April 1, 1958 H. L. HARTZELL ET AL 2,828,725

ENGINE GOVERNOR

Filed Nov. 22, 1954

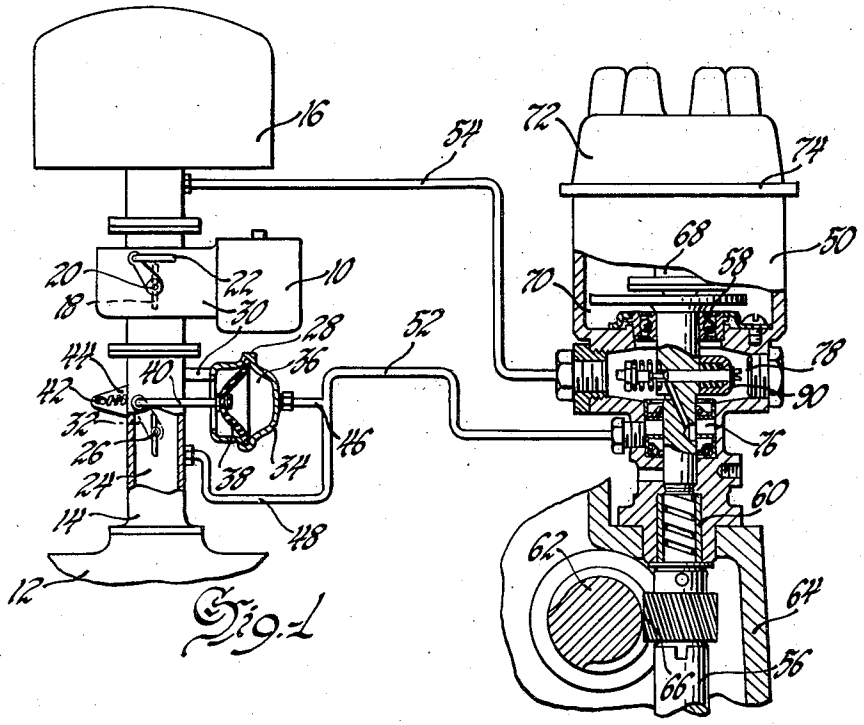


Fig. 1

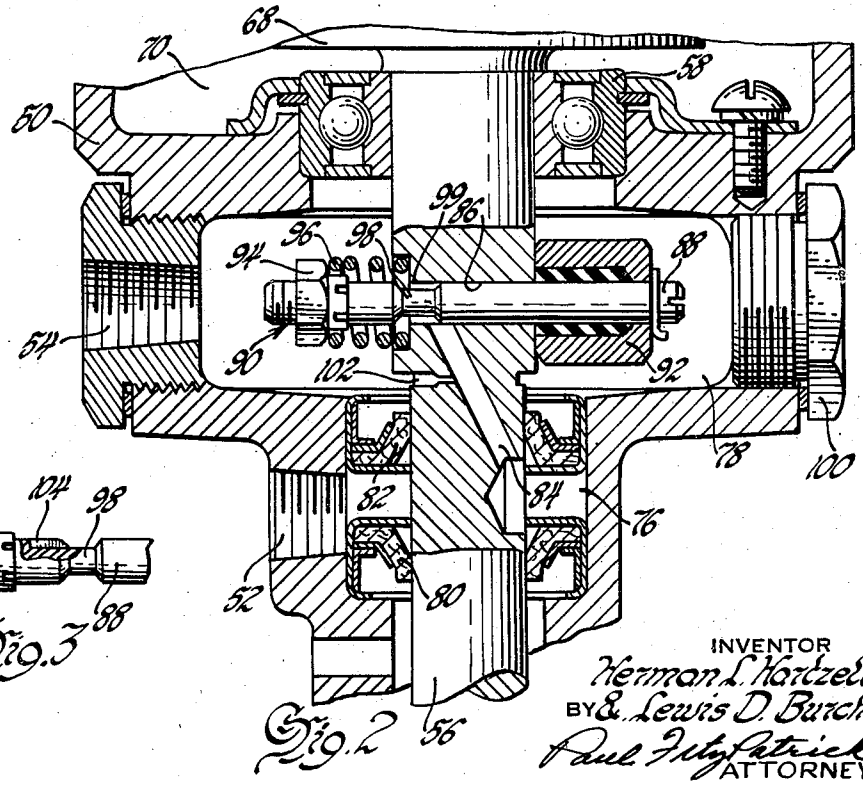


Fig. 2

Fig. 3

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2,828,725

Patented Apr. 1, 1958

2,828,725

ENGINE GOVERNOR

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Application November 22, 1954, Serial No. 470,201

3 Claims. (Cl. 123—103)

This invention relates to engine governors and more particularly to a speed control for an internal combustion engine.

