May 15, 1934. C. H. KIRBY 1,958,542

CARBURETOR

Filed Aug. 6, 1928 2 Sheets-Sheet 1

Fig. 2.

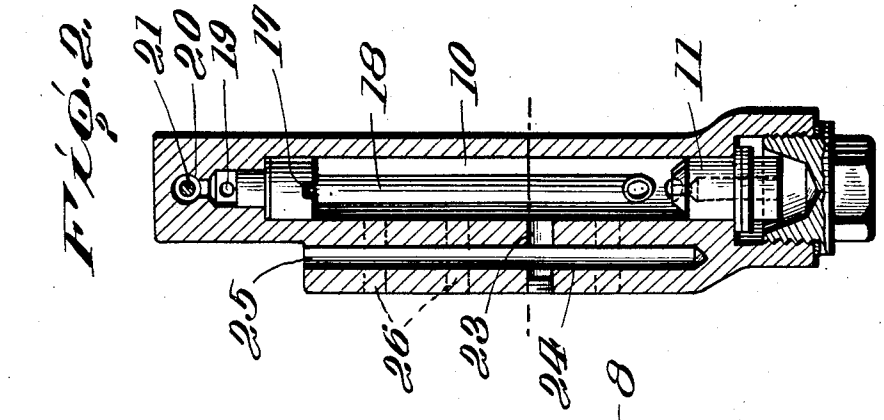
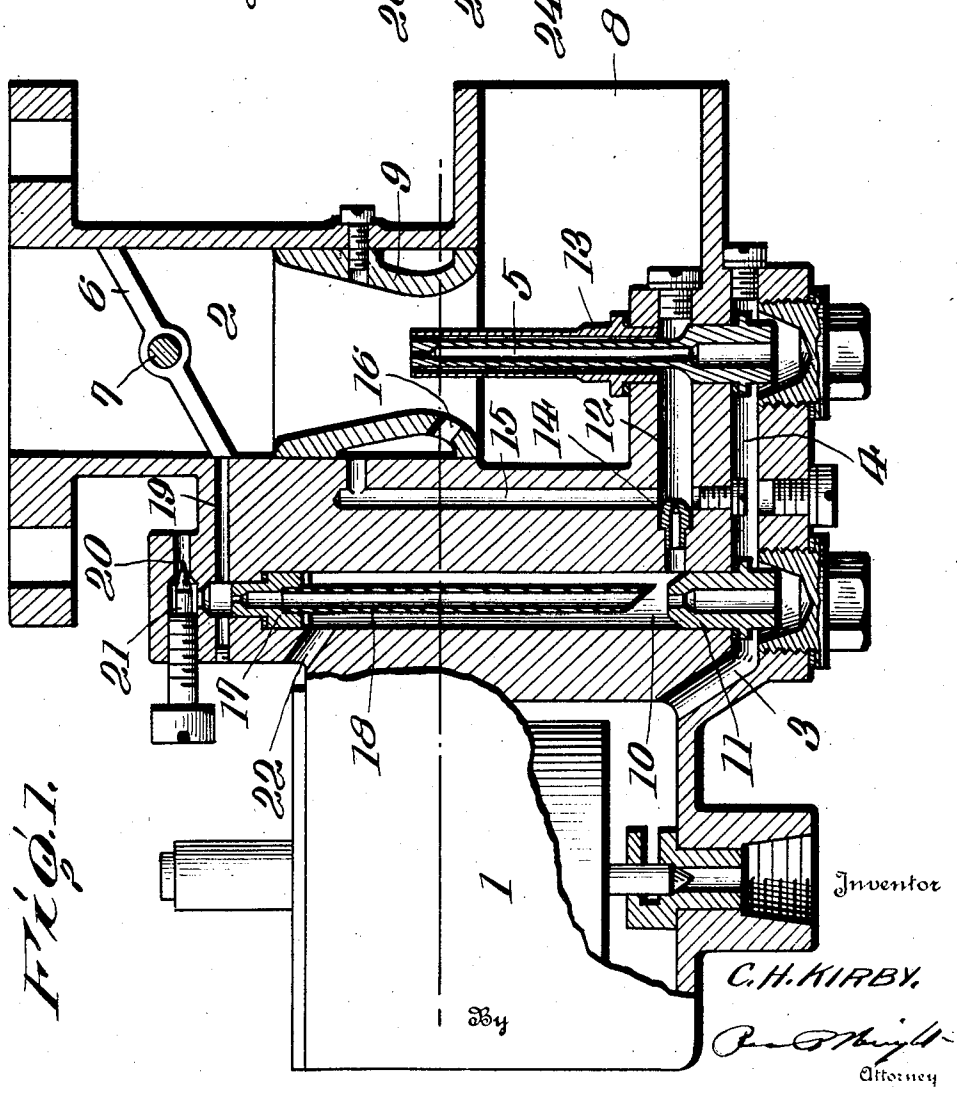


