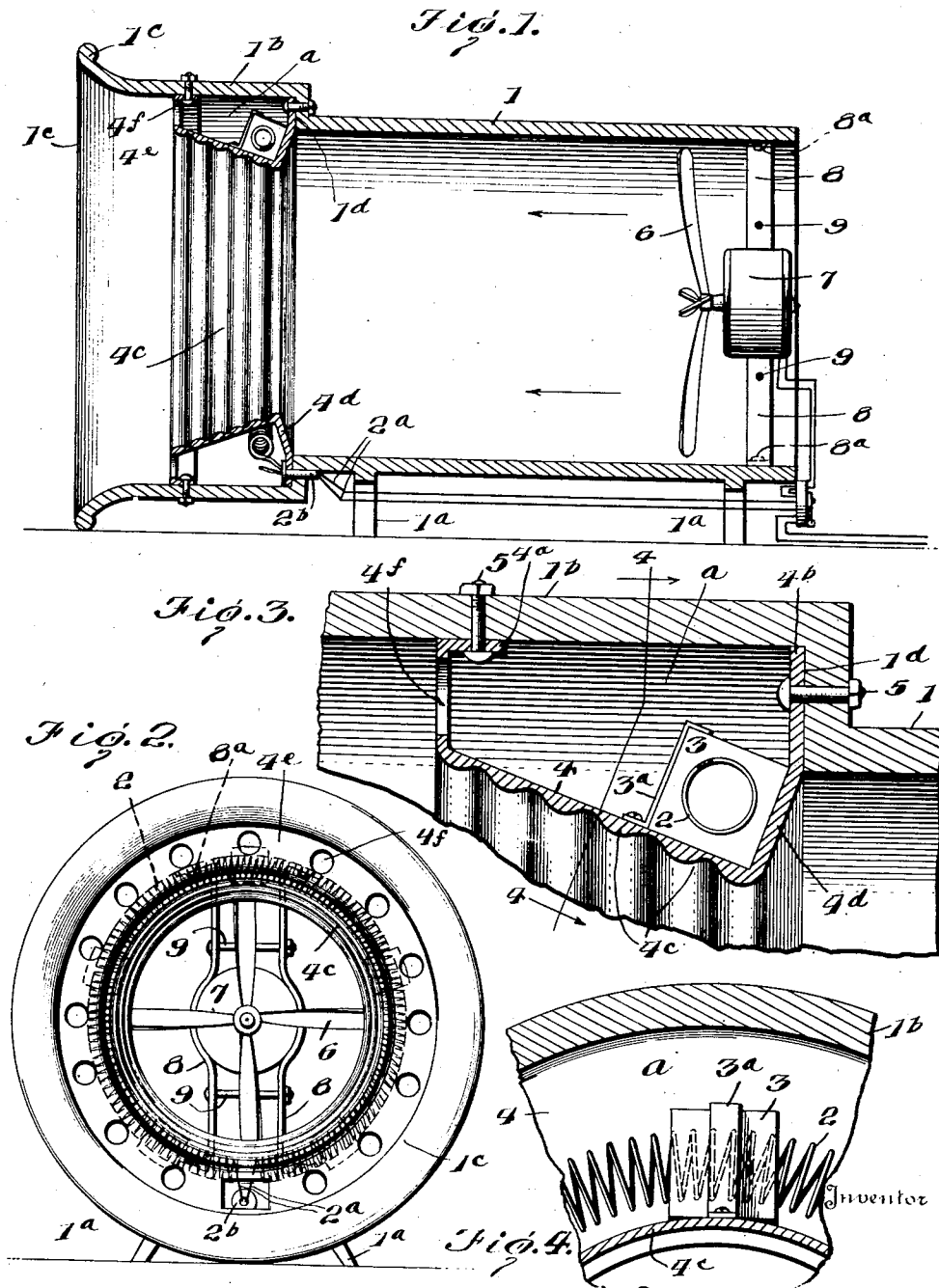


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L. SIMMONS
ELECTRIC HEATING MACHINE

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UNITED STATES PATENT OFFICE.

LEO SIMMONS, OF WASHINGTON, DISTRICT OF COLUMBIA.

ELECTRIC HEATING MACHINE.

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To all whom it may concern:

Be it known that I, LEO SIMMONS, a citizen of the United States of America, and resident of Washington, District of Columbia, have invented certain new and useful Improvements in and Relating to Electric Heating Machines, of which the following is a specification.

This invention relates to improved means for economically and effectively heating space for human habitation by forced circulation of the air in said space through a heated air draft tunnel for the purpose of raising the temperature of the air in said space to a degree that will render such space comfortable for human occupation; and the objects and nature of the invention will be readily understood by those skilled in the art in the light of the following explanations and the accompanying drawings that illustrate what I now believe to be the preferred mechanical expression or embodiment of my invention from among other forms, constructions and arrangements within the spirit and scope thereof.