An object of the invention is to provide an engine governor of simple and inexpensive construction that utilizes the existing parts of the engine to as great an extent as is possible. Another object of the invention is to provide an engine governor that will maintain the engine at predetermined speed with minimum speed variation despite abrupt changes in load. A further object of the invention is to provide an engine governor that is adjustable to govern the engine over a wide range of predetermined speeds and that will function effectively throughout the governing range.

The invention is an improvement on Patent 2,664,867, Engine Governor, issued January 5, 1954 to the assignee of the present invention.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a partial elevation, partially broken away, of an internal combustion engine incorporating the invention;

Figure 2 is an enlarged partial section of a portion of Figure 1; and

Figure 3 is a partial view, partially broken away, of a portion of Figure 2 illustrating a modified form of the invention.

Referring to Figure 1, a carburetor 10 mounts on the engine intake manifold 12 through an intermediate governor duct 14 and carries an air cleaner 16. A butterfly throttle valve 18 is supported in the carburetor barrel by a shaft 20 to determine fuel-air flow to the engine below the governed speed in accordance with the position of the manual throttle control 22. An air balanced butterfly throttle valve 24 is supported in the governor duct 14 by a shaft 26 to determine fuel-air flow to the engine in accordance with engine load to maintain the engine at predetermined governed speed when the carburetor throttle valve 18 is sufficiently open for the engine governor to assume control.

Actuation of the governor throttle valve 24 is accomplished by a servomotor 28 that is supported on a duct lug 30 and that connects to a crank arm 32 of the throttle valve. The servomotor 28 includes a cylinder 34 that forms a collapsible chamber 36 with a flexible wall 38 which carries a link 40 pivotally connected to the crank arm 32 and biased to governor valve opening direction by a tension spring 42 connected between the crank arm 32 and a duct lug 44.

A conduit 46 connects the collapsible chamber 36 to the governor duct 14 on the engine side of the governor throttle valve by way of a suction conduit 48 and to the air cleaner 16 by way of an ignition distributor housing 50 and air bleed conduits 52 and 54. The servomotor chamber 36 does not have a conduit connection to the engine intake passage between the carburetor throttle valve and the governor throttle valve in contrast to many present day engine governors.

A distributor shaft 56, journaled in the housing 50 by a sealed ball bearing 58 and a sleeve bearing 60, engages a camshaft 62 in the engine block 64 through a worm and pinion drive 66. The shaft carries a distributor rotor 68 in the distributor chamber 70 which is covered by a distributor cap 72 releasably flanged at 74 in such manner as to allow ventilation of the chamber.

Referring to Figure 2, the distributor housing 50 includes annular chambers 76 and 78 about the distributor shaft 56 that are separate from each other and from the upper chamber 70. The chamber 76 communicates with the air bleed conduit 52 and is cut off from communication with the engine block interior and the chamber 78 by axially spaced shaft seals 80 and 82. The chamber 78 communicates with the air bleed conduit 54 and is cut off from communication with the chamber 70 by the sealed ball bearing 58. A diagonal passage 84 in the distributor shaft 56 provides the only communication between the chambers 76 and 78.

The diagonal shaft passage 84 communicates with a diametrical shaft passage 86 that receives the stem 88 of a centrifugally unbalanced valve 90. A weight 92 is secured on one end of the valve stem 88 and a nut 94 is adjustably threaded on the other end. A compression spring 96 encircles the valve stem 88 and engages the nut 94 and distributor shaft 56. The valve stem 88 is necked at 98 to provide a variable area orifice 99 for the shaft passage 86. A threaded plug 100 provides access to the chamber 78 for adjustment of the nut 94 to increase or decrease the compression of the spring 96 and thereby determine the governed speed of the engine. The centrifugal valve 90 is provided to control the amount of air bleed to the vacuum servomotor 28 and thereby vary the position of the governor throttle valve 24 to keep the engine at the governed speed. Air flow through the variable area orifice 99 does not bias the centrifugal valve 90 so the movement of the valve is solely in accord with engine speed.

