H. C. WAITE.

CARBURETER.

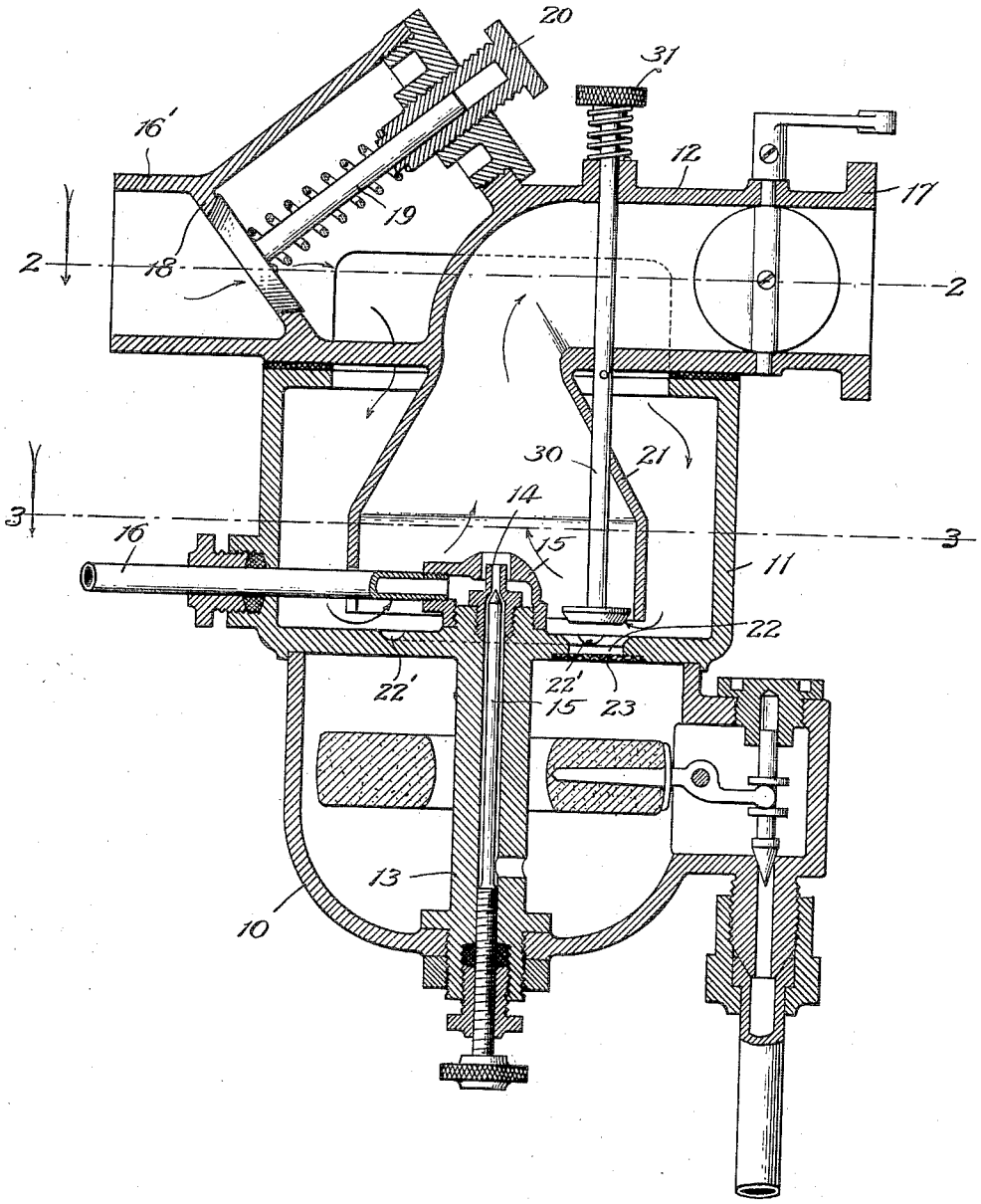
APPLICATION FILED MAR. 23, 1917.

1,319,633.

