F. E. LAMMERT.

TEMPERATURE REGULATOR FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED MAY 1, 1915.

1,223,079.

Patented Apr. 17, 1917.

2 SHEETS—SHEET 1.

Fig. 1

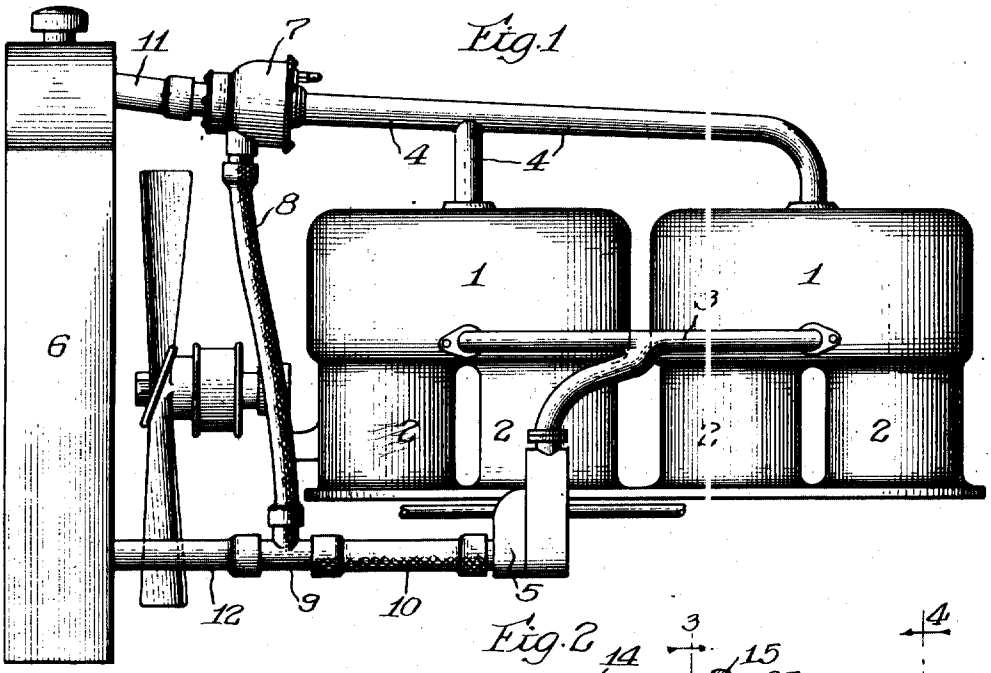
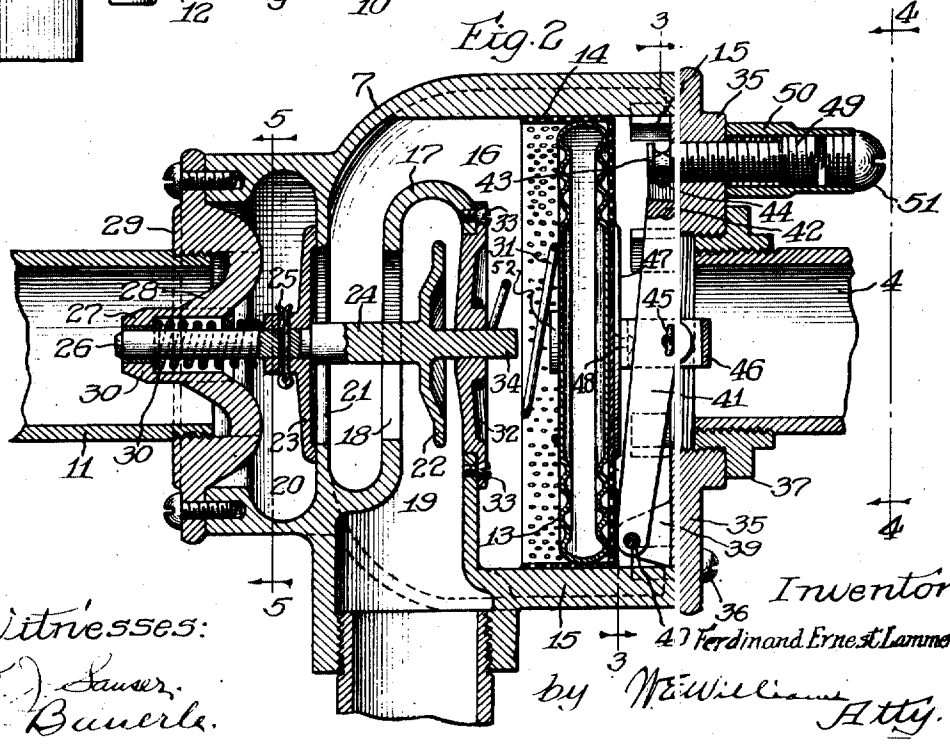


