

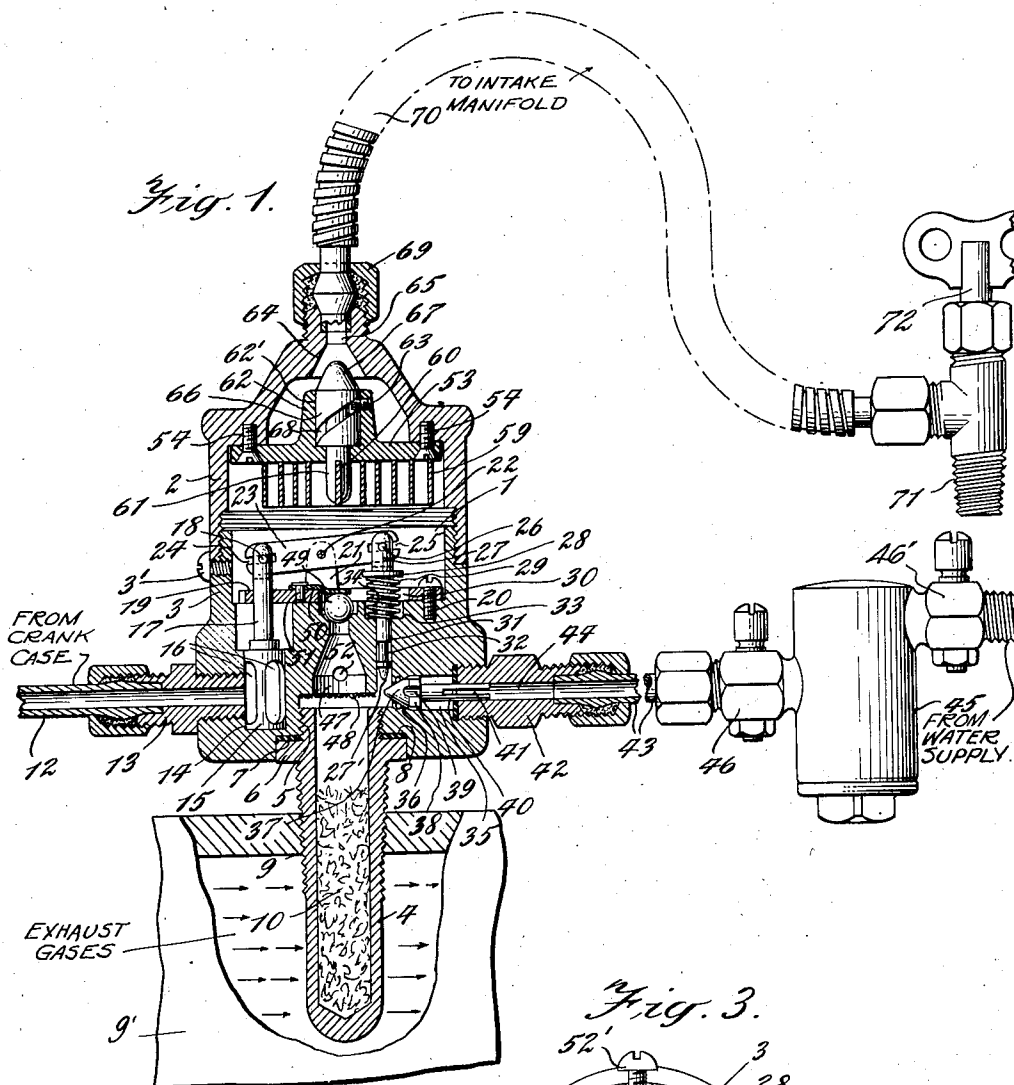
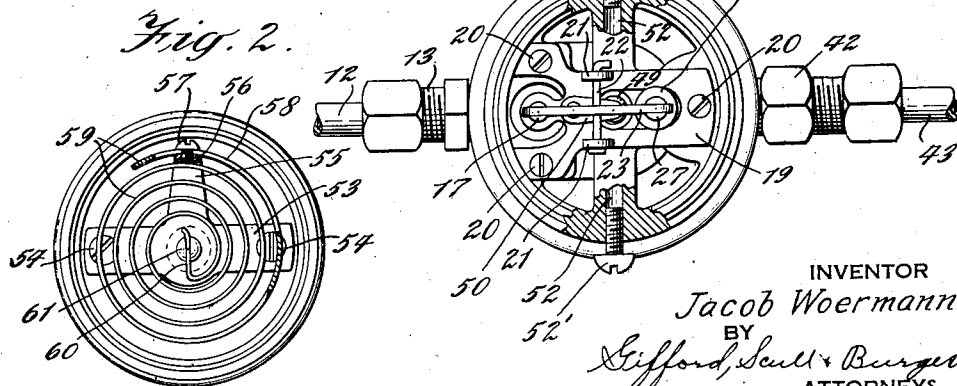
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J. WOERMANN

