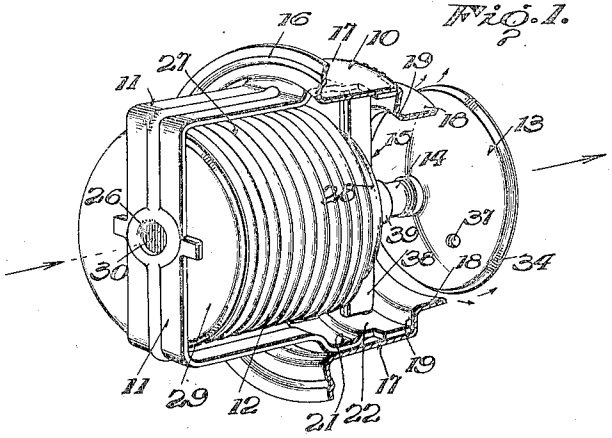
Oct. 4, 1938. J. E. DUBE 2,132,290

TEMPERATURE REGULATOR

Filed June 27, 1935

Fig. 1.



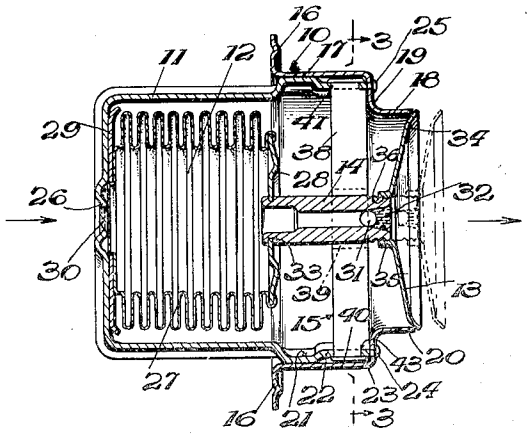


Fig. 2.

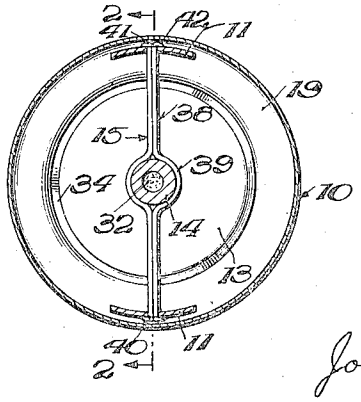


Fig. 3.

Inventor

John E. Dube.

By

Cameron, Kerkam & Sutton Attorneys

Patented Oct. 4, 1938 2,132,290

UNITED STATES PATENT OFFICE

2,132,290

TEMPERATURE REGULATOR

John E. Dube, Knoxville, Tenn., assignor to The Fulton Sylphon Company, Knoxville, Tenn., a corporation of Delaware

Application June 27, 1935, Serial No. 28,728

11 Claims. (Cl. 236—34)

This invention relates to temperature regulators, and more particularly to a temperature regulator for controlling the circulation of cooling medium through the cooling systems of internal combustion engines.

It is an object of this invention to provide a device of the type characterized which is simple in construction, formed of few parts all of which are capable of manufacture by simple and inexpensive operations, easily assembled, and susceptible of production in large quantities from standardized parts at a relatively low cost.

Another object of this invention is to provide a device of the type characterized which is particularly adapted for use in automobile cooling systems and which is so constructed as to form a relatively simple and inexpensive unit that may be readily assembled with the cooling system.

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 drawing, 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 the several figures,

Fig. 1 is a perspective elevation, partly broken away, of an embodiment of this invention;

Fig. 2 is an axial section of said embodiment; and

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

In the form shown the regulator is composed of a tubular housing 10, a strap 11 carried thereby and adapted to support a thermostat 12, and a valve member 13 connected to the thermostat by a valve stem 14 and suitably guided by a valve stem guide 15.

