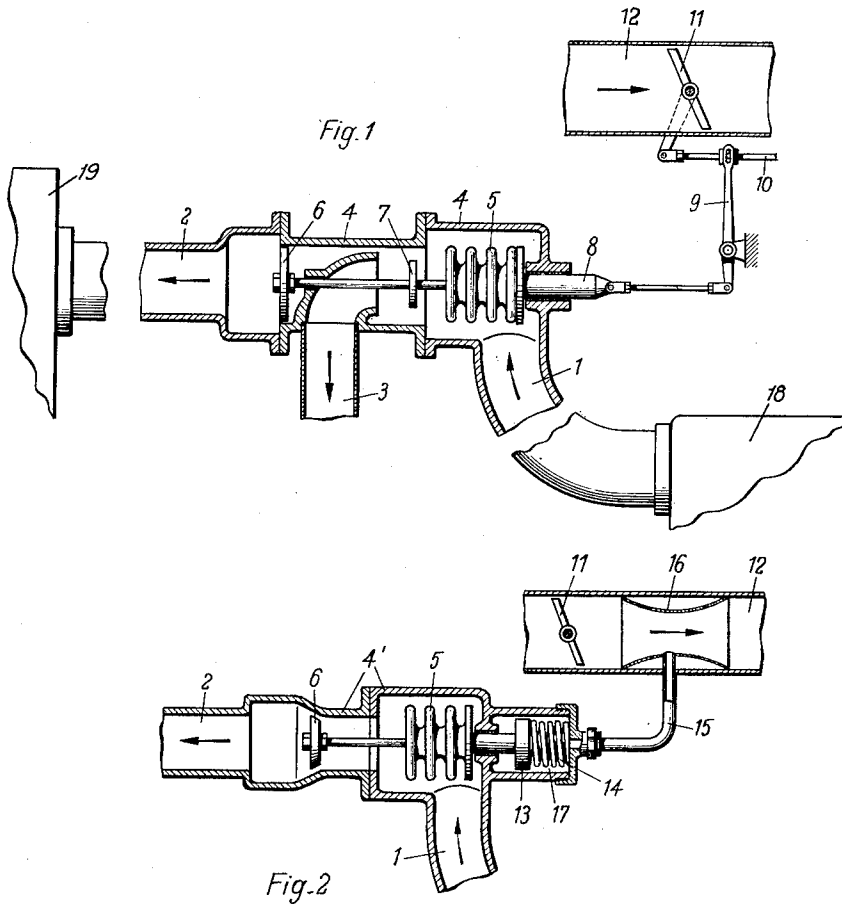


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DEVICE FOR THE CONTROL OF THE TEMPERATURE  
IN COMBUSTION ENGINES  
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## UNITED STATES PATENT OFFICE

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## DEVICE FOR THE CONTROL OF THE TEMPERATURE IN COMBUSTION ENGINES

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This invention relates to a device for controlling the temperature of a combustion engine, particularly a vehicle engine running at high load.

One feature of this invention consists in that the wall temperature of the engine is maintained as constant as possible independently of the load. Another feature of the invention consists, moreover, in that the temperature of the coolant of the engine is controlled in a suitable way. In engines as are in use today the temperature of the coolant is adjusted, as a rule, at a predetermined level. However, due to the high power load, the wall temperature of the cylinder and the cylinder head rises, particularly with engines running at high load, in an undesirable way, whereas it generally remains too low when power load decreases, especially when the engine is idling.

In contrast to the foregoing, one feature of the invention consists in that the temperature of the coolant, or the wall, is controlled in a way dependent of the engine load, particularly in such a way that where the load is higher the temperature of the coolant is adjusted for a lower amount than when the load, at which the engine runs, is lower. This makes it possible to obtain a constant, or more uniform, wall temperature, independently from the power load, thus avoiding an undesirable thermic overloading of the wall or an overcooling of same. The more uniform wall temperature thus obtained results in an improved thermic balance as well as an easier starting of the engine and, in some cases, a reduction of the engine weight.

In the drawing there are shown two examples of embodiment of the invention, viz:

Fig. 1 shows a cooling water control system which is influenced by the setting of a throttle.

Fig. 2 shows a cooling water regulation system which is influenced by the vacuum existing in the induction pipe of the engine.

In Fig. 1 is the cooling water line coming from the water jacket 1 of the engine—e. g. the driving engine of a motor vehicle. This line bifurcates into line 2 to the radiator, and circulation line 3 which by-passes the radiator 1 and goes back to the cooling water pump, or the engine. In housing 4 of pipe 1 there is arranged a thermostat 5 which bears the two valve heads 6 and 7 for the control of the two lines 2 and 3. Thermostat 5 is supported by a slide 8 for it to shift in axial direction, and is connected to a lever 9 which, in turn, is shifted by rods 10 of throttle 11 arranged in the induction pipe 12 of the engine.

