

March 9, 1926.

1,576,109

A. FORMAN ET AL

HUMIDIFIER FOR INTERNAL COMBUSTION ENGINES

Filed Oct. 2, 1922

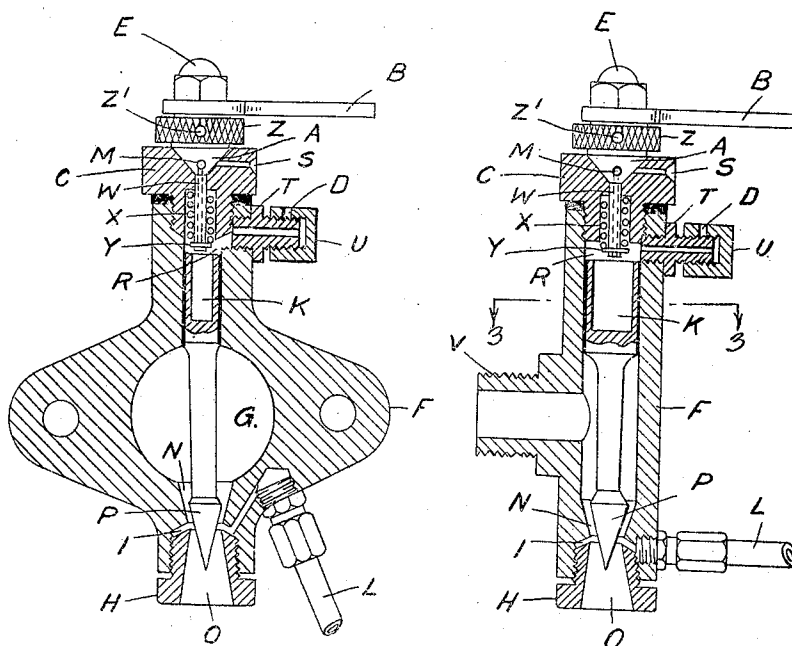


FIG. 1.

FIG. 2.

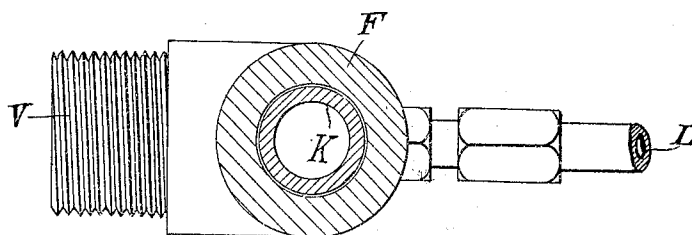


FIG. 3.

Inventors Adam Forman
Richard Marchett
By their attorney —
A. J. Davies.

Patented Mar. 9, 1926.

1,576,109

UNITED STATES PATENT OFFICE.

ADAM FORMAN AND RICHARD MATCHETT, OF BEATTOCK, SCOTLAND.

HUMIDIFIER FOR INTERNAL-COMBUSTION ENGINES.

Application filed October 2, 1922. Serial No. 591,990.

To all whom it may concern:

Be it known that we, ADAM FORMAN, a subject of the King of Great Britain, and resident of Craigielands, Beattock, Dumfriesshire, Scotland, and RICHARD MATCHETT, a subject of the King of Great Britain, and resident of Cleughfoot, Beattock, Dumfriesshire, Scotland, have invented certain new and useful Improvements in Humidifiers for Internal-Combustion Engines, of which the following is a specification.

This invention relates to apparatus for supplying humidified air or mixture to the cylinders of internal combustion engines of the type in which moistening is effected by the admission of water to the throat of a Venturi tube or double conical passage, the water supply being controlled by a suction-actuated valve.

According to the present invention the water is admitted through an annular adjustable orifice or annular water space at the throat of the Venturi tube or double conical passage through which the air or mixture is induced, the passage of air or mixture through the tube or passage and consequent water supply being controlled by a valve located in the throat or narrowest portion of the tube or passage.

In order that the invention may be more clearly understood reference is hereinafter made to the accompanying explanatory drawings showing two forms of apparatus according to our invention, by way of example.

Fig. 1 is a vertical section through one form of apparatus having flanges whereby the apparatus may be secured in the induction pipe of the engine.

Fig. 2 shows a spigot type of apparatus in vertical section adapted to be screwed laterally into the induction pipe.

Fig. 3 is an enlarged horizontal cross section of Fig. 2 showing conventionally the annular clearance between the piston and the casing.

