Nov. 23, 1954 J. Z. BRUBAKER 2,695,012

THERMOSTATIC VALVE

Filed Oct. 20, 1948

3 Sheets-Sheet 1

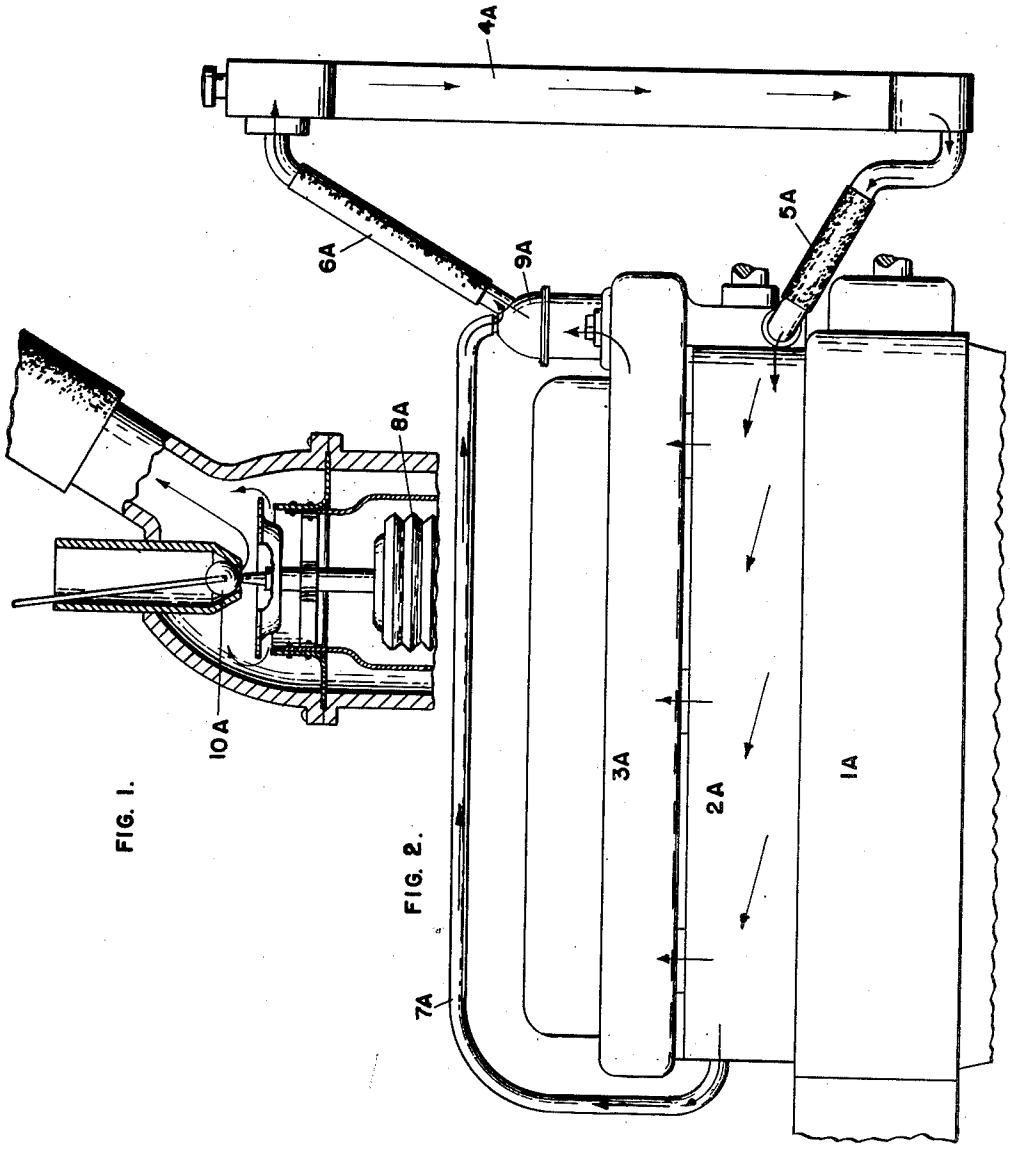


FIG. 1.

FIG. 2.

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FIG. 3.

