

July 24, 1923.

1,462,767

W. H. PUTNAM

INTERNAL COMBUSTION ENGINE

Filed Aug. 27, 1919

2 Sheets-Sheet 1

Fig. 1.

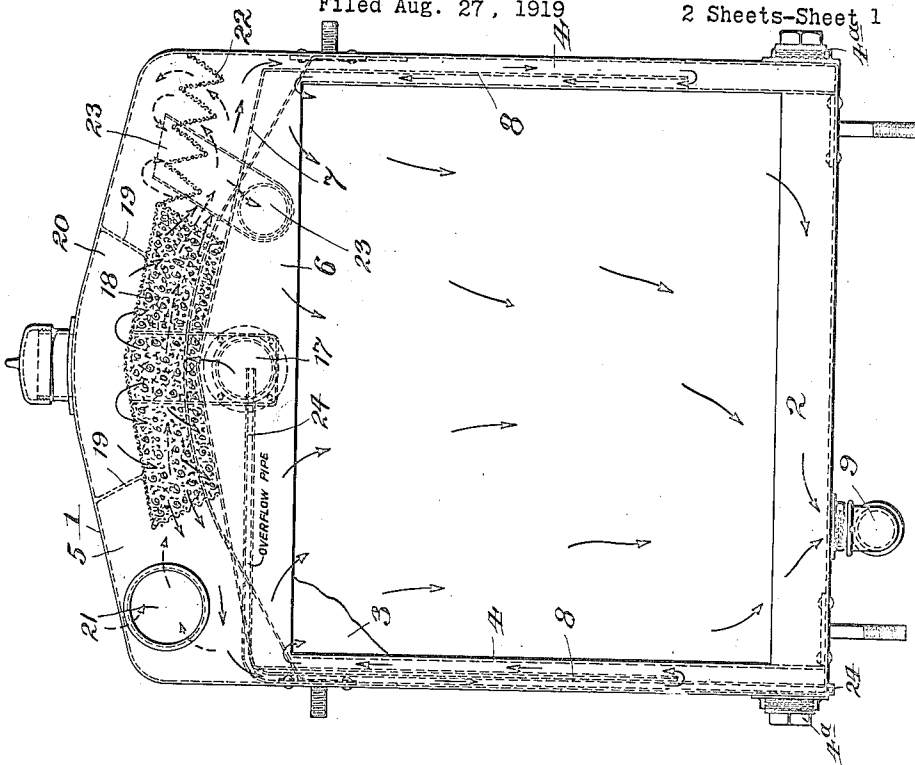
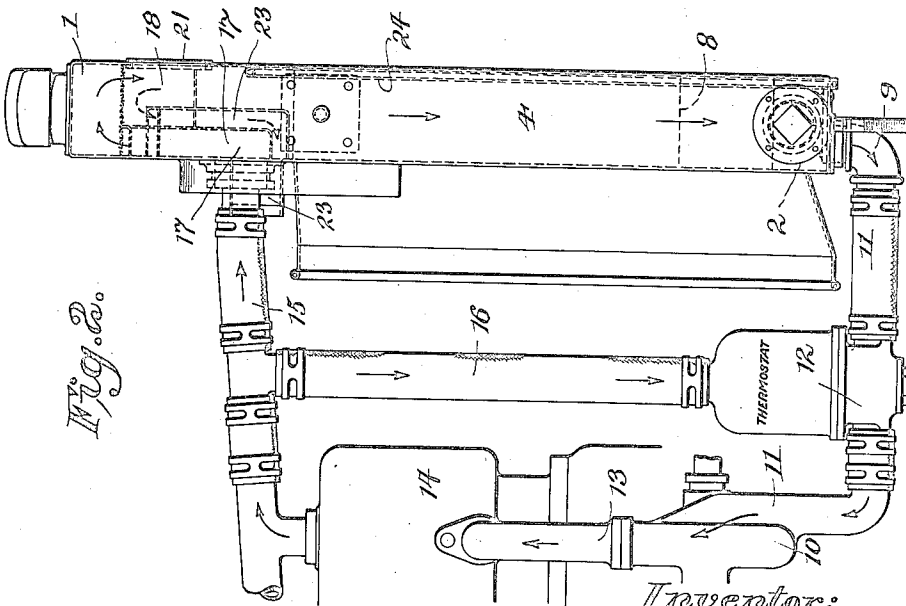


Fig. 2.



