Jan. 23, 1940. E. L. MAYO 2,187,886

THERMOSTAT

Filed Aug. 23, 1938

FIG. 1.

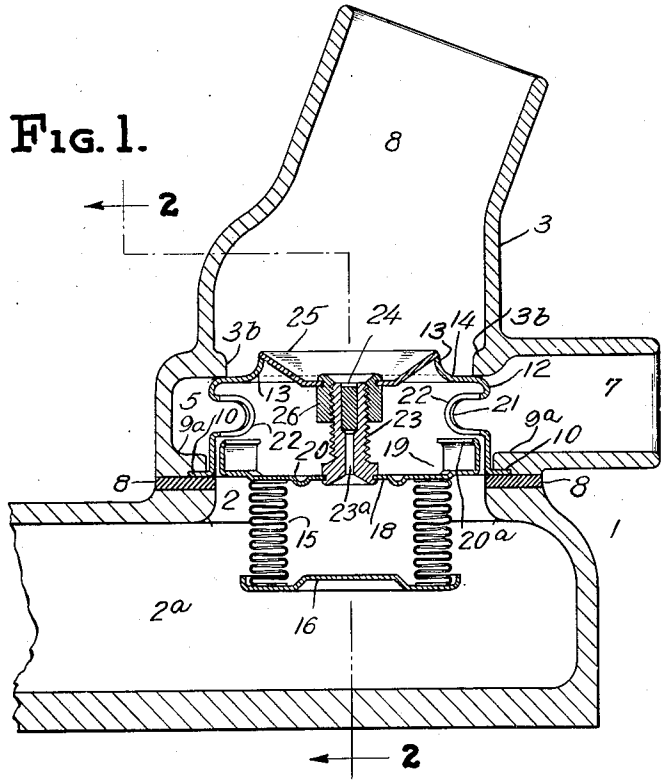
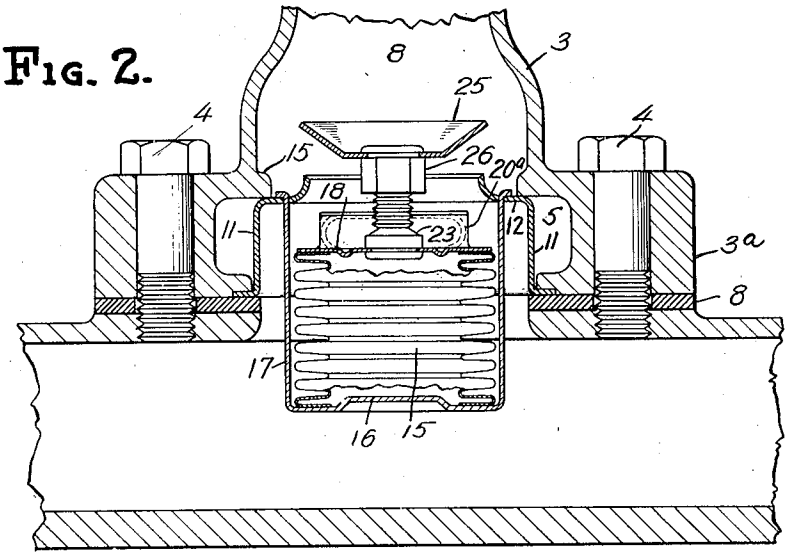


FIG. 2.



INVENTOR.

BY E. L. Mayo

Hull, Brock & West

ATTORNEYS.

Patented Jan. 23, 1940

2,187,886

UNITED STATES PATENT OFFICE

2,187,886

THERMOSTAT

Edward L. Mayo, Cleveland, Ohio, assignor to Bishop & Babcock Manufacturing Company, Cleveland, Ohio, a corporation of Ohio

Application August 23, 1938, Serial No. 226,295

1 Claim. (Cl. 236—34)

This invention relates to thermostatic valve mechanisms of the by-pass types such as are used with internal combustion engines for the purpose of effecting a thermostatic control of the flow of the cooling liquid for such engines through circuits including the radiators thereof as well as for effecting a thermostatic control of the flow of such liquid through by-pass circuits excluding the radiators.

One of the objects of this invention is to provide an improved construction whereby the outlet casting may be secured to the engine head and at the same time enable the housing of the thermostatic valve mechanism to maintain an efficient seal between the by-pass outlet and the outlet through which water is conducted to the radiator. A further object of the invention is to provide an improved construction of that portion of the valve mechanism which controls the circulation of the cooling fluid through the by-pass circuit.

I accomplish the foregoing objects in and through the construction and arrangement of parts shown in the drawing hereof, wherein Fig. 1 represents a vertical medial sectional view through my improved thermostatic valve device, as it appears installed on the head of an internal combustion engine and with the by-pass valves in open position; and Fig. 2 a sectional view taken on the line 2—2 of Fig. 1, showing the bellows in elevation and the by-pass valves in closed position.

