

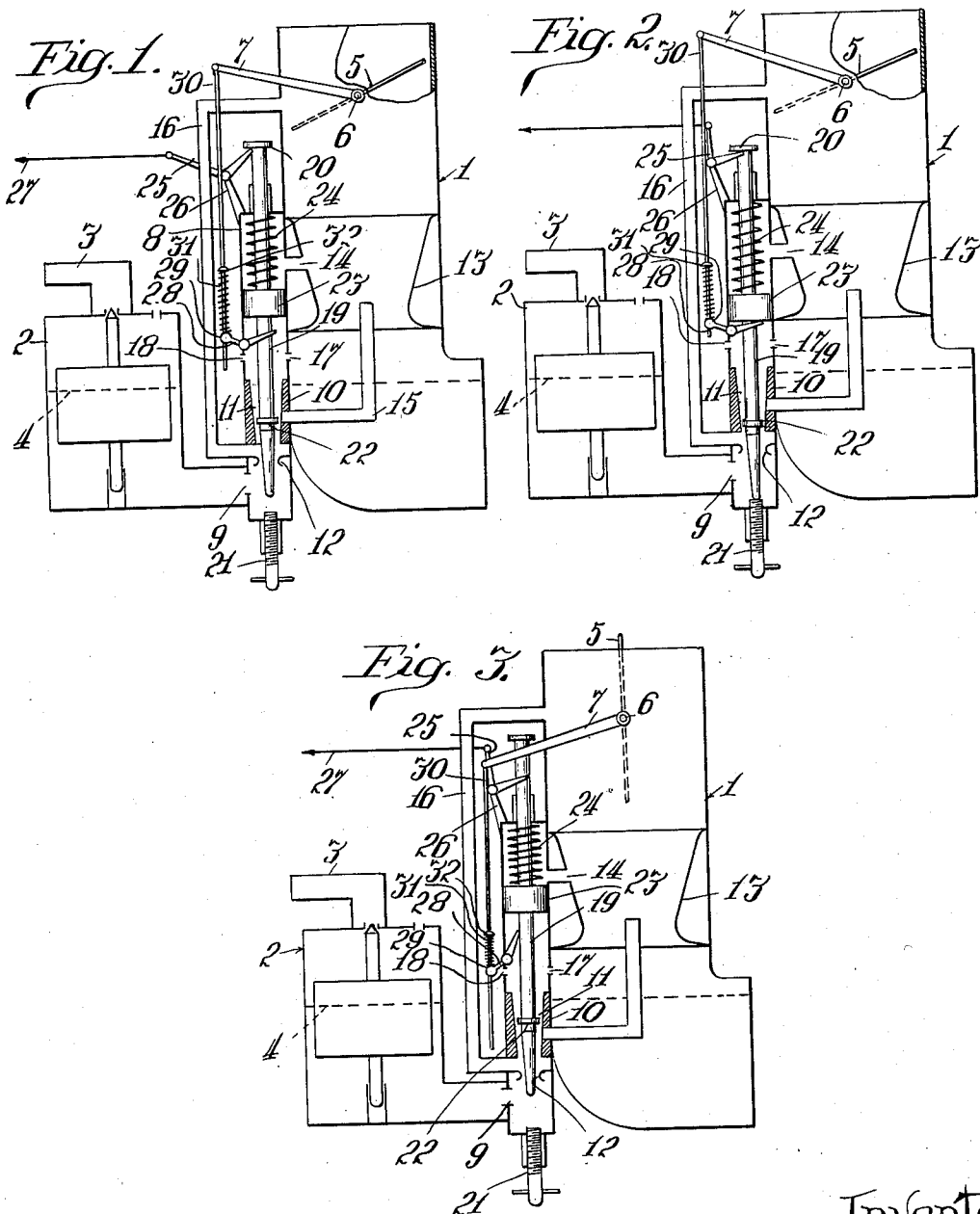
May 31, 1932.

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1,860,869

CARBURETOR

Filed July 5, 1928



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CARBURETOR

Application filed July 5, 1928. Serial No. 290,476.

This invention relates to improvements in carburetors and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

5 The primary object of the invention is to provide a carburetor for internal combustion engines which permits of an easier starting and warming up of the engine, gives a better idling and low speed performance thereof and greater power output and flexibility when required.

10 Another object of the invention is to provide a carburetor which is economical in fuel consumption and is of such a simple construction as to make it easy and practical to manufacture, the parts being so made and correlated that the carburetor cannot readily get out of order.