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VAPORIZER FOR GAS ENGINES

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INVENTOR
Jacob Woermann
BY
Gifford, Scull & Burgess
ATTORNEYS

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VAPORIZER FOR GAS ENGINES

Jacob Woermann, Glendale, Long Island, N. Y.

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8 Claims. (Cl. 123—119)

This invention relates to a vaporizer for gas engines by means of which a mixture of hydrocarbon oil vapors, air and steam can be introduced into the suction side or manifold of an internal combustion engine. The device is adapted to be heated by exhaust gases from the engine and the supply of water to the device from which the steam is generated is automatically cut off when the engine stops and is kept cut off until the vaporizer has reached a predetermined temperature and the engine is running. The water supply is opened due to suction in the manifold, but is kept closed to prevent water from reaching the vaporizer when it is not desirable or needed.

The invention will be understood from the description in connection with the accompanying drawing in which Fig. 1 is a vertical section through the device; Fig. 2 is a plan view of a thermostat used in the device and Fig. 3 is a plan view of the device with parts removed.

In the drawing reference character 1 indicates the vaporizer which may be made of an upper section 2 and a lower section 3 that may be screwed together and kept from accidentally unscrewing by a screw 3' screwing into one of them at the contacting edges. A tube 4 having its lower end closed is screwed into an opening 5 in the lower portion of the section 3 of the vaporizer. The tube 4 has an annular shoulder 6, and a gasket 7 of fibre or copper is interposed between this shoulder and a shoulder 8 on the vaporizer to insure against leakage. The tube 4 is provided with an external thread 9 so that it may be screwed into a threaded hole through a portion of the system that is heated by exhaust gases, such as the exhaust manifold 9' or muffler. Copper wool 10 or the like may be placed in the tube 4 to prevent slugs of water from being thrown out.

A tube 12 leads from the crank case so that when the engine becomes heated oil vapors and hot air will be led through this tube into the vaporizer. The tube 12 is connected to the vaporizer by means of the connection 13. A cylindrical hollow guide-way 14 for a valve 15 is provided at the bottom of the vaporizer with which the tube 12 communicates. The valve 15 is in the form of a hollow cylinder with an open lower end having elongated slots 16 through its walls. The valve stem 17 for the valve 15 has its upper end bifurcated with a pin 18 extending across the bifurcated portion.

A plate 19 is held in place inside the vaporizer against the shoulders provided therefor by means

of the screws 20, and a hole is provided through this plate for the valve stem 17 and serves as a guide for this stem. A pair of lugs 21 is provided on the plate 19 and a cross pin 22 extends through holes in these lugs. A lever 23 is pivoted at its center on the cross pin 22 and has a slot 24 at one end thereof for the pin 18. A slot 25 is provided at the other end of the lever 23 for the pin 26 that extends across the bifurcated upper end of a pin 27 which opens the water connection valve.