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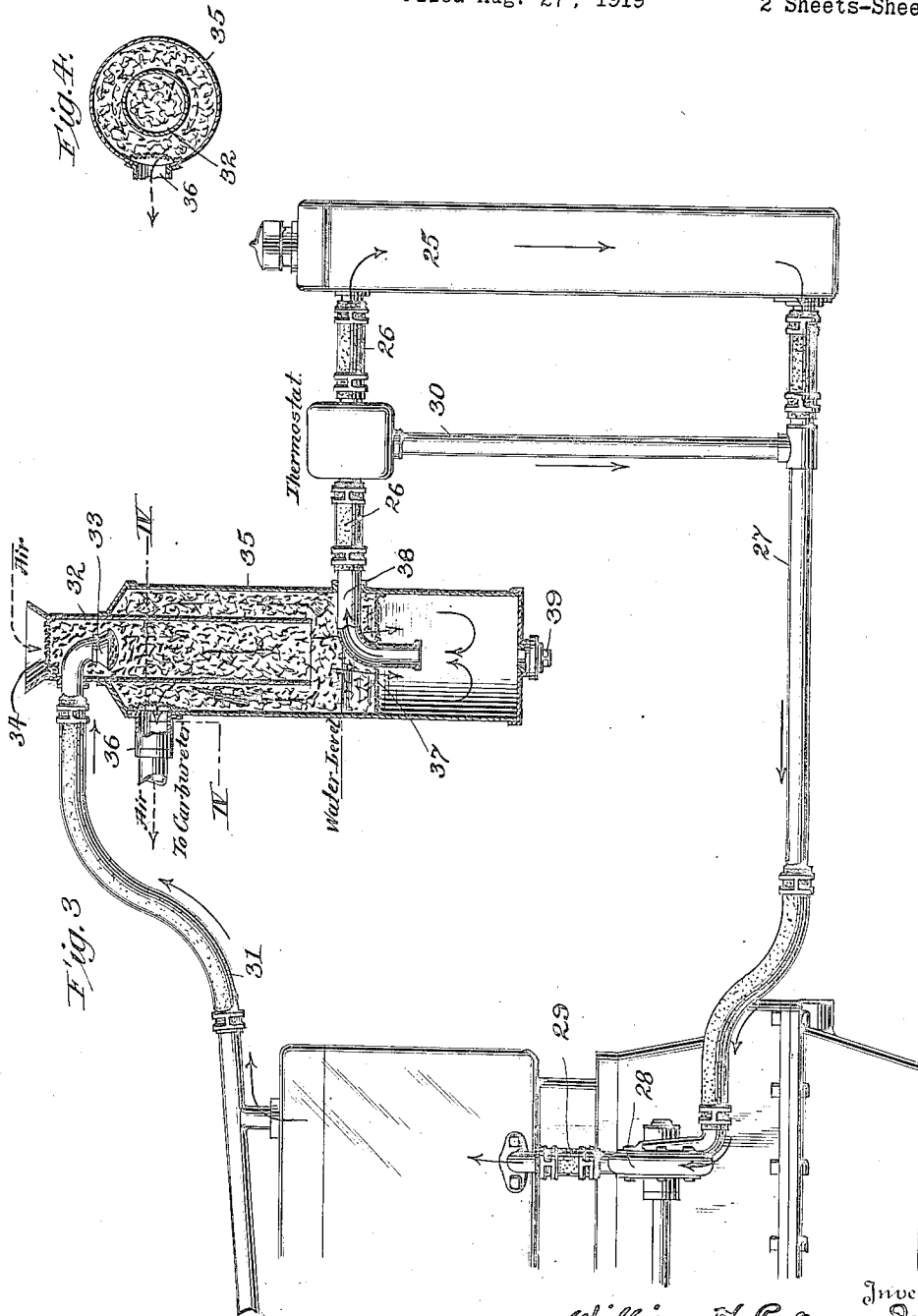
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2 Sheets-Sheet 2



Inventor
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UNITED STATES PATENT OFFICE.

WILLIAM H. PUTNAM, DECEASED, LATE OF MADISON, WISCONSIN, BY CENTRAL WISCONSIN TRUST COMPANY, EXECUTOR, OF MADISON, WISCONSIN, ASSIGNOR TO MADISON KIPP CORPORATION, OF MADISON, WISCONSIN, A CORPORATION OF WISCONSIN.

INTERNAL-COMBUSTION ENGINE.

Application filed August 27, 1919. Serial No. 320,260.

To all whom it may concern:

Be it known that the CENTRAL WISCONSIN TRUST COMPANY, a corporation of Madison, in the county of Dane, State of Wisconsin, executor of the estate of WILLIAM H. PUTNAM, late a citizen of the United States, and a resident of Madison, in the county of Dane, State of Wisconsin, has knowledge that the said WILLIAM H. PUTNAM did invent certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention pertains to an improved apparatus for supplying air to internal combustion engines.

