

[54] **INTEGRATED ANTI-STALL AND IDLE-SPEED ADJUSTMENT MECHANISM**
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[51] Int. Cl.F02d 11/08, F02m 19/12, F16f 3/07
[58] Field of Search123/103 E; 261/DIG. 18; 267/175, 177, 170; 188/298, 304, 305, 303

2,862,702	12/1958	Emerson.....	188/298 X
2,966,351	12/1960	Scholz.....	188/298 X
3,081,847	3/1963	Smitley.....	188/298
3,266,791	8/1966	Emerson.....	267/175

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[57] **ABSTRACT**

An integrated anti-stall and idle-speed adjustment mechanism for an internal combustion engine including a dashpot means for arresting or time delaying the final closing movement of an engine throttle valve to prevent stalling of the internal combustion engine. This dashpot includes adjustment means for setting the stroke of the dashpot and for stopping the closing movement of the throttle valve to thereby set the idle speed position of the throttle and the internal combustion engine.

7 Claims, 4 Drawing Figures

[56] **References Cited**
UNITED STATES PATENTS
2,741,474 4/1956 Babitch.....188/298 X

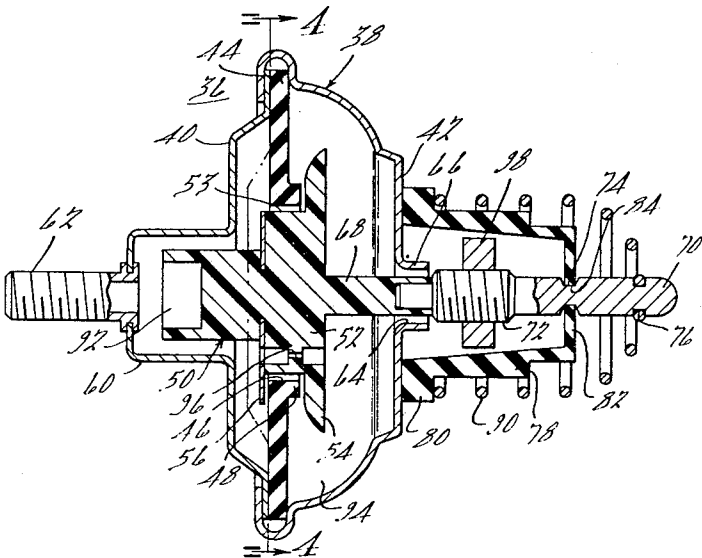


FIG. 1.
Prior Art.

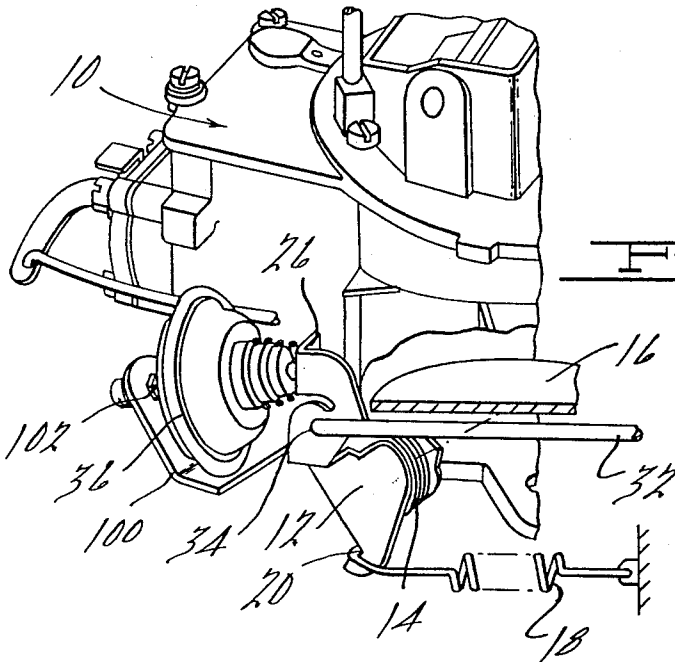
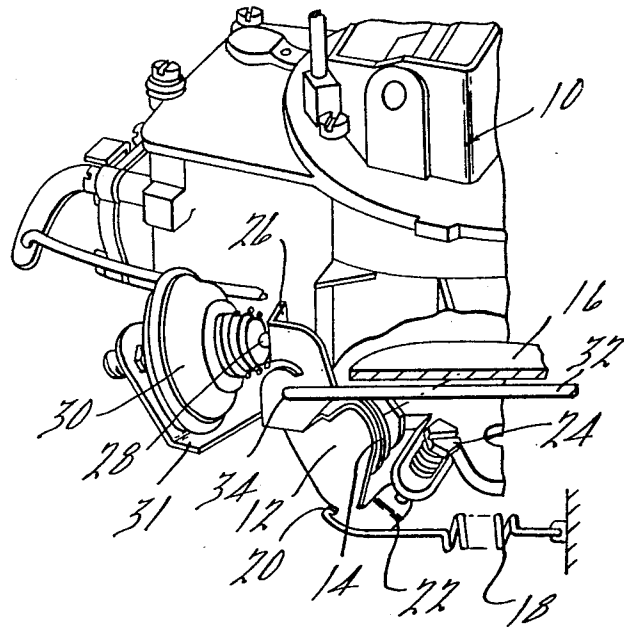


