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INDUCTION HEATER

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Fig. 1

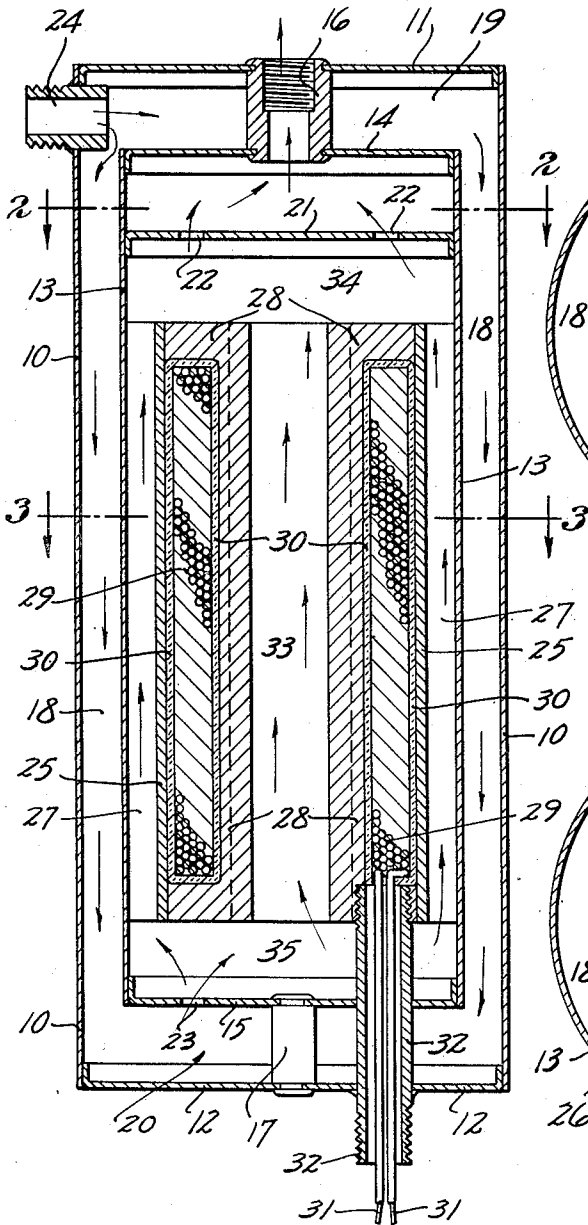


Fig. 2

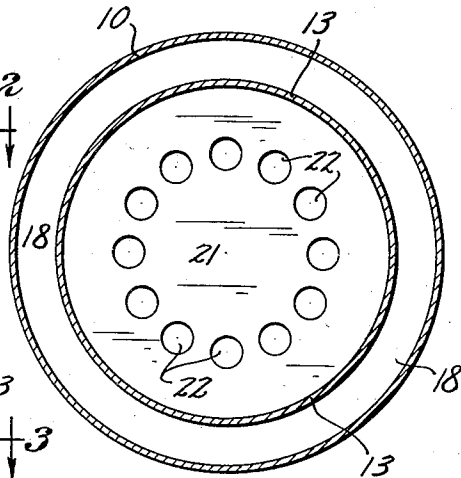
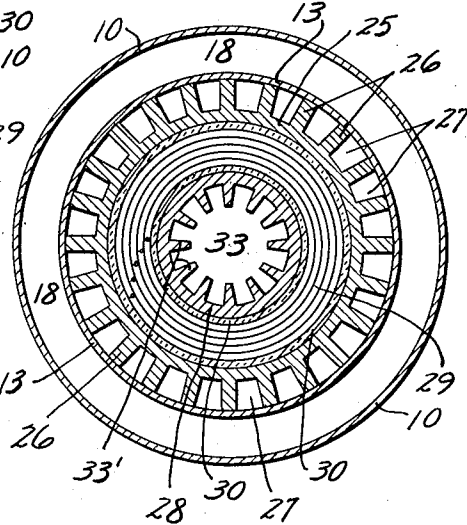


Fig. 3



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INDUCTION HEATER

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2 Claims. (Cl. 219-47)

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My present invention provides a simple and highly efficient induction heater; and, generally stated, consists of the novel devices, combination of devices, and arrangement of parts hereinafter described and defined in the claims.

