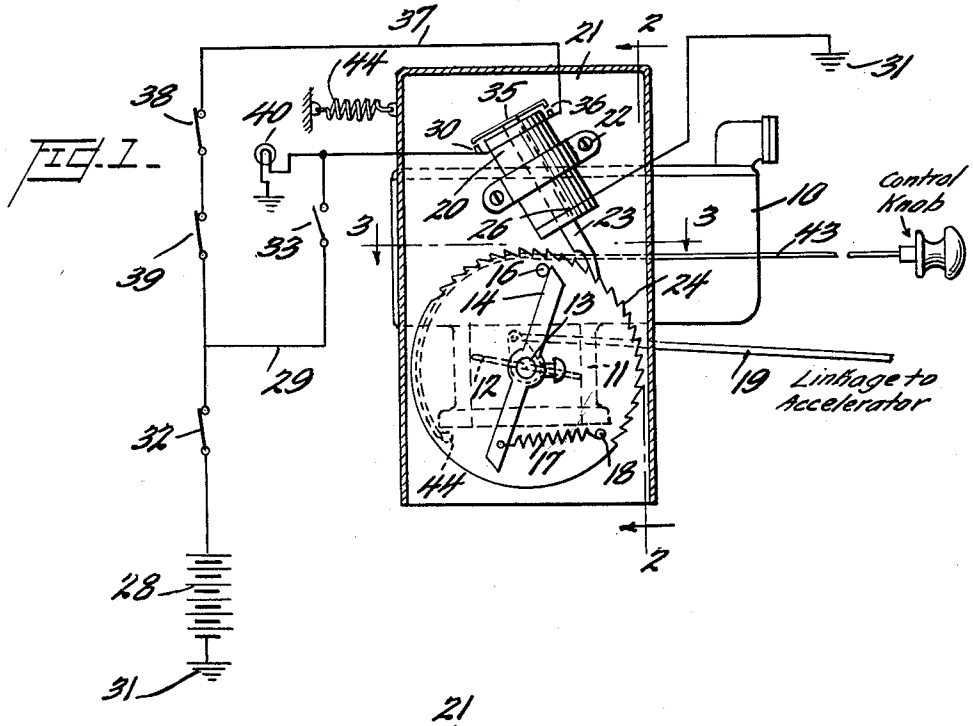


FIG. 2.

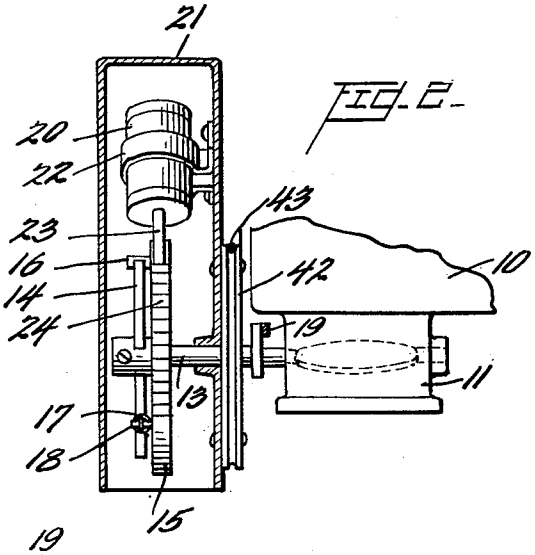
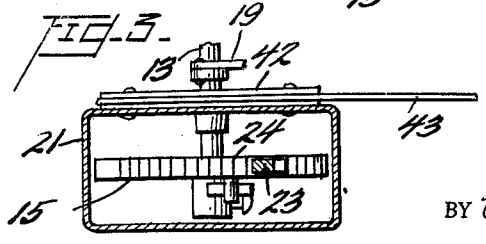


FIG. 3.



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THROTTLE OPERATING MECHANISM

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12 Claims. (Cl. 192—.058)

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This invention relates to a mechanism for controlling the throttle setting of a motor driven vehicle, and more particularly to a throttle setting control mechanism designed and constructed to permit the throttle setting to be varied above a selected minimum setting subject to inactivation of the control mechanism by the operation of the vehicle controls which are normally employed to slow down or stop the vehicle, as for example, the clutch or brake operating levers.

