April 15, 1930. H. C. WAITE 1,754,972

CARBURETOR

Original Filed Feb. 20, 1924

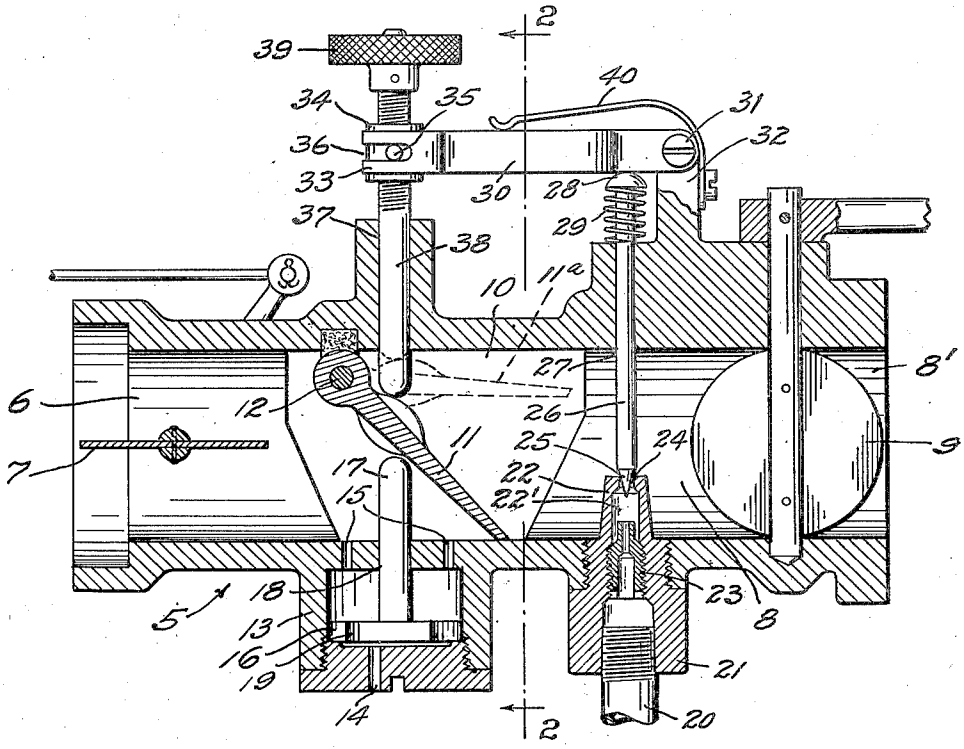


Fig. 1.

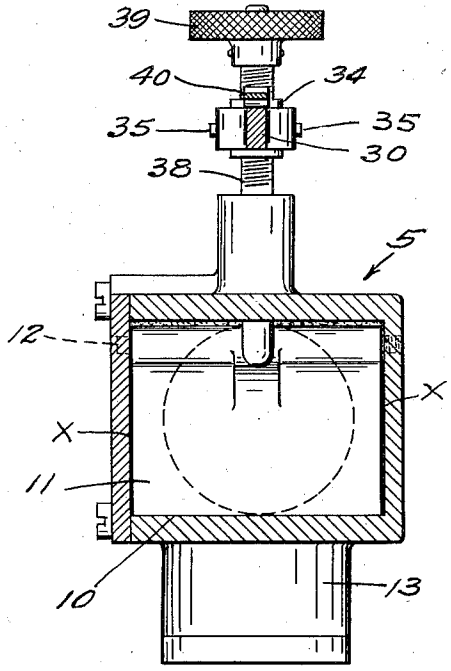


Fig. 2.

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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed February 20, 1924, Serial No. 693,969. Renewed September 13, 1929.

This invention relates to carburetors for use more particularly in connection with internal combustion engines of motor vehicles.

The object of the invention, generally, is to simplify and otherwise improve the construction of carburetors with a view to increase the efficiency thereof.

A further object is to provide a carburetor which will be self priming in starting and will adapt itself automatically to accommodate variations in the speed or demand of the associated engine.

My invention pertains to the floatless type of carburetor and has an air inlet with a choke valve; a throttle valve at the intake engine manifold connection, a mixing chamber forward of the throttle for the gasoline intake, and a flap valve in an air or vacuum chamber adapted to control the opening or closing of the gasoline inlet by a metering pin, an auxiliary vacuum cylinder connected to the air chamber has a piston with a stem, the stem through the medium of the flap valve actuating the metering pin, in accordance with a suction or vacuum produced in the auxiliary cylinder.

Other objects and advantages of the invention will appear in the following specification.

