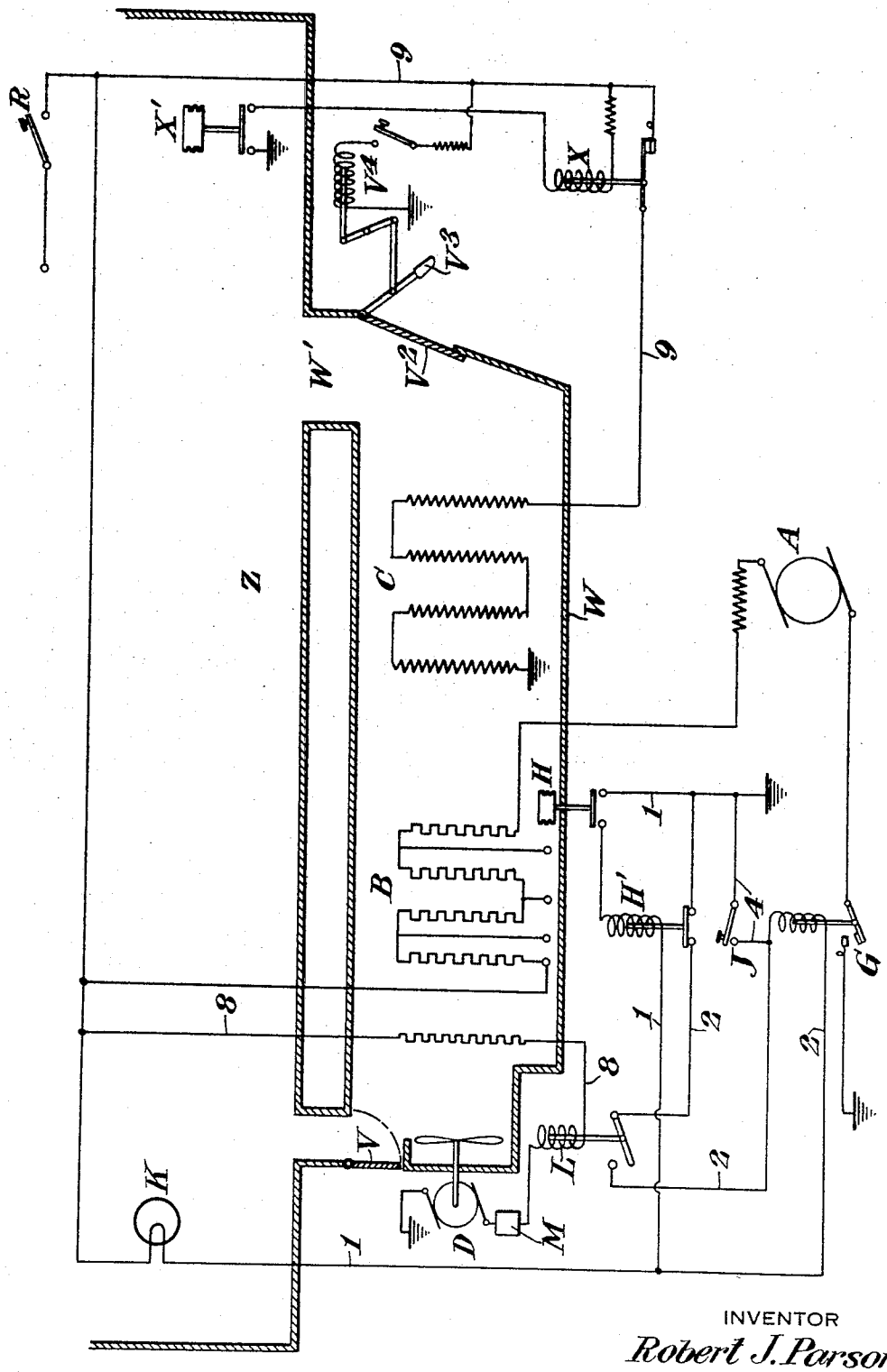
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ELECTRIC CAR HEATER

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ELECTRIC CAR HEATER

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3 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.