FIG. 2.

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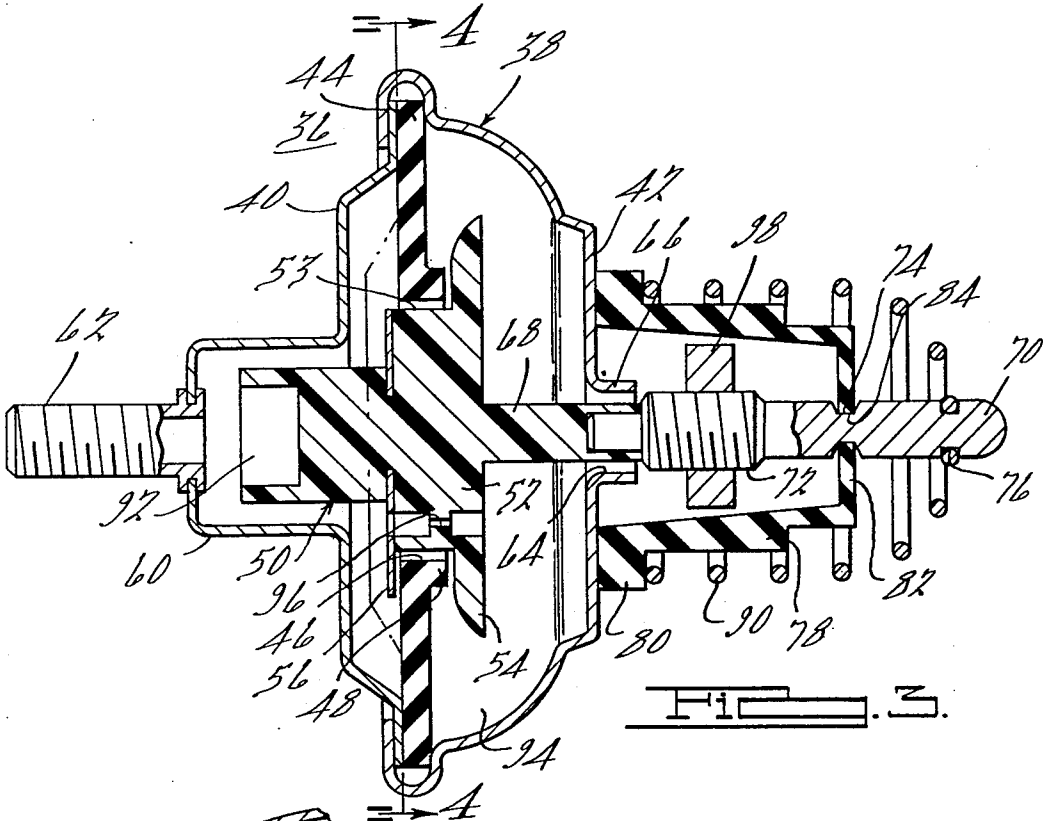


Fig. 3.

