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BY-PASS THERMOSTAT VALVE MECHANISM

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FIG. 1.

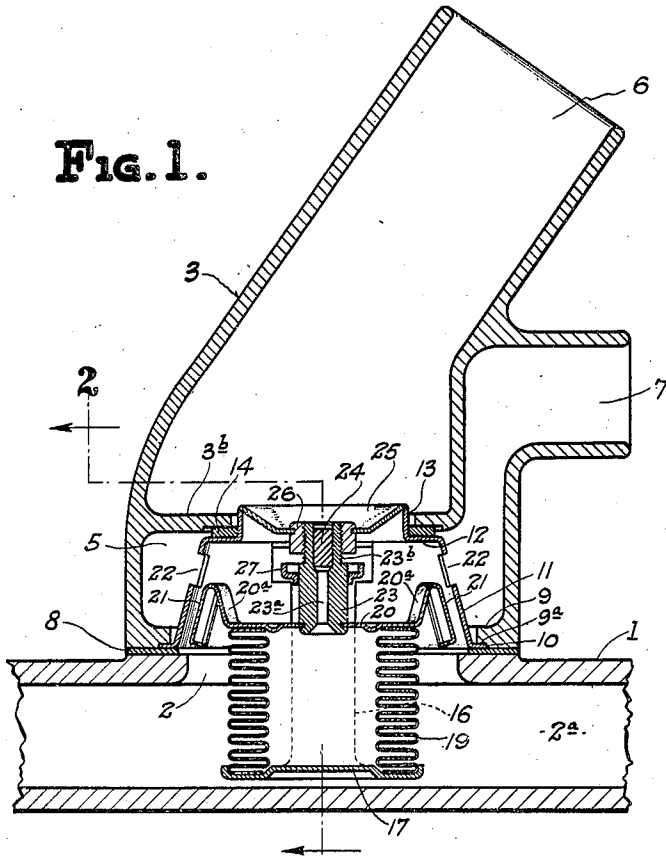
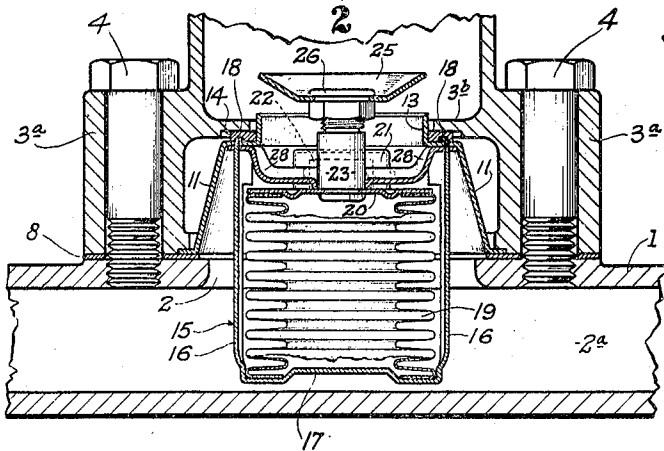


FIG. 2.



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BY-PASS THERMOSTAT VALVE
MECHANISM

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3 Claims. (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.

It is the general purpose and object of this invention to provide an improved construction of that portion of such a valve mechanism which controls the circulation of the cooling fluid through the by-pass circuit.

I accomplish the foregoing object 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.

One of the thermostatic valves of the type shown and described herein comprises a casing having a cylindrical skirt provided with openings in the wall thereof for the circulation of water through the by-pass circuit, with valve members carried by the top of the bellows and adapted to slide in contact with said skirt as the bellows expands and contracts, thereby to control the flow of liquid through the said openings. Due to the fact that the valve members contact with the skirt throughout their entire movement, they are liable to adhere to the skirt and thereby impair the efficient operation of the valve mechanism in controlling the flow of the cooling liquid through both circuits. Due to the construction shown and described herein, I am enabled to overcome the objections noted and to accomplish this object in and through a relatively simple and inexpensive installation.

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 2^a of the water-jacket circuit. An outlet casting 3 is secured to the engine head in any approved manner, as by lugs 3^a 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 radi-

ator; 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 9^a for the reception of an outturned flange 10 on the bottom of the frusto-conical skirt 11 of the valve casing 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 9^a.

The valve casing comprises, in addition to the flange 10 and the skirt 11, a shoulder 12 extending radially and horizontally inwardly from the top of the skirt and a cylindrical neck 13 extending upwardly from the inner edge of said shoulder, the neck projecting above a flange 3^b extending radially inwardly from the outlet casting 3 and being spaced from the inner edge of said flange. A gasket 14 is interposed between the shoulder 12 and the bottom of the flange 3^a, thereby to prevent any circulation of liquid beneath the said flange and around the outside of the neck 13. The by-pass connection 7 communicates with the chamber 5 below the flange 3^b.

