J. M. ULRICH & W. RAHR, Jr.

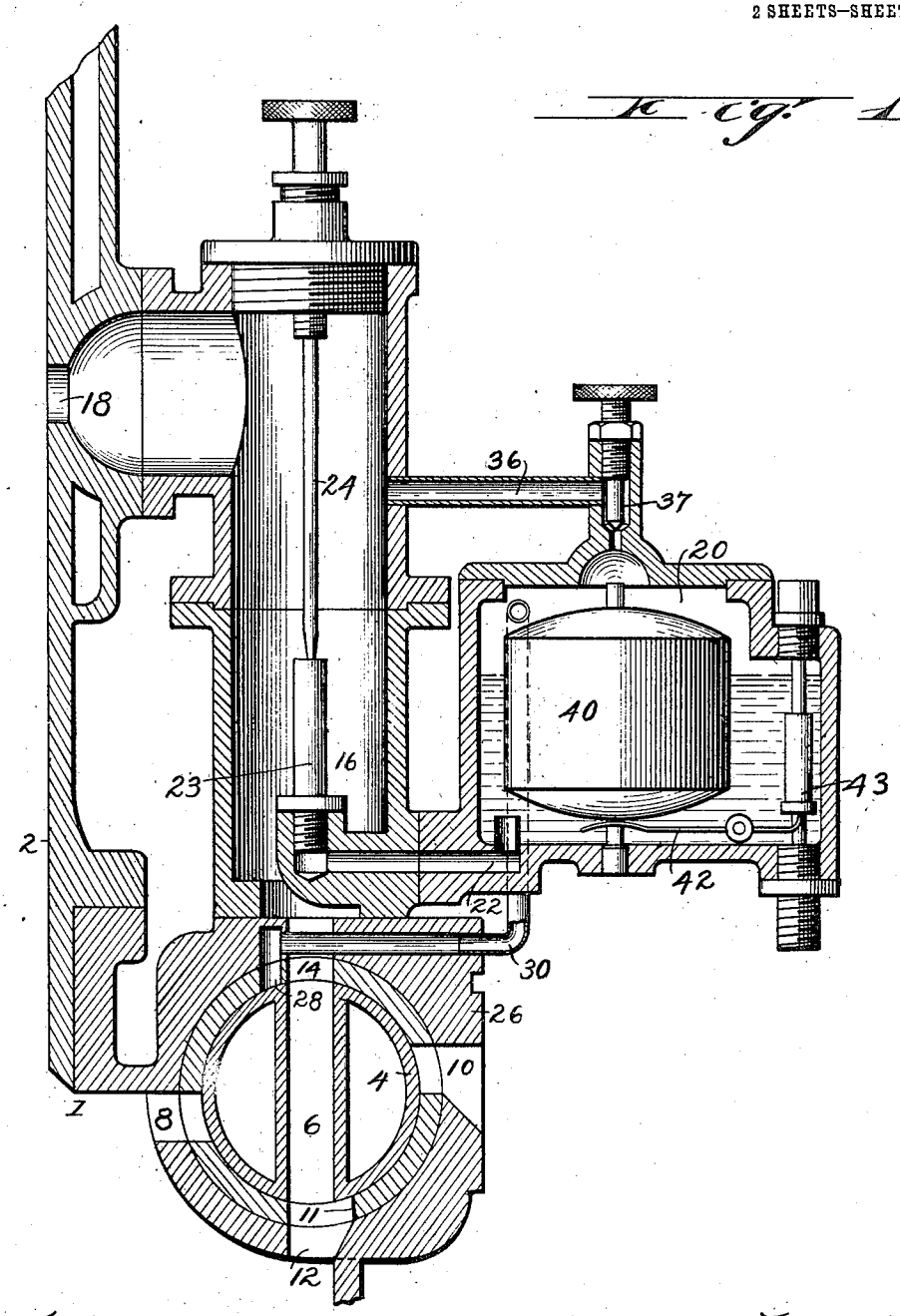
CARBURETER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED AUG. 27, 1910.