Describing the parts herein by reference characters, 1 represents a part of the head of an internal combustion engine, the same being provided with an opening 2 communicating with a portion 2a of the water-jacket circuit. An outlet casting 3 is secured to the engine head in any approved manner, as by lugs 3a and bolts 4. This casting is provided with an annular chamber 5 which communicates with the opening 2 and with a connection 6 through which cooling liquid from the engine is conducted to the radiator; also with a by-pass hose connection 7 through which the cooling liquid is circulated in the usual manner.

8 denotes a gasket which is interposed between the base of the casting 3 and the engine head. The base of the casting 3 is also provided with a radially inwardly projecting flange 9 provided with an annular seat 9a for the reception of an outturned flange 10 on the bottom of the skirt 11 of the valve housing of my thermostatic valve device, the bottom of the flange 10 being held in engagement with the inner portion of the gasket by the upper wall of the seat 9a.

It will be noted that the shoulder 12 which is formed at the top of the cylindrical skirt 11 is engaged by the bottom of the radially inwardly projecting annular shoulder 3b, the length of the skirt being such that the shoulder 12 forms a seal with the bottom of the shoulder 3b when the flange 10 is inserted into the annular seat 9a which is formed at the inner edge of the bottom of the flange 9. The gasket 8 is made of compressible resilient material and is made excessively thick, as compared with standard practice, for the purpose of insuring a seal between the bottom of the casting 3 and the engine head, even should there be some small clearance between the top of the flange 10 and the bottom of the annular seat 9a in the flange 9.

Where thermostatic valves are provided with cylindrical skirts having openings in the wall thereof, as shown herein, there has been a tendency for the valve members which control these openings to adhere to the skirt, due to their contact therewith throughout their entire movement, with resultant impairing of the efficient operation of the valve mechanism in controlling the flow of the cooling liquid through both circuits.

By the construction shown and now to be described, I am enabled to overcome this objection and to accomplish the object in and through a relatively simple and inexpensive construction and operation.

The valve housing is provided at the top with a neck 13 forming a seat for the valve which controls the flow of cooling liquid to the radiator. This valve, and the valve members which cooperate with the openings in the skirt 11 are carried on the top of the thermostatic bellows 15 which is supported by a disk 16 extending beneath the bottom thereof and by straps 17 integrally connected with the said disk and having their upper ends secured to and supported by the skirt.

To the top of the bellows there is sealed a disk 18 provided with arms 19 each having a valve member 20 having the general shape of a segment of a cylinder. These valve members control the passage of cooling liquid to the by-pass connection through the openings 21 in the skirt 11. It should be noted that each of these openings is provided with a flange 22 extending therearound and projecting into the interior of the skirt, the said flanges being adapted to be engaged by the outer surfaces of the valve members 20. In order to prevent the tops of these valve members from engaging beneath the bottoms of the flanges 22, the tops are beveled or

rounded inwardly from the outer surfaces thereof, as shown at 20a. Furthermore, in order to accommodate any lack of truly vertical movement of the valve members, their side edges are also rounded or beveled, whereby these members will move along their respective flanges without undue frictional resistance.

By providing the openings 21 with the flanges 22, which can be accomplished by an extruding operation, the outer surfaces of the valve members 20 can be spaced inwardly from the cylindrical skirt 11 a sufficient distance to prevent engagement with the interior of the skirt, with consequent freedom from binding and sticking.

23 denotes the customary tubular stud, which is sealed to the disk 20, and through the bore 23a whereof the bellows may be charged with a suitable liquid having the desired low-temperature vaporizing point, the top of the bore being closed by a plug 24. The upper end of the stud is provided with an external thread upon which the valve 25 is adjustably mounted, by means of the internally threaded sleeve 26.

With the parts constructed and arrangd as described, the operation will be readily understood. When the cooling liquid of the engine is below a predetermined temperature, the valve 25 will be seated and the water will circulate freely through the interior of the skirt 11, the openings 21 and the hose connection 7 to the water jacket of the motor. As the temperature of the cooling liquid rises, the valve members 20 will be moved upwardly by the bellows, gradually and finally completely closing the openings 21, while the valve 25 will be correspondingly gradually opened until, when it reaches its fully open position, as illustrated in Fig. 2, the cooling liquid will circulate practically entirely through the circuit including the radiator.

Having thus described my invention, what I claim is:

In a by-pass thermostat valve mechanism for controlling the flow of cooling liquid for an internal combustion engine, the combination of a housing comprising a cylindrical skirt, a neck and an annular shoulder connecting the top of the skirt and the neck, the said neck being provided at its outer end with a seat for a valve and the said skirt being provided with one or more openings for the passage of cooling liquid to a by-pass connection, each of said openings having a flange surrounding the same and projecting into the interior of the skirt, a thermostatic bellows, means for supporting the bottom of the said bellows in fixed relation to said housing, a valve carried by the upper end of said bellows adapted to cooperate with the seat formed on the outer end of said neck, and a valve member for each of said openings carried by the said bellows and each being so shaped as to contact with its outer surface the flange surrounding each of the openings in the said skirt, the top of each valve member being rounded or beveled inwardly from the outer surface thereof, and a thick gasket of compressible material interposed between the bottoms of the said flanges and the seat surrounding the opening in the engine head.

EDWARD L. MAYO.