April 4, 1939. W. E. LEIBING 2,153,047

GOVERNOR

Filed March 5, 1936

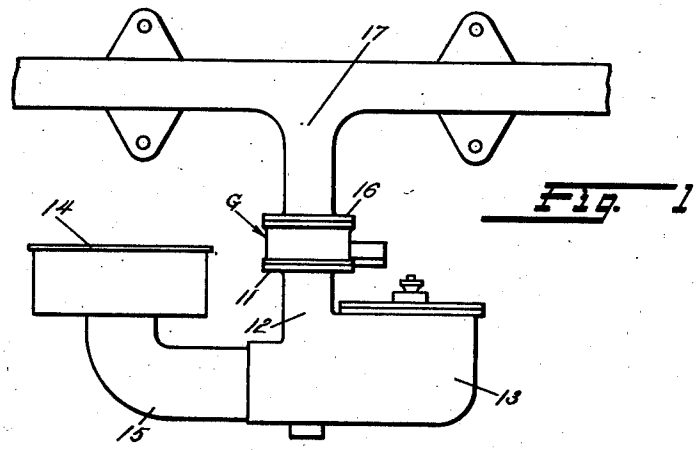


Fig. 1

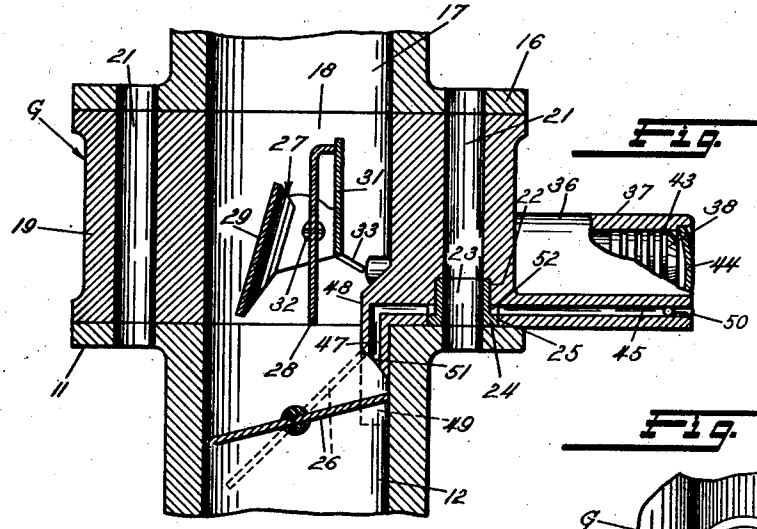


Fig. 2

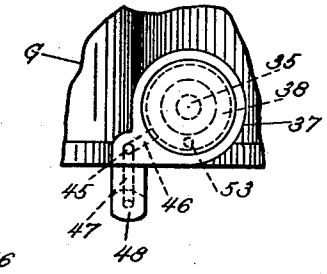


Fig. 4

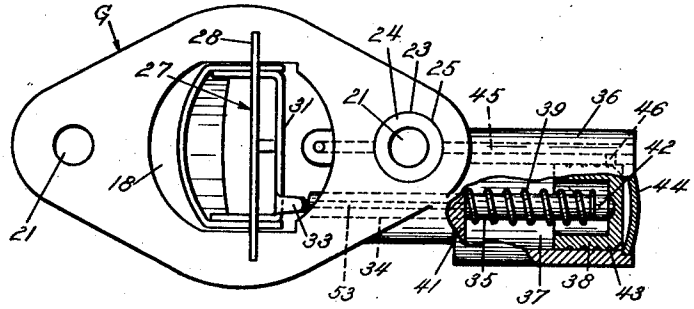


Fig. 3

Inventor
William E. Leibing

By Strauch & Hoffman
Attorneys

Patented Apr. 4, 1939 2,153,047

UNITED STATES PATENT OFFICE

2,153,047

GOVERNOR

William E. Leibing, Sausalito, Calif., assignor to Leibing Automotive Devices, Inc., San Francisco, Calif., a corporation of Nevada

Application March 5, 1936, Serial No. 67,358

10 Claims. (Cl. 277—22)

This invention relates to methods and apparatus for governing the rates of fluid flow through a conduit, and more particularly, to methods and apparatus for use in association with the intake manifold of an internal combustion engine for the purpose of automatically preventing the latter from operating above a predetermined maximum speed. The present invention constitutes an improvement over the apparatus disclosed in copending application Serial No. 738,114, filed August 2, 1934, now Patent No. 2,081,825 granted May 25, 1937, of which I am a joint inventor.

