W. C. HESS & M. MORDEN.

CARBURETER.

APPLICATION FILED MAY 5, 1917.

1,257,862. Patented Feb. 26, 1918.

Fig. 1.

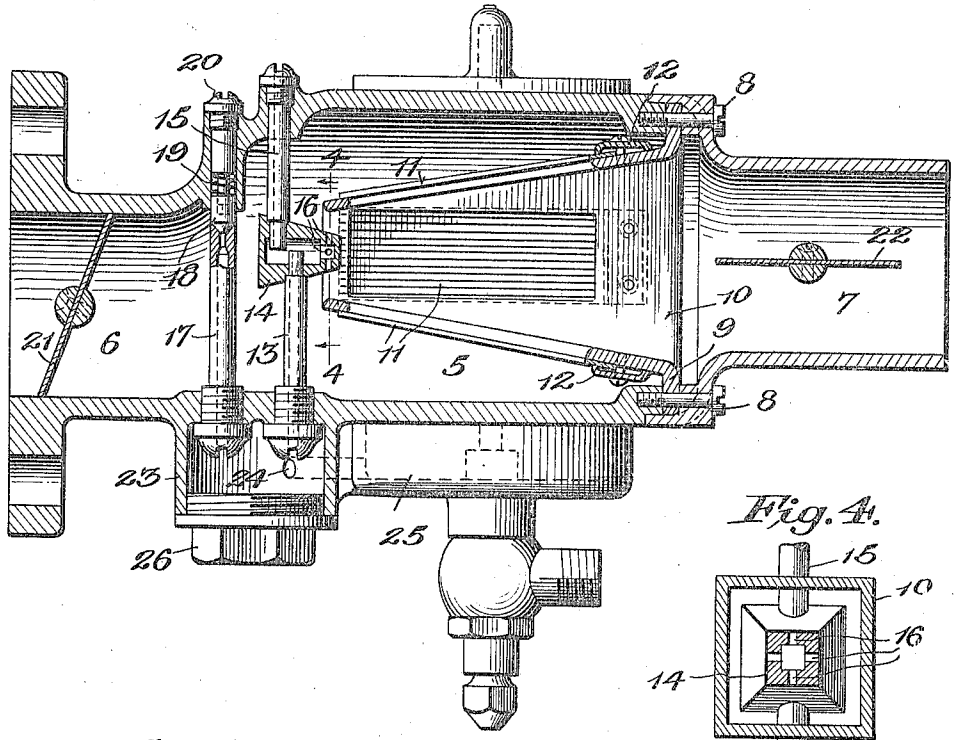


Fig. 4.

Fig. 2.

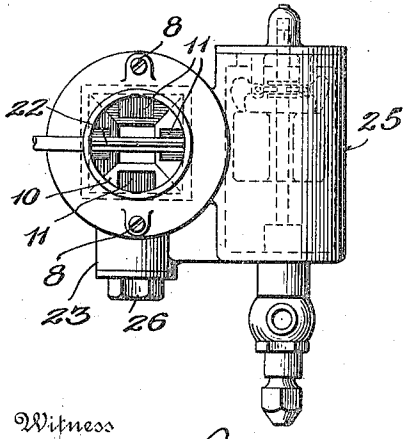
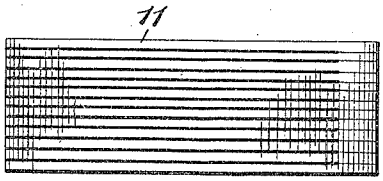


Fig. 3.



Witness

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CARBURETER.

1,257,862. Specification of Letters Patent. Patented Feb. 26, 1918.

Application filed May 5, 1917. Serial No. 166,570.

To all whom it may concern:

Be it known that we, WILLIS C. HESS and MILLICENT MORDEN, citizens of the United State of America, and residents of Toledo, county of Lucas, State of Ohio, and Brooklyn, county of Kings, State of New York, respectively, have invented certain new and useful Improvements in Carbureters, of which the following is a full and clear specification.

