

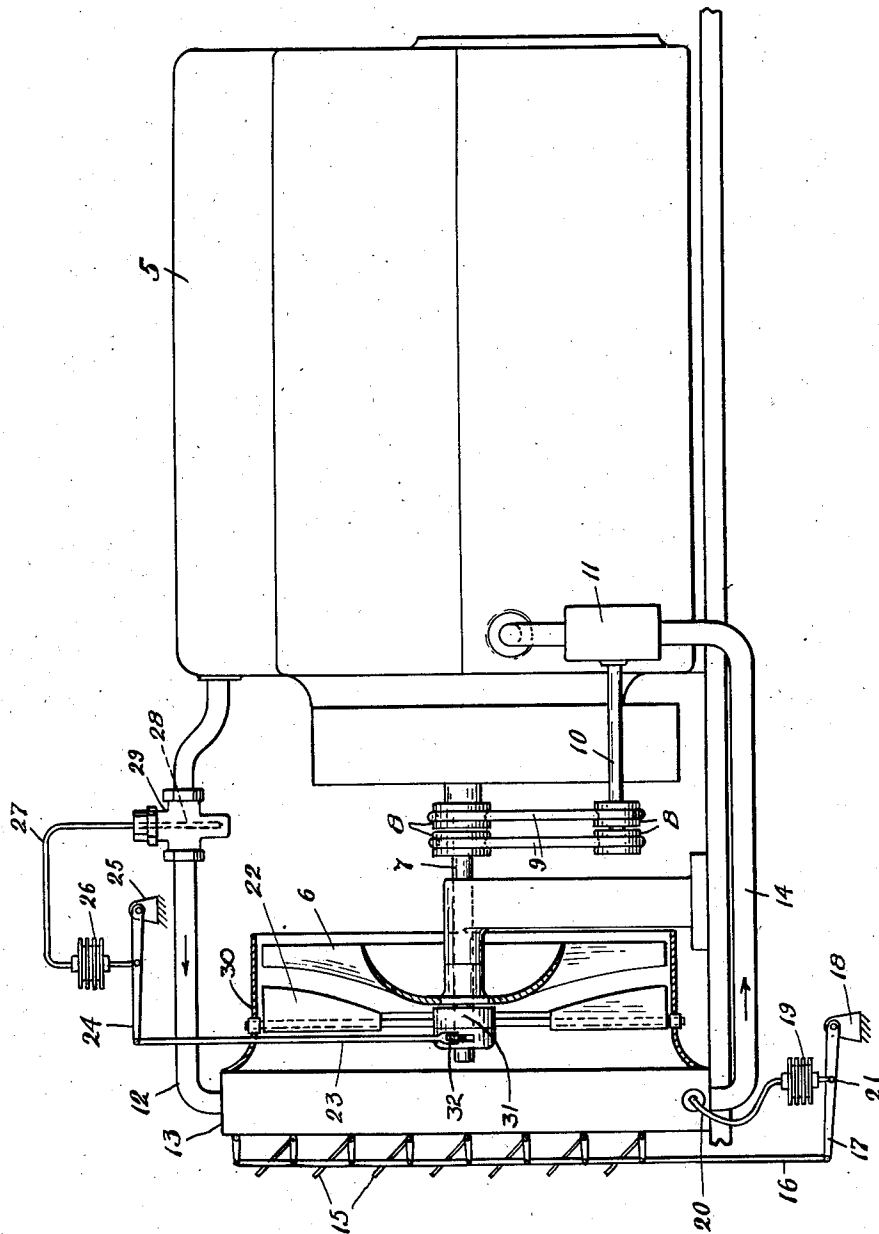
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THERMOSTATICALLY CONTROLLED ENGINE FAN COOLING SYSTEM

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THERMOSTATICALLY CONTROLLED ENGINE
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2 Claims. (Cl. 236—35)

This application relates to apparatus for maintaining the jacket water of an internal combustion chamber at a desired temperature and has as its object the saving of fan power when the cooling loads are light.

There are two systems in general use of thermostatically controlling the temperature of the water circulated through the cylinder jackets of internal combustion engines. One is to have a thermostat control the proportion of water circulated through the cooling radiator and bypassed around same, and the other is to have a thermostat adjust shutters extending across the face of the radiator. In both systems the cooling fan requires substantial engine power even when little or no cooling is required. The fan power is considerable especially those used with the high powered Diesels now in general use.

