Feb. 20, 1934. L. D. BOYCE 1,947,693

CARBURETOR

Filed Sept. 27, 1932 2 Sheets-Sheet 1

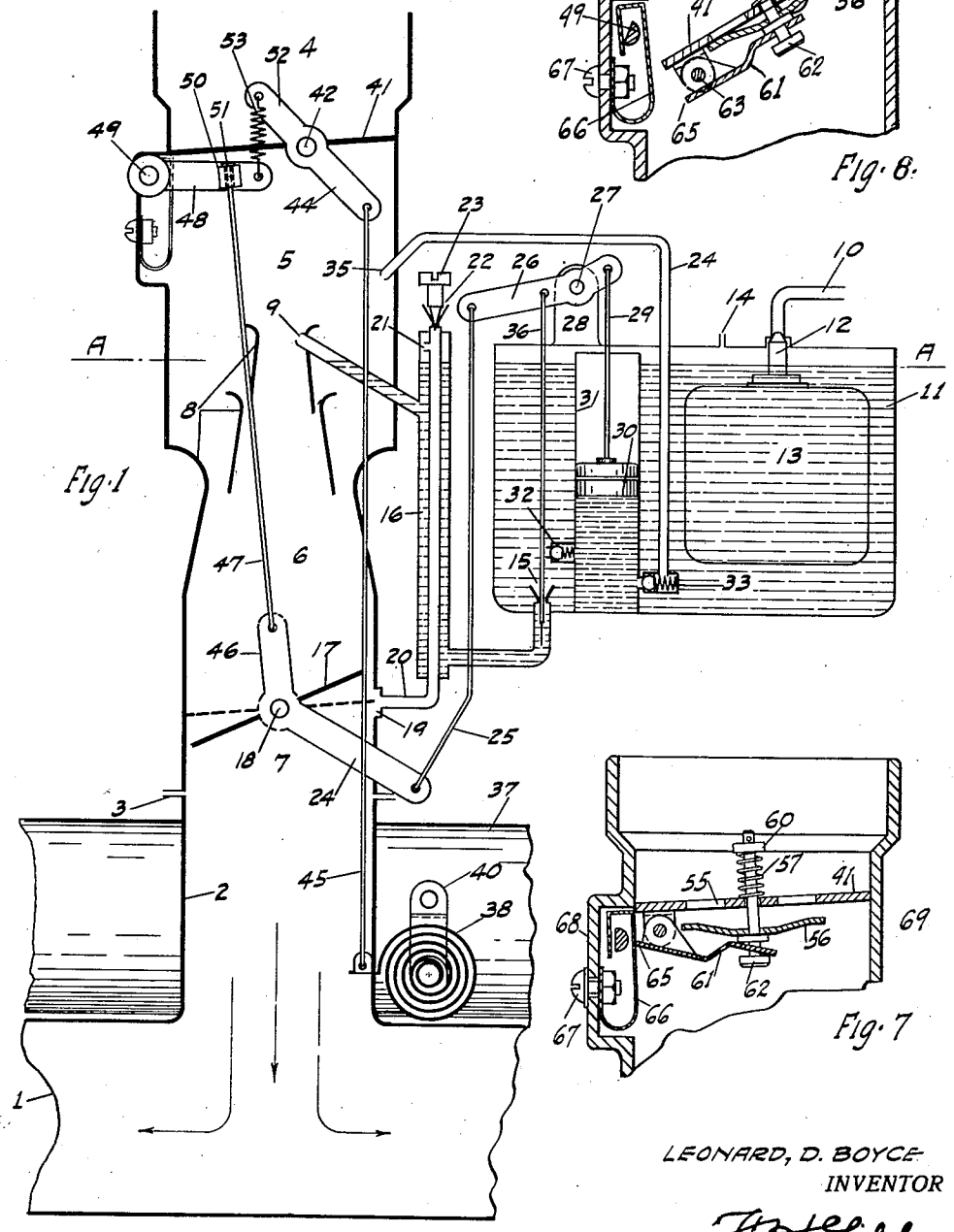


Fig. 1

Fig. 8.