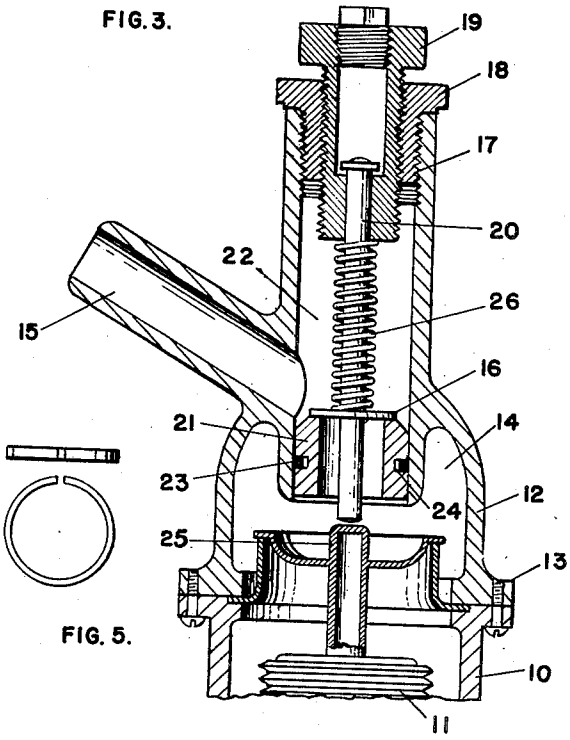
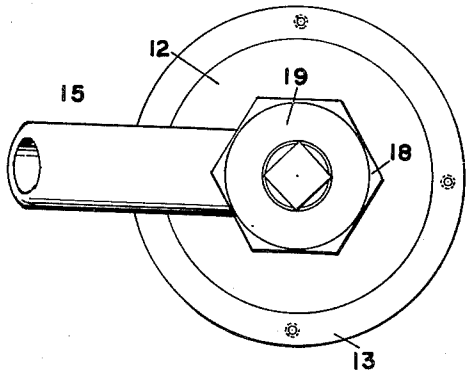


FIG. 5.

FIG. 4.



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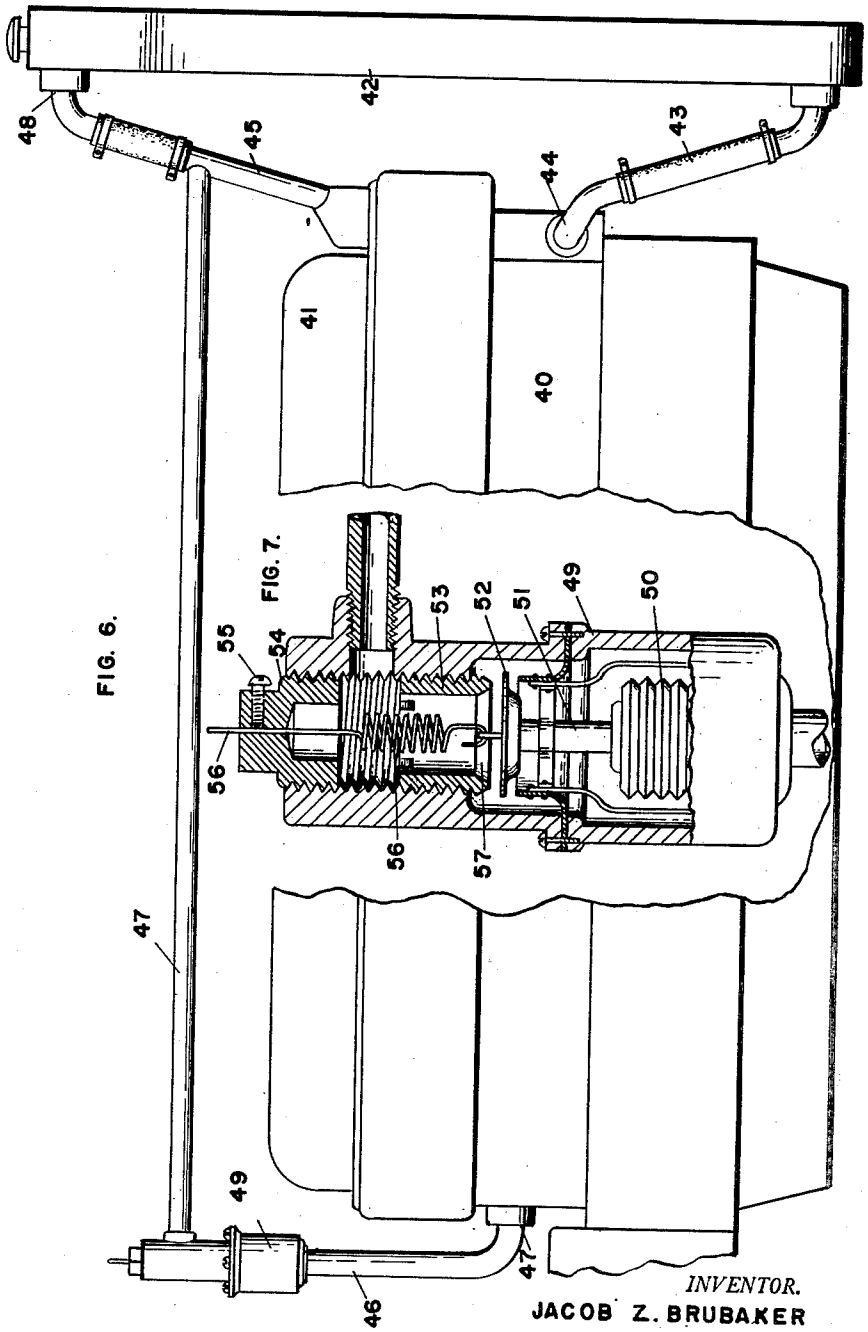


FIG. 6.