The invention consists in the novel construction, adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawing,—

Figure 1 is a vertical longitudinal section of a carburetor embodying my invention; and Fig. 2 is a transverse section on line 2—2 of Fig. 1.

As illustrated in said drawing, the carburetor comprises a body or casing 5 formed to provide at one of its ends an inlet passage 6 which is open to the atmosphere for the admission of air subject to the control of a butterfly choker valve 7 which is rotatable about a horizontal axis.

At the other end the body is provided with a mixing chamber 8 having an outlet passage 8^1 communicatively connected to the intake manifold not shown, of an internal combustion engine. Said outlet passage is provided with the usual throttle valve 9. Said inlet and outlet passages are preferably circular in transverse sections. Intermediate said passages the body is provided with a chamber 10 of a rectangular transverse section containing a flap valve 11, arranged, as shown in Fig. 1 and swingingly supported at its upper end on a pivot pin 12.

The valve 11 is of slightly less width than the width of the chamber 10 to afford a relatively narrow opening, see Fig. 2, at each side of the valve so that when the latter and the choker valve 7 are in their closed positions, a partial vacuum is obtained in the space between these valves due to the suction strokes of the pistons of the associated engine.

The body is formed to provide a cylinder 13 below the valve chamber 10. The bore of said cylinder is communicatively connected at its lower end with the external atmosphere through the medium of an air inlet hole 14 and at its upper end with the chamber 10 through the medium of apertures 15.

Within said cylinder is a piston 16 provided with a stem 17 extending upwardly through a guide hole 18 of the body, the stem having the upper end thereof engageable against the underside of the valve 11 to elevate the same into open position when the piston is forced upwardly by the power of atmospheric pressure acting against the underside of the piston.

To permit a small leakage of air by the piston, the latter is made of slightly less diameter than the cylinder bore or, as shown, the piston may be provided with leak openings or notches such as 19 in its periphery.

20 represents a gasoline supply pipe connected to a coupling 21 threaded into the bottom wall of the casing, the coupling be provided with a nozzle 22 extending into the mixing chamber 8 intermediate the throttle valve 9 and the flap valve 11.

The nozzle 22 is chambered as at 22^1 and extending into the chamber 22 is a nozzle provided on a fitting 23. Said fitting is removably secured within the coupling 21 in order to be replaced by another fitting having a larger or smaller duct as may be required with different engines.

The bore or duct of the nozzle fitting 23 is

of less diameter than the orifice 24 of the nozzle 22.

Arranged to seat in the orifice 24 of nozzle 22 is the conical lower end 25 of a vertically disposed rod 26, hereinafter designated as the metering pin, which passes through a guide hole 27 in the body and is formed or provided at its upper end with a relatively large head 28.

Interposed between body 5 and the head 28 of the metering pin is a spring 29 of sufficient power to overcome the weight of the pin for elevating the same into its open position with respect to the nozzle orifice 24.

30 represents a lever fulcrumed at one end to a bolt 31 which is connected to a post 32 provided on the body. As shown, said lever extends over the metering pin and has its free end forked to receive between the lever bifurcations, such as 33, a nut 34 having at diametrically opposite sides trunnions 35 which engage in grooves or slots, as 36, provided in the respective bifurcations.

Extending vertically through a guideway 37 of the casing and taking in the screw threads of said nut is a screw threaded rod 38 having, preferably a regulating wheel 39 at its upper end whereby the rod 38 may be rotated for adjusting the same axially in the nut 34.

The end of the rod 38 within the body chamber 10 is held against the flap valve 11 by means of a spring 40 herein shown as attached to the post 32 and bearing down upon the lever 30.

The spring 40, moreover, is sufficiently strong to overcome the power of the spring 29.

The operation of the invention is as follows: The carburetor being connected to an internal combustion engine, to prime the engine, the choker valve 7 is closed with respect to the air inlet passage 6 and, as the engine crank-shaft is rotated for starting, the resulting suction strokes of the engine pistons produce a suction or partial vacuum within the carburetor chamber 10.

As this occurs a partial vacuum will also obtain in the cylinder 13 above the piston 16 which partial vacuum cooperating with the air pressure acting against the under surface of the piston causes the same to ascend and through the medium of the piston stem 17 causes the flap valve to be swung upwardly into the position in which it is represented by dotted lines 11^a in Fig. 1.

The flap valve when swung upwardly pushes the rod 38 therewith to elevate the lever 30 whereupon the spring 29 acts to raise the metering pin 26 from its seat in the nozzle 22 permitting gasoline to be discharged through both of the nozzles into the mixing chamber 8.

