

May 13 , 1924.

M. DORION

1,493,773

HEATER FOR ENGINE COOLING SYSTEMS

Filed Dec. 29 . 1921

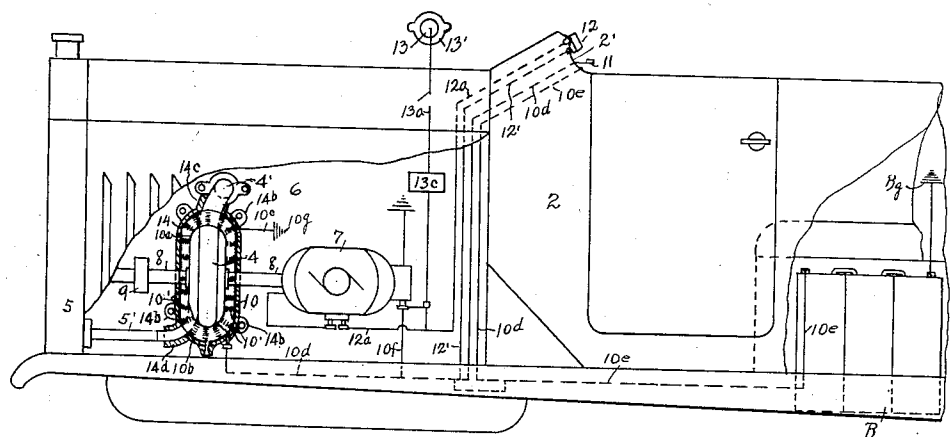


FIG. 1.

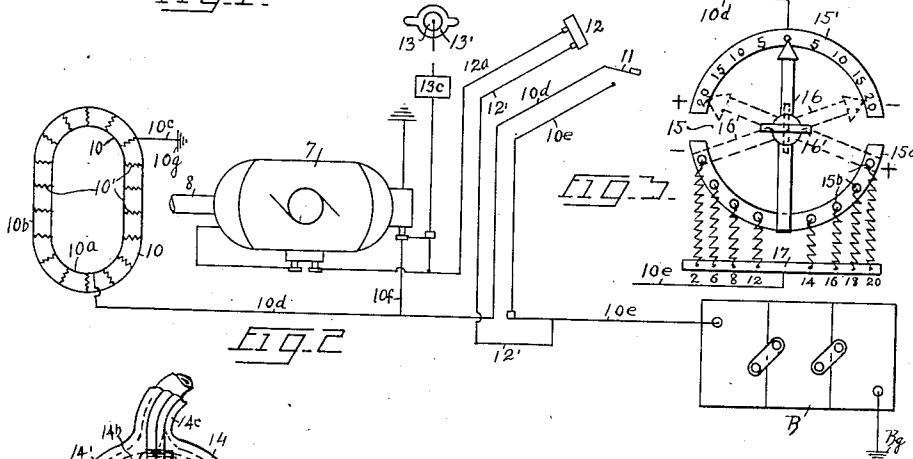


FIG. 2.

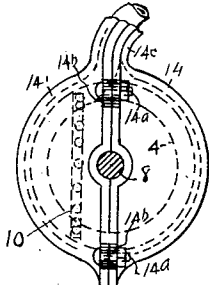


FIG. 4.

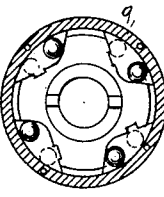


FIG. 5.

Inventor
Malcolm Dorion.

By Harry D. Wallace
Attorney

Patented May 13, 1924.

1,493,773

UNITED STATES PATENT OFFICE.

MALCOLM DORION, OF SYRACUSE, NEW YORK.

HEATER FOR ENGINE-COOLING SYSTEMS.

Application filed December 29, 1921. Serial No. 525,681.

To all whom it may concern:

Be it known that I, MALCOLM DORION, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Heaters for Engine-Cooling Systems, of which the following is a specification.

This invention relates primarily to a novel electric heater for heating the water of the cooling systems of automobiles and the like during cold weather, and means for effecting the circulation of the water at times when the engine is stopped.

The object of the invention is to provide a novel electric heating element, arranged to encircle the pump, which effects the circulation of the cooling water, and enclosing the said element and the pump by means of an insulated casing. A further object is to provide means for driving the pump when the engine is not running for effecting the circulation of the water heated by the said element, both the heating element and the pump actuating means being operated by electric current, which may be derived from the battery which is usually carried by an automobile, or by current derived from the ordinary commercial lighting system. A further object is to provide means for automatically throwing the heating element and the pump-actuating means into and out of operation and for charging the battery. And a further object is to provide a novel and simple manually controlled regulator by means of which the current of the heating element may be varied to suit the changing conditions of the weather.

I attain these objects by the means set forth in the detailed description which follows, and as illustrated by the accompanying drawing, in which—

Figure 1 is a broken side elevation of the body of an automobile to which my improvements are applied. Fig. 2 is an enlarged diagrammatic view of the heating element, motor-generator, battery and the various circuits. Fig. 3 is a diagrammatic view of the temperature regulator. Fig. 4 is an enlarged side view of the pump enclosed by a casing which protects the heating coil. And Fig. 5 is a sectional view of the coaster brake coupler.

