Sept. 17, 1929. C. M. DOWELL 1,728,176

MEANS FOR CONTROLLING THE COOLING CAPACITY OF RADIATORS

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Fig. 1.

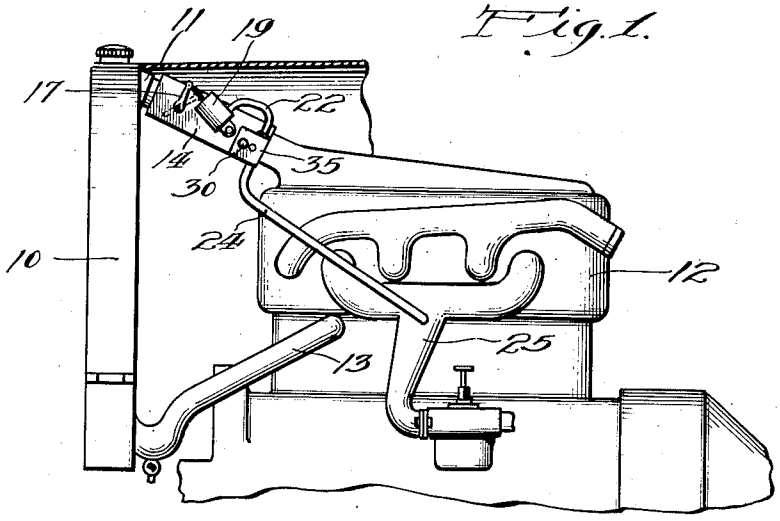
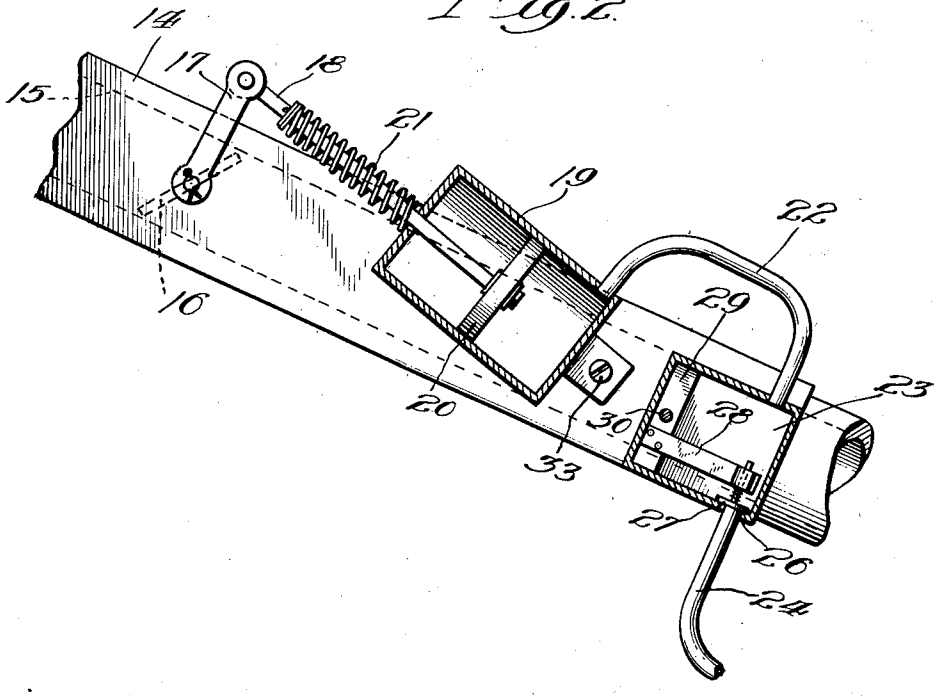


Fig. 2.



Witness:
Stephen V. Kelona

Inventor:
Chester M. Dowell,
by Wm. F. Dowell
Attty.

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Fig. 3.

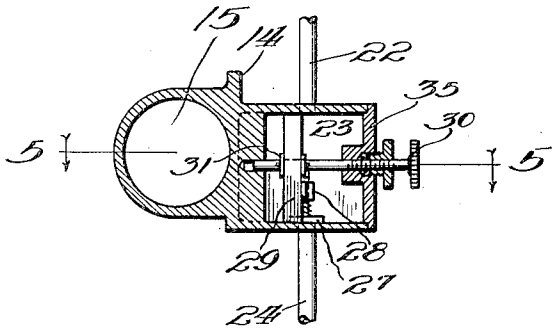


Fig. 4.

