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DEVICE FOR REGULATING THE SPEED OF VEHICLES

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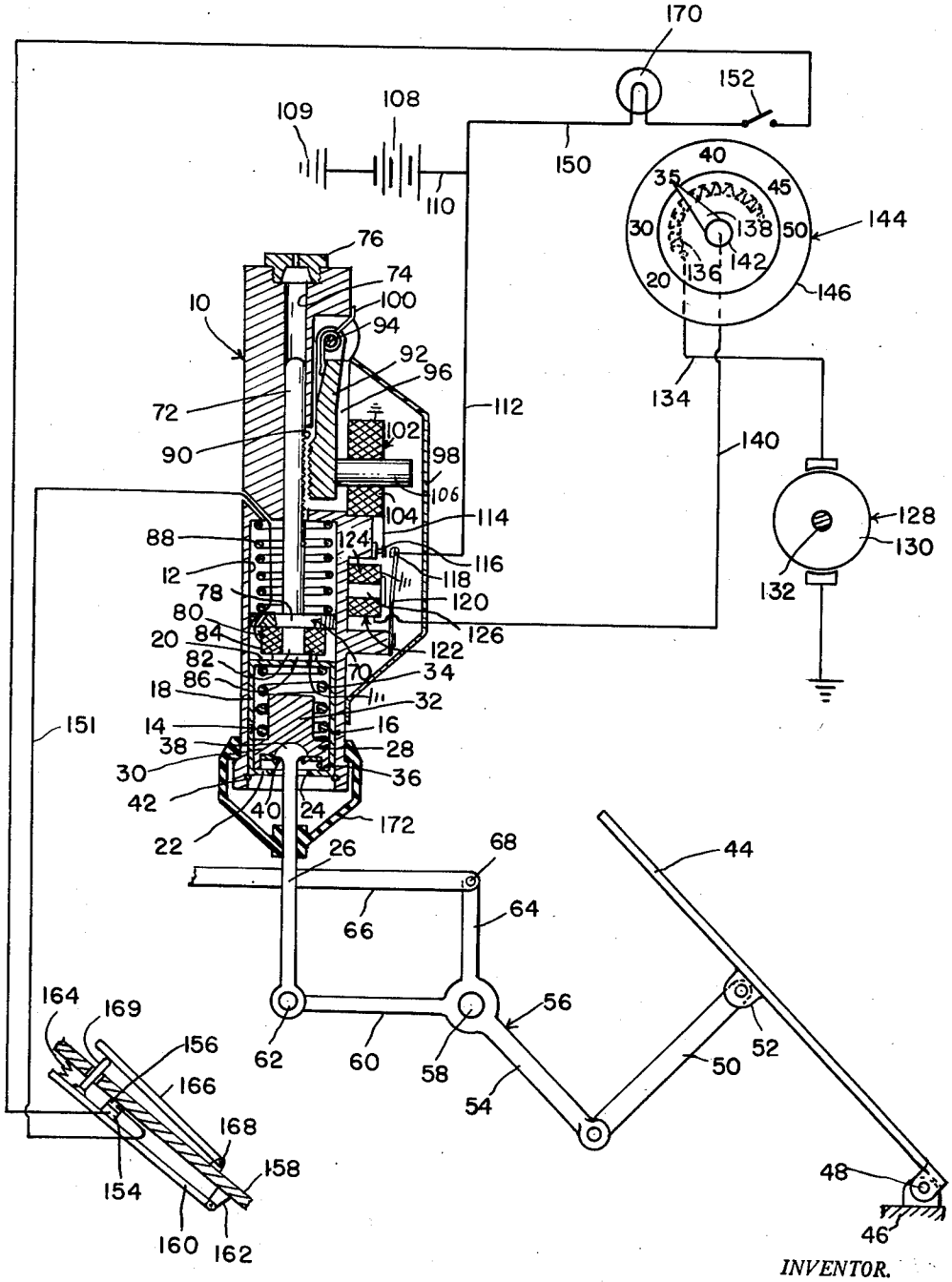

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DEVICE FOR REGULATING THE SPEED OF VEHICLES

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2 Claims. (Cl. 180—82.1)

This invention relates to speed regulating devices and more particularly to a device for regulating the speed of vehicles.