1,006,809. Patented Oct. 24, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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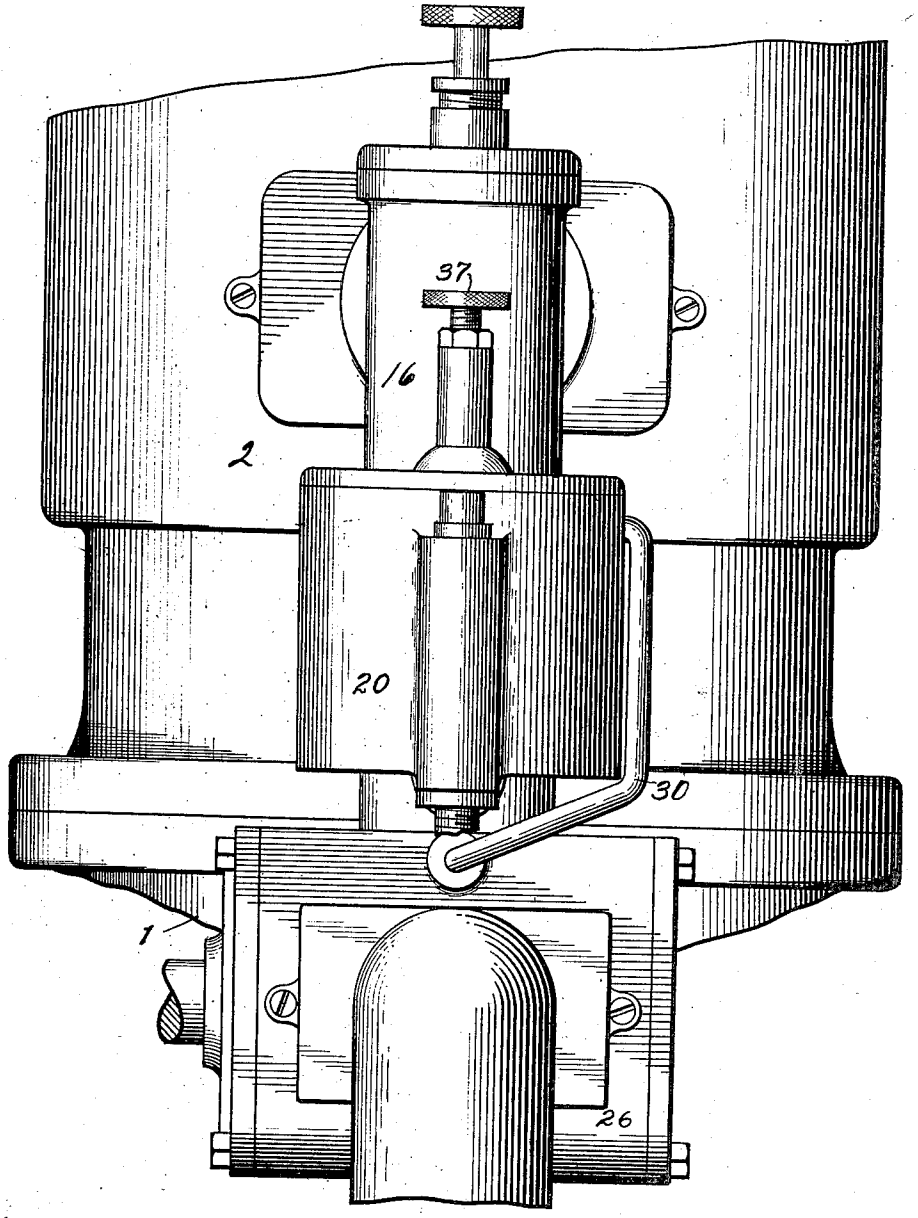
Fig. 2.



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UNITED STATES PATENT OFFICE.

JULIUS M. ULRICH AND WILLIAM RAHR, JR., OF MANITOWOC, WISCONSIN.