It is one of the objects of this invention to provide a mechanism which may be associated with the fuel feeding system of a vehicle engine which permits the operator of the vehicle to select a desired road speed which will be automatically maintained subject to immediate and automatic release when the driver of the vehicle intervenes to slow down or stop the vehicle to meet various exigencies which may arise.

A further purpose of the invention is to provide a throttle control mechanism which relieves the driver of the vehicle from the necessity of constantly maintaining a foot pressure on the accelerator pedal of the vehicle for long periods of time, and which permits the driver to increase the road speed of the vehicle by depressing the accelerator pedal to open the throttle beyond the setting maintained by the control mechanism without disturbing the control which is re-instituted when the accelerator pedal is released.

A further object of the invention is to provide a throttle control mechanism which may be conveniently operated from the driver's station of the vehicle to maintain a selected operating speed for the vehicles and which at the same time fulfills the requirements of the conventional dashboard and throttle control employed conventionally to vary the idling speed of the engine of the vehicle or to maintain an increased idling speed during certain operations of the vehicle in which a high starting engine torque is necessary.

Other objects and advantages of the invention will be apparent from the following detailed description thereof made with reference to the accompanying drawings. It will be understood that the illustration of a single embodiment of the invention and the detailed description thereof is made for the purpose of facilitating an understanding of the invention and is not intended as a limitation thereon, as various changes and modifications will be apparent to those skilled in the art to which the invention relates.

In the drawings:

Figure 1 is a transverse sectional view through the casing of the throttle control mechanism illustrating the manner in which the mechanism may be assembled with the carburetion system of a conventional internal combustion engine, and diagramming a power circuit which may be employed to energize the solenoid of the mechanism;

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Figure 2 is a sectional view along the line 2—2 of Figure 1, and

Figure 3 is a section of the same mechanism viewed along the line 3—3 of Figure 1.

In the embodiment illustrated in the drawings the throttle control mechanism is shown associated with a carburetor 10 which comprises a throat portion 11 in which a conventional butterfly valve 12 is rotatably supported to regulate the rate of admission of fuel to the associated engine of the vehicle. The butterfly valve 12 is fixed to the shaft 13 journaled in appropriate supports in the throat portion 11. One end of the shaft 13 extends through the wall of the throat portion and to this end of the shaft is fixed a lever 14 by means of a set-screw in the hub portion of the lever or by other suitable means of attachment. The distal end of the lever 14 thus affixed to the shaft is moved arcuately when the setting of the butterfly valve 12 is altered to regulate the rate of admission of fuel to the associated engine, and correspondingly the setting of the butterfly valve may be changed by arcuate movement of the distal end of the lever 14. A retaining wheel 15 is freely supported on the shaft 13 immediately adjacent and inwardly of the lever 14. The wheel 15 is provided with an axially disposed pin 16 toward its outer edge which is positioned to engage the upper arm of the lever 14 when the wheel is rotated in a clockwise direction as viewed in Figure 1. The pin 16 and the arm 14 are normally held in engagement with one another by the light tension spring 17 which is secured at one end to the lower arm of the lever 14 and at its other end to a pin or other suitable abutment 18 fixed to the wheel.

It will be apparent from the foregoing description that the butterfly valve 12 which is rigidly connected with the lever 14 by means of the shaft 13 may be prevented from moving toward throttle closed position from any selected setting by restraining the wheel against counter-clockwise movement as during the opening movement up to the selected setting the pin 16 has been retained in engagement with the left edge of the upper arm of the lever 14 as viewed in Figure 1 by the action of the spring 17. However, the lever 14 is free to move in a clockwise direction which direction corresponds to movement of the

butterfly valve in throttle opening direction. Accordingly, no interference is encountered to movement of the butterfly valve in throttle opening direction effected, for example, by the linkage 19 secured at one end to the shaft 13 and at the other end connected to the accelerator pedal of the vehicle for control thereby upon release of the accelerator pedal, however, the conventional spring-urged closing movement of the valve will be stopped when the upper arm of the lever 14 again engages the pin 16 on the wheel which has been restrained against movement in the position which corresponds to the desired setting of the throttle.

