May 13, 1924. 1,493,541

W. F. HIATT

HUMIDIFIER

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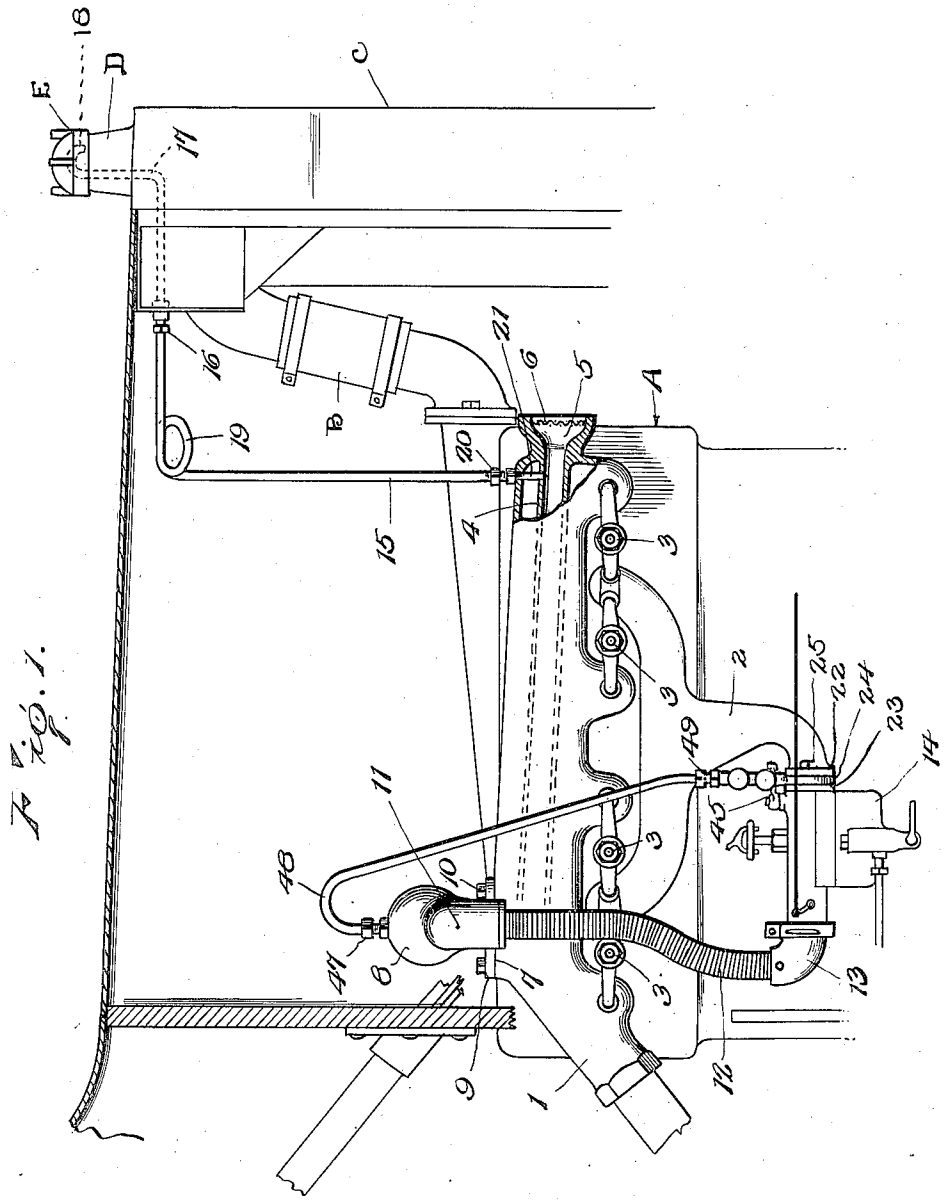


Fig. 1.

Inventor

W. F. Hiatt.

By Lee & Rowley Attorneys

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W. F. HIATT

HUMIDIFIER

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Fig. 3.