This invention provides for spinning the air entering the engine cooling fan, under thermostatic control, when the cooling load is light, thus reducing the work done by the fan, and the power drawn by it from the engine.

In a preferred embodiment of the invention, shutters extending across the face of the radiator are adjusted by a thermostat responding to the temperature of the water in the circulating system, to close at temperatures below a predetermined range and to open for temperatures above the selected range. These shutters serve, when the engine is idle, to keep the jacket water from falling to too low a temperature, and to conserve heat when wayside heat is applied in the yards, to prevent freezing.

Another thermostat exposed to the water temperature adjusts the spin vanes for full open, no spin position, at the temperature at which it is desired the engine operate, and adjusts the vanes towards closed position for producing spin at temperatures below the operating temperature.

The shutter control produces quick warm-up and proper preheat, and the vane control saves power after the engine is warmed up.

The invention will now be described with reference to the drawing which is a side elevation partially in section of one embodiment of the invention.

The internal combustion engine 5 has the axial flow fan 6 mounted on the shaft 7 which is driven from the engine and which drives through the pulleys 8 and belts 9, the shaft 10 of the water pump 11.

The pump 11 circulates water from the engine, through the pipe 12, radiator 13 and pipe 14. The radiator has the shutters 15 pivoted along its

outer face and movable simultaneously towards open or closed position by the lever 16. The lever 16 is attached to one end of the lever 17 which is pivoted at its other end to a fixed support 18. The bellows 19 which is connected by the tube 20 to a thermostatic expansible column in the radiator 13, is connected at 21 to the lever 17 and upon increases in temperature, moves the shutters 15 towards open position. For example, the shutters may start to open at 50° F. and become fully open at 100° F.

The spin vanes 22 are mounted in the inlet to the fan 6 by being pivoted in the casing 30 and the bearing support 31 as shown in detail by the Bartlett and Leonard Patent No. 2,113,391 and are adjusted by the lever 23 which is connected to a lever 32 which corresponds to the lever 13 of said patent. The lever 23 is connected to the outer end of lever 24 which has its other end pivoted to the fixed support 25. The bellows 26 which is connected by the tube 27 to the thermostatic column 28 in the thermostat fitting 29, is connected to the lever 24 between its ends. Upon increase in temperature, the bellows 26 expands and moves the levers 24, 32 and 23 downwardly and causes as described in said patent, the vanes 22 to be adjusted towards open position.

As the vanes are adjusted towards closed position, they vary the angle of attack between the air entering the fan blades and the blades, and spin the air conformably with the degree of closure. This causes lower volumes of air to be moved by the fan and lower powers are required from the engine for operating the fan.

For example, the vanes may be adjusted to full open, at which position they exert no spin upon the air, when the temperature is at 160° F. or higher. At temperatures below 160° F., the vanes are adjusted towards closed, spin producing position, thus decreasing the volume of air entering the fan and the power required by the fan from the engine. At 100° F., the temperature at which the shutters 15 are completely open, the vanes 22 should be fully closed.

It is seen that the two thermostatic controls cooperate, the shutter control acting to bring the engine quickly up to heat when started cold and the vane control then maintaining the engine at the proper operating temperature and doing this by decreasing the power required by the cooling fan when its full capacity is not required.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement

of apparatus illustrated, as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. In a liquid cooled engine having a radiator with a pump for circulating liquid from the engine therethrough, having adjustable shutters extending across a surface of the radiator, and having an axial flow fan for moving air through the radiator, means including a thermostat responsive to the temperature of the liquid for opening said shutters at a predetermined relatively low temperature, means for varying the angle of attack of the air with respect to the blades of said fan, and means including means responsive to the temperature of said liquid for adjusting said means for decreasing said angle of attack at temperatures above said predetermined temperature.

2. In a liquid cooled engine having a radiator with a pump for circulating liquid from the engine therethrough, having adjustable shutters extending across a surface of the radiator, and having an axial flow fan for moving air through the radiator, means including a thermostat responsive to the temperature of the liquid for opening said shutters at a predetermined relatively low temperature, spin vanes upstream with respect to air flow of said fan, and means including means responsive to the temperature of said liquid for adjusting said vanes towards closed position at temperatures below said predetermined temperature.

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