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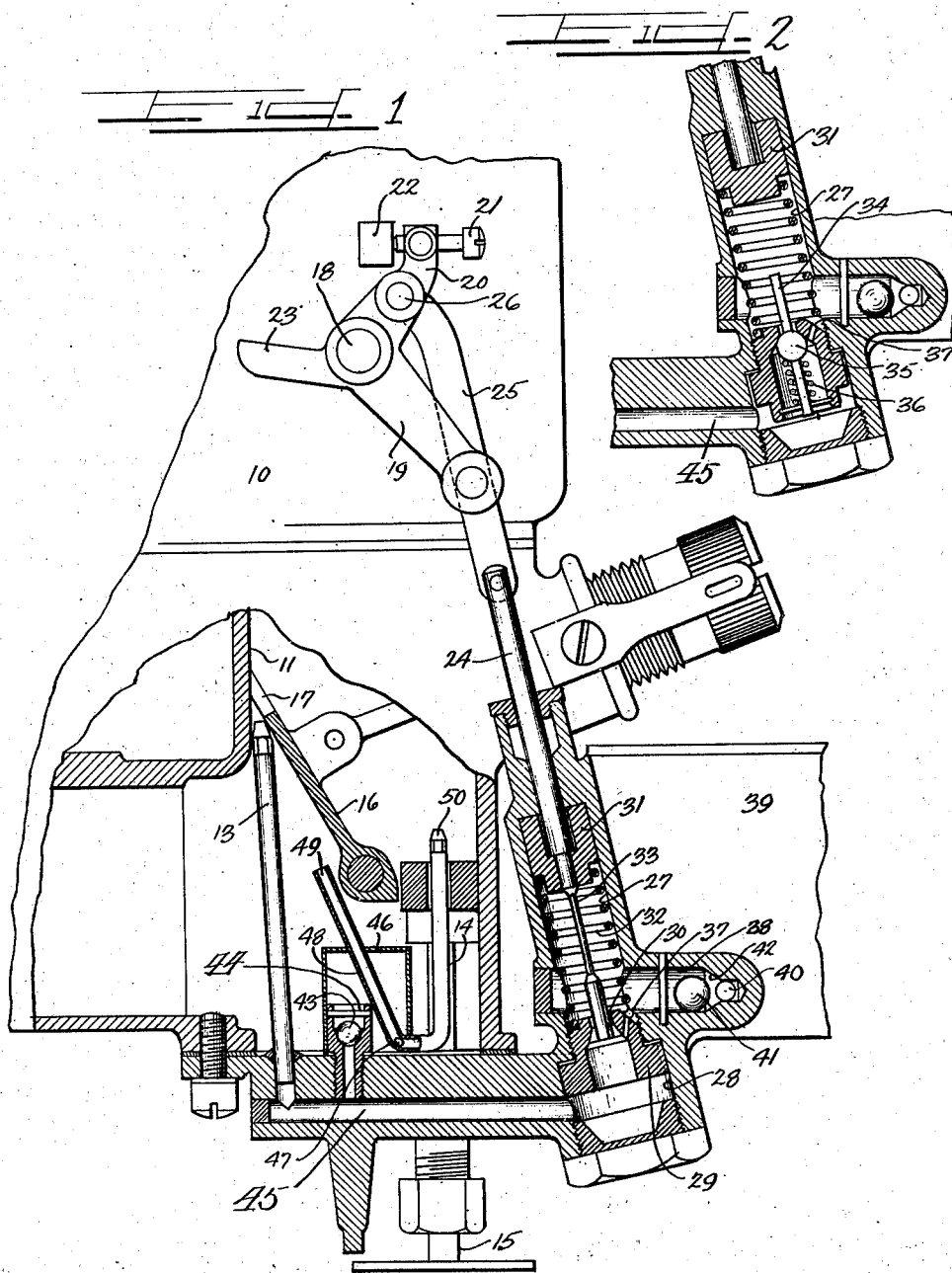
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CARBURETOR

Filed June 7, 1926

3 Sheets-Sheet 1



INVENTOR

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BY

ALVE

June 10, 1930.

