

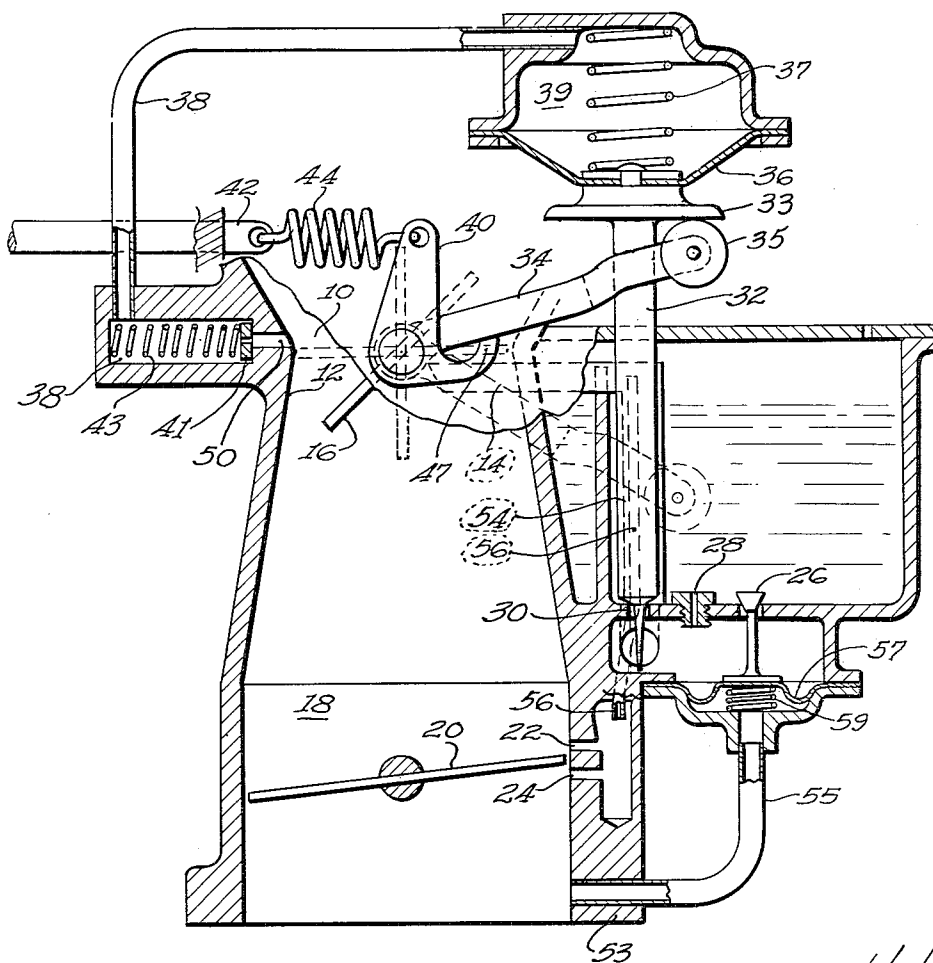
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CARBURETOR

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CARBURETOR

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At the present time it is customary to have a first stage carburetor for normal running. For maximum speeds, a second carburetor is automatically brought into action.

The object of this invention is to get a two-stage result, but have only a single stage carburetor. If the choke valve is located in the venturi and used to create an artificial suction in the throat of the venturi, then this result can be attained if at high engine speeds, as the air flow increases, it is arranged to open this choke and a needle valve is also connected to the choke valve so that it is caused to rise as the choke opens up wide. The air fuel mixture ratio will thus be unchanged and the maximum power will thus be obtained at maximum engine speeds. The venturi effect is spoiled by the partly open choke, but that tends to reduce the "knock." What is important is that at maximum air flow the choke valve is wide open and the venturi functions efficiently when it is needed to be efficient to create the maximum fuel flow with the minimum restrictions to the flow of air to the engine. The venturi suction is used to open the choke valve after the engine has begun to run to complete the last stage in the opening of the choke located in the venturi.

The figure shows diagrammatically the preferred form of my invention.

