F. E. LAMMERT.

TEMPERATURE REGULATOR FOR COMBUSTION ENGINE CYLINDERS.

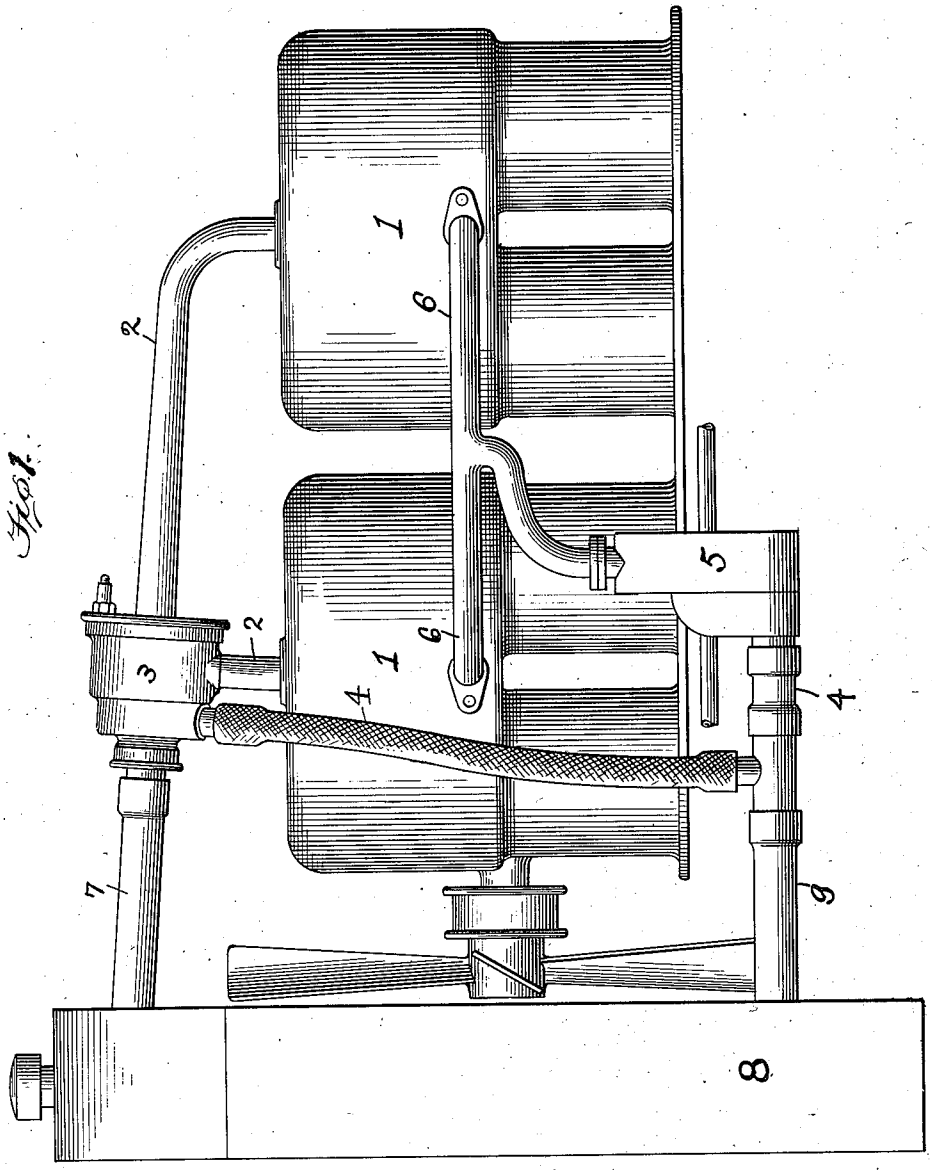
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1,223,078.

Patented Apr. 17, 1917.

2 SHEETS—SHEET 1.

Fig. 1.



Inventor

F. E. LAMMERT

Witnesses

A. D. Shanklin

J. N. Pearson

By W. E. Williams

Attorney

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2 SHEETS—SHEET 2.

Fig. 2.