An object of the invention is to provide improved means for raising the temperature of the air in enclosures for human occupancy by circulating the air within such enclosure, through an air draft tunnel heated in an improved manner by electric glow heating resistance protected against direct contact with the air blast passing through such tunnel.

With this and other objects in view, my invention consists in certain novel features in construction or in combinations and arrangements as more fully and particularly set forth and specified hereinafter.

Referring to the accompanying drawings:—

Fig. 1 shows an embodiment of my invention in longitudinal vertical section.

Fig. 2 is a front end elevation, dotted lines indicating the enclosed protected heating coil.

Fig. 3 is a detail longitudinal section on an enlarged scale.

Fig. 4 is a detail section on the line 4—4, Fig. 3.

In the particular embodiment of my invention illustrated by the drawings as an example for purposes of explanation, I provide an elongated air heating and hot air circulating tunnel formed by elongated tubular casing or housing 1, open at both

ends, and fixed to and supported by depending feet or supports 1^a, which in this example, support the casing in a horizontal position and render the same portable.

In this example, the tubular casing is cylindrical throughout the major portion of its length, with its front portion 1^b enlarged in diameter and forming a flaring mouth or bell 1^c. In this instance, the enlargement in diameter is abrupt to form the annular forwardly facing shoulder or seat 1^d, within the air draft and heating tunnel.

The means for heating the bore of or chamber formed by the air draft tunnel, is annular in form and usually concentrically arranged within the enlarged front end of the tunnel in advance of the annular shoulder 1^d, to surround and heat the tunnel bore and consequently heat the air circulating through the tunnel.

For instance, the particular heating means shown consists of an annular electric heating or resistance wire coil 2 passing through and supported by an annular series of spaced porcelain or other insulating material blocks or tubes 3, with the heating coil and blocks 3 enclosed within an annular chamber *a* surrounding and concentric with the tunnel bore and, in the example shown, formed by a hollow thick-walled heat conducting and radiating casing or coil enclosing ring or annulus 4, fitted within the tunnel and at its otherwise outer open side, closed by the surrounding tunnel wall.

This ring can be approximately U-shape in cross section on a radius, Fig. 3, and formed with flanges 4^a, 4^b, through which the ring can be secured, as by bolts 5, to the casing or tunnel walls, so that the surrounding outer open side or circumference of the casing or coil enclosing ring will be closed by the surrounding portion of the tunnel wall 1^b, within which the ring is fitted.

Said casing ring is preferably somewhat elongated longitudinally with its front end of less radial depth or thickness than its rear end and with its bore flaring or increasing in diameter from the rear end toward the front end, thereby providing a forwardly flaring or approximately frusto-conical inner or bore wall 4^c, preferably circumferentially fluted or corrugated at its exposed surface to provide a heat radiating surface of extended area exposed to the air blast or circulation through the tunnel, for

increasing the heating efficiency and capacity of the tunnel.

The internal diameter of the rear end of the ring bore is, preferably, less than the internal diameter of the portion 1 of the casing or tunnel, and the rear end wall (flange 4^b) is, in this instance fitted rearwardly against and secured to the front face of the tunnel or casing shoulder 1^a, with the inner annular portion 4^d, of the rear end wall of said casing ring forming an inwardly projecting annular shoulder or baffle within the tunnel at the front end of tunnel portion 1. This baffle 4^d, is, preferably, flared inwardly and forwardly to meet the rear end of the forwardly flared bore of the casing ring.

In the example shown, the insulation blocks or tubes 3, are secured in any suitable manner, as by clamps 3^a, within the ring, say within the rear end thereof against the inner surfaces of ring walls 4^c, 4^d, and the heating coil 2 is supported by said blocks spaced from and out of contact with the ring walls. The coil 2 is preferably in the form of an approximate annulus encircling the interior of the ring with its leading in or feed connection 2^a extending to the exterior of the casing or tunnel through insulating tube 2^b, preferably at the underside of the tunnel casing. The annular front end wall 4^e of the casing ring is preferably formed with an annular series of spaced mica-covered openings 4^f, through which the red glow of the coil 2 can be seen through the open front end of the tunnel, for purposes of ornamentation. The portions of the electric heating coil 2 intervening between the insulation supporting blocks 3, are exposed within the ring chamber *a*, but are cut off by the casing ring and the mica-covering the ring openings, from being directly contacted by the air blast or circulation through the air tunnel, as it is the purpose of my invention to keep the electric heating element or elements 2, at a constant high temperature and red heat or glow while in action, to maintain the coil-casing metal ring 4 at the desired high temperature by radiation, convection, conduction through the insulation blocks 3 and by maintaining a high temperature in chamber *a*. The object is to prevent cooling the coil by exposing the same to direct contact with the air circulation, and to utilize the high temperature, red heat, of the coil to maintain a higher temperature of the extensive radiating surfaces of the casing ring exposed within