In prior types of governors such as that disclosed in the application above identified, so-called throttle cheat devices are employed which are designed to prevent improper manipulation of the throttle valve to build up a supply of fuel to the engine without disturbing the position of the governor valve, and thus obtain speeds far in excess of those for which the governor is set to operate. This building up is possible when there is a relatively low vacuum in the intake, and the velocity of the fuel mixture passing therethrough is insufficient to effect closing of the governor valve.

As disclosed in the application above identified, a plunger and piston arrangement may be used to prevent throttle cheat, the piston being subject to atmospheric pressure and the pressure within the intake, and being arranged to act upon the plunger which in turn contacts the governor valve to effect closing thereof, when there is sufficient differential between the pressure in the intake and the atmospheric pressure. The differential required depends upon the degree of resistance of the spring or other means selected to react upon the plunger, the most desirable strength thereof being selected by experiment.

While devices of the type disclosed in my copending application have proven satisfactory, they are characterized by several disadvantages which are overcome in the present invention. For instance, there is a certain amount of air leakage past the plunger and piston from the atmosphere to the intake manifold. This is objectionable since at idling and closed throttle position, the fuel mixture flowing into the engine is diluted and carburetion is seriously upset. Moreover, the air thus leaking in may not be filtered and cleaned as the air from the carburetor and consequently the advantage of the filter in combination with the carburetor is lost. If filters or cleaners are employed in connection with throttle cheat devices, they must be frequently cleaned to maintain their efficiency and must be of relatively small size.

The second marked disadvantage of the prior art, including the governor of my application Serial No. 738,114, and Patent No. 2,081,825 is that it is easily possible for the operator of an engine or another unauthorized person to apply adhesive tape, chewing gum, or any other type of seal to the exterior of the atmospheric connection on the throttle cheat device, and thus seal the system from the effect of atmospheric pressure whereby the governor is rendered inoperative as regards throttle cheat, and speeds considerably in excess of those for which the governor has been set and sealed may be obtained.

Prior art throttle cheat devices have also been characterized by somewhat expensive and complicated structures whereby a considerable amount is added to the cost of the governor. If it is desired that the air escaping into the intake from the throttle cheat device be cleaned, the cost of a filter connected with the atmospheric connection is to be added.

In overcoming the aforesaid disadvantages of the prior art and other disadvantages thereof, it is a major object of my invention to provide a governor for controlling fluid flow through a conduit in combination with novel means for preventing so-called throttle cheat, the factors entering into the actuation of the throttle cheat device being determined by conditions within the conduit.

A further object of my invention is to provide novel means for preventing throttle cheat in connection with a governor located in the intake of an internal combustion engine, wherein a pressure responsive element is provided to actuate said means, the fuel mixture passing through the intake being utilized as the sole actuating force of the pressure responsive means.

A further object of my invention is to provide novel means for preventing throttle cheat in connection with a governor mounted in the intake of an internal combustion engine wherein a pressure responsive element is provided in connection with the throttle cheat preventer, the element being subject only to fluid that has been cleaned by the filter associated with the carburetor of the engine.

Still a further object of my invention is to provide a novel governor embodying means for preventing throttle cheat, the governor being tamper-proof and not subject to any disarrangement by an unauthorized person.

A further object of my invention is to provide

novel means for preventing throttle cheat in combination with a governor employed in an internal combustion engine wherein the need for a filter on a throttle cheat device is eliminated, and the parts thereof are relatively simple and cheap to manufacture.

A further object of my invention is to provide a governor for use in connection with an internal combustion engine wherein novel means for preventing throttle cheat is employed including a pressure responsive element, the latter being arranged so that atmospheric air cannot leak into the governor and interfere with the proper carburetion of the fuel mixture passing to the engine.

A further object of my invention is to provide a novel method for the governing of fluid flow through a conduit having a governor therein responsive to fluid flow and a manually operated valve, wherein the pressure differential on opposite sides of the manually operated valve is employed to operate the governor.

A further object of my invention is to provide a governor of novel design for use in the intake of an internal combustion engine in combination with a manually operated throttle valve, wherein the throttle valve may be manipulated to vary the pressure differential acting upon the governor and thereby control the operation of the governor.

A still further object of my invention is to provide novel governing means in combination with a manually operated throttle valve located in the intake of an internal combustion engine wherein means is provided in connection with said throttle valve to vary the factors acting upon the governor dependent upon the position of the throttle valve.

Still a further object of my invention is to provide a governor for use in the intake of an internal combustion engine in combination with a manually operated throttle, a novel device for preventing throttle cheat being associated with the governor and embodying a pressure responsive element, means being provided in combination with the governor and throttle whereby the pressures effective upon the pressure-responsive element are balanced when the throttle is in certain predetermined positions, and unbalanced in other predetermined positions of the throttle.