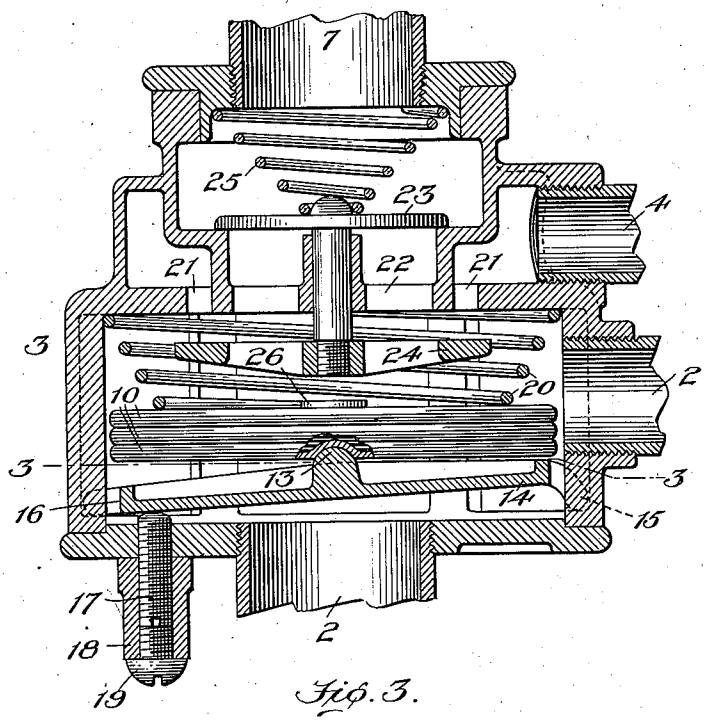
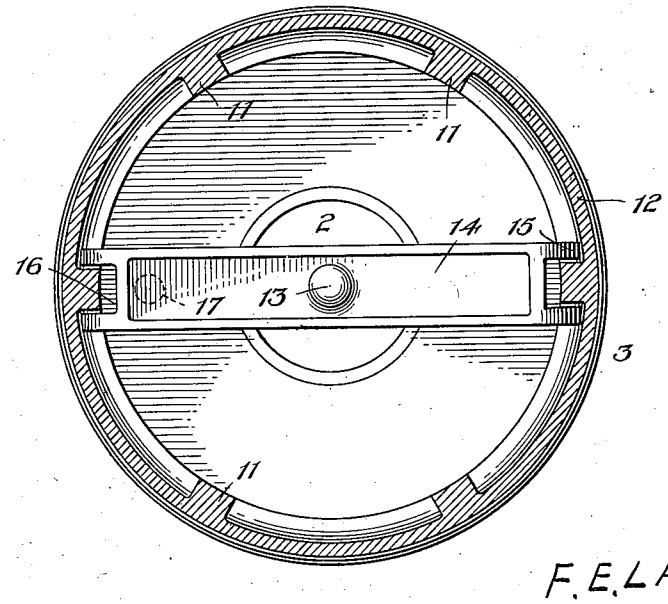


Fig. 3.



Witnesses
R. D. Shanklin
J. N. Pearson.

Inventor
F. E. LAMMERT

By W. E. Williams

Attorney

UNITED STATES PATENT OFFICE.

FERDINAND ERNEST LAMMERT, OF CHICAGO, ILLINOIS.

TEMPERATURE-REGULATOR FOR COMBUSTION-ENGINE CYLINDERS.

1,223,078. Specification of Letters Patent. Patented Apr. 17, 1917.

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To all whom it may concern:

Be it known that I, FERDINAND ERNEST LAMMERT, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Temperature-Regulators for Combustion-Engine Cylinders, of which the following is a specification.

The object of my invention is to provide a system of regulation for the cooling of the engine cylinder walls in such a way that a uniform temperature of the walls may be maintained at all times. The invention is set forth in the claims.

A combustion engine is operated most efficiently at a temperature approximately that of boiling water or a little below, say 180° F. and lubrication is best at about that temperature.

With engines of rather high compression the added heat of the compression above approximately boiling water makes a momentary temperature so high that it approaches the ignition point of the charge, and hence in order to gain at all times the desired cylinder wall temperature the automatic regulating device for the cooling must be such that it will control upon slight variations of temperature else there will be danger of premature explosions or ignitions, or, on the other hand, there will occur serious losses of efficiency and other injurious results.

