T. W. KINGS.

CARBURETER.

APPLICATION FILED NOV. 9, 1918.

1,379,346.

Patented May 24, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

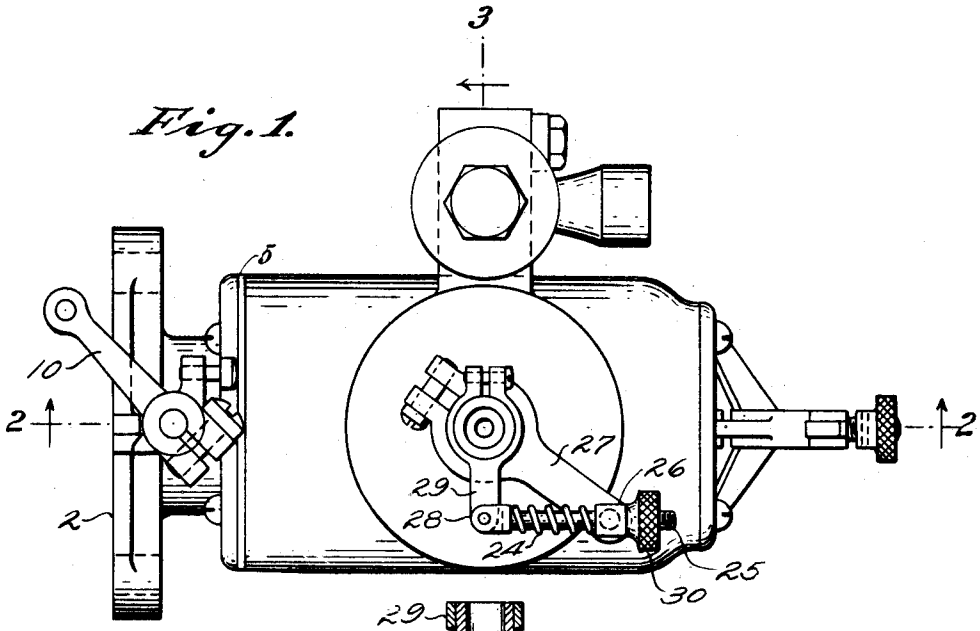
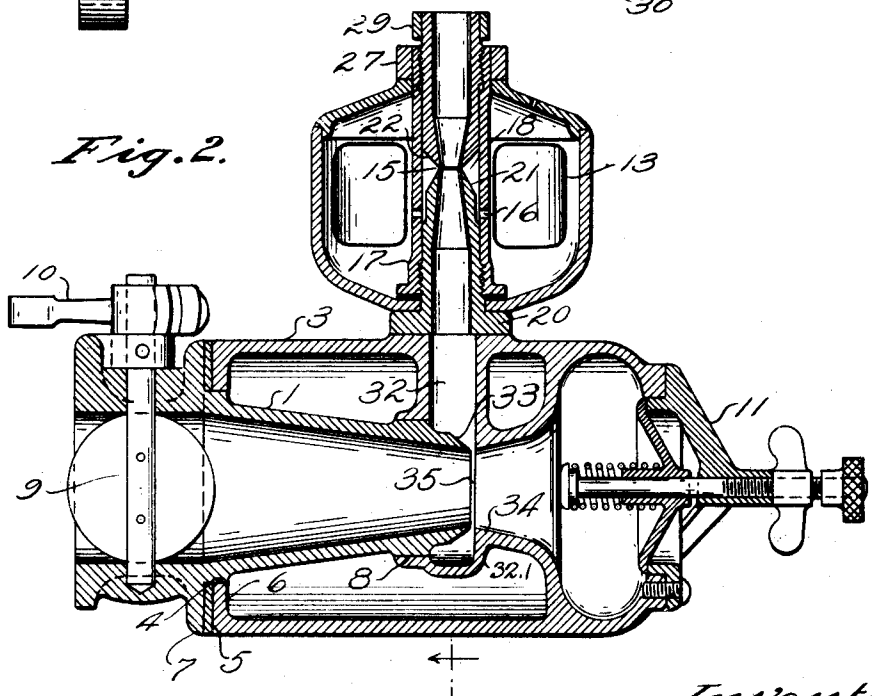


Fig. 2.