Fig. 2



Witnesses:

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Inventor:

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by W. E. Williams Atty.

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Fig. 3

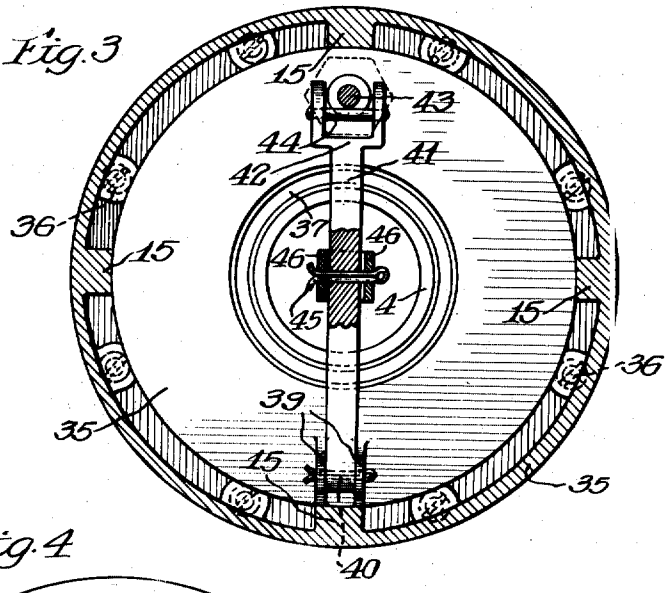


Fig. 4

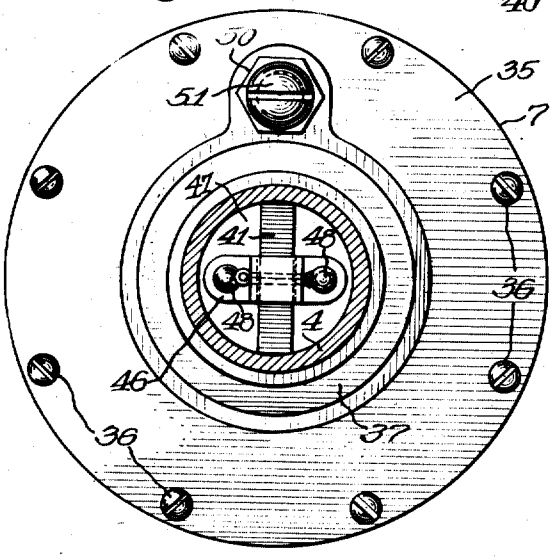
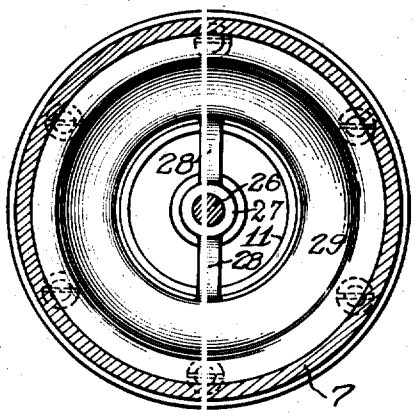


Fig. 5



Witnesses:

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UNITED STATES PATENT OFFICE.

FERDINAND ERNEST LAMMERT OF CHICAGO, ILLINOIS.

TEMPERATURE-REGULATOR FOR INTERNAL-COMBUSTION ENGINES.