Additional objects, many of a subordinate or more specific nature, will appear from a study of the following detailed description and the claims appended thereto when taken in connection with the accompanying drawing wherein:

Figure 1 is a diagrammatic view of the intake manifold of an internal combustion engine shown in connection with the carburetor and illustrating a preferred embodiment of the present invention.

Figure 2 is a section of the governor and a fragment of the intake manifold of Figure 1 shown in combination with a portion of the carburetor in section including the throttle thereof.

Figure 3 is a bottom plan view of the governor of Figure 2 with a portion of the throttle cheat device broken away to illustrate the structure of a preferred form of pressure responsive means for operating the governor.

Figure 4 is a view of a portion of the governor as viewed from the right of Figure 2 and with the connections to the pressure responsive mechanism shown in dotted lines.

With continued reference to the drawing wherein like characters are employed to designate like parts, reference numeral 11 designates an apertured flange on a conduit 12 of a carburetor 13 to which air is supplied from an air filter 14 through a connection 15. The flange 11 is designed for attachment to flange 16 of an intake manifold 17, but is shown separated therefrom to provide a space for the reception of a governor generally indicated at G. If desired, a degassing device (not shown) may also be inserted between the manifold section and conduit 12 as described in connection with application Serial No. 568,844 filed October 14, 1931, and now Patent No. 2,109,296, granted Feb. 22, 1938.

The governor G has a cylindrical bore 18 formed therein and aligned with the carburetor conduit 12 and manifold passageway 17, bore 18 being formed within a block 19. Block 19 is generally similar in shape and cross section to flanges 11 and 16 of the carburetor and intake manifold, respectively, and cooperates therewith to form bores 21 for the reception of assembly bolts (not shown) which serve to rigidly secure the governor in the desired position. Bore 18 with conduit 12 and the conduit in manifold 17 constitute the fuel intake passage leading to the engine proper.

If desired, the bores 21 may be made slightly larger than the corresponding bores in the adjacent flanges so as to provide for ready connection of the governor to flanges of varying size. A gasket may be provided between the contacting flanges to insure against leakage from the conduit if desired.

It will be noted that substantially all mechanism associated therewith as will be hereinafter described is contained within planes passing through the flanges on governor block 19.

For a purpose that will be later described, one end of a bore 21 is enlarged as shown at 22 to receive a bushing 23. Bushing 23 has an enlarged flange 24 thereon which is of a size to fit within a still larger aperture 25 formed in the block 19 concentric with bore 21. As will be noted from Figure 2, the aperture 25 is deeper than the width of flange 24 on bushing 23 and defines an annular passage around the bushing for a purpose that will later appear.

Conduit 12 connected to the carburetor 13 contains a throttle valve 26, preferably of the butterfly type, which is designed to be manually operated to control the quantity of fuel mixture drawn into the intake manifold 17.

The governing device comprises an oscillatable valve mechanism 27 for throttling passageway 18 when the engine reaches a predetermined speed. Governor 27 comprises a fixed bridge member 28 and spaced vanes 29 and 31 arranged to pivot about axis 32. Vane 31 is provided with a projection or lug 33 thereon which is arranged to cooperate with the throttle cheat mechanism as will be later described.

The valve mechanism disclosed together with the spring means which is employed to react against the effect of the fluid flowing through the conduit upon the vanes of the governor, is fully described in my copending application Serial No. 738,114, filed August 2, 1934, and now Patent No. 2,081,825 granted May 25, 1937, and a detailed description thereof in the present application is considered unnecessary.

As shown in my copending application above referred to, means is provided in connection with the governor shown therein to prevent throttle cheat or to insure closing of the valve under throttle conditions where the vacuum is rela-

tively high and the velocity is so low that it will not close the governor valve. As therein disclosed, a plunger is provided to act upon a lug corresponding to lug 33 in the governor herein described, the plunger being contacted by a piston. The internal face of the piston is exposed to the pressure within the intake conduit immediately adjacent the governor, the outer face thereof being exposed to atmospheric pressure through a suitable filter.

As has been pointed out, this construction is disadvantageous, there being a constant air leakage therethrough of atmosphere to the governor and then to the manifold of the engine. This not only allows the introduction of air not properly filtered, but also results in dilution of the mixture coming from the carburetor. Furthermore the arrangement is such that the governor may be readily tampered with and rendered inoperative by an unauthorized person.