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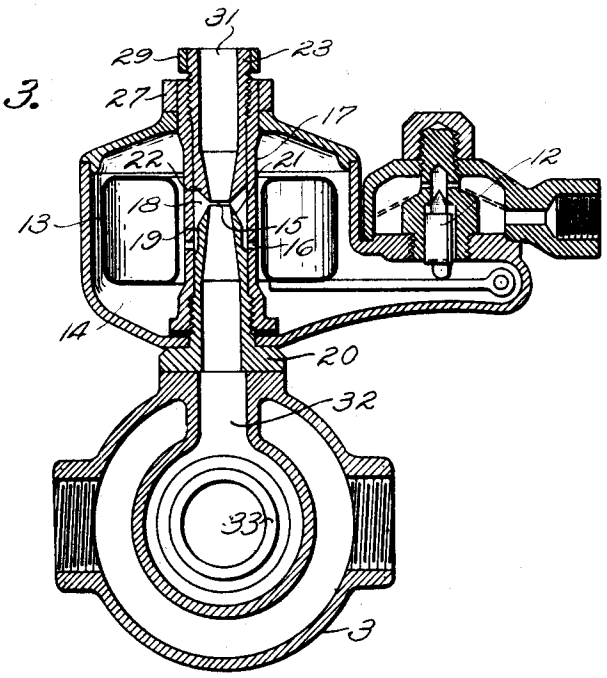
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2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS W. KINGS, OF CHICAGO, ILLINOIS.

CARBURETER.

1,379,346. Specification of Letters Patent. Patented May 24, 1921.

Application filed November 9, 1918. Serial No. 261,796.

To all whom it may concern:

Be it known that I, THOMAS W. KINGS, a subject of the King of England, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to carbureters of the suction, float feed and exhaust-heated type designed to properly vaporize the heavier oils for use in internal combustion engines. The invention more particularly relates to an improved construction of double Venturi tubes whereby a highly efficient mechanical atomization of the fuel may be effected. A further object of the invention is to provide a design of carbureter permitting the use of but a comparatively low quantity of heat for the complete preparation of the charge of fuel and air. The aim of the last-mentioned object is to keep the volumetric efficiency of the engine high. Another object of the invention is to provide an arrangement of carbureter permitting a highly efficient application of heat to the mixed vapor.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a plan view of a carbureter constructed according to this invention.

Fig. 2 is a central longitudinal section along the line 2—2 of Fig. 1.

Fig. 3 is a transverse vertical section along the line 3—3 of Figs. 1 and 2.

The principal features of the invention are the two Venturi tubes, both, as shown in the drawings, being divided into two parts at the throat or smallest diameters of the tubes. The smaller or primary venturi is mounted or assembled in a tube which passes vertically through the center of a float chamber of ordinary construction. The lower half of the venturi is stationary and arranged with the top end slightly above the level of the fuel in the float chamber. The upper half is adjustable toward and away from the lower half, so that the ends of the two parts of the venturi may be brought in contact or separated to form the desired gap to admit fuel from the float chamber.

The larger or secondary venturi is preferably, but not necessarily, arranged at right angles to the primary. The secondary venturi in principle of construction is similar to the primary venturi, being formed in two parts one of which is integral with an outer shell or casing which forms a hot exhaust jacket and also a housing for an automatic adjustable air valve of conventional construction.

In the drawings, the part of the venturi which is shown integral with the housing is the entrance half of the venturi, while the remaining part is arranged to permit relative adjustment between it and the entrance half of the venturi and is made in one piece with a throttle valve housing and flange for attaching the carbureter to the engine. The expansion portion of the venturi has a flange which fits into the jacket, permitting the jacket and parts of the carbureter carried thereby to be shifted along the expansion section of the venturi and thus varying the size of the opening between the two halves of the secondary venturi and arranging for the desired admission of the rich mixture of fuel and air from the primary venturi.

