

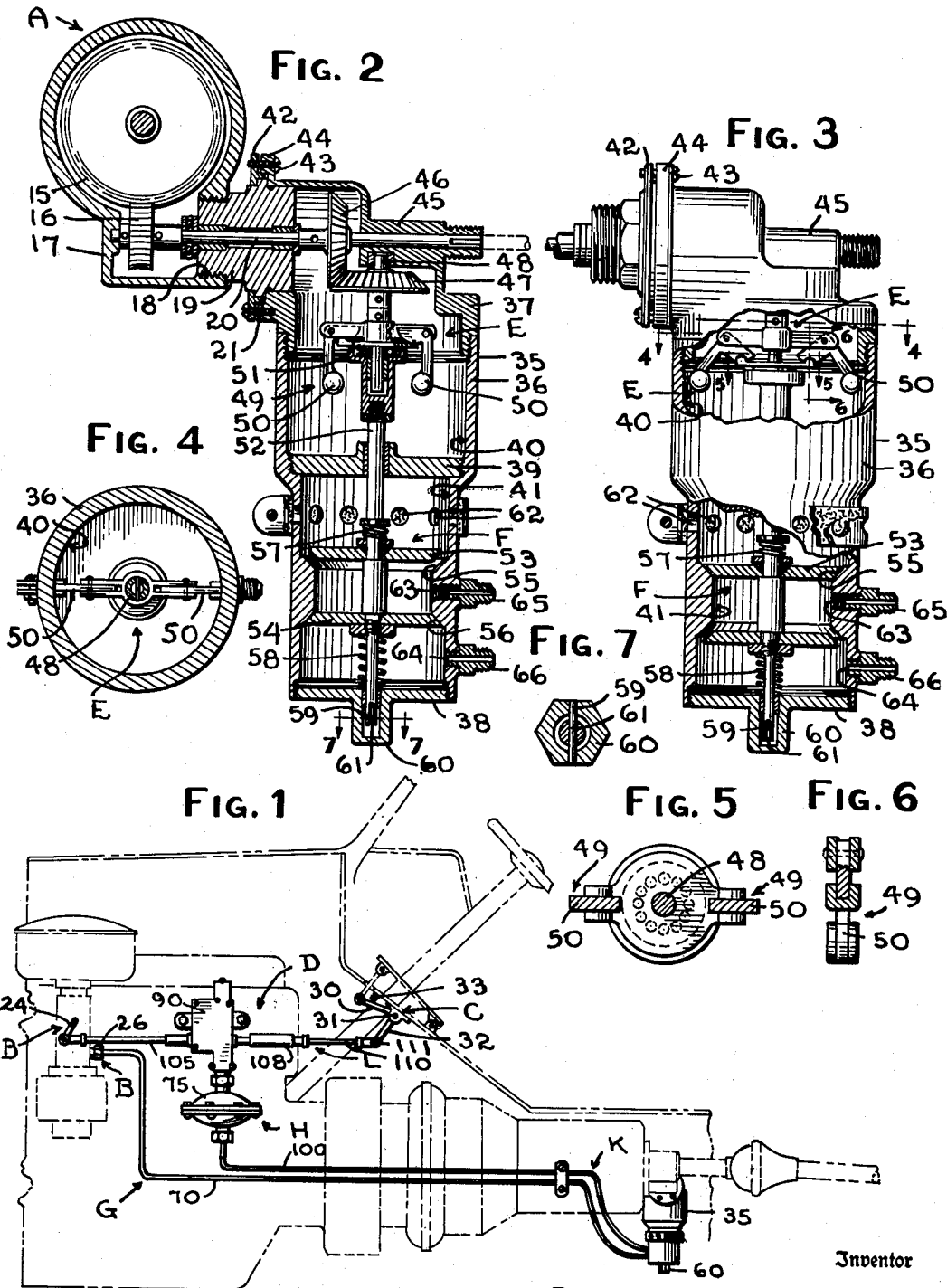
April 24, 1956

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VEHICLE SPEED REGULATORS

2,742,792

Filed May 2, 1952

2 Sheets-Sheet 1



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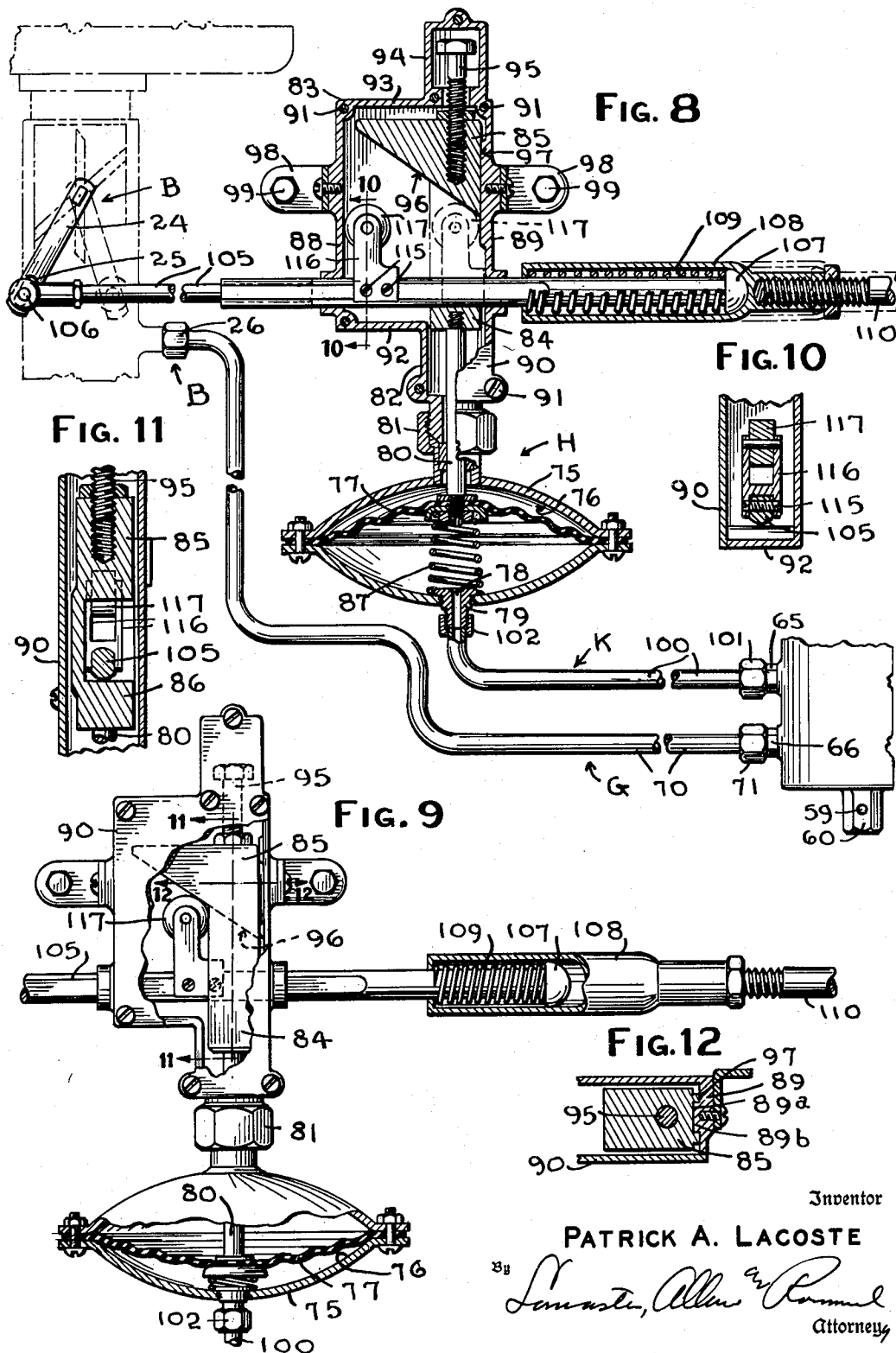
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VEHICLE SPEED REGULATORS

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9 Claims. (Cl. 74—110)

This invention relates to speed regulators, employing pneumatic means and a governor. The speed regulator of this invention has application, for example, in association with an internal combustion engine of a vehicle, its carburetor and the accelerator pedal of the vehicle.

An important object of the invention is to check automatically engine speeds in excess of a predetermined maximum by the use of a speedometer drive operated governor in conjunction with adjustable wedge and stop means to force movement of the operative connection between an accelerator pedal of a motor vehicle and the control lever of the throttle valve of the carburetor of an internal combustion engine powering the vehicle, so that the control lever will be moved to close or partly close the valve until the speed has dropped to the maximum predetermined speed.