In the figure:

- 10 is the air entrance.
- 12 is the venturi therein.
- 14 is the nozzle discharging into 12.
- 16 is the butterfly choke valve located in 12 just above the nozzle 14.
- 18 is the mixture outlet.
- 20 is the butterfly throttle therein.
- 22 and 24 are the low speed fuel outlets.
- 26 is the suction operated fuel economizer of a well-known type.
- 28 is the main fuel restriction for economical operation.
- 30 is the auxiliary variable fuel restriction.
- 32 is the needle valve controlling 30.
- 34 is the lever controlling the valve 16 and controlled by the valve 32. A roller 35 is provided at the end of the lever 34 to engage a flange 33 on the shaft of the needle valve 32.
- 36 is the diaphragm controlling 34.
- 37 is the spring controlling 36.
- 38 is the passage connecting the diaphragm chamber 29 with 50 which is a restriction in the throat of the venturi 12 and is located on the upstream side of the choke valve 16 when the valve 16 is closed and 39 is the vacuum chamber above the diaphragm 36.
- A perforated valve 41 seated by a light spring 43 may be used to restrict the rate at which the pressure in chamber 37 falls and permits the pressure to rise rapidly whenever a load is applied such as would cause "knocking."
- 42 is a manually operated choke control rod adapted to positively close the choke valve 16.
- 44 is a relatively weak tension spring connecting rod 42 to the choke lever 40. This spring yields when the

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choke valve stop 47 contacts the lever 34, which is freely mounted on the shaft of the choke valve.

- The stop 47 on choke lever 40 moves always with the choke valve and delays the opening of the choke valve 16 until the engine has gained enough speed to create enough vacuum in the venturi to permit the spring 44 and stop 47 to raise the lever 34.

- When the choke rod 42 is manually moved to the right, the spring 44 becomes solid and the choke valve 16 is closed for starting the engine in a well-known manner.

- The well-known fuel well 54 and the low speed fuel passage 56 terminate at its upper end on the level of the main nozzle 14 and at its lower end in the low speed fuel outlets 22 and 24 adjacent to the upstream lip of the throttle valve 20.

These well-known elements are shown only as necessary background for the invention.

Operation

- In normal operation the choke valve 16 is in the position shown. If the car exceeds a reasonable maximum speed (say, 60 M. P. H.) or if the car is in difficulties (e. g.—deep snow) and a high rate of engine speed in low gear is called for, then the suction at restriction 41 located on the atmospheric side of choke valve 16 in the venturi 12 overcomes the spring 37; then the lever 34 rises slowly under the influence of atmospheric pressure acting against spring 37 whereupon the choke valve 16 opens up wide, the needle 32 opens up to its maximum opening of opening 30 and the maximum possible flow of air and fuel follows. As "knocking" is usually associated with a lean mixture at low speed wide-open operation, the compression ratio now usually about 7 to 1 can be increased to, say, 7½ without any knocking as a comparatively rich mixture (over 14 to 1) and a high rate of speed (over 60 M. P. H.) demand a lower octane than a leaner mixture (16 to 1) at a lower speed (35 M. P. H. wide open on a hill). On coming to a hill the pressure at restriction 41 rises rapidly, the spring 43 yields and the atmospheric pressure is no longer able to compress the spring 37. The valve 26 opens at low inlet manifold suction and closes at high vacuum in inlet manifold in a well-known manner. Spring 44 causes the stop 47 of the lever 40 to abut and raise lever 34 and roller 35 which roller thus engages the flange 33 which is moved to a position determined by the diaphragm 36, the diaphragm spring 37, the suction in vacuum chamber 39 and the tension in the spring 44.

- More specifically, as the rod 42 is manually moved to the left and held there the lever 40 and stop 47 engages the depressed lever 34 and overcomes the weight of the lever 34 and roller 35 which are thus raised and the choke valve 16 is thus moved counterclockwise from 100% closed position to its half open position. From there on the valve 16 responds to the vacuum in the passage 50 and pipe 38 which vacuum reflects air flow. An over-rich condition (in hot weather) can be corrected as follows: The choke can be forced wide open and the rich mixture can be "washed out" by air freely drawn in with the choke 16 and throttle 20 both wide open. This will call for an extreme leftward movement of the rod 42. Normally, however, the choke valve is manually placed in the half open position. Thereafter as the engine picks up speed the disc 33 rises and the normal position of the rod 42 is so set that the tension in the spring 44 causes the lever 34, roller 35, to just follow the upward travel of the disc 33 as it responds to the increasing suction in the venturi 10 transmitted through the passage 50, restriction 41, pipe 38 and so to chamber 39 where the spring 37 is compressed by atmospheric pressure acting in the flexible diaphragm 36. The flange 33 thus rises and is followed by roller 35. Ultimately the choke 16 is moved to its wide open position. The resulting freedom for the

passage of air through the venturi 10 would result in an over-lean mixture. To correct this, as flange 33 rises so also does valve 32 rise and tapered pin 30 is so formed to give whatever mixture ratio the customer demands. The jet 28 is the jet which determines "Road Mileage" with the choke half open and (as is well known), this jet is also changed to suit the customer's requirements.