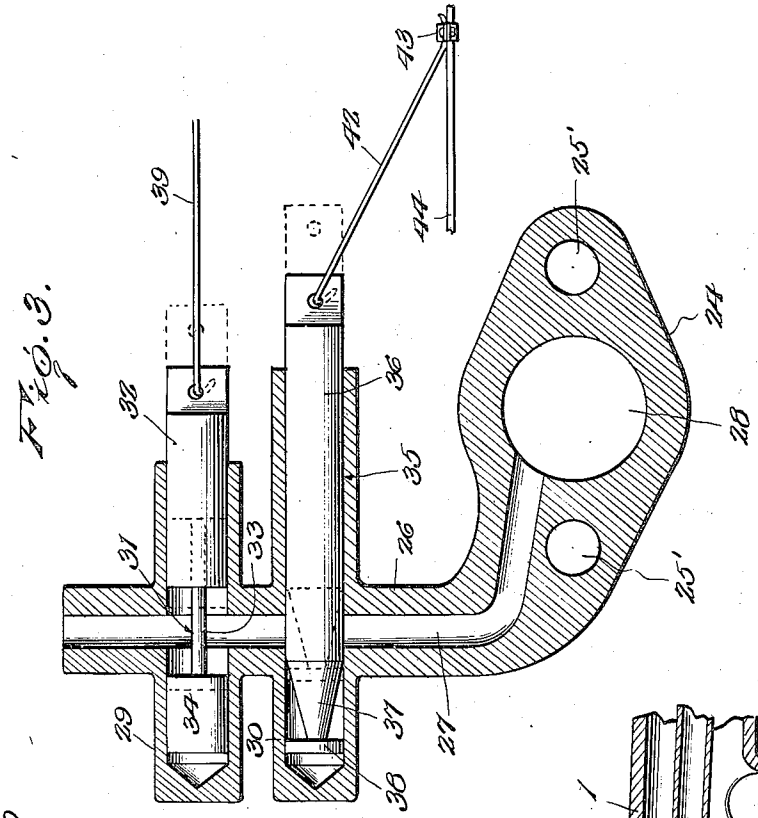


Fig. 2.

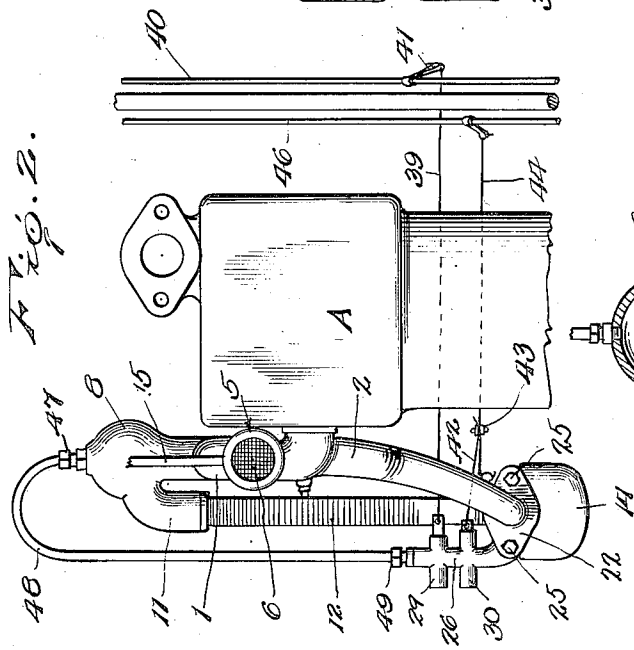
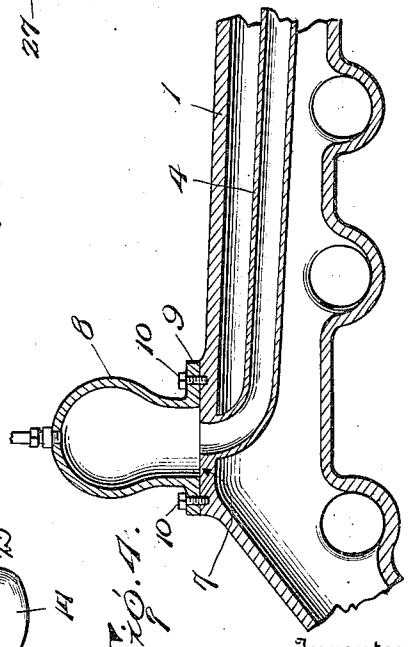


Fig. 4.



