E. PLANCHE.

HYDROCARBON VAPORIZER.

APPLICATION FILED DEC. 11, 1916.

1,242,975. Patented Oct. 16, 1917.

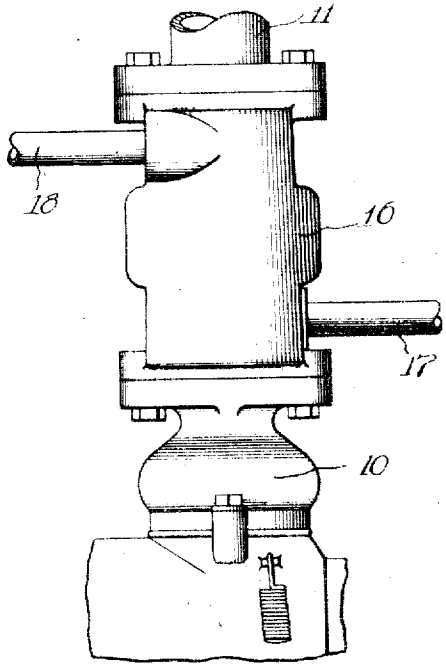


Fig. 1.

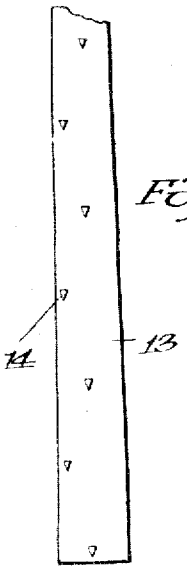


Fig. 4.

Fig. 2.

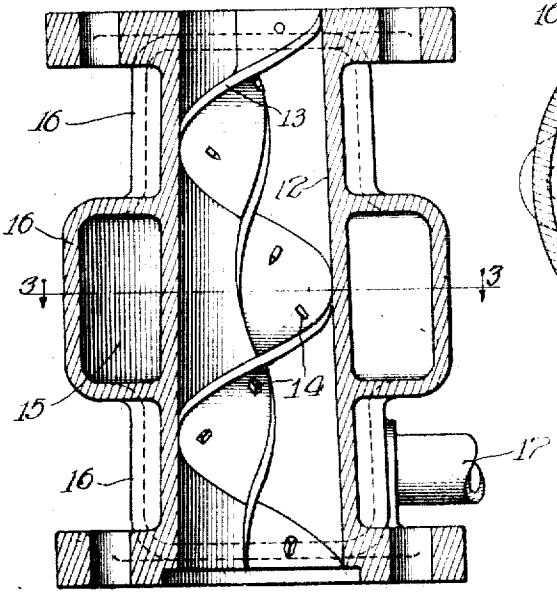
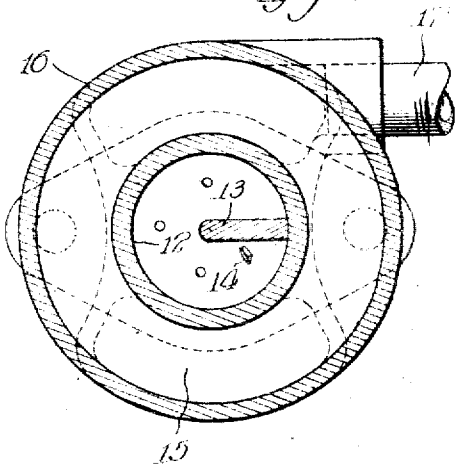


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

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HYDROCARBON-VAPORIZER.

1,242,975. Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed December 11, 1916. Serial No. 136,328.

To all whom it may concern:

Be it known that I, ETIENNE PLANCHE, a citizen of the United States, and resident of Flint, in the county of Genesee and State of Michigan, have invented certain new and useful Improvements in Hydrocarbon-Vaporizers, of which the following is a specification.

My invention relates to hydrocarbon motors and has particular reference to a novel device for mixing the combustible gas just prior to its entrance into the cylinders.

I am aware of many forms of mixing devices which employ stationary or movable means for causing a whirling or spiral motion in the body of the gas. I am, however, enabled to secure high efficiency in hydrocarbon motors by setting up such a whirling motion in the gas and simultaneously increasing the velocity thereof. This is accomplished by gradually lessening the cross-sectional area of the conduit.

It is well known that in order to utilize hydrocarbons with highest efficiency the explosive mixture consisting of air and vapor should be gaseous; that is, it should contain no liquids in suspension. However, due to the velocity of the air past the feed nozzle and the tendency to slow vaporization of the gasolene now commonly sold, some globules of liquid will be carried along in suspension by the air. I have, therefore, provided means supplemental to the agitating means, for breaking up such globules into finer particles in order that each thereof may finally dissolve into vapor. This result is secured by interposing in the helical passage a plurality of relatively small baffles, which, while they offer but little resistance to the free flow of the vapor, act as a check to globules of liquid traveling with the gas and serve to subdivide them into such small particles that vaporization is practically assured.

Of course, the ratio of vaporization of hydrocarbons is a function of the heat applied thereto. Having this in mind, I have secured still greater efficiency by applying heat to the walls of the helical conduit in which the gases are whirled.

