

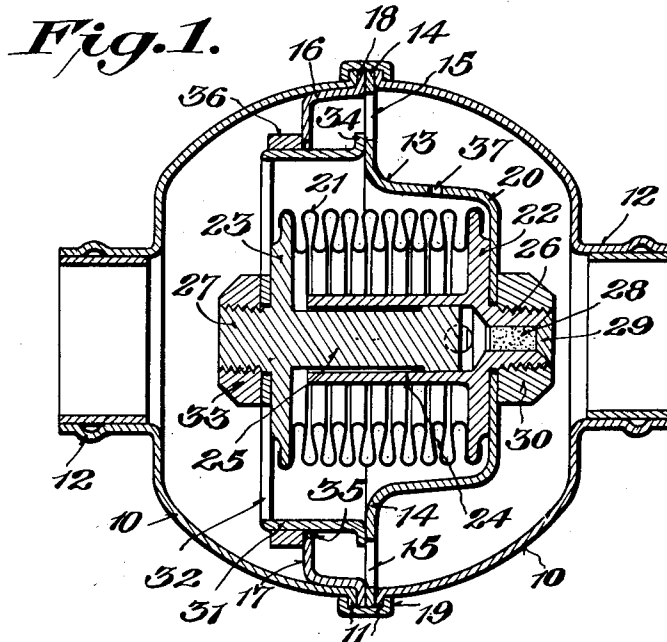
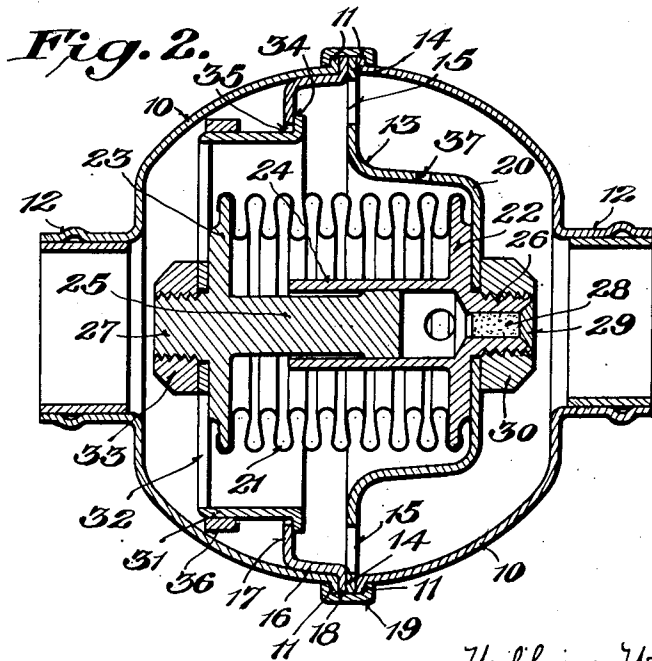
Aug. 16, 1927.

1,639,286

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TEMPERATURE REGULATOR

Filed Dec. 27, 1926



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UNITED STATES PATENT OFFICE.

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TEMPERATURE REGULATOR.

Application filed December 27, 1926. Serial No. 157,344.

This invention relates to thermostatically controlled valve mechanism, and particularly to valve mechanism of this character for controlling the circulation of a cooling medium through the cooling system of an internal combustion engine.

It is an object of this invention to provide a thermostatically controlled valve mechanism of the choker type of improved construction wherein the thermostatic element is protected from the effects of variations in the velocity head of the circulating cooling medium and whereby the thermostatically operated valve mechanism may be simply built up of a few easily and inexpensively manufactured elements, with the elimination of sliding fits and the machine work incident thereto. Other objects will appear as the description of the invention proceeds.

The invention is capable of receiving a variety of mechanical expressions, one of which is shown on the accompanying drawings, but it is to be expressly understood that the drawing is for purposes of illustration only, and is not to be construed as a definition of the limits of the invention, reference being had to the appended claims for that purpose.

Referring in detail to the drawing, wherein the same reference characters are employed to designate corresponding parts in both figures:

Fig. 1 is an axial section of an embodiment of the present invention, showing the thermostat contracted and the valve closed; and

Fig. 2 is an axial section of the embodiment of Fig. 1, but with the thermostat expanded and the valve open.