Patented Oct. 21, 1919.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

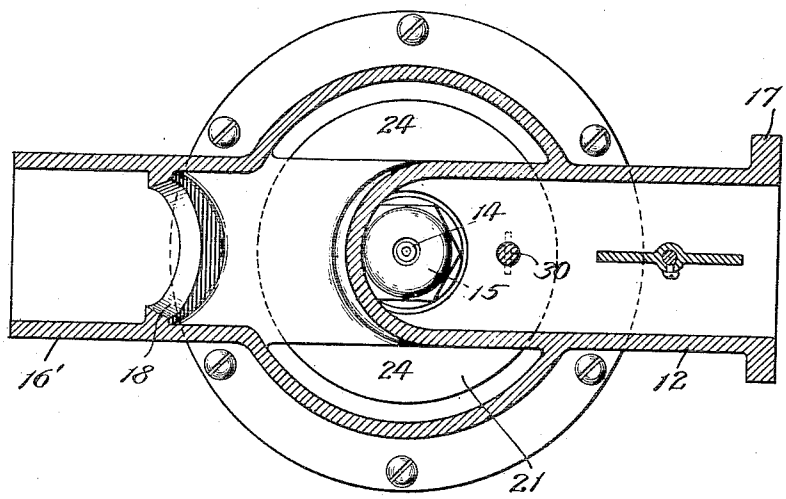
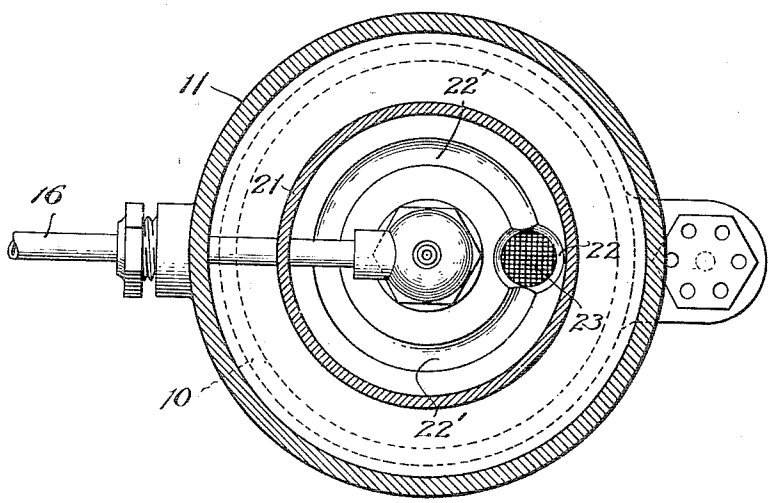


Fig. 3.



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UNITED STATES PATENT OFFICE.

HARRY C. WAITE, OF ELGIN, ILLINOIS, ASSIGNOR TO ELGIN TRACTOR CORPORATION, OF ELGIN, ILLINOIS, A CORPORATION OF NEW YORK.

CARBURETER.

1,319,633. Specification of Letters Patent. Patented Oct. 21, 1919.

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To all whom it may concern:

Be it known that I, HARRY C. WAITE, a citizen of the United States, residing at Elgin, in the county of Kane and State of Illinois, have invented a new and useful Improvement in Carbureters, of which the following is a specification.

My invention relates to certain new and useful improvements in carbureters for internal combustion engines and will be fully understood from the following detailed description of a specific embodiment thereof, taken in connection with the accompanying drawings.

In these drawings, Figure 1 is a longitudinal central section through the carbureter, and Figs. 2 and 3 are transverse sections on the lines 2—2 and 3—3, respectively, Fig. 1.

Referring more particularly to the drawings, the numeral 10 designates the float bowl of the carbureter, the numeral 11, the mixing chamber casting and the numeral 12, the inlet and outlet casting. The float bowl is of the usual form, carrying a float and float valve through the action of which a constant fuel level is maintained. The mixing chamber casting forms a cover for the float bowl and is secured thereto by means of a depending stem 13 which is centrally bored to form a fuel conduit communicating at the base with the float bowl and at the upper end with a fuel nozzle 14. A needle valve 15 extends through the bore of the stem and is arranged for the regulation of the nozzle 14. Surrounding the fuel nozzle 14 there is an annular blast nozzle 15 with which communicates a conduit 16 through which gas under pressure is supplied, this conduit being preferably tapped into the exhaust manifold of the internal combustion engine to which the carbureter is attached.

The upper casting 12 is provided with axially-alined horizontal inlet and outlet nipples 16^1 and 17, the latter being flanged for attachment to the intake manifold. Just inside of the end of the inlet nipple 16^1 there is formed a valve seat 18 arranged at an angle to the vertical and horizontal planes and having seated thereon a spring-pressed valve 19, the tension of the controlling spring being adjustable as by means of the threaded abutment and guide-member 20, the narrow head of which is accessible from the outside of the carbureter. The outlet pipe 12 turns through an angle of 90° at the approximate center of the casting and has an inwardly extending end 21 which is flared to form a funnel or bell surrounding the fuel atomizer, this bell extending almost to the bottom of the casting 11 to form an annular air-orifice. Within the circumferential projection of the bell the head of the float well 10 is provided with an aperture 22, screened as at 23 to prevent the passage of flame in the event of back firing. In order that all condensate or drips collecting on the head may drain back to the float chamber a gutter or groove 22^1 is provided which discharges into the aperture 22. The aperture may be closed at will by a spring-held valve 30 the stem of which extends outward through the top of the carbureter and carries an operating head 31 on its outer end. The air entering through the automatic valve 19 reaches the annular space surrounding the bell 21 through side apertures 24 cored out of the upper casting 12 as shown in Fig. 2.

