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CARBURETOR STARTING DEVICE

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3 Claims. (Cl. 261—23)

The object of this invention is to improve the starting of an automobile engine. Specifically, the object is to eliminate some of the difficulties experienced with automatic chokes so far invented. Automatic chokes in general use have an automatic control on the ordinary choke valve in the air entrance. From time to time it has been proposed that a separate passage be used for supplying the extra mixture necessary for starting and for the drive-away, which is commonly described as the "fast idle."

One difficulty with this method is that the suction responsive valves that have been used in the fast idle passage have stuck. These valves have been cylindrical. The applicants' invention is based on the use of a valve of novel character which is less likely to stick. Valves of this type are new in this art although old in the governor art.

It is also an object of this invention to make the auxiliary starting carburetor automatic so that when the air flowing through it varies widely, the mixture ratio will not vary greatly. In other words, there will be an automatic mixture regulation during the starting and drive-away. When a choke is used in the air entrance, there are necessarily very wide variations in mixture ratios and the automatic characteristic of the main carburetor is destroyed.

In the figures:

Fig. 1 shows diagrammatically the invention arranged so that it can be shown on one plane.

Fig. 2 shows the position of the accelerating throttle before firing.

In the figures, 10 is the entrance in which is located the main fuel nozzle 11 which discharges into the throat of the venturi 12. A low speed by-pass 13 is also provided which discharges through the outlets 14 and 15 adjacent to the upstream lip of a throttle 47. This, of course, is the conventional low speed arrangement in general use today. In addition, there is a vacuum tube 36 connecting at a point 33 in the mixture outlet from the carburetor. This is connected with a casing 41 containing a spring 38 which engages with a diaphragm 42. This diaphragm carries a valve rod 34 the end of which is formed in the shape of a valve which controls the fuel opening 37 which leads into a chamber 46 which communicates with a passage 45 which discharges into a horizontal passage 44, and so down into the nozzle 11. This is the vacuum economizer which is also generally used today and has been for many years. This enables the road load fuel mix-

ture ratio to be somewhat leaner than the wide open throttle mixture ratio. The road load fuel is supplied to the chamber 46 and so to the passage 45 through the opening 35. The float chamber 50 contains a float 51 maintaining the fuel at a definite level in the float chamber 50 so that the nozzle 11 will not syphon over. For this reason the passage 44 is provided with a small air opening.

The starting feature will now be described, as all that has been mentioned before are the parts in general use on all conventional carburetors today.

The parts that relate to the invention consist of a fuel passage 43 with a small vent opening into the air entrance and a fuel nozzle 19 which discharges into the venturi 18 and which leads to the mixture outlet 17 controlled by the auxiliary throttle 20. Now this auxiliary throttle 20 has the upstream leg longer than the downstream leg, so that it is unbalanced and it engages with a throttle stop 39 which is eccentric and which adjusts the throttle 20 so that when it is opened as wide as it can be opened, it is still not fully open. The result is that the air drawn into the engine tends to close the valve 20 the moment the engine fires. The throttle 20 is connected to a throttle lever 27 which carries the movable finger 21. The compression spring 26 abuts against a lever 40 and engages with the lever 27 and is mounted on a rod 31 which passes through a slot on the lever 27. The rod 31 is supported on the lever 40. This lever 40 engages with a thermostat 23 which tends to rotate the lever 40 clockwise. A compression spring 25 engages with the lever 40 and tends to rotate it anti-clockwise. Hence, as the thermostat gets warmer, the lever 40 turns clockwise and the throttle 20 is permitted to close completely as the lever 27 is rotated by the air flowing around the throttle 20.

The thermostat 23 is mounted on the cover 28 which encloses the air entrance to the venturi 18. The thermostat is shown in an intermediate temperature. When the thermostat is cold it assumes the position 23a and when it is hot it assumes the position 23b. The air for this venturi is supplied through a pipe 29 which secures its warm air from around the outside of the exhaust pipe 32, so that as the engine warms up the thermostat 23 moves clockwise, the lever 40 moves clockwise, and the small throttle 20 eventually closes completely, as the stop 22 moves clockwise, permitting the finger 21 to also move clockwise. The stop 22 refers to the cam-shaped

portion of the face of the lever 40 which engages with the finger 21 of the lever 27.

In order that there shall be at all times a circulation of warm air across and around the thermostat 23, a small opening 30 is provided on the engine side of the throttle 20, so that at all times there is a small flow of air down the passage 48 which discharges through the elbow 49 into the mixture outlet.

The ball headed rod 31 serves to positively hold the throttle valve 20 closed when the thermostat 23 moves clockwise in response to a rise in temperature.

The lever 40 is located below the plane of the Venturi tube 18 in Fig. 1. As the thermostat 23 moves the lever 40 clockwise, it moves behind the Venturi tube 18 and the ball-headed rod 31 moves up and to the left and engages with the lever 27 and thus holds the auxiliary throttle 20 in the closed position. When the thermostat 23 cools to assume the position 23a, the spring 25 causes the lever 40 to rotate anti-clockwise. The boss of the lever 40 is circular but that portion which engages with the finger 21 is tangential to the circle. Hence, as the lever 40 moves counter-clockwise, the finger 21 is pushed to the right so as to open the valve 20 slightly, so that the tendency of the suction of the air flowing through the tube 49 to close the valve 20 is counteracted by the obstruction the finger 21 experiences when it is rotated clockwise by this suction. In other words, the minimum opening of the valve 20 is increased in cold weather, which gives the desired fast idle essential for the proper operation of an engine when starting in cold weather.

When the thermostat is hot and assumes the position 2b the lever 40 rotates clockwise. The valve 20 also rotates clockwise because the finger 21 then engages with the cylindrical portion of

the surface of the lever 40, permitting the valve 20 to close and thus giving a normal idle determined by the position of the throttle valve 47.

What we claim is:

1. A starting means for an automobile carburetor in conjunction with a carburetor having a mixing chamber, a nozzle discharging therein, a mixture outlet, air throttle flow restricting means therein, comprising a separate air by-pass around said throttle leading to the mixture outlet, a fuel nozzle discharging therein, a mixture outlet, a second throttle of the butterfly type therein, said butterfly throttle having the upstream leg longer than the downstream leg, whereby the air flow through the said by-pass tends to close the butterfly throttle, a movable finger carried by the butterfly throttle, a movable stop with which the movable finger engages to limit the closing position of the butterfly throttle, a thermostat adapted to move with the movable stop, and spring means for maintaining the butterfly throttle in a partially open position until the engine fires, said thermostat being adapted when cold to prevent said butterfly throttle closing.

2. A device as set forth in claim 1 in which there are means also responsive to temperature for positively holding the said butterfly throttle in a closed position when the temperature exceeds a certain predetermined temperature.

3. A device as set forth in claim 1 in which the spring means which maintain the butterfly throttle in a partially open position is also controlled by temperature responsive means so that it becomes more effective to maintain the butterfly throttle in the open position as the temperature falls.

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