One object of this invention is to provide an improved device by means of which it is possible to limit the speed at which a vehicle can be driven, having provision for readily varying the speed limit. A device of this kind is of particular value on long trips and especially at night, when it is difficult to determine the speed of the vehicle without paying constant attention to the speedometer.

Another object of this invention is to provide an adjustable speed limiting device for vehicles which has provision for enabling the vehicle to be driven at greater speeds than the speed at which the device is set under emergency conditions, as where it is desired to pass the vehicle ahead. In accordance with the arrangement described hereinafter, by the mere application of a somewhat greater pressure upon the accelerator pedal, the vehicle may be driven at speeds greater than the limit provided by the adjustable device.

Still another object of this invention is to provide means for maintaining an adjustable pre-set speed of the vehicle while permitting the driver to remove his foot from the accelerator pedal. This arrangement takes away much of the discomfort and fatigue which accompanies long trips and moreover provides a safety factor, particularly for high speed travel on the open highways, since it permits the driver to devote all of his attention to steering the vehicle.

A further object of the invention is to provide an arrangement as described in the previous paragraph having provision for instantaneously rendering inoperative the adjustable pre-set speed device upon initial application of the brake pedal.

Other objects of the invention will become apparent as the following description proceeds, especially when taken in conjunction with the accompanying drawing wherein the single figure is a semi-diagrammatic illustration of the invention partly in section.

Referring now more particularly to the drawing, the device there illustrated comprises a housing generallly indicated at 10 which is fixedly attached by any suitable means to the vehicle which is to be controlled thereby. The device may be mounted under the hood of the vehicle, for example.

Within the housing is a cylindrical chamber 12 which is open at the lower end of the housing. Reciprocable within the chamber or cylinder 12 is a piston generally indicated at 14. The piston comprises an outer hollow part 16 of ferrous material which has a cylindrical side wall 18, a top wall 20 and a bottom wall 22. The bottom wall 22 is formed with a central aperture 24 to receive the upper end of link 26.

The inner part of piston 14 is indicated by the reference character 28 and has a lower cylindrical portion 30 which has a cylindrical wall slidable within the part 16, and a reduced upper portion 32. A relatively heavy coil spring 34 is compressed between the top wall 20 of the

outer part 16 and the shoulder which connects the lower portion 30 and the upper reduced portion 32 of the inner part 28. This spring tends to urge the parts 16 and 18 away from each other so that the lower end of part 28 normally abuts the bottom wall 22 of the outer part as shown. The bottom wall of the inner part 28 has a recess 36 and a socket in the base of the recess receives the hemispherically-shaped end portion 38 of link 26 for limited swivel movement. The end portion 38 of link 26 is retained in the socket by the annular retainer 40 which is welded to the base of the recess 36 and which has a downwardly flared inner margin overlying the shoulder formed between the end 38 and the portion of the link 26 to which it is connected. A split ring 42 removably retained in an annular groove adjacent the lower end of cylinder 12 retains the piston 14 within the cylinder.

The manually operated throttle control lever or accelerator pedal is diagrammatically shown at 44 and is pivotally connected to the floor 46 of the vehicle for vertical swinging movement about the axis of pin 48. A link 50 has one end pivotally connected to an ear 52 upon control lever 44 and the other end of link 50 is pivotally connected to the arm 54 of a link member 56. Link member 56 is supported for rotation upon a fixed pin 58 and has an arm 60 connected to the lower end of link 26 as indicated at 62. Link member 56 has a third arm 64, the upper end of which is pivotally connected to a link 66 at 68, the link 66 having the other end connected to the throttle (not shown) of the vehicle. It will be understood that when the control lever 44 is depressed, the link 66 will be drawn to the right, as seen in the drawing, to open the throttle and increase the vehicle speed.