In overcoming these disadvantages of the prior devices in the present invention, a relatively small bore or feed line 34 is formed in block 19, a plunger 35 being provided to reciprocate in bore 34 to contact lug 33 on vane 31 of the governor 27. Plunger 35 is of a length to extend through a casing 36 formed upon the governor block 19, which contains a cylinder 37 within which operates a piston 38. Piston 38 is preferably cup-shaped as shown with the end of plunger 35 being arranged to abut against the interior of the cup. A spring 39 is arranged to react against the wall 41 of cylinder 37 and against a pin 42 secured in a suitable aperture in the end of plunger 35 to normally maintain piston 38 in the right end of cylinder 37. Piston 38 is preferably grooved as shown at 43 to keep the leakage thereby to a minimum.

As shown in Figures 2 and 3, the end of cylinder 37 is open to facilitate manufacture thereof and assembly of the respective parts. After assembly, the cylinder 37 is closed preferably by a suitable drive plug 44 to seal the piston against the access of atmosphere and to prevent tampering therewith. If desired, the drive plug 44 may be sealed by means of a suitable soft metal in which an impression may be made, any unauthorized tampering with the plug being indicated by mutilation of the impression.

A bore 45, preferably parallel to the axis of cylinder 37 is formed in block 19, extending from a point adjacent the outer end of cylinder 37 to a passage or bore 47 within the fuel conduit. A cross bore 46 leading from bore 45 to the interior of cylinder 37 at its end adjacent the drive plug 44 is provided as shown in Figure 4. The open end of bore 45 is closed as by a plug 50.

The opposite end of bore 45 connects with the bore 47 formed in a rib or extension 48 preferably formed integral with governor block 19. Rib 48 extends downwardly from the lower plane surface of governor block 19 into the conduit 12 of the carburetor terminating at a point adjacent the upper edge of the butterfly valve 26 when the latter is in substantially or nearly closed position as shown in Figure 2.

Since in different types of carburetors, the throttle valves are located at different positions, it is preferred to make the rib 48 of relatively soft material and relatively long so that the governor may be employed in connection with almost any type of carburetor and the rib 48 easily cut for accommodation to any position of the throttle valve. As shown in Figure 2 in dotted lines, rib 48 is preferably constructed as shown at 49 in actual manufacture, but, in an installation of the type shown, is cut off to form an angular face 51 to cooperate with the upper edge of throttle 26.

As pointed out, bore 21 may be enlarged at the end thereof to receive a bushing 24 which defines an annular passage 52 in bore 45. This permits the use of a suitable bolt in bore 21 without obstruction of the bore 45.

As shown in Figure 2, the throttle 26 is just coming into the throttle cheat position when the throttle arrives at the position indicated by dotted lines, the lower end of the bore 47 will be at atmospheric pressure, such pressure in advance of the throttle being transferred to the outer end of piston 38. Since the pressure immediately adjacent the governor valve 27 is effective on the inner end of the cylinder 37 by reason of the bore 34 within which the plunger 35 operates, the piston 38 will move toward the governor valve 27 and force the left end of plunger 35 into contact with lug 33 on blade 31 of valve 27. Continued movement of plunger 35 under the influence of the differential between the pressures acting on the opposite ends of piston 38 will rotate valve 27 around pivot 32 to closed position. When the differential of pressures no longer exists or is materially reduced, spring 39 will force piston 38 and plunger 35 back into the position shown in Figure 3 wherein the plunger 35 has no effect upon the operation of the governor. But it will be noted that the fluid employed in actuating the piston is the fuel mixture from the carburetor and will accordingly have been cleaned by the air filter attached to the carburetor. Moreover, it will be noted that there is no aperture accessible to a dishonest driver or the tampering of some other unauthorized person nor any possibility of dilution since the fuel mixture from the carburetor is the operating medium for the piston.

When the carburetor throttle 26 is in its fully closed position as shown in full lines in Figure 2, the lower end of the bore 47 is exposed to the same pressure as that adjacent the governer 27, so that the pressures effective upon the outer end of piston 38 and upon the inner end are equal. Thus the piston is rendered inoperative, the vanes of the governor and the springs associated therewith are not being stressed, and as the lower end of bore 47 is in the manifold pressure area, there is no possibility of a leakage of atmospheric air into the mixture passing into the intake of the engine as is the case in prior throttle cheat devices.

When the throttle 26 is in fully open position, atmospheric pressure will exist both adjacent the governor 27 and adjacent the open end of bore 47 in which case the pressures upon the piston 38 will be balanced and the piston will be rendered inoperative.

If desired, a bore 53 may be provided leading from face 41 of cylinder 37 to the interior of conduit 18 to further facilitate the effect of the pressure in conduit 18 upon the cupped end of piston 38.