Broadly considered, the heater is adapted for use to heat flowing fluids, either air or liquids, but is particularly designed and intended for use as an airflow heater. The immediate object of the present invention is the provision of a simple and efficient device for heating small air spaces, such as airplane cabins, aviators' garments, and the like.

A preferred commercial form of the heater is illustrated in the accompanying drawing wherein like characters indicate like parts throughout the several views.

Referring to the drawing:

Fig. 1 is a view in axial section showing the improved heater;

Fig. 2 is a transverse section taken on the line 2-2 of Fig. 1; and

Fig. 3 is a transverse section taken on the line 3-3 of Fig. 1.

Of the parts of the heater, the numeral 10 indicates a cylindrical drum-like shell, preferably of sheet metal, provided with heads 11 and 12. Within the outer shell 10 is a smaller intermediate drum-like shell 13, also preferably of sheet metal, and of cylindrical form, provided with heads 14 and 15. The head 14 is rigidly connected to the head 11 by a tubular hub or sleeve 16. The head 15 is rigidly connected to the head 12 by an axially located spacing stud or hub 17.

The intermediate shell 13 is spaced from the shell 10 to form annular air space 18. The head 14 is spaced from the head 11 to form an air intake chamber 19; and the head 15 is spaced from the head 12 to form an air chamber 20. The space at the upper or outlet end of the shell 13 is spanned by a baffle plate 21 having circumferentially spaced air pockets or passages 22. The head 15, in a similar manner, has circumferentially spaced air perforations or passages 23. The cold air inlet tube 24 opens into the air chamber 19 through one wall of the shell 10.

Located within the intermediate shell 13, but concentrically spaced therefrom, is one of the two paramagnetic heating elements of the induction heater. This cylindrical shell or member 25 is preferably made of cast iron or soft steel and is formed with heat-radiating fins 26 spaced to form air passages 27 between said members 13 and 25.

The other paramagnetic heating element of

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the heater, which is also preferably of cast iron or soft steel, is indicated by the numeral 28 and is in the form of a spool, which, at its ends, has outstanding flanges that closely engage the ends of the member 25 leaving an annular space within which is located the electrical induction coil 29. This coil 29 is made of insulated wires and the whole coil is preferably placed within an outer casing or coating of insulating material 30. The lead wires 31 to and from the coil are preferably brought in and out through a tube or pipe section 32 that is extended through the heads 12 and 15, and screwed thereto at adjacent flanged ends of the spool-like element 28. This spool-like element 28 has a large axial air passage 33 and the interior wall of the member 28 is provided with radiating fins 33'.

In length, the electro-magnetic heating elements 25 and 28 are less than the space between the head 15 and baffle or partition 21, so that there is formed an upper distributing chamber 34 and a lower distributing chamber 35.

The cold air under pressure from a suitable outside wall, not shown, will be delivered through the tube 24 through the upper chamber 19 and will be spread out over the head 14 and delivered downward through the annular chamber 18 and completely around the intermediate shell 13. From the annular channel 18 the air initially or slightly warmed will be delivered into the lower chamber 20, and from thence will pass upward through the perforations 23 of head 15, into chamber 35. In chamber 35 the air will be spread out and will pass upward, in part, through the circumferentially spaced passages 27, and in part through the axial passage 33 into chamber 34. From chamber 34 the warmed or hot air will be passed above baffle 21, and out through the sleeve or neck 16. The sleeve 16 is shown as internally threaded for application of a hot air delivery pipe or tube, not shown.