15 These objects of the invention as well as others, together with the many advantages thereof will more fully appear as I proceed with the specification.

In the drawings:—

20 Fig. 1 is a diagrammatic longitudinal vertical sectional view through a carburetor embodying my invention, with the parts in the position they occupy for starting and warming up the associated engine.

25 Fig. 2 is a similar view with the parts in the position they occupy when the engine is idling and the metering pin is free from the dash control.

30 Fig. 3 is another similar view with the parts in the position they occupy as when the throttle is wide open and the metering pin is controlled by suction.

35 Referring now in detail to that embodiment of the invention illustrated in the accompanying drawings:—1 indicates as a whole the shell of a carburetor of the plain tube type, having the usual float bowl and mechanism 2 for controlling the flow of liquid fuel thereinto from a fuel supply pipe 3. 40 The float bowl mechanism maintains the liquid level in the carburetor as is indicated by the dotted line 4. In the shell 1 near its top end is located a throttle valve 5 mounted on a shaft 6 that projects through one side of the shell and there has attached to it, a lever

arm 7 by which the throttle may be opened and closed.

Between the shell and float chamber is provided an upright cylinder 8 which is connected at its bottom end by a port 9 with the fuel bowl and in said cylinder above said port is an air measuring cone 10 with a passageway 11 therein. This passageway tapers downwardly as shown. Between the bottom of said cone and the port 9 there is provided in said cylinder, a valve seat or liquid fuel metering orifice 12.

45 In the shell 1, substantially midway between its ends is a Venturi tube 13 and a horizontally disposed conduit 14 opens through said tube into the cylinder 8 near its top end. 15 indicates the main fuel nozzle. Said nozzle is herein shown as substantially L-shaped and its horizontal leg opens through the cone 10 and its vertical leg which is disposed coaxially with respect to the Venturi tube 13 terminates a short distance above the bottom thereof. 16 indicates a fuel by-pass tube which is connected at its bottom end with the cylinder 8 between the cone 10 and orifice 12 and consequently below the fuel nozzles and is connected at its top end with the shell 1 so as to open thereinto above the throttle 5. The cylinder 8 is connected at one side above the cone 10 by a port 17 with the air intake end of the shell below the Venturi tube and is open at its other side to atmosphere by a port 18.

48 Arranged in the cylinder 8 is what I term a combined liquid fuel and air metering pin 19, the top end of which has an enlarged head 20 disposed above and without the top end of the said cylinder. The bottom end of said pin which is tapered, extends down through the orifice 12 and its normal position with respect thereto may be determined by means of an adjustment screw 21 threaded into the bottom end of the cylinder 8. On said pin, shortly above the tapered bottom end thereof so as to coact with the tapered bore 11 of the measuring cone 10, is a collar 22 and also fixed to said pin normally above the ports 17 and 18 is a piston 23 which snugly fits the bore of said cylinder. A spring 24 surrounds said pin between the top end of

said cylinder and said piston and normally acts to urge said piston and pin downwardly.

Means is provided by which the metering pin may be manually lifted or raised, from the dash of the automobile in which the engine equipped with my improved carburetor forms a part. Said means includes a bell crank lever 25 which is pivoted to a bracket 26 on the top end of the cylinder and one arm of said bell crank is engaged under the metering pin head 20 while the other arm has connected to it a link or wire 27 leading to the dash in a position convenient for the operator.

Pivoted between its ends to the cylinder 8 just above the port 18 is a lever 28 with one of its arms disposed within the cylinder so as to be engaged under certain conditions with the underside of the piston 23 therein, while the other end of said lever carries a ball 29 through which slides the bottom end of a link 30. The top end of said link is pivotally connected to the throttle arm 7 and a spring 31 surrounds said link to engage at one end with the ball 29 and at its other end against a shoulder 32 on said link.

The operation of the carburetor above described is as follows:

Assume that the engine is at rest and is cold and it is desired to start and warm it up. The throttle will be closed and in this rest period of the engine, fuel builds up in the nozzle 15, the cone bore 11 and the by-pass 16 and will assist in enriching the mixture for starting. The operator should then manipulate the dash link or wire and this will, by reason of the bell crank lever 25, lift the metering pin 19 which in effect will increase the size of the fuel metering aperture 12 as best shown in Fig. 3. As the engine turns over under the action of the starting motor, a suction action is produced in the shell above the throttle 5 which is still closed, so that by this time the by-pass 16 becomes in effect a solid column of fuel discharging into the engine manifold to give the rich mixture necessary for starting. With the engine turning over under its own power, the dash link or wire is released and the parts tend to return to their normal position and the throttle 5 is next opened.