Inventor

W. F. Hiatt.

By

Lacy & Lacey, Attorneys

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W. F. HIATT

HUMIDIFIER

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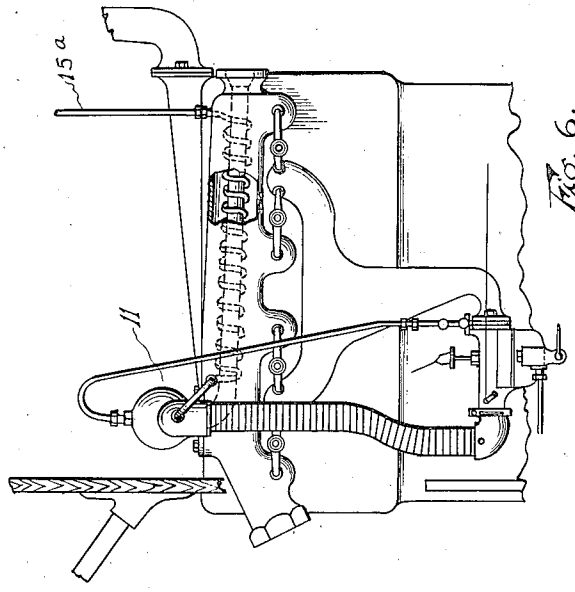


Fig. 6.

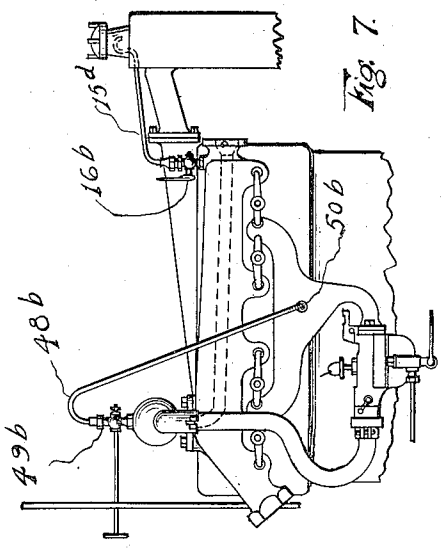


Fig. 7.

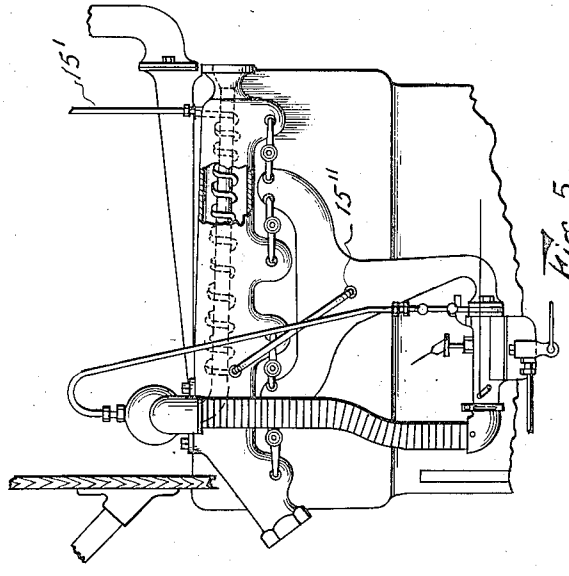


Fig. 5.

Inventor
W.F. Hiatt

By Lacey & Lacey, Attorneys

Patented May 13, 1924. 1,493,541

UNITED STATES PATENT OFFICE.

WILLIAM F. HIATT, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE H-O-B MFG. CO., A CORPORATION OF INDIANA.

HUMIDIFIER.

Application filed October 1, 1920. Serial No. 414,003.

To all whom it may concern:

Be it known that I, WILLIAM F. HIATT, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Humidifiers, of which the following is a specification.

This invention relates to means for furnishing a highly combustible mixture to internal combustion engines.

It is an established fact that with the present low grade fuel oils used in internal combustion engines relatively low efficiency is obtained, due to the incomplete combustion of the fuel which, in addition to requiring a large expenditure of fuel to produce a satisfactory power output, results in an abnormally large deposit of carbon on the surfaces of the combustion chamber, thereby necessitating frequent removal and otherwise generally impairing the operation of the engine.