A collar 28 against which one end of a compression spring 29 bears is provided on the pin 27. An opening 30 is provided through the plate 19 for the pin 27 and spring 29. An opening 31 is provided in the lower portion of the section 3, in which opening the reduced portion 32 of the pin 27 fits and slides. A counter-sunk opening 33 is provided at the upper end of the opening 30 and the shoulder 34 between the large and small portions of the pin 27 strikes the bottom of the counter-sunk opening 33 when the pin 27 is in its lowermost position. The lower end of the compression spring 29 also rests upon the bottom of the counter-sunk opening 33. The lower end of the pin 27 is rounded or conically shaped, as indicated at 27'.

An opening 35 is provided through the side of the section 3 of the vaporizer and a conically shaped valve seat 36 is provided at the inner end of this opening. A conically shaped valve 37 is located in the opening 35 to seat against the valve seat 36. The pointed portion of the valve 37 extends inwardly far enough to be struck by the end 27' to open this valve. The valve 37 is provided with a cylindrically shaped portion 38 that slides in the cylindrically shaped portion of the opening 35. The portion 38 is provided with grooves 39 along its periphery for the passage of water. The stem 40 of the valve 37 is provided with a slot as indicated at 41 at its outer end leaving an opening that permits water to pass.

A connection 42 connects the tube 43 with the opening 35 and is provided with a cylindrically shaped opening 44 into which the end of the valve stem 40 extends and is guided. The tube 43 leads from any convenient source of water, preferably the water-cooling system of the engine, and is provided with a strainer 45 and valves 46 and 46'.

An opening 47 is provided through the central portion of the section 3 of the vaporizer connecting with the opening into which the tube 4 screws. A strainer 48 may be provided over the lower end of the opening 47 and a ball valve 49 is provided

for closing the upper reduced end of the opening 47. The valve 49 may be kept from chattering or becoming loose by means of a thin leaf spring 50 that presses against it and is connected to the plate 19 by means of the rivet 51. A transverse hole 52 passes through the section 3 and hole 47 so that the opening 47 may be reached from the outside. The outer ends of the hole 52 may be closed by means of the screws 52'.

A cross bar 53 is attached to the inside of the upper portion of the section 2 by means of screws 54. The cross bar 53 carries an arm 55 (Fig. 2). A downwardly extending extension 56 is provided at the outer end of the arm 55. A screw 57 in the extension 56 passes through a slot 58 near one end of the thermostat element 59 so that this element can be adjusted. The other end 60 of the thermostat element 59 is bent inwardly and extends through a slot in the end of a valve stem 61.

An extension 62 is provided on the upper side of the cross bar 53 and has a cylindrical opening 62' therein. A pin 63 extends through the wall of the extension 62 and projects a short distance into the cylindrical opening 62'.

A conical valve seat 64 is provided on the inside of the upper portion of the section 2 at the entrance to the opening 65, which is preferably located at the center of the upper end of the section 2.

The valve to which the stem 61 is attached has a cylindrical portion 66 fitting in the opening 62' and a conical portion 67 to seat upon the valve seat 64. The cylindrical portion 66 is provided with a spiral groove 68 into which the end of the pin 63 projects.

A connection 69 is provided at the upper end of the section 2 to connect the flexible tube 70 so that this tube may be moved around and connected to the engine manifold by the connection 71 that is provided with a valve 72.

The operation is as follows:

The tube 4 carrying the vaporizer is screwed into a portion of the system that is heated by exhaust gases. The tube 12 is connected to the crank-case so that a mixture of oil vapors and hot air will pass through it into the vaporizer when the engine becomes heated. The tube 43 is connected to a source of water supply, preferably the cooling system of the engine, and the valve 37 is kept closed by the pressure of the water either if the engine stops or the vaporizer is cold.

