

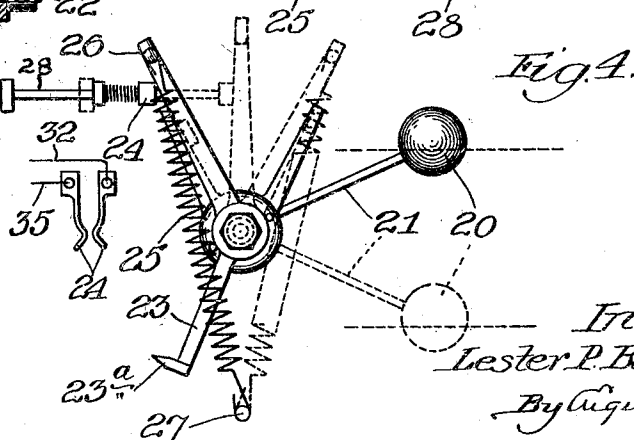
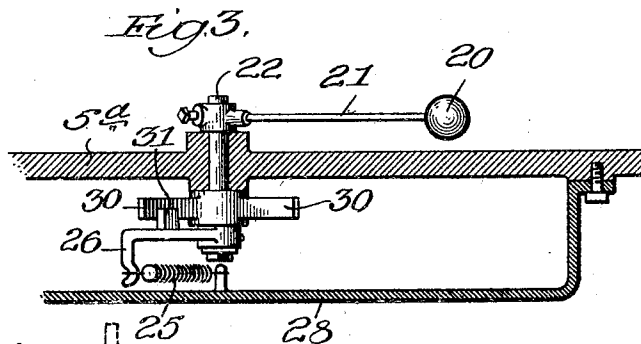
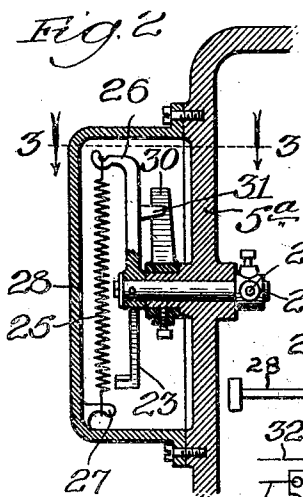
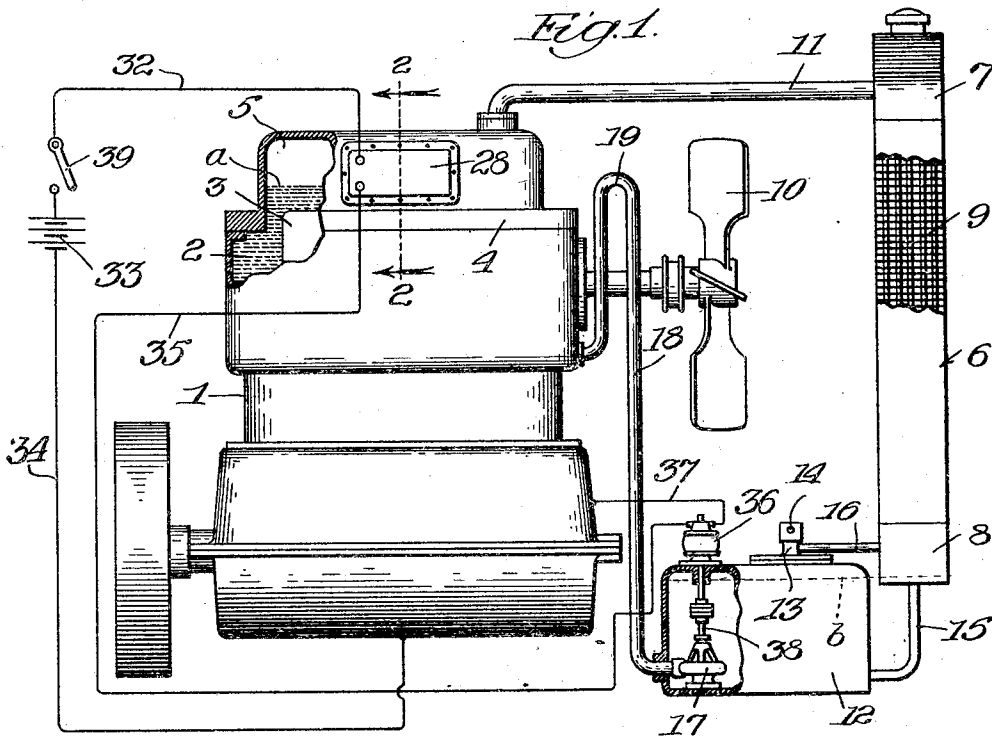
Jan 6, 1931.

L. P. BARLOW

1,787,562

ENGINE COOLING SYSTEM

Filed Jan. 10, 1929



Inventor:
Lester P. Barlow,
By *Wm. C. Cram*
Atty

UNITED STATES PATENT OFFICE

LESTER P. BARLOW, OF DETROIT, MICHIGAN

ENGINE-COOLING SYSTEM

Application filed January 10, 1929. Serial No. 331,696.