In the present invention, the efficiency of the engine is increased by the addition of heated air and superheated steam to the carbureted mixture both for initially forming the mixture and for diluting the previously formed mixture, thus materially diminishing the fuel consumption and, at the same time, substantially eliminating carbon deposits and rendering it possible to procure more even torque by reason of the fact that the power impulses are more nearly uniform.

Furthermore, the construction of the invention is such that a metering valve directly proportions the volume of diluting fluid to the volume of carbureted mixture burned by the engine, depending upon the speed and power output of the engine, so that for low engine speed with small throttle opening, a lesser amount of the diluting fluid is used than when the throttle is fully open for high speed or maximum power.

The invention possesses the further advantage of providing for complete automatic cut-off of the supply of the diluting fluid when the spark is retarded as, for instance, in starting the engine, pulling extremely hard grades with a motor vehicle, and under similar conditions of low spark with open throttle.

A further feature of the invention resides in the provision of an exhaust manifold having an internal superheating tube disposed lengthwise of the manifold and extending practically the entire distance from the foremost to the rearmost exhaust port and receiving air and water vapor at one end which are heated to an extremely high degree before reaching the other end where they are then delivered in the heated state to the air intake of the carbureter and to the intake manifold of the engine.

In the drawings:

Figure 1 is a side elevation of a motor vehicle power plant equipped with the present invention.

Figure 2 is a fragmentary front elevation of the engine thus equipped.

Figure 3 is a sectional view showing the proportioning and controlling valves employed.

Figure 4 is a longitudinal vertical section (fragmentary) through the exhaust manifold.

Figure 5 is a side elevation of a vehicle motor equipped with the modified form of the invention.

Figure 6 is a view similar to Figure 5 showing still another form.

Figure 7 is also a view similar to Figure 5 showing yet another form.

In detail:

The invention, as herein shown, is applied to the well known Ford engine of the present period, though it is equally applicable to any internal combustion engine.

The cylinder block of the engine is indicated at A and is coupled by the hose B with the radiator C having the filler spout D closed by the cap E.

A standard exhaust manifold is replaced by a special exhaust manifold 1, while the standard intake manifold 2 is retained in use, both manifolds being held by the ordinary fastening means 3 characteristic of the Ford motor. The exhaust manifold 1 houses an air-intake heater tube 4 disposed lengthwise of the exhaust manifold and having a forwardly facing flared open end 5 covered by a dust excluding diaphragm 6 of reticulated or other perforated material. The air-intake heater tube 4 extends substantially throughout the major portion of the length of the exhaust manifold and consequently receives the highest heat of the exhaust gases due to the fact that on leaving the cylinders such gases impinge directly upon the heater tube 4. This special

manifold is enlarged somewhat over the usual standard manifold so as to provide the same exhaust area as the standard manifold, thus eliminating any possibility of developing back pressure which would tend to decrease the power of the engine.

Near the rear end of the exhaust manifold 1, the heater tube 4 curves upwardly and ends in an outlet in a boss 7 which receives a separating or dividing chamber 8 of bulbous form and provided with a flange 9 held to the boss 7 by bolts 10. This dividing chamber 8 carries an outlet elbow 11 connected by means of flexible tubing 12 or a like conduit, with the air-intake 13 of the usual carbureter 14.

During the time that the engine A is in operation, water vapor is present in large volume above the water level in the radiator C and some of this is taken off by a water vapor tube 15 leading through a suitable connection 16 in the radiator reservoir to a location beneath the filler cap E, the end of said tube being bent upwardly as shown at 17 and then turned downwardly as at 18 to prevent the entrance of water in liquid form during filling of the radiator. A suitable bend 19 may be incorporated in the tube 15 to absorb vibrations which might otherwise tend to fracture the tube. The outlet end of the tube 15 carries a union 20 connecting the same with a nozzle 21 entering the forward end of the heater tube 4, whereby the water vapor passes along the highly heated heater tube 4 in the form of steam, at the same time being thoroughly mixed with the incoming air.

Interposed between the flange 22 of the intake manifold 2 and the carbureter outlet flange 23 is a similarly shaped flange-like member 24, the three being held rigidly together by bolts 25 extending through holes 25'.

This member 24 constitutes the body of a proportioning and controlling valve and has an upwardly extending stem 26 provided with a fluid passage 27 leading into an opening 28 which forms a part of the engine intake passage.

