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C. F. PIZZEY

METHOD OF AND MEANS FOR AUTOMATIC CONTROL OF THE TEMPERATURE IN THE WATER JACKETS OF INTERNAL COMBUSTION ENGINES

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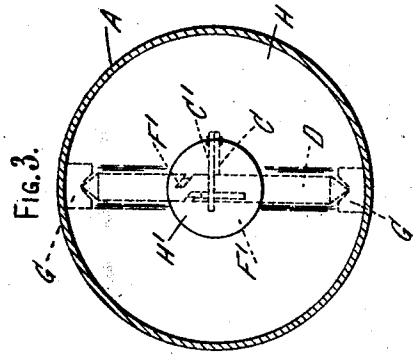


FIG. 3.

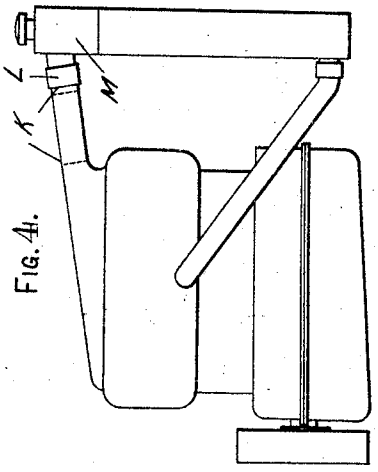


FIG. 4.

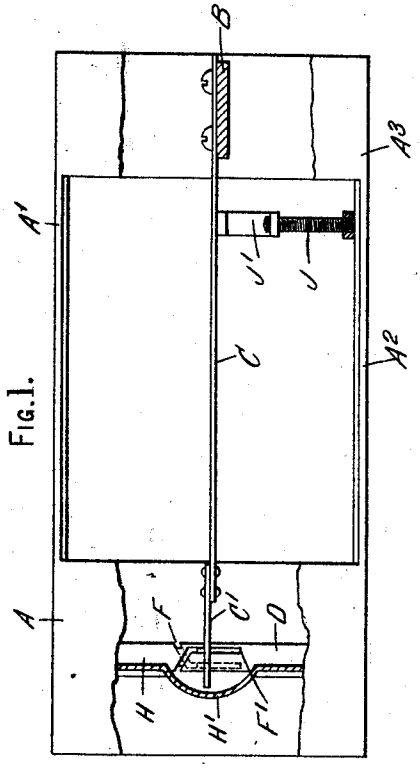


FIG. 1.

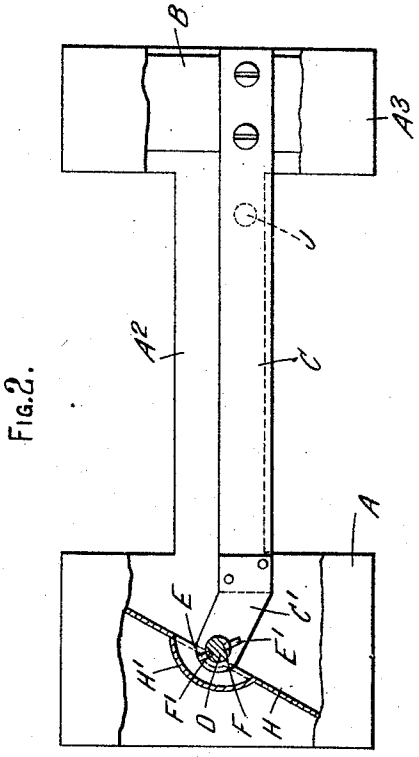


FIG. 2.

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METHOD OF AND MEANS FOR AUTOMATIC CONTROL OF THE TEMPERATURE IN THE WATER JACKETS OF INTERNAL-COMBUSTION ENGINES.

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To all whom it may concern:

Be it known that I, CYRIL FRANK PIZZEY, a subject of the King of Great Britain, and a resident of 127 Samuel Street, Woolwich, London, S. E. 18, England, have invented a new and useful Method of and Means for Automatic Control of the Temperature in the Water Jackets of Internal-Combustion Engines, of which the following is the specification.

In internal combustion engines hitherto, especially those used for propelling motor vehicles, it has been a great disadvantage that when left for a time with the engine not running, the cylinders rapidly cool owing to the continued circulation of the water from the jacket through the radiator or the like. It is frequently seen that to avoid this disadvantage, motor drivers will, when leaving the car standing for a time, place a rug or some cover over the radiator to retain the heat. Other disadvantages also occur which are afterward referred to.

It is the chief object of this invention to avoid these disadvantages.

According to this invention I provide and fit a thermostat within preferably the outlet or flow pipe from the engine jacket to the radiator in motor vehicle engines, or the outlet pipe to the cooling tank in stationary or other power engines.

The thermostat may conveniently and preferably consist of a bi-metal strip, as for example, invar-zinc, and I connect the thermostat suitably to a throttle or butterfly valve pivotally mounted within the said pipe, the thermostat being mounted between the valve and the water jacket.

One end of the thermostatic strip may be mounted on a stud or base plate projecting within the pipe and the other end of the said strip may operate the valve by means of a plate or fork with opposed pins fitting within cam grooves arranged on the spindle of the valve, whereby the valve is partly rotated.

The thermostatic control is so arranged that when the temperature of the water in the cylinder jacket is less than approximately 85° C., the pivoted disc valve or throttle valve or the like is closed, and the valve thus preventing circulation of the cooling water through the radiator, or to the tank or the like, the water in the cylinder jacket therefore retains its heat, and the engine may be more rapidly started when desired.