Another important object is to provide a speedometer drive operated governor directly connected with a valve means which, in turn, pneumatically causes movement of a diaphragm associated with the wedge and stop means referred to heretofore, the several movements being smooth and quick, without great strain upon any of the parts of the new speed regulator.

A further important object is to provide a speed regulator as described, wherein the adjustment of the regulator to function as soon as an excess of predetermined speed is attained, is not complicated and may be readily made.

Still another object is to provide a speed regulator as described which is not bulky, may be mounted upon a conventional motor vehicle and its engine without any complicated problems arising as to the attachment of the regulator, all of which may be disposed mainly to one side of the engine housing.

A major object is to provide a vacuum responsive device forming a part of the new speed regulator which includes a novel wedge and stop device operating in conjunction with an abutment upon a reciprocating rod, the abutment having an arcuate face engageable with the point of the wedge and stop device so that the wedge may move over this arcuate face to force the abutment to move the rod and actuate the lever of the butterfly valve of a carburetor, the wedging providing a steady movement of the lever.

Other objects and advantages of the invention will be apparent during the course of the following detailed description of the invention, taken in connection with the accompanying drawings forming a portion of this disclosure and in which drawings:

Fig. 1 is an elevation of the new speed regulator in full lines, associated with an internal combustion engine of a motor vehicle and shown in dots and dashes.

Fig. 2 is a vertical section of a governor and valve forming a portion of the new speed regulator, with the governor at rest.

Fig. 3 is a view, partly in elevation and partly in vertical section of the governor and valve, with the governor responding to centrifugal force.

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Fig. 4 is a horizontal section of the governor, substantially on the line 4—4 of Fig. 3.

Fig. 5 is an enlarged horizontal section substantially on the line 5—5 of Fig. 3.

Fig. 6 is an enlarged fragmentary vertical section of the governor substantially on the line 6—6 of Fig. 3.

Fig. 7 is a horizontal section, substantially on the line 7—7 of Fig. 2.

Fig. 8 is a vertical section of a vacuum responsive device, associated with the new governor and valve (fragments of which, with connections, are shown in elevation) and with a carburetor (shown in dots and dashes) the vacuum responsive device being in position to cause no change in speed of the engine with which the carburetor is associated.

Fig. 9 is a view, partly in vertical section and partly in elevation of portions of the vacuum responsive device of Fig. 8 with the device in position to cause a change in engine speed.

Fig. 10 is a fragmentary vertical section, substantially on the line 10—10 of Fig. 8.

Fig. 11 is a fragmentary vertical section substantially on the line 11—11 of Fig. 9.

Fig. 12 is a fragmentary horizontal section substantially on the line 12—12 of Fig. 9.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention and wherein similar reference characters designate corresponding parts throughout the several views, the letter A designates a speedometer drive means; B, a carburetor structure of a conventional carburetor of a conventional internal combustion engine (both shown in dots and dashes in Fig. 1); C, a rocker arm of a conventional accelerator pedal (shown in dots and dashes in Fig. 1) and D, the new speed regulator, comprising a governor E, a valve F associated therewith, an operative connection G between the valve F and the air inlet manifold portion of the carburetor structure B, a vacuum responsive device H, an operative connection K between the valve F and device H, and an operative connection L between the butterfly valve lever of the carburetor structure B, rock arm C and device G.

The speedometer drive means A includes a driving gear 15, a driven pinion 16 contained within a suitable housing 17 provided with means, as screw threads 18, to detachably secure the housing 17 to the outer screw threaded end portion of a bearing 19, through which housing 17 and bearing 19 extends a driven shaft 20 constructed and arranged to have operatively coupled thereto a conventional flexible shaft extending to the operating means of a speedometer (not shown). The bearing 19 has an annular outer shoulder 21 intermediate its ends.

Referring mainly to Figs. 1 and 8, the carburetor structure B includes a conventional lever 24 adapted to rotate the butterfly throttle valve of the carburetor (both shown in dots and dashes in Fig. 8) and rocks back and forth. The lever B as in Fig. 8 is in position to close the valve and when the outer end of the lever moves clockwise, the valve opens. At its outer end, the lever B has a longitudinally extending slot 25 to receive a pin to be subsequently described. The carburetor structure also includes a coupling 26 opening into the air intake manifold.

