April 22, 1930. J. E. ESHBAUGH 1,755,984

THERMOSTAT

Filed April 7, 1928 2 Sheets-Sheet 1

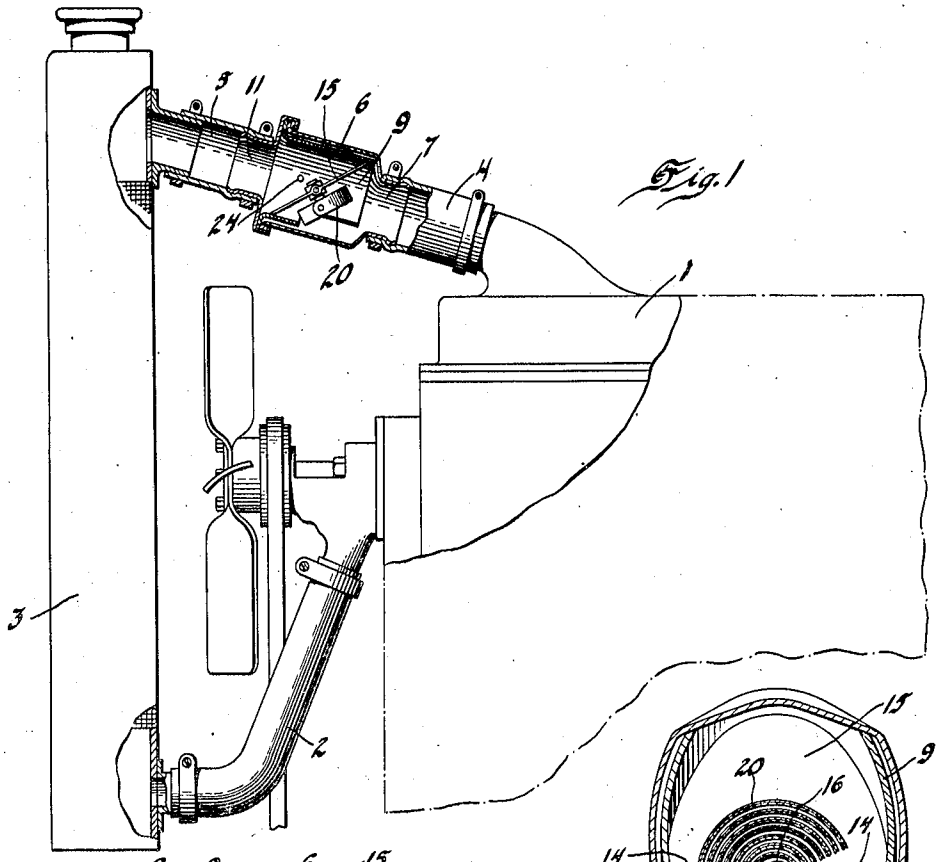

Fig. 1

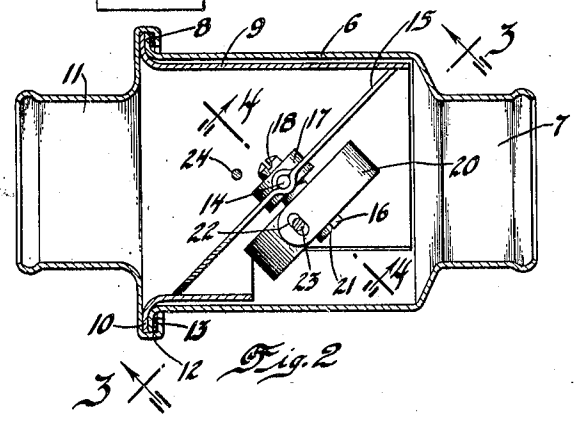

Fig. 2

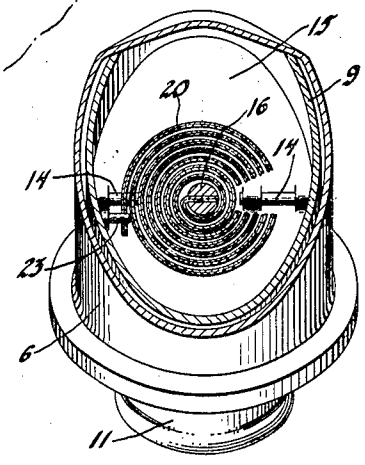

Fig. 3

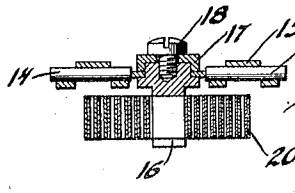

Fig. 4

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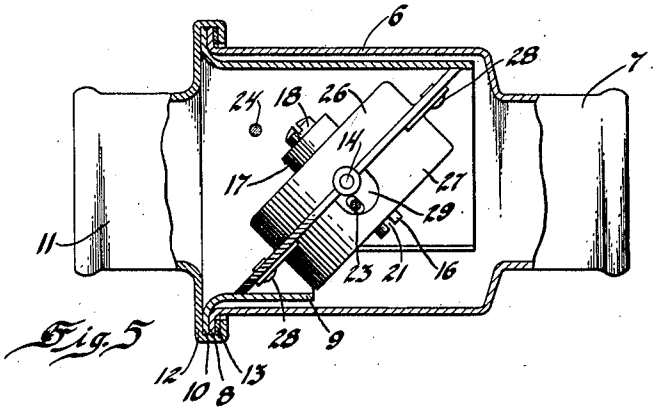