The temperature regulating devices heretofore used in connection with cooling systems, where the cooling fluid was used over and over again and itself cooled by radiation during service, have never been in so close association with the temperature of the engine cylinder wall that they were able to control, in any accurate manner, if at all, the temperature of the cylinder walls.

On starting and operating an engine as desired in cases of extreme low temperature weather, all the heat of the engine may be needed to keep itself at the right temperature.

It is desirable at all times to keep the cylinder walls as nearly as possible at a uniform temperature determined by the best conditions suited for the fuel supply carburization and ignition systems as well as lubrication. My invention is necessary to accomplish these results.

Reference will be had to the accompanying drawings, in which—

Figure 1 is a side elevation of an ordinary automobile engine with my invention applied.

Fig. 2 is a sectional view through the thermostat and valve.

Fig. 3 is a transverse section of Fig. 2 on line 3—3 of Fig. 2.

In the drawing, 1 indicates the engine cylinders of an ordinary automobile engine having cast water or cooling jackets or any other suitable cooling fluid compartments.

2 indicates the escape pipes or escape manifold from the jacket chamber and they are connected to a thermostat casing 3 wherein is located a thermostat and valve of any suitable design, but I prefer to use my own design of special merit as I will describe. The thermostat itself may be inclosed if desired on the inside of the jacket and be otherwise suitably connected.

From the thermostat there runs the pipe 4 back to the circulating pump 5 which is in turn connected to the cylinder jacket chambers by the pipes or manifold 6.

If a gravity circulation is used the pipe 4 will connect directly with the lower sections of the jacket chambers or the lower manifold 6.

On the other side of the thermostat casing 3 from the pipes 2 there is a pipe 7 which connects it to a radiator 8 of any suitable construction and a pipe 9 connects the lower part of the radiator 8 to the return pipe 4. This arrangement makes the radiator, as it were, on a by-pass circuit.

I prefer to make my thermostat having a metal bellows thermo member 10 of any suitable construction and this sits loosely in the casing and is held from displacement on its edges by the ribs 11 in the walls 12 of the casing and the bellows is held to its seat by a coiled spring 20. In the bottom of the bellows there is a concave seat that rests over a convex projection 13 of a lever 14 having one end 15 seated as a fulcrum at the side of the casing and the other end 16 resting on an adjusting screw 17 screwed into the bottom of the casing. On the screw 17 there is a lock nut 18 to keep the screw 17 from coming loose and a screw 19 closes the end of the nut to insure against leakage around the thread.

Fluid from the conduits 2 may pass from the thermostatic bellows chamber through a passage 21 to the pipe 4, and thence back to the engine jackets, or from the same chamber through a passage 22 to the pipe 7 leading to the radiator. The temperature of the bellows chamber, which is always substantially that of the cylinder jacket, determines which of the two courses fluid shall take, or whether the flow shall be divided between the two channels. This control is obtained by means of a sort of double puppet valve having an upper flange which normally closes the passage 22 and a lower flange 24 which normally leaves the passage 21 open. The flange 23 is pressed toward its seat by a spring 25. From the construction it is evident that so long as the water is not hot enough to actuate the bellows it will continually circulate passing from the upper part of the jackets through the pipes 2, casing 3, pipe 4, pump 5, and pipes 6, back to the lower part of the casing or jacket, thereby keeping the upper and lower parts of the jackets and cylinders at very nearly the same temperature while they are being heated to the desired degree, and without losing heat. In other words, the cylinders are heated in the shortest possible time. When the heat in the jackets reaches the limit at which the thermostat operates the latter rises pressing a boss 26 against the lower end of the valve and gradually opening the passage 22 to the radiator and gradually closing the passage 21. So long as both passages are partly open part of the fluid passes through the radiator and is thus cooled. If, however, the heat continues to rise in the jackets, the valve is further raised closing the passage 21 and opening fully the passage 22 so that all the fluid passes through the radiator. It is to be noted that the thermostat is always in water having substantially the same temperature as in the hottest part of the jackets being in the path of hot fluid passing toward the radiator, and that it therefore responds almost instantly to any change from the predetermined temperature found most desirable, with the result that the temperature in the jacket hardly varies two degrees.

