Sept. 9, 1941. J. V. GIESLER 2,255,159

TEMPERATURE REGULATOR

Filed Nov. 15, 1939

Fig. 1.

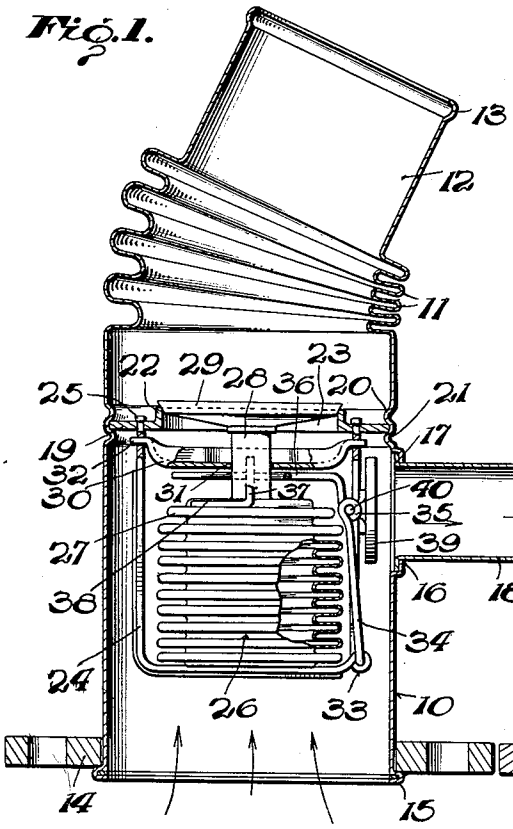


Fig. 2.

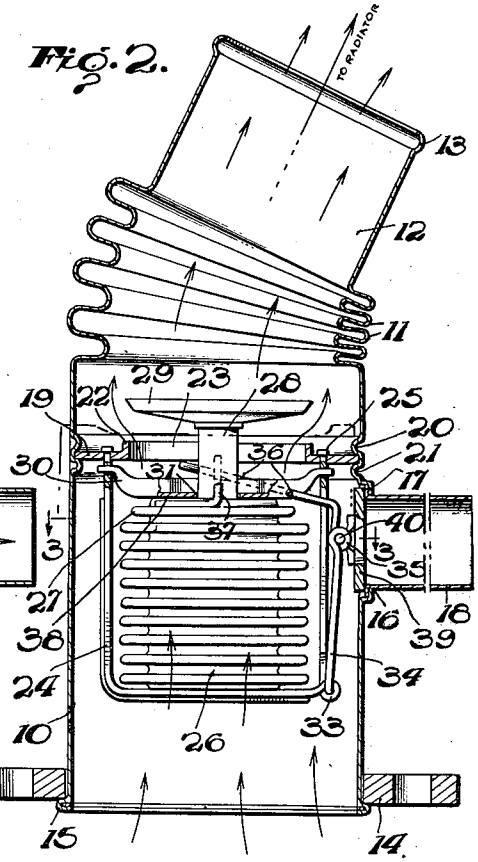


Fig. 3.

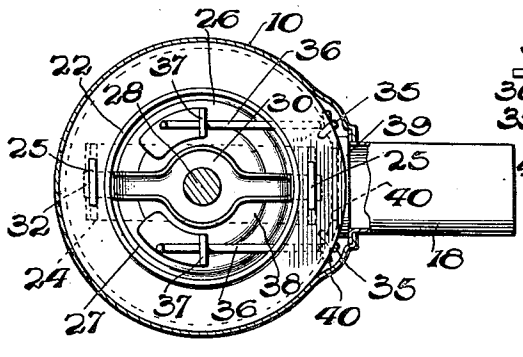
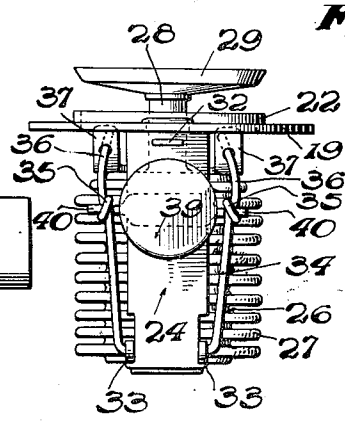


Fig. 4.