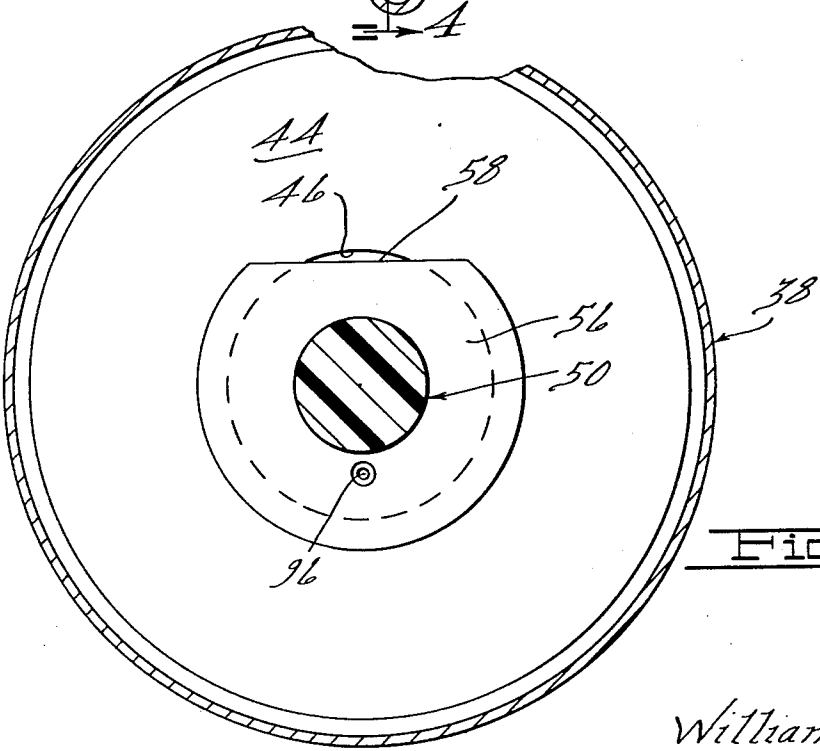


Fig. 4.

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INTEGRATED ANTI-STALL AND IDLE-SPEED ADJUSTMENT MECHANISM

BACKGROUND OF THE INVENTION

Current day automotive vehicles, particularly those employing automatic transmissions, use a dashpot to arrest or time delay the final closing movement of the engine throttle valve located in the carburetor of the engine to prevent stalling during deceleration. This stalling is caused by the sudden decrease in the intake manifold pressure when the throttle is closed, which vaporizes condensed fuel collected on the inner surface of the manifold during normal engine operation. This vaporized fuel, together with the decrease in the air supply, creates a fuel mixture which is far too rich to burn properly. The above described dashpot arrangement, which causes a time delay in the final closing movement of the engine throttle, produces an air-fuel mixture that may be properly burned by the internal combustion engine, thereby preventing the stalling action.

Nearly all of the carburetors employed with current day internal combustion engines have an idle-speed adjusting screw, which is employed to set the idle speed of the internal combustion engine when it has reached normal operating temperatures. The present invention provides an integrated anti-stall and idle-speed adjustment mechanism which is inexpensive, uncomplicated and reliable. This mechanism performs the anti-stall function described above and also sets the normal idle speed of the engine.

SUMMARY OF THE INVENTION

In the invention, a throttle valve, rotatably mounted on a shaft in a carburetor, controls the fuel supply to an internal combustion engine. This shaft has a lever fixed thereto and a biasing means is coupled to the lever for biasing the throttle valve toward the closed position. A dashpot, including a casing, is mounted on the carburetor adjacent one end of the lever. This dashpot includes a plunger reciprocably mounted therein and means for biasing the plunger towards one end of the lever. Means are carried by the plunger and are engageable with the casing for setting the stroke of the dashpot and for stopping the closing movement of the throttle valve against the force of the biasing means, thereby determining the idle speed position of the engine.

In the preferred embodiment of the invention, the mechanism for accomplishing the anti-stall and idle-speed adjustment functions comprises a casing, with a flexible diaphragm dividing the casing into two chambers. A plunger is coupled to and supported by this diaphragm and the plunger extends through an opening in the casing. Means are provided which engage the plunger and the casing for biasing the plunger outwardly through this opening. Means are also provided in the structure for causing restricted fluid flow from the chamber opposite the opening to the chamber adjacent the opening as the plunger is moved inwardly through this opening. An adjustable means, preferably in the form of a threaded nut, threaded on the plunger is engageable with the casing for setting the stroke of the plunger, and, thus, the time delay of the anti-stall function. This adjustable means also provides a positive stop with respect to the movement of the plunger inwardly into the casing, thereby providing an engine idle stop for the lever attached to the throttle valve.

