J. G. MECHAM.

HYDROPNEUMATIC VAPORIZING APPARATUS FOR GAS ENGINES.

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1,239,929.

Patented Sept. 11, 1917.

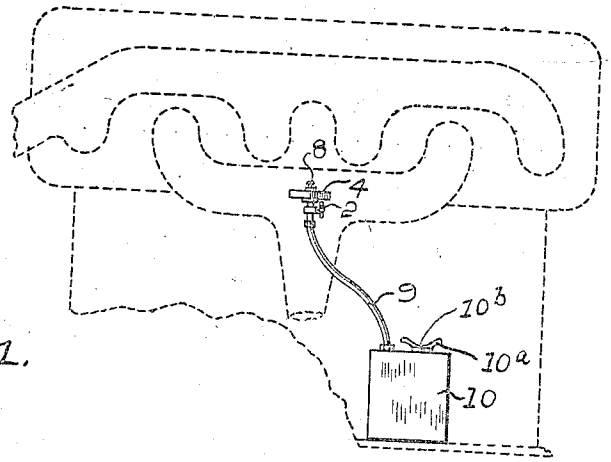



Fig. 1.

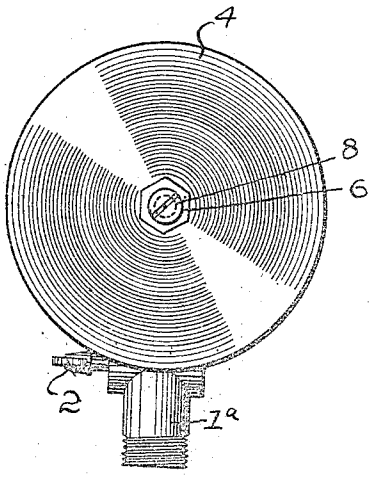



Fig. 3.

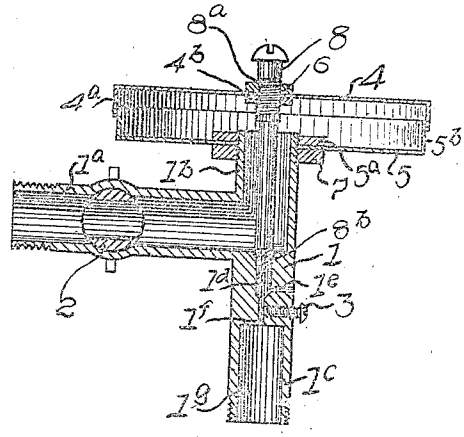



Fig. 2.

Inventor

James G. Mecham

By A. B. Bowman

Attorney

# UNITED STATES PATENT OFFICE.

JAMES G. MECHAM, OF SAN DIEGO, CALIFORNIA, ASSIGNOR TO MECHAM MANUFACTURING CO., A CORPORATION OF ARIZONA.

## HYDROPNEUMATIC VAPORIZING APPARATUS FOR GAS-ENGINES.

1,239,929. Specification of Letters Patent. Patented Sept. 11, 1917.

Application filed June 27, 1916. Serial No. 106,153.

*To all whom it may concern:*

Be it known that I, JAMES G. MECHAM, a citizen of the United States, residing at San Diego, in the county of San Diego and State of California, have invented certain new and useful Improvements in Hydropneumatic Vaporizing Apparatus for Gas-Engines, of which the following is a specification.

My invention relates to an apparatus to be used in connection with internal combustion engines for automatically injecting water vapor into the intake manifold of the gas engine to be used as a portion of the fuel mixture, and the objects of my invention are: first, to provide an apparatus of this class which operates automatically with the opening and closing of the throttle; second, to provide an apparatus of this class with a double diaphragm action, thus providing for great flexibility and a very sensitive action; third, to provide an apparatus of this class which is adjustable throughout, thus making it readily adaptable to various constructions of engines and carbureters; fourth, to provide an apparatus of this class which admits a certain regulated quantity of air and a certain regulated quantity of water together in a vaporized form into the intake manifold of the engine; and fifth, to provide an apparatus of this class which is simple and economical of construction, durable, easily installed and will not readily deteriorate or get out of order.

With these and other objects in view as will appear hereinafter my invention consists of certain novel features of construction, combination and arrangement of parts as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon which form a part of this specification, in which:

Figure 1 is a fragmentary side elevational view of an engine with the intake and exhaust manifold in connection therewith in dotted lines and showing my apparatus in connection therewith in solid lines. Fig. 2 is an enlarged sectional view of my apparatus minus the water receptacle and conducting tube connecting therewith and Fig. 3 is a top or plan view of the same.

Similar characters of reference refer to similar parts throughout the several views.

The T shaped conducting member 1, valve 2, adjusting screw 3, diaphragm member 4, diaphragm member 5, lock nut 6, clamping nut 7, needle valve screw 8, liquid-conducting tube 9 and liquid receptacle 10 constitute the principal parts of my apparatus.