Through the link 30 the lever 28 is rocked so that the inner end of said lever will slightly lift the piston 23 thus holding the metering pin raised and an increased flow of air is afforded through the bore 11 and an increased flow of fuel through the orifice 12. Thus the volume of the mixture through the by-pass 16 into the neck of the shell 1 above the throttle 5 may be varied by the manual setting of the metering pin without regard to the position of the throttle. By this arrangement an increase in the idling speed of the engine during the warming up period may be had without disturbing the setting

of the throttle for idling when the engine is warm and the stalling of the engine during the warming up is prevented.

When the engine is idling, engine suction is exerted upon the by-pass 16 to the fuel orifice 12 and bore 11, air therefor being supplied through the ports 17 and 18. The amount of air in this instance is controlled or measured by reason of the collar 22 on the metering pin due to its position in said bore 11 and this modifies the suction action at the fuel orifice. This amount of air may be varied by the diameter of the shoulder which can be determined by test at the shop. In this idling movement the greater portion of air passes around the throttle and at this time there is no liquid fuel in the bore 11 or nozzle 15.

In low speed range operation of the engine, the throttle 5 is but slightly opened and the metering pin will be in the raised position corresponding thereto, through the agency of the link 30. This results in an increase in the flow of fuel in proportion to the increase of air flow past the throttle valve 5. This amount of increase of fuel for any given amount of lift on the metering pin is determined by the taper of the bottom end of the metering pin and bore 11, both of which is ascertained in the shop. In this raising of the meter pin, assistance is provided by the atmospheric pressure exerted on the bottom end of the piston 23 which is further influenced by the suction action on the top of said piston through the port 14 which connects the cylinder 8 with the interior of carburetor shell at the Venturi tube and the amount of this suction, of course, varies with engine speed.

When the throttle 5 has reached a predetermined open position as for instance, about two thirds of wide open position, the collar 22 on the metering pin has reached a point slightly above the inlet end of the fuel nozzle 15. At this throttle opening with its corresponding motor speed the suction increases at the restricted part of the Venturi tube 13 so that it is greater than that above the throttle in the vicinity of the by-pass 16 and in consequence no fuel is fed through the by-pass 16, but only through the nozzle 15 which delivers it axially into the air stream passing through the restricted end of the Venturi tube. At this time should the throttle be closed down a bit so as to moderate the engine speed, the reverse operation of the parts above mentioned takes place.

With the throttle valve in the wide open position shown in Fig. 3, engine suction in the cylinder 8 above the piston 23 through the port 14, is sufficient to control the position of the metering pin 19 so that it will permit the passage of fuel through the orifice 12 proportionate to the amount of air entering the restricted part of the Venturi tube 13,

without any mechanical aid except that of the spring 24 acting on the piston 23 in opposition to said suction. The tension of said spring which is predetermined, is such as to insure the proper position of the metering pin 19 for different engine loads and corresponding suction. In this operating position, engine suction is greater at the venturi than it is in the shell 1 where the by-pass 16 discharges therein so that all fuel for the engine when the engine is running with a wide open throttle is supplied by the nozzle 15.

The construction described has many advantages in that all ranges of engine speeds, from cold starting through the warming period and up to wide open throttle is effectively taken care of. Starting a cold engine is made easier and the danger of choking and consequent stopping during warming up period is eliminated and this with a low fuel consumption.

No liquid fuel is lifted by suction above the normal liquid level except through the by-pass when starting as before explained and the positive delivery of fuel at the highest suction even with small throttle openings is made possible and positive by the automatically varied discharge of the by-pass 16 above the throttle valve.

The Venturi tube 13 has no effect on low speed performance of the engine and consequently the restriction thereof is only determined by the maximum output of the engine and as there is no compromise between these two speeds, the size of the said restriction can be indeed accurately determined. Again, as the control of the metering pin is in accordance with engine suction after starting, the proportionate amount of fuel for correct mixtures for all engine speeds is automatically made.

Again it is pointed out that the metering orifice is disposed not only below the level of fuel but also below the inlet for the main nozzle and this together with the associated elements permits the fuel flow to be influenced both by suction and gravity. Thus, less energy is required to lift the liquid fuel into the air stream and liquid fuel will be picked up or aspirated at the nozzle 15 at slower engine speeds or with a larger size of venturi and this results in a greater power range.