Restraining the wheel 15 to effect the desired throttle control subject to immediate inactivation of the control when the driver intervenes to slow down or to stop the vehicle is conveniently accomplished by means of a solenoid 20 which is fixed to the inner wall of a casing 21 by means of a bracket 22 and positioned with respect to the wheel so that the armature 23 of the solenoid lies in the plane of the wheel. The wheel 15 is provided with a series of peripheral notches 24 which are engaged by the lower end of the solenoid armature 23 at the downward limit of its movement, the solenoid being wound so that the armature is caused to move downwardly when the solenoid is energized.

The power circuit provided to energize the solenoid and activate the throttle control mechanism subject to immediate inactivation by other vehicle control elements such as the brake or clutch lever, comprises a power source 28 which may be the conventional battery in a vehicle comprising a spark ignition system and a conductor 29 connected to the terminal 30 of the solenoid coil and to one pole of the battery, the power circuit being completed through the grounds 30, 31. A unit control switch 32 and a solenoid activating switch 33 are connected in series with the conductor 29. The switch 32 serves to complete the power supply to the activating switch 32 and to place the mechanism in operating condition. The switch 32 thereafter remains closed during normal operation. The switch 33 is yieldingly maintained in open position by any suitable resilient means and when depressed momentarily completes the power supply circuit to the solenoid coil 26 which causes the armature 23 thereof to move downwardly, the lower end thereof engaging one of the notches 24 of the wheel 15 and thereby restraining the wheel from rotation about the axis 13. The downward movement of the armature which occurs when the actuating switch 33 is closed places the conductor 35 which is carried by the upper end of the armature across the terminals 30 and 36 which thereupon completes the power supply to the solenoid coil through the conductor 37. As this occurs almost immediately after the actuating switch 33 has been closed the pressure on the switch 33 may be released almost immediately and the solenoid coil will be maintained energized nevertheless through the conductor 37 as a result of the relay action initiated by the downward movement of the solenoid armature. The conductor 37 comprises a switch 38 which may be controlled by a movable element on the braking mechanism of the vehicle, and a similar switch 39 which is likewise controlled by a movable element of the clutch mechanism. The switches 38, 39 are arranged to be closed when the brakes of the vehicle are released and the clutch engaged, and while these mechanisms remain in this condition (the normal condition when the vehicle is cruising) the power supply to the solenoid coil will be continued and the wheel 15 restrained against rotation about its axis by the armature 23.

When the braking or the clutching mechanism is operated, as it required to slow down or stop the vehicle, the power supply through the conductor 37 will be interrupted and the solenoid de-energized thereby permitting the wheel 15 to again turn freely on its axis. If at this time the accelerator pedal is released the spring pressure which normally tends to move the butterfly valve toward throttle closed position will be sufficient to close the throttle and in so doing will cause the lever 14 to rotate counterclockwise and draw with it the wheel 15.

As the lower end of the armature 23 is engaged in the notched edge of the wheel 15 the armature will be moved upwardly and the connection across the terminals 30, 36 will be broken. The mechanism will thus be returned to condition in which it may again be rendered operative by depressing the actuating switch 33 when it is desired to re-institute the throttle control.

The device may be provided with a pilot light 40 conveniently located at the driver's station to indicate when the solenoid is energized through either the conductor 29 or the conductor 37. If desired, the power circuit may be completed through the ignition switch of the vehicle to insure that the system will not be inadvertently energized.

The device is constructed so that the driver of the vehicle may make adjustments of the throttle opening, or so that such adjustments may be made automatically in order to maintain a constant road speed as the engine load is changed while the solenoid is energized and a selected throttle opening is being maintained thereby.

