R. B. BENJAMIN.

HUMIDIFIER FOR GAS ENGINES.

APPLICATION FILED JULY 3, 1916.

1,280,643.

Patented Oct. 8, 1918.

Fig. 1.

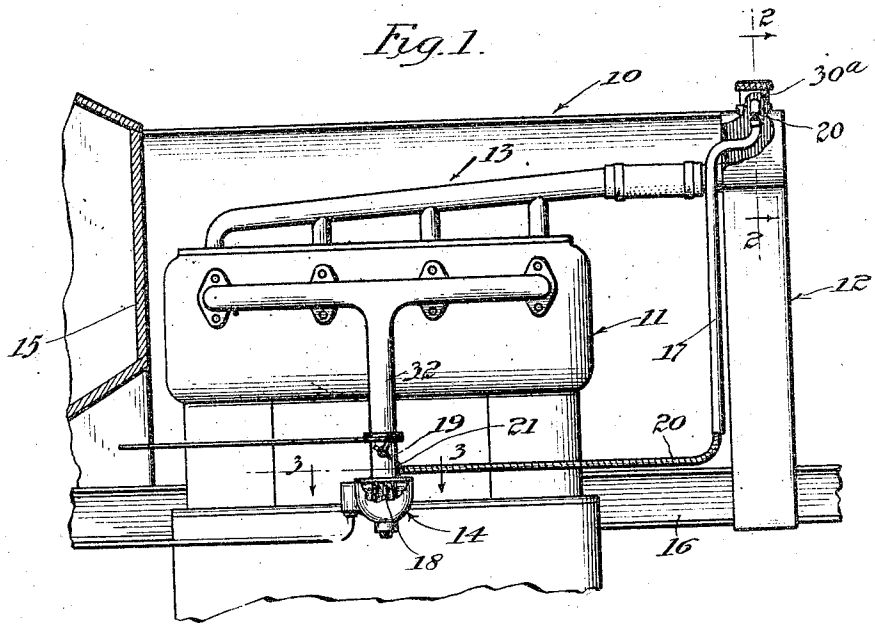


Fig. 2.

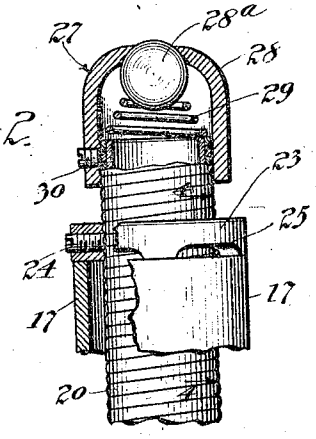


Fig. 4.

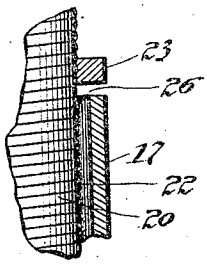
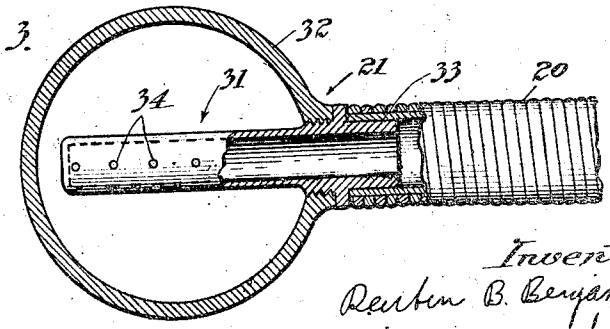


Fig. 3.



Witnesses:
W. J. Smith

Inventor:
Reuben B. Benjamin
By Jones, Addington, Ames & Seibold
Attys.

UNITED STATES PATENT OFFICE.

REUBEN B. BENJAMIN, OF CHICAGO, ILLINOIS, ASSIGNOR TO BENJAMIN ELECTRIC MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

HUMIDIFIER FOR GAS-ENGINES.

1,280,043. Specification of Letters Patent. Patented Oct. 8, 1918.

Application filed July 3, 1916. Serial No. 107,437.

To all whom it may concern:

Be it known that I, REUBEN B. BENJAMIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Humidifiers for Gas-Engines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to humidifiers for gas engines. In internal combustion engines it has been found that the combustion is improved if moisture, in some form, is supplied to the combustion chamber. This supply of moisture also lessens the deposit of carbon and enables a lower grade of fuel to be used.

Among the objects of my invention is to provide an improved device of the character indicated which shall be simple of construction and manufacture and efficient in operation, and which can easily be applied to existing engines.

Further objects will appear from the detailed description to follow and from the appended claims.

In the drawings, in which I have illustrated one embodiment of my invention—

Figure 1 is a sectional view of the front part of an automobile;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 1; and

Fig. 4 is a section on the line 4—4 of Fig. 2.

Referring to the drawing in detail the invention is shown in connection with an automobile of which the drawing shows the hood 10, the internal combustion engine 11, the radiator 12, the cooling water manifold 13 connecting the water jacket of the engine with the radiator, the carbureter 14, the dash 15, and part of the frame 16. These parts may be of any suitable or standard construction. The radiator is provided with the usual overflow pipe 17 which permits the escape of steam and surplus water in the cooling system, and the carbureter is provided with the usual spray nozzle 18 and throttle valve 19.