When the engine has been started and the temperature of the cooling water rises, for example above 85° C., the valve begins to open by means of the thermostat and at 95° C. for example, it is fully open. This operation has the following effects that:— (1) the water in the cylinder jacket is kept at a far higher average and more uniform temperature than hitherto, (2) excessive cooling of the engine cylinders is prevented, so preventing loss of efficiency, and (3) when the engine is started, as circulation cannot commence at once the cooling water rapidly reaches a high temperature, and the circulation cannot commence until the desired or predetermined temperature is reached.

The preferred mode of carrying my invention into effect is illustrated in the accompanying drawing in which:—

Fig. 1 is a part sectional elevation,

Fig. 2 is a plan of Fig. 1,

Fig. 3 is an end view showing the valve face, and,

Fig. 4 is an elevation of a multi-cylinder engine indicating the position of my thermostatic device.

A is the casing of the thermostat consisting of a piece of tube having two central portions, cut away on each side leaving two bridge pieces A^1 and A^2 connecting the two tubular ends A and A^3. In the casing end A^3 is mounted a transverse plate member B to which is secured by screws the end of the bi-metal strip C. The other end of the strip has riveted thereto the plate C^1 conveniently at an angle as shown. The plate C^1 has a hole at its end which loosely fits the valve spindle D. The plate has secured thereto conveniently by soldering two pins E, E^1, diametrally arranged with regard to the hole, each pin projecting toward the centre radially and fitting a slot formed in the spindle D. The two cam slots F, F^1, oppositely cut are longitudinal at one end

and at the other are cut at an angle like two opposed threads of a screw, see Figs. 1 and 3. The spindle D is rotatably supported in point and cup bearings G secured inside the casing A.

The throttle valve H is formed as a disc normally closing the passage through the casing. It has a dished projecting portion H^1 at its centre to accommodate the plate C^1 and permit of its movement along the spindle. The disc valve H is secured to the spindle by soldering or other convenient means. The screw J is secured to the bridge piece A^2 and has the nut member J^1 fitted thereon to provide adjustment as the stop or limitation of return movement of the bi-metal strip C which abuts against the nut member J^1 when the jacket water is cold. The dotted lines K in Fig. 4 indicate the preferred position for placing the device in a multi-cylinder internal combustion engine as fitted on a vehicle, the device being fitted inside the water outlet pipe L between the cylinders and the top of the radiator M as shown, the end A^3 of the casing A being placed nearest the cylinders so that the heated water has direct access to the bi-metal strip.

In operation, as the temperature of the jacket water rises the heat is conveyed to the bi-metal strip immersed in it, and the unequal expansion thereof causes the strip C with its attached plate C^1 to move laterally and the pins therefore slide slowly with the further rise in temperature along the longitudinal or axial portion of the slots formed in the spindle. When the desired or predetermined temperature has been reached the pins engage the portions of the slots cut at an angle and the pressure of the pins caused by the further lateral bending of the bi-metal strip causes the spindle to rotate carrying the valve with it, the valve thus being turned on its spindle is opened slightly and the water in the tube L begins to circulate but in restricted volume. As the temperature further rises, the valve is further opened until it is turned to a position almost parallel with the axis of the tube and of the casing A when unrestricted circulation of the water will take place.

It will be observed that by this device a considerable movement of the bi-metal strip may occur along the longitudinal slot until the desired or predetermined temperature is reached before the thermostatic strip begins to operate to open the valve.

Although two opposed slots and two pins are shown in the drawings, it is found in practice that a single pin and a single cam slot serve to satisfactorily operate the spindle and valve, but I prefer to employ two as shown, the two being more reliable.

What I do claim as my invention and desire to secure by Letters Patent is:—

1. A device for automatically controlling the temperature of water in the water jacket of an internal combustion engine comprising a casing adapted to be fitted within the jacket outlet pipe, a bi-metal strip mounted in the casing, pins attached to the strip, a spindle having slots therein to receive the pins, and a valve carried by the spindle, said valve being operated by the movement of the bi-metal strip when a predetermined temperature has been reached.

2. A device for automatically controlling the temperature of water in the jacket of an internal combustion engine, comprising a casing fitted within the jacket outlet pipe, a bi-metal strip mounted in the casing, pins attached to the strip, a spindle mounted in bearings in the casing and having slots therein to receive the pins, and a throttle valve carried by the spindle, said valve having a dished portion at its center to enable the end of the bi-metal strip to surround the spindle.

3. A device for automatically controlling the temperature of water in the jacket of an internal combustion engine, comprising a casing fitted within the jacket outlet pipe, a bi-metal strip mounted in the casing, pins attached to the strip, a spindle mounted in bearings in the casing, said spindle having a curved slot longitudinally or axially arranged for a portion of the length of the slot to receive the pin, and a throttle valve carried by the spindle, said valve having a dished portion at its center to enable the end of the bi-metal strip to surround the spindle.

4. A device for automatically controlling the temperature of water in the jacket of an internal combustion engine, comprising a casing fitted within the jacket outlet pipe, a bi-metal strip mounted in the casing, pins attached to the strip, a spindle mounted in bearings in the casing and having slots therein to receive the pins, and a throttle valve carried by the spindle.

5. A device for automatically controlling the temperature of water in the jacket of an internal combustion engine, comprising a casing fitted within the jacket outlet pipe, a bi-metal strip mounted in the casing, pins attached to the strip, a spindle mounted in bearings in the casing, said spindle having a curved slot longitudinally or axially arranged for a portion of the length of the slot to receive the pins, and a throttle valve carried by the spindle.

CYRIL FRANK PIZZEY.