CARBURETER FOR INTERNAL-COMBUSTION ENGINES.

1,006,809. Specification of Letters Patent. Patented Oct. 24, 1911.

Application filed August 27, 1910. Serial No. 579,325.

To all whom it may concern:

Be it known that we, JULIUS M. ULRICH and WILLIAM RAHR, Jr., citizens of the United States, residing at Manitowoc, county of Manitowoc, and State of Wisconsin, have invented new and useful Improvements in Carbureters for Internal-Combustion Engines, of which the following is a specification

Our invention relates to improvements in carbureters for internal combustion engines.

The object of our invention is to provide means for applying a pulsating pressure to the liquid fuel in such a manner as to cause the discharge of a jet of such fuel into the mixing chamber of the carbureter, followed by an immediate reduction in pressure sufficient to equalize the pressure in the mixing chamber and the supply or float chamber and thus cause a cessation of the discharge, whereby the uncertainty and inequalities of fuel discharge incident to gravity or constant pressure feeding devices is avoided.

To this end our invention is designed to provide means for forcing the liquid through the nozzle opening of the carbureter, by the sudden application of a mechanically developed pressure, which will always be the same, and will produce substantially the same effect upon the liquid fuel, variations in the height of the liquid column, density of the liquid and any atmospheric conditions having no material effect upon the operation of the engine, which will also run at substantially the same economy under light loads as when full load.

In the following description reference is had to the accompanying drawings in which—

Figure 1 is a vertical sectional view of a carbureter embodying our invention as it appears when designed for a two cycle engine, Fig. 2 is an elevation of the same.

Like parts are identified by the same reference characters in both views.

In the construction shown, a portion of the crank chamber 1 and a portion of the compression chamber 2 of a two cycle engine, are illustrated in connection with a carbureter embodying our invention. The admission and delivery of air to and from the crank chamber, is controlled by a rotary two way plug valve 4, which is provided with a port 6 adapted to register with and connect, either the air inlet ports 8 and 10 of the crank chamber and valve casing or the air outlet port 12 of said chamber and the inlet port 14 of the mixing chamber 16. The air becomes charged with hydro-carbon vapor in the mixing chamber 16 and is delivered to the compression chamber 2 of the engine through the port 18. The liquid fuel is delivered from a float chamber 20 to the mixing chamber, through a duct 22 and nozzle 23, the flow of liquid through the latter being in part controlled by the needle valve 24.

The valve casing 26 is provided with a port 28 adjacent to the port 14 and at that side thereof past which the valve port 6 moves to the position illustrated in the drawings for the delivery of air from the crank chamber to the mixing chamber. This port 28 is connected by a duct 30 with the float chamber 20, the outlet of the duct 30 being above the maximum level of the liquid in said chamber.

When the valve 4 is rotated from the position of crank case admission to the position illustrated, (the position of crank case delivery), the valve port 6 will first register with and connect the port 12 with the port 28, and then register with and connect ports 12 and 14. Substantially the full pressure of the air in the crank chamber will therefore be first exerted through the port 28 upon the surface of the liquid in the float chamber, but port 28 is in such proximity to port 14 that the latter will be opened before the port 28 is closed, thus permitting the pressure in the float chamber to drop as the air rushes through port 14 into the mixing chamber. The continued rotation of the valve 4 will then progressively close port 28 and simultaneously continue to open the mixing chamber port 14 until the port 28 is closed at which time the pressure in the mixing chamber and float chamber will be sufficiently equalized to stop the flow of liquid fuel.

The rush of air through the port 28, when the latter is first connected with the port 12 through the port 6, delivers the air through the duct 30 with considerable velocity, and as the volume required to develop pressure in the float chamber is small, a considerable degree of kinetic or momentum energy is developed, which is imparted to the liquid, and produces a forcible jet at the nozzle. The crank case compression being uniform, and the jet ceasing with uniformity as the pressure equalizes, it is obvious that the quan-

tity delivered can be accurately regulated by the needle valve 24.