Inventor

Jean V. Giesler.

By Cameron, Kerkam & Sutton Attorneys

Patented Sept. 9, 1941

2,255,159

UNITED STATES PATENT OFFICE

2,255,159

TEMPERATURE REGULATOR

Jean V. Giesler, Knoxville, Tenn., assignor to The Fulton Sylphon Company, Knoxville, Tenn., a corporation of Delaware

Application November 15, 1939, Serial No. 304,620

2 Claims. (Cl. 236—34)

This invention relates to temperature regulators, and more particularly to temperature regulators for controlling the flow 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 employs a housing that may be readily modified at the time of installation to conform with the requirements of location of other elements of the cooling system without the use of different elements having outlets differently arranged to meet the requirements of different systems.

Another object of this invention is to provide a device of the type characterized which employs a housing that may be simply and inexpensively fabricated out of relatively light metal, thereby eliminating the use of castings as heretofore commonly employed.

Another object of this invention is to provide a device of the type characterized which is particularly adapted for use in cooling systems of the by-pass type.

Another object of this invention is to provide a temperature regulator of the by-pass type wherein the means employed for actuating the by-pass valve from the main thermostatically-operated valve is of simplified construction so that it may be easily and inexpensively fabricated in quantity production and without the use of skilled labor or expensive material.

Another object of this invention is to provide a device of the type last characterized which employs a by-pass valve operating mechanism that will permit the by-pass valve to align itself with its seat and then yield after the valve is closed, and thereby assure proper operation even though there may be appreciable variations in the size and relative location of parts because of manufacturing tolerances.

Other objects of the invention will appear as the description thereof proceeds.

The invention is capable of receiving a variety of mechanical expressions one of which is illustrated 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 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 an axial section, somewhat schematic of a temperature regulator embodying the invention with the main valve shown closed;

Fig. 2 is a like view but showing the main valve open;

Fig. 3 is a section on line 3—3 of Fig. 2; and

Fig. 4 is a view of the thermostatically-operated valve unit removed from its housing and viewed from the right of Figs. 1 and 2.

In the form shown the housing 10 takes the form of a generally cylindrical or tubular member which is preferably formed of sheet metal or drawn from light gauge metal. Adjacent its outlet end said housing is provided with a plurality of corrugations 11 of sufficient depth and size to render the outlet end portion of the housing readily bendable with respect to the body portion thereof, so that the outlet portion 12 may be pointed in the desired direction by flexing the corrugations 11, as shown in Figs. 1 and 2, whereby the outlet may be properly aligned with the inlet to the radiator. The designs and dimensions of different cars may require that the outlet from the housing assume different angles with respect to the axis of the housing if the outlet is to be aligned with the inlet to the radiator. Heretofore this has required that the outlet from the housing take the form of an elbow member suitably attached to the end of the housing, and differing designs and dimensions of different cars have required different angularity of the elbows in order to align the outlet of the housing with the inlet to the radiator. By the present invention the outlet end of the housing may be readily bent to such an angle as to align it with the radiator inlet, and hence the present housing is readily available for application to cooling systems of different design and dimensions.

The outlet section 12 beyond the corrugations 11 may assume any suitable form, being shown as a tubular section having a beaded extremity 13 to facilitate the attachment of the hose line thereto. The opposite end of the housing is provided in any suitable way with a flange for attachment of the housing 10 to the motor block by a clamping member 14. As shown, the end of the housing 10 is provided with a bead 15 which is collapsed to form an annular flange by which the housing 10 may be clamped in position by annular member 14 with or without the interposition of a gasket between the flange 15 and the annular member 14. The housing 10 is also provided with a lateral opening 16 in which is secured in any suitable way, as by a flange 17, a tube 18 which forms a part of the by-pass conduit.