Fig. 7

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CARBURETOR

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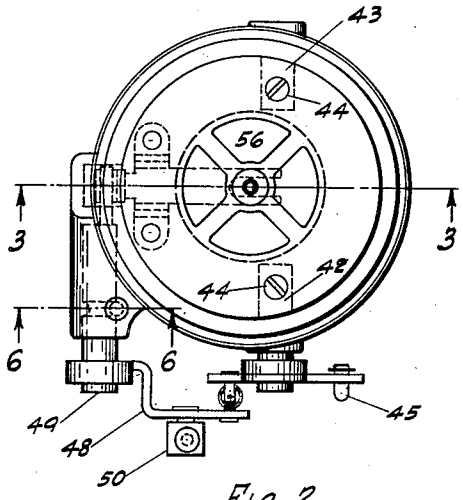


Fig. 2

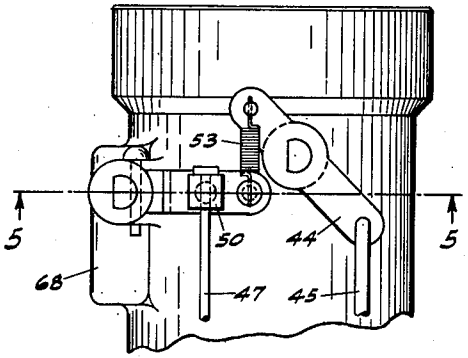


Fig. 4

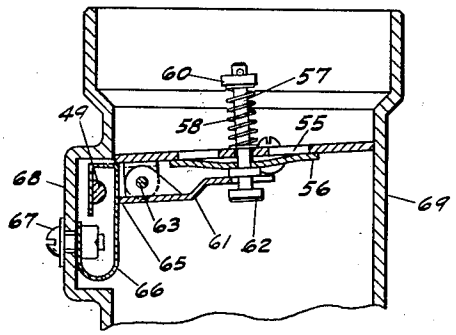


Fig. 3

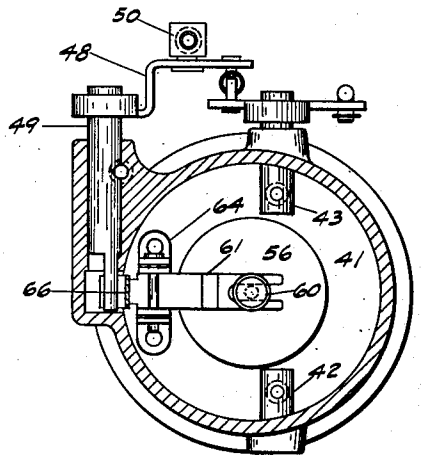


Fig. 5

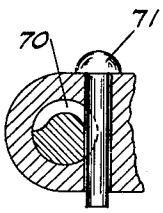


Fig. 6

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Patented Feb. 20, 1934

1,947,693

UNITED STATES PATENT OFFICE

1,947,693

CARBURETOR

Leonard D. Boyce, Maplewood, Mo., assignor to Carter Carburetor Corporation, St. Louis, Mo., a corporation of Missouri

Application September 27, 1932
Serial No. 635,025

13 Claims. (Cl. 123—119)

It will be understood that the invention is susceptible of many modifications, and, accordingly, I do not wish to be limited in my protection, except as set forth in the accompanying claims.

This invention relates to carburetors for internal combustion engines and more particularly to automatic choking devices for such carburetors.

In automatic choking devices of this general character it is customary to provide two suction operated valve devices for controlling the admission of air to the carburetor. One of these devices is operable only at a comparatively high suction and the other is operable by comparatively low suction. For the initial start under low temperature conditions, it is necessary to provide some kind of a locking device to hold the low suction valve closed or else the high suction would never be opened under any circumstances.