In the form shown, the thermostatically operated valve unit is enclosed in a casing of any suitable size, construction and material, but preferably composed of two generally hemispherical halves 10, which may be conveniently pressed up from sheet metal or stamped or drawn to shape. Each half is provided with a peripheral flange 11, and a central or axially arranged nipple 12 whereby the casing may be connected into the water line of any suitable cooling system.

Within the casing 10, 10 is mounted, in any suitable way, a generally cup-shaped thermostat support 13 provided with a radially directed flange 14 having apertures

15 of such a number and size as to afford the proper flow of cooling medium. Also mounted within said casing is a cup-shaped valve seat member 16 having a radially directed flange 17 which constitutes the valve seat, said member also being shown with a second radially directed flange 18 whereby said member may be mounted in position. While said thermostat support 13 and valve seat member 16 may be mounted in position in any suitable way, they are preferably fixedly retained in position by clamping the flanges 14 and 18 between the flanges 11 of the casing halves, in which position the parts may be fixedly and rigidly secured together, forming a fluid-tight joint, by embracing the flanges 11, 14, 18 with a U-shaped clamping ring 19, which may be soldered or otherwise suitably secured to said flanges or the casing halves.

Mounted on said thermostat support 13 and within the cup-shaped depression 20 formed in said support, is a thermostat of any suitable size, construction and type, but preferably composed of a deeply corrugated, expansible and collapsible tubular wall 21, preferably of resilient metal, and secured at its ends in any suitable way, as by soldering or brazing, to a stationary end wall 22 and a movable end wall 23. In the form shown, said end walls 22 and 23 are provided interiorly of the corrugated wall with telescopic guide members 24 and 25, respectively, and one of said telescopic members, as the tubular member 24, is made of such length as to constitute a stop for limiting the contraction of the thermostat when the same is not mounted in position. Each of said end walls 22 and 23 is also shown as provided with an exteriorly threaded boss, 26 and 27 respectively, for a purpose to be described. The thermostat is provided with a suitable filling opening so that the volatile fluid of suitable character may be introduced into the interior thereof and said filling opening may be conveniently formed in the boss 26, said opening being shown as sealed with a stopper 28 and solder 29.

The thermostat is mounted in position on the thermostat support 13 by passing the threaded boss 26 through an aperture centrally arranged in the bottom of the depression 20 of said support, and clamping the

stationary end wall 22 fixedly and rigidly to said support by a nut 30 threaded onto said boss 26.

Mounted on the boss 27 in any suitable way is a cup-shaped valve member 31 provided with apertures 32 of suitable size and number in its bottom wall, so as to provide for an adequate flow of the cooling medium. Said valve member is shown as fixedly clamped to the movable end wall 23 of the thermostat by a nut 33 threaded onto boss 27. Said valve member 31 is provided at the inner extremity of its skirt with a peripheral, outwardly directed flange 34 adapted to engage the flange 14 of the thermostat support 13, radially inside of the peripheral apertures 15, whereby said flange 14 constitutes a valve seat for said valve member 31. Said flange 34 is also preferably adapted to engage the inner side of the flange 17, upon expansion of the thermostat, as a limit stop for said expansive movement. The aperture 35 in said valve seat member 16 is made of such a size that it freely receives the skirt of the cup-shaped valve member 31 with a substantial clearance, so as to eliminate the necessity for machining either the peripheral surface of the valve member or the aperture of the member 16 closely to size.

Mounted on the cup-shaped valve member 31 is a second valve member 36, provided thereon in any suitable way, said member 36 being of such a size and so located on said member 31 that it will contact the outer face or valve seat portion of the flange 17 and close the opening between the skirt of the member 31 and the wall of the aperture 35, when the flange 34 is in contact with the valve seat or flange 14 of the thermostat support. Valve member 36 may be formed integrally with member 31, but it is preferably formed as a separate ring which may be conveniently positioned on the valve member 31 by slipping the ring 36 over the valve member 31 until it contacts the flange 17 throughout its extent when flange 34 is in contact with flange 14, and then soldering or otherwise suitably attaching the member 36 to the member 31.

If desired, a bleed opening 37 may be formed in the lateral wall of the depression 20 of the thermostat support so as to provide a constant flow of the cooling medium over the thermostat when the flange 34 is in contact with the flange 14.