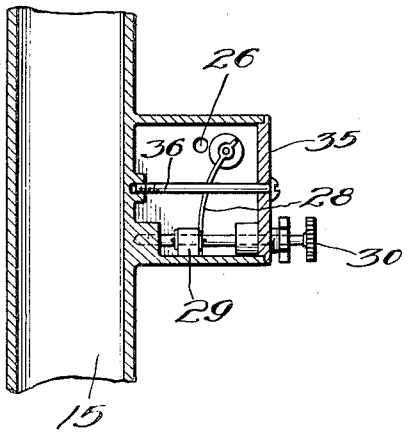


Fig. 5.

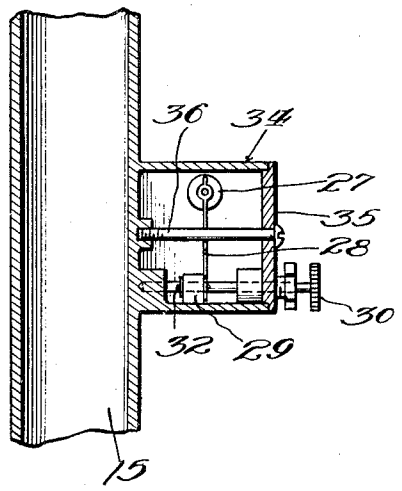
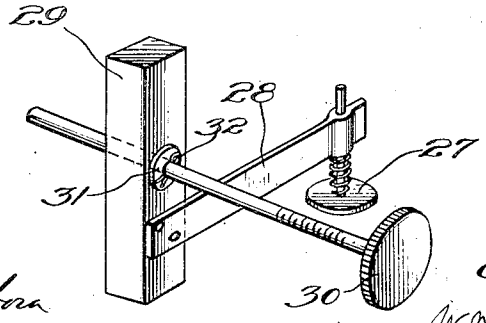


Fig. 6.



Witness:
Stephen H. Mebra

Inventor:
Chester M. Dowell,
by Wm F. Ball Atty.

Patented Sept. 17, 1929 1,728,176

UNITED STATES PATENT OFFICE

CHESTER M. DOWELL, OF HUNTINGBURG, INDIANA, ASSIGNOR TO HERBERT R. LEWIS, OF DETROIT, MICHIGAN

MEANS FOR CONTROLLING THE COOLING CAPACITY OF RADIATORS

Application filed March 26, 1924. Serial No. 701,995.

This invention relates to means for controlling the cooling capacity of a radiator whereby the temperature of the cooling water for an internal combustion engine may be maintained at a predetermined degree, and also relates to an improved means for adjustably controlling the temperature. The invention in its broader aspects, is a continuation of my application Serial No. 159,496.

In the drawings in which I have illustrated an improved form for adjustably controlling the cooling capacity of a radiator, Fig. 1 is a diagrammatic side elevational view showing my invention applied to an automobile engine.

Fig. 2 is an enlarged elevational view, partly in section through the control mechanism.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary sectional view showing the control mechanism in one position of adjustment.

Fig. 5 is a view similar to Fig. 4 showing the mechanism in a different position of adjustment.

Fig. 6 is a perspective view of part of the thermostatic valve mechanism.

Describing in detail the particular construction shown in the drawings, 10 designates the radiator of an internal combustion engine, and in the particular form shown, is an internal combustion engine for automobiles. The radiator at its upper end is connected by a pipe 11 with the water space surrounding the cylinders of the engine 12. This water space or water jacket of the engine is also connected by a return pipe 13 with the lower end of the radiator 10, these parts being of the ordinary construction commonly used with multiple cylinder internal combustion engines of automobiles of the water cooled type.