Thus, the present invention has the advantage that it eliminates the idle-speed adjustment screw currently employed with automotive vehicle internal combustion engines, and provides a mechanism in which the setting of the stroke of an anti-stall dashpot automatically sets the position of the idle speed stop and, hence, the idle speed of the internal combustion engine.

An object of the present invention is the provision in an internal combustion engine of an integrated anti-stall and idle-speed adjustment mechanism.

A further object of the invention is the provision of a dashpot mechanism for an internal combustion engine which not

only serves as a means for preventing engine stalling as the throttle is moved toward the closed position, but also provides a means for setting the idle speed of the engine.

Another object of the invention is the provision of an integrated anti-stall and idle-speed adjustment mechanism in which the stroke of the anti-stall dashpot may be adjustably set and the setting of this stroke, in turn, determines the correct engine idle speed.

Still another object of the invention is the provision of a dashpot mechanism associated with the throttle valve of an internal combustion engine for providing a time delay for the closing of the throttle valve in which the fully compressed position of this dashpot serves as a throttle stop for setting and determining engine idle speed.

Other objects and advantages of the present invention will become apparent when the specification is considered in connection with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of prior art carburetors employing an anti-stall dashpot and a separate idle speed adjusting screws;

FIG. 2 is a perspective view, partially in section, of a carburetor, including the improvements of the present invention;

FIG. 3 is a longitudinal sectional view through the integrated anti-stall and idle-speed adjustment mechanism of the present invention; and

FIG. 4 is a sectional view taken along the lines 4—4 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in which like reference numerals designate like parts throughout the several views thereof, there is shown in FIG. 1 a typical prior art carburetor 10 for an internal combustion engine. This carburetor 10 includes a throttle valve actuating lever 12 which is connected to a shaft 14 rotatably mounted in the carburetor 10 to operate the throttle valve 16. The lever 12 has a tension spring 18 connected at 20 to bias the throttle 16 towards its closed position.

The lever 12 has an inwardly extending portion 22, located at one end thereof, which engages an idle-speed adjusting screw 24. This idle-speed adjusting screw is adjusted to set the idle speed of the internal combustion engine during normal engine operations, i.e., when the internal combustion engine has reached normal operating temperatures.

The other end of the lever 12 has an inwardly extending portion 26 adapted to engage a plunger 28 on an anti-stall dashpot 30, which is mounted on the carburetor 10 by means of a bracket 31. The inwardly extending portion 26 engages the plunger 28 under the impetus of the tension spring 18 during engine deceleration or engine throttle closing action prior to the time that the inwardly extending portion 22 of lever 12 engages the idle-speed adjusting screw 24. The dashpot 30 is arranged to give a time delay, for example, on the order of 2.5 seconds, between the time that the inwardly extending portion 26 of lever 12 first engages the plunger 28 and the time the inwardly extending portion 22 engages the idle-speed adjusting screws 24. This time delay prevents the stalling of the engine by preventing the overly rich mixture in the intake manifold described previously.

The lever 12 and, hence, the throttle valve 16, is operated by an accelerator link 32, which is connected to the lever 12 at 34. This accelerator link 32 is moved to the right, as shown in FIG. 1, to open the throttle valve 16 against the bias of the tension spring 18. When the link 32 is released by reducing the pressure on an accelerator peddle (not shown) located in the passenger compartment of the vehicle, the tension spring 18 rotates the lever 12 and, hence, the throttle valve 16 towards the closed position.

The present invention, as shown in FIGS. 2, 3, and 4, provides an integrated anti-stall dashpot and idle-speed adjust-

ment mechanism, which eliminates the need for the idle-speed adjusting screw, shown in FIG. 1. It includes means which will simultaneously provide for proper time delay, or setting of the stroke of the dashpot, and for setting of the idle-speed stop for proper engine idle speed.