This invention is designed to produce a carbureter especially adapted for internal combustion engines on motor vehicles, and the object of the invention is to provide for an exceedingly thorough commingling of the air and the hydrocarbon and also to provide a very simple means for insuring an additional quantity of the mixture when the demands of the engine require it, as more fully hereinafter set forth.

In the drawings—

Figure 1 is a vertical longitudinal sectional view showing the preferred embodiment of our invention;

Fig. 2 is an end view looking at the air-inlet end of the device;

Fig. 3 is a plan view of one of the air valves; and

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 1 looking in the direction of the arrow.

Referring to the drawing annexed by reference characters, 5 designates a tubular main mixing chamber having an outlet neck 6 at one end (this neck being flanged as usual for attachment to the engine) and an inlet tube 7 removably clamped to the other end of the mixing chamber by a pair of screws 8. Clamped movably between the end of the inlet tube and the end of the mixing chamber is a radial flange 9 formed on the outer end of a tubular air nozzle 10 which tapers inwardly and terminates short of the opposite end of the mixing chamber, both ends of this nozzle tube being open and the tube being tapered inwardly. This air nozzle has four flat sides and therefore has the form of a pyramidal frustum. Each of the flat sides of the frustum is provided with a longitudinal opening which is normally closed by a flat valve 11 clamped against the flat side of the tube at a point near the attachment thereof to the mixing chamber by means of a clamping plate 12 secured to the tube by suitable screws. Each valve overlaps the marginal edges of the air opening in the nozzle and is constructed of a multiplicity of thin elastic tines secured together at their point of attachment to the tube and being free of each other and the nozzle tube from that point to their inner ends. These tines lie sufficiently close together to avoid any appreciable spaces between them, so that together they form a closure for the air port. The tines are secured rigidly together at their point of anchorage by fusing, brazing or soldering them together side by side.

The main fuel nozzle is indicated at 13; it extends through the bottom wall of the mixing chamber and rises to a point about on a line with the axial center of the air nozzle tube 10. This main nozzle discharges into a mixing chamber 14, through whose lower side it extends. Also discharging into this mixing chamber from the upper side thereof is an air nozzle 15 which is inserted down through an opening in the top wall of the mixing chamber, both this nozzle 15 and the fuel nozzle 13 being screwed into place for ease of assembling as well as cleaning and repairing. The blending or mixing chamber 14 is thus supported on the two nozzles, but it will be understood that it may be supported additionally in any other manner. This mixing chamber 14 is the shape of a frustum of a pyramid with the truncated end directed toward the air inlet side of the carbureter. This truncated end of the mixer 14 extends into the truncated end of the nozzle tube 10 and is provided near its truncated end with radial jet openings 16. The air nozzle 15 terminates within the mixer 14 at a point just behind the exit of the main fuel nozzle 13.

A supplemental fuel nozzle 17 is screwed up through the bottom wall of the main mixing chamber at a point a short distance back of the main fuel nozzle, and this sup-

plemental fuel nozzle is normally closed by a valve 18 which fits down in its upper cupped exit end, which exit end terminates at a point back of the mixer 14. The valve 18 is guided in its up and down movement in a bore formed in the top wall of the main mixing chamber, this valve being free to seat itself by gravity, supplemented, if desirable, by a coil spring 19, a suitable screw plug 20 being employed to close the upper end of the bore. A butterfly valve 21 is arranged in the mixture outlet 6, and a similar valve is arranged in the air-inlet tube 7, each of these valves being operable in any suitable or convenient manner, as is usual, from the driver's seat if our device be employed on a motor vehicle. The liquid hydrocarbon may be supplied to the fuel nozzles in any suitable manner; we prefer casting on the under side of the main mixing chamber a small reservoir 23 which is connected by a lateral always-open passage 24 to the float chamber 25, which is preferably cast integral with the mixing tube 5 at one side thereof, this float chamber being of any suitable construction which will automatically keep the fuel reservoir 23 filled with the fuel liquid. For convenience in assembling, repairing and interchanging the fuel nozzles, the bottom of the reservoir 23 is in the form of a plug 26 removably screwed into the bottom of the reservoir.