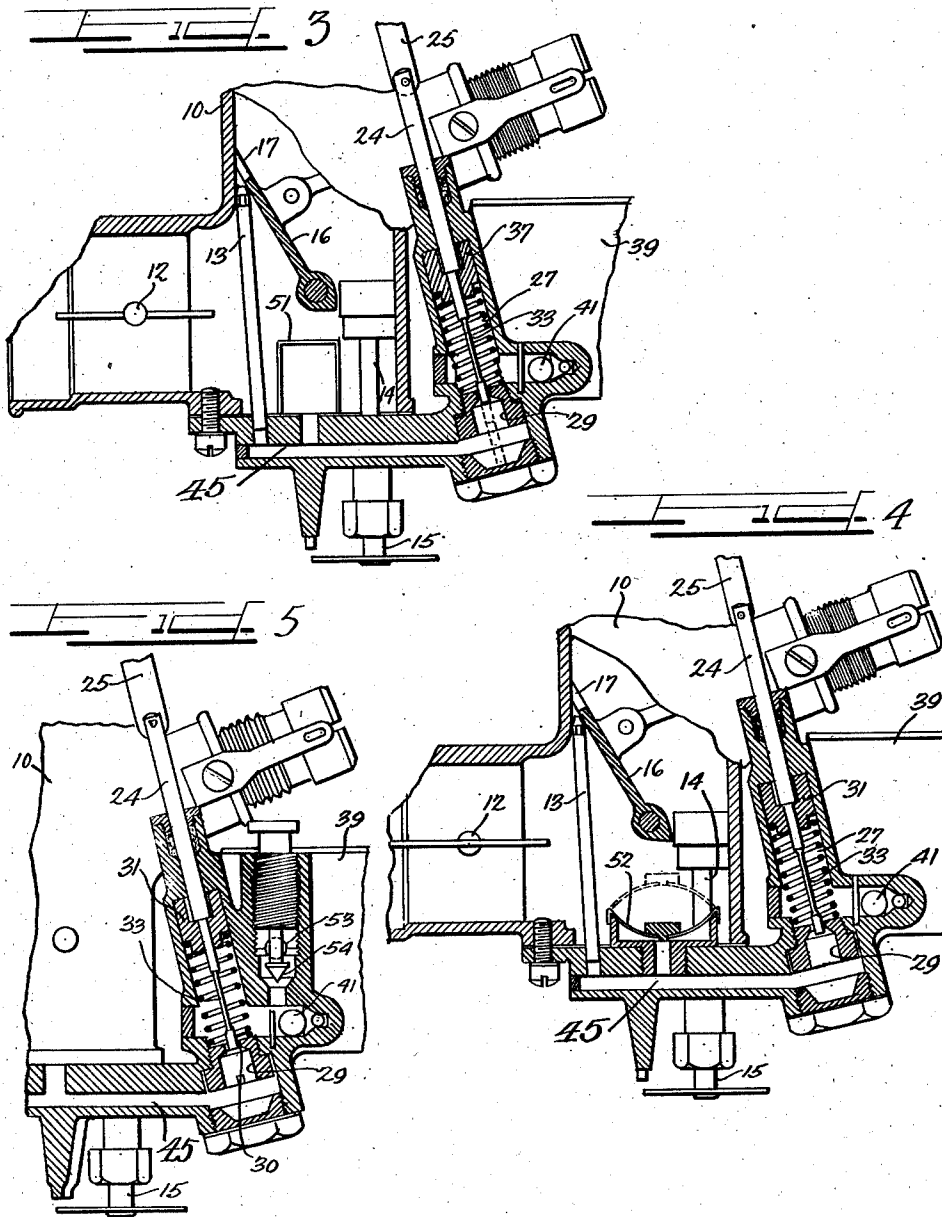
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CARBURETOR

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3 Sheets-Sheet 2



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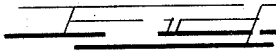
C. H. KIRBY