The casing 21 to which the solenoid 20 is affixed is freely supported on the shaft 13. A wheel 42 which is coaxial with the shaft 13 is affixed to the outside wall of the casing as most clearly illustrated in Figures 2 and 3. The wheel is provided with a circumferential groove which receives and guides the cord or wire 43 which is secured at one end to a pin 44, the other end of the cord being connected to a control means which may be a manually operated knob at the driver's station or may be a speed responsive governor means driven by the engine of the vehicle. The casing is yieldingly retained in an upright position by a resilient member 44 which is fixed at one end to the casing and at its other end to a fixed abutment. It will be seen that tensioning the cord or wire 43 sufficiently to overcome the spring 44 will cause the casings and the solenoid affixed thereto to rotate in a clockwise or throttle opening direction. Accordingly, when the solenoid is energized and the wheel 15 is restrained against movement in a counter-clockwise direction, clockwise rotation of the casing will result in an increased throttle opening. When the tension on the cord 43 has been released, the resilient member 44 will return the casing to its normal position. The result achieved by causing the casing to rotate about the axis 13 in the manner described may also be accomplished by arranging the casing on tracks or rails for linear movement in response to tensioning of the cord 43.

The throttle control mechanism described would be operated as follows:

The unit control switch **32** is closed to ready the mechanism for operation. The vehicle with which the mechanism is associated is started and the selected road speed is obtained by increasing the throttle opening by means of the accelerator pedal to overcome the spring force which normally urges the butterfly valve to its closed position. The wheel **15** is caused to follow the clockwise movement of the lever **14** by the action of the light spring **17** as the throttle is opened by means of the accelerator pedal. The solenoid actuating switch **33** is closed momentarily and the solenoid is energized through the conductor **29** causing the armature of the solenoid to move downwardly and engage the notch on the periphery of the wheel **15** which is in its line of travel. The wheel **15** is thus restrained against counter-clockwise movement and prevents the lever **14** from moving in counter-clockwise direction to close the throttle. The lever **14** may, however, be moved in throttle opening direction. The downward movement of the armature completes the power supply to the solenoid through the conductor **37** which comprises the switches **38** and **39** operated, respectively, by the brake and clutch mechanism of the vehicle. Switches **38, 39** are normally closed but operation of the brake or clutching mechanism by the driver results in the switches being opened and the power supply to the solenoid interrupted. In this circumstance the accelerator pedal would be released and the spring normally urging the butterfly valve toward throttle closed position would cause the lever **14** and the wheel **15** to rotate in a counter-clockwise direction thereby moving the armature **23** upwardly to disconnect the conductor **37** from the solenoid coil and thus return the throttle control mechanism to the condition in which it may again be activated by depressing momentarily the solenoid actuating switch **33**. The throttle opening may also be varied by tensioning the cord **43** sufficiently to overcome the force of the spring **44** which causes the casing to rotate about the shaft **13**, and in the instance the solenoid is energized the lever **14** is caused to rotate in a clockwise direction and open the throttle. Release of the tension on the cord **43** permits the spring **44** to return the casing to its normal operating position.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A device for retaining a selected rate of fuel feed to a power plant subject to immediate release from such retention and movement in feed increasing direction comprising, means for regulating the rate of fuel admission to the power plant, a member including a rotatable shaft connected with said regulating means to rotate in correspondence with variations in the setting of said regulating means, means freely supported on the said rotatable shaft and arranged to immediately engage said member when said member is caused to move by movement of said member is means in fuel decreasing direction, a solenoid positioned in relation to said freely supported means to permit the armature of said solenoid to engage and restain movement of said freely supported means when said solenoid is energized, and means operated by other controls acting to regulate the speed of operation of said power plant for de-energizing said solenoid.

2. A device as claimed in claim 1 which comprises a casing freely supported on said rotatable shaft, said solenoid being rigidly fixed to said casing, means connected to said casing extending to the operating station of said power plant for causing said casing to rotate about said rotatable shaft, whereby the regulating means may be moved in fuel increasing direction when the said solenoid is energized by rotating said casing as aforesaid.