The air passed upward through the circumferentially spaced channels 27 will be subjected to heat radiated from the fins 26; and in passing upward through the axial passage 33 the air will be subjected to heat radiated from the internal fins 33'.

In this heater the cold air is progressively warmed or heated as it passes through the heater. Of course, the hottest place is adjacent to the induction heating elements 25 and 28. Nevertheless, heat will be radiated radially outward so that the incoming air will be initially warmed as it passes downward through the annular channel or passage 18. As the air passes upward through

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and around the core of the heater, it will receive its final temperature, both by direct radiation and by contact with the walls and fins of the core. The perforated bottom or head 15 spreads the air and distributes it within the chamber 35, so that it will be evenly or properly distributed through the axis and around the core. From the chamber 34, the air passes through the perforations 22 and out through the neck 16, as already stated, in final heated condition.

This being an induction heater, the wires or leads 31 will be connected with a suitable source of alternating current; and the coil will be of low resistance.

The inner shell 13 should be of metal so that it will conduct and radiate heat into the annular space 18. The body of the outer heating element 25 is spaced from the shell 13, but its radiating fins 26, as stated, preferably have direct contact with the said metallic shell 13. The air inlet to the interior of the shell 13 is through the ports 23 in head 15 and the outlet for the heated air is forced through the perforations 22 of the baffle 21, and thence out through the tubular sleeve 16. The cold air inlet 24 to the chamber 19 is at the upper end of the heater and the outlet 16 for the hot air is also at the upper end of the heater. The air entering chamber 35 is spread out and properly distributed for passage through the axis of the heating core and around the same through the circumferentially spaced air passages 27. The spacing of the heating core from the heads 14 and 15, as well as from the baffle 21, is important as is obvious from statements already made.

For convenience in this specification and claims, the term "air passages or ports" has been used to indicate passages for fluid that is to be heated by the device; but, as already stated, the heater can be used for heating water or liquids.

What I claim is:

1. In an induction heater, a drum-like shell having an inlet passage in one end and an outlet passage in its other end, a paramagnetic heating core enclosed entirely within said drumlike shell, said paramagnetic heating core being in peripheral contact with the inner surface of said shell and being spaced from the ends thereof to provide fluid chambers therebetween and the ends of said shell, said paramagnetic heating core com-

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prising telescopically engaged inner and outer heating elements formed to provide an annular coil space therebetween, an induction coil incorporated in said core between the inner and outer heating elements thereof, the said inner heating element of said paramagnetic core being provided with an axially extended fluid passage connecting the said opposite end chambers of the drum-like shell, the said outer heating element of said paramagnetic core being provided with circumferentially spaced passages connecting the said end chambers of the drum-like shell, an outer drum-like shell spaced from the sides and ends of the aforesaid drum-like shell, said outer shell having a fluid passage therethrough at one end portion to the space between said drum-like shells, and a fluid conduit leading through the same end portion of the outer shell to the adjacent end chamber of the other shell.

2. In an induction heater, a drum-like shell having an inlet passage in one end and an outlet passage in its other end, a paramagnetic heating core enclosed entirely within said drum-like shell, said paramagnetic heating core being in peripheral contact with the inner surface of said shell and being spaced from the ends thereof to provide fluid chambers therebetween and the ends of said shell, said paramagnetic heating core comprising telescopically engaged inner and outer heating elements formed to provide an annular coil space therebetween, an induction coil incorporated in said core between the inner and outer heating elements thereof, the said inner heating element of said paramagnetic core being provided with an axially extended fluid passage connecting the said opposite end chambers of the drum-like shell, the said outer heating element of said paramagnetic core being provided with circumferentially spaced passages connecting the said end chambers of the drum-like shell, an outer drum-like shell spaced from the sides and ends of the aforesaid drum-like shell, said outer shell having a fluid passage therethrough at one end portion to the space between said drum-like shells, and a fluid conduit leading through the same end portion of the outer shell to the adjacent end chamber of the other shell, said conduit serving to bind the said shells together.

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