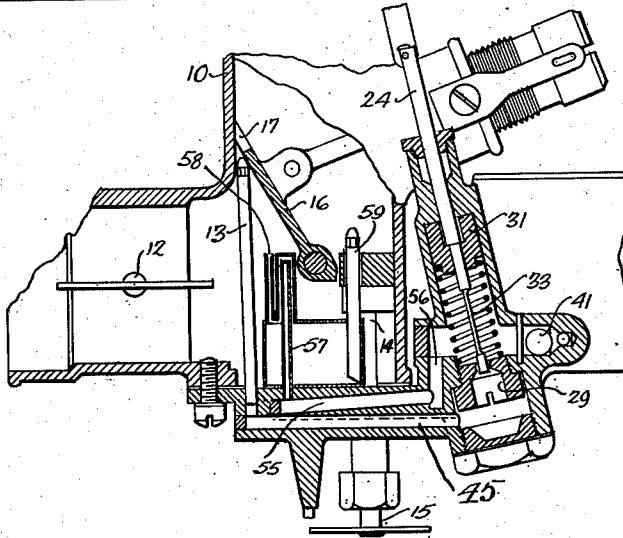
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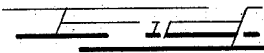
CARBURETOR

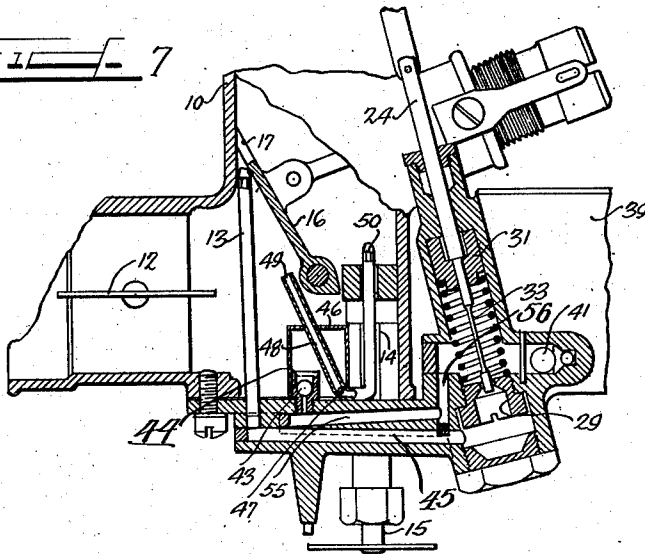
Filed June 7, 1926

3 Sheets-Sheet 3

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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed June 7, 1926. Serial No. 114,104.

This invention relates to carburetors for internal combustion engines.

It is an object of this invention to provide a carburetor suitable for the demands of rapid and sustained acceleration when used in connection with automotive vehicles and the like, and to obtain this object, a pumping type carburetor is provided with an auxiliary chamber adapted to receive the major part of this pump discharge and to feed this extra fuel to the nozzle after the completion of the pump stroke to give a prolonged accelerating charge. I have found that an extra charge of fuel pumped through the nozzle gives excellent results for short acceleration periods, but if the acceleration demand is prolonged much beyond the pumping period that the engine will hesitate or falter because of the lag in normal fuel pick up and delivery through the manifold. It is to be understood that the carburetor nozzles supply sufficient fuel for the full power of the engine, but the difficulty lies in getting enough fuel into the cylinders during a sudden pick up, the best method being to supply an extra amount of fuel by pumping, which fuel will be carried to the cylinders by the inrushing air faster than the normal increase in nozzle delivery, because a large part of the normal fuel supply reaches the cylinders by slowly traveling as a liquid on the walls of the manifold.

It is also an object of this invention to provide an improved form of accelerating pump delivering a surplus of fuel into temporary storage to be fed back after the pump completes its stroke.

It is another object of this invention to provide an improved form of accelerating nozzle fed from the fuel stored during the delivery stroke of the accelerating pump.

Other and further objects of this invention will be apparent from the disclosures in the specification and accompanying drawings.

The invention in a preferred form is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a fragmentary elevation of a

carburetor partly broken away to show one form of the device of this invention.

Figure 2 is a fragmentary section showing a slightly modified form of accelerating pump valve.

Figure 3 is a fragmentary section showing a modified form of accelerating fuel reservoir.

Figure 4 is a fragmentary section showing another modified form of reservoir.

Figure 5 is a fragmentary section showing an adjustably controlled by-pass for reducing the accelerating charge.

Figure 6 shows another form of fuel reservoir.

Figure 7 is a variation of Figure 1, showing independent channel between pump chamber and reservoir.

