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CAR HEATING SYSTEM

Filed June 18, 1932

Fig. 1.

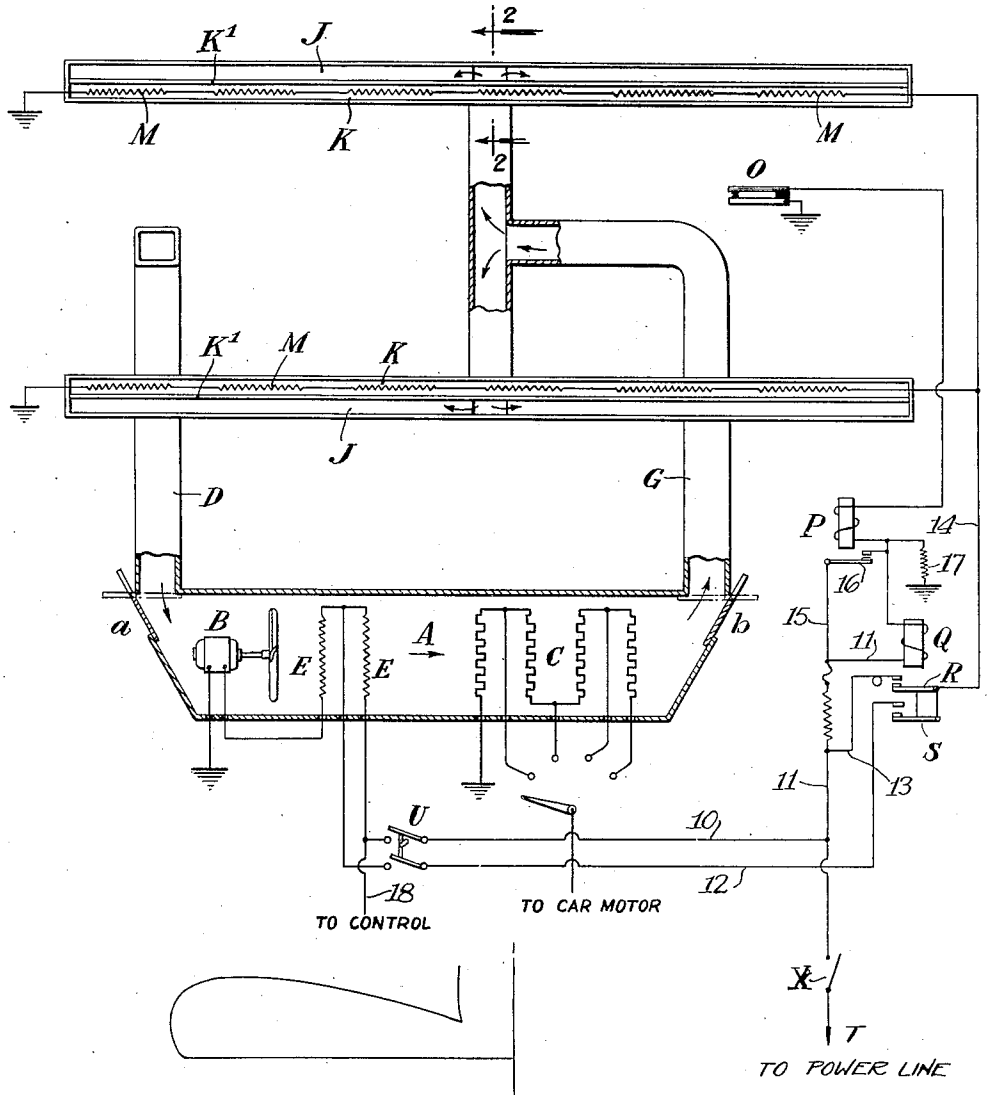
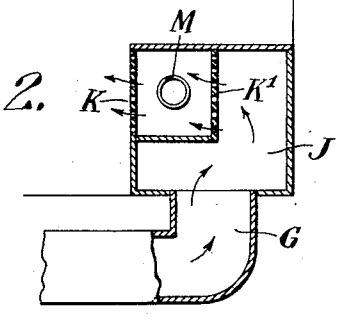


Fig. 2.



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CAR HEATING SYSTEM

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10 Claims. (Cl. 219—20)

For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawing forming a part thereof, wherein

Fig. 1 is a diagram of my system;

Fig. 2 is a cross section of the duplex air duct in the car.

My system is of the type wherein the heat is provided by the car motor resistors, and/or, by other resistances as well, and is conveyed from the under-car enclosure containing said resistors to the car body by a line of duplex conduits.

In the drawing, A represents an enclosure underneath the car, containing the heating coils, which are here shown as including the regular motor resistors C and two special coils E which are normally in series with a fan motor B but the outer coil of the two may be connected at will by conductor 18, with any desired form of independent control apparatus (not shown) located on the car, so that the circuit to said coils may be controlled independently of the switch U.