The valve 26 is the well known expedient to provide the maximum power when the throttle 20 is wide open. This device is in almost universal use in 1954.

What I claim is:

1. In a carburetor having a venturi air entrance, a variable positioned butterfly choke valve therein, a fuel nozzle discharging into said venturi adjacent to but downstream of said choke valve in all positions of said choke valve, a mixture outlet, a throttle valve therein, a constant level fuel supply chamber, a smaller chamber therein connected at its upper end with said nozzle, a first restricted fuel supply orifice, a second restricted fuel orifice, both communicating with said smaller chamber, a vacuum chamber, a moving wall therein, a passage from said chamber to the throat of said venturi at a location approximately opposite to but slightly upstream to that of the nozzle so that it is always on the atmospheric side of said choke valve, a variable stop for said choke connected to said moving wall so that the choke is only permitted to move to its wide open position at a specific suction created by a specific high rate of air flow through said venturi, a needle valve also connected to said moving wall and adapted to open said second fuel restriction as said choke is permitted to move to its wide open position, means for moving said choke to its wide open position against said choke valve stop, comprising a lever connected to said choke valve and engaging said stop, spring means engaging said choke valve to hold the end of said lever in engagement with said stop.

2. In a carburetor, an air entrance, a mixing chamber of the venturi type therein, a choke valve located in the throat of said venturi, said valve being of the butterfly type, a fuel nozzle discharging into the throat of said venturi downstream of said choke valve at all positions of said choke valve, a mixture outlet throttle therein, an opening in the wall of said venturi located on the atmospheric side of the downstream lip of said butterfly choke valve in all positions of said valve, a suction chamber, a passage connected to said chamber and to said opening so as to admit air from the throat of said venturi to said chamber, a moving wall for said chamber, a spring connected to said wall, a first lever connected to said choke valve, a choke valve stop moved by said wall and engaged by said lever and adapted to limit the opening movement of said choke valve, manually operated yieldable means, a second choke opening lever connected thereto and engaging said first choke lever, said yieldable means being adapted to cause the choke valve to open wide when the said stop is moved in response to a high suction in the venturi, said manually operated control means being adapted to positively close said choke valve when moved in the opposite direction, a first fuel opening leading to

said nozzle, said opening having a fixed area, a second fuel opening which has a variable size also leading to said nozzle, a needle valve for said second opening moved by said movable wall in unison with the movement of said choke valve stop so that as the choke valve is opened the second fuel opening is also opened.

3. In a carburetor for an internal combustion engine, an air entrance, a venturi therein, a butterfly choke valve therein located in the throat of said venturi, a first choke lever rigidly connected to said valve, a second lever having a one-way connection with said valve, a movable choke stop mounted on said first choke lever and engaging the second lever so as to limit the final opening movement of said first choke lever, an air chamber having a moving wall, a passage from the venturi to said air chamber connected at a point in the throat which is always upstream of said choke valve, yieldable means opposing the motion of said wall in the direction it moves in response to atmospheric pressure, a second stop moved by said wall and engaging the end of the said second lever, a fuel nozzle discharging into said venturi adjacent to said choke but always downstream thereof, a constant level fuel supply chamber, a restricted fuel supply leading to said nozzle, a variable fuel restriction also leading to said nozzle in parallel with said restricted fuel supply, a control valve for said variable restriction connected so as to move with said second stop so that as the choke valve is opened more fuel will flow to said nozzle.

4. A device as set forth in claim 3 in which there is a third fuel supply opening from said fuel supply chamber to said fuel nozzle, a second moving wall, a chamber associated with said second wall, a suction passage from said chamber to the mixture outlet downstream of said throttle, yieldable means opposing the motion of said second wall when it moves in response to an increase in engine suction, a valve in said third fuel supply opening and connected to said second wall so as to restrict the fuel flow whenever the throttle is closed.

5. A device as set forth in claim 3 in which there is a manually operated choke valve rod and in which the yieldable means is a one-way connection interposed between the second choke lever and said rod through said first lever and is adapted to yield when the second choke lever engages said second stop when the rod is moved so as to open the choke valve and when the rod is moved to close the choke valve the said yieldable means becomes solid so as to positively choke the engine.

6. A device as set forth in claim 3 in which the nozzle extends into the venturi almost to the center of the throat thereof so that the nozzle is subjected to the full suction effect of the venturi throat and the partly open choke therein.

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