As shown on the drawings:

A portion of a carburetor body is indicated by the numeral 10 in each figure, the mixing chamber 11, the choke valve 12, the high speed nozzle 13, and the low speed nozzle 14, with adjusting needle 15, being also indicated in certain figures. A flap valve 16, serves to restrict the air inlet to the mixing chamber proper and in association with the nozzle 13 functions as a variable orifice venturi. This high speed nozzle 13 discharges through a slot 17 in the flap 16, when the flap is in approximately closed position for the slow speed range, as this nozzle, while normally the high speed nozzle, also serves as an accelerating nozzle in certain of the embodiments shown.

The end of the throttle shaft is indicated at 18 in Figure 1. The throttle lever 19 is double-ended and of the form of a bell-crank, one end 20, carrying an adjustable stop screw 21 contacting the abutment 22 formed on the carburetor body. The extra arm 23 of the bell crank abuts against the stop to define the wide open position of the throttle. The accelerating pump is operated by means of the plunger 24, linked to the arm 20 of the throttle lever by a bar 25 pivoted at 26 to the arm 20.

The pump referred to comprises a cylinder 27 formed in a boss on the side of the float bowl, the lower end of the cylinder having an

enlarged chamber 28, separated from the pump cylinder proper by a plug 29 having a metering orifice 30 therein. A piston 31 is normally held at the top of the cylinder by a coil spring 32, a metering pin 33, depending from the piston 31, and entering the orifice 20, in the plug 29. This metering pin is tapered off to a small diameter for the central part of its length to enlarge the effective area of the orifice when the piston is pressed downwardly.

The above description holds good for all the modifications shown with the exception of that of Figure 2, wherein a metering pin 34, independent of the piston is provided with a ball 35 and is urged upwardly by a spring 36, to seal the central orifice except when the pin is pressed down by the piston when near the bottom of its stroke. The normal fuel supply to the high speed nozzle is maintained by a by-pass 37, in the side of the orifice plug. The same by-pass 37, for constant independent flow, is shown in Figure 1, the metering pin making a close fit in the orifice 30, in this case to serve as a closure when the pin is in its upper position.

In all the modifications the same form of velocity responsive check valve is used, a horizontal passage 38, being provided in communication with the pump cylinder above the orifice plug. This passage is fed from the float bowl 39, by the passage 40, shown in end view. The passage 38, is of larger diameter than a ball check 41. The seat 42, for this ball is formed as a gradual taper up which the ball must be lifted by the velocity of the fuel, and the angle of this seat determines the abruptness of movement of the accelerating pump necessary to close this check valve and so cause the accelerating pump to eject fuel into the carburetor proper. This provides a simple means for rendering the accelerating pump inactive during gradual opening movements of the throttle when an extra supply of fuel is not required.

The form of auxiliary reservoir shown in Figure 1 for maintaining the accelerating fuel supply after the end of the pump stroke comprises a ball check valve 43, and cage 44, opening from the fuel passage 45, supplying the high speed nozzle, together with an enclosing reservoir 46. The outlet from this reservoir is through the port 47, in the lower part of a tube 48, which is open to the incoming air at 49, and leads down into the reservoir and then up in the form of a nozzle 50, to the right of the flap valve. The air inlet 49, serves to mix air with the fuel flowing to the nozzle 50, thus assisting in atomizing the fuel. With this arrangement the reservoir tends to fill up during the first part of the pump stroke at the same time as fuel is delivered as a jet from the high speed nozzle and after the completion of the pump stroke the nozzle 50, keeps up the accelerating charge until the

reservoir has been emptied. When the piston is stationary, as when the throttle is held open, the high speed nozzle tends to discharge all the fuel passing the orifice 37, so that the reservoir ordinarily will not refill until the accelerating pump is again brought into action.

Figure 3 differs from Figure 1 only in the provision of a plain reservoir 51, without a check valve or auxiliary nozzle. Figure 4 closely resembles Figure 3, with the provision of a weighted flexible diaphragm 52, for a top closure for the reservoir 51, instead of the closure shown in Figure 3. The flexible diaphragm expands upwardly as shown in dotted lines to provide the necessary capacity during the initial stages of the pump stroke.