Fig. 5

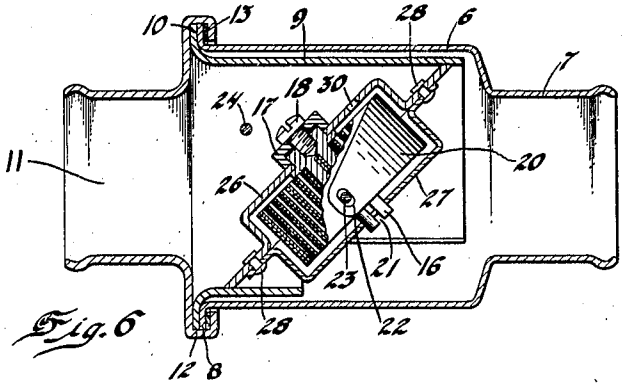

Fig. 6

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UNITED STATES PATENT OFFICE

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THERMOSTAT

Application filed April 7, 1928. Serial No. 268,189.

This invention relates to cooling systems for internal combustion engines or the like and more particularly to a thermostatically operated valve for controlling liquid flow through the system in accordance with the temperature of the liquid.

It is an object of the invention to provide a device that may be readily inserted as a unit in the cooling system of an engine, either as standard equipment on new cars or as an accessory on existing vehicles, without requiring change in the engine design.

Another object of the invention is to provide a device that will cut off circulation through the cooling system when the engine is cold, in order that the liquid in the water jackets of the engine may be warmed up quickly to proper temperature for efficient engine operation and which, as the heat of the liquid increases, will automatically allow circulation through the radiator for the dissipation of excess heat and the prevention of engine overheating.

A further object of the invention is to provide an improved design of the thermostatic valve unit which will be simple in construction, economical in manufacture, entirely automatic in operation, efficient in use, easy to install, and unlikely to get out of order.

Other objects and advantages will be apparent from the following specification taken in connection with the accompanying drawing in which:

Figure 1 is a side elevation of a portion of an engine and a radiator associated therewith, with parts broken away and shown in section, illustrating the installation of the device forming the present subject matter.

Figure 2 is a longitudinal sectional view of the device with the valve shown in closed position.

Figure 3 is a sectional view taken on line 3—3 of Figure 2.

Figure 4 is a detail sectional view taken on line 4—4 of Figure 2.

Figure 5 is a side elevation, partly broken away, of a modified element and

Figure 6 is a longitudinal sectional view of the device shown in Figure 5.

Referring to the drawing, water or other cooling medium is supplied to the water jackets of the internal combustion engine 1, through a hose connection 2 leading from the bottom of a radiator 3, and returns to the upper portion of the radiator from the water jackets through suitable hose connections 4 and 5, between which may be inserted the device forming the present subject matter. This type of circulating system is more or less conventional. As to the thermostatic control unit, the numeral 6 indicates a cylindrical container, having a reduced extension 7 at one end about which the hose 4 may be clamped, and an annular out-turned flange 8 at its opposite end; the numeral 9 indicates a cylindrical casing or cage inserted within the container 6, and also having an annular out-turned flange 10 lying adjacent the flange 8, while the reference character 11 indicates a tubular extension for the clamping thereon of the hose 5, one end 12 being flanged outwardly and then bent or spun over the flanges 10 and 8 as well as a sealing gasket 13, to form a leak proof joint and a rigid connection between the parts. Pivotally mounted on a pair of aligned shafts 14 carried by the inner casing or cage 9, is a balanced plate or disc valve 15 having a central opening through which projects a shouldered extension of stud 16, extending transversely or perpendicularly to the face of the plate valve, and which is held in place by a cap or washer 17 and a set screw 18 threaded into the end of the stud. A coiled or spirally wound bi-metallic strip or thermosensitive element 20 is carried by and lies in the same plane of the plate valve 15, the inner end being fixedly secured in a transverse slot 21 of stud 16, and the outer end being provided with a slot 22 through which extends loosely a projection or pin 23 in the side of the inner casing 9. This arrangement of the coil does not materially affect the balance of the valve. It will be evident that temperature changes will tend to wind or unwind the coil since the outer end of the coil is held fixed by the pin and slot connection, and this winding tendency will cause the inner end of the coil to act on the stud 16 and swing the valve about its pivotal axis, to either the closed position shown in Figure 2, or to an

open position wherein the valve will abut the pin or stop 24. The pin and slot connection 23—22 is intended to relieve twisting strains on the coil during the swinging movement of the valve. If desired however, a rigid connection may be substituted, in which event the flexibility of the coil may be relied on to withstand any twisting of the coil without harmful effect.