In operation, when the cooling medium is below that temperature at which it is desired that circulation thereof be permitted through the cooling system, the thermostat is contracted and holds the flange 34 of the valve member 31 against the flange or valve seat 14 of the thermostat support 13, and the valve member 36 against the valve seat 17, thereby preventing circulation of the

cooling medium through the casing 10, 10, except for such circulation as is permitted through the bleed opening 37, as shown in Fig. 1. When the temperature of the cooling medium rises above that temperature at which circulation is to be permitted, the thermostat expands and moves the valve members from the position shown in Fig. 1 toward the position shown in Fig. 2, the flange 34 being thereby withdrawn from flange 14 so that the medium may flow through the openings 15 and between the flanges 34 and 14 out through the openings 32. If the thermostat continues to expand owing to a rise in temperature of the cooling medium, the parts will finally assume the position shown in Fig. 2 wherein the flange 34 has engaged the inner wall of the flange 17 and further expansion of the thermostat is prevented. When the temperature of the cooling medium decreases, the thermostat contracts and moves the flange 34 toward the flange 14, decreasing the circulation, and when the temperature falls below that at which circulation is to be permitted, flange 34 contacts flange 17 to stop the circulation between said flanges and out through the openings 32, the valve member 36 simultaneously contacting the flange 17 and preventing all flow of the cooling medium between the valve member 31 and said flange 17.

The valve unit may be mounted in the water line so as to permit circulation in either direction through the casing 10, 10. Preferably, the valve unit is so mounted in the water line that the inlet is at that side adjacent the thermostat support, so that when the valve members are closed against their seats the thermostat is not open to the pressure in the line leading to the casing 10, 10, and when the valve members are opened the direction of circulation (through the openings 15, between the flanges 34 and 14, and out through the apertures 32) is normal to the circumferential wall of the thermostat, so that the latter is unaffected by the variations in the velocity head of the circulating medium.

The thermostat is preferably charged with its volatile fluid at such a pressure that the interior pressure, at all temperatures below that at which the thermostat is designed to expand, is less than the exterior pressure, so that if the internal and external pressures become equalized, as by a leak in the thermostat, there will be an unbalanced force tending to expand the thermostat and open the valves, this unbalanced force being provided by the inherent resiliency of the expansible and collapsible wall, or in any other suitable way. While this is the preferred construction of thermostat, the invention is not limited thereto, as any other suitable type of construction of thermostat may be employed.

It will therefore be perceived that a novel

thermostat unit has been provided which protects the thermostat against fluctuations in the velocity head of the circulating medium and which is composed of a few easily manufactured and assembled parts, all of which may be inexpensively constructed, while the cost of machining parts to close dimensions, as in the case of sliding fits, has been eliminated. Thereby a thermostatically controlled valve mechanism of the choker type has been provided which is inexpensive to manufacture and easy to install.

While the embodiment of the invention illustrated on the drawing has been described with considerable particularity, it is to be expressly understood that the invention is not restricted thereto, as the same is capable of receiving other mechanical expressions, some of which will now readily suggest themselves to those skilled in the art, while changes may be made in the details of construction, arrangement and proportion of parts without departing from the spirit of this invention. Reference is therefore to be had to the appended claims for a definition of said invention.

What is claimed is:

1. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat support mounted within said casing, a thermostat mounted on said support, a valve member operatively connected to said thermostat and adapted to seat against said support, a member surrounding said valve member, and a second valve member carried by said first valve member and adapted to seat against said surrounding member to prevent flow around said valve members.

2. In a thermostatically controlled valve mechanism, in combination with a casing, a cup-shaped thermostat support mounted within said casing, a thermostat mounted within the depression of said support, a valve member operatively connected to said thermostat and adapted to seat against said support, a member surrounding said valve member, and a second valve member on said first valve member adapted to seat against said surrounding member to prevent flow around said valve members.

3. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat support mounted within said casing, a thermostat mounted on said support, a cup-shaped valve member surrounding and operatively connected to said thermostat and adapted to seat against said support, a member surrounding said valve member, and a second valve member mounted on said first valve member and adapted to seat against said surrounding member to prevent flow around said valve members.

4. In a thermostatically controlled valve mechanism, in combination with a casing, a

cup-shaped thermostat support mounted within said casing, a thermostat mounted in the depression of said support, a cup-shaped valve member surrounding and operatively connected to said thermostat and adapted to seat against said support, a member surrounding said valve member, and a second valve member mounted on said first valve member and adapted to seat against said surrounding member and prevent flow around said valve members.