FIG. 7.

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THERMOSTATIC VALVE

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Application October 20, 1948, Serial No. 55,482

2 Claims. (Cl. 123—41.08)

This invention relates to a dual temperature cooling system for internal combustion engines.

More particularly it is a continuation in part of patent application, Serial #611,302, filed August 18, 1945, now Patent No. 2,468,735, May 3, 1949.

To enhance the efficiency of an internal combustion engine it is advantageous to maintain the cylinder walls cool so that the oil will provide proper lubrication while at the same time maintaining the head at a high degree of temperature. The purpose of this invention is to provide a single cooling system which will provide a difference in temperature between the lower part of the engine, including the main portion of the cylinder walls and the upper part of the engine or the head.

It is necessary, however, that a certain degree of heat prevail in the lower part of the engine of the cylinder walls to insure the best performance of the motor and to obtain the best lubricating effect from the oil.

A further purpose of this invention is then to provide an automatic valve in the system as set forth in the Patent 2,069,749 which may be set to maintain a predetermined degree of heat in the lower part of the engine.

A further object of the invention is to automatically control, stop and change the flow of cooling liquid, particularly in an emergency where the motor has become extremely hot.

A still further object of the present invention is to provide a thermostat which may be adjusted manually and while on the motor to a higher or lower temperature setting which provides a readily adjustable feature for changing the operation of the cooling system in accordance with the prevailing temperatures.

A further object of the present invention is to provide a means for rapidly and accurately adjusting a thermostatic valve in a water cooling system of an internal combustion engine so that the valve may be operated upon by an expansion thermostat without lost motion.

A further object of the present invention is to provide a sliding seat for a valve which is frictionally held in a sleeve and adapted to be positioned in the sleeve relative to a thermostat.

A still further object of the present invention is to provide a thermostatic valve for an internal combustion engine water cooling system with means for regulating the tension of the valve spring.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein described may be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is shown in the accompanying drawings in which:

Figure 1 is a side elevation of the invention, a portion of the thermostat casing being broken away and shown in section, and a portion of the thermostatic valve mechanism being also shown in section.

Figure 2 is a side elevation of the invention applied to a motor.

Figure 3 is a cross section of the valve assembly.

Figure 4 is a top plan view of the same.

Figure 5 is a detail view of the valve seat spring.

Figure 6 is a modification of the valve structure as shown in Figures 3, 4 and 5 and shows the valve, of a slightly different type inserted in the line.

Figure 7 is a cross sectional view of the modified form of the valve.

To review the application Serial #611,302, now Patent No. 2,468,735, an engine 1A has a block 2A and a head 3A. A water cooling system is provided with a condensing radiator 4A joined at its lower end by cool connection 5A to the pump and at its upper end by hot connection 6A to the engine head. A by-pass 7A is connected to the block and carries a portion of the water directly from the block to the connection 6A. This provides means for maintaining the block from 10 to 30° cooler than the head. A thermostat 8A is carried in the housing 9A at the lower end of connection 6A and it is into this casing 9A that the by-pass 7A is connected to the outlet 6A. This connection is controlled by a valve 10A operated by the thermostat 8A and it is in this connection that the continuation in part, drawn particularly to the thermostatically controlled valve is filed. The ball valve 10A is provided with a small handle such as a wire by which it may be lifted out of position in case it is desired to dismantle for any reason.

Referring particularly to Figures 3, 4 and 5, a casing 10 secured directly to the block of an internal combustion engine to take the place of casing 9A of Fig. 2 has housed therein a thermostat 11 and carries an upper housing 12 secured thereto by screws 13.

The upper housing 12 has a main passage 14 connected to hot connection 6A and a by-pass 15 which may be shut off from the main passage by the operation of a valve 16. The upper portion of the housing 12 is internally threaded at 17 to receive a bushing 18 which carries a threaded sleeve 19 housing and serving as a guide for the stem 20 of the valve 16.

