April 26, 1949. R. R. HOLBROOK 2,468,667

HYDRAULIC SPEED GOVERNOR

Filed May 3, 1948

FIG. 5.

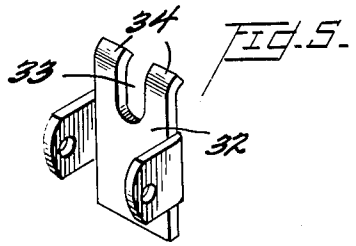


FIG. 1.

FIG. 2.

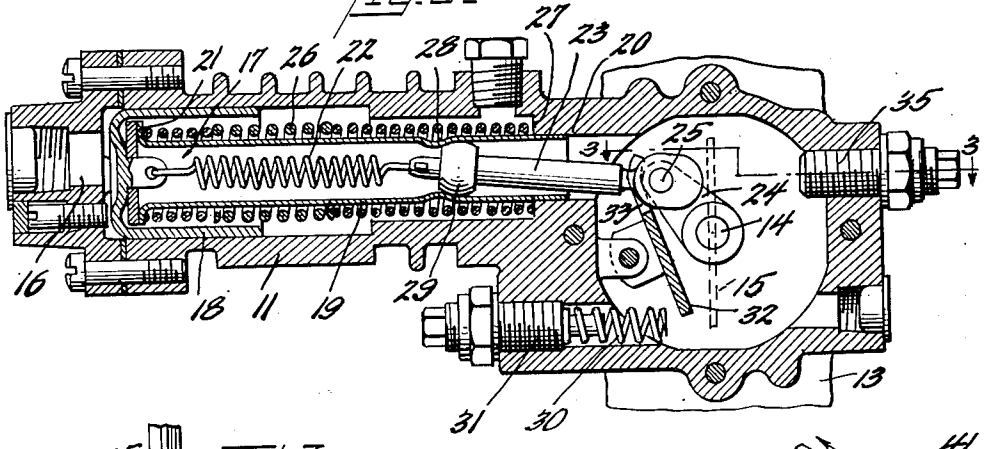


FIG. 3.

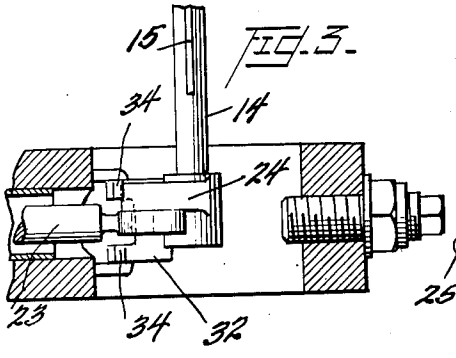
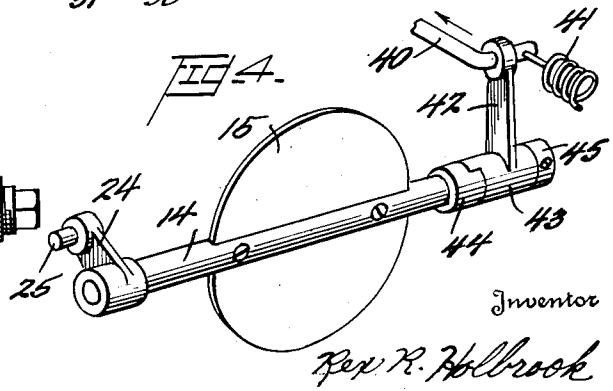


FIG. 4.



Inventor

Rex R. Holbrook

By

Watson, Cole, Grindle & Watson

Attorneys

Patented Apr. 26, 1949 2,468,667

UNITED STATES PATENT OFFICE

2,468,667

HYDRAULIC SPEED GOVERNOR

Rex R. Holbrook, Whitmore Lake, Mich., assignor to King-Seeley Corporation, Ann Arbor, Mich., a corporation of Michigan

Application May 3, 1948, Serial No. 24,833

5 Claims. (Cl. 137—153)

1

This invention relates to speed governors for internal combustion engines, and more particularly to governors of the type in which the flow of fuel mixture to the engine is controlled by a servo-motor or "slave" assembly. The movements of the slave assembly are controlled, through transfers of fluid pressure, by a "master" unit of the type, for example, in the Darnell application, Serial No. 785,143, filed November 10, 1947.