For supplying vapor to the combustion chamber a flexible conduit 20 is provided which is connected to the fuel passage at 21 between the spray nozzle 18 and the throttle valve 19, and which extends up through the overflow pipe 17 to the space in the radiator above the top of the overflow pipe, which is usually located beneath the filling cap 22 of the radiator.

The flexible conduit 20 is considerably smaller than the overflow pipe so that there is a passage 22 between the outside of the conduit 20 and the inside of the pipe 17 through which the steam and surplus water may escape. For adjustably supporting the conduit 20 with respect to the overflow pipe a collar 23 is threaded onto the conduit 20 and secured in the proper position by means of a set screw 24. This collar 23 is recessed at 25 to provide passage 26 between the collar and the upper end of the overflow pipe for the escape of steam and water. To prevent water from splashing into the vapor conduit 20 or from being poured into it when filling the radiator a check valve 27 is provided at the top of the conduit comprising a cup-shaped casing or cap 28 screwed onto the conduit, a ball valve 28^a and a coil spring 29 engaging the end of the conduit 20 for pressing the ball valve to its seat. The tension of the spring may be adjusted by screwing the cap 28 in or out in the conduit 20, a set screw 30 being provided for holding the cap in adjusted position.

As the overflow pipe is usually located directly beneath the filling opening 30^a the check valve 27 prevents water from being poured down in the vapor conduit 20 when the radiator is being filled.

For connecting the conduit 20 to the fuel passage a tubular ejector member 31 is threaded into the fuel conduit 32 and the conduit 20 is connected in any suitable manner to the nipple 33 on the ejector member. This ejector member is provided with a number of openings 34 disposed and arranged so that the flow through the fuel conduit will cause suction in the ejector member and will draw vapor through the conduit 20 from the space above the water level of the radiator, the spring 29 yielding to permit the valve 28^a to open.

On account of the connection of the vapor conduit to the fuel conduit being made between the throttle valve and the spray nozzle, the throttle valve will cause the

vapor supply to vary in accordance with the fuel supplied (which it would not do if connected above the throttle) and still the air passing the spray nozzle will not be saturated by water vapor, as would be the case if the water vapor were supplied below the spray nozzle. By making the connection to the cooling system through the overflow pipe the necessity of making a special opening into the cooling system is avoided. By locating the entrance opening of the vapor conduit in the space above the water level in the radiator an ample supply of water vapor is obtained as the warm water rises and the vapor is quickly generated in this space.

The operation is as follows: When the engine is running water is forced through the manifold 13, radiator 12, and a water jacket of the engine by any suitable means, not shown. At the same time suction in the engine causes vapor to be drawn in from the space above the water level in the radiator past the valve 28^a through the conduit 20 and into the fuel passage 32 between the spray nozzle 18 and the throttle valve 19.

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

1. The combination with an internal combustion engine and a water cooling system therefor including a radiator having an overflow pipe for the escape of steam or surplus water, of means for supplying moisture to the combustion chamber comprising a conduit in communication with the combustion chamber extending from the interior of said radiator through said overflow pipe.

2. The combination with an internal combustion engine and a water cooling system therefor including a radiator having an overflow pipe for the escape of steam or surplus water, of means for supplying moisture to the combustion chamber extending from the interior of said radiator through said overflow pipe, the entrance to said moisture conduit extending above the entrance to said overflow pipe.

3. The combination with an internal combustion engine and a water cooling system therefor including a radiator having an overflow pipe for the escape of steam or surplus water, of means for supplying moisture to the combustion chamber extending from the interior of said radiator through said overflow pipe, and means for holding the entrance end of said moisture conduit in different adjusted positions with respect to said pipe.

4. The combination with an internal combustion engine and a water cooling system therefor including a radiator having an overflow pipe for the escape of steam or surplus water, of means for supplying moisture to the combustion chamber extending from the interior of said radiator through said overflow pipe, and means for holding the entrance end of said moisture conduit in different adjusted positions with respect to said pipe comprising a collar secured to said conduit and resting on the entrance end of said pipe.

5. The combination with an internal combustion engine and a water cooling system therefor including a radiator, of means for supplying moisture to the combustion chamber comprising a conduit in communication with the combustion chamber extending from the interior of said radiator, and a check valve at the entrance end of said moisture conduit to hinder the entrance of water.

6. The combination with an internal combustion engine and a water cooling system therefor including a radiator, of means for supplying moisture to the combustion chamber comprising a conduit in communication with the combustion chamber extending from the interior of said radiator, and a check valve at the entrance end of said moisture conduit to hinder the entrance of water, comprising a cap secured on the end of said conduit provided with a valve seat and a spring pressed valve seating on said cap.

7. The combination with an internal combustion engine and a water cooling system therefor including a radiator, of means for supplying moisture to the combustion chamber comprising a conduit in communication with the combustion chamber extending from the interior of said radiator, and a check valve at the entrance end of said moisture conduit to hinder the entrance of water, said radiator having a filling opening and said check valve being located directly beneath said filling opening.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

REUBEN B. BENJAMIN.

Witnesses:
J. T. B. ADDINGTON,
FRANK P. RICE.