3. A device as claimed in claim 2 which comprises a resilient member connected to said casing and to a fixed abutment acting to yieldingly restrain said casing against rotation by said rotating means.

4. A device as claimed in claim 3 in which said power plant comprises the internal combustion engine of an automobile and in which said other controls comprise the braking means and clutch of said automobile.

5. A device for retaining a selected rate of speed in the operation of an automobile having an internal combustion engine equipped with a butterfly valve supported on a shaft extending through the throat of the carburetor of the engine comprising, a radially extending lever rigidly fixed to an extension of the said valve shaft, a retaining disc freely supported on said shaft, said disc being provided with a lug positioned to normally abut one edge of said lever and a series of peripheral notches, a solenoid positioned immediately adjacent the periphery of said disc, one end of the armature of said solenoid being arranged to engage in one of said notches and restrain movement of said disc when said solenoid is energized, a power circuit for selectively energizing said solenoid, switches in series in said circuit, one of said switches being operated by the brake lever of said automobile and being closed when the brake lever is released, another of said switches being controlled by the clutch lever of said automobile and being closed when the clutch lever is released.

6. A device as claimed in claim 5 which comprises a casing freely supported on said shaft, said solenoid being rigidly fixed to said casing, a cord affixed at one end to said casing and extending to the driver's station for varying the arcuate position of said casing on said shaft, means for retaining the cord in any selected position, whereby the setting of the butterfly valve may be selected and retained beyond a desired setting by means of said cord when said solenoid is energized.

7. A device as claimed in claim 6 in which said cord comprises a flexible wire, a sheathing around said wire, the frictional engagement between said wire and sheathing being sufficient to retain said casing in any selected position.

8. A device as claimed in claim 5 in which said power circuit comprises switches in series in said circuit, one of said switches being operated by the brake lever of said automobile and being closed when the brake lever is released, another of said switches being controlled by the clutch lever of said automobile and being closed when the clutch lever is released.

9. A device as claimed in claim 8 which comprises a casing freely supported on said shaft, said solenoid being rigidly fixed to said casing, a cord affixed at one end to said casing and extending to the driver's station for varying the arcuate position of said casing on said shaft, means for retaining the cord in any selected position, whereby the setting of the butterfly valve may be

selected and retained beyond a desired setting by means of said cord when said solenoid is energized.

10. A device as claimed in claim 9 in which said cord comprises a flexible wire, a sheathing around said wire, the frictional engagement between said wire and sheathing being sufficient to retain said casing in any selected position.

11. A device for retaining a selected rate of speed in the operation of an automobile having an internal combustion engine equipped with a butterfly valve supported on a shaft extending through the throat of the carburetor of the engine comprising a radially extending lever rigidly fixed to the valve shaft for movement therewith, a retaining disc freely supported on said shaft, said disc being provided with a lug positioned to normally engage one edge of said lever and with a series of peripheral notches, a casing freely supported on said shaft, a solenoid rigidly fixed to said casing and positioned thereon immediately adjacent the periphery of said disc, one end of the armature of said solenoid being arranged and adapted to engage one of said notches and restrain movement of said disc when said solenoid is energized, a power circuit for energizing said solenoid, switches in series in said circuit, one of said switches being operated by the lever of said automobile and being closed when the brake lever is released, another of said switches being controlled by the clutch operating lever of said automobile and being closed when the clutch lever is released, a cord affixed at one end to said casing, the other end thereof extending to the driver's station for varying the arcuate position

of said casing on said shaft, and means for retaining the cord and casing in any selected position, whereby the setting of the butterfly valve may be retained beyond a desired setting by means of said cord when said solenoid is energized.

12. A device as claimed in claim 11 in which said power circuit comprises a conductor permanently connected to the coil of said solenoid and power supply, an actuating switch connected in series with said first conductor, a second conductor having a terminal near said connection between said first conductor and said coil, and a relay arm supported on said armature, said arm being arranged to contact the said terminal and said connection when the armature is caused to move when said solenoid is energized by closing said actuating switch.

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