

W. H. COLLIER.
CARBURETOR.
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1,417,501.

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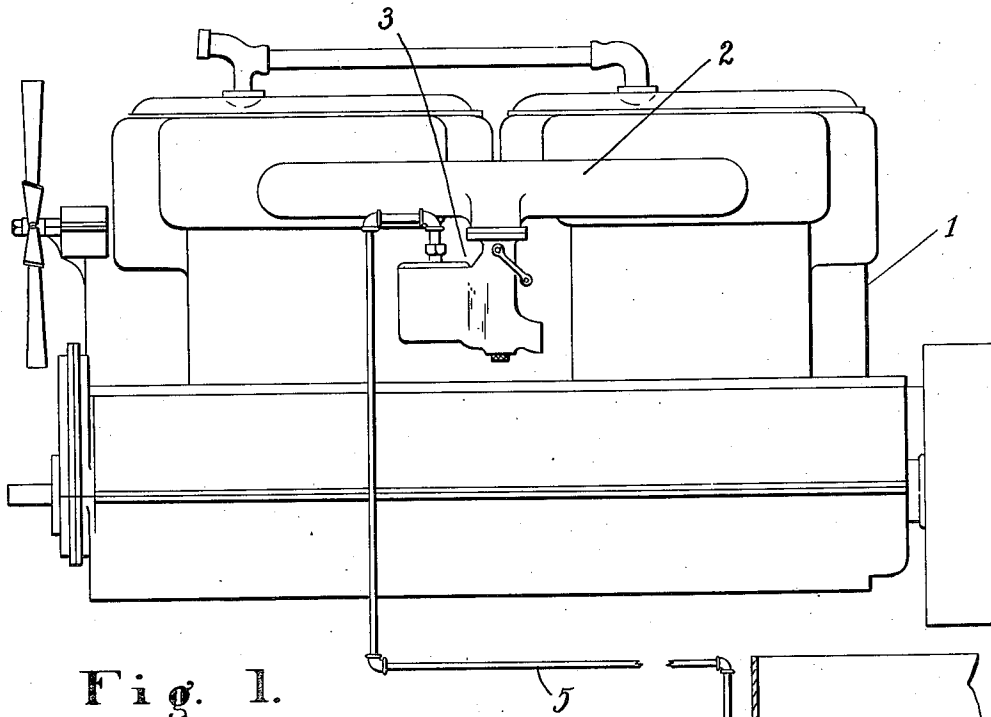


Fig. 1.

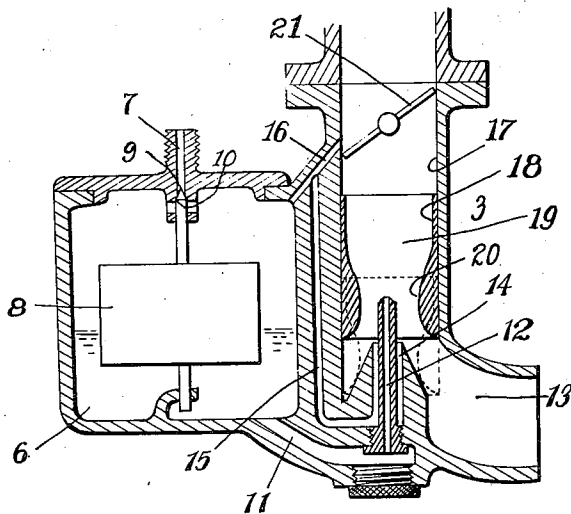


Fig. 2.

WITNESS

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WILLIAM H. COLLIER, OF BRENTWOOD, TENNESSEE.

CARBURETOR.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM H. COLLIER, a citizen of the United States of America, and a resident of Brentwood, county of Davidson, and State of Tennessee, have invented a certain new and useful Improvement in Carburetors, of which the following is a specification.