The assembled construction provides for a chamber surrounding the small diameter of the secondary venturi, and this chamber is in turn inclosed in the exhaust jacket.

In the drawings, the expansion portion 1 of the secondary venturi is shown rigid with a flange 2 which serves as a support for the carbureter by being attached to the engine frame at the fuel inlet port. The body 3 of the carbureter is adjustable along the shoulder 4 on part 1, any particular adjustment being maintained by inserting one or more gaskets 5, of suitable thickness, between the flange 6 on the housing 3 and flange 7 on the expansion portion 1. The thickness of the gasket 5 will therefore determine the size of the opening between the two parts of the secondary venturi, it being desirable to avoid having the operator tamper with this adjustment. The entrance end of the expansion member 1 of the venturi fits within a suitable bearing 8 formed in the housing 3. The throttle valve 9 and its operating lever 10 at the left end of tube 1 and also the automatic air inlet valve 11 at the right-hand end of casing 3 are of conventional design.

Fig. 3 of the drawing also shows a well-known form of fuel inlet valve 12 and controlling float 13 in a chamber 14 of well-known design. This float valve construction operates to maintain a fuel level in chamber 14 slightly below the gap 15 in the

primary venturi, but above the apertures 16 in the tube 17. The apertures 16 provide communication between the chamber 14 and a small chamber 18 in the tube 17 around the gap 15 in the primary venturi. The chamber 18 is provided for by reducing the diameter of the top end 19 of the lower section 20 of the primary venturi and by beveling the adjacent ends 21 and 22 of the upper and lower sections 20 and 23 of the primary venturi. The upper section 23 is shown as having threaded engagement with the tube 17. This threaded engagement between the member 23 and tube 17 permits a fine adjustment of the member 23 along the tube, for the purpose of varying the size of the gap 15. In order to prevent injury to the beveled ends of the primary venturi, this adjustment is effected through a spring 24 (Fig. 1). The spring 24 is coiled around the rod 25 and is located between the post 26 on a fixed arm 27 and the enlarged end 28 of rod 25. The rod 25 is pivotally connected at its enlarged end to an arm 29 secured to the upper section 23 of the primary venturi.

A knurled adjusting nut 30 is in threaded engagement with the free end of rod 25. By unscrewing the nut 30, the spring 24 urges the arm 29 to swing to the left or effect a right-hand rotation of the section 23 of the venturi, and thus cause it to travel toward the lower section 20. By turning the nut 30 in a right-hand direction, the rod 25 will be drawn to the right (Fig. 1) and thus cause an increase in the width of the gap 15. Air enters the primary venturi through the upper open end 31.

The lower section 20 of the primary venturi communicates with a chamber 32 of a casing 32.1 surrounding the beveled end 33 of the part 1 of the secondary venturi. The entrance end 34 of the secondary venturi, which is in communication with the air inlet valve 11, is formed integral with the casing 3. The sections 1 and 34 of the secondary venturi are normally not in contact at their adjacent ends and thus provide a gap 35 through which the rich mixture from the primary venturi is admitted to the expansion section 1 of the secondary venturi.

In the action of the carbureter as controlled by the suction of the engine, air enters at the top of the primary venturi and as it travels past the smallest diameter of the venturi where its velocity is greatest and its pressure is reduced, it takes up the charge of fuel from the surface of the latter in chamber 18. The charge of fuel is drawn through the small annular gap 15 between the two halves of the venturi. In practice, with common grades of kerosene and when the engine is carrying a full load, the gap is adjusted from .0015″ to .0025″. This results in a thin film of fuel entering the high-velocity stream of air around the entire circumference of the Venturi tube, in condition for thorough atomization and intimate mixture with the stream of air. The rich mixture thus formed, on leaving the primary venturi enters the chamber 32 surrounding the beveled end 33 of the section 1 of the secondary venturi, and while it passes through the expansion portion 1 of the secondary venturi, its temperature rises as it absorbs heat from the surrounding hot exhaust jacket, or at least its temperature is maintained sufficiently to counteract the drop in temperature due to expansion.