In the use of gas engine propelled vehicles, and more particularly tractors for farm and road work, the wearing parts of the engine are subjected to undue wear incident to the presence of dust which is carried into the cylinders and through the valves by the air which is employed in the production of the explosive or combustible charge.

Farm tractors, particularly when moving with the wind are frequently surrounded by a cloud of dust laden air, and as the air which enters into the explosive mixture must be drawn from such surrounding atmosphere, it follows that a considerable amount of dust is drawn into the engine causing more or less rapid deterioration thereof.

The present invention is designed to provide means for washing the air before it is intermixed with the fuel and to employ water used for cooling the engine for that purpose. Aside from freeing the air of dust, the employment of this source of water has the advantage that it heats the air (and conversely cools the water) and also that the air is moistened to a greater or less degree, thereby increasing the effectiveness of the explosive mixture, as is well understood. The invention further contemplates the use of a thermostat for controlling the flow of the cooling water whereby the temperature may be regulated, which heating, of course, affects the amount of moisture or vapor which may be taken up by the air.

Two embodiments of the invention are illustrated in the annexed drawings, wherein:

Fig. 1 is a front elevation of an automobile radiator, showing the invention applied thereto;

Fig. 2 a side elevation of the radiator and the pipe connections leading to and from the same to the cooling jacket of the motor;

Fig. 3 a sectional elevation of a modified embodiment of the invention wherein the water cleansing chamber is formed independently of the radiator; and

Fig. 4 a transverse longitudinal section on the line IV—IV of Fig. 3.

Referring first to the construction shown in Figs. 1 and 2, the radiator frame may be said to comprise an upper section 1, a lower section or chamber 2 with an interposed cellular or similar radiation element 3 (shown only in part) and two vertical side chambers 4, 4. The upper section is divided into upper and lower compartments 5 and 6, the same being effected by a transverse partition 7, said partition terminating short of the outer side walls of the upper section and being provided with downward extensions 8 which divide the side chamber 4 vertically into two legs or compartments, said extensions 8 stopping short of the bottom of the chambers. The water which is employed for cooling the motor and cleaning the air passes from the chamber 2 (the water flow being indicated by the solid arrows) through an outlet 9 to the circulating pump 10 through a pipe line 11, in which is located a thermostatically controlled by-pass 12. From the pump the water passes through a pipe 13 to the jacket 14 of the motor and thence into a pipe 15. A by-pass line 16 connects pipe 15 to the thermostatically controlled valve 12. Pipe 15 discharges into an L-shaped conduit or channel 17 located within the rear central portion of the upper section 1, the conduit at its upper end terminating in line with the upper portion of a chamber 18 which is filled with brass chips or the like. The upper and end walls of said chamber 18 are foraminous, being preferably formed of .025 diameter galvanized wire, while the lower wall or bottom of the chamber is formed by the imperforate cross partition 7. Solid transverse partitions 19 are located between the upper wall of the chamber and the upper wall of the

upper section 1 forming a chamber 20 above the chamber 18 into which chamber 20 the conduit 17 discharges. The water passes from chamber 20 through the chips in chamber 18 and into the chamber 5 above partition 7; it passes thence down the vertical chambers 4, beneath the ends of the partitions or extensions 8, upwardly in said chambers 4 and into chamber 6. From channel 6 it passes into radiating elements 3 and thence to chamber 2. The lower ends of chambers 4 form, in effect, settling or mud drums and each one is provided with a removable plug to permit the removal of mud therefrom, from time to time. The air for the explosive charge enters the radiator through an opening 21 formed in the upper section 1, the air (indicated by the dotted arrows) passing into chamber 5 through the chips in chamber 18, discharging at the right hand end thereof (Fig. 1). It there contacts a fluted or zigzag perforate screen surface 22 which acts to separate and arrest any large water particles or drops, the air finally passing into the upturned end of an off-take pipe 23, the lower end of which passes rearwardly through the rear wall of the head section 1, and is connected to the carbureter or other charge forming device (not shown). An overflow pipe 24 is provided, the upper end thereof extending into chamber 6.

In operation, the water is caused to flow by the pump as above described and as indicated by the solid arrows. It is forced upwardly through conduit 17 into chamber 20 and in passing therefrom is broken up as it passes downwardly and laterally through the chips or filling in chamber 18. At the same time the air is being drawn by the suction of the motor through the chamber 18 and is brought into intimate contact with the water in its subdivided condition. The air and water flow, in effect, in counter currents, and, by reason of the subdivision of both, the air is thoroughly washed and freed of all dust and dirt which is ultimately trapped and collected in the bottom of the chamber 4. Assuming the engine has been running a short while, the water entering chambers 20 and 18 will be heated and as a consequence the air being drawn in will be heated thereby. The raising of the temperature of the air enables it to take up a certain amount of moisture which is thus carried along in the air to the charge forming device. By the use of the thermostatically controlled bypass 16, the water in the radiator may be maintained at a predetermined temperature and in this way one may control the temperature of the air which is drawn in and consequently the degree of saturation of the air.