Thermostat 5 is influenced in the usual way by the temperature of the cooling water prevailing in line 1, in such a way as to keep line 2, to the radiator, closed—as illustrated in the drawing—when the temperature is low, whereas circulation line 3 is open. As the temperature of the cooling water increases, circulation line 3 will gradually close, whereas line 2 will open, so that the cooling water will be increasingly directed through the radiator and re-cooled in same.

In addition to this regulation of the cooling water, which is known per se, there is provided a control of the original position of the thermostat in dependence of the setting of throttle 11, i. e. in such a way that when throttle 11 is closed, slide 8 supporting thermostat 5 will reach its righthand end position, whereas it will reach its lefthand end position when the throttle is entirely open. The result of this will be that when the engine is running at low load, circulation line 3 will remain open for a longer period (i. e. when the temperature is still relatively high), and line 2 to the radiator will open relatively late: the coolant will thus be influenced towards a higher temperature. On the contrary, as the throttle valve opens, circulation line 3 will close sooner, and radiator line 2 will open sooner, respectively, than with closed throttle, so that the temperature of the cooling water will be regulated towards a relative reduction, which will result in a more intense cooling action of the cooling water on the engine wall.

When applying the foregoing to diesel engines, thermostat 5 may be connected to the control rods of a fuel injection pump in lieu of connecting it to control rods 10 of a throttle.

In the example of embodiment according to Fig. 2, thermostat 5 is connected to a piston 13 which is subjected on the one hand to the action of a spring 14, and on the other hand to the action of a depression existing in chamber 17 and produced in induction pipe 12, e. g. at the point where a Venturi tube 16 (which is connected at its narrowest cross section to chamber 17 by line 15) is arranged at the rear of throttle 11. In this case, the thermostat may be provided with only one valve 6 which controls line 2 to the radiator. It is, however, obvious that also in this case a circulation pipe 3 could be provided.

When the engine is running at low load, in nozzle 16 there exists a relatively high vacuum which will cause thermostat 5 to shift to the right against the action of spring 14, thereby preventing valve 6 from opening until the temperature of the cooling water is relatively high. On the

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contrary, when the engine is running at high load, in nozzle 16, and consequently in chamber 17, there generally will exist a relatively low depression, whereby spring 14 will shift thermostat 5 bodily to the left, and valve 6 will clear line 2 already at a relatively low temperature of the cooling water, instead of waiting for a relatively high temperature to be reached.

This invention is obviously not limited to the examples of embodiment outlined above. Instead of effecting the regulation of the coolant by means of a thermostat, this can be done in any other suitable way, e. g. by actuating a radiator shutter, by suitably controlling a radiator fan or a coolant blower (e. g. in case of air cooling). Instead of influencing the temperature of the cooling medium in a way dependent of the engine output through the rods of the member controlling the output, or by utilizing the depression produced in the induction pipe, this can be done in any other suitable way, e. g. by means of a device metering the quantity of fuel supplied to the engine per unit of time, or by means of a device operating in a way directly or indirectly dependent of the torque of the engine.

What I claim is:

1. In a device for the control of the temperature of a combustion engine, which comprises an induction pipe of the engine, a nozzle-shaped narrowing in the induction pipe, means for the control of the coolant temperature of the engine; and means for the variable setting of the above mentioned means in dependence of the depression existing at the point where the cross section of the suction pipe is the narrowest.

2. In a device for the control of the temperature of a combustion engine, which comprises control means operating in dependence of the engine load; a coolant circulation system; means for the control of the circulation of the coolant, a thermostat controlling the adjustment of the latter mentioned means; and means for displacing the thermostat as a unit in dependence on the engine load.

3. Device according to claim 2, wherein the control means operating in dependence of the

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engine load comprise a member controlling the quantity of fuel supplied to the engine and a rod for varying the adjustment of said member, and wherein the thermostat is connected to the above mentioned rod which shifts the thermostat bodily in axial direction.

4. Device according to claim 2, wherein the control means operating in dependence of the engine load comprise an induction pipe and a throttle member arranged in same; and the above mentioned means for changing the basic setting comprise a cylinder, a piston which is sliding in same and is connected to the thermostat, a pipe which connects the cylinder with the induction pipe at the rear of the throttle member, in the direction of flow, in such a way as to have the thermostat shift in axial direction due to the depression existing in the induction pipe; and, moreover, means causing the thermostat to shift in the opposite direction when the depression is decreasing.

5. In a device designed to control the temperature of a combustion engine, which comprises a liquid coolant system comprising a radiator, a line connecting the engine to the radiator, a by-pass circulation line, thermostatic means in said liquid coolant system controlling the circulation of the liquid coolant through said line leading to the radiator and said by-pass circulation line, control means operating in dependence of the engine load and means adapted to adjust said thermostatic means in dependence of the position of said control means.

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