The enclosure A is connected at either end with the ducts D and G which lead up into the car body and there G at least connects with the duplex ducts J and K which extend under the car seats. Enclosure A is also provided at its respective ends with dampers *a* and *b* by which the outside air may be admitted to the enclosure to any desired degree. Damper *b* is arranged so that in the summer time it can be opened. In the open position it closes duct G. Heat from the resistor will then pass to atmosphere. It will then serve as a means of ventilating the resistors during hot weather. The duplex ducts J and K aforesaid are formed of a rectangular tube of sheet metal with an internal partition K^1 dividing the main duct into two parallel tubes of which the one K, at the left in Fig. 2, is rectangular and the other J is L-shaped. The vertical outer wall of K and the vertical part of the internal dividing wall K^1 are perforated with small holes. The rectangular tube contains a line of heater elements M, placed in the circuit at intervals, while the L-shaped tube constitutes an air supply source from which the air passes through the perforations into the rectangular tube, and over the heaters M therein and emerges thence into the car through the outer perforated wall. This constitutes an effective distributor for the hot air and allows all of the air in the heaterless part of the duplex tubes to come from one source of supply, which, in this case, is the aforesaid duct G leading up from the aforesaid enclosure A. It will be observed that the current comes from a suitable source of energy through the trolley T and the incoming circuit is provided with two branches 10 and 11, a manual switch U being provided to control the flow of current to the heaters E and the fan B, and to the car control as shown. For instance, the switch U is provided with one arm which controls passage of the current along conductor 10 to the heaters E and the fan motor B. Another arm of said switch controls a branch circuit 12 leading from a position between the two coils E as shown. The branch circuit 11 is provided with a branch 13 having a terminal contact in the vicinity of a similar terminal contact connected with the branch wire 12. These contacts are complemental to contacts carried by switches R and S so as to respectively connect the wire 12 and the wires 11, 13 with separate or main heaters M by means of conductor 14. It will be noted that the conductor 12 is so arranged as to provide a by-pass circuit for a portion of the heater coils E.

The operation of the switches R and S is controlled by an electro-magnet Q which is in the circuit 11 which is grounded through the resistance 17, as indicated. The magnet Q is by-passed by a branch circuit 15 leading from the circuit 11 and including a switch 16 controlled by the magnet P which in turn is controlled by a grounded thermostat O.

In operation, the circuits are closed by the switch U so as to energize the fan motor. At this time the circuit is from trolley T, to wire 10, all of the coils E, fan motor B to ground. At the same time, the circuit from wire 10 branches to the car control mechanism. If the temperature of the interior of the car is high the switches R and S will be in the positions shown in the drawing. However, assuming that the car is cold the circuit will also pass from the trolley through the branch 13 to branch 14 and the heaters M. The result of closing the switch S will also be to by-pass a portion of the heater coils E by way of conductor 12. The coils E are also rheostat coils for the fan motor, so that under these conditions the speed of the motor is increased and current will flow over the branch circuit 12, switch S to conductor 14 and the heaters M. These conditions will be maintained until the interior of the car reaches a temperature which will actuate the thermostat O, the result of which is that the current after passing through the coil of magnet Q will pass through the coil of magnet P and through the thermostat to ground. The magnet P will thereupon be energized, attracting the switch 16 and closing the branch circuit 15 so

as to by-pass the magnet Q and deenergize the same, whereupon both switches R and S will move to open position. At this time the current will be maintained through wires 11, 15, switch 16, magnet P and thermostat O and also through the wire 10, all of the coils E and the motor B of the fan, so that the speed of the fan will be reduced. It is preferable to place a manual control switch in the main circuit leading from the trolley as indicated at X. By effecting the by-passing of one of the coils E and connecting the by-pass with the conductor 14 a portion of the current which would otherwise be utilized to operate the fan is employed to supplement the current through conductor 11 to the main heaters by way of conductor 14. It will be noted that one circuit is from the switch X through the relay coil Q and relay P to the thermostat O and the ground. This circuit is arranged to be of such resistance as compared to the circuit through the relay coil Q, resistance 17 and ground that sufficient energy will flow therein to energize the relay P. When the last mentioned relay is energized and its contact closed, then the circuit from switch X through the contact of relay P and through the relay P itself and thermostat O to the ground is of such resistance that sufficient current does not flow from X through relay Q and to ground through the resistance adjacent thereto to energize the relay Q. One advantage of the above-described arrangement is that it requires no safety devices other than ordinary fuses to protect the fan or heaters. The fan maintains an active movement of the air from end to end of the car and enclosure A.