A duct 36 is provided between the float chamber and the mixing chamber, with a manually actuated valve 37 controlling the flow of air or vapor through the duct. This valve 37 is opened when the engine stops, to prevent flooding the mixing chamber with hydro-carbon in case the engine should stop with the valve 4 in position to deliver air from the crank chamber to port 28. The port 12 is wider than the port 14, being enlarged at 11 so that it permits a delivery of air through the port 6 into port 28 before the said port 6 registers with the port 14. For this reason the port 28 is located in close proximity to port 14 so that the initial delivery may be made through port 28 followed by equalization through ports 14 and 28.

It will be understood that the float 40 in the float chamber controls the delivery of liquid from any suitable source of supply to such chamber by means of a lever 42 and valve at 43 in substantially the ordinary manner. It will also be understood that the valve 4 will be actuated, (rotated) from the engine by any suitable mechanism (not shown).

We have shown and described our invention as applied to a two cycle engine, but we do not limit the scope of our claims to its combination with such an engine since it is obvious that our invention is applicable to any form of engine where a difference is secured between the pressure in the mixing chamber at the point of fuel delivery, and that of the air before it reaches such point. In an ordinary two cycle engine this difference is created by compression in the crank chamber, and in a four cycle engine by the partial vacuum developed in the mixing chamber during the suction stroke of the engine piston. We have also described our invention as involving the application of pressure to the liquid fuel in a float chamber, but recognize the fact that a float, or float chamber as such, is not essential, the float being merely a convenient means for regulating the liquid supply from a source which may be located at a distant point. The material fact in this connection is that an excess pressure over that at the nozzle is temporarily developed upon the surface of the liquid and that the pressure is then permitted to equalize, thus producing an impulse feed of the liquid at the beginning of the cylinder filling interval, which will deliver the heavier, as readily as the lighter liquids without change of adjustments other than that of the needle valve. In addition to the fact that the flow of the liquid is thus more easily controlled than by continuous suction during the cylinder filling stroke of the engine piston, we are able to expose substantially the whole charge of liquid fuel to all the air delivered to the cylinder, and thus provide for a better or more complete mixture. We regard the use of the rotary valve 4 or its equivalent as very important for the purpose of timing the pressure impulse upon the fuel and developing a considerable degree of kinetic energy in the air entering the float chamber. This enables us to virtually secure what we call a hammer pressure upon the liquid fuel, which ejects it under the influence of shock. The liquid jet is therefore thrown violently and distributed over the walls of the mixing chamber preparatory to the delivery of air thereto, and we have found that under these conditions, substantially all of the liquid being exposed during the entire period of air delivery, the liquid is vaporized more readily and thoroughly, than it is where the rush of air is simultaneous with the fuel discharge. We are also enabled to regulate the quantity of the delivered liquid with great accuracy.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is,—

1. A carbureter for internal combustion engines, comprising the combination of a mixing chamber provided with an air inlet and a vapor outlet, a chamber for liquid fuel provided with an outlet duct opening into the mixing chamber, an air duct leading to the fuel chamber above the level of the liquid therein, means for directing air through said duct at an initial pressure in excess of that in the mixing chamber at the point where the liquid outlet connects with such chamber, said air directing means being also adapted to deliver air to the mixing chamber and to permit the pressure to equalize in said duct and mixing chamber during the period of air delivery to such chamber sufficiently to stop the flow of liquid through the liquid outlet.

2. In a carbureter for internal combustion engines, the combination of a mixing chamber provided with an air inlet and a vapor outlet, a chamber for liquid fuel provided with an outlet duct opening into the mixing chamber, an air duct leading from a point adjacent to the mixing chamber inlet to the fuel chamber above the level of the liquid therein, means for delivering air through said duct at a sufficient initial pressure in excess of that in the mixing chamber at the point where the liquid outlet connects with such chamber, to produce a forcible delivery of liquid through said outlet duct;—said air delivering means being adapted to, subsequently connect said air duct with the mixing chamber air inlet; and permit an equalization of pressures in the fuel and mixing chambers sufficient to stop the flow of liquid.