Mounted within the housing 10 in any suitable way is a valve seat member 19, here shown as retained in position by a bead 20 at one side thereof and indentations or a bead 21 at the opposite side thereof. As shown valve seat member 19 takes the form of a circular plate provided with an axially extending flange 22 which surrounds a port 23 and constitutes a valve seat. Suspended from the member 19 and attached thereto in any suitable way is a U shaped support 24, here shown as in the form of a strap bent to U form and having its extremities projected through slots in the member 19, where said extremities may be upset to lock the same in position, as shown in 25, although staking, brazing, soldering or the like may be employed if preferred. Suitably attached to the support 24 at the intermediate portion thereof is the stationary end wall of an expansible and collapsible corrugated tubular metal vessel or bellows 26, said vessel 26 being provided with a movable end wall 27 to which is attached in any suitable way a valve stem 28 at the extremity of which is a valve member 29 of any suitable form and construction, such for example as is commonly employed in the art. Vessel 26 together with its stationary and movable end walls provides an expansible and collapsible chamber which is charged with any suitable thermosensitive fluid so as to provide a thermostat as is well understood in the art. Means are also preferably provided for guiding and limiting the expansive movement of the thermostat, said means being shown as a member 30 which may be conveniently formed of a pair of sections adapted to form a central aperture 31 to embrace the valve stem 28 and having their extremities extended through slots in the strap 24, where they may be upset, staked, soldered or otherwise secured in said slots, as shown at 32.

In accordance with the present invention means are also provided for positively opening and closing a valve member for controlling the by-pass 18, said means being of a construction such as to provide yieldability if the thermostat continues to expand after the by-pass valve is closed, and also a capacity for self-aligning movement of the by-pass valve so that it will properly seat notwithstanding variations in size and location such as may arise from manufacturing tolerances. In order that such provision shall not unduly add to the cost of the instrument said provisions are embodied in a form such that the component parts thereof may be cheaply and expeditiously fabricated in quantity from inexpensive stock and without skilled labor. To this end the U shaped strap 24 is provided adjacent the bend thereof on that side of the strap which is adjacent the by-pass with a pair of tabs 33 which may be bent into the form of a pair of eyes providing two aligned pivotal mountings for the operating member 34 of the by-pass valve member. As shown more particularly in Fig. 4 said operating member 34 may be conveniently formed of a wire or light rod bent into U shape with the bottom of the U passed through the eyes 33. The legs of the U 34, substantially opposite the transverse diameter of the by-pass inlet, are coiled to provide a pair of aligned eyes 35 to afford a pivotal mounting for the by-pass valve member, as to be described. Above said eyes 35 the legs of the U are bent at approximately right angles as shown at 36, and extend through apertures provided in the axially extending tabs 37 of a yoke 38. As more clearly shown in Fig. 3 said yoke 38 may take the form of a disk from which the tabs 37 are cut and bent at right angles. Yoke 38 is secured to the end wall 27 in any suitable way so as to move therewith.

Mounted in the eyes 35 for cooperation with the inlet to the by-pass 18 is a by-pass valve 39 which is shown as in the form of a disk to the rear face of which is secured in any suitable way a diametrically extending pin 40 which extends through the eyes 35. As shown more particularly in Fig. 3 said transverse pin 40 may be deflected laterally for alignment with said eyes 35.

Thus the by-pass valve member 39 is pivotally mounted on the U shaped member 34 so that it may properly align itself with the inlet to the by-pass when brought into contact therewith. If after such engagement of the by-pass valve with its seat the thermostat 26 continues to expand, the U shaped member 34 is sufficiently yieldable so that no injury is done to the parts by the continued application of force to the bent extremities 36 of the legs of said U shaped member. At the same time, as said member 34 is connected through the engagement of the extremities 36 in the eyes of the yoke 38 to the movable end wall of the thermostat, said by-pass member is moved positively during both expansion and contraction of the thermostat, said extremities 36 bending and slipping in said eyes as apparent from comparing Fig. 2 with Fig. 1, so that a predetermined relationship is maintained between the position of the main valve 29, as to its seat, and the by-pass valve member 39, as to its seat.