This invention relates to improvements in vapor or steam cooling systems for internal combustion engines of the automotive and other types.

5 One object of my invention is to provide means for maintaining a predetermined liquid level in the cylinder jacket of the engine by automatically starting and stopping the supply pump as the liquids in the jacket drop
10 below and rise to said predetermined level.

Another object of my invention is to operate the pump by an electric motor so that the pump will be driven independent of the engine and thus have a set speed regardless of
15 the speeds of the engine.

A further object of my invention is to provide a float operated switch in the motor circuit for starting and stopping the motor as the liquids in the jacket drop below and rise
20 to the before mentioned predetermined level.

The invention consists further in the matters hereinafter described and claimed.

In the accompanying drawings—

25 Fig. 1 is a view showing an internal combustion engine of the automotive type equipped with a vapor cooling system embodying the features of my invention;

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1;

30 Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 2; and

Fig. 4 is a diagrammatic view showing the operation of the make and break switch.

35 In Fig. 1, 1 indicates an internal combustion engine of the automotive type having a water jacket 2 about the cylinders 3 thereof, as in engines of this general character. The head 4 of the cylinder block has an upwardly projecting portion forming a steam dome 5
40 opening into the jacket and adapted to have the cooling liquid rise therein from the jacket to approximately to the level α .

45 Located in front of the engine is a condenser 6, which may be made like the customary automobile radiator with its upper and lower tanks 7, 8 and interposed core structure 9, through which currents of air pass in the motion of the car and by the use
50 of a fan 10, as usual in automotive equipment. A conduit 11 connects the dome 5 with

the upper tank of the condenser for conveying steam thereto, the steam being condensed as it passes down through the core 9 so as to be returned as condensate to the cooling system of the engine.

55 Disposed below the condenser 6 is a tank or reservoir 12 of a size to contain a body of water as a supply and reserve for the system. The tank 12 has a filling neck 13, the cap of which has an opening 14 for venting
60 the tank to the atmosphere. The maximum level of the water in the tank 12 is indicated by the dotted line b , and this is below the condenser as shown. A conduit 15 connects
65 the lower portion of the bottom tank 8 of the condenser with the lower portion of the reservoir 12 so that the condensate may drain into the reservoir from the condenser. A
70 pipe 16 connects the upper portion of the lower tank of the condenser with the filling neck 13 of the reservoir so as to vent the condenser to the atmosphere through the vent
75 opening 14 of said reservoir. In venting the condenser in this way, the vent opening 14 for both the condenser and the reservoir is removed from the air currents from the fan
as well as through the condenser. Thus there is no ejection or absorption effect on
80 the vent to remove liquids and vapors therefrom as when the vent is positioned within the influence of these air currents.

85 A force pump 17 is located in the reservoir 12 adjacent its bottom so that the intake of the pump will at all times be submerged in the water in the reservoir. A conduit 18
90 connects the discharge of the pump with the lower portion of the jacket 2 for supplying liquids thereto. This conduit 18 before it enters the jacket 2 extends above the level α to be maintained in the dome 5 and thence
95 back to the place where it enters the jacket. In so arranging the conduit, its upper portion 19 is in the form of an inverted U with the bend or loop in the U extending
above the level α , as shown in Fig. 1.

100 In the dome 5 is a float 20 arranged to float on the level of the liquids in the dome and move up and down in the rising and falling of said level. The float 20 has an arm 21 which is fixed to a short rock shaft 22 jour-

naled in the side wall 5^a of the dome 5 and extending outward through the same, as shown in Figs. 2 and 3. An arm 23 is fixed to the outer end of the shaft 22 and carries at its outer end a contact plug 23^a suitably insulated from the arm and moved in the movement of the float into and out of engagement with a pair of electrical contacts 24, as shown in Fig. 4. This action is accomplished by means of a coiled spring 25 connected at its upper end to an upward extension 26 of said arm and at its lower end to a lug 27 fixed to a stationary support such as the cover 28 over the switch device, causing the spring 25 as it passes through a vertical position to effect movement of the arm 23 to make and break the circuit through the contacts 24, 24. To assist the float to move the arm to break the circuit, I may provide a spring pressed plunger 28 which presses against the upper portion 26 of said arm. Stops 30, 30 are provided to limit the extent of movement of the arm 23, the upper extension 26 thereof having a lug 31 between the stops.

One contact 24 is connected by a wire 32 with one of the poles of a storage battery 33 or other source of electric current supply. The other pole of the battery is grounded on the crank case of the engine by a wire 34. The other contact 24 is connected by a wire 35 with one of the terminals of an electric motor 36, which is mounted above the reservoir 12, preferably on its top wall. The other terminal of the motor is grounded to the casing of the engine by a wire 37.

The shaft 30 of the pump 17 extends upward to the motor 36, and is suitably connected to the armature shaft thereof so as to operate the pump.

