March 30, 1937. R. J. PARSONS 2,075,463

HEATER

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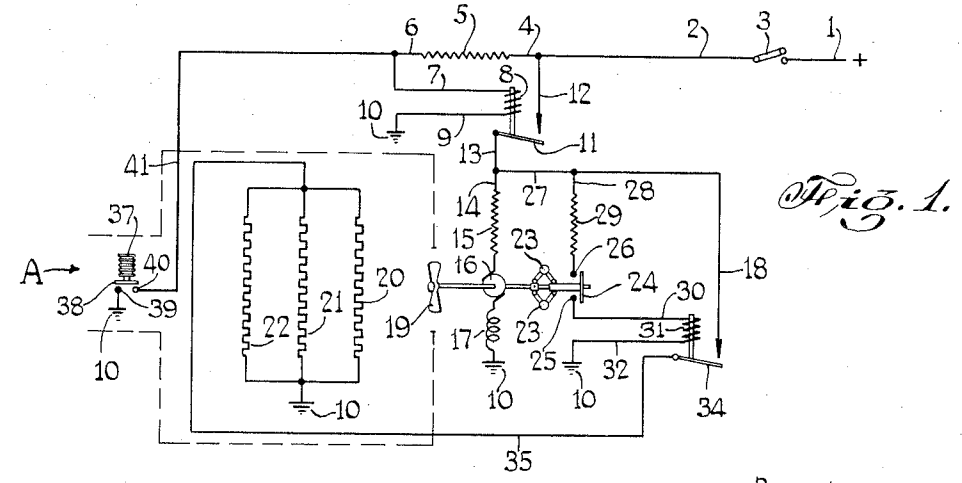


Fig. 1.

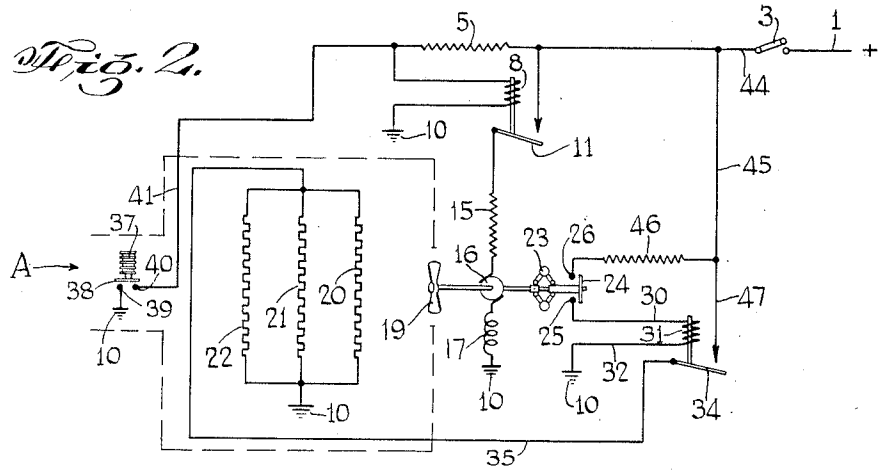


Fig. 2.

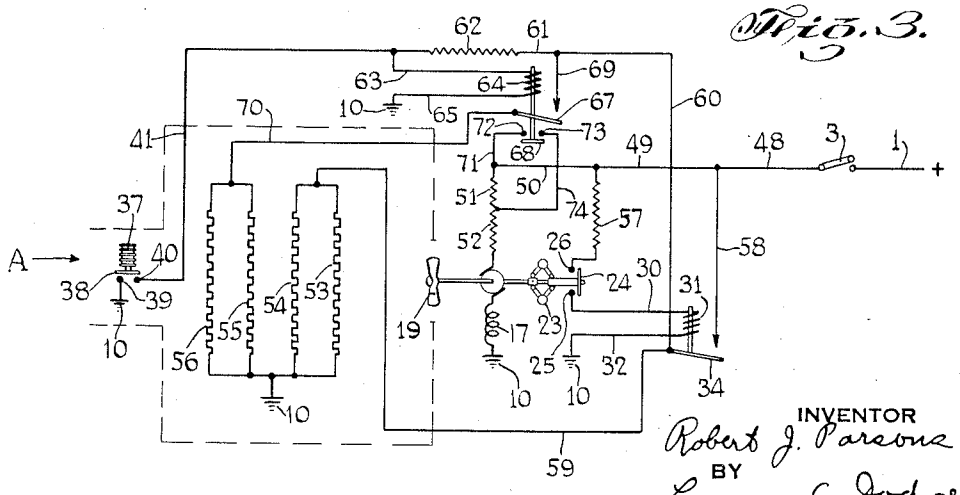


Fig. 3.