The tubular housing 10 may be made of any suitable size, material and construction. As shown it is provided with a flange 16 adapted to be engaged with or supported on any suitable member of the cooling system, as a wall of the engine jacket or a wall of the radiator, etc., but if preferred the structure may be made of the type that is adapted to be inserted in a hose line. Said tubular housing 10 may be made in any suitable way, but preferably is drawn from sheet metal for simplicity of construction. As shown said housing comprises two tubular sections 17 and 18 of different diameters, the latter being of smaller diameter, joined by a shoulder 19. The portion 18 of said housing terminates in a valve seat 20 which may be of the full inside diameter of the said portion 18 and with which cooperates the valve member 13 to be described.

The strap 11 is preferably formed of sheet metal and bent into U-shape as shown. Said strap adjacent the ends thereof is shown as provided with outwardly deflected portions 21 having substantially the same outside dimension as the interior diameter of the portion 17 of the housing, so that said strap will fit within said housing portion 17. The end portions 22 of the strap are preferably bent to a somewhat smaller outside dimension as shown so as to leave a clearance 23 between said end portions and the tubular portion 17 of the housing for a purpose to be explained. The extremities 24 of said strap are inserted in slots 25 formed in the shoulder 19, as illustrated, and retained therein in any suitable way, as by upsetting, swaging, spot welding, etc., so as to prevent withdrawal of the strap from said slots. Midway of the bottom section of the U-shaped strap, said strap is apertured as shown at 26 or otherwise suitably formed so as to afford a means of attachment for the thermostat next to be described.

The thermostat may be of any suitable type and construction. As shown it is composed of a tubular, deeply corrugated expansible and collapsible metal wall 27 having one end suitably secured to a movable end wall 28, as by folding the end corrugation over the periphery of said end wall 28 and soldering the same thereto, and having its opposite end either integral with a stationary end wall or suitably attached to a stationary end wall 29, here shown as in the form of a guard wall of slightly greater diameter than the corrugated wall 27 and suitably secured to the end wall of the bellows 27, as by swaging said end wall into an aperture in said guard wall to provide a central boss 30 which may project into the aperture 26 in the strap 11, said guard wall being soldered or otherwise suitably secured to the strap.

Attached in any suitable way to the movable end wall 28 of the thermostat 12 is the valve stem 14, here shown as tubular so as to provide a filling opening for the thermostat 12. After a suitable charge has been introduced into the thermostat said filling opening may be sealed in any suitable way, as by a ball 31 and plug of

solder 32. The inner end of the valve stem 14 is shown as secured to the movable end wall 28 by reducing the diameter at the inner end of said stem 14, passing the same through an aperture in the end wall 28 and then swaging over the portion of reduced diameter so as to lock said end wall 28 against the shoulder 33 on the valve stem 14.

The valve member 13 may be of any suitable construction and attached to the valve stem 14 in any suitable way. As shown said valve member 13 is formed of sheet metal and dished so as to provide a valve member of substantially the diameter of the portion 18 of the tubular housing, said valve member preferably having an angularly directed peripheral portion 34 that is adapted to make line contact with the edge of the valve seat 20. The central portion of said valve member 13 is made tubular as shown at 35 and tapped so as to have threaded engagement with the threaded end 36 of the valve stem 14. After the valve member has been threaded home on the valve stem it may be suitably locked thereto, as by soldering, so as to prevent the valve member from working loose. The valve member 13 may be provided with a leakage aperture 37 so as to maintain a predetermined circulation of water over the thermostat 12 when the valve member is in engagement with its seat.