It is well known that the ratio of vaporization varies inversely as the pressure; also that in a moving body of fluid the pressure varies inversely as the velocity; therefore, as I increase the velocity of the gases I reduce the pressure and consequently enhance vaporization.

The functional coöperation between the helical deflector and the heating means is in this:—the whirling motion of the gas develops centrifugal force which causes the impingement of any globules of liquid which may be carried in suspension against the surrounding walls. As these walls are highly heated and as heat is transferred by conduction much more readily than by convection through a body of air or gas, the unvaporized liquid is able to absorb heat and thereby more readily vaporize than if insulated from the heat by a surrounding body of air and gas.

By combining these functional advantages in a single structure I am able to effect decided economies in relative fuel consumption per horse-power hour.

The invention will be more readily understood by reference to the accompanying drawings, wherein—

Figure 1 is a fragmentary side elevation of a device constructed in accordance with my invention;

Fig. 2 is a longitudinal sectional view therethrough,

Fig. 3 is a sectional view on the line 3—3 of Fig. 2; and,

Fig. 4 is a plan view of the plate before it is bent into spiral form and located in the conduit.

Referring to the drawings, it will be seen that the device is mounted preferably between the carbureter 10 and the intake manifold 11; in fact, it forms a part of the intake manifold.

The device is generally cylindrical in outline, the walls 12 defining a conduit circular in cross-section and gradually tapered from the lower to the upper end thereof. The cross-sectional area of the manifold pipe is uniform with that of the contracted upper end of the conduit 12.

Formed within the conduit is a helically-disposed web 13, the width and pitch of the web being such as to insure a whirling motion of the gases without unnecessary restriction of the passage. An arrangement such as this operates effectively, but I am able to secure still greater efficiency by providing on the surface of the web or deflector a large number of pins or projections 14, preferably triangular in cross-section, disposed transversely of the line of flow of the fluid, with one sharp edge directed toward the supply of fluid. This is [illegible]

in Fig. 4, which illustrates the deflector before being bent into the form of a helix. It will be understood that the pins 14, pass through the deflector; that is, the ends of the pins project from opposite sides of the plate. These projections are located in staggered relation and serve to break up or "pulverize" any globules of liquid which may be carried in suspension by the moving body of gas.

Realizing the value of heat as an adjunct in vaporization, I have provided for the circulation of water or exhaust gases around the mixing chamber through the space 15, formed by the jacket 16. Inlet and outlet pipes 17, 18, respectively are shown in communication with the space 15.

It is well understood that in order to transform a liquid at a given temperature and pressure into a vapor having the same temperature and pressure, heat must be supplied. The extra number of heat units necessary to cause this transformation is called the latent heat of vaporization; it varies with different substances, 966 B. T. U. being required to change a pound of water at 212° F. into steam having the same temperature. This explains the phenomenon of the cold and moist intake manifold of a running motor even on a hot day when every other part of the motor is too hot to permit of contact by the hand. Thus it is seen that the degree of vaporization is dependent upon the extra amount of heat which can be supplied at and following the point of mixing of the gases. Inasmuch as this heat, to be effective, must be applied equally to the liquid and inasmuch as the transfer of heat by convection is slow, many globules of liquid are unvaporized and carried in suspension. These are the particles which are caused to contact the heated walls of the conduit and absorb the necessary extra heat units for vaporization.

The objects in view and the advantages gained might accrue with structures of modified form and I do not wish to be limited to the exact form herein shown and described.

I claim:

1. In a vaporizing device, the combination of a tapered conduit, the point of smallest cross-sectional area being farthest from the carbureter to which it is attached, and means within the conduit for whirling the gases in order to assist in mixing the same, substantially as described.

2. In a device of the class described, the combination of a tapered conduit adapted to be attached to the intake manifold of a hydrocarbon motor between the carbureter and the engine, the point of smallest cross-sectional area of the conduit being farthest from the carbureter, means for whirling the gases, and means for applying heat exteriorly of the conduit, substantially as described.

3. In a device of the class described, the combination of a conduit adapted to be disposed in the intake manifold of an engine, a helical deflector located within said conduit, and projections on said deflector adapted to be contacted by particles of liquid and to pulverize the same, substantially as described.

4. In a device of the class described, the combination of a conduit for a combustible mixture, a deflector located in said conduit, and a plurality of angular pins disposed transversely of the flow of fluid through said conduit, substantially as described.

5. In a device of the class described, the combination of a tapered conduit adapted to be attached to the intake manifold of a hydrocarbon motor between the carbureter and the engine, the point of smallest cross-sectional area of the conduit being farthest from the carbureter, a stationary, helical deflector located in the conduit, and means for applying heat exteriorly of the conduit, substantially as described.

6. In a device of the class described, the combination of a tapered conduit adapted to be attached to the intake manifold of a hydrocarbon motor between the carbureter and the engine, the point of smallest cross-sectional area of the conduit being farthest from the carbureter, a helical deflector located in the conduit, and projections on said deflector adapted to be contacted by particles of liquid which may be carried in suspension, substantially as described.

Signed at Flint, Michigan, this 6th day of December, 1916.

ETIENNE PLANCHE.

Witnesses:
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JOSEPH RAWLEY.