When a latch of this general character is provided to hold the main or low suction valve in closed position, it sometimes happens, in starting the motor, that too much gasoline is supplied by the carburetor and the cylinders become flooded. When this occurs continued cranking only draws in more gasoline as long as the choke valves are closed and makes the condition worse, so that once flooded, the engine would never start unless the choke valve is opened in some way.

Latches of this nature, no matter how carefully they are designed, sometimes drag to such an extent on the choke valve during the closing movement that the thermostat has not sufficient strength to move the valve to fully closed position, and one object of this invention is to provide a device for withdrawing the latch during the closing movement of the choke valve.

It is a further object of this invention to provide a carburetor with a pair of choke valves operating at different suctions and an improved latch means for holding the low suction valve in closed position during the initial cranking and starting of the motor.

It is a further object of this invention to provide a device under control of the operator of the car for releasing the latch and opening the choke valve in case the motor should become flooded with gasoline so as to stop the supply of rich mixture and permit the flooded condition to be relieved by continuous cranking of the motor with the throttle in open position.

It is a further object of this invention to provide a generally improved device of the above character.

The invention will be better understood from the following description and accompanying drawings referring to which;

Figure 1 is a diagram of a carburetor constructed according to my invention.

Figure 2 is a plan view showing the upper end of the mixing conduit and the carburetor according to my invention.

Figure 3 is a vertical sectional view of the upper end of the carburetor shown in Figures 1 and 2, the section being taken along the lines 3—3 of Figure 2.

Figure 4 is a side elevation of the device shown in Figure 3.

Figure 5 is a sectional plan view taken along the lines 5—5 of Figure 4 looking in the direction of the arrows.

Figure 6 is a vertical sectional detail view taken along the lines 6—6 of Figure 2.

Figure 7 is a vertical sectional view of the parts shown in Figure 3, with the parts in a different operating position.

Figure 8 is a vertical sectional view of the parts shown in Figures 3 and 7, with the parts in a different operating position.

The reference numeral 1 indicates the intake manifold of an internal combustion engine. The manifold is provided with a riser 2 terminating in a flange 3 to which the discharge outlet of the downdraft carburetor is applied as indicated in Figure 1. The mixing conduit comprises an air inlet 4, air chamber 5, mixing chamber 6, and discharge outlet 7. One or more venturis 8 are provided at the entrance of the mixing chamber, in this case three venturis are shown and the main fuel nozzle 9 discharges into the smallest of the venturis.

Fuel is applied to the carburetor thru the conventional fuel inlet 10 from any suitable source (not shown), and its admission to the float chamber 11 is controlled by the float valve 12 and float 13 in such a manner as to maintain the normal fuel level as indicated by the lines *a*—*a* in Figure 1. The float chamber is provided with the usual atmospheric vent 14.

The main fuel flow controlling device comprises the outlet orifice 15 leading from the float chamber to the chamber 16, with which the main nozzle 9 is connected. The carburetor is provided with a conventional butterfly throttle 17 mounted on shaft 18 and controlled by any suitable manual operating means, such as the usual accelerator or hand throttle of an auto-

mobile. This forms no part of the invention and is not shown.

An idle port 19 is formed in the wall of the mixing conduit at a point adjacent the edge of the throttle valve when it is in closed position and an idle tube 20 extends upwardly to the top of the chamber 16 with which it communicates by means of the port 21. A vent 22 is provided for the upper end of the chamber 16 and the idle tube, and this vent is controlled by a conventional idle adjusting screw 23.

The shaft 18 is provided with a double lever 24 fixed thereto and a pump operating rod 25 is pivoted to one end of this lever. The pump operating rod runs to a rocker arm 26 which is mounted on the rock shaft 27. Shaft 27 is carried in a suitable standard 28 on the top of the float chamber. A connecting rod 29 is attached to the rocker arm 26 and has its other end connected to the piston 30 of the accelerating pump 31.