When first putting the cooling system into use, a switch 39 in the wire 32 is left open. The reservoir is then filled with water through the neck 13 to approximately the level *b*. The switch 39 is then closed and, as there is not water at this time in the jacket 2, the float will be in its lowermost position and the switch plug 23^a will be between the blades 24, 24 to supply current from the battery 33 to the motor 36 for operating the same. This will operate the pump 17 and cause the same to fill the jacket 2 with water from the reservoir 12. When the jacket fills to the level *a*, the float will have been raised and broken the circuit to the motor 36. This will stop the motor and the pump and no more liquids will be supplied to the jacket to raise the water level *a*. When the engine warms up and boils the water in the jacket, the water level in the dome 5 will drop slightly, due to portions of the water going off as steam. The float 20 will instantly move downward with the lowering water level and again complete the circuit to the motor through the switch plug 23^a and blades

24, 24 and start the motor 36 to cause the pump 17 to supply liquids to the jackets through the pipe 18, to make up for the amounts of liquids going off as steam. This action is repeated intermittently during the steaming operation, and thus the level *a* is automatically maintained, the amounts of water supplied to the jacket being in direct proportion to the amounts going off as steam in the jacket regardless of the speeds of the engine 1 or the loads thereon.

With an electric motor 36 for driving the pump 17, the latter may be operated at a constant speed at all times without regard to the speeds of the motor, as the pump is driven independently of the engine and is not therefore subject to the varying speeds at which the engine is driven as in motor vehicle operation. Furthermore, a motor of the size required to drive the pump at a given speed in proportion to the size of the pipe 18 and reservoir 12 may be employed, and thus control the rate of supply of liquids to the jacket 2, to maintain the level *a* therein.

The bend 19 in the supply conduit 18 extends sufficiently above the level *a* for the jacket 2 to prevent siphoning of the liquids in the jacket back to the reservoir 12. Thus the jacket 2 is not emptied of its liquid content when the pump 17 stops.

The details of structure and arrangement of parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim as my invention:

1. In a vapor cooling system for internal combustion engines, the combination with the engine, its cylinder jacket and a condenser connected therewith, of means including a power operated pump for supplying cooling liquids to said jacket from the condenser, and means for maintaining the cooling liquids at a predetermined level in the jacket, said last named means acting to automatically start and stop the pump as the liquids drop below and rise to said level.

2. In a vapor cooling system for internal combustion engines, the combination with a cylinder jacket, of means including a pump for supplying cooling liquids to said jacket, an electric motor for operating said pump, and means for maintaining the cooling liquids at a predetermined level in the jacket, said last named means acting to automatically start and stop the pump, by turning on and off the current to the motor, as the liquids drop below and rise to said level.

3. In a vapor cooling system for internal combustion engines, the combination with a cylinder jacket, of means including a pump for supplying cooling liquids to said jacket, an electric motor for operating said pump, and means for maintaining the cooling liquids at a predetermined level in the jacket, said last named means including a float op-

erated electric switch device in the motor circuit for automatically starting and stopping the motor as the liquids in the jacket drop below and rise to said level.

as the liquids in the jacket drop below and rise to said level, said conduit having its upper portion extending above said level before entering the jacket.

In testimony whereof I affix my signature.

LESTER P. BARLOW.

5 4. In a vapor cooling system for internal combustion engines, the combination with a cylinder jacket having a steam dome, of means including a pump for supplying cooling liquids to said jacket, an electric motor for
10 operating said pump, and means for maintaining the cooling liquids at a predetermined level in said dome, said means consisting of an electric switch device to make and break the circuit to the motor for starting and stop-
15 ping the pump, and a float in the dome for opening and closing the switch as the liquids in the dome drop below and rise to said level.

5 5. In a vapor cooling system for internal combustion engines, the combination with
20 the engine, its cylinder jacket and a condenser connected therewith, of a supply and reserve reservoir for the system connected with the jacket and condenser, respectively, means including an electrically actuated pump in the
25 reservoir for supplying liquids therefrom to said jacket, and means for maintaining the cooling liquids at a predetermined level in the jacket, said means acting to automatically start and stop the pump as the liquids in the
30 jacket drop below and rise to said level.

6. In a vapor cooling system for internal combustion engines, the combination with a cylinder jacket, of a supply and reserve reservoir for the system, means including a pump
35 in the reservoir for supplying liquids therefrom to the jacket, an electric motor for operating said pump, and means for maintaining a predetermined level in the jacket, said means including a float operated electric
40 switch in the motor circuit for automatically starting and stopping the motor as the liquids in the jacket drop below and rise to said level.

7. In a vapor cooling system for internal combustion engines, the combination with
45 a cylinder jacket having a steam dome, of a supply and reserve reservoir for the system, means including a pump in the reservoir for supplying liquids therefrom to the jacket, an electric motor for operating said pump,
50 and means for maintaining a predetermined level in said dome, said means consisting of a switch in the motor circuit to automatically make and break the circuit to the motor for starting and stopping the same, and a float in
55 the dome for opening and closing said switch as the liquids in the dome drop below and rise to said predetermined level.

8. In a vapor cooling system for internal combustion engines, the combination with a
60 cylinder jacket, of a pump, a conduit connecting the pump with the lower portion of the jacket for supplying liquids thereto, and means for maintaining a predetermined liquid level for the jacket, said means act-
65 ing to automatically start and stop the pump

70

75

80

85

90

95

100

105

110

115

120

125

130