Fig. 1.



Inventor

C. H. KIRBY.

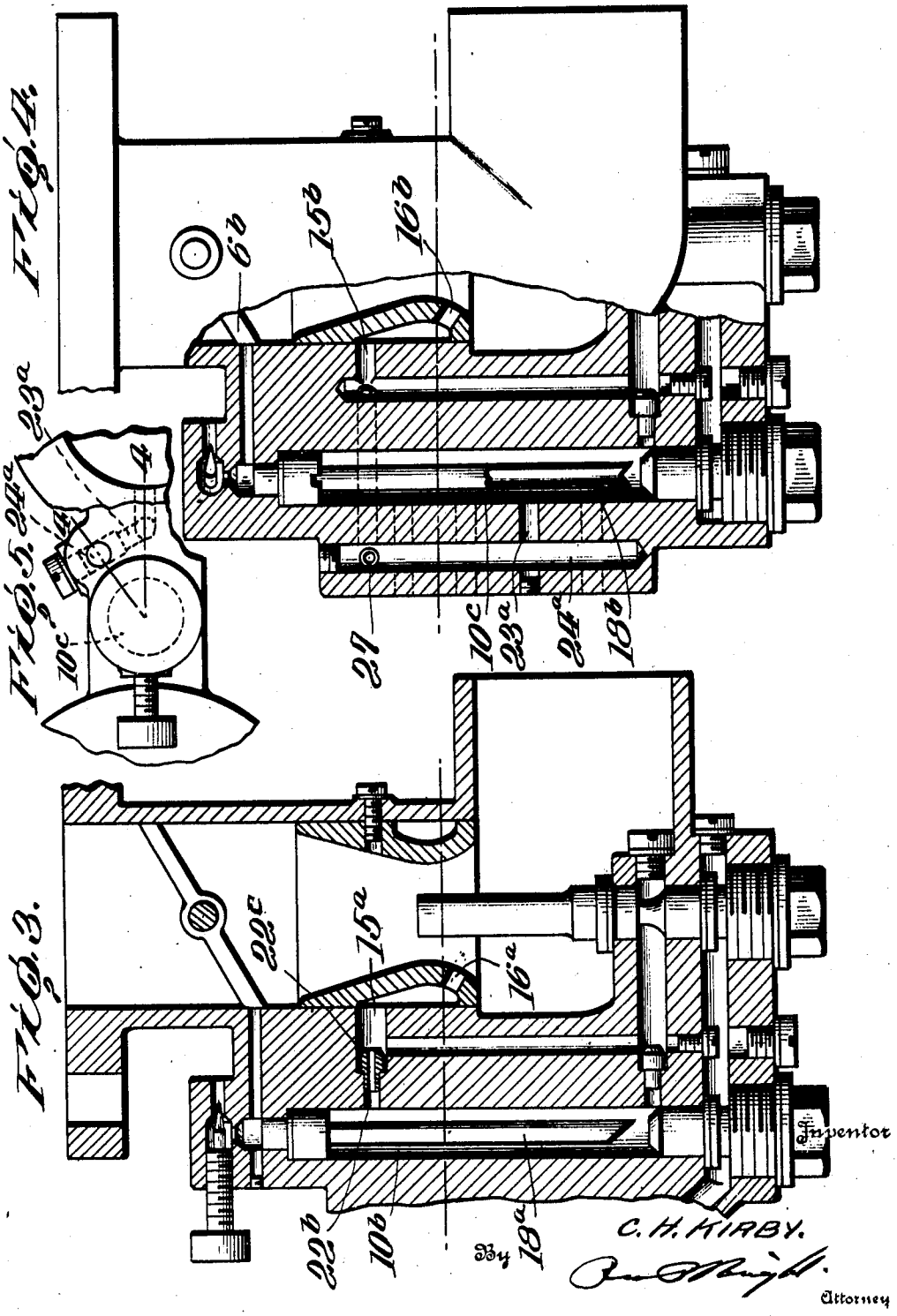
By

Attorney

May 15, 1934. C. H. KIRBY 1,958,542

CARBURETOR

Filed Aug. 6, 1928 2 Sheets-Sheet 2



Patented May 15, 1934 1,958,542

UNITED STATES PATENT OFFICE

1,958,542

CARBURETOR

Charles H. Kirby, Flint, Mich., assignor to Marvel Carbureter Company, Flint, Mich., a corporation of Illinois

Application August 6, 1928, Serial No. 297,697

12 Claims. (Cl. 261—41)

This invention relates to carburetors, and more particularly to improvements in carburetors of the type having auxiliary means for constantly feeding fuel to the main mixture passageway of the carburetor to augment the supply of fuel fed by the main nozzle.

The primary object of the invention is to provide a carburetor, including an auxiliary nozzle which cooperates with the main nozzle to feed fuel when the throttle valve is in certain positions, the structure being such that the feed through the auxiliary nozzle will be automatically diminished as the throttle valve moves from closed toward fully opened position.

Another object of the invention is to provide a carburetor of this character, including means for introducing an auxiliary mixture of air and fuel into the main mixture passageway in the vicinity of the throttle valve, such auxiliary means functioning to increase its feed when the throttle valve is moved from fully open toward fully closed position, and being adapted to decrease its feed when the throttle valve is moved from closed toward fully opened position.