The accelerating pump has an inlet ball check 32 and an outlet ball check 33 which is connected by means of a conduit 34 to the discharge outlet 35 of the pump, which outlet is located in the air chamber 5 to discharge at a point anterior to the venturis as indicated in Figure 1. A conventional metering rod 36 is attached to the rocker arm 26 and extends into the orifice 15 for the purpose of controlling the fuel mixture in accordance with throttle position.

The engine is provided with the usual exhaust manifold 37 and a conventional bi-metallic coil thermostat 38 is mounted on the manifold by means of a bracket 40 so that it will be quickly heated up when the engine is started. A main choke valve 41 is provided to control the air inlet at the entrance of the air chamber. This valve is of the butterfly type and is eccentrically mounted on the stub-shafts 42 and 43 to which it is attached by means of suitable screws 44. A connecting rod 45 connects the free end of the thermostat to an operating arm 46 which is fixed to the choke valve shaft 42 so that the choke valve will be operated in accordance with the position of the thermostat.

The double arm 24, which is mounted on the throttle shaft 18, is provided with an extension 46 which is connected by means of a rod 47 to the arm 48 which is pivoted to the walls in the mixing conduit as indicated at 49. The rod 47 is made slidable in the pivot block 50 and is provided with a head 51 so that movements of the throttle valve can move the arm 48 forcibly in a downward direction, but can cause no movement of the member 48 in an upward direction. The operating arm 44 is provided with an extension 52 which is connected to the arm 48 by means of spring 53.

From an inspection of Figure 1 in which the throttle valve 17 is in a slightly open position, it will be noted that the arm 46 is on the dead center between the shaft 18 and the pivot block 50, and that the throttle valve 17 will require approximately 15 or 20 degrees of movement to move it to full closed position, while it has approximately 65 or 70 degrees to move it to full open position, so that when the throttle is moved to full position the member 48 will exercise a slight pull on the spring 53 tending to pull the choke valve to a slightly more open position. If the throttle valve 17 is moved to full open position, the arm 48 will be caused to exercise a very strong pull on the spring 53 tending to pull the choke valve to full open position.

The choke valve 41 is provided with openings 55 which are normally closed by an auxiliary choke valve 56 which is mounted on the shaft 57. This shaft passes thru a suitable opening in the center of the openings 55 as indicated in Figure 3 and a spring 58 held in position by suitable stop means 60 is provided for normally holding the valve in closed position. The strength of the spring 58 compared to the area of the auxiliary choke valve 56 is greater than the spring action of the thermostat 38 with respect to the effective or differential area of the main choke valve 41, at least for any ordinary atmospheric temperature down to and including 10 below zero Fahrenheit. A fork or yoke 61 is placed between the valve 56 and a head 62 on the lower end of shaft 57 as indicated in Figures 3 and 5. The yoke 61 is pivoted as indicated at 63 to a bracket 64 mounted on the main choke valve and the rear end of the yoke extends slightly beyond the pivot 63 as indicated at 65.

A latching device for the choke valve is provided in the form of a spring member 66 which is attached by any suitable means such as bolt 67 to the housing 68 which is formed on the wall 69 of the air chamber. The spring member 66 is bent into a loop at both ends, the upper end of the loop being brought up under the longer edge of the main choke valve as indicated in Figure 3 and then bent down again to contact with a rock shaft 49 which may be rocked in either direction by movements of the throttle valve and when so rocked will push the latch back out of the path of the choke valve 41 to permit the same to close, and also to open freely either by suction or by a downward pull of the spring 53, acting in response to an opening or closing movement of the throttle.

In order to limit the movements of the arm 48, a groove 70 extending only part of the way around is formed in the shaft 49 to receive the pin 71 as indicated in Figures 5 and 6. This permits partial rotation of the shaft 49 but prevents its falling altogether out of place. The operation is as follows:

When the engine is to be started under low temperature conditions, the thermostat 38 will turn its free end in an anticlockwise direction with respect to Figure 1 and close the choke valve 41.