In order that the opening and closing movements of the valve may be varied according to conditions of use, the mounting of the coiled thermosensitive unit has been made adjustable. To effect an adjustment it is only necessary to turn back or loosen the screw 18, whereupon a suitable tool may be engaged with the stud 16 in the slot 21 and then rotated to wind or unwind the coil to a proper extent, after which the screw 18 may be again drawn up to firmly hold or lock the coil in its adjusted position.

By mounting the valve and thermosensitive valve operating element in an independent casing or cage 9, which is positioned within the outer casing, there is provided a small compact assembly that may be made from thin gauge material at small cost, and without requiring extreme care and accuracy in manufacture, and which eliminates the possibility of leakage of liquid from the system at the shaft bearings.

If desired the coiled thermostat may be encased to free it from dirt and sediment, as is shown in Figures 5 and 6, which also insures better balance of the valve. In this instance, the coil is mounted in the depression 26 and is covered by the cap 27 secured in place by rivets 28. A small amount of liquid is allowed to circulate through the casing, entering through the slot 21 in the mounting stud 16, and also through opening 29 for the pin 23, and passing out an opening or small port 30 in the depressed portion 26 of the valve. The construction is otherwise as before described.

I claim:

1. A casing, a swinging butterfly valve pivotally mounted therein, a coiled thermostatic element carried by said valve with its convolutions receding from a pole perpendicular to the pivotal axis of the valve, and, having one end secured to the valve and the other end secured to the casing.

2. A casing, a butterfly valve pivotally mounted therein, a stud carried by the valve and extending transversely to the pivotal axis of the valve, a coiled thermostatic element having its inner end fixed to said stud, and its outer end secured to the casing.

3. A casing, a shaft extending crosswise of the casing, a plate valve pivotally mounted on the shaft, a coiled thermostatic element carried by the plate valve on one side thereof and having its outermost coil bearing against the casing, whereby the expansion or contraction of the coil under temperature variations opens or closes said valve.

4. A casing, a plate valve pivotally mounted on a transverse axis therein, a coiled thermostatic element mounted on one side and extending in a plane parallel to that of the plate valve, and means to secure the outer end of the coiled thermostatic element on the casing.

5. A casing, a butterfly valve pivotally mounted therein on an axis extending crosswise of the casing, a stud carried by the valve and rotatable on an axis extending transversely to that of the valve, a coiled thermostatic element having one end secured in fixed relation with said casing and its other end secured to the rotatable stud, whereby its windings may be varied.

6. A casing, a valve pivotally mounted for swinging movement on a transverse axis therein, a coiled thermo-sensitive element lying in a plane parallel to that of the valve, means to fixedly secure the inner end of said coiled element to said valve, and a fixed projection extending loosely through a slot in the outer end of said element, whereby to free the coil of twisting strains during the swinging movement of the valve.

7. A casing, a valve pivotally mounted on a transverse axis therein, a coiled thermo-sensitive element lying in a plane parallel to that of the valve and having a slot in its outer end, a projection on the casing extending loosely thru said slot to hold said outer end in fixed relation with the casing while permitting the swinging movement of the coil with the valve, and an adjustable member carried by the valve to which the inner end of the coiled element is fixed.

8. A casing, a plate valve pivotally mounted therein, an adjustable stud carried by and extending transversely to the axis of the plate valve, a spirally coiled thermo-sensitive element lying in a plane parallel with that of the plate valve on one side thereof, and having its inner end fixed to said adjustable member, and means to anchor the outer end of the coiled element in fixed relation with said casing.

9. The structure of claim 8 wherein the anchoring means comprises a projection on the casing extending loosely thru an opening in the end of the coiled thermo-sensitive element to accommodate the swinging movement of the element with said valve.

10. A casing, a plate valve pivotally mounted therein, an adjustable stud carried by and extending transversely to the axis of the plate valve, a coiled thermo-sensitive element lying in a plane parallel with that of the plate valve, and having its inner end fixed to said adjustable member, means to lock the stud in adjusted position and a connection between the outer end of the coiled element and the casing.

11. A casing for fluid flow, a shaft extending crosswise of the casing, a butterfly valve pivotally mounted on the shaft for swinging movement to opened and closed positions and having a lateral projection thereon, a coiled thermostat extending in a plane parallel to that of the valve, connections between one end of the coiled thermostat and said projection, and a connection between the opposite end of the thermostat and the casing, one of said connections being adjustable to permit variations in the coil winding.

In testimony whereof I affix my signature.

JESSE E. ESHBAUGH.