The integrated anti-stall and idle-speed adjustment mechanism is shown in detail in FIGS. 3 and 4, and is generally designated by the numeral 36. It includes a housing or casing 38, formed by two sheet metal casing members 40 and 42, which peripherally clamp a flexible diaphragm 44 that may be formed of synthetic rubber. This flexible diaphragm 44 has an inner circular aperture 46 and a thickened axial lip 48 is formed integrally therewith at the inner peripheral surface of the aperture 46. A plunger 50, which may be conveniently formed of a plastic material, includes a central body portion 52 having an outer peripheral surface 53 fitting within the central aperture 46 in the flexible diaphragm 44 in a loose-fit relationship. The plunger 50 also has a radially outwardly extending lip 54, which is adapted to engage the axially extending portion 48 of the flexible diaphragm 44 when the plunger is moved from the right to the left as shown in FIG. 3. In addition, the body portion 52 of the plunger carries a metallic disc 56, which may be generally annular in configuration with a flattened section 58. This flattened section 58 will permit the flow of air through the space between the outer peripheral surface 53 of the plunger 50 and the axial lip 48 of the flexible diaphragm 44 when the plunger 50 is moved from the left to the right, as shown in FIG. 3.

The casing member 40 has a reduced axially extending portion 60 for receiving a portion of the plunger 50 during its movement, and this axially extending reduced portion 60 has a bolt 62 suitably affixed thereto. The other casing member 42 has a central aperture 64 positioned therein and an axially extending lip 66 formed about this aperture 64. The plunger 50 includes a reduced portion 68 which extends through the aperture 64. The plunger 50 also includes a metallic portion 70, which may be press fitted within the reduced portion 68. This metallic portion 70 has threads 72 located thereon, adjacent the aperture 64 in the casing member 38, as well as a first groove 74 and a second groove 76 located therein.

A generally cylindrical or cup-shaped elastomeric sealing boot 78 has one end enlarged to provide a radially extending flange 80, which engages the casing member 42. The other end of the elastomeric sealing boot 78 includes an inwardly extending annular flange 82 which has a central aperture 84 sized to be complementary in size with the groove 74 so that the flange 82 is trapped within the groove 74.

A helical compression spring 90 has one end thereof positioned against the radially extending flange 80 of the elastomeric sealing boot 78, and the other end thereof positioned and affixed in the groove 76 located within the metallic portion 70 of the plunger 50.

The flexible diaphragm 44 and the plunger 50 divide the casing 38 into two chambers 92 and 94. Means are provided for causing restricted fluid flow from the chamber 92 to the chamber 94 as the plunger 50 and the inner portion of the flexible diaphragm 44 are moved from the right to the left, as shown in FIG. 3. This means is shown in the form of a restrictor 96 positioned in the central body portion 52 of the plunger 50, but obviously any means for causing such restricted fluid flow may be employed.

An adjustable means, preferably in the form of a nut 98, is threaded on the threads 72 of the metallic portion 70 of plunger 50. This adjustable means is adapted to engage the axially extending flange 66 on the casing member 38 to limit, or set, the stroke, of the plunger 50 within the casing 36.

The helical compression spring 90 biases the plunger 50 to the right, as shown in FIG. 3, to thereby set the plunger 50 and, particularly, the metallic portion 70 to its outermost position with respect to the aperture 64 positioned within the casing member 38. During this movement air may flow readily from the chamber 94 into the chamber 92 through the space between the outer peripheral surface 53 of the plunger 50 and

the axially extending lip 48 of the flexible diaphragm 44 in the vicinity of flattened portion 58 of the metal disc 56. As a result, there is little resistance to the movement of the plunger 50 from the left to the right as shown in FIG. 3. The movement of the plunger 50 in this direction and, hence, the outward position of the end of the metal portion 70 thereof is limited by the radially extending flange 54 coming into engagement with the complementary portion of the casing member 42.

As shown in FIG. 2, the integrated anti-stall and idle-speed adjustment mechanism 36, shown in FIGS. 3 and 4, is mounted on carburetor 10 in the same position as the dash-pot 30, shown in the prior art example of FIG. 1. This may be accomplished by a bracket 100 of substantial construction which has an aperture 102 receiving the bolt 62 on the casing member 40. The end of the metallic portion 70 of the plunger 50 is positioned to engage the inwardly extending portion 26 of the lever 12. It can be readily appreciated from an inspection of FIG. 2 that the idle-speed adjusting screw shown in the prior art example of FIG. 1 has been eliminated.

In operation, when the internal combustion engine associated with the present invention has been started and the throttle valve 16 has been moved to an open position, as a result of the movement of the accelerator link 32 to the right, as shown in FIG. 2, the inwardly extending portion 26 of the lever 12 will come out of engagement with the end of metallic portion 70 of plunger 50. Consequently, the plunger 50 and the flexible diaphragm 44 will move to the right, as shown in FIGS. 2 and 3, to the point where the radially extending flange 54 in the main body portion 52 of the plunger 50 engages the casing member 42.