In an application of even date herewith (Serial No. 577,083) I have shown and described a car heating system based on the joint use of heating coils that are in shunt to the propelling or traction motor and heating coils that are in series with said motor. A heater of that fundamental nature is shown in a patent to Joseph M. Bosenbury, No. 1,705,393, dated March 12, 1929.

In such a system the shunt heater coils are independent of the traction motor and may be of a definite, calculable value, and may be cut in or out of circuit for regulative purposes, but the series heating coils are dependent on the traction motor and can not be cut in and out of circuit for heat regulation, since they must be cut in and out for regulation of the traction motor. I have therefore devised, and set forth in said simultaneous application, a heating system that is regulated to a degree by cutting in and out the heating coils that are in shunt with the traction motor, and have combined therewith a regulation of the series coils, not by cutting them in or out of circuit, but by leaving them as they may be connected up by the car controller for regulating the power and speed of the traction motor, but I adjust their heating effect by means of a diversion of the heated air into the outside atmosphere instead of into the car body. This involves the grouping of said series coils in a compartment separate from the car body but communicating therewith, whereby this regulating method may be applied to the heat produced by the joint heating effect of said series coils, instead of being applied to the coils themselves. For convenience the shunt heating coils are also included in said separate compartment, wherein they may be regulated in the usual way, by cutting them in or out of circuit to the extent of their contribution to the joint heating effect, while the remainder of the regulation is effected as aforesaid, not by cutting the series coils in or out of circuit, but by diverting more or less of their heat into the outside air instead of into the car body. By this means I am able to utilize for car heating purposes the large amount of heat generated by the series coils, which heat has heretofore been wasted. This constitutes an improvement over the device of Bosenbury which I have heretofore alluded to.

There remains, however, the matter of the blower, or draft-creator, which is required to convey the heat from the separate compartments into the car body. In my aforesaid application, filed simultaneously herewith, I have treated this blower in one manner, and the present application is directed to its treatment in a different manner. That is, in this application I include in the circuit of said blower, a relay magnet, and also a thermal cut-out. The response of said relay magnet to current in the blower circuit will act to close a circuit controlling the line-breaker of the traction motor, which line-breaker controlling circuit is also liable to open by a thermally-controlled relay. Thereby the said line-breaker is made subject to the aforesaid thermally-controlled relay and also subject to a break in the blower circuit. I, moreover, include in the blower-circuit the aforesaid thermal cut-out which, in case of excessive current in the blower-circuit, will open the blower-circuit, whereupon the said relay magnet therein will drop and open the control circuit of the said line-breaker.

Moreover, I arrange that a closure of the main switch R that governs all the control circuits will also close the blower-circuit, which, in my other application, is closed by a thermal switch. By this means the blower operates all the time that the said main switch is closed, and is thus interlocked with the traction motor, which is also subject to said main switch.

Referring to the drawing A is the traction motor. W is the separate compartment containing the shunt heating coils C and the series heating coils B. This compartment communicates by a duct W^1 with the car body Z. At its left end is the blower D, also a damper V by which fresh air may be admitted to the compartment to mingle with the heated air therein that would otherwise be merely circulated and recirculated by the blower in the compartment W and the car body Z. At the right-hand end the compartment W is provided with a damper V^2 that may be operated either by the handle V^3, or by the magnet V^4 to regulate the heating effect of the series coils B on the car body air, instead of cutting those series coils B into or out of circuit. X^1 is the thermostat governing the magnet X which magnet regulates the shunt coils C by cutting them in or out of circuit.

In the circuit of blower motor D is the aforesaid relay magnet L and the thermal cut-out M. The main switch R closes the control circuits, and, when closed, admits current to blower circuit 8—8 and to circuit 9—9 of the shunt heaters C. The relay magnet L aforesaid, in the blower circuit 8—8 acts, when energized, to close the cir-

cuit 2—2, which circuit 2—2 is the control circuit of the line-breaker G of the traction motor A.