It will be understood that the throttle is normally closed while the engine is standing still, so that the latch is normally withdrawn and cannot drag on the valve to interfere in any way with its closing movement. Of course, the construction of the latch is such that even if the throttle was left partially open, there should be only a slight resistance to the valve movement, and the choke valve will close anyhow if the temperature is low enough, but the complete withdrawal of the latch prevents any possibility of resistance at this point. The auxiliary choke valve 56 will, of course, be already in closed position.

For starting purposes the operator will move the throttle valve 17 to approximately the position shown in Figure 1 so that there will be no interference with the closing of the choke valve 41 under the influence of the thermostat. The latch 66 will engage the choke valve after it has

moved to closed position and hold it there against the light suction produced by the engine at cranking speed say up to and including 100 R. P. M.

As soon as the engine starts to run under its own power the R. P. M. and the suction will substantially increase, and the valve 56 will be drawn open and will pull the yoke 61 downwardly, thereby forcing the extension 65 against the latch 66 and disengaging the latch from the edge of the choke valve 41. As soon as the latch is disengaged, the suction of the engine acting on the unbalanced valve 41 will draw it open against the tension of the thermostat 38 to a position in accordance with the temperature and the speed of the engine. As the engine warms up the temperature of the exhaust manifold 37 will increase and the thermostat will gradually move the choke valve 41 to open position.

In case the engine fires but fails to run due to faulty ignition or other conditions, the cylinders may become flooded and in such case the operator moves the throttle 17 to wide open position causing the shaft 49 to be rocked to the position shown in Figure 7 and causing a strong downward pull on the member 52 by means of the spring 53. This will cause a substantial opening of the choke valve, as the spring 53 will overcome the spring tension of the thermostat 38 to at least a certain extent, in accordance with temperature conditions. With the choke valve 1 in open position, further cranking of the motor at low speed will eliminate the surplus gasoline from the cylinders and when this has been thoroughly accomplished the throttle may again be moved to the position shown in Figure 1, the choke valve will then close under the influence of the thermostat and the engine may be started in the usual manner.

When the engine is running under low temperature conditions, as for instance when it has just been started cold, it is desirable to insure an opening movement of the choke when the throttle is either in fully closed or fully opened position, and this, as will be noted from the previous description will be accomplished as the arm 46 is moved in either direction from the position shown in Figure 1.

I claim:

1. In a carburetor, means forming an air inlet passageway, a pair of separately operable valve members for controlling the admission of air to said passageway, one of said members being operable by suction, latch means for holding the other of said valve members in closed position and means operated by the suction operated valve member for controlling said latch.

2. In a carburetor, means forming an air inlet passageway, a main choke valve for said passageway, yieldable means for holding said main choke valve in closed position, said yieldable means being displaceable by a comparatively low degree of suction applied to said choke valve, latch means for holding said choke valve in closed position, an auxiliary choke valve, yieldable means for holding said auxiliary choke valve in closed position, said auxiliary choke valve requiring a comparatively high suction to open it, and connections for disengaging said latch from said first-named choke valve when said auxiliary choke valve is fully opened.

3. In a carburetor, means forming a mixing conduit, a suction operated choke valve in said mixing conduit, a heat responsive device normally holding said choke valve in closed position when the temperature is low, latch means for holding said choke valve in closed position, a throttle valve and means operated by an opening movement of said throttle valve for disengaging said latch.

4. In a carburetor, means forming a mixing conduit, a pair of suction operated choke valves for said conduit, said choke valves operating at different suctions, heat responsive means for controlling the position of one of said choke valves, a latch for holding one of said choke valves in closed position, means operated by the other choke valve for disengaging said latch and additional means operated by the throttle valve to disengage said latch.