The control lever 44 is shown in the position it assumes when no foot pressure is applied thereon and the piston is shown in its lowermost position. When the control lever 44 is depressed to increase the vehicle speed, the piston 14 will be moved upwardly within cylinder 12.

A second piston 70 is mounted for reciprocation within cylinder 12 above piston 14. Piston 70 comprises an elongated rod 72 which is guided in its reciprocatory movement by the cylindrical passage 74 which opens into the cylinder 12 at its lower end and which is closed at the upper end of the housing by a threaded cap 76. At the lower end of the rod 72 is a circular disc 78 which may be fixedly secured to or integral with the rod and whose outer periphery has a sliding contact with the wall of cylinder 12.

An electro-magnet 80 is carried by the lower end of disc 78 and includes a core 82 which may be integral with or secured to the disc 78 of the piston, and the winding 84 which encircles and is retained on the core by the transverse disc-like head 86 at the lower end of core 82. A coil spring 88 encircling rod 72 is compressed between the upper end of cylinder 12 and the disc 78 urging piston 70 downwardly and thereby causing it to follow the piston 14 in the reciprocatory movement of the latter.

The control lever 44 is shown in the position it assumes when no foot pressure is applied thereon and the piston 14 is shown in its lowermost position. It will be apparent that when the control lever 44 is depressed to open the throttle and increase the speed of the vehicle, the piston 14 will move upwardly in the fixed cylinder 12 and the piston 70 will move as a unit with the piston 14 both in the up and down movement of the latter because of the spring 88. The reciprocation of piston 14 will occur without any relative movement between the parts 16 and 28 since the spring 88 is of much smaller strength than the spring 34. The added pressure upon

the control lever to compress spring 88 is so small that the operator will not be aware of it.

Under certain conditions such as when driving at night, or for long periods of time, it is desirable to provide means for limiting the speed of the vehicle to a predetermined maximum value. In this way, there is no danger of exceeding a safe speed and at the same time it is not necessary to constantly check the speedometer reading.

As seen in the drawing, the rod 72 is formed with serrations indicated at 90 along one side thereof and a lever arm 92 is pivotally connected at its upper end to the housing 10 by a pin 94 for movement of the lower end of the lever arm toward and away from the rod. The lower end of lever arm 92 is also provided with serrations on the surface opposed to the serrations 90 on the rod so that when the lever arm is forced against the rod 72, the serrations prevent the rod 72 and hence the entire piston 70 from reciprocating. The lever 92 is mounted in a recess 96 formed in one side of the housing and closed by a removable cover 98.

The lever arm 92 is normally urged by a spring 100 in a direction causing the lower end thereof to move away from rod 72 to assume the position shown in the drawing. The lever arm 92 is moved in the opposite direction by a solenoid 102. The solenoid 102 is fixed upon the housing and includes winding 104 and a reciprocable core 106. When the solenoid 102 is energized, the core 106 is urged to the left, thereby engaging and forcing the lower end of the lever arm 92 against rod 72 with sufficient force to hold the rod against up and down movement.

The solenoid 102 is energized by a battery 108. Battery 108 is grounded at 109 and is connected to the solenoid 102 by leads 110, 112 and 114, the winding of the solenoid 102 being suitably grounded to complete the circuit. The lead 114 terminates in a contact 116 secured to the housing and the contact 116 is normally spaced from contact 118 at the end of lead 112. Thus the circuit to the solenoid 102 is normally open. However, the contact 118 is mounted upon a flexible member 120 of ferrous material which is controlled by relay 122. The relay 122 is fixed to the housing and incorporates a winding 124 and a core 126 and when the relay is energized by the application of a predetermined voltage, the member 120, which is secured at one end to the housing, is urged to the left to close the circuit to solenoid 102 through contacts 116 and 118. It will thus be apparent that the relay 122 controls the energization of solenoid 102.