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HEATER

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6 Claims. (Cl. 219—39)

This invention relates to electricity, particularly to heating by electricity, and more especially to forced draft heating.

It is well known to those skilled in this art that vehicles propelled by electricity are generally also heated by electricity. The heating systems take many forms, but they are quite often of a form which includes a fan for causing a flow of air over the heating element. It is also well known that the heating element generates so much heat that if tne flow of air thereover ceases, there is great danger of burning out the heating element.

The principal object of this invention is to provide an arrangement of heating units and means for causing a flow of air thereover such that the heating element will be deprived of heating energy upon the cessation of the flow of air thereover.

Other objects and advantages will appear as the description of the particular physical embodiments selected to illustrate the invention progresses, and the novel features will be particularly pointed out in the appended claims.

In describing the invention in detail and the particular physical embodiments selected to illustrate the invention, reference will be had to the accompanying drawing and the several views thereon, in which like characters of reference designate like parts throughout the several views, and in which:

Figure 1 is a schematic or diagrammatic view of an arrangement of heating units and air movement means arranged in accordance with applicant's invention; Fig. 2 is a modified form of the device as shown by Fig. 1; Fig. 3 is a further modification of the device of Fig. 1 in that it shows means for varying the flow of air over the heating units.

In Fig. 1, numeral 1 designates a conductor connected to a source of potential. This conductor 1 is connected to conductor 2 by means of a manually operable switch 3. When this switch 3 is in the closed position, current flows through wire 1, switch 3, wires 2 and 4, limiting resistance 5, and wires 6 and 7 to the energizing coil 8 of a relay, and thence by wire 9 to 10 which is indicated as ground and symbolizes the negative side of the source of potential.

Upon the energization of relay 8, the armature 11 is raised to the upper position contacting with the contact point terminating wire 12 so that electricity may then flow from the positive terminal of the source of potential from wire 2 through wire 12, armature 11, wire 13, wire 14, resistance 15, armature 16 and field 17 to ground 10. Current flowing in the above traced path will cause the armature 16 of the motor to rotate. Upon a rotation of the armature 16, the fan blades 19 will cause a flow of air over the heating units 20, 21 and 22 and at the same time cause the fly balls 23 of the fly ball governor to fly outwardly and move contact member or bridge 24 into contact with contacts 25 and 26. As soon as these contacts 25 and 26 are bridged by bridging member 24 current may then flow as follows: from the positive terminal of the source of potential, wire 1, switch 3, wires 2 and 12, armature 11, wires 13, 27 and 28, resistance 29, contact 26, bridge 24, contact 25, wire 30, relay energizing coil 31 and wire 32 to the negative terminal of the source 10.

Current flowing in the above traced path raises armature 34 so that then current may flow from wire 27, through wire 18, armature 34, wire 35, and through the three heating units 20, 21 and 22 to the negative terminal of the source 10.

From the above description it will be seen that only after the armature 16 has started to rotate and the fan blades 19 are delivering air over the heating units 20, 21 and 22 is the relay coil 31 energized so that its armature 34 is raised so as to supply electrical energy to the heating units 20, 21 and 22. This being so, it is readily seen that it is impossible to overheat the heating units 20, 21 and 22 because at times when electrical energy is flowing therethrough, the fan blades 19 are forcing air thereover so as to keep the temperature down to the proper value.

As the air passing over the heating units 20, 21 and 22 is for heating a space such as space A, applicant positions therein a thermostat 37, preferably of the well known sylphon type, operating a bridge 38 which bridges contacts 39 and 40 when the thermostat 37 is subjected to a temperature too high in degree. When the bridging member 38 bridges the contacts 39 and 40 the current which formerly flowed from wire 6 through wire 7 to energizing coil 8 and the relay would then flow through wire 41, contact 40, bridge 38, contact 39 and wire 42 to the negative terminal 10 of the source so that the relay armature 11 would fall becoming disconnected from wire 12. Upon de-energization of the relay whose energizing coil is 8 the motor would be cut off from the source of potential and consequently the heating coils would also be cut off from the source of potential. When the temperature of

the space A is sufficiently lowered the thermostat 37 will withdraw the bridge 38 and the relay whose energizing coil is 8 will again raise the armature 11 and the parts will function as before.

