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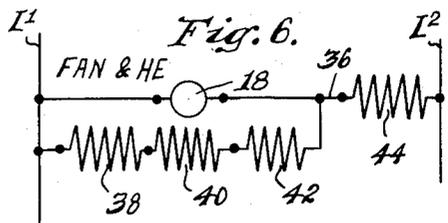
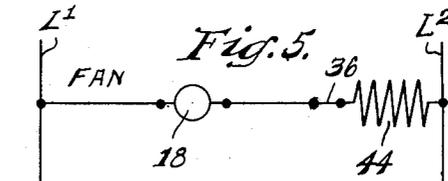
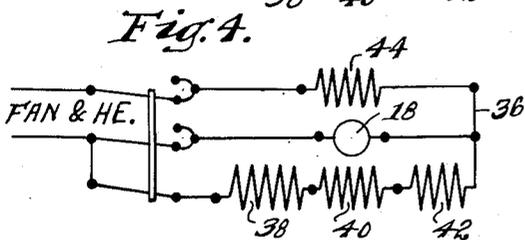
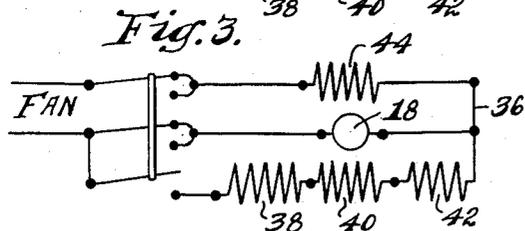
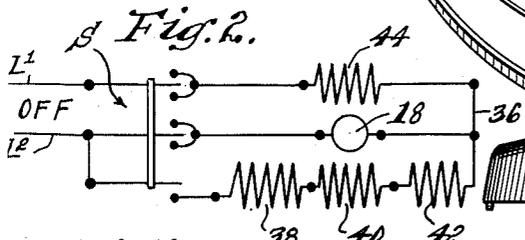
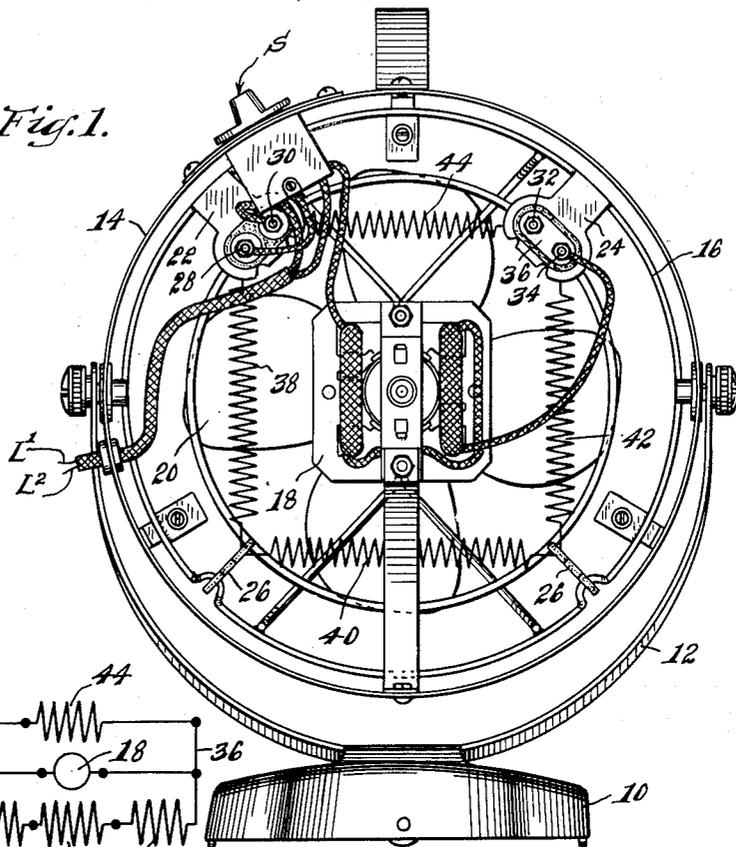
M. E. LAUTNER

2,647,198

CONTROL CIRCUIT FOR AIR FAN HEATERS

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Fig. 1.



Inventor.
Max E. Lautner.
By Bain, Freeman & Molinare
Att'ys.

UNITED STATES PATENT OFFICE

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CONTROL CIRCUIT FOR AIR FAN HEATERS

Max E. Lautner, St. Louis, Mo., assignor to
Knapp-Monarch Company, St. Louis, Mo., a
corporation of Delaware

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3 Claims. (Cl. 219—39)

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This invention relates to a control circuit for an electric circulating fan having heating means for the air and in which selective control is had for heating the air or not as desired.

One object of the invention is to provide a comparatively simple arrangement for reducing the speed of the fan when the heating element is energized so that most efficient pick-up of heat from the heating element by the air being circulated is had, yet when the air is being circulated without being heated, the fan may operate at relatively high speed for producing the desired circulation.

Another object is to provide a high speed fan for normal air circulation and a means to slow down its speed when the air is being heated by electric heating elements.

A further object is to provide a control switch and circuit arrangement for a heating element and a fan motor to accomplish the desired results without the use of a separate potentiometer or rheostat, portions of the heating element itself being utilized for effecting the desired control or different speed of the motor when the air is heated compared to when it is not heated.