3. In a carbureter for internal combustion

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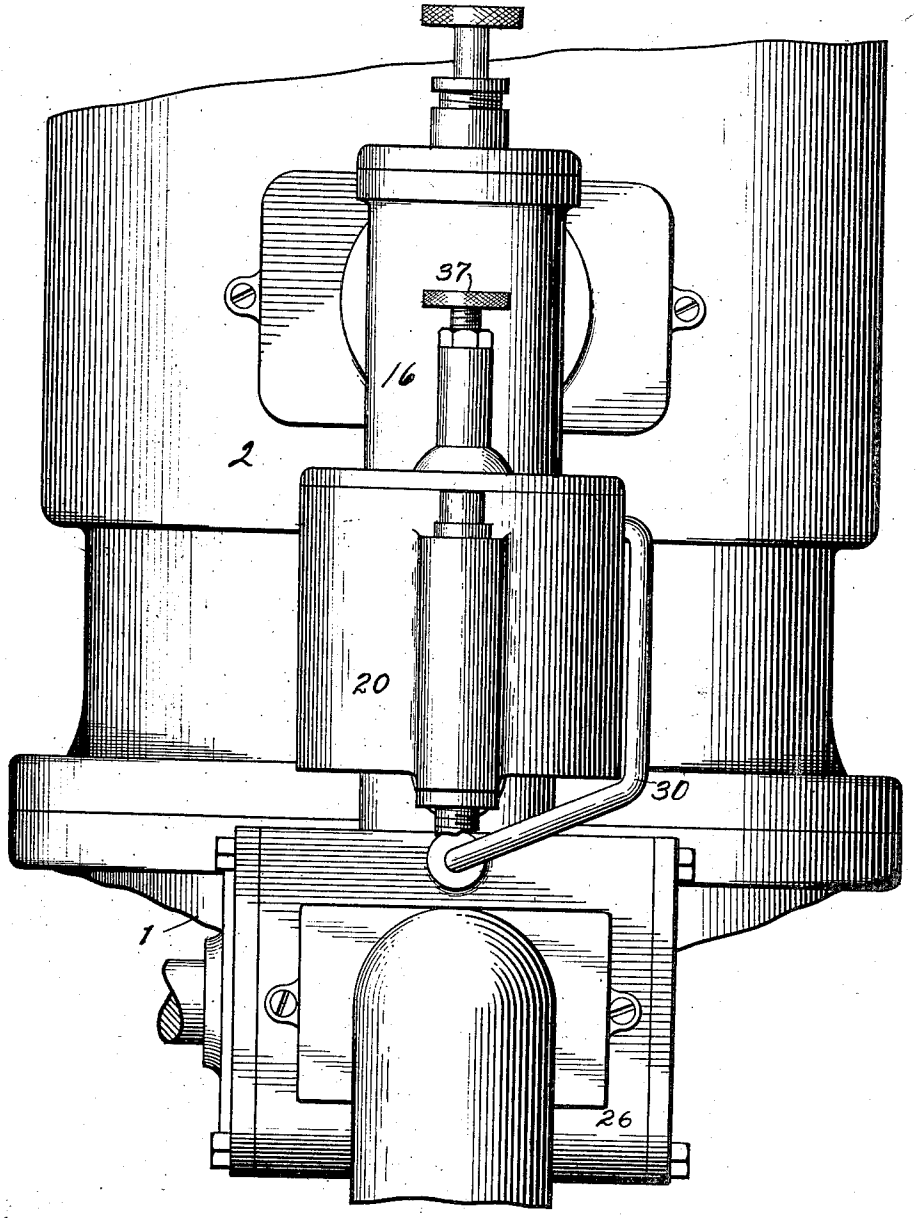

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