It has heretofore been the usual practice in employing governors in connection with internal combustion engines of the carbureted type, to insert the fuel mixture control member, or governor throttle plate, in the fuel mixture conduit between the carburetor and the intake manifold. However, in some instances it has been found satisfactory to dispense with the extra throttle plate, and to apply the governing action directly to the spindle or shaft of the carburetor throttle plate. This type of installation, however, involves certain problems. For example, in the case of a vehicle the carburetor throttle must obviously be susceptible of manual control, such as that ordinarily exerted by the vehicle operator through the medium of the accelerator or foot throttle device. It is, therefore, necessary to provide means whereby the operator may control the speed of the vehicle up to the desired governed speed, whereupon the speed-responsive device will take charge and limit the speed of the engine. Again, when the operator desires to reduce the speed of the engine to idling speed by removing the pressure from the accelerator pedal, the carburetor throttle must be allowed to move to idling position regardless of the speed-responsive mechanism.

A further problem is created by the inherent quality of all precision governing devices to cause, under certain conditions, a surging action necessitating the employment of damping means to prevent the governing device from engaging in a continuous back and forth movement in search of stable equilbrium. The damping means, of course, must not interfere with the action of the automatic means for returning the throttle plate to idling position at the will of the operator.

The device of the present invention is adapted to solve the aforesaid problems. It is, therefore, a general object of the present invention to provide a governing means suitable for application directly to the shaft of a carburetor throttle plate, said governing means being of the hydraulic type employing a piston responsive to fluid pressures and connected to the shaft of the

2

throttle plate in such a way as not to interfere with the manual operation thereof until governed speed is reached, and to permit the employment of damping means which can be brought into play when the governor is in control of the vehicle but will not otherwise interfere with the operation of the carburetor throttle.

More specifically, it is an object of the present invention to provide, in combination with a carbureted engine having a fuel mixture passage, a throttle plate secured on a shaft extending across said passage, manually operable means for rotating said shaft to vary the effective cross-section of the passage, automatic means for rotating the shaft to idling position when the manually operable means is deactivated, and speed-responsive means connected to the shaft for rotating the same to vary the effective cross-section of the passage, said speed-responsive means being connected to the shaft in such a way that when the manually operable means is deactivated, the automatic means may return the throttle plate to idling position irrespective of the speed-responsive means.

A further object is the provision of a device of the type described employing damping means for the governor which damping means are so disposed as to be operable by the governor when the engine approaches governed speed, but which will not interfere with the manual operation of the engine at lower speeds.

Other and further objects, features and advantages will be apparent from the description which follows, read in connection with the accompanying drawings in which

Figure 1 is a plan view of the slave unit of a hydraulic governor according to the present invention in conjunction with a fragmentary view of a fuel mixture passage and throttle plate of a carburetor;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a section on line 3—3 of Figure 2;

Figure 4 is a perspective view of a throttle plate and shaft, showing the means of connection to the speed-responsive device, and also to the manually operable means; and

Figure 5 is a perspective view of the lever shown in section in Figure 2.

In order to facilitate an understanding of the invention, reference is made to the embodiment thereof shown in the accompanying drawings and detailed descriptive language is employed. It will nevertheless be understood that no limitation of the invention is thereby intended and that various changes and alterations are contemplated

such as would ordinarily occur to one skilled in the art to which the invention relates.

As stated above, the governor in question is of the hydraulic type comprising, generally, a master unit and a slave unit. The present invention relates only to modifications of the slave unit and its connection with the shaft of the throttle plate, and hence the master unit need not be described. For a full description of a suitable master unit, reference is made to the aforesaid Darnell application.

The slave unit to be described is in many respects similar to that disclosed in the aforesaid application and comprises, generally, a body 10 comprising a cylindrical portion 11 and a box-like portion 12 adapted to be secured to a carburetor 13 in a position such as to enable connection of the governor mechanism to the shaft 14 of the usual carburetor throttle plate 15. Fluid under pressure is introduced into the cylinder 11 through an orifice 16 by means of a conduit (not shown) connected at its other end to the master unit. The cylinder 11 contains a piston 17 comprising a head 18 which is slidable within the cylinder 11, and a tubular piston rod 19 which is also slidable in the reduced portion 20 of the cylinder bore, the left-hand end of the tube 19 abutting the closed end of the head 18 and having an annular flange 21. The flanged end of the tube 19 is connected with the throttle plate shaft 14 by means of a tension spring 22, link 23 and crank 24 to which the distal end of the link 23 is connected by means of a pin 25. The flanged end of the tube 19 is at all times maintained in engagement with the piston head 18 by means of a spring assembly 26 which is under compression between a fixed abutment 27 and flange 21.

The tube 19 is constricted as at 28 to provide a seat for an enlargement 29 formed on the adjacent end of the link 23, so that the latter cannot move toward the head 18, beyond the point 28, but is normally held at that point by means of the tension spring 22. The link 23, however, can be moved outwardly or toward the right relative to the tube 19, against the tension of the spring 22.