The line-breaker control circuit 2—2 is thus not only closed by the energizing of the said relay magnet L, but is also opened by the relay magnet H^1 in the circuit 1—1 under the control of thermostat H. In said circuit 1—1 is also contained a warning signal K which gives notice to the motorman, when said signal is actuated by the closing of circuit 1—1 by the thermostat H, under excessive heat conditions, that such excessive heat conditions prevail, and that his line-breaker has dropped and disabled his car. The line-breaker control-circuit 2—2 is thus subject to opening, not only by the lifting of relay magnet H^1, but also by the dropping of relay magnet L, in the blower circuit 8—8, which latter may occur if the blower motor is stalled, or if its thermal cut-out M acts on excessive heat. There is also a hand-operated switch J by means of which the motorman can, in an emergency, close a by-pass circuit 4—4 around circuits 1—1 and 2—2, thereby preventing the disabling of his car by dropping out of the line-breaker. In operation, while the circuit is closed by switch R, the circuits 8—8 and 9—9 are normally energized, and current will flow respectively to the shunt coils C and to the fan motor D. The circuit 9—9, however, is also controlled by the magnetic switch X, in the branch circuit leading from the circuit 9—9 and including the thermostatic switch X'. Should the temperature within the car become too high the branch circuit is energized by the closing of switch X', whereupon the magnetic switch X will be operated to break the circuit to the coils C. Simultaneously, upon the energizing of the circuit 8—8, current will flow through the coil of magnetic switch L, thermal cut-out M, and fan motor D to the ground, thereby placing the fan in operation. However, circuit 1—1 would not be normally energized by the closing of the circuit at R, because said circuit 1—1 is normally broken by the thermostatic switch H.

The closing of the fan circuit 8—8 energizes the coil of the switch L and closes the circuit 2—2. Current then flows through the coil of the line breaker G, switch L, switch H' to ground. Thereupon, line breaker G is retained in circuit closed position, so that current will flow through motor A and series coils B, under rheostatic control, in the usual and well known manner. If, however, excessive heat should be generated in the vicinity of the fan, the fan circuit will be broken at M, thereby breaking the line-breaker-control circuit 2—2, whereupon the motor circuit will be broken at G. If too much heat is generated in the vicinity of the coils B, the thermostatic switch H closes the circuit through 1—1, whereupon the coil of switch H is energized, thereby breaking circuit 2—2 and thereupon releasing line breaker G. Obviously, the coil of line breaker G may be de-energized at will through the by-passing circuit 4, controlled by the switch J.

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

1. In a car heating system, the combination with a motor, of heating means consisting of regulating rheostat coils for the motor in series therewith and other heater coils in shunt with the motor, said rheostat coils and said heater coils being so relatively positioned that the cumulative heat of both may be utilized for heating purposes, an electrically propelled blower for conveying air heated by the respective coils to the space to be heated, a line breaker in the motor circuit, a controlling circuit for the line breaker, and a relay in the blower circuit constructed and arranged to control said line-breaker-control-circuit, so that the line breaker is operated upon failure of the blower circuit.

2. In a car heating system, the combination with a motor, of heating means consisting of regulating rheostat coils for the motor in series therewith and other heater coils in shunt with the motor, said rheostat coils and said heater coils being so relatively positioned that the cumulative heat of both may be utilized for heating purposes, an electrically propelled blower for conveying air heated by the respective coils to the space to be heated, a line breaker controlling the motor circuit, a circuit including an electro-magnet for actuating said line breaker, two relays controlling the last mentioned circuit, one of said relays being in the blower circuit and operative to deenergize said electro-magnet upon failure of the blower circuit, and a thermostatically controlled circuit including the other relay and so constructed and arranged as to deenergize said magnet upon overheating of said heating means.

3. In a car heating system, the combination with a motor, of heating means consisting of regulating rheostat coils for the motor in series therewith and other heater coils in shunt with the motor, said rheostat coils and said heater coils being so relatively positioned that the cumulative heat of both may be utilized for heating purposes, an enclosure containing said coils and having a discharge opening, an electrically propelled blower for conveying heat through said closure and discharging it through said opening, a line breaker controlling the motor circuit, a control circuit for the line breaker, a blower circuit including a relay controlling said line-breaker-control-switch, and a thermal cut-out in said blower circuit so that a break in the blower circuit will cause the opening of the line breaker.

ROBERT J. PARSONS.