A further object is to furnish a carburetor having a main mixture passageway, provided with a Venturi throat and a throttle valve arranged posterior to the throat, and fuel feeding means controlled by the throttle valve for feeding a primary stream of fuel and an auxiliary stream of fuel into the throat as long as the throttle valve is within certain limits of opening, and additional means for introducing a second auxiliary charge of fuel into the mixture passageway in the vicinity of the throttle valve, both auxiliary means being automatically varied due to different positionings of the throttle valve.

Another object is to provide a carburetor of the above type, in which one of the auxiliary fuel feeding devices includes a well, the capacity of which may be increased without enlarging the diameter of the well.

A still further object is to furnish a carburetor, in which the auxiliary feed means includes a well which may be subjected to sub-atmospheric pressure, or atmospheric pressure.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, my invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

Referring to the drawings,

Fig. 1 is a vertical sectional view, partly in elevation, of one embodiment of the carburetor forming the subject matter of this invention.

Fig. 2 is a similar view of a detail of a modification.

Fig. 3 is a vertical sectional view of another form of the invention, with certain parts omitted to facilitate illustration.

Fig. 4 is a side elevation, partly in vertical section, of a still further embodiment of the invention, the section being taken on line 4—4 of Fig. 5.

Fig. 5 is a top plan view of a fragment of the structure shown in Fig. 4.