The member 1 is a hollow pipe member shaped as shown best in Fig. 2 of the drawings consisting of portions $1^a$, $1^b$ and $1^c$. The portion $1^a$ is externally threaded with a pipe thread adapted to fit into a threaded hole in the intake manifold of the gas engine. The portion $1^a$ is also provided with a valve 2 therein adapted to close the hole through said portion $1^a$ when desired. The portion $1^b$ is externally threaded and on said threads is screwed the clamp nut 7 and also on said threads is screwed the reinforcing member $5^a$ which is rigidly secured to the diaphragm member 5. This diaphragm member 5 is a circular piece provided with an upwardly extending flange $5^b$ to which is secured another diaphragm member 4 which is provided with a downwardly extending flange $4^a$ which over-laps the flange $5^b$ to which it is secured preferably by means of soldering. Mounted centrally on the diaphragm member 4 is a reinforcing piece $4^b$ which is centrally threaded adapted for the threads $8^a$ on the needle valve screw 8. Said needle valve screw is supported on the diaphragm member 4 and is locked in certain positions relatively thereto by means of a lock nut 6. It will be here noted that the needle valve screw 8 is supported in position by means of two diaphragm members thus giving it great flexibility of movement and making it very sensitive. The other end of the needle valve screw 8 is pointed at $8^b$ and extends into a hole $1^d$ with downwardly converging walls thus forming a needle valve in the portion $1^c$ of the T member 1. Communicating with the lower end of this hole $1^d$ is a hole $1^e$ at right angles thereto extending to the outside of said portion $1^c$ and extending from the lower extremity of said hole $1^d$ is a small hole $1^f$ communicating with a large hole $1^g$ in the lower end of said portion $1^c$. Mounted in the side of said portion $1^c$ and extending into the hole $1^f$ is the screw 3 which is adapted to regulate the size of the hole $1^f$ from the outside by the turning of said screw 3 therein. Upon the extended end of the portion $1^c$ is an external thread upon which is mounted the conducting tube 9

which extends to and to near the bottom of a receptacle 10 filled with liquid preferably water which is provided with a hole for filling the same which is closed by a plug $10^a$, said plug is provided with a small air hole $10^b$ therein adapted to admit air into said receptacle.

Though I have shown and described a particular construction, combination and arrangement of parts I do not wish to be limited to this particular construction, combination and arrangement of parts, but desire to include in the purview of my invention the construction, combination and arrangement substantially as set forth in the appended claims.

It is obvious that with this construction there is provided a hydro-pneumatic vaporizing appartaus for admitting a regulated quantity of vapor to the engine cylinders in proportion to the quantity of hydro-carbon from the carbureter at all times, that the diaphragm members 4 and 5 will be actuated relatively to the vacuum in the intake manifold thus regulating the size of the opening around the needle valve which controls the quantity of vapor to said intake manifold, that the air inlet $1^e$ being always open will prevent siphoning, that said air intake being at right angles to the water inlet will cause a vaporization of the water entering through the hole $1^f$, that the quantity of air and water in a vapor form to the intake manifold may be regulated and adjusted by the turning of the screw 8 into the diaphragm reinforcing piece $4^b$, that the relative quantities of air and water may be regulated and adjusted by means of the screw 3, that the apparatus as a whole is simple and economical of construction, durable, easily installed, automatic in its action and will not readily get out of order.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In an apparatus of the class described, a vapor conductor provided with separate water and separate air inlets, means for regulating the quantity of vapor therethrough, said means consisting of a double hollow diaphragm communicating with said conductor and a needle valve supported by said diaphragms and means for adjusting said needle valve relatively to said diaphragm supports.

2. In an apparatus of the class described, a vapor conductor provided with separate water and separate air inlets and means for regulating the quantity of vapor therethrough, said means consisting of a double hollow diaphragm communicating with said conductor, a needle valve supported by said diaphragms, means for adjusting said needle valve relatively to said diaphragm supports and manually operated means for closing said conductor independent of said needle valve.

3. In an apparatus of the class described, a vapor conductor provided with separate water and air inlets connecting with the intake manifold of a gas engine, means for regulating the quantity of vapor through said conductor, said means consisting of a double hollow diaphragm actuated by the vacuum in said intake manifold, a needle valve supported by said diaphragms, means for adjusting said needle valve relatively to said diaphragm supports and means for adjusting the size of the water intake to said conductor.

4. In an apparatus of the class described, the combination of an intake manifold to a gas engine, a T shaped conductor rigidly secured thereto, means adjacent to said manifold for manually closing said conductor, a hollow double diaphragm communicating with said conductor, a needle valve adjustably mounted on said diaphragm whereby said needle valve is automatically opened and closed relatively to the vacuum in said intake manifold, means for supplying water and air to said needle valve, and means for regulating the quantity of water to said needle valve.

In testimony whereof, I have hereunto set my hand at San Diego, California, this 21st day of June, 1916.

JAMES G. MECHAM.