My invention relates to improvements in carburetors, and comprises what may be termed an improved "vacuum carburetor", i. e., a carburetor the float chamber of which has a vacuum connection whereby a supply of fuel will be maintained within that float chamber during the operation of the engine, to which the carburetor is connected, even though the source of supply of fuel for that carburetor be located below the carburetor itself. Other features of my invention will appear hereafter.

The objects of my invention are, to secure a supply of fuel to the carburetor, from a source located below the carburetor; and without the employment of auxiliary fuel feeding devices; to automatically regulate the richness of the mixture produced by the carburetor, and in particular to secure a rich mixture when starting, without the use of the usual hand operated "choker"; to provide a carburetor with regulating means such that the engine will not choke upon sudden wide opening of the throttle; to avoid flooding of the carburetor; to avoid occasion for use of adjustment devices on the carburetor; to avoid leakage of gasoline or other fuel from the carburetor; and in general to make the carburetor very simple, very certain and reliable in operation, and entirely automatic in its operation.

I will now proceed to describe my invention with reference to the accompanying drawings, and will then point out the novel features in claims. In said drawings:

Figure 1 shows more or less diagrammatically an elevation of an automobile engine fitted with my fuel supply means, and

Figure 2 shows a central vertical section of carburetor.

In the drawings, 1 designates the engine, 2 the intake manifold thereof, 3 the carburetor, 4 the main fuel supply tank, and 5 the fuel line leading from said tank to the carburetor.

In Figure 2, 6 designates the float chamber or feed-regulating chamber also termed the fuel supply chamber, of which the inlet is designated by numeral 7, and the float is designated by numeral 8. 9 is the usual needle valve, which needle valve, in this case, coacts with a valve seat 10 in the top of the float tank 6. By so locating the needle valve, the construction of the fuel supply device is greatly simplified, and other advantages hereinafter pointed out are attained.

11 designates the main fuel supply channel leading from the float chamber 6 to the main jet nozzle 12 located centrally in the air passage 13 of the carburetor. Around this jet nozzle 12 there is another and annular nozzle 14 connected to the top of the float chamber 6 by a passage 15 and an intersecting passage 16 to be referred to hereinafter. It will be noted that the annular nozzle 14 is cone-shaped externally.

The main portion 17 of the carburetor is cylindrical and within it is a sliding automatically-adjusted air valve 18, adapted to move up and down in portion 17 of the carburetor, under the influence of the varying draft through the carburetor. In Figure 2 the valve 18 is shown in full lines in an average running position, while in dotted lines that valve is shown in position occupied when the engine is not running. The passage 19 of this valve is restricted at a point 20, so that the valve is in form a Venturi tube, the main nozzle 12 being in the throat of the venturi when the valve is in a normal running position.

21 designates the ordinary butterfly throttle valve of the carburetor. This butterfly valve is shown in Figure 2 in closed position; but as is well known, such butterfly valves are arranged to be opened more or less, as desired.

The operation of the carburetor is as follows:

Supposing the float chamber of the carburetor to be empty, and the engine to be standing still. The valve 18 will then occupy the dotted line position shown in Figure 2, said valve resting upon the cone-shaped exterior of the secondary nozzle 14; the supply of air being almost completely cut off by said valve 18. If now the engine be turned

over the suction thus produced by the engine will be communicated through duct 16, to the float chamber, drawing fuel through pipe 5 from tank 4, and so supplying fuel to the float chamber 6, and thence through passage 11 to nozzle 12. Since the supply of air is at this time greatly restricted, owing to the valve 18 being in or about the position shown in dotted lines, the mixture, first supplied to the engine, is very rich, as is desired when starting; the more so as the suction of the engine is devoted very largely at first to drawing fuel up through the nozzle 12. As the engine speeds up, and its suction increases, valve 18 is raised, admitting air more freely; and, for the same reason, the flow of fuel through the nozzle 12 is less in proportion to the air supplied. Since the valve 18 moves up and down within the carburetor in proportion to the varying suction of the engine, and in so doing regulates the air supply, partly by throttling between the lower edge of the valve and the cone 14, and partly by varying area at the throat of the venturi, due to varying position of such throat with respect to the nozzle 12, the supply of air and the richness of the mixture is regulated automatically, in accordance with the speed of the engine; such regulation of supply being of course modified by the position which the butterfly valve 21 may occupy.