A damping spring 30 is mounted in the body portion 12 in a position laterally displaced from the cylinder 11 but parallel thereto, and is adjustable by means of the plug 31. Intermediate the spring 30 and the link 23 there is pivoted a bifurcated lever 32 (best seen in Figure 5) which is so formed that the notch 33 provides clearance for the link 23, while the arms 34 on either side of the notch 33 will be contacted by the right-hand end of the tube 19 when the latter moves sufficiently far to the right, as when the governor takes control of the engine. Under these circumstances the lever 32 is rocked in a clockwise direction so that the lower end thereof engages the spring 30 and a damping or surge-inhibiting action is thus achieved. A suitable member 35 is provided in the body portion 12 to prevent the link 23 from going to such a position as would jam the throttle plate in the fuel mixture conduit, and corresponds to the usual "idle stop."

The connection between the shaft 14 and the accelerator device is illustrated in Figure 4 in which the rod 40 is connected to the conventional accelerator pedal in such a way that depression of the latter results in movement of the rod 40 in the direction of the arrow. This movement is resisted by a spring 41 which, it is to be noted, is of sufficient weight or strength to overcome, under the conditions to be described, the tension of the spring 22. The rod 40 and spring 41 are connected to the shaft 14 through the medium of an arm 42 and a dog clutch one portion 43 of which is integral with or secured to the lower end of the arm 42, and the other portion 44 of which is fast upon the shaft 14. The portion 43 is, of course, rotatable on the shaft 14 and is held against longitudinal displacement by means of a collar 45.

It will be seen that the tension of the spring 41 tends to force the clutch portions 43, 44 into engagement and to urge the throttle plate 15 into idling position. On the other hand, pressure upon the accelerator pedal overcomes the tension of spring 41 and permits the plate 15 to rotate into wide open position when the engine is running below governed speed. If, however, the engine reaches governed speed and the speed-responsive device takes charge the shaft 14 may be rotated toward closed-throttle position notwithstanding the position of the rod 40 and the accelerator pedal, the clutch portions 43 and 44 then becoming disengaged.

From the foregoing it will be understood that manual control of the position of the throttle plate may be exerted without interference from the governor at all speeds below governed speed, and when the manual control is deactivated, as when the pressure is removed from the accelerator pedal, the spring 41 will cause the throttle plate to be rotated to idling position. Under these circumstances the piston 18 will, of course, assume its outward or left-hand position, but the shaft 14 may nevertheless be rotated by the spring 41 since the latter is more powerful than the spring 22. The link 23, under these conditions, is drawn outward or toward the right in the tube 19. On the other hand, when the engine approaches governed speed the piston 18, under the pressure of the fluid entering through the orifice 16, will move toward the right against the resistance of the spring assembly 26 forcing the tube 19 and the link 23 in the same direction. When governed speed is reached the speed-responsive device takes charge, the link 23, through the crank 24, serving to rotate the shaft 14 and throttle plate 15 into position to control the engine at the governed speed.

From the foregoing description it is believed that the construction and operation of the present invention may be readily understood, and that the means of accomplishing the aforesaid objects will be apparent.

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

1. Control means for the throttle-plate shaft for a carbureted engine comprising, in combination, manually operable means for rotating said shaft to vary the flow of fuel mixture, automatic means connected to said shaft for rotating said shaft to substantially closed position when said manually operable means is deactivated, and means connected to said shaft for rotating said shaft to vary the flow of fuel mixture, said last means comprising a cylinder, a piston slidable in said cylinder, a link resiliently connected to said piston and positively connected to said shaft, and means positively spacing said link from said piston.

2. Control means for the throttle-plate shaft for a carbureted engine comprising, in combination, manually operable means for rotating said shaft to vary the flow of fuel mixture, automatic

means connected to said shaft for rotating said shaft to substantially closed position when said manually operable means is deactivated, and means connected to said shaft for rotating said shaft to vary the flow of fuel mixture, said last means comprising a cylinder, a piston slidable in said cylinder, a link connected to said piston by a tension spring and positively connected to said shaft, and means positively spacing said link from said piston.

3. In combination with a device according to claim 2, a damping spring, a member movable with said piston, and a lever adapted to be contacted by said member and to engage said damping spring when said piston nears the extremity of its movement.

4. A device according to claim 3, said member comprising a tube concentric with said piston and surrounding said tension spring and a portion of said link, and said lever being formed to provide clearance for said link.

5. A device according to claim 4, said tube being constricted at a point spaced from said piston to form a seat for said link.

REX R. HOLBROOK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,142,403	McCollough	Jan. 3, 1939
2,249,439	Stryker	July 15, 1941
2,260,576	Maybach	Oct. 28, 1941
2,412,021	Weakley	Dec. 3, 1946

FOREIGN PATENTS

Number	Country	Date
431,293	Great Britain	July 4, 1935