The operation of my improved carbureter is as follows: A constant fuel level being maintained in the float well 10, the pressure of the exhaust from the engine acting through the conduit 16 and annular nozzle 15 will serve to draw the liquid upwardly and spray it or atomize it from the nozzle 14, the construction illustrated in the drawing having been found to be particularly efficient for the accomplishment of this blast atomization. Under the vacuum created by the suction strokes of the engine pistons, the valve 19 will be raised from its seat to admit a regulated quantity of air which will pass downwardly through the cored openings 24 into the space surrounding the bell 21 and under the bottom of the latter into the interior of the bell, there to mix with the atomized fuel to form a combustible mixture which will pass outwardly to the engine through the nipple 17, the usual throttle valve being employed for regulating the quantity of mixture supplied to the engine.

My carbureter is particularly designed for handling relatively heavy or difficultly vaporizable liquid fuel, the exhaust-actuated atomizer serving to produce from such fuel a fine mist or vapor which is capable of being carried along to the engine cylinders without excessive condensation. This result follows from three peculiarities of my

construction; first, the use of a gas under pressure, *i. e.*, the exhaust gas for securing the atomization of the fuel; second, the use of a relatively hot gas, *i. e.*, exhaust gas, for effecting this atomization, and, third, the provision of the relatively large bell 21 in which the air velocity is low and which is so mounted as to drain its condensate directly back into the float well. Thus, it will be observed from the drawing that the diameter of the flared bell 21 considerably exceeds that of the carbureter outlet (which latter diameter corresponds with the diameter of the engine intake pipe), and the velocity of the mixture within the bell is therefore correspondingly lower than its normal velocity in the intake pipe. As the result of this construction only that proportion of the atomized liquid which has reached a sufficiently fine state of subdivision to remain in suspension in the air in its course through the intake manifold is carried upwardly out of the bell. All liquid particles which are not sufficiently small to remain in suspension drain backward immediately into the float well.

A further advantage of my construction lies in its superior regulation under varying loads and speeds of the internal combustion engine. This result follows from the fact that the quantity of fuel atomized is dependent upon the pressure in the exhaust manifold which is in turn a function of the load and speed of the engine. Thus, under a low throttle opening and with a low rate of speed the exhaust pressure will be very small and the quantity of liquid atomized correspondingly small. Furthermore, under such conditions the air velocity in the bell 21 will be so small that only the most perfectly atomized portion of the liquid fuel will be carried upward. As the throttle is opened the exhaust pressure will increase, thereby effecting greater atomization, the increased air velocity through the valve serving to pick up a greater proportion of the atomized liquid. These functions are further influenced by the action of the automatic valve 19, the tension of which is sufficient to create and maintain sufficient vacuum within the carbureter to secure an adequate atomizing effect at those very low speeds and loads at which the exhaust pressure is practically *nil*. Under higher loads and speeds the automatic inlet valve does not play such an important part, reaching its full opening and ceasing to further effect the operation of the carbureter at a point below the full-load line.

The valve 30 of my carbureter is intended primarily for enriching the mixture at the time of starting, replacing the strangler valves or primers commonly employed for this purpose. It will be seen that by closing valve 30 prior to the initial suction strokes of the engine the free space above the liquid level in the float bowl will be temporarily maintained at atmospheric pressure, thus providing an initial excess flow of fuel from the nozzle when the vacuum resulting from the operation of the engine pistons is applied.

While I have shown in considerable detail one specific embodiment of my invention, it will be understood that this is illustrative only and for the purpose of making more clear the nature and objects of the invention and that I do not regard the invention as limited to these details, nor to any of them, except in so far as such limitations are included within the terms of the accompanying claims in which it is my intention to claim all novelty inherent in my invention as broadly as is permissible in view of the prior art.

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

1. In a carbureter for internal combustion engines, a constant level reservoir, a nozzle fed from the same, a mixing chamber designed to operate under a partial vacuum and into which the nozzle discharges, means establishing communication between the mixing chamber and the space above the liquid level in the reservoir, and a manually operated spring-pressed valve for interrupting such communication.

2. A carbureter for internal combustion engines, comprising a reservoir for liquid fuel, a blast atomizer fed from the said reservoir, said atomizer being connected with, and operable from, the exhaust of the engine, a mixing chamber into which said atomizer discharges, a passage for establishing communication between said mixing chamber and the fuel reservoir whereby the atomized liquid may be drained from said mixing chamber, and means for closing said passage at will.

3. A carbureter for internal combustion engines, comprising a reservoir for liquid fuel, a blast atomizer fed from the said reservoir, said atomizer being connected with, and operable from, the exhaust of the engine, a mixing chamber into which said atomizer discharges, a passage for establishing communication between said mixing chamber and the fuel reservoir whereby the atomizer liquid may be drained from said mixing chamber, and a normally opened spring pressed valve for closing said passage at will.

HARRY C. WAITE.