The rocker arm C, shown in Fig. 1, of the manual control, is pivotally connected at one end portion 30 to the conventional link at the upper end of the accelerator pedal and is pivoted, intermediate its ends as at 31 to the under side of the conventional floor board. The other end portion 32 of the rocker arm C has a pivot pin accommodating opening to receive a pivot pin to be subsequently described. The end portion 30 is normally resiliently urged toward the floor board as by a contraction coil

spring 33 carried, at one end, by the floor board and secured at its other end to this portion 30.

Referring first mainly to Fig. 1, it will be seen that the new speed regulator D extends along the conventional internal combustion engine and transmission housings (shown in dots and dashes) from the carburetor to the take-off of the speedometer drive means.

The governor E and valve F are preferably contained within a single housing 35 having an elongated cylindrical wall 36, a removable end closure and sub-housing portion 37 (which is preferably connected to the wall 36 as by screw threads), an opposite removable end closure 38 (which has preferably a screw threaded connection with the wall 36), and a preferably removable partition 39, whereby there is a governor-containing chamber 40 and a valve-containing chamber 41.

To the closure and sub-housing portion 37 is detachably secured the bearing 19 in any approved way, such as by a ring 42 having a plurality of spaced-apart screw-threaded openings to receive the shanks of screws 43 which extend through suitable openings in a flange 44 of the sub-housing portion 37 with the heads of the screws bearing against this flange. The ring bears against the annular shoulder 21 of the bearing 19. This sub-housing portion 37 is provided with a bearing 45 partly for a portion of the shaft 20.

Fixedly mounted upon the shaft 20 within the sub-housing portion 37 is a drive gear (preferably a bevel gear) 46 meshing with a driven gear (also preferably a bevel gear) 47 fixedly mounted upon a shaft 48 with the adjacent end portion of the shaft 48 also journaled in the bearing 45.

Also mounted upon the shaft 48 is a governor structure 49 comprising a collar fixedly secured to the shaft 48 and provided with rigid arms extending outwardly from the collar and pivotally carrying the pendulums 50 whose rocker arms are pivoted thereto, with the inner portions of the arms adapted to bear upon and depress a thrust bearing which, in turn, is adapted to bear upon an abutment 51 when the pendulums swing outwardly as indicated in Fig. 3. The foregoing structure 45 to 50 inclusive is within the chamber 40 and comprises the governor E. The abutment 51 is fixed to the end of a reciprocating valve stem 52 and the other end portion of the shaft 48 extends through this abutment and is rotatable therein and rotatable within the adjacent end portion of this stem 52.

The valve stem 52 slidably extends through the partition 39 and mounts a pair of spaced-apart disc valve members 53 and 54. These members are bevelled at their edges and the valve 53 seats upon a seat 55 which converges toward the end closure 38 while the valve seat 56 for the valve 54 diverges toward this closure 38, but both seats are, of course, spaced from this closure 38 and are also spaced from the partition 39, being in the chamber 41. The valve members 53 and 54 are prevented from moving toward each other by spaced-apart shoulders of the valve stem 52 and the valve member 53 is resiliently urged toward its adjacent shoulder by an expansion coil spring 57 while the valve member 54 is resiliently urged toward its associated shoulder by an expansion coil spring 58 which also tends to urge the valve stem 52 toward the governor structure 49 and the valve member 54 to seat upon the seat 56, whereupon the valve member 53 is unseated (as in Fig. 2). As the abutment 51 is moved by the pendulums 50 (which, of course, causes movement of the valve stem 52), the valve member 53 seats and the member 54 is unseated (as in Fig. 3).

The tension on spring 58 may be varied by adjustments of the end closure 38 with respect to the wall 36. This is effected by a pin 59 extending through a hollow wrench-receiving projection 60 at the end of the closure 38. This pin 59 extends into a slot 61 in the end portion of the valve stem 52 (normally when the valve

member 53 is unseated this pin 59 is near the open end of the slot 61). Since one end of the spring 58 bears against the inner face of the closure 38, by screwing the latter farther into the chamber 41, tension on the spring 58 is increased and when this closure 38 is screwed in the opposite direction, tension on the spring will be decreased.