To guide the valve stem and valve member under the expansive and contractive movements of the thermostat a valve stem guide 15 is provided. As shown, said guide is composed of a pair of strips 38 provided midway of their lengths with semicircular portions 39 so that when laid face to face a circular guide closely surrounding the valve stem 14 is provided as shown in Fig. 3. At their extremities said strips 38 are reduced in width as shown at 40 and said reduced portions are inserted in slots 41 formed in the strap 11 adjacent the ends thereof. Said projecting ends may be upset or swaged over as shown at 42 in Fig. 3, so as to lock the ends of the strap against the shoulders 43 formed by the reduction in width of said strips, although without such swaging the said strips will be locked in the strap when said strap is secured in the tubular housing 10. The clearance 23 between the end portions of said strap and the tubular portion 17 of the housing allows for the projecting and swaged over ends of said strips 38.

The thermostat may be charged in any suitable way, but by preference it is so charged that at temperatures below that at which the valve is designed to open, the interior pressure is less than atmospheric pressure so that the differential between interior and atmospheric pressure tends to maintain the valve member in contact with its seat, but in the event of the thermostat leaking so that both interior and exterior pressures are equalized the valve member is moved away from its seat, as shown in dotted lines in Fig. 2, by the inherent resiliency of the corrugated wall 27, or by use of a spring supplementing said resiliency if preferred, so as to assure that on failure of the thermostat the valve member 13 will be held open and permit flow of the cooling medium.

It will be perceived that a regulator made in conformity with the present invention is composed of a few parts all of which may be readily standardized and produced in large quantities at low cost by simple manufacturing operations. The tubular housing 10 with its portions 17 and 18 of different diameters may be readily drawn from sheet metal. The strap 11 may be readily stamped from sheet metal and bent to the form illustrated, after which the thermostat 12 may be soldered or otherwise attached thereto with the boss 30 projecting into the aperture 26. The strips 38 laid face to face as shown in Fig. 3 may be telescoped over the valve stem 14 and the ends of the strap sprung so as to permit the introduction of the extremities 40 of said strips into the slots 41, after which the extremities of said strips may be swaged over to lock the ends of the strap 11 against the shoulders 43 on the strips 38. The strap with the valve stem guide secured thereto may then be inserted into the tubular housing 10 and the extremities of the strap inserted into the apertures 25 and secured therein as described. The valve member 13, which may be stamped from sheet metal, may be threaded onto the end of the valve stem 14 and secured thereto as by soldering. Thus the structure is easily assembled and the entire construction readily lends itself to large quantity production of standardized parts which may be rapidly and inexpensively produced by simple machine operations that do not require the use of skilled labor.

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 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, material, arrangement and proportion of parts without departing from the spirit of the invention. Reference is therefore to be had to the appended claims for a definition of said invention.

What is claimed is:

1. In a temperature regulator, a tubular housing having a tubular portion whose extreme edge provides a valve seat, a thermostat support in the form of a U-shaped strap having its extremities secured in apertures formed in an intermediate portion of said housing, said strap having its arms bulged intermediate of their length and engaged at said bulged portions with portions of said housing which are spaced axially of said housing from said intermediate portion, a thermostat mounted on said strap, and a valve member operatively connected to said thermostat and cooperating with said valve seat formed by the extreme edge of said tubular housing for controlling the flow of fluid therethrough.

2. In a temperature regulator, a tubular housing including tubular portions of different diameter connected by a shoulder, one of said tubular portions having its extreme edge forming a valve seat, a thermostat support in the form of a U-shaped strap having its extremities secured in apertures formed in said shoulder, said strap having its arms provided with intermediate portions of larger exterior dimension than at the extremities thereof and engaged at said larger dimension with said other tubular portion at locations spaced axially from said shoulder, a thermostat mounted on said strap, and a valve member operatively connected to said thermostat and cooperating with said valve seat formed by the extreme edge at the tubular extremity of said housing to control the flow of fluid therethrough.

3. In a temperature regulator, a tubular housing provided with a valve port, a thermostat sup-

port in the form of a U-shaped strap secured to said housing, a thermostat mounted on said U-shaped strap, a valve stem attached to said thermostat, a valve stem guide composed of a pair of strips bent to embrace said valve stem and having their extremities secured in slots in the ends of said strap, and a valve member operatively connected to said valve stem and cooperating with said valve port to control the flow of fluid through said housing.