Our carbureter is designed particularly for use on motor vehicles, since in that use of the carbureter it will have its highest efficiency by reason of the thorough mixture it insures and also by reason of its capacity to respond to abnormal demands for fuel by the engine.

In starting, the butterfly throttle 21 is opened and the butterfly 22 is closed, so that a very rich initial charge is supplied to the engine. When the engine has been started, the butterfly 22 is open wide, and the throttle 21 is adjusted to supply the needed amount of fuel mixture to the engine. When the engine is running under normal loads and speeds, the supply of fuel is obtained entirely through main fuel nozzle 13. The fuel is discharged from nozzle 13 into the mixer or blender 14 and at the same time a continuous stream of air is drawn into the mixer through the air nozzle 15; the air and fuel thus drawn into the mixer is commingled and blended and then it jets radially outwardly through the passage 16. In this way the fuel is considerably broken up and commingled with a quantity of air before it is ejected into the main mixing chamber. As this mixture emerges from the sides of the preliminary mixer 14 in a plurality of fine streams, these streams are met by the in-rushing blast of air drawn in through the main air nozzle, the tapering form of this main air nozzle and the location of the preliminary mixer 14 insuring the concentration of the air blast upon the laterally issuing jets. In this way an exceedingly thorough mixture of air and fuel is obtained. By having the truncated end of the primary mixer 14 project into the exit end of the nozzle tube 10, it will be seen that any liquid that drips off the mixer 14 will be caught by the nozzle tube and will then spread itself over the interior surfaces of the nozzle tube, whence it will be picked up and atomized by the incoming air, thereby preventing any appreciable quantity of liquid hydrocarbon collecting in the apparatus.

When the work the engine is called upon to do demands a supply of fuel greater than the capacity of the main nozzle and a larger quantity of air, valves 11 will open and supply the additional air required, the degree of opening being, of course, dependent on the degree of vacuum the engine creates in the main mixing chamber. By having these flat valves 11 formed of a multiplicity of elastic tines, we not only provide a very sensitive valve, but also provide a valve arrangement which will insure an even distribution of the air around the blending nozzle, the tines being of equal length and strength so as to be actuated simultaneously. These closely adjacent elastic tines, when the valves open, also tend to separate slightly and thus divide part of the incoming air into a large number of thin films, thus still further promoting a thorough mixture of the air and fuel. When the engine demands an additional quantity of fuel as well as an additional quantity of air, the degree of vacuum increases in the mixing chamber to a point where the normal tendency of valve 18 to close is overcome and said valve is forced by atmospheric pressure on the fuel in the reservoir upwardly off its seat, thereby admitting an additional auxiliary supply of fuel through the nozzle 17.

The nature and scope of the invention having been thus indicated and its preferred embodiment having been specifically described, what is claimed as new is:

1. In a carbureter, the combination of a mixing chamber, an air nozzle affixed to the air inlet side thereof and extending inwardly, this nozzle being tapered inwardly and having a plurality of side walls each of which is provided with a longitudinal opening, a valve secured over each opening on the exterior of the nozzle and consisting of a multiplicity of elastic tines of equal length and strength lying closely together, and means for admitting fuel to the inner open end of said air nozzle.

2. In a carbureter, the combination of a mixing chamber, an air nozzle affixed to the air inlet side thereof and extending in-

wardly, this nozzle tapering inwardly, and means for introducing a blend or mixture of air and fuel into the inner open end of said nozzle, said means consisting of an inwardly-extending supplemental air nozzle, an inwardly-extending fuel nozzle, and a blending chamber supported on the inner ends of said latter nozzles and provided at the end nearest the mixing chamber with laterally-extending exit openings.

In testimony whereof we hereunto affix our signatures.

WILLIS C. HESS,
MILLICENT MORDEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."