Figure 5 illustrates a by-pass passage 53, leading back to the float chamber and controlled by an adjustable needle valve 54, to reduce the accelerating charge by providing a variable area by-pass from the pump. The advantage of such a structure will be evident in permitting adjustment of the accelerating charge to suit individual engine requirements.

Figures 6 and 7 show two modifications of the auxiliary reservoir which are filled through an independent passage 55, opening into the pump cylinder at 56, above the orifice and therefore rapidly filled by an unrestricted flow of fuel from the pump. This reservoir of Figure 7 differs from that of Figure 1 only in the provision of this independent refill passage 55. Figure 6 shows a reservoir provided with an overflow tube 57, extending up to the normal liquid level in the float bowl to restrict the refilling to the movement of the pump while still having the independent refill passage 55. A vent tube 58, is provided to allow the escape of air from the reservoir to reduce the pressure required to inject a suitable amount of fuel thereinto. In this figure a plain nozzle 59, is shown without provision for air admixture with the fuel prior to the discharge thereof.

In the operation of these various modifications the same objective is desired, namely, an initial injection of fuel above a predetermined suddenness of operation of the pump followed by a sustained or auxiliary accelerating fuel discharge after the pump completes its stroke. The by-pass back to the float bowl, as shown in Figure 5, may be used with any of the modifications to provide individual adjustments of the total amount of the accelerating charge.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. In combination with an accelerating pump and the discharge nozzle therefor, a passage connecting the pump to the nozzle, means associated with the pump for varying the effective area of said passage during the movement of said pump, and means for storing a part of the pump discharge adapted to maintain the delivery of the accelerating charge after the cessation of the pump stroke.

2. In a carburetor, a source of fuel supply, a nozzle, a throttle, a pump controlled from the throttle for forcing fuel through the nozzle for the initial acceleration requirements, a valve operatively associated with the pump for varying the supply of fuel to the nozzle and an auxiliary fuel chamber also supplied with fuel by said pump and adapted to supply additional fuel to sustain said acceleration after the cessation of the pump stroke.

3. In a carburetor, a fuel discharge passageway, a source of fuel adapted to be connected thereto, an accelerating fuel pumping means, a discharge nozzle therefor, means for controlling the flow of fuel through said passageway comprising a variable orifice, means operable by said pumping means for varying the size of said orifice when the pumping means is brought into play to discharge accelerating fuel through said nozzle, and a fuel storage chamber connected to said pumping means so as to receive fuel therefrom on the discharge stroke of the pumping means and adapted to supply additional accelerating fuel to said nozzle after the cessation of the discharge stroke of said pumping means.

4. In a carburetor, throttle controlled pumping means, a nozzle connected therewith, a main carburetor fuel passageway connected to said pumping means, a source of fuel supply adapted to be connected to said passageway, said main passageway being arranged to supply the normal needs of the carburetor when said pumping means is idle, said pumping means having associated therewith a storage space for fuel in communication with said nozzle and valve means for automatically shutting off the source of fuel supply from said passageway upon the actuation of said pumping means to cut off the normal discharge of fuel therefrom and whereby accelerating fuel is discharged from said nozzle by said pumping means independent of said source of supply, said valve means being adapted to be opened by the return stroke of said pumping means whereby the pumping means is charged with fuel from said source as said source is again connected to said passageway, said storage space being connected with said pumping means to have fuel stored therein and being arranged to prolong the discharge of accelerating fuel through said nozzle after the discharge stroke

of said pumping means and during the time said source of supply is again being connected to said passageway.

5. In a carburetor, a throttle operated accelerating fuel pumping means, a main carburetor fuel discharge passageway connected thereto, a source of fuel supply for said passageway, a discharge nozzle for said pumping means, said main passageway being arranged to supply the normal needs of the carburetor when said pumping means is idle, valve means associated with said pumping means for shutting off said source of supply to said passageway during the discharge stroke of said pumping means to cut off the normal discharge from said passageway, and means connected to said pumping means for storing fuel adapted to maintain the discharge of accelerating fuel through said nozzle after the cessation of the discharge stroke of said pumping means, said storage means being arranged so as not to have the fuel withdrawn therefrom through said passageway whereby said pumping means can again be charged with fuel during the discharge of fuel from said storage means.

In testimony whereof I have hereunto subscribed my name.

CHARLES H. KIRBY.