By the manual lifting of the metering pin through the dash link or wire, the by-pass is momentarily transformed into a solid fuel jet on the suction side of the throttle so that the latter is effective as a choke in starting. Again this arrangement presents the correct amount of fuel for starting a cold engine and this without flooding when the speed is increased. Through the manual manipulation and during the warming up period, the idling speed of the engine is slightly increased with

out changing the setting for idling when the engine is warm. This prevents stalling while maneuvering with a cold engine.

While in describing the invention I have referred in detail to the several parts, together with their relative locations, the same must be considered as illustrative only so that I do not wish to be limited thereto except as may be pointed out in the appended claims.

I claim as my invention:—

1. In a carburetor, the combination of a mixing chamber having a main air inlet and a discharge outlet, a throttle valve for controlling said outlet, a fuel nozzle for said mixing chamber, means for supplying fuel to said nozzle, a by-pass communicating with the discharge of said mixing chamber above said throttle valve, means for supplying air and fuel to said by-pass, and a valve for controlling the amount of air and fuel supplied to said by-pass, a piston on said valve, a cylinder for said piston, yielding means for moving said piston and valve in a direction to decrease the amount of fuel and air supplied to said by-pass, and a conduit providing communication between said cylinder and said mixing chamber for moving said piston and valve in a direction to increase the amount of fuel and air supplied to said by-pass in proportion to the amount of suction in said mixing chamber.

2. In a carburetor having a mixing chamber and a main air inlet, a discharge outlet and a throttle valve for said discharge outlet, means providing a supply of fuel for said carburetor, a metering orifice for said fuel, means for providing an auxiliary supply of air to mix with the fuel before it is discharged into said mixing chamber, a metering orifice for said auxiliary air supply, a metering pin extending through both of said orifices and having a tapered end disposed in said fuel metering orifice and an enlargement thereon, the said air metering orifice having tapered walls leading thereto, the enlargement of said pin cooperating with said tapered walls to vary the amount of air passing therethrough upon movement of said pin, and manual means for moving said pin to open the orifice when the suction in said mixing chamber is lowest.

3. In a carburetor having a mixing chamber and a main air inlet, a discharge outlet and a throttle valve for said discharge outlet, means providing a supply of fuel for said carburetor, a metering orifice for said fuel, means for providing an auxiliary supply of air to mix with the fuel before it discharges into the mixing chamber, a tapered metering orifice for said auxiliary air supply, a metering pin extending through both of said orifices and having a tapered end disposed in said fuel metering orifice and an enlargement thereon, the said air meter-

ing orifice having tapered walls leading thereto, the enlargement of said pin cooperating with said tapered walls to vary the amount of air passing therethrough upon movement of said pin, a piston on said metering pin, a cylinder for said piston, yielding means for moving said piston and pin in a direction to decrease the amount of fuel and air passing through said metering orifice, and a conduit providing communication between said cylinder and said mixing chamber for moving said piston and pin in a direction to increase the amount of fuel and air passing through said orifice in proportion to the amount of suction in said mixing chamber.

4. In a carburetor, the combination of a mixing chamber having a main air inlet and a discharge outlet, a throttle valve for controlling said outlet, a passageway having a fuel supply communicating therewith at one end thereof, an air supply communicating therewith at the other end thereof, a nozzle for said mixing chamber communicating with said passageway intermediate said air and fuel supplies, a fuel by-pass having one end communicating with the discharge of said mixing chamber above said throttle valve and the other end thereof with said passageway in spaced relation to said nozzle connection, an element movable in said passageway for varying the amounts and proportions of air and fuel supplied to said nozzle and by-pass, manually operable means for moving said element, and automatic means controlled by suction in said mixing chamber for continuing the movement of said element.

5. In a carburetor, the combination of a mixing chamber having a main air inlet and a discharge outlet, a throttle valve for controlling said outlet, a passageway having a fuel supply communicating therewith at one end thereof, an air supply communicating therewith at one end thereof, a nozzle for said mixing chamber communicating with said passageway intermediate said air and fuel supplies, a fuel by-pass having one end communicating with the discharge of said mixing chamber above said throttle valve and the other end thereof with said passageway in spaced relation to said nozzle connection, an element movable in said passageway for varying the amounts and proportions of air and fuel supplied to said nozzle and by-pass, means operated by movement of said throttle valve for imparting limited movement to said element, and automatic means controlled by suction in said mixing chamber for continuing the movement of said element.

In testimony whereof, I have hereunto set my hand, this 26th day of June, 1928.
PANTALEON E. MIQUELON.