Breather opening 62 in the wall 36 opening into the chamber 41 between the valve member 53 and partition 39 are preferably provided and these may be protected by conventional filtering material, as a band of compressed fibres extending about the outer surface of the wall 36 to cover these openings 62.

There is provided an air port 63 through the wall 36 into the chamber 41 between the two valve members 53 and 54 and an air port 64 through the wall 36 into that portion of the chamber 41 between the valve member 54 and closure 38. This last portion of the chamber may be called the vacuum chamber. Each port is provided with a suitable screw threaded nipple 65 and 66 respectively for receiving portions of the operative connections G and K, and the structure 51 to 66 constitutes the valve F.

The operative connection G between the valve F and the coupling 26 of the carburetor structure B, comprises a conduit 70 opening into the port 64 with a coupling 71 to detachably secure one end portion of this conduit to the nipple 66.

Referring mainly to Figs. 1 and 8 to 12, the vacuum responsive device H includes a preferably two-piece housing 75 defining a diaphragm-containing chamber 76 and clamping a suitable diaphragm 77 dividing the chamber into two parts and with a port 78 opening into one part and surrounded by a suitable nipple 79. Conventionally connected to the axial center of the diaphragm is a reciprocating rod 80 extending through an opening in the housing 75 directly opposite the port 78 and also through a coupling 81 which detachably connects the housing 75 to one end portion 82 of a housing 83. This end portion 82 provides a well for slidably accommodating a reciprocating L-shaped portion 84 (shown especially in Fig. 11) of a reciprocating member or combined wedge and movable stop 85 with the leg 86 of the portion 84 detachably secured to the end portion of the rod 80 opposite the attachment of the latter to the diaphragm 77. Normally, a small part of the leg 86 is within this well, as in Fig. 8, but the entire leg may move into the well, as in Fig. 9, carrying with it the remainder of the wedge and movable stop which, however, remains within the major portion of the housing as is clear in Figs. 8 and 9.

In order to restore the wedge and movable stop 85 to the position shown in Fig. 8, an expansion coil spring 87 bears at one end against a conventional cup secured to the opposite end of the rod 80 where the latter projects through the center of the diaphragm 77 and the other end of this spring bears against the wall of the diaphragm housing 75.

Referring again to the housing 83, the same is provided with opposite end walls 88 and 89 and one side wall 90 is removable, as a plate, to expose the interior of the housing. This wall 90 may be secured to the rest of the housing as by screw means 91. There is also a wall 92 into which the well of the end portion 83 opens, and a wall 93 opposite the wall 92. The walls 88 and 89 are each provided with a polygonal-shaped opening preferably slightly above the wall 92 with the two openings aligned to slidably receive portions of a reciprocating rod of the operative connection L to be subsequently described, and the wall 93 has an opening extending from the interior of the housing to the interior of a cap or second end portion 94 of the housing 83 to slidably receive the shank of a movement limiting means connected with the wedge and movable stop 85. This means may be a screw 95 with its screw-threaded

shank extending into a screw threaded socket in the wedge and stop 85, with the head of the screw movable within the cap 94.

The wedge and movable stop 85, with the exception of the L-shaped portion 84, is triangular in vertical section, as in Fig. 8, whereby there is a face or surface 96 which is inclined from the wall 93 toward the wall 89 with this face facing toward the walls 88 and 92. This face 96 may be inclined about 30° from the horizontal. The vertical face 97 of the stop may be grooved as at 89^a in Fig. 12 with the wall 89 having a tongue 89^b extending into the groove, providing a slideway for the wedge and stop 85.

The housing 83 may be detachably secured to the internal combustion engine housing as by a bracket 98 of the housing 83 and suitable screws 99.

The operative connection K between the valve F and device H, is a conduit 100 with one end portion coupled, as by the coupling 101, to the nipple 65 and the other end portion coupled, as by the coupling 102, to the nipple 79.

Referring to Figs. 1 and 8 to 10, the operative connection L between the lever 24 of the carburetor structure B and the rocker arm C of the accelerator includes a reciprocating rod or controlled member 105 with one end portion pivotally connected, as by pin 106 to the lever 24 at the slot 25. The intermediate portion of the rod 105 is polygonal in transverse section, as in Fig. 11 and this portion slides through the aligned polygonal-shaped openings of the walls 88 and 89. The other end portion of the rod 105 beyond the polygonal portion thereof is provided with an enlarged head 107 enclosed in a lost motion device housing 108, into which the said other end portion extends and this end portion is surrounded by an expansion coil spring 109 with one end bearing against the head 107 and the other end bearing against the end wall of the housing from which the rod 105 extends. The lost motion device operates as in Fig. 9.