In the drawing, 2 represents the body of the automobile, 2' the dash, 4 the pump,

which effects the circulation of the cooling water which it receives from the radiator 5, by means of a pipe 5', and discharges the water into the jacket of the engine 6 through a pipe 4'. 7 is the usual motor-generator carried by automobiles. The motor-generator is driven by the engine by means of a shaft 8 which also operates the pump 4. The shaft 8 is provided with the usual coaster-brake coupling 9, by means of which the pump 4, and the generator 7, may be driven directly when the engine turns the shaft 8, but when the pump is driven by the motor-generator 7, the portion of the shaft to the left of the coaster-brake 9 remains stationary and only the pump is operated.

My heating device consists of a coil 10, composed of suitable resistance wire, and may follow any of the usual and suitable constructions for devices of the kind, but preferably consists of a number of small coils 10' which are connected in parallel to main leads or wires 10^a—10^b, from which a wire 10^c connects with the ground at 10^d, and another wire 10^d, which supplies the current to the coil, connects the latter to a switch 11, which may be conveniently mounted on the dash 2'. From the switch 11, a wire 10^e extends to one side of the battery B, the other side of the battery being grounded at B^s. The wire 10^d also connects with the motor-generator 7, by means of a wire 10^f. 12 represents an ammeter or charging meter, which receives the current from the same pole of the battery, through the wire 10^e and a wire 12', the current flowing from the said meter via a wire 12^a to the motor-generator 7, in the usual manner. By referring to Fig. 2, it will be understood that when the automobile is left standing on the street during cold weather, by closing the switch 11, the battery current will heat the coil 10, and at the same time operate the device 7 as a motor, and that the latter will rotate the pump 4, for circulating the water throughout the cooling system, and during such operation of the pump, the device 9 serves to "break" the shaft 8, so as to prevent the operation of the engine. When the automobile is run into the garage and left there during a cold night, the battery current would hardly be sufficient to heat the coil 10, and also run the motor 7 throughout the night. At such times I prefer to

operate the motor 7, and also heat the coil 10, by means of current which may be derived from the ordinary commercial lighting circuit, and for this purpose I employ a plug 13, which may be inserted in the usual socket 13', and connect the plug with the motor 7, by means of a conduct-cord 13^a. By this arrangement, sufficient current may be obtained for heating the coil 10, for driving the motor 7, and also for recharging the battery B through the charging circuit 12^a, meter 12 and wires 12'—10^e. Obviously the charging of the battery and the heating of the coil 10, as well as the operations of the motor, for circulating the water through the cooling system, may all be effected simultaneously by my improvement. When the current is drawn from the commercial circuit, it is usually necessary to employ a transformer, as 13^c, in a well-known manner. When the operating current is taken from the socket 13', the switch 11 should be left open, as shown in Figs. 1 and 2. It is further obvious that the battery B may be charged directly by the outside current derived from the socket 13' without the said current operating the motor-generator 7, or the heating coil 10, by the use of extra switches, and if the outside current is alternating, by means of a current converter (not shown). By disposing my heating coil 10 around the housing of the ordinary circulation pump, as herein shown and described, I am able to keep the water of the cooling system at any desired temperature, whether the car is standing outside or in the garage, and that the heating of the coil 10, as well as the driving of the pump 4, through the motor 7, may be executed for intervals of reasonable duration, by current taken from the battery B, at times when the engine is stopped, and it is not convenient to connect the heating element and the other parts with the commercial circuit. After the coil 10 is placed in position around the pump 4, a split casing comprising similar sections 14—14', are clamped around the pump and the coil, and the said sections are then secured together, by means of bolts 14^a, which are inserted through perforated lugs 14^b. The casing is preferably split on a line which cuts through the axis of the shaft 8, and has top and bottom projections 14^c—14^d, for embracing the pipes 4' and 5'. The interior of the casing is preferably lined with asbestos, as shown at 14^e in Fig. 1, for preventing the absorption of the heat by the casing. By this disposition and arrangement of the parts, the entire pump housing may be heated sufficiently to keep the water of the cooling system from freezing in the coldest weather. And the further provision, the operation of the pump 4 when the engine

is standing still, by the motor 7, insures the proper circulation of the water throughout the cooling system, the same as when the engine is running and performing this work.