The operation of the unit described is believed to be apparent. When the cooling medium is cool, thermostat 26 is in its contracted position, the main valve member 29 is held in contact with its seat, and by-pass valve member 39 is in its most remote position from its seat, as shown in Fig. 1. When the temperature of the cooling medium has risen to that temperature at which the thermostat takes control, expansion of the thermostat is accompanied by a movement of the main valve member 29 away from its seat, with the simultaneous movement of the by-pass valve member 39 toward its seat, to diminish the flow through the by-pass and increase the flow through the radiator, until eventually the by-pass valve is closed and the main valve is open wide, as shown in Fig. 2. Subsequent cooling of the cooling medium causes a contraction of the thermostat 26 and a movement of the valve members reversely to that just described. Throughout the expansion and contraction of the thermostat, member 34 is moved positively by the movement of the movable end wall of the thermostat, said member 34 pivoting in the eyes 33. When the by-pass valve member 39 engages its seat, it may pivot in the eyes 35 to maintain proper alignment with its seat. If the thermostat expands after the by-pass valve member is in fully closed position, the member 34 may yield, said member preferably being formed out of a wire or light rod having sufficient resiliency so that within the limits determined by the engagement of the movable end wall of the thermostat with the stop 30, no set will be taken by the member 34.

It will therefore be perceived that by the present invention a novel housing for the regulator has been provided which may be conveniently formed out of light metal, avoiding castings as heretofore used, and which has a readily adjustable outlet that may be bent to conform with

the location of the radiator inlet, thereby eliminating the need for different outlets where different relationships exist in the cooling systems of different cars.

The present invention has also provided means for operating a by-pass valve member positively and simultaneously with the operation of the main valve member by simple operating mechanism, and said operating mechanism is such that notwithstanding the differences due to manufacturing tolerances the by-pass valve member will align itself with its seat and the operating mechanism then yield until the main valve member has been fully opened. At the same time the latter provisions have been afforded without undue complexity and by the use of simple elements that may be conveniently and inexpensively fabricated out of common stock.

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 limited thereto, as other embodiments 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, the novel housing may be used with or without a by-pass and with or without the novel mechanism for operating the by-pass valve, and the latter may be used without the novel housing, etc., without departing from the spirit of this invention. Reference is therefore to be had to the claims appended hereto for a definition thereof.

What is claimed is:

1. In a by-pass regulator for the cooling system of an internal combustion engine of the type which employs a thermostat, a support therefor, a main valve operated by said thermostat, a by-pass and a valve member for controlling the flow of cooling medium through said by-pass, means for operating the by-pass valve member from the thermostat including a bendable member, means for pivoting said member on said thermostat support, means on said bendable member providing a pivotal mounting for said by-pass valve member, and means for pivoting said bendable member to move said by-pass valve member with respect to said by-pass and then bending said member including means connected to the movable end wall of said thermostat and cooperating with the end of said bendable member.

2. In a by-pass regulator for the cooling system of an internal combustion engine of the type which employs a thermostat, a support therefor, a main valve operated by said thermostat, a by-pass and a valve member for controlling the flow of cooling medium through said by-pass, means for operating the by-pass valve member from the thermostat including a U-shaped bendable member, means providing a pivotal mounting on said thermostat support for the base of said U-shaped member, the legs of said U-shaped member providing a pivotal mounting for said by-pass valve member and the extremities of said U-shaped member being bent inwardly to overlie the movable end wall of said thermostat, and means for both bending said U-shaped member and pivoting the same about its axis on said thermostat support including apertured means connected to the movable end wall of said thermostat and receiving in the apertures thereof the inwardly bent extremities of said U-shaped member.

JEAN V. GIESLER.