

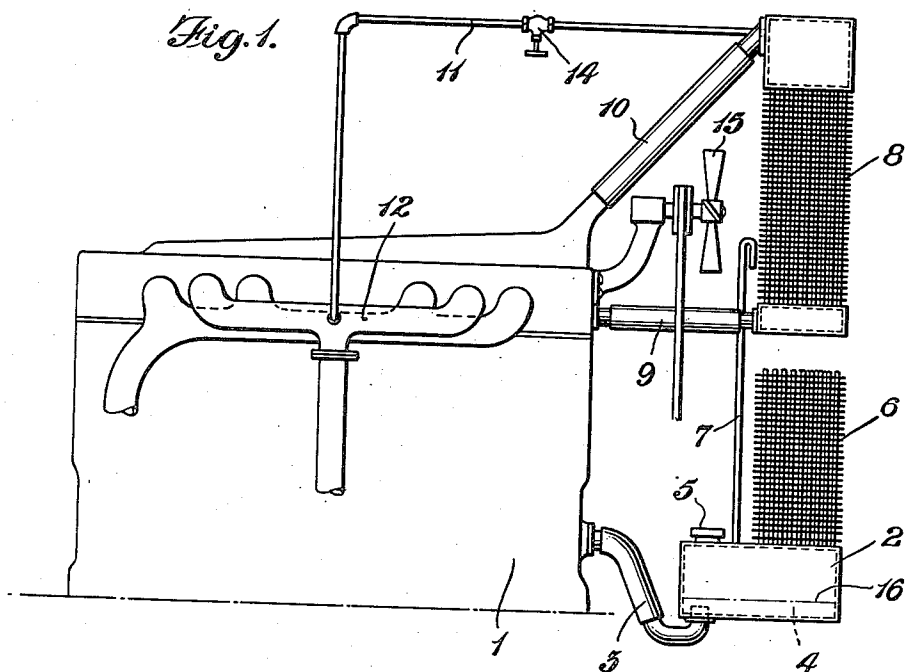
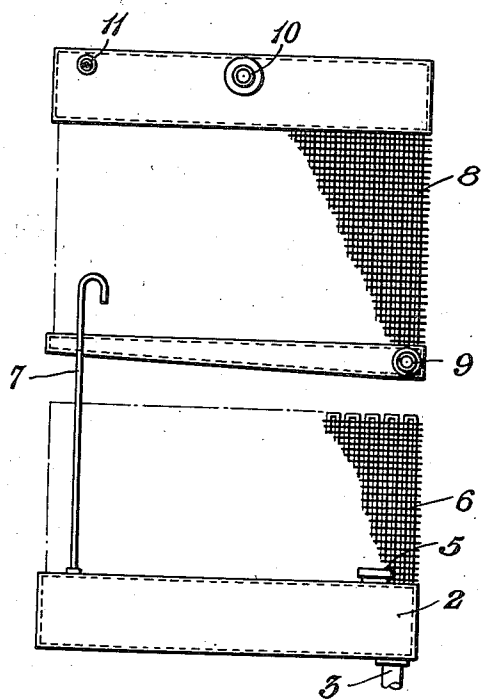
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COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES

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COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES

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5 Claims. (Cl. 123—174)

This invention relates to improvements in cooling systems for internal combustion engines and analogous power plants and comprehends the circulation of cooling fluid by means of vacuum and pressure. More specifically the present system includes, in combination with a motor having a cooling jacket, a reservoir and a superimposed radiator, the reservoir communicating with the cooling jacket by a suitable conduit and the radiator communicating with the water jacket by a plurality of conduits, the radiator having in addition a connection with the intake manifold or other source of suction, whereby upon the initial acceleration of the motor a vacuum may be caused to exist in the radiator for lifting the water from the reservoir into the engine jacket. The invention comprehends the acceleration and condensation of the vapors from the water jacket within the radiator. Certain details such as a cut-off valve in the vacuum line of the radiator and the provision of an elevated vent in the reservoir cooperate to produce the successful operation of the system and the normal retention of the cooling fluid within the jacket and the radiator.

Other features of construction will be clear from an inspection of the drawing forming a part of this application and wherein like characters of reference designate corresponding parts throughout the several views in which:

Figure 1 is a side elevation, and
Figure 2 an end elevation of the apparatus.