5. In a thermostatically controlled valve mechanism, the combination of a two-part casing, a thermostat support clamped between the parts of said casing, a thermostat mounted on said support, a valve member operatively connected to said thermostat and adapted to seat against said support, a stationary member surrounding said valve member and also clamped between said parts, and a second valve member on said first valve member adapted to seat against said stationary member and prevent flow around said valve members.

6. In a thermostatically controlled valve mechanism, the combination of a two-part casing, a cup-shaped thermostat support clamped between the parts of said casing, a thermostat mounted within the depression of said support, a cup-shaped valve member surrounding and operatively connected to said thermostat and adapted to seat against said support, a stationary member surrounding said valve member and also clamped between parts of said casing, and a second valve member on said first valve member adapted to seat against said stationary member and prevent flow around said valve members.

7. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat support mounted within said casing, a thermostat mounted on said support, a valve member operatively connected to said thermostat and adapted to seat against said support, a stationary member surrounding said valve member and approximately filling the space between said valve member and said casing, and a member mounted on said valve member and adapted to seat against said stationary member to prevent flow therebetween when said valve member is in contact with said support.

8. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat support mounted within said casing, a thermostat mounted on said support, a cup-shaped valve member surrounding and operatively connected to said thermostat, said valve member having a peripheral flange adapted to seat against said support, a stationary member surrounding said valve member and approximately filling the space between said valve member and said casing, and a member on said valve member adapted

to seat against said stationary member and prevent flow therebetween when said flange is in contact with said support, said flange also being adapted to engage said stationary member and limit the expansion of said thermostat.

9. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat support mounted in said casing, a thermostat mounted on said support, a valve seat member mounted in said casing and surrounding said thermostat, and a composite cup-shaped valve member operatively connected to said thermostat and adapted to simultaneously seat against said support and said valve seat member to prevent flow through or around said valve member.

10. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat support mounted therein, a thermostat mounted on said support, a valve seat member mounted in said casing and surrounding said thermostat, and a composite cup-shaped valve member operatively connected to and surrounding said thermostat, said valve member permitting circulation between said support and said valve member when said thermostat is expanded, and said valve member simultaneously contacting both said support and said valve seat member when said thermostat is contracted.

11. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat support mounted in said casing, a thermostat mounted on said support, a centrally apertured valve seat member mounted in said casing and surrounding said thermostat, a cup-shaped valve member operatively connected to said thermostat and adapted to seat against said support, said valve member being movable within the aperture of said valve seat member, and means on said valve member adapted to engage said valve seat member and close the opening between the same and said valve member when said valve member is in engagement with said support.

12. In a thermostatically controlled valve mechanism, the combination of a casing, a cup-shaped thermostat support in said casing, a thermostat mounted within the depression of said support, a valve seat member mounted in said casing and surrounding said thermostat, a cup-shaped valve member operatively connected to said thermostat and

surrounding the same, said valve member being movable within the opening of said valve seat member and adapted to seat against said support, and means on said valve member adapted to seat against said valve seat member and close the opening between the same and said valve member when said valve member is in contact with said support.

13. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat mounted within said casing, a cup-shaped valve member operatively connected to said thermostat, a stationary member cooperating with the open end of said valve member and forming a valve seat therefor, a second stationary member surrounding said valve member, and a second valve member on said cup-shaped valve member adapted to seat on said second stationary member when said cup-shaped valve member seats on said first stationary member.

14. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat mounted within said casing, a cup-shaped valve member operatively connected to said thermostat and having a flange at the periphery of its skirt, a stationary member providing a seat for said flange, a second stationary member surrounding said valve member, and a second valve member on said cup-shaped valve member adapted to seat on said second stationary member when said flange seats on said first stationary member.

15. In a thermostatically controlled valve mechanism, in combination with a casing, a thermostat mounted within said casing, a cup-shaped valve member operatively connected to said thermostat and having a flange at the periphery of its skirt, a stationary member providing a seat for said flange, a second stationary cup-shaped member spaced from said first stationary member and surrounding said valve member, and a second valve member on said cup-shaped valve member, said second valve member and said flange adapted to contact said second stationary member at the opposite limits of movement of said cup-shaped valve member.

In testimony whereof I have signed this specification.

WILLIAM W. CARSON, Jr.