When the engine has stopped and the vaporizer is cold the parts are in the position shown in Fig. 1 except that the valve 67 is closed by means of the thermostat 59. When the engine is started up the parts remain in this position until the exhaust gases heat the tube 4 and the vaporizer sufficiently to expand the thermostatic element 59, thus turning the valve stem 61 and causing the spiral groove 68 thereof into which the pin 63 extends to move this valve 67 downwardly into the open position. The suction through the tube 70 from the suction manifold then raises the valve 15 and compresses the spring 29 a sufficient distance to permit oil vapors and air to pass from the tube 12 into the space inside the vaporizer and thence into the tube 70. This raises the left-hand end of the lever 23 and lowers the other end forcing the pin 27 downwardly, compressing the spring 29 and opening the valve 37 to permit water to enter from the tube 43. The water flows into the tube 4 and is vaporized into steam which passes through the opening 52 and thoroughly

mingles with the oil vapor and air before they pass out through the tube 70 to the engine.

As soon as the engine stops the spring 29 closes the valve 15 and raises the pin 27 so that the water inlet valve 37 closes and remains closed until the device is heated up sufficiently to cause the thermostat 59 to open the valve 67 and sufficient suction is induced through the tube 70 to open the valve 15. In this way the danger of an excess supply of water collecting in the tube 4 is eliminated, and very little, if any, steam is generated which would be condensed in the upper portion of the device.

I claim:

1. In a vaporizer for an internal combustion engine, a water connection, a connection for a mixture of oil vapor and air, a supporting tube for said vaporizer closed at one end to be placed in a hot zone, and means located in the vapor space of the vaporizer to open said water connection after the vapor space of the vaporizer has become heated.
2. In a vaporizer for an internal combustion engine, a water connection, a connection for a mixture of oil vapor and air, a supporting tube for said vaporizer closed at one end to be placed in a hot zone, and means located in the vapor space of the vaporizer to close said water connection and keep it closed until the vapor space of said vaporizer becomes heated.
3. In a vaporizer for an internal combustion engine, a water connection, a connection for a mixture of oil vapor and air, a supporting tube for said vaporizer closed at one end to be placed in a hot zone, and means located in the vapor space of the vaporizer to close said water connection and keep it closed until the vapor space of said vaporizer becomes heated and the engine is running.
4. In a vaporizer for an internal combustion engine, a water connection, a connection for a mixture of oil vapor and air, a supporting tube for said vaporizer closed at one end to be placed in a hot zone, means to open said water connection after the vaporizer has become heated, said means comprising a valve and a pin adapted to contact with said valve, and means whereby engine suction causes said pin to be operated.
5. In a vaporizer for an internal combustion engine, a water connection, a connection for a mixture of oil vapor and air, a supporting tube for said vaporizer closed at one end to be placed in a hot zone, and means to open said water connection after the vaporizer has become heated, said means comprising a valve and a pin adapted to contact with said valve, said means being operated by engine suction.
6. In a vaporizer for an internal combustion engine, a water connection and a connection to the crank case of said engine, valves for said connections, and means to cause the opening of one of said valves to open the other one, and a valve opened by a thermostat, said last-named valve being located in an outlet from said vaporizer.
7. In a vaporizer for an internal combustion engine, a vapor chamber, a connection for a mixture of oil vapor and air to said vapor chamber, a water chamber adapted to be placed in a heated zone and communicating with said vapor chamber, a connection from a source of water supply to said water chamber, and means to prevent water from splashing into said vapor chamber from said water chamber.
8. In a vaporizer for an internal combustion engine, a vapor chamber, a connection for a

mixture of oil vapor and air to said vapor chamber, a water chamber adapted to be placed in a heated zone and communicating with said vapor chamber, a connection from a source of water supply to said water chamber, means to prevent water from splashing into said vapor chamber from said water chamber, a valve in each of said connections, and means whereby opening of the valve in said first-named connection causes the valve in said second-named connection to open.

JACOB WOERMANN.

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