In Figs. 3 and 4 a further embodiment of the invention is shown. Under this con-

struction the radiator is denoted by 25, the inflow pipe leading thereto by 26, and the outflow pipe by 27, the latter being connected to the pump 28 which discharges into the water jacket of the engine through a pipe 29. A thermostatically controlled bypass 30 is interposed between the pipes 26 and 27 and corresponds to the pipe 16 in the construction above described. The outlet pipe of the water jacket is denoted by 31 and it extends laterally into a member 32, which, in the form illustrated, is cylindrical, the pipe being provided with a downwardly directed spray nozzle 33. The upper end of the member 32 is provided with a screen 34 through which the air leading to the carbureter passes. The member 32 is suspended or positioned in the upper end of a chamber 35, the member 32 being spaced away from the wall of the chamber 35 and terminating short of the lower end thereof, as clearly indicated in Fig. 3. The chamber 35 is provided with an air outlet or exit 36 adjacent its upper end so that the air passing inwardly through the upper end of the member 32 is caused to travel downwardly through said member, thence beneath the lower end thereof and upwardly to the outlet 36. A screen 37 is mounted in the lower portion of the chamber 35 and forms the support for the filling, such as brass chips or the like introduced into the member 32 and into the upper portion of the chamber 35, which surrounds the member 32. The air is therefore caused to travel downwardly through the pipe or member 32 and thence upwardly outside of the same in the chamber 35 on its way to the outlet 36. Water passing from the cooling jacket of the engine is ejected from the nozzle 33 and passes downwardly with the incoming air, the water and the air being broken up by the chips so as to cause a thorough intermingling thereof. The water passes downwardly through the screen 37 into the lower end of the chamber 35 and thence passes outwardly through the downturned pipe 38 which at its outer end is connected to the adjacent pipe 26. Chamber 35 at its lower end will be provided with a draw-off plug 39 so that the sediment or mud which tends to collect in the lower end of the chamber may be removed from time to time. The lower end of this chamber forms, in effect, a mud drum similar to the lower portions of the chambers 4 in the construction above set forth.

What is claimed is:

1. In combination with an internal combustion engine; a circulatory water cooling system therefor embodying a radiator for cooling the water; means for causing a subdivision of the water as it passes through the radiator; and an air intake passage leading to the charge forming device of the engine, said passage leading to and through the

means for causing the subdivision of the water whereby the air will be brought into direct contact with the water and washed thereby.

2. In combination with an internal combustion engine; a water cooling system embodying a radiator; a chamber formed within said radiator; a filling for said chamber presenting an extended broken up surface throughout and through which the water of the cooling system passes; and an air conduit leading to the charge forming device of the engine and embodying as a part thereof said filled chamber, whereby the air and water will be brought into intimate contact in a subdivided condition and the air washed substantially free of entrained dust.

3. In combination with an internal combustion engine; a radiator, said radiator comprising an upper chambered portion, two side chambers in communication at their upper ends with the upper chamber, a lower chamber, and a radiating element in communication with the lower portion of the upper chamber and the lower chamber; a partition extending through the upper chambered portion and downwardly into each of the side chambers and terminating short of the bottom of the latter; a perforate chamber located within the upper chambered portion of the radiator above the partition; a filling therefor presenting an extended broken up surface; a conduit leading from the water jacket of the engine and discharging into the upper portion of the radiator

above the filled chamber; a pipe leading from the lower chamber to the water jacket; and a passage for the air leading to the charge forming device of the engine, said passage including the filled chamber aforesaid.

4. In combination with a water-jacketed internal combustion engine; a radiator through which the cooling water passes, said radiator having an upper hollow portion with an opening for the intake of air; a foraminous chamber mounted in said upper portion; an open filling therefor and through which the cooling water passes; a pipe leading to the charge forming device of the engine, said pipe having an upturned end opening into the upper hollow portion of the radiator and to one side or end of the foraminous chamber; and a perforate baffle interposed between the chamber and said upturned end of the pipe.

5. In combination with a water-jacketed internal combustion engine; a circulatory system including a radiator through which the cooling water passes; an air conduit formed in the radiator and leading to the charge forming device of the engine; means for effecting a washing of the air by the water as the two pass through the radiator; and mud collecting chambers carried by the radiator.

WILLIAM H. PUTNAM, Deceased.

CENTRAL WISCONSIN TRUST COMPANY,

Executor

By LUCIEN M. HANKS,

President.