The arrangement as shown in Fig. 2 varies from that shown in Fig. 1 in that the energy of the heating coil does not pass through the armature of the relay corresponding to the relay whose energizing coil is 8 in Fig. 1. In Fig. 2, after the switch 3 has been closed, and the relay coil 8 has been energized, the motor armature 16 bridges the contacts 25 and 26 so that then current will flow from the positive terminal of the source of potential through wire 1, switch 3, wires 44 and 45, through limiting resistance 46 to contact 26, bridge 24, contact 25, wire 30, energizing coil 31, wire 32 to ground 10. The flow of current in the above traced path energizes the relay so that armature 34 is raised and then the heating units 20, 21 and 22 are energized by current which flows in a path as follows: positive terminal of the source of potential, wire 1, switch 3, wires 44, 45 and 47, armature 34 and wire 35 to heating units 20, 21 and 22 and thence to ground 10.

Other than the fact that the heating energy is not taken through the relay whose energizing coil is 8, Fig. 2 is the same in construction, operation, and function as Fig. 1.

In Fig. 3 provision has been made to supply heat to the space to be heated, but at lower rate, even after the thermostat 37 has bridged the contacts 39 and 40.

In Fig. 3 when switch 3 has been manually closed, current flows from the positive terminal of the source of potential by wire 1, the switch 3, wires 48, 49 and 50 to two part resistance 51 and 52, armature 16, field 17, to ground 10. Current flowing in the above traced path will cause the armature 16 to revolve and the fan blades 19 to force air over the heating units 53, 54, 55 and 56.

When the armature 16 revolves, the bridging contact 24 bridges contacts 25 and 26 so that current then flows as follows: positive terminal of the source of potential, wire 1, switch 3, wires 48, and 49, limiting resistance 57, contact 26, bridge 24, contact 25, wire 30, energizing coil 31 and wire 32 to ground 10. Current flowing in the above traced path will cause the armature 34 to be raised so that then current may flow from the wire 48 through wire 58, armature 34, wire 59 and through heating units 53 and 54 and thence to ground 10.

Under the conditions just described, the armature 16 being fed through both resistances 51 and 52 would revolve at a speed which we may designate as a lower speed and at the same time only two of the heating units 53 and 54 would be energized, but at the same time current would flow through armature 34 from wire 36 through wires 60 and 61, limiting resistance 62, wire 63, energizing coil 64 and wire 65 to ground 10. Current flowing in the last traced path causes armature 67 to be raised and also armature or bridging member 68.

When armature 67 is raised then current can flow from the positive terminal of the source through wire 1, switch 3, wires 48 and 58, armature 67, wire 70, through heating coils 55 and 56 and then to the negative terminal of the source through ground 10, thus energizing all of the heating units. At the same time, bridging member 68 would allow current to flow from the positive terminal of the source of potential as follows: positive terminal of the source of potential, wire 1, switch 3, wires 48, 49, 50 and 71, contact 72, bridge 68, contact 73, wire 74 to resistance 52 and then through armature 16 and field 17 to ground 10. The effect would be that the motor would be fed by a current all of which did not pass through both of the resistances 51 and 52, that is, the resistance between the source and the motor would be largely decreased. The effect would be that the motor armature would move at a very much higher speed and the fan blades 19 would move at a higher speed so that while all of the heating units 53, 54, 55 and 56 are energized more air would be passed over them.

If the thermostat 37 is arranged in the space A, to be heated and is so adjusted that its bridging member 38 contacts 39 and 40 only when the thermostat has been subjected to the heat obtained by blowing air over all of the heating units 53, 54, 55 and 56 at a time when all of them have current flowing therethrough, then when the space A has arrived at the proper high heat the bridging member 38 bridging contacts 39 and 40 will short circuit the energizing coil 64 of the relay and cause the armature 67 and the bridging member 68 to fall, the one breaking contact with wire 69 and the other breaking contact with the contacts 72 and 73. When this occurs, the motor will then be fed through both of the resistances 51 and 52, the armature will revolve at the lower speed and the electrical energy will be cut off from the heating coils 55 and 56. When the temperature of the space A gets to such a low point that the thermostat 37 is operated to withdraw the bridge 38 from the contacts 39 and 40 the system will resume as before.

The method of heating hereinbefore described is applicable to any situation where a space must be heated but is particularly applicable to the heating of vehicles propelled by electricity because in such case the electrical energy is available as it may be taken from the same source as that which propels the vehicles.

Although I have particularly described several particular physical embodiments of my invention and explained the operation, construction and principle thereof, nevertheless, I desire to have it understood that the forms selected are merely illustrative, but do not exhaust the possible physical embodiments of the idea of means underlying my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a heating system, in combination: a heating unit; a selectively operable second heating unit; a motor; means operated by the motor for causing a flow of air over both of the heating units; means for supplying electrical energy to the motor including a resistance in series therewith; a circuit closing and opening device and means operable exclusively by said motor to open and close said device; means for causing a flow of electricity through the first of said heating units including the said circuit closing and opening device; means for causing a flow of electricity through the second mentioned heating unit controlled by the last mentioned means; and means for causing a flow of electricity through said motor through less than all of the said resistance when said second heating unit is in operation whereby the motor operates at increased speed and causes a greater flow of air over said heating units.