After the internal combustion engine, which is associated with the present invention, reaches normal operating temperatures, so that the fast idle mechanism associated therewith is no longer operative, the integrated anti-stall and idle-speed adjustment mechanism of the present invention will provide a proper time delay upon the closing of the throttle valve 16 when the accelerator link 32 is released during deceleration of the vehicle. The actual stroke of the plunger 50 is set by the adjustment of the adjusting means 98 on the threads 72 of metallic portion 70. As the lever 12 is rotated counter-clockwise, as shown in FIG. 2, under the impetus or bias of tension spring 18, the inwardly extending portion 26 thereof will come into engagement with the end of metallic portion 70 of plunger 50, thereby forcing the plunger 50 to the left, as shown in FIG. 3. This action has a certain time delay caused by the restricted fluid flow from chamber 92 to chamber 94, for example, through the restrictor 96. The adjusting means 98 will then come into engagement with the axially extending flange 66 formed in the casing member 42, thereby providing an adjustable stop for the plunger 50. It can also be appreciated that the idle position setting of the throttle 16 will be at a position commensurate with the position of the plunger 50 when the adjusting means 98 engages the axially extending flange 66.

Adjustment of the adjustment means 98 not only sets the idle speed of the engine, but also sets the stroke of the plunger 50 to provide the proper time delay of the closing of the throttle 16 to prevent stalling during deceleration or throttle closing operations. Thus, by means of one adjustment, i.e., adjustment of the adjusting means or nut 98, proper idle speed of the internal combustion engine is set and the proper time delay for anti-stall action is set.

Thus, the present invention provides an extremely uncomplicated mechanism which eliminates the normal idle screw in conventional internal combustion engine carburetors and also provides a mechanism in which one adjustment will properly set the stroke or time delay of an anti-stall dashpot and the idle speed of an internal combustion engine.

What is claimed is:

1. In a carburetor for an internal combustion engine, the combination comprising a throttle valve, a shaft supporting said throttle valve rotatably mounted in the carburetor, said shaft having a lever affixed thereto, biasing means affixed to

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said shaft for biasing said throttle valve toward a closed position, a dashpot including a casing mounted on said carburetor adjacent one end of said lever, said dashpot including a plunger reciprocally mounted therein and means for biasing said plunger toward the one end of said lever, and means carried by said plunger and engageable with said casing for setting the stroke of said dashpot and for stopping the closing movement of said throttle valve against the force of said biasing means thereby determining the idle speed position of said throttle.

2. The combination of claim 1 in which said last mentioned means comprises a threaded portion on said plunger located externally of said casing, and an adjustable nut positioned on said threaded portion.

3. The combination of claim 1 in which said dashpot includes means for causing a predetermined time delay in the movement of the throttle valve between a position where the end of said lever first engages said plunger during throttle closing operations and the idle speed position of said throttle.

4. An integrated anti-stall and idle-speed adjustment mechanism comprising a pair of casing members, a diaphragm peripherally clamped between said casing members to form two separate fluid chambers, a plunger coupled to and supported by said diaphragm and extending through an opening in one of said casing members, means engaging said plunger and one of said casing members for biasing said plunger outwardly through said opening, means for causing restricted

fluid flow from one side of said diaphragm to the other as said plunger is moved inwardly through said opening, and adjustable stop means positioned on said plunger exteriorly of said casing members and engageable with one of said casing members for limiting the extent of plunger movement inwardly through said opening.

5. The combination of claim 4 in which said adjustable stop means comprises a threaded nut positioned on a threaded portion of said plunger.

6. An integrated anti-stall and idle-speed adjustment mechanism for an internal combustion engine comprising a fluid tight casing, a flexible diaphragm dividing said casing into two chambers, a plunger coupled to and supported by said diaphragm, said plunger extending through an opening in said casing, means engaging said plunger and said casing for biasing said plunger outwardly through said opening, means for causing restricted fluid flow from the chamber opposite said opening to the chamber adjacent said opening as said plunger is moved inwardly through said opening, and adjustable means on said plunger and engageable with said casing for setting the stroke of said plunger and flexible diaphragm and for setting the idle speed of the internal combustion engine.

7. The combination of claim 6 in which said adjustable means comprises a threaded nut positioned on a threaded portion of said plunger.

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