With the engine under governor control, the centrifugal valve 90 decreases air bleed to the servomotor 28 on momentary engine acceleration due to falling load thereby occasioning increased vacuum in the servomotor chamber 36 which overbalances the servomotor spring 42 and moves the governor throttle valve 24 toward closed position reducing fuel-air flow to the engine to decelerate the engine to governed speed. Conversely, the centrifugal valve 90 increases air bleed on momentary engine decelerations due to increased loads thereby occasioning decreased vacuum in the servomotor chamber 36 which is overcome by the servomotor spring 42 which moves the governor throttle valve 24 toward open position increasing fuel-air flow to the engine to accelerate the engine to governed speed. Sharper operation of governor control is achieved by having both the governor throttle valve 24 and the governor speed valve 90 air balanced, i. e., unbiased by air flow past the valves.

The governor as thus far described operates somewhat unsatisfactorily as the centrifugal valve 90 of Figure 2 entirely cuts off the air bleed through the orifice 99 to the servomotor 28 on large and sudden load decreases causing overtravel of the governor throttle valve 24 toward closed position. To avoid the resulting hunting condition, the centrifugal valve 90 is provided with a restricted air bleed by-pass passage 102 that is located diametrically in the distributor shaft 56 to permit a small and measured flow of air from the distributor chamber 78 to the distributor chamber 76. An alternate means of accomplishing a controlled continuous air bleed from the distributor chamber 78 to the distributor chamber

76 is shown in Figure 3. An axial slot 104 is milled in the centrifugal valve stem 88 to extend radially outward from the necked portion 98 and thereby insure a measured flow of air past the variable area orifice 99 in any position of the centrifugal valve 90. The distributor shaft passage 102 is omitted in the form of the invention shown in Figure 3.

While the preferred embodiment of the invention has been described fully in order to explain the principles of the invention, it is to be understood that modifications of structure may be made by the exercise of skill in the art within the scope of the invention which is not to be regarded as limited by the detailed description of the preferred embodiment.

We claim:

1. A governor for an internal combustion engine having inlet passage means for supplying fluid for operating said engine and comprising a throttle in said inlet passage means for controlling the supplying of said fluid, means connected to said throttle and tending to open said throttle, a fluid actuated servomotor connected to said throttle and to said inlet passage means on the engine side of said throttle and tending to close said throttle against said means, air supply passage means connected to said servomotor and tending to supply air to said servomotor to oppose the closing of said throttle by said servomotor, valve means in said air supply passage means for controlling the air supplied to said servomotor, means responsive to the speed of said engine for moving said valve means toward closed position in said air supply passage means as the speed of said engine increases, and by-pass passage means in said air supply passage means and providing air bleed means around

said valve means as said valve means moves toward said closed position in said air supply passage means, said air bleed means having inlet and outlet means at all times in open communication with said air supply passage means.

2. A governor for an internal combustion engine as defined by claim 1 and in which said air bleed means is axial slot means in said valve means.

3. A governor for an internal combustion engine having servomotor actuated throttle means, and comprising, air supply passage means adapted to be connected to said servomotor and tending to supply air to said servomotor to oppose the movement of said throttle by said servomotor, valve means in said air supply passage means for controlling the air supplied to said servomotor, means adapted to respond to the speed of said engine for moving said valve means toward closed position in said air supply passage means as the speed of said engine increases, and by-pass passage means in said air supply passage means and providing air bleed means around said valve means as said valve means moves toward said closed position in said air supply passage means, said air bleed means having inlet and outlet means at all times in open communication with said air supply passage means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,381,131	Mallory	Aug. 7, 1945
2,415,508	Mallory	Feb. 11, 1947
2,415,510	Mallory	Feb. 11, 1947
2,521,736	Mallory	Sept. 12, 1950
2,664,867	Hartzell et al.	Jan. 5, 1954