The relay is such that when a predetermined voltage is applied thereon, it will operate to close contacts 116 and 118. The voltage for closing contacts 116 and 118 is provided by a D.-C. generator 128 which has a rotor 130 secured to the transmission shaft 132 of the vehicle. The generator, of course, develops a voltage which is substantially proportional to the speed of rotation of the transmission shaft and hence the speed of the vehicle. The generator has a lead 134 which is electrically connected to one end of a rheostat 136 and the rheostat is connected to the winding of relay 122 by a contact arm 138 and a lead 140. The relay winding is suitably grounded. The contact arm 138 is pivotally mounted upon a hub 142 for rotation and the outer end portion of the contact arm 138 slides along the rheostat as it turns. It will be apparent that there will be a voltage drop in the rheostat which is adjustable by turning the contact arm 138.

The contact arm 138 is a part of a dial generally indicated at 144, the dial including, in addition, an annular ring 146 having numbers applied thereto corresponding to various vehicle speeds.

The relay 122 is designed to urge the member 120 to the left sufficiently to close the circuit to solenoid 102 upon the application of a predetermined voltage. If it is desired to limit the speed of the vehicle to say 35 M. P. H. the contact arm 138 will be turned to the position shown whereupon the voltage applied to the relay 122, generated by generator 128 and reduced by rheostat 136, is just sufficient to close the relay. The voltage produced by the generator at speeds less than 35 M. P. H. would not be sufficient to close the relay. Upon closing of the relay, the solenoid 102 is energized, lever arm 92 is urged in a clockwise direction whereupon the serrations thereon engage similar serrations on rod 72 to prevent reciprocation of piston 70. Accordingly, piston 70 will provide an abutment limiting the upward movement of piston 14 and thereby preventing the driver from depressing the control lever 44 any farther with ordinary foot pressure.

It will be apparent that as the vehicle accelerates, the pistons will gradually rise in cylinder 12. However, the voltage applied to the relay will not be sufficient to close the circuit to the solenoid until the transmission shaft is rotating at a speed corresponding to a speed of 35 M. P. H. of the vehicle. The piston 70 has, of course, reached a predetermined elevation within the cylinder at this time, and is held in this position by the arm 92 when the solenoid is energized.

If a speed limit of say 50 M. P. H. is desired, then the contact arm 138 is turned to that position on the dial, and the voltage drop in the rheostat is increased by an amount requiring a transmission shaft rotation corresponding to a vehicle speed of 50 M. P. H. to close relay 122. The piston 70 will be locked in a somewhat higher position in the cylinder.

The piston 70 provides a variable fixed abutment for piston 14 limiting its upward movement and thereby limiting the amount the lever 44 can be depressed. Actually the abutment is provided by the disc 86 at the bottom of electro-magnet 80.

If it is necessary in an emergency to increase the speed of the vehicle, as for passing, the control lever 44 may be depressed further by the application of a force of say 10–15 pounds sufficient to compress spring 34 enabling upward movement of the inner part 28 of the piston.

It is also desirable at times to enable the driver to remove his foot from the foot pedal or control lever 44. This may be particularly desirable on long trips to prevent fatigue. Under such circumstances, the electro-magnet 80 is of value. When the electro-magnet 80 is energized, the piston 14 is held thereagainst thus holding the control lever 44 depressed without the need for the application of foot pressure thereon. The electro-magnet 80 is energized by the battery 108 through leads 150 and 151, it being appreciated that the winding of electro-magnet 80 is suitably grounded to complete the circuit. The lead 150 has a manual switch 152 therein shown in its open position. However, the switch 152 may be manually shifted to closed position to complete the circuit to the electro-magnet.

It will be apparent that when the piston 70 is held against up and down movement by lever arm 92, the piston 14 may also be held against up and down movement upon energization of electro-magnet 80. If it should happen that electro-magnet 80 is energized at a time when the piston 70 is free to reciprocate, the result is the same as if electro-magnet 80 were de-energized since the two pistons would simply reciprocate as a unit.