1,223,079. Specification of Letters Patent. Patented Apr. 17, 1917.

Application filed May 1, 1915. Serial No. 25,208.

To all whom it may concern:

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

My invention relates to a thermostatic control of the circulation of the cooling fluid for the engine cylinder jackets and the invention is set forth in the claims.

Reference will be had to the accompanying drawings in which Figure 1 is a side elevation showing engine cylinders, a radiator and my device connected in the circulation.

Fig. 2 shows a central sectional elevation through my thermostatic controlling device.

Fig. 3 is a sectional view on line 3—3 of Fig. 2.

Fig. 4 is a transverse end elevation looking in the direction of the arrows 4 of Fig. 2.

Fig. 5 is a transverse sectional elevation looking in the direction of the arrows 5, Fig. 2.

In the drawings, 1 indicates the water jackets of the engine cylinders 2, 3 indicates the intake manifolds for the water circulation, and 4 the outlet manifolds, and 5 the circulation fluid pump. 6 indicates the radiator. All of the above parts are of the ordinary construction.

My thermostatic regulator is indicated by 7 and it is connected on one side to the outlet manifold 4 and on the other side to the return circulating pipe 8. The pipe 8 is connected to a T at 9, to the return pipe 10 going into the pump.

In my system of controlling the temperature of the engine cylinders, I make the main circulation, independent of the radiator 6 causing the water to circulate around through the water jackets through my regulator and back around to the pump and the jackets, maintaining that as the main circulation all the time, keeping a uniform temperature of the circulating water until such time as the temperature rises above the desired point whereat my regulator diverts the fluid from the main circulation, causing it to pass from the thermostatic regulator through the pipe 11 to the radiator 6, and then back through the pipe 12 to the T 9 and pipe 10 back to the pump.

The action of the regulator 7 is such that under the influence of the heat of the circulating fluid, it keeps all of the water going around through the engine jackets by way of the pipe 8 until an excess temperature is arrived at, when then a little or all of the circulating fluid is diverted through the radiator, cooling down the circulating fluid just enough to maintain it at the desired regulated point.

The details of the regulator are as follows:

On the inside of the casing of the regulator 7, there is mounted a thermo member 13 of what is known as the bellows type, such as is used in aneroid barometers, and is in other places. This bellows is in the form of a hollow disk and it is supported loosely on the inside of a perforated metal basket 14. This basket slides within the embrace of ribs 15, on the inside of the casing, which permits clear passage ways around the outside of the basket between the ribs 15. The main inside chamber 16 is divided by a compartment wall 17 having an orifice 18 opening into a compartment 19. The manifold pipe 4 coming from the top of the cooling jacket, carries the fluid into the chamber 16 where it circulates all around and through the perforated metal basket 14 coming in full contact with the thermostatic bellows 13, and then passing around through the orifice 18 into the chamber 19 and out through the main circulating pipe 8. Another chamber 20 is connected by an orifice 21 to the chamber 16. This chamber 20 is open to pipe 11 connected to the radiator. A valve plate 22 is adapted to close the orifice 18 and a valve plate 23 to close the orifice 21. Valve plate 22 is permanently fixed to a stem 24 and plate 23 is detachably mounted to the same stem and is fastened by the cotter pin 25. The upper end 26 of stem 24 slides in a keeper block 27 supported by cross arms 28 to a disk 29 in the end of the main housing or casing of the regulator. A spring 30 holds the valve plate 23 normally closed on the orifice 21 and thus holding the orifice 18 normally open all the time. A spring 31 bears on one side against the bellows thermo member 13 and on the other side against a plate 32, fastened by screws 33 to the wall 17 and the end 34 of stem 24 slides freely through a hole in the plate 32.

A plate 35 fastened by screws 36 closes the large end of the regulator. Into the plate 35 there is screwed a plate 37 and into this there

is screwed the pipe 4 of the top manifold. On the inside wall of plate 35 there are two lugs 39 which carry a pivot pin 40 for the end of a lever 41, the other end of which embraces the end of a screw 43 and is connected to this end of the screw by a pin 44. A pin 45 at the central body of the lever is connected to a stirrup 46 which is fastened by rivets 48 to the reinforcing plate 47, fastened to the bottom of the basket 14. Thus the basket and bellows are moved under the influence of the lever 41.