Still a further object is to provide a circuit arrangement having a single control switch which opens both sides of the line in the off position of the switch.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my control circuit for air fan heater, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a rear elevation of an air fan heater of the general character shown in my copending application, Serial No. 216,168, filed March 17, 1951, and including a control circuit in accordance with the present invention.

Figure 2 is an electrodiagrammatic view of the control circuit with the switch in the off position.

Figure 3 is a similar view showing the switch in position for energization of the fan without heating the air.

Figure 4 is a similar view with the switch in position for operating the fan and heating the air.

Figure 5 is a view for tracing out the circuit of Figure 3; and

Figure 6 is a similar view for tracing out the circuit of Figure 4.

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On the accompanying drawing I have used the reference numeral 10 to indicate a supporting base and 12 a U-shaped supporting strap for a tubular casing 14. The casing 14 has supported therein a circular wire 16 provided with suitable means of attachment to the casing and supporting a motor 18. A fan blade 20 is mounted on the shaft of the motor for circulating the air through the casing 14 when the motor is energized.

Heating element supports 22, 24 and 26 extend inwardly from the circular wire 16 for supporting a heating element comprising sections 38, 40, 42 and 44. Terminals 28 and 30 are supported on and insulated from the support 22, and terminals 32 and 34 are supported on and insulated from the support 24. A shunt 36 connects the terminals 32 and 34 and suitable wiring connects the terminals 28 and 30 with a switch S.

The circuit connections are shown diagrammatically in Figures 2 to 6. In Figure 2, the switch S is in the off position so that none of the heating element sections nor the motor 18 are energized, and both sides of the line are open.

In Figure 3, the motor 18 is energized but one section 44 of the heating element is in series therewith and this can be traced out somewhat better in Figure 5 from line L¹ to line L².

The motor 18 draws about one-half ampere of current and the resistance of the heating element section 44 is only two or three ohms. This gives only about one volt drop across the heating element section 44 which acts as a resistance, 110 volts being applied across the line L¹—L². Accordingly, the motor operates at substantially line voltage and the half ampere of current flowing through the resistance 44 hardly affects it so that it does not act as a heating element but merely as a resistance.

When both the fan and the heating element are on, the switch S is positioned as in Figure 4 giving a circuit arrangement such as shown in Figure 6 with the heating element sections 38, 40 and 42 in series with the heating element section 44 across the line and the three sections 38, 40 and 42 are then in parallel with the motor 18. This results in about three-fourths of the line voltage across the motor and its speed is therefore considerably reduced.

Thus a high speed motor is had for efficient air circulation when it is desirable that room air be circulated but not heated. When it is desirable to heat the air, the heating element

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comes into full scale operation utilizing all four sections 38, 40, 42 and 44 but due to the peculiar connection of the section 44 in the circuit in relation to the motor, the motor is slowed down considerably so as to slowly circulate the air over the heating element to permit maximum pick-up of heat therefrom and accordingly slow enough circulation of the air that it is circulated as hot air and not as merely slightly warmed air.

With the arrangement disclosed, a unique control of the circuit is had for securing high and low speed operation of the fan as desired from a single switch and utilizing the heating element efficiently for slow-down of the fan when the heating element is energized, yet permitting it to operate at substantially maximum speed without heating the air in the circuit position of Figures 3 and 5 even though part of the heating element is used in the circuit at that time. My experience has been that the heat generated by the section 44 is relatively negligible during cool air circulation because of the high resistance of the motor windings yet the normal arrangement of a heating element and a fan both energized for circulating hot air is had with a slowing down of the fan as desirable when the heating element is energized. The single switch provided also disconnects all electrical elements of the appliance from either side of the supply line when the switch is adjusted to the "off" position.

Some changes may be made in the construction and arrangement of the parts of my control circuit for air fan heater without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

1. In a control circuit for an air fan heater adapted to be supplied with electric current from a supply line, an air circulating fan, a heating element having two sections, a switch for energizing said fan for circulating either room air or heated room air, said switch in one position connecting said fan in series with one section of said heating element, in another position effect-

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ing a similar connection and connection of the other section of the heating element in series with said one section and in parallel with said fan motor, and in still another position disconnecting both said fan and said heating element from both sides of the supply line.

2. A control circuit for an air fan heater adapted to be energized from a pair of line wires comprising an air circulating fan, a heating element for heating air circulated thereby, and a three-position switch for controlling said fan and heating element by selectively connecting a minimum portion of said heating element in series with the fan for high speed operation of the fan when the switch is in a first position, also connecting a major portion of the heating element in parallel with the fan when the switch is in a second position for low speed operation of the fan when heating the air circulated thereby, and disconnecting the fan and heating element from both of the line wires when the switch is in a third position.

3. A control circuit for a two wire electrically energizable air fan heater comprising a three-blade, three-position switch having five contacts, said blades being connected to the two supply wires and said contacts being connected to the fan and a heating element for controlling them by selectively connecting a minimum portion of the heating element in series with the fan for high speed operation of the fan in one position of said blades, connecting a major portion of the heating element in parallel with the fan and in series with said minimum portion of the heating element for low speed operation of the fan when heating the air circulated thereby in another position of said blades or disconnecting both line wires from the fan and heater in still another position of said blades.

MAX E. LAUTNER.

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