In the embodiment of the invention illustrated in Fig. 1, 1 designates an ordinary float chamber from which the fuel is fed to the mixture tube or passageway 2. The main feed is by way of ducts 3 and 4 to the main nozzle 5, and the feed of the fuel from this nozzle is automatically regulated by the positioning of a throttle valve 6, which is mounted on a pivot shaft 7. Air enters the mixture passageway at the point 8, and in flowing through a Venturi tube or throat 9, picks up fuel from the main nozzle, and thus induces a flow through the ducts 3 and 4. When the throttle valve is moved from closed to fully opened position, it will be appreciated that the velocity of the air through the Venturi throat will be greater, and when the throttle valve is fully opened, the main nozzle will feed a maximum quantity of fuel.

I have combined with this main feed, a plurality of auxiliary feeds, one of which cooperates directly with the main fuel nozzle. This feeding means includes a well 10 into which the fuel from passageway 3 flows through an orifice member 11. A duct 12 leads from the well to an auxiliary nozzle 13 which surrounds the main nozzle, and an orifice member 14 is located in the passageway 12 to regulate the flow of fuel to the auxiliary nozzle.

Duct 12 communicates with a vertical conduit 15, which is in communication with an opening 16 arranged in the entrance lip of the Venturi throat. During the normal running of the engine, when the throttle valve is only partly open, fuel in constant amount will be fed from the auxiliary nozzle, but as soon as the throttle valve is opened to a greater degree, the velocity of the air passing through the Venturi tube will be increased, with the result that sub-atmospheric pressure will be induced in the duct 15, and this will tend to retard the feed of fuel to the auxiliary nozzle. It will thus be seen that when the throttle valve is almost closed, the constant supply through the auxiliary nozzle will augment the

minimum feed passing through the main nozzle, but as soon as the throttle valve is fully opened, the main nozzle will supply a maximum amount, and at such times, the feed through the auxiliary nozzle will be at a minimum. In other words, the present invention always provides the necessary and proper feed of fuel from the nozzles, regardless of the position of the throttle valve, and when the throttle valve is practically closed, the nozzles will supply a sufficient amount of fuel to prevent the engine from stopping.

The second auxiliary feed means includes an orifice member 17, arranged in the well, and from which depends a tube 18. The orifice member leads to a duct 19 which discharges into the mixture passageway 2 at a point posterior to the Venturi throat, and adjacent to the throttle valve. When the throttle valve is closed, it shuts off the duct 19, as illustrated. As soon, however, as the throttle valve is opened slightly, maximum suction will be exerted on the duct 19, and consequently, fuel from the well will be drawn through 18 and 17, and fed to the main mixture passageway. This auxiliary fuel, before entering the mixture passageway, is admixed with air drawn through a port 20 which communicates with the duct 19, and is controlled by a needle valve 21. An atmospheric port 22 communicates with the well, and when the engine is idle, this port will permit fuel to rise in the well, on a level equal to that in the float chamber, and at the same time, the liquid will also rise to the same level in the tube 18, passageway 15, and the nozzles 5 and 13. Due to this connection, it will be apparent that in starting the engine, when the throttle valve is opened more or less, a maximum amount of fuel will be immediately fed to the engine, for at this time, the auxiliary nozzle will draw fuel directly from the passageway 18 and the duct 19 will immediately draw fuel from the well.

It will be obvious to those skilled in the art, that this feeding principle may be incorporated in many different embodiments of the invention, and in Fig. 2, I have shown a structure which permits the well to supply a larger quantity of fuel than the well shown in Fig. 1, and this without the necessity of enlarging the diameter or length of the well. In this modification, the well 10*a* communicates through a port 23, with an auxiliary well 24, open to the atmosphere at 25. The port 23 may be placed at any elevation, as indicated by the dotted lined portions designated 26.