The screw 43 is threaded into the plate 35 and the head of the screw 49 is also threaded, but on a larger diameter, than the thread which passes through the plate 35. Onto the threaded head 49 of the screw 43, there is screwed a jam nut 50 and into the other end of the thread of the jam nut 50 there is screwed a sealing screw 51.

The screw 43 is the adjusting screw for controlling the distance between a boss 52 of the bellows 13 and the end 34 of the valve stem 24. By varying this distance under the influence of screw 43, varies the temperature at which the thermostatic bellows needs to extend sufficiently to bring the boss 52 in contact with the end 34 of valve stem and thus lift the valve plate 23 opening the orifice 21 and simultaneously closing valve plate 22 against the orifice 18.

As the bellows lifts and moves the valve stem, the circulation is diverted from pipe 8 to pipe 11 and hence to the radiator where it cools. When the cooling required becomes sufficient to use the full capacity of the radiator, the valve stem is lifted to complete closure of the orifice 18 and a full opening for the orifice 21, thus shutting off entirely the circulation by way of pipe 8.

In the event that the thermostat should not be properly adjusted and steam be generated in the circulation, the extra pressure would lift the valve 23 and cause the circulation to flow to the radiator even though the thermostat would fail to act, and thus the safety of the engine is insured.

The length of the thread of the screw 43 adapted to screw through the plate 35, is not so long but the enlarged head of the screw would prevent the screw from being screwed into the casing so far as to damage the basket and the bellows.

The lock nut 50 not only locks the screw 43 from misplacement, but serves as an additional seal to prevent leakage around the screw.

The screw 51 is an additional seal to prevent leakage past the threads of the screw 43.

The arrangement of the valves in the chamber 16 is such that the pressure of the escaping circulating fluid presses in opposite directions in escaping toward the radiator or the return pipe 8 to the jackets, so that when both valves are open and the circulation is divided part going both ways, there is no siphoning effect drawing reverse currents that make uncertain the operation of the device. This arrangement of the flow of the circulation helps to balance the pressure on the valve blocks and permits the employment of a simple light spring 30 to hold the valves in normal position.

The circulating fluid used in cooling systems sometimes gets gummy and clogs the valves, so I make my valves in the form of disks which have small contact faces with their seats and have little liability to gum up and stick.

What I claim is:

1. The combination with the cooling jacket of an engine, a radiator, a pipe connecting the hottest portion of the jacket with the radiator, a cooled-water tube leading from the radiator back to the jacket, and a conduit connecting said pipe and tube between the jacket and radiator, a valve between said conduit and the radiator controlling the passage to the latter, a valve controlling the flow in said conduit, a spring normally holding the first valve closed and the second valve open, and a thermostatic device arranged to act in opposition to the spring, opening the first valve and closing the second.

2. The combination with the cooling jacket of an engine of a regulating chamber, a pipe leading from the upper, hottest portion of the jacket to said chamber, a radiator, a normally closed tube leading from said chamber to the radiator, a return pipe from the radiator to the jacket, a normally open conduit leading from said chamber to the return pipe, and means within the chamber for automatically opening and closing said tube and conduit.

3. The combination with the cooling jacket of an engine, of a chamber, outside the jacket, having a receiving compartment, and discharge compartments, a conduit leading from the jacket to the receiving compartment, a radiator having an outlet to the jacket, a conduit leading from one discharge compartment to the radiator, a conduit leading from the other discharge compartment back to the radiator, valves controlling the passage of water from the receiving compartment to the discharge compartments, respectively, and automatic means for opening and closing said valves.

Signed at Chicago, in the State of Illinois, and county of Cook this 24th day of April, 1915.

FERDINAND ERNEST LAMMERT.

Witnesses:

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EDWARD JAMES BINGHAM.