After consideration of the foregoing disclosure, it will be seen that I have provided a device whereby it is impossible by improper manipulation of the throttle valve to gradually build up a fuel supply without disturbing the position of the governor valve and obtain speeds far in excess of those at which the governor is set to operate, or in other words throttle cheat the governor.

Moreover, my improved construction insures against dilution of the fuel passing through the intake manifold of the engine, insures operation of the throttle cheat device when such operation is desired, and provides a supply of clean air to the engine.

It is also apparent upon comparing the present invention with the device of my application Serial No. 738,114, now Patent No. 2,081,825, and prior art devices that the air filter cartridge, the necessary screening and the securing nut together with the operation of tapping the cylinder and threading the governor block are all eliminated and replaced by drilled holes and a drive plug which does not permit of tampering.

While in the present embodiment of the invention I have shown a butterfly valve as employed in connection with a governor, it is to be understood that other types of throttle valves may be employed and the parts of the governor suitably modified so that such throttle valves may be used to control the pressures effective upon the pressure responsive element operating the governor valve.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. In a governor for an internal combustion engine employed in combination with a manually operable valve for governing fluid flow through a conduit, pressure responsive means to operate said governor, and means to connect said pressure responsive means to said conduit, said valve coacting with said means in one position to subject said pressure responsive means to the pressure in the conduit on one side of said valve and in another position with the pressure in said conduit on the other side of said valve.

2. In a governor for an internal combustion engine employed in combination with a manually operable valve in advance of said governor for governing fluid flow through a conduit, pressure responsive means to operate said governor, and means to subject said pressure responsive means to different pressures within said conduit, said valve coacting with said means in one position to subject said pressure responsive means to the pressure adjacent said governor, and in another position to the pressure in advance of said valve.

3. In a governor for an internal combustion engine employed in combination with a manually operable valve in advance of said governor for governing fluid flow through a conduit, pressure responsive means to operate said governor, a fluid connection between said means and said conduit opening into said conduit at a point immediately adjacent an edge of said valve when the latter is near closed position whereby in substantially closed position of said valve said means is subject to the pressure adjacent said governor and in partially open position of said valve, said means is subject to pressure on the advance side of said valve.

4. In a governor for internal combustion engines arranged to be placed in the fuel intake thereof between the carburetor throttle and the intake manifold, pressure responsive means to operate said governor, a fluid connection between said pressure responsive means and said intake at a point adjacent said governor, a second fluid connection between said pressure responsive means and the intake adjacent said throttle, said throttle being arranged to render said latter connection subject to the pressure adjacent said governor or the pressure in advance of said throttle.

5. In combination with a governor for the fuel intake of an internal combustion engine, a manually operable throttle in said intake, pressure responsive means for operating said governor, means to subject said pressure responsive means to the pressure in said intake adjacent said governor, and means upstream of said first means including said throttle to additionally subject said pressure responsive means to a pressure varied in accordance with the position of said throttle.

6. In combination with a manually operable throttle and a governor for use in the intake of an internal combustion engine, means subject to a plurality of pressures within said intake passage arranged to operate said governor, and means including said throttle whereby said pressures are controlled by said throttle in a manner whereby the pressures are balanced to render said means inoperative at fully closed and full open positions of said throttle, and are unbalanced in other predetermined intermediate positions of said throttle to render said means operative.

7. In combination with a manually operable throttle and governor for use in the intake of an internal combustion engine, means subject to a plurality of pressures within said intake and arranged to operate said governor, means to control said pressures by said throttle whereby the pressures are balanced to render said means inoperative at substantially closed position of said throttle, the pressures are unbalanced at partially open position of said throttle to render said means operative, and the pressures are balanced at open position of said throttle to render said means inoperative.

8. In combination with a manually operable throttle and a governor in the fuel intake of an internal combustion engine, means responsive to a differential of pressures within said fuel intake to operate said governor, a connection for said means to said intake immediately adjacent said governor, and a second connection for said means having an orifice in said intake located in the path of movement of an edge of said throttle when near closed position to balance said pressures when said throttle is in substantially closed position.

9. In combination with a butterfly valve and a governor in the fuel intake of an internal combustion engine, means responsive to a differential of pressures to operate said governor, a connection for said means to said intake immediately adjacent said governor, and a second connection for said means having an orifice in said intake immediately adjacent an edge of said valve when near closed position to balance said pressures when said valve is in substantially closed position.

10. In combination with a governor for the fuel intake of an internal combustion engine, a manually operable throttle, means subject to a plurality of pressures in said intake and arranged to operate said governor, and means to balance said pressures when said throttle is in substantially closed position.

WILLIAM E. LEIBING.