It will be seen that with this carburetor, no special vacuum-operated feeding device is necessary, even when the tank 4 is located well below the carburetor; the suction connections 16 and 18 from the main passage of the carburetor to the float chamber and to the secondary nozzle 14 serving to fill that float chamber, even when empty.

No flooding of the carburetor is possible, due to grease or sediment sticking up the needle valve 9; for the fuel enters the float chamber from the top, and the tank is located below the float chamber, so that as soon as the engine 1 stops, the suction tending to draw the fuel into the float chamber, stops.

Tests of this carburetor under varying conditions and with various motors have shown that it makes a good mixture under all operating conditions. Since the same vacuum is maintained in the float chamber as in the main passage 13 of the carburetor, when the carburetor is in normal operation, the regulation of fuel supply to air supply is particularly correct; which promotes even operation of the engine.

In certain other types of carburetors there is air pressure in the float chamber, and fuel stands in that float chamber about the level of the orifice of the nozzle. In such carburetors when the motor is running, the air velocity creates a partial vacuum around the nozzle, drawing the fuel out through the

nozzle and making a mixture which is rich or lean, according as the vacuum is thereby increased. In the present carburetor this is not the case, the vacuum in the float chamber being the same as that in the vicinity of the nozzle; a condition which, as above stated, permits the production of a mixture of proper proportions at all speeds.

What is termed herein the "annular nozzle", or "secondary nozzle" 14, is not in fact a fuel nozzle, but is merely an air passage which, in connection with the passage 15, equalizes the partial vacuum existing around the nozzle 12 and above the butterfly valve 21. To this equalizing passage is due in large measure the good quality of the mixture of air and fuel at all speeds, produced by this carburetor. Not only does passage 16 serve to permit the suction of the engine to draw fuel into chamber 6, but also this passage, and the branch 15 forming a part of it, serves to equalize the pressure in the upper part of chamber 6 with that obtaining in the vicinity of spray nozzle 12; an equalization which has much to do with the desirable proportioning of the mixture maintained at all speeds.

What I claim is:—

1. In a carburetor, the combination of a main air passage, a fuel supply chamber, a nozzle and a fuel connection from such supply chamber to said nozzle, and a permanently open suction duct leading from a portion of the fuel supply chamber above the normal fuel level therein to said main air passage; and a throttle valve in said main air passage arranged to restrict such passage at a point between the connection of such suction duct to such main air passage and said nozzle, said fuel supply chamber being closed to the external air except for the connection of such suction duct to the main air passage, and being provided with a fuel supply connection and with means for regulating the level of the fuel within it.

2. In a carburetor, the combination of a main air passage, two nozzles therein, one located concentrically about the other and having a tapering exterior form, a fuel supply chamber, means for supplying fuel from said chamber to the inner nozzle, a suction duct leading from a part of said chamber above the normal fuel level to said main air passage, a sliding valve within said main air passage adapted in its lowermost position to rest upon the tapering portion of the outer nozzle, and in such position to restrict greatly the entry of air to said main air passage, said valve arranged to be lifted by suction and in such elevated position to regulate the passage of air around said inner nozzle, and a duct leading from said outer nozzle to said suction duct.

3. In a carburetor, the combination of a main air passage, a nozzle therein, a source

of fuel supply connected to that nozzle, a specification in the presence of two subscri-
passage for equalizing vacuum between the ing witnesses.
space around said nozzle and said source of
fuel supply, and a sliding suction-operated
5 valve controlling said main air passage an-
terior to said nozzle.

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Witnesses:

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In testimony whereof I have signed this