Located with axes in parallel relation and intercepting the fluid passage 27, are the two plunger chambers 29 and 30, the former of which contains a plunger stop valve 31 comprising a guiding stem 32, a reduced neck 33 and a valve body 34; while the latter chamber 30 receives a metering valve 35 having the guiding stem 36, conical metering portion 37 and end guiding disc 38.

The stop valve 31 is connected by a link 39 with the spark control rod through the medium of a suitable lever 41 carried by the said control rod so that when the spark is retarded, the passage 27 is completely closed by the valve body 34, as indicated in dotted lines in Figure 3, and yet when the engine is running and the spark is advanced, the passageway 27 is unobstructed except by the reduced neck 33.

The metering valve 35 is connected by a link 42, as at 43, with the operating rod 44 of the carbureter throttling valve 45 which, in turn, is connected with the usual controlling rod 46 so that by reason of the tapered or conical metering portion 37, a greater or less amount of vapor passes directly into the intake manifold to dilute the normal carbureted mixture, the amount so passing being dependent upon whether the throttle is opened considerably or just a little. At any rate, the construction of the metering valve is such that the volume of diluting vapor entering the carbureted mixture is directly proportional to the volume of carbureted mixture passing to the engine.

At the top of the dividing chamber 8 is a union 47 connecting with a tube 48 leading to a similar union 49 at the head of the valve chamber 26, whereby a proper supply of heated air and superheated water vapor or steam is delivered to the chamber 26.

The operation is as follows:

In starting, as is customary with the spark fully retarded, the stop valve 31 closes off the passage 27 so that only the normal rich carbureted mixture is delivered from the carbureter to the intake manifold.

However, once the engine is running and becomes warmed up, the spark then being advanced, the stop valve 31 moves to open up the passage 27 so that on subsequent movement of the throttle valve by means of the operating rod 44 and control rod 46, the metering valve 35 is so regulated that a proper ratio of diluting fluid (air and superheated steam) is maintained with respect to the volume of carbureted mixture drawn from the carbureter by the engine.

Also, now that the engine is hot, the carbureter receives its supply of air and superheated steam through the conduit 12 from the dividing chamber 8, thus insuring proper vaporization of low grade gasoline, kerosene, or like, and insuring the efficient operation of the engine with a minimum of carbon deposit.

While, in the foregoing description, I have described the invention as applied to the Ford engine, it is nevertheless apparent that slight structural changes adapt the same to other internal combustion engines and hence the invention is not to be construed as strictly limited to a Ford accessory.

In the form of the invention shown in Figure 5, the moisture pipe 15', instead of simply entering the superheater tube is coiled about the outside of the superheater tube and is preferably of copper so that the moisture passing through the pipe 15' is thoroughly heated, the outlet end of said

pipe being tapped into the inlet manifold as at 15''. In the form of the invention shown in Figure 6, the pipe 15^a is similarly coiled about the superheater tube but instead of being tapped into the inlet manifold it is tapped into the elbow 11 of the separator dome.

The invention as shown in Figure 7 differs from that shown in Figure 1 only in that moisture pipe 15^d is provided with a cutoff cock 16^b and likewise the pipe 48^b is provided with a similar cutoff cock 49^b and is tapped into the Y of the inlet manifold, as indicated at 50^b.

Having thus described the invention, what is claimed as new is:

1. In a device of the character described, an exhaust manifold having an internally spaced air tube connected at its ends to the wall of the manifold and extending from a point near the rear end thereof to a point near the forward end thereof opening at its end through said wall, the front end of the tube being open to the atmosphere, a separating chamber secured upon the manifold over the rear end of said tube, means for connecting said chamber with the primary intake of a carbureter, and a vapor supply pipe in communication with said tube near the forward end thereof, whereby vapor is made to enter said tube together with atmospheric air.

2. In a device of the character described, an exhaust manifold having an internally spaced air tube connected at its ends to the wall of the manifold and extending from a point near the rear end thereof to a point near the forward end thereof opening at its end through said wall, the front end of the tube being open to receive atmospheric air, a separating chamber secured upon the manifold over the rear end of said tube, means for connecting said chamber with the primary intake of a carbureter, and a vapor supply pipe leading from the radiator of the engine through the manifold and entering said tube near the forward end thereof.

In testimony whereof I affix my signature.

WILLIAM F. HIATT. [L. S.]