The valve 16 which is of the flat disc type is seated on a valve seat 21 frictionally held in the cylindrical portion 22 of the housing 12 through contact with an expansion spring 23 with the sides of the cylindrical portion 22. The spring 23 is carried in a groove 24 of the sleeve 21 and provides sufficient friction to maintain the valve seat in any desired position within the cylinder 22. The valve stem 20 extends through the flat disc valve 16, through the valve seat 21 to a position contacting the upper end of the extending tubing forming the hollow stem 25 of the thermostat 11. The stem 25 comprises a thermostat tubular extension sealed at its upper end and communicating with the interior of bellows-like thermostat 11 as clearly shown in Fig. 3. A spring 26 normally holds the valve 16 seated on the valve seat and can be used to modify the opening of the thermostat valve by proper adjustment of sleeve 19.

Referring to Figure 6, an engine block 40 has the usual head 41 and cooling radiator 42. The usual intake of cool water 43 leads into the block at 44 and after circulating through the block and head leaves through outlet 45. As described in Patent 2,069,749 a by-pass 46 is connected to the block at 47 and transports a portion of the cool water in the system directly to the outlet 45 and from there into the radiator at 48. All of this construction and the working of the system is broadly described in Patent 2,069,749.

Interposed in the by-pass line is a thermostatically controlled valve 49 which is adapted to control the temperature of the water in the block 40. This valve has the usual bellows thermostat 50 operating a stem 51 and a disc valve 52. In order to render this valve adjustable so that it may be quickly and easily set for either winter or summer driving a valve seat 53 is threaded into the upper end of the valve housing to provide means for dispensing with the by-pass entirely should it be necessary. In other words, by adjusting the valve seat inwardly or outwardly the hot closing point of the valve can be adjusted and, also, if it is desired to make the device inoperative, then the seat 53 can be screwed down into contact with valve 52 while seated on the fixed seat. Also threaded into the housing is a cap 54 having a set screw 55 threaded therein which screw is adapted to hold a spring 56 at any desired tension. By adjusting the tension of the spring 56 which is attached to the valve 52 at 57, the temperature at which the valve 57 operates may be easily regulated. This provides a quick absolutely reliable and easily adjustable means for regulat-

ing the temperature of the cooling water in the block **40** and insures a maximum efficiency both for the lubricating qualities of the oil and the operation of the pistons in the cylinder walls.

The operation of the system with the valves is easily explained and entirely obvious. Referring to Figure 6, the cool water enters the block at **44** and until sufficiently warmed, the thermostatic valve **50** being closed the water circulates through the block **40**, the head **41** and passes out the outlet **45** to the radiator **42**. When the warm water from the block **40** opens the valve **52**, circulation is set up in the by-pass **46—47** and the block is maintained at from 20 to 30° cooler than the head **41**, as described in Patent 2,069,749. The various valves shown by Figures 1, 3 and 7, and regardless of their location in the system, operate in the same manner as just described in connection with Figs. 6 and 7. In other words, when the engine cooling fluid is cold the valves will be resting on the fixed seat held thereon by the thermostat bellows. As the fluid warms up the valve will move off of the fixed seat, permitting fluid to flow through the by-pass. The flow of fluid from the lower portion of the engine will lower the volume of flow through the normal hot outlet and thereby rapidly bring the bottom of the engine to proper operating temperature. If an ordinary valve were used, the thermostat would then continue opening, increasing the flow through the by-pass and raising the temperature at the base of the engine beyond the proper point. With the valves as shown, as the engine lower portion gets hotter the valve will move toward the other valve seat, gradually closing off the flow through the by-pass. If, for any reason, the base of the engine becomes too hot, then the thermostat will expand sufficiently to seat the valve on the opposite seat, thus completely blocking flow through the by-pass and causing all cooling fluid to flow through the normal hot outlet to the radiator. In this manner the base or skirt portion of the engine is quickly brought to proper operating temperature and maintained at this temperature due to the construction of the special valves shown. By

reason of the increased coolness of the cylinder walls, a loss of power is prevented with an increased delivery of power through the pistons to the crank-shaft and at the same time the lubricating effect of the oil is enhanced.

What is claimed is:

1. In a temperature cooling system for internal combustion engines, a valve assembly to control cooling fluid flow comprising a body portion having spaced apart fluid flow passages, first and second valve seats carried by said body portion in spaced relation to each other and positioned between the flow passages, a valve interposed between the first and second valve seats and seatable on each to block flow of fluid between the flow passages, and a thermostat positioned in one of the passages and connected to the valve to move the same into seating engagement with the first seat when cooling fluid temperature is low and into seating engagement with the second seat when cooling fluid temperature is high.

2. The structure of claim 1 characterized in that said first valve seat is fixedly carried by the body portion adjacent the thermostat and said second valve seat is adjustably carried by the body portion and movable toward and away from the first valve seat.

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