5. In a carburetor, means forming an air inlet passageway, a choke valve mounted in said passageway, said choke valve being eccentrically mounted and adapted to be urged by suction toward its open position, an opening in said choke valve, a poppet valve controlling said opening and normally held in closed position by spring, a heat responsive device for controlling the position of one of said valves, latch means for preventing the opening by suction of said valve, a throttle valve, and means operated by said throttle to disengage said latch.

6. In a carburetor, means forming a mixing conduit, having an air inlet and a mixture outlet, a pair of suction operated valves for controlling said air inlet, a throttle valve for controlling said mixture outlet, heat responsive means for operating one of said inlet valves latch means for controlling one of said inlet valves, and means operated by said throttle for controlling said latch.

7. In a carburetor, means forming a mixing conduit having an air inlet and a mixture outlet, main and auxiliary choke valves for controlling said air inlet, a throttle valve for controlling said mixture outlet, heat responsive means for holding said main choke valve in closed position when the temperature is low, said main inlet valve being constructed and arranged to be opened by a comparatively low suction, said auxiliary choke valve being adapted to be operated by comparatively high suction, latch means for preventing the opening of said main choke valve, means operated by the opening of said auxiliary choke valve for disengaging said latch, and means operated by said throttle for disengaging said latch.

8. In a carburetor, means forming a mixing conduit, a suction operated choke valve, a manually operated throttle valve in said conduit, latch means for holding said choke valve in closed position, a yieldable connection between said throttle valve and said choke valve, said connection tending to cause an opening movement of said choke valve in response to an opening movement of said throttle valve, and means for disengaging said latch when said throttle valve is open.

9. In a carburetor, means forming a mixing conduit, a suction operated choke valve and a manually operated throttle valve in said mixture, a yielding connection between said throttle valve and said choke valve, said connection being constructed and arranged to tend to cause an opening movement of the choke valve, when the throttle valve is either fully closed or fully opened, a heat responsive device connected to said choke valve for controlling its position in

accordance with temperature, a latch for preventing the opening of said choke valve and a manually controlled device for operating said latch.

10. In a carburetor, means forming a mixing conduit, a suction operated choke valve and a manually operated throttle valve in said conduit, a heat responsive device for controlling said choke valve, a latch for engaging said choke valve when it is moved to closed position to resist its opening by suction, and means for withdrawing said latch from the path of the choke valve during a normal closing thereof as a result of decrease in temperature.

11. In a carburetor, means forming a mixing conduit, a choke valve and a throttle valve in said conduit, a heat responsive device for controlling said choke valve, a latch for engaging said choke valve when it is closed position to resist the opening thereof, and means independent of said choke valve for withdrawing said latch.

12. In a carburetor, means forming a mixing conduit, having an air inlet and a mixture outlet, a choke valve in said air inlet, a throttle valve in said mixture outlet, a heat responsive device controlling the movements of said choke valve, a latch to resist the opening of said choke valve, and means operated by said throttle for removing said latch from the path of said choke valve during the closing movement thereof.

13. In a carburetor, means forming a mixing conduit having an air inlet and a mixture outlet, a suction operated choke valve in said air inlet, a manually operated throttle in said mixture outlet, a latching device for resisting the opening of said choke valve, and means operated by a movement of said throttle to closed position for withdrawing said latch from the path of said choke valve to prevent interference of said latch with the closing movements of said choke valve.

LEONARD D. BOYCE.

DISCLAIMER

1,947,693.—*Leonard D. Boyce*, Maplewood, Mo. CARBURETOR. Patent dated February 20, 1934. Disclaimer filed April 10, 1934, by the patentee and the assignee, *Carter Carburetor Corporation*.

Hereby enter this disclaimer to that part of the claims in said Letters Patent which is in the following words, to wit:

"3. In a carburetor, means forming a mixing conduit, a suction operated choke valve in said mixing conduit, a heat responsive device normally holding said choke valve in closed position when the temperature is low, latch means for holding said choke valve in closed position, a throttle valve and means operated by an opening movement of said throttle valve for disengaging said latch."

[*Official Gazette May 1, 1934.*]