With the main air inlet 6 closed by the choker valve the only air admitted into the carburetor is the relatively small quantity which passes by the piston 16 so that the resultant or priming mixture sucked from the carburetor is of a character rich in hydrocarbons. After the engine is operated by the explosion of charges of such a fuel mixture the choker valve 7 is returned into its full open position resulting in air being admitted through the inlet 6 thereby overcoming the partial vacuum in the cylinder 13 but maintaining the flap valve at elevations varying with and responsive to the suction operations of the associated engine.

When the choker valve is in position, moreover, to allow but a small inflow of air through the passage 6 the suction in the chamber 10 will serve to draw air through the cylinder 13 and enable the atmospheric pressure against the bottom of the piston to raise the flap valve 11 which, in turn, effects the opening movement of the metering pin with respect to the fuel nozzle thus permitting a relatively rich mixture to be produced by suitably regulating the choker valve.

It will be obvious that even if the choker valve is wide open and the engine is speeded up by opening the throttle so that a sufficient suction is formed in the mixing chamber the flap valve 11 will be elevated and the vacuum will draw upward the piston 16, thereby acting to lift the metering pin and allow more fuel to flow.

I do not wish to be understood as confining myself to the specific construction and arrangement of parts herein shown, except as limited by the scope of the following claims.

What I claim, is,—

1. In a carburetor, a body provided with a valve chamber, an inlet passage and a mixing chamber, a fuel feed nozzle provided in the mixing chamber, a valve for said nozzle, a control valve provided in said valve chamber for regulating the opening movement of the nozzle valve, a choker valve provided in the inlet passage, and means actuated by the partial vacuum in the valve chamber for actuating the control valve to produce an opening movement of the latter, said means being rendered operative by closing of the choke valve.

2. In a carburetor having an air inlet passage, a mixing chamber, a valve chamber and a cylinder disposed below said chamber, the bore of said cylinder communicating from its opposite ends with said valve chamber and the atmospheric exterior of the body, a fuel-feed nozzle in said mixing chamber, a valve therefor, a spring tending to open said valve, a control valve provided within said valve chamber, means rendered operative by the opening movement of the control valve for regulating the opening movement of the nozzle valve, a choker valve provided in the inlet passage, a piston provided in the said cylinder, a stem extending from said piston

into engageable relation with the control valve whereby the latter is moved into open position by atmospheric pressure acting against the underside of the piston when a partial vacuum obtains within the cylinder bore above the piston.

3. In a carburetor, the combination of a body having inlet and outlet passages and having between said passages a chamber constituting a passage through which all of the air entering the carburetor passes, a flap valve in the chamber, a cylinder in proximate relation to said flap valve, a piston in said cylinder having a stem extending into said chamber and bearing freely against the flap valve and adapted to move the flap valve to open position, said cylinder being in communication respectively with the atmosphere and with the chamber, and the piston being adapted to permit a limited passage of air in all of its positions of movement, a fuel inlet passage, a metering pin co-operating with the fuel inlet passage, and operative devices interposed between the flap valve and the metering pin for opening the metering pin when the flap valve is moved to open position, the flap valve being movable either through a thrust imparted by the piston stem or movable to open position independently of the piston stem by direct suction from the engine.

4. In a carburetor, the combination with a body having inlet and outlet passages; of a chamber in the body having a flap valve; a cylinder below said chamber; a piston within the cylinder and having a stem extending into the chamber, said stem bearing on said flap valve, said cylinder having an air passage to said chamber and an air passage to the atmosphere; a fuel inlet passage communicating with said chamber; a metering pin co-operating with said fuel passage; and operative connections between the stem of the piston and the metering pin for controlling the operation of said fuel passage in accordance with the amount of vacuum created in the cylinder, said connections including a rod co-operating with said flap valve, a lever adjustably connected to said rod, a spring pressing the metering pin against the lever, and a second spring pressing the lever in the opposite direction.

5. In a carburetor, for internal combustion motors, the combination with a mixing chamber having an outlet communicating with the intake of the motor, a main inlet communicating with the atmosphere, of a choke valve for said main inlet; fuel feed means communicating with said mixing chamber; a suction device communicating with the mixing chamber, said suction device being actuated by the atmospheric pressure when said choke valve is operated to close the main inlet; an air valve operated by said device for controlling the passage of air through said mixing chamber; and means for controlling the fuel admitted to said mixing chamber of said fuel feed means also actuated by said device.

Signed at Seattle, Washington, this 13 day of February, 1924.

HARRY C. WAITE.