In the water pipe connection 11, there is inserted in the usual hose connection, a casting 14 which has a passageway 15 through which the water flows. This passageway is controlled by a butterfly valve 16 operated by rock arm 17. The latter is connected to a piston rod 18. The piston rod extends into a cylinder 19, and connects with the piston 20 operating therein. A spring 21 normally tends to hold the piston toward the left, and thus hold the butterfly valve 16 closed so as to prevent the water from the engine circulating to the radiator. In this manner, the cooling effect of the radiator on the cooling water of the engine is controlled. As soon however, as the engine reaches a predetermined temperature it is desirable that the water in the jacket surrounding the cylinder block of the engine shall be permitted to flow through the radiator and be cooled by the air passing through the radiator. For this purpose, the cylinder 19 is provided with a flexible connection 22 leading into a chamber 23. This chamber has another lead 24 running to the intake manifold 25 of the engine. The port 26 between the chamber 23 and the lead pipe 24 is controlled by slide valve 27, normally spring pressed to its seat. The latter is carried by suitable thermostatic bar 28. At normal temperature, this bar is in the position shown in Fig. 5, so that the port 26 is shut off by the valve 27. When however, the engine reaches a predetermined temperature, the bar 28 will be warped. This is caused by the heat of the engine being transmitted through the cooling water and the casting 14, to the thermostatic bar 28. This warping of the thermostatic bar 28 will slide the valve 27 to the position shown in Fig. 4, uncovering the port 26, and if the engine is running, the suction from the intake manfold will be transmitted to the cylinder 19, and this will draw the piston 20 to the right and through the piston rod 18 and rock arm 17 will open the butterfly valve so that the water can freely circulate through the radiator.

In the construction illustrated, the circulating of the water is produced by thermo-siphon effect so that whenever the butterfly valve 16 is rocked to its open position, the water of the cooling system will be circulated through the radiator 10 and its cooling effect on the engine temperature will thereby be increased.

In order that the operator may select the temperature at which he wishes the butterfly valve 16 to be opened, and the increased cooling effect of the radiator brought into oper-

ation, I have provided an adjustment mechanism. In detail, this comprises a movable bar or support 29 which carries one end of the thermostatic bar 28. The bar 29 can be slid to the left or right of the position shown in Fig. 4, by turning the adjusting screw 30. The bar 29 is positioned between a pair of washers 31 located between cotter pins 32 extending through the adjusting screw 30. Therefore, when the screw 30 is tightened up, it will shift the bar 29 toward the left so as to require a higher temperature to open the valve 26. If however, the set screw is adjusted outwardly from the position shown in Fig. 4, it will decrease the temperature necessary to open the valve 26.

In order to prevent binding of the rock arm 17 and the piston rod 18 when the piston 20 is drawn toward the right, the cylinder 19 is pivotally connected to the casting 14 at 33. The box 34 which forms the chamber 23 enclosing the thermostat and valve, is preferably formed integral with the casting 14, but has a cover plate 35 which is clamped in position by the set screw 36 so as to form an air-tight chamber.

When the engine is stopped, and the effect of the suction on the piston ceases, the spring will automatically rock the valve 16 to its closed position.

I claim as my invention:

1. In combination with an internal combustion engine having a water cooling system therefor, including a water jacket surrounding the engine cylinders and a radiator connected to said water jacket, of a valve for controlling the volume of water passing from the water jacket to the radiator, a piston for rocking said valve, a pivoted cylinder in which said piston is mounted, a connection between said cylinder and the intake manifold of the engine, an air-tight chamber located in said connection, a slide valve located in said chamber and adapted to control communication between said cylinder and the intake of the engine, a thermostatic bar located in said chamber and adapted to operate said valve, a supporting bar carrying said thermostatic bar, and means for variably adjusting the supporting bar to shift the supporting end of said thermostatic bar so as to variably control the temperature at which said valve opens communication between the cylinder and the intake of the engine.

2. In combination with an internal combustion engine having a water cooling system including a water jacket for the engine cylinders and a radiator connected to said water jacket, of a valve for controlling the volume of water passing from the water jacket to the radiator, a piston for operating said valve, a cylinder receiving said piston, a connection between said cylinder and the engine intake manifold having a chamber, a valve in said chamber adapted to control communication between said cylinder and the intake manifold, a thermostatic bar located in said chamber and adapted to actuate said second-named valve, and adjusting means for said thermostatic bar to variably control the temperature at which said second-named valve will be operated.

3. In combination with an internal combustion engine having a water cooling system including a water jacket for the engine cylinders and a radiator connected to said water jacket, of a valve for controlling the volume of water passing from the water jacket to the radiator, a piston for operating said valve, a cylinder receiving said piston, a connection between said cylinder and the engine intake manifold having a chamber, a valve in said chamber adapted to control communication between said cylinder and the intake manifold, a thermostatic bar located in said chamber and adapted to actuate said second-named valve, a supporting member for said thermostatic bar, and means for adjusting said supporting member so as to variably control the temperature at which said second-named valve will be operated.

CHESTER M. DOWELL.