It is further to be noted that should the valve stick or fail to act properly from improper adjustment or other cause, the jacket may become hot enough to generate steam, and the expansive force of this would lift the valve, starting circulation through the radiator and quickly reducing the temperature, thus saving the engine from injury in limiting its heat to about 212° even in case of accident, which is a highly desirable safeguard.

The circulation which is maintained around through the chamber or casing of the thermostat and back to the chambers, of the jacket when the radiator is cut out I call the main circulation and it keeps an unvarying temperature of the jacket chambers and cylinder walls and guards against unequal heating and expansion in the different regions of the walls which might take place were no local circulation obtained when the radiator is cut out. I call the circulation through the radiator the by-pass circulation.

The thermostat arranged as I have shown is a compact efficient device and is easily adjusted. It is inexpensive to make and is neat in appearance and can be placed within the hood of any automobile engine.

The valve is a double puppet valve, and occupies a very small space with little mechanism and is inexpensive.

The results secured by my regulator are in general terms as follows:

On starting the engine it takes but a few minutes, two or three, for the heat of the engine to arrive at the desired temperature thus making the period very short when an engine is most liable to make smoke, for the smoking of an engine is in part due to the engine's being too cold for complete combustion.

My regulator not only automatically causes the engine to heat up to the desired temperature almost at once upon its starting but it then keeps the temperature at that point all the time regardless of winter or summer weather, thus saving the gasolene or fuel supply, burning no more in winter than in summer, although without it more fuel is required in the winter than in the summer for the same service.

My regulator also saves lubricating oil by keeping the cylinder walls at a uniform temperature, thus making variations of adjustment in the oil supply unnecessary.

The valves and the cylinder walls themselves are saved from wear by my regulator for with it less carbon is formed in the cylinders and this carbon deposit injures the cylinders, pistons and valves.

My regulator also is beneficial in relation to the ignition system both from the absence of carbon and the presence of a uniform temperature secured by its use.

What I claim is:

1. The combination with an engine cylinder and its cooling jacket, of a conduit leading outward from the jacket and returning thereto, means for forcing cooling liquid to circulate through said jacket and conduit, a thermostat located in the hot outgoing liquid, a radiator, a by-pass from said conduit through said radiator, and means operated by the thermostat to keep the by-pass closed when the temperature at the thermostat is below a predetermined point and to vary admission to the by-pass as the temperature varies above that point.

2. The combination with the cooling

jacket of an engine cylinder, of a conduit leading outward from the upper, hotter portion of the jacket and returning to the cooler, lower portion thereof, means for compelling circulation in said jacket and conduit, a radiator, a by-pass from said conduit through said radiator, a thermostat located in that part of the conduit leading from the jacket to the by-pass, and a valve controlling the flow of liquid in said by-pass and actuated by the thermostat.

3. In apparatus of the class described, the combination with an engine having cooling fluid compartments around the cylinders, of circulating pipes from the upper to the lower portions of the compartments, a by-pass from the upper portion of the circulating pipes to the lower section of the same, a radiator interposed in the by-pass, a valve located in the upper portion of the pipes and adapted to regulate the circulation through the radiator, a thermostat located in the upper, hottest part of the circulation and connected to and adapted to control the said valve in accordance with variations of temperature in the said hottest part of the circulation, and means for adjusting the thermostat for different conditions.

4. A temperature regulator for the cooling system of a combustion engine comprising cooling fluid compartments around the cylinders, a casing, for holding a thermostat, pipes running directly from the upper, hotter portions of the compartments to the casing and a conduit running from the casing to the cooler, lower portion of the compartments, a radiator connected by a pipe to the casing and by another pipe to said conduit, a valve governing the flow in the pipe leading to the radiator, and a thermostat located in said casing and arranged to move said valve in accordance with variations of temperature in said casing.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FERDINAND ERNEST LAMMERT.

Witnesses:
NICHOLAS MORRIS,
SIGMUND BERGMANN.