What I claim as new and desire to secure by Letters Patent is:

1. In a car heating system, an enclosure, heating coils therein, an inlet duct connected with said enclosure, an outlet duct also connected with said enclosure and provided with branches, heating ducts constructed and arranged to be placed adjacent the space to be heated, each heating duct being formed of two parallel tubes separated by a perforated wall, one tube of each duct having a perforated wall opening into said space, and heaters in the last mentioned tube, the branches of said outlet ducts being connected with the other tubes.

2. In a car heating system two branch circuits leading from a common source of energy, one branch circuit including heater coils and a fan motor in series, the other branch circuit including a relay magnet; a main heater circuit, a circuit leading from the fan motor circuit at a position to by-pass a portion of said heater coils, and means controlled by said magnet for simultaneously connecting or disconnecting the fan circuit and the by-pass circuit with said main heater circuit.

3. In a car heating system, two branch circuits leading from a common source of energy, one branch circuit including heater coils and a fan motor in series, the other branch circuit including a relay magnet, a main heater circuit, a circuit leading from the fan circuit at a position to by-pass a portion of said heater coils, and control means for deenergizing said relay magnet so that the main heater circuit and the by-pass circuit will be broken, said control means including means for continuing to maintain the circuit to the heater coils and fan while the other circuits are broken.

4. In a car heating system, a main heater circuit, two branch circuits leading from a common source of energy, one of said branch circuits including a relay switch connected with said heater circuit, a fan motor and a supplemental heater between the relay switch and the fan motor and in series therewith, said supplemental heater being so constructed and arranged as to serve as the rheostat coils for the fan motor, the other branch circuit including a magnet for controlling said relay switch, means connected with said last-mentioned branch circuit for energizing said magnet, temperature-responsive means for controlling the magnet energizing means, and means connected with the supplemental heater and said relay switch in such manner as to control the speed of the fan motor.

5. In a car heating system, a main heater circuit, two branch circuits leading from a common source of energy, one of said branch circuits including a relay switch connected with said heater circuit, a fan motor and rheostat coils for said motor in series therewith, the other branch circuit including a magnet for controlling said relay switch, means connected with the last-mentioned branch circuit for energizing the magnet, and means connected to and movable with said relay switch for by-passing a portion of said rheostat coils.

6. In a car heating system, a main heater circuit, two branch circuits leading from a common source of energy, one of said branch circuits including a relay switch, one of the terminals of which is connected with said heater circuit, and also including a fan motor and supplemental heater coils between the switch and the fan motor in series therewith and so constructed and arranged as to serve as the rheostat coils for the motor, a supplemental member connected to and movable with said relay switch and normally connected in circuit with said main heater circuit, the other branch circuit including a magnet for controlling said relay switch, means connected with the last-mentioned branch circuit for energizing said magnet, temperature-responsive means for controlling the magnet energizing means, and means connecting the supplemental switch member with said supplemental heater coils at a position between the ends thereof so as to control the speed of the fan motor.

7. In a car heating system, two branch circuits leading from a common source of energy, one of said branch circuits including a resistance and a fan motor arranged in series, and a relay switch for controlling said motor, the other branch circuit including a relay magnet for operating said switch, a main heater circuit connected with said switch, temperature-responsive means for controlling the operation of the magnet, and means also controlled by said relay for by-passing a part of the said resistance in such manner as to change the speed of the fan in correlation with the operations of the temperature-responsive means.

8. In a car heating system, two branch circuits leading from a common source of energy, one of said branch circuits including a resistance and a fan motor arranged in series, and a relay switch for controlling said motor, the other branch circuit including a relay magnet for operating said switch, means connected with the last-mentioned branch circuit providing a circuit by-passing said relay magnet, temperature-responsive means for controlling the last-mentioned by-pass circuit, and means also controlled by said relay for by-passing a part of the said resistance in such manner as to change the speed of the fan in correla-

tion with the operations of said temperature-responsive means.

9. In a car heating system, two branch circuits leading from a common source of energy, one of said branch circuits including a resistance and a fan motor arranged in series, and a relay switch for controlling said motor, the other branch circuit including a relay magnet for operating said switch, a by-pass circuit leading from the said resistance at a position between the ends thereof to said relay switch, a main heater circuit also connected with said relay switch, a by-pass circuit connected to the second branch circuit and so arranged as to by-pass said relay magnet, said last-mentioned by-pass including a switch, a magnet controlling said switch, a thermostat, and means connecting said thermostat and the coils of said magnets in series with the second branch circuit.

10. In a car heating system, an enclosure, heaters therein, an inlet duct connected with said enclosure, an outlet duct also connected with said enclosure and provided with branches, air-circulating ducts connected with said branches and adapted to distribute air to diverse regions of the space to be heated, having spaced wall openings in communication with said space at said regions respectively, each heating duct having a series of auxiliary heaters so disposed with relation to said wall openings as to impart heat at spaced intervals of each duct to the air circulated to said space through said ducts and the respective wall openings.

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