As the mixture passes around the beveled end 33 of section 1 of the secondary venturi and enters the current of air passing through the venturi, it is further finely divided, due to passing around the sharp edge of the inner end of the expansion tube and the high velocity of the current at this point. The gas mixture finally delivered does not condense even in a comparatively cool manifold during the time of its passage from the carbureter to the engine.

Due to the fact that the passages 16 communicating with the float chamber 14 and the chamber 18 surrounding the gap of the venturi are below the fuel level, the suction of the downward stream of air through the venturi creates a partial vacuum in chamber 18. The fuel level in chamber 18 rises to the opening 15, and fuel is drawn into the venturi by the action of the partial vacuum and atmospheric pressure on the surface of the fuel in float chamber 13.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. In a carbureter, a casing forming a fuel chamber, a vertical tube communicating with said chamber, a Venturi tube located in said vertical tube and forming an air intake passage, said Venturi tube comprising two parts separated near the smallest diameter of the venturi, one of said parts having threaded engagement with said vertical tube so as to be adjustable toward and away from the other of said parts, the inner adjacent ends of said venturi parts being smaller in external diameter than said tube to provide a chamber between the venturi and said vertical tube, and a fuel passageway in said vertical tube providing communication between the fuel chamber and the chamber formed between said vertical tube and venturi.

2. In a carbureter, a casing forming a fuel chamber, a vertical tube passing through said chamber, a Venturi tube located in said vertical tube and forming an air intake passage, the reduced diameter of

said Venturi tube forming an inclosed chamber between it and the said vertical tube, a fuel inlet aperture in said venturi at its reduced diameter, and an aperture in said vertical tube providing communication between said chamber inside the vertical tube and the fuel chamber surrounding the vertical tube, said last-mentioned aperture being below the aperture in the Venturi tube.

3. A carbureter having a casing forming a fuel chamber, a vertical tube extending through said casing, a Venturi tube within said vertical tube forming an air intake passage and made in two parts separated near the smallest diameter of the venturi and one of which is adjustable toward and away from the other, the inner adjacent ends of said venturi being beveled for the purpose of providing a chamber between the venturi and said vertical tube, a fuel passageway in said vertical tube providing communication between the fuel chamber and the chamber formed by the beveled ends of the venturi, said passageway being located below the adjacent ends of the two sections of the Venturi tube, and means for maintaining fuel in said chamber in the vertical tube at a level which is between the passageway in the vertical tube and the adjacent ends of said Venturi tube.

4. In a carbureter, a tube having fuel and air inlets, a casing communicating with the outlet end of said tube, and a venturi comprising two parts separated near the smallest diameter of the venturi, said venturi communicating with said casing at the inner adjacent ends of said parts, one of said parts being supported on said casing so as to be longitudinally adjustable toward and away from the other of said parts for regulating the flow of fuel through said venturi.

5. In a carbureter, a tube having fuel and air inlets, a casing communicating with the outlet end of said tube, and a venturi of larger proportions comprising two parts separated near the smallest diameter of the venturi, said venturi communicating with said casing at the inner adjacent ends of said parts, one of said parts being integral with said casing, the other of said parts being supported on said casing so as to be longitudinally adjustable toward and away from said first-mentioned part.

6. In a carbureter, a tube arranged to provide a passageway for air, a fuel inlet aperture in said tube, a venturi communicating at one end with an air inlet and having an outlet at its opposite end, said venturi having an aperture at its smallest diameter communicating with the tube, said aperture being an annular gap dividing the venturi in two portions, and means for adjusting one portion of said venturi toward and away from the remaining portion.

Signed at Chicago this 31st day of Aug., 1918.

THOMAS W. KINGS.