The form of the invention shown in Fig. 3 differs from that shown in Fig. 1 by the substitution of a sub-atmospheric vent for the well 10*b*, instead of an atmospheric vent. In this embodiment, the port 22*b* communicates through an orifice member 22*c*, with a duct 15*a* that communicates with the port 16*a*, arranged in the entrance lip of the Venturi throat, and owing to this construction, the sub-atmospheric pressure created in 15*a*, due to the velocity of the air flowing through the Venturi tube when the throttle is open, will be felt in the well 10*b*, and this sub-atmospheric pressure will tend to retard the flow of fuel through the tube 18*a*.

As shown in Figs. 4 and 5, this sub-atmospheric venting may also be applied to a structure having an auxiliary well 24*a*. In this modification, the well proper 10*c* communicates with the auxiliary well through a port 23*a*, and the upper end of the auxiliary well communicates by a duct 27, with the passageway 15*b* that leads to the Venturi port 16*b*. Due to this construction, the sub-atmospheric pressure created owing to the port 16*b*, will be felt in both the main and auxiliary wells, and in this way, the flow of auxiliary fuel through the tube 18*b* will be modified as the throttle valve 6*b* is moved.

While I have disclosed what I now consider the preferred embodiments of this invention, it is obvious that numerous changes may be made in the structures disclosed, without departing from the spirit of the invention, as expressed in the claims.

What I claim and desire to secure by Letters Patent is:

1. In a carburetor having a constant level reservoir, a carbureting passage provided with a throttle valve, a Venturi throat arranged in said carbureting passage, main and auxiliary nozzles disposed in said Venturi throat, main and auxiliary means for supplying the nozzles with fuel and means regulated by the velocity of air passing through the Venturi throat for varying the feed from the auxiliary nozzle means, said means comprising an air passage extending from said auxiliary nozzle means and entering the Venturi throat in a reverse direction to the direction of the air stream passing therethrough.

2. In a carburetor having a constant level reservoir, a carbureting passage having a throttle valve, a Venturi throat disposed in said carbureting passage, main and auxiliary nozzles disposed in said Venturi throat, means for feeding fuel to the main nozzle from said constant level reservoir, an auxiliary reservoir fed from the constant level reservoir for feeding fuel to the auxiliary nozzle and means regulated by the velocity of air flowing through the Venturi throat for varying the amount of fuel fed by the auxiliary nozzle, said means comprising an air passage extending from said auxiliary nozzle and entering the Venturi tube in a direction reverse to the direction of the air stream passing therethrough.

3. In a carburetor having a constant level reservoir, a carbureting passage provided with a Venturi tube, concentric main and auxiliary nozzles extending into said carbureting passage, means for constantly feeding fuel from said constant level reservoir to said main nozzle, an auxiliary reservoir fed with fuel from said constant reservoir for feeding fuel to the auxiliary nozzles and means regulated by the velocity of air flowing through said carbureting passage for varying the feed of fuel fed through the auxiliary nozzles, said means comprising an air passage extending from said auxiliary nozzle and entering the Venturi tube in a direction reverse to the direction of the travel of air in its passage therethrough.

4. In a carburetor having a constant level fuel reservoir, a carbureting passage having a Venturi throat arranged therein, main and auxiliary fuel nozzles extending into said Venturi throat, main and auxiliary means for feeding fuel to said main and auxiliary nozzles and means regulated by the velocity of air flowing through the Venturi throat for varying the amount of fuel fed through one of said nozzles, said means comprising an air passage extending from said auxiliary nozzles and entering the Venturi tube in a direction reverse to the direction of travel of air passing therethrough.

5. In a carburetor having a carbureting passage and a constant level reservoir, a throttle valve controlling the passage of explosive mixture

through said carbureting passage, a Venturi tube arranged in said carbureting passage, main and auxiliary fuel nozzles extending into said Venturi tube, independent means for feeding fuel to said nozzles and means including a conduit and a passageway leading from said conduit to the lip of the venturi for controlling the amount of fuel passing through said conduit, said passageway entering the Venturi tube in a direction reverse to the direction of travel of the air passing therethrough.