With reference now to the structure involved an internal combustion engine is indicated at 1, and is designed to include the conventional jacket 35 which encloses the cooling chamber formed about the motor. Reference character 2 indicates a reservoir in the form of a rectangular container positioned transversely and at one end of the motor in the present illustration. The reservoir 40 2 is connected by conduit 3 with the water jacket about the motor and the outer extremity of the conduit 3 extends upwardly through the base of the reservoir 2 for a short distance whereby a small quantity of water is maintained in the reservoir at all times thereby providing in substance 45 a water seal over the conduit extremity. The water line is indicated by the reference character 4. The reservoir 2 is provided with an opening at its top and through which it may be filled. A suitable cap 5 is shown as closing this opening. 50 Positioned upon the top of the reservoir is a radiator section 6 of such a size as to facilitate the condensation of vapors which may form during the operation of the motor. A vent 7 extends 55 from the top of the reservoir 2 upwardly to a

point above the water line in the motor and insures normal atmospheric pressure upon the fluid contained therein.

Above the radiator section 6 positioned upon the reservoir 2 is a main radiator 8 communicating by conduit 9 with the water jacket. The conduit 9 in the present illustration extends to a point below the water level in the motor, the exact level being determined by the pressures and fluid capacity involved. The upper extremity of the radiator 8 is connected by conduit 10 with the upper wall of the water jacket of the motor and functions with the conduit 9 for the passage of vapors and transfer of cooling fluid. A pipe 11 connects the top of the radiator 8 with the intake manifold 12 and a valve 14 functions to open and close this line. A cooling fan 15 is illustrated as positioned between the motor and the radiator 8 for more rapidly effecting the cooling of the latter.

The main radiator 8 and the lower radiator section 6 may be of conventional design, it merely being necessary that their structure will insure the rapid condensation of any vapors existing within these assemblies.

The operation of this cooling system is as follows:

The cooling fluid is placed in the reservoir 2 through the filling cap 5, the motor is started and the valve 14 in the vacuum line 11 is opened. The suction from the intake manifold 12 will tend to elevate the water from tank 2 through the water jacket of the motor and into the radiator 8 by means of conduits 9 and 10. The filling operation should find the water level in the reservoir 2 about as indicated by dotted lines 16 which is at such a point as to cover the outer extremity of the conduit 3 and form a water seal thereover. When the reservoir 8 is full of water the valve 14 is closed and remains in closed position until such time as leakage or the changing of the cooling fluid may necessitate the recharging of the reservoir 2.

The continued operation of the motor will rapidly bring about the evaporation of the cooling fluid and pressure generated thereby will force water through the pipe 3 into the reservoir 2. The vapors pass into the radiator 8 and a portion of the water in radiator 8 flows into the cooling jacket of the motor by gravity through the conduit 9. The steam which passes from the cooling jacket of the motor to the radiator 8 rapidly condenses and this space is again occupied by water from the reservoir 2, the water in the reservoir 2 being under atmospheric pressure by

virtue of vent 7 seeking a pre-designed level determined by the temperatures and pressures involved in the system. The radiator section 6 formed in open communication with the tank 2 functions to condense any vapors which may be trapped or generated within this portion of the apparatus.

From the foregoing it will be observed that the system functions automatically, that the water jacket is normally full of water, that the vapors generated by the heat of the motor are quickly condensed and that the construction and arrangement of the parts insure a constant supply of cooling fluid and a rapid cooling of the latter.

The present apparatus has definite advantages over the conventional cooling systems involving pumps and analogous structures in that there are no moving parts to develop leaks, less cooling surface and less fluid is necessary because of the cooling effects of steam, and the regulation and control is automatic at all times.

Numerous changes in construction and arrangement of parts may be made without departing from the spirit of the invention as exemplified in the following claims forming a part of this specification.

I claim:

1. In combination with an internal combustion engine having a cooling jacket, a reservoir, a conduit directly connecting the engine cooling jacket and reservoir, a radiator positioned above the motor level, connections between the radiator and the cooling motor jacket forming a closed circuit, and means for causing initial suction within the radiator for elevating the fluid in

the reservoir to the radiator through said engine cooling jacket.

2. A system for cooling an internal combustion engine having a water jacket, a reservoir positioned below said engine, a direct communication between the reservoir and the engine water jacket, a radiator positioned above the engine, connections between the radiator and the water jacket forming a closed circuit therewith, means for applying suction to the radiator, and means for maintaining atmospheric pressure within the reservoir.

3. The substance of claim 2 characterized in that the reservoir is provided with a radiator section for condensing the vapors generated therein.

4. The substance of claim 2 characterized in that a cut-off is provided in the means for supplying suction to the radiator.

5. In an internal combustion engine including a fluid cooling jacket therefor, a radiator positioned above the motor in closed circuit with the fluid in the cooling jacket, a reservoir below the radiator and in communication with the cooling jacket, said reservoir having a vent open to atmospheric pressure, and the reservoir and radiator having a closed circuit therebetween and through the cooling jacket whereby pressures created in said radiator will force the fluid contained therein through said cooling jacket and into said reservoir and means for applying suction to said radiator for initially filling the latter from said reservoir through said cooling jacket.

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