15 denotes a sheet metal stirrup which is suspended from the horizontal shoulder or flange 12, said stirrup comprising a pair of diametrically opposed vertically extending straps 16 having their bottoms integrally connected with the disk 17 and their upper ends terminating in shanks 18 which are inserted through and secured to the horizontal flange 12, as by riveting. The disk 17 has sealed thereto the bottom of a bellows 19, the upper end of which is sealed by a disk 20. This disk is provided with opposed arms 20^a each having at its outer end a valve member 21, each of said valve members being preferably formed by bending the arms upwardly and downwardly, the valve members thus formed being each in the form of a frusto-conical segment and having their outer surfaces parallel with the wall of the skirt 11. The arms 20 are such length that the valve members 21 do not contact with the inner wall of the skirt until they shall have been moved upwardly by the expansion of the bellows a sufficient distance to enable the valve members to close the opposed openings 22 in the said skirt. By this construction and arrangement of parts, I am able to overcome the binding and sticking of the prior art valves to which reference has been made hereinbefore.

23 denotes a tubular stud, which is sealed to the disk 20 and through the bore 23^a 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 reduced in diameter as shown at 23^b and is provided with an external thread upon which the valve 25 is adjustably mounted, by means of the internally threaded sleeve 26.

27 denotes the central portion of a yoke, the said portion surrounding the stud 23 and forming a guide therefor. Arms 28 extend outwardly from this guide portion and are provided each adjacent to its outer end with a slot for the passage of the shanks 18 of the straps 16. The riveting of the upper ends of the shanks 18 to the shoulder 12 of the casing anchors the yoke in place so that it serves the double purpose of guiding the stud 23 and limiting the expansion of the bellows.

With the parts constructed and arranged 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 22 and the hose connection 7 to the water jacket of the motor. As the temperature of the cooling liquid rises, the valves 21 will be moved upwardly by the bellows, gradually and finally completely closing the openings 22, 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:

1. In a by-pass thermostat valve mechanism for controlling the flow of cooling liquid for an internal combustion engine, the combination of a casing comprising a frusto-conical skirt, a substantially cylindrical neck extending from the smaller end of said skirt and provided at its outer end with a seat for a valve, the said skirt being provided with openings through the side wall thereof for the passage of cooling liquid to a by-pass connection, a thermostatic bellows, a stirrup for supporting the bottom of said bellows and for suspending the said bellows from the upper portion of said casing, a plate secured to the upper end of said bellows, a stud connected with the upper end of said bellows and extending through the said plate, a valve adjustably mounted on said stud and adapted to cooperate with the seat formed on the end of said neck, and valve members carried by said plate, said members each comprising a frusto-conical segment the outer

surface of which is similarly shaped with the inner frusto-conical surface of said skirt and adapted to contact with said surface only when the valve members shall have substantially closed the said openings.

2. In a by-pass thermostat valve mechanism for controlling the flow of cooling liquid for an internal combustion engine, the combination of a casing comprising a skirt, the upper portion of the side wall of said skirt flaring outwardly and downwardly and being provided with one or more openings in such portion for the passage of cooling liquid to a by-pass connection, the lower portion of said skirt having a diameter at least as great as that of the bottom of the flared portion thereabove, a substantially cylindrical neck extending from the smaller end of said skirt and provided at its outer end with a seat for a valve, a thermostatic bellows, a stirrup for supporting the bottom of said bellows and for suspending the said bellows from the upper portion of said casing, a plate secured to the upper end of said bellows, a stud connected with the upper end of said bellows and extending through and connected to the said plate, a valve adjustably mounted on said stud and adapted to cooperate with the seat formed on the end of said neck, and valve members carried by said plate, said members comprising a frusto-conical segment the outer surface of which is similarly shaped with the inner frusto-conical surface of said skirt and adapted to contact with said surface only when the valve members shall have substantially closed the said openings.

3. In a by-pass thermostat valve mechanism for controlling the flow of cooling liquid for an internal combustion engine, the combination of a casing comprising a frusto-conical skirt, a substantially cylindrical neck extending from the smaller end of said skirt and provided at its outer end with a seat for a valve, the said skirt being provided with openings through the side wall thereof for the passage of cooling liquid to a by-pass connection, a thermostatic bellows, a stirrup for supporting the bottom of said bellows and for suspending the said bellows from said casing, a plate secured to the upper end of said bellows, a stud connected with the upper end of said bellows and extending through the said plate, a valve mounted on said stud and adapted to cooperate with the seat formed on the end of said neck, and valve members carried by said plate, said members each comprising a frusto-conical segment the outer surface of which is similarly shaped with the inner frusto-conical surface of said skirt and adapted to contact with said surface only when the valve members shall have substantially closed the said openings.

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