Referring to Fig. 1 of the drawings, F represents a flanged body or casing adapted to be fixed between the carbureter and induction pipe of the engine. The casing F has a central passage G which thus forms part of the induction passage. Opening into the passage G is a conical passage N, which registers with an oppositely disposed conical air inlet O in an adjustable plug H screwed into a recess in the casing F in such

a manner as to form an annular orifice or water space I to which water is supplied by a water pipe L. A valve P is located in the throat of the double conical passage N, O, and is carried by the stem of a piston K which is a loose fit in a cylindrical chamber R formed in the casing F. Into the casing F is also screwed a plug C having an air hole S leading to a conical valve seat at the upper end of an axial passage in the plug C. Fitted in the plug C is a rotary conical valve A, having an air hole M which may register with the air hole S. The valve A turns with a lever B which may be controlled from the dashboard of the motor vehicle. E is a lock-nut. The stem W of the valve A is hollow and communicates with the air hole M, the stem W passing through the axial passage in the plug C and being surrounded by a spring X held in compression between a shoulder in the plug and a thrust collar Y on the stem, the spring holding the valve on its seating. T is a hollow plug communicating with the chamber R and with a hollow adjustable cap U having an auxiliary air hole D. If desired the plug T may communicate with a valve-controlled air pipe leading to the dashboard.

Z is a milled head on the valve A, provided with a suitable index mark Z' for enabling the valve A to be set so that the air holes M and S register in the requisite position of the lever B.

The arrangement illustrated in Fig. 2 is substantially identical with that shown in Fig. 1 except that the casing F has no passage G therethrough, but has a lateral hollow union V whereby it may be screwed into the induction pipe of the engine.

The operation of the apparatus is as follows:—

The piston K being a slightly loose fit in the casing F when either or both of the air inlets S and D are open there is full atmospheric pressure on the top of the piston K while only the smaller effective area of the valve P is open to such atmospheric pressure, the piston K and valve P therefore fall, closing the latter. If both air controls S and D are closed the suction of the engine reduces the pressure in the casing F between the piston K and the valve P and the air above K percolates past the loose fitting piston K causing the pressure above K to approximate to the reduced pressure in the casing F. The full atmospheric pres-

sure below the valve P then raises the latter and will keep it raised as the air entering the chamber F will not pass the loosely fitting piston K to the top side thereof, owing
5 to the restriction of the loose fit, but will pass to the induction pipe by way of the branch V. When however the conical valve A is turned to open the air hole S to the atmosphere full atmospheric pressure is admitted to the chamber R, the restriction of
10 the loose fit preventing free flow of such atmospheric pressure to the space below the valve, where a reduced pressure is obtained, and the valve P closes. The orifice D in the cap U (or the valve-controlled pipe connected to T) constitutes an auxiliary control for admitting air to the chamber R. Thus the lift of the valve P can be controlled either
15 by the valve A or cap U. The lever B may be controlled in harmony with the throttle lever of the carbureter, so that the control of the chamber R through the air holes S and M (and consequent control of the valve P) will be regulated synchronously with
20 the varying suction in the induction pipe due to the throttle control.

The water may be taken by the pipe L either from the engine cooling circulation at a convenient position on the engine or radiator or from an auxiliary tank.
30

The valve P may be of either conical or ball type or of any other convenient construction and instead of the arrangement shown on the drawings, the lift of the valve
35 P may be controlled by an adjustable spring or in any other manner.

The velocity of the air at I due to the suction of the engine atomizes the water and atomization may be assisted by drawing the
40 water from a point as near as possible to the highest temperature in the cooling system.

It will be understood that, in the case of air-cooled engines, the water may be supplied from an auxiliary tank.
45

The apparatus is such that its action is entirely automatic, the proportion of air and water admitted being controlled by the valve P.

50 In the construction illustrated, the apparatus is adapted to supply additional air to the engine, but if desired the double-

conical passage N, O may be located in the induction pipe of the engine so that the combustible mixture atomizes the water at I. 55

We claim:

1. A humidifying apparatus for internal combustion engines comprising, a casing, a Venturi tube in the casing through which the engine suction operates, an annular water inlet at the throat of the Venturi tube, a valve at the throat of the Venturi tube controlling the water inlet, a piston carried by the valve, a chamber in the casing within which the piston is a loose fit, said chamber
60 being open to the engine suction, a passage opening into said chamber at a point beyond the piston and effecting communication between said chamber and the atmosphere, and means for closing said passage. 70

2. A humidifying apparatus for internal combustion engines comprising, a casing, a Venturi tube in the casing through which the engine suction operates, an annular water inlet at the throat of the Venturi tube, a valve at the throat of the Venturi tube controlling the water inlet, a piston carried by the valve, a chamber in the casing within which the piston is a loose fit, said chamber
80 being open to the engine suction, a passage opening into said chamber at a point beyond the piston and effecting communication between said chamber and the atmosphere, and a rotary valve for closing said passage. 85

3. A humidifying apparatus for internal combustion engines comprising, a casing, a Venturi tube in the casing through which the engine suction operates, an annular water inlet at the throat of the Venturi tube, a valve at the throat of the Venturi tube controlling the water inlet, a piston carried by the valve, a chamber in the casing within which the piston is a loose fit, said chamber
90 being open to the engine suction, a passage opening into said chamber at a point beyond the piston and effecting communication between said chamber and the atmosphere, a rotary valve for closing said passage, and an auxiliary control for admitting air to the chamber. 95

In testimony whereof we affix our signatures. 100

ADAM FORMAN.
RICHARD MATCHETT.