4. In a temperature regulator, a tubular housing provided with a valve port, a U-shaped strap secured to said housing, a thermostat mounted on said U-shaped strap, a valve stem attached to said thermostat, a valve stem guide composed of a pair of strips bent to embrace said valve stem and having their ends secured in slots in said strap, said strips being locked in said slots when said strap is secured to said tubular housing, and a valve member operatively connected to said valve stem and cooperating with said port to control the flow of fluid through said housing.

5. In a temperature regulator, a tubular housing provided with a valve port and including portions of two diameters connected by a shoulder, a U-shaped strap having its extremities secured in apertures in said shoulder, a valve stem guide secured to the extremities of said strap, a thermostat mounted on said strap, a valve stem secured to said thermostat, and a valve member secured to said valve stem and cooperating with said port to control the flow of fluid through said housing.

6. In a temperature regulator, a tubular housing provided with a valve port and including two tubular portions of different diameters connected by a shoulder, a U-shaped strap having its extremities secured in apertures formed in said shoulders, a thermostat mounted on said strap, a valve stem secured to said thermostat, a valve stem guide composed of a pair of strips bent to embrace said valve stem and having their extremities locked in slots in said strap, and a valve member secured to said valve stem and cooperating with said port to control the flow of fluid through said housing.

7. In a temperature regulator, a drawn sheet metal housing including two tubular portions connected by a shoulder, one of said portions terminating in a valve seat, a sheet metal U-shaped strap having its ends secured in slots in said shoulder, a thermostat mounted on said strap, a valve stem secured to said thermostat, a valve stem guide composed of a pair of sheet metal strips bent to embrace said valve stem and having their extremities secured in slots in said strap, and a sheet metal valve member secured to the end of said valve stem and cooperating with said valve seat to control the flow of fluid therethrough.

8. In a temperature regulator, a tubular housing terminating in a valve seat, a U-shaped strap secured to said housing, a thermostat mounted on said U-shaped strap, a valve stem attached to said thermostat, a valve stem guide secured to the extremities of said strap, and a dished sheet metal valve member threadedly attached to said valve stem and having its peripheral portion cooperating with said valve seat.

9. In a temperature regulator, a tubular housing provided with a valve seat and including two tubular portions of different diameters connected by a shoulder, a U-shaped strap having its extremities secured in slots in said shoulder, said strap being formed to fit the larger tubular portion of said housing at portions of the legs of said strap spaced from said shoulder and said legs being bent to provide a clearance between said tubular portion and said legs adjacent said shoulder, a thermostat mounted on said strap, a valve stem attached to said thermostat, a valve stem guide having its ends extending into slots in said strap with the ends of said guide projecting into said clearance provided between the legs of said strap and said housing, and a valve member operatively connected to said valve stem and cooperating with said valve seat.

10. In a temperature regulator, a tubular housing provided with a valve seat, a U-shaped support secured to said housing and having its extremities spaced from the tubular wall thereof, a thermostat mounted on said support, a valve stem attached to said thermostat, a valve stem guide having its ends locked between said tubular casing and the ends of said U-shaped support, and a valve member operatively connected to the end of said valve stem and cooperating with said valve seat.

11. In a temperature regulator, a tubular housing including portions of different diameters connected by a shoulder, the portion of smaller diameter terminating in a valve seat constituted by the end of said tubular portion, a U-shaped support mounted on said shoulder, a thermostat mounted on said U-shaped support, a valve stem attached to said thermostat, a valve stem guide mounted in apertures in said strap and locked in said apertures by the cooperation of said strap with the portion of said housing which is of larger diameter, and a valve member operatively connected to the end of said valve stem and having at its periphery an obliquely inclined portion adapted to make line contact with the valve seat provided by the end of said tubular housing.

JOHN E. DUBE.