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CENTRIFUGAL GOVERNOR

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6 Claims. (Cl. 123-103)

The object of this invention is to control the speed of an internal combustion engine.

Fig. 1 shows diagrammatically the elements of my invention.

Fig. 2 shows the range of speeds between which the governor can be adjusted to function.

In Fig. 1, 10 is the air entrance, 11 is the venturi into which discharges a fuel nozzle 12. 13 is a mixture outlet in which is located a throttle valve 14 controlled by the throttle lever 31 which is automatically controlled by the governor rod 15 and manually controlled by a rod 17 which engages with the lever 31 so as to close the throttle 14. The throttle is opened by the spring 16 and is closed automatically by the governor rod 15 and manually by the rod 17.

The right-hand side of diaphragm 18 is subjected to the suction in the mixture outlet 13 through the restricted opening 32 so as to close the throttle when the speed becomes excessive. This suction in the mixture outlet 13 is conducted to a chamber 19 located to the right-hand side of the diaphragm 18 thru the restricted opening 32, passage 20, past an adjustable needle 21 which is located in a passage 24 between the passage 20 and the chamber 19.

Atmospheric air is admitted to the chamber 19 through an opening 22 which is formed in the wall of a chamber 23 rotated by a shaft 28. This chamber is connected to the chamber 19 through a passage 24 and a restriction 33. A centrifugal weight 25 is slidably mounted inside the rotating chamber 23 which is rotated at engine speed or at some speed proportional to engine speed. A spring 26 pulls the weight 25 off its seat so that the opening 22 is always slightly open. A tapered projection 27 on the end of the weight 25 forms a variable resistance to the flow of atmospheric air through the opening 22 into the chamber 19.

This chamber 23 and its shaft 28 driven by the engine at engine speed or some fraction thereof takes the place of the centrifugal weights in any ordinary mechanical governor.

A relatively large passage 29 free from restrictions connects the venturi 11 with the passage 20 so that when the throttle 13 is wide open and there is little or no suction in the mixture outlet 13 the device can then operate with the Venturi suction. With the throttle wide open, the suction in the venturi 11 is transmitted through the passage 29 past a check valve 30 and a needle valve 21. The governor functions whenever centrifugal force causes the weight 25 to close the opening 22 when the suction in the throat of the venturi 11 is powerful enough to overcome the pull of the

spring 16. Thereupon the throttle closes and then the suction in the venturi 11 falls and the suction in the mixture outlet 13 increases. The check valve 30 is provided so that when the throttle 13 begins to close, the check valve closes automatically. Thereafter the suction in the mixture outlet 13 is able to furnish the operating means so that the governor can function without interference from the suction or rather lack of suction in the venturi 11 as the suction in the mixture outlet is great compared with the Venturi suction. For this reason a restriction is placed in the exit from the passage 20 and is made small compared with passage 29.

The position of the tapered portion 27 of the centrifugal weight 25 in the atmospheric opening 22 determines the amount of suction in the chamber 19, and therefore determines the position of the throttle 14. Obviously throttle 14 must close until equilibrium is established so that the speed of the engine is such as to restrict the atmospheric opening 22 so that the restricted opening 21 subjects the chamber 19 to hold the throttle 14 in the position shown as determined by the pull of the spring 16. The restriction 32 is smaller than the opening past the check valve 30 so that at wide open throttle the diaphragm 18 responds to the suction in the venturi 11.

In Fig. 2 the line AB represents the normal increase in power with increase in speed. At the point B with the adjustment 21 opened up fairly wide the power falls off along the line BC and at 2700 R. P. M. the throttle is completely closed, the point C (2700) being the point of idle cutoff. Now, let us assume that the point B is 49 hp. at 2400 R. P. M. and let us also assume that the adjustment 21 is rotated so as to restrict the passage past the adjustment 21. The speed now increases to 2500 before there is sufficient vacuum in the venturi 10 to cause the diaphragm 18 to move the throttle 14 towards the closed position. The centrifugal weight 25 then moves rapidly to close the opening 22 and the power falls steeply along the line DC. With this adjustment the hp. has risen at the point D to say 53 hp. Therefore, there has been a gain in power of 4 hp. or 8% due to the restriction at the needle valve 21. However, this can be carried too far, and if the line DC becomes too steep there is a tendency for the engine to hunt and for the R. P. M. of the engine to alternately increase and to decrease in a steady rhythm. If this happens, the needle valve 21 is opened up to avoid any such hunting.

What I claim is:

1. In an internal combustion engine having a

carburetor which incorporates a venturi acting as the main air passage to said engine, a throttle valve controlling the air flow thru said venturi to the engine inlet passage, a governor comprising a rotating chamber, a weight therein, yieldable means engaging with said weight so as to oppose the action of the centrifugal force imparted to said weight, an atmospheric opening leading into said chamber, a variable restriction adapted to be moved by said centrifugal weight so as to decrease the area of said opening as the speed increases, a moving wall, a stationary chamber associated therewith, a passage connecting said rotating chamber with said chamber, a connection from said moving wall to said throttle, spring means adapted to open said throttle so as to oppose the movement of said moving wall when the stationary chamber is subjected to suction, a by-pass connecting the engine inlet passage with the throat of said venturi, a non-return check valve in said by-pass near the point where it connects with the venturi, said check valve being adapted to open only when the vacuum in the venturi exceeds the depression in the engine inlet passage, a passage leading out of said by-pass between said check valve and said engine inlet and into said chamber to subject said chamber to the suction created by the air entering said engine on both sides of said throttle.

2. A device as set forth in claim 1 in which there is an adjustable restriction in the last mentioned passage between said by-pass and said chamber.

3. A device as set forth in claim 1 in which there is a restriction in said by-pass adjacent to

the point where it connects with the engine inlet passage.

4. In an internal combustion engine having a carburetor which incorporates a venturi acting as the main air passage to said engine, a throttle valve controlling the flow thru said venturi, a centrifugal governor adapted to be driven by said engine, a speed regulating valve operated by said governor, an orifice open to the atmosphere and adapted to be controlled by said regulating valve, a passage connecting said orifice to the throat of said venturi, a non-return check valve therein located adjacent to said venturi, a second passage connected to said first mentioned passage between said check valve and said regulating valve and leading to the main air passage on the engine side of said throttle valve, a chamber connected to the first-mentioned passage between said check valve and said regulating valve, a moving wall in said chamber, a connection from said moving wall to said throttle, adapted to close said throttle in response to suction in said chamber, yielding means tending to open said throttle valve, manually operated means for closing said throttle valve.

5. A device as set forth in claim 4 in which there is a restriction in said second passage adjacent to the point where it connects with the engine inlet passage.

6. A device as set forth in claim 4 in which there is an adjustable restriction in the first passage between the point where it connects with said chamber and said check valve.

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