2. In a heating system, in combination: an

electrical heating unit; a fan rotatable relative to said unit for causing movement of air over said heating unit; means for operating said fan; and means operable exclusively by said fan-operating means and only while said fan is operating for causing a flow of electrical energy through the said heating unit; a space to be heated; a thermostat in said space; and means controlled by the thermostat for governing the operation of the fan and so the flow of electricity through the heating unit.

3. In a heating system, in combination: a space to be heated; an electrically energizable means for heating said space; an electrically energizable means for blowing air over said heating means in transit to said space; a source of electrical potential, including an electrical main; a power circuit connected with said main and including said blower means; a shunt adapted to govern the operation of said power circuit, and a thermostatic device adapted to establish and break said shunt in response to changes in temperature in the air influenced by said heating means; a heating circuit including at least a portion of said space heating means, and an electro-magnetic relay associated with said thermostatic device and adapted to serve therewith in governing the operation of said blower means.

4. In a heating system, in combination: a space to be heated; an electrically energizable means for heating said space; an electrically energizable means for blowing air over said heating means in transit to said space; a source of electrical potential, including an electrical main; a power circuit connected with said main and including said blower means; a shunt adapted to govern the operation of said power circuit, and a thermostatic device adapted to establish and break said shunt in response to changes in temperature in the air influenced by said heating means; a heating circuit including at least a portion of said space heating means, and an electro-magnetic relay associated with said thermostatic device and adapted to serve therewith in governing the operation of said blower means; and a control circuit for said heating circuit, said control circuit including a relay coil of another electro-magnetic relay adapted to establish and break said heating circuit, said control circuit having a gap adapted to be bridged by a bridging member, and said blower means having a bridging member adapted to close said control circuit when said blower means is operated, and to open said control circuit when said blower means is inoperative, whereby the portion of said heating circuit controlled thereby is energized when said blower means operates, and is de-energized when said blower means is inoperative.

5. In a heating system, in combination: a space to be heated; an electrically energizable means for heating said space; an electrically energizable means for blowing air over said heating means in transit to said space; a source of electrical potential, including an electrical main; a power circuit connected with said main and including said blower means; a shunt adapted to govern the operation of said power circuit, and a thermostatic device adapted to establish and break said shunt in response to changes in temperature in the air influenced by said heating means; a heating circuit including at least a portion of said space heating means, and an electro-magnetic relay associated with said thermostatic device and adapted to serve therewith in governing the operation of said blower means; and a control circuit for said heating circuit, said control circuit including a relay coil of another electro-magnetic relay adapted to establish and break said heating circuit, said control circuit having a gap adapted to be bridged by a bridging member, and said blower means having a bridging member adapted to close said control circuit when said blower means is operated, and to open said control circuit when said blower means is inoperative, whereby the portion of said heating circuit controlled thereby is energized when said blower means operates, and is de-energized when said blower means is inoperative; and further characterized by having said blower-energizing circuit, said heater-energizing circuit and said control circuit disposed respectively in branches of a circuit under the control of said first-named electro-magnetic relay, and brought into operation successively thereto in the order named.

6. In a heating system, in combination: a space to be heated; an electrically energizable means for heating said space; an electrically energizable means for blowing air over said heating means in transit to said space; a source of electrical potential, including an electrical main; a power circuit connected with said main and including said blower means; a shunt adapted to govern the operation of said power circuit, and a thermostatic device adapted to establish and break said shunt in response to changes in temperature in the air influenced by said heating means; a heating circuit including at least a portion of said space heating means, and an electro-magnetic relay associated with said thermostatic device and adapted to serve therewith in governing the operation of said blower means; and a control circuit for said heating circuit, said control circuit including a relay coil of another electro-magnetic relay adapted to establish and break said heating circuit, said control circuit having a gap adapted to be bridged by a bridging member, and said blower means having a bridging member adapted to close said control circuit when said blower means is operated, and to open said control circuit when said blower means is inoperative, whereby the portion of said heating circuit controlled thereby is energized when said blower means operates, and is de-energized when said blower means is inoperative; and further characterized by having the electrical energy for said heating circuit derived from said main by a branch thereof separately from said blower-operating circuit, whereby the heating current supply is by-passed relatively to said first-named electrical relay, while the operation of said control-circuit, and consequently, of said heating circuit remains under the control of said blower actuating means.

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