6. In a carburetor having a constant level reservoir, a carbureting passage having a throttle valve, a Venturi throat in said carbureting passage, main and auxiliary nozzles extending into said Venturi throat, an auxiliary reservoir, passageways extending from said constant level reservoir and said auxiliary reservoir to said main and auxiliary nozzles and a passageway extending from said auxiliary nozzles and communicating with the throat of the Venturi tube in a passage extending therethrough in a direction reverse to the travel of air passing through said carbureting passage.

7. In a carburetor having a constant level reservoir, a carbureting passage, a Venturi throat in the carbureting passage, concentric main and auxiliary nozzles projecting into said Venturi throat, a fuel passageway extending from said constant level reservoir to said main fuel nozzle, an auxiliary reservoir fed with fuel from said constant level reservoir, a passageway extending from said auxiliary reservoir to said auxiliary fuel nozzle and a duct placing the last mentioned passageway in communication with the carbureting passage through a port extending through the Venturi throat in a direction reverse to the direction of the travel of air passing therethrough for retarding the flow of fuel through said auxiliary nozzles.

8. A carburetor as claimed in claim 7 including an orifice member arranged in the last mentioned passageway.

9. In a carburetor having a constant level reservoir, a carbureting passage having a throttle valve arranged therein, a Venturi throat disposed in said carbureting passage, a main fuel nozzle disposed in said carbureting passage and supplied constantly with fuel from said constant level reservoir, an auxiliary reservoir, a second nozzle disposed in said carbureting passage, a conduit for feeding fuel from said auxiliary reservoir to said second nozzle, means for feeding fuel from said auxiliary reservoir to said carbureting passage posterior of said throttle valve, means for admitting auxiliary air in regulated quantities into the second conduit and a duct placing one of said conduits in communication with the entrance lip of the Venturi throat through a port extending through said throat and entering said carbureting passage in a reverse direction to the direction of travel of the air passing therethrough for retarding the flow of fuel through said nozzle.

10. In a carburetor having a constant level reservoir, a carbureting passage having a throttle valve therein, a venturi disposed in said carbureting passage, a pair of concentric nozzles disposed in said Ventri tube forming main and auxiliary nozzles, a conduit extending from said constant level reservoir to said main nozzle, a plurality of auxiliary wells fed from said constant level reservoir, a conduit for feeding fuel from said auxiliary wells to said auxiliary nozzle and a passageway in communication with said last mentioned conduit terminating in a port extending through the lip of the Venturi tube in a direction reverse to the direction of travel of the air passing therethrough for retarding the flow of fuel through said auxiliary nozzle.

11. In a carburetor, a mixture passageway, a throttle valve and a Venturi throat arranged in the passageway, fuel nozzle means extending into the passageway, an auxiliary fuel well, a second auxiliary well, a port placing said second auxiliary well in communication with the first mentioned well, conduits for feeding fuel to one of the wells and nozzle means, a duct placing the first mentioned well in communication with the mixture passageway at a point adjacent to the throttle valve, and a passageway placing said well in communication with the entrance lip of the Venturi throat at approximately 90° to the air stream passing therethrough for placing sub-atmospheric pressure on the fuel in said well by the velocity of air passing through said mixture passageway.

12. In a carburetor having a constant level reservoir, a carbureting passage having a throttle valve, a Venturi throat arranged in said carbureting passage, fuel nozzle means disposed in said carbureting passage, an auxiliary fuel well, conduits for feeding fuel to the well and nozzle means, a second auxiliary well, a port placing said second auxiliary well in communication with the first mentioned auxiliary well, a duct placing the first mentioned well in communication with the fuel passageway at a point adjacent the throttle valve and a passageway placing said well in communication with the entrance lip of the Venturi throat through a port extending through the throat of said venturi in a direction reverse to the direction of travel of air passing therethrough.

CHARLES H. KIRBY.