In the event that the piston 70 is locked against up and down movement and electro-magnet 80 is energized, piston 14 is held against movement to maintain a predetermined vehicle speed without any attention on the part of the driver. However, it may be necessary to stop the vehicle and under these circumstances it is desirable to make provision for reducing the throttle opening to idling speed to facilitate braking of the vehicle. Accordingly, the leads 150 and 151 respectively have contacts 154 and 156 at the adjacent ends which normally contact each other to close the circuit. Contact 156 is fixed to the floor 158 of the vehicle and contact 154 is carried by a lever

160 pivoted to the floor 158 at one end by bracket 162 and urged toward the floor by a tension spring 164 to normally close the contacts. The brake pedal 166 is shown pivoted to the floor at 168 and has a rigid connection 169 with the lever 160. It will be appreciated that when the brake pedal is initially depressed, the contacts 154 and 156 will be opened, thereby opening the circuit to electro-magnet 80 and de-energizing the same to release piston 14.

A lamp 170 is provided in series with the lead 150 to indicate when the electro-magnet 80 is energized. A rubber cup 172 has the annular rim frictionally retained over an enlargement at the lower end of the housing 10, and the link 26 slidably extends through an opening in the bottom of the cup.

What I claim as my invention is:

1. A speed regulating device for use with the manually operated throttle control lever of a motor vehicle, comprising a cylinder, first and second pistons independently reciprocable in said cylinder, means connecting said first piston to the control lever whereby movement of the control lever in one direction to effect an increase in the speed of the vehicle operates to move said first piston toward said second piston and movement of the control lever in the opposite direction to effect a decrease in the speed of the vehicle operates to move said first piston away from said second piston, resilient means urging said second piston toward said first piston causing said second piston to follow the first piston in its reciprocation, a locking arm pivoted on said housing and movable into engagement with said second piston in any position of the latter to clamp the same against movement so that said second member presents a fixed abutment to said first piston limiting movement of said first member in a direction toward said second member and hence limiting movement of the control lever in said one direction, a solenoid having a plunger adapted to move said locking member into engagement with said second member upon energization of said solenoid, an electric circuit for energizing said solenoid, a relay having a normally open contact in said

circuit, said relay being effective to close said contact upon the application thereon of a voltage of a predetermined magnitude, a generator driven by the transmission shaft of the vehicle whereby the voltage output of said generator is substantially proportional to the speed of rotation of the transmission shaft and hence to the speed of the vehicle, a circuit connecting said generator to said relay and including a rheostat adjustable to vary the voltage output of the generator applied to the relay, said first piston comprising one part engageable with said second piston and another part secured to said connecting means and movable relative to said one part longitudinally of said cylinder, resilient means urging said parts away from each other, stop means limiting movement of said parts away from each other, an electro-magnet carried by said second member adapted to attract and hold said one part upon energization thereof, an electric circuit for energizing said electro-magnet, and manually controlled switch means for opening and closing the last-mentioned circuit.

2. Structure as defined in claim 1 including a normally closed switch in the last-mentioned circuit adapted to be opened upon initial actuation of the brake pedal of the vehicle.

References Cited in the file of this patent

UNITED STATES PATENTS

1,987,275	Tatter	Jan. 8, 1935
2,014,854	Lothrop	Sept. 17, 1935
2,021,832	Callihan	Nov. 19, 1935
2,036,619	Brown et al.	Apr. 7, 1936
2,171,401	McCoy	Aug. 29, 1939
2,174,062	Raesler	Sept. 26, 1939
2,243,354	Musser	May 27, 1941
2,265,524	Fruth	Dec. 9, 1941
2,372,702	Armentrout	Apr. 3, 1945
2,471,690	Howland	May 31, 1949
2,519,859	Teetor	Aug. 22, 1950
2,708,979	Reynoldson	May 24, 1955
2,712,762	Pavlik	July 12, 1955