The housing 108 is detachably secured to one end portion of a rod 110 which is pivotally connected as by pin 111 (Fig. 1) to the end portion 32 of the rocker arm C and they, too, constitute parts of the manual control.

Secured, as by screws 115, to the rod 105 at the portion within the housing 83 is an upwardly-extending bracket 116 mounting an abutment 117 disposed on a substantially horizontal axis, and providing an abutment. From Fig. 8 will be seen that, when the wedge and movable stop 85 is in the extreme upper position, the abutment 117 may move across the housing from wall 88 to wall 89 or vice versa but when the wedge and movable stop starts to descend it will engage the arcuate face of the abutment 117 and act as a wedge to force the abutment 117 to the left, as in Fig. 8, and, consequently, the rod 105 will also move to the left, causing a gradual closing of the butterfly valve attached to the lever 24. When this roller is in the dot-and-dash position in Fig. 8, the butterfly valve is fully open, while the full-lines position in Fig. 8 indicates the butterfly valve is fully closed. In Fig. 9, the descending stop 85 has moved the abutment 117 to a position intermediate the walls 88 and 89 and the butterfly valve is partly closed.

As the speed of the internal combustion engine increases, the valve member 53 will seat and valve member 54 will unseat. This will cause a vacuum to be created in that part of the chamber 76 (of the diaphragm housing 75) below the diaphragm and cause it to be drawn downwardly, as to the position shown in Fig. 9, wedging and stopping the abutment 117 as described.

By the removal of the side wall 90, the manipulation of the screw 95 adjustment of the extent to which the wedge and stop 85 may descend is effected, and the removal of the wall 90 makes lubrication of the structure within the housing 83 easy.

Various changes may be made to the form of the invention herein shown and described without departing from the spirit of the invention or scope of the claims.

What is claimed is:

1. In apparatus for interconnecting a manual control and an automatic control of a mechanism, a controlled member, an abutment carried by said controlled member, a housing containing said abutment, and wedge and stop means, including a combined wedge and stop within said housing and slidable over the inner face of an outer wall of said housing, to automatically move said controlled member responsive to changes in the movement of said automatic control when said combined wedge and stop contacts said abutment and wedges between said abutment and said outer wall.

2. Apparatus as defined in claim 1, characterized in that said abutment is a cylinder with its periphery engaged by said wedge and stop.

3. Apparatus as defined in claim 1, characterized in that said abutment and said wall are upstanding, said abutment is a cylinder with its periphery engaged by said wedge and stop, and the point of said wedge moves in upward and downward paths.

4. Apparatus as defined in claim 1, characterized in that said abutment and said wall are upstanding, said abutment has a cylindrical outer face, engaged by said wedge and stop, the point of said wedge moves in upward and downward paths, and means is provided to manually limit the extent of movement of said wedge and stop in one direction.

5. Apparatus as defined in claim 1, characterized in that said abutment moves in substantially a straight path and said housing has opposite walls disposed in the path of travel of said abutment.

6. Apparatus as defined in claim 1, characterized in that said abutment moves in substantially a straight path, said wedge and stop moves in a path normal to the path of said abutment and said housing has opposite walls disposed in the path of travel of said abutment.

7. Apparatus as defined in claim 1, characterized in that said abutment moves in substantially a straight path, said wedge and stop moves in a path normal to the path of said abutment, said housing has opposite walls disposed in the path of travel of said abutment, and means is provided to manually limit the extent of movement of said wedge and stop in one direction.

8. Apparatus as defined in claim 1 characterized in that said housing includes a well, and said combined wedge and stop includes an L-shaped portion extending about a portion of said controlled member and slidable in said well, and said automatic control is secured to said L-shaped portion.

9. Apparatus as defined in claim 1 characterized in that said abutment is adapted to contact a portion of said outer wall, said housing includes a well, and said combined wedge and stop includes an L-shaped portion extending about said abutment when said abutment is in contact with said portion of said outer wall, and said L-shaped portion also extends about a portion of said controlled member and slidable in said well, and said automatic control is secured to said L-shaped portion.

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