In order to properly control the heating and other circuits, as well as to conserve the electric current, I provide a novel, simple and effective temperature regulator 15, which is shown diagrammatically in Fig. 3. The regulator consists of a semi-circular terminal 15', and a similarly shaped part 15^a which are so disposed as to form substantially a circle, at the center of which is pivoted a pointer 16, whose opposite ends are arranged to sweep the parts 15'—15^a when the pointer is rotated by a handle 16'. The terminal 15' is provided with numerical markings, which are arranged to be read in opposite directions from a central zero marking. For convenience in describing the regulator, the markings at the right, read from zero to 20 below, while the markings at the left read from zero to 20 above. The terminal or part 15^a, supports the upper ends of a number of resistance coils arranged in plus and minus series corresponding to the markings of the terminal 15', and these coils are insulated from the part 15^a by bushings 15^b. The lower ends of these coils are connected to a common conductor 17, to which the wire 10^e may be connected, and the terminal 15' may be similarly connected to the wire 10^d. In practice, the regulator 15 is sometimes substituted for the switch 11, but it may be connected up in other ways, in a well known manner, for effecting the regulation of the battery and the lighting currents. The coils of each series in the regulator preferably have different resistance values, and the coils of the two series are also of different values. When the pointer 16 is in the full line position, shown in Fig. 3, the regulator circuit is open. When the pointer 16 is swung toward the right, for indicating below zero weather, its lower end makes contact with the coils of the minus series, whose resistance decreases from right to left, as shown by the numerals appearing below the coils. When the pointer is swung toward the left, the circuit is closed between the terminal 15' and the several plus coils whose resistances increase progressively, as shown by the numbers below the said coils. Thus when the indications presage a temperature of 20° below zero, the driver, before leaving the automobile for the night swings the pointer 16 towards the right until it registers with the numeral —20 on the terminal 15'. This correspondingly positions the opposite end of the pointer in contact with the longer minus coil, which offers the least resistance of any of the coils. By this arrangement the coil 10 will

receive the greatest amount of current the heating circuit can supply, and the water of the cooling system will be heated to a correspondingly higher degree. So also, when the weather is mild and the indications are that the temperature will not drop below 20° above zero, he swings the pointer 16 in the opposite direction to the extreme leftward position in registry with the numeral +20 which throws into the heating circuit the highest amount of resistance, of say 20 ohms, for cutting down the current and but slightly heating the water of the cooling system. By the use of my novel temperature regulator the amount of current consumed for the different changes of the weather can never be in excess of the requirement, and therefore none of the current is wasted. When the regulator 15 is substituted for the switch 11, the pointer 16 may be manipulated like the handle of any ordinary switch. For example: When the pointer is disposed in the full line position shown in Fig. 3 the circuit controlled by the regulator-switch is open, and when it is swung in either direction from that shown, the circuit will be closed. In order to get the benefit of the full current from the battery, however, the pointer 16 should be swung towards the right to the number -20, which closes the circuit through the corresponding minus coil having the lowest resistance, as described.

Having thus described my invention what I claim, is—

1. In an automobile, the combination with the cooling system, including the internal combustion engine having a jacket to receive the water, a radiator, a pump, and a battery, of a heating element for preventing the water from freezing in cold weather comprising a resistance coil, a casing surrounding said coil, a motor-generator adapted to drive said pump when the engine is stopped, a circuit connecting said coil and said motor-generator with the battery for simultaneously heating said coil and actuating said motor-generator, and means for driving the pump and motor-generator from the engine.

2. In combination with an automobile cooling system, including a pump driven by the internal combustion engine, of an auxiliary drive for operating the pump when the engine is inoperative, and means for automatically rendering the engine drive inoperative and the auxiliary drive operative when the engine becomes inoperative.

3. In a water cooling system for automobiles, the combination with the engine jacket, the radiator and the pump for ef-

fecting the circulation of the water, and a source of electric current, of a heating element disposed around the pump, a casing for enclosing said pump and said element for preventing the escape of the heat, said casing being attached directly to the engine, a shaft for operating said pump by the power of the engine, independent means for driving said pump while the latter is being heated by said element for circulating the water when the engine is stopped, a circuit adapted to simultaneously supply the current to said coil and for actuating said independent driving means, and a regulator for predetermining the amount of current to be delivered to the heating element corresponding to the changes of the weather.

4. In an automobile, the combination with the water-cooling system including the engine jacket, the radiator, the battery, and the pump for effecting the circulation of the water, of a heating element for heating the water when the engine is stopped, comprising a resistance coil which is arranged to encircle the pump, a casing surrounding said element and said pump and attached to the side of the engine, means for simultaneously heating said coil and charging the battery, and means for heating said coil and circulating the water while the engine is stopped.

5. In an automobile, the combination with the cooling system, including the internal combustion engine having a jacket to receive the water, a radiator, a pump driven by the engine, and a battery, of a heating element for preventing the water from freezing in cold weather and arranged about the pump housing; a motor generator adapted to drive said pump when the engine is stopped, a circuit connecting said coil and said motor-generator with the battery for heating said coil and actuating said motor-generator, and a clutch interposed between the engine and the pump for automatically disconnecting the engine from the pump to permit the motor-generator to drive the pump when the engine ceases to drive the latter.

6. In combination with an automobile liquid cooling system, including a pump driven by the internal combustion engine, of an auxiliary drive for the pump for operating the same upon the slowing down of the engine below predetermined speed, and an automatic clutch between the engine and pump to permit the engine slowing down below said speed without affecting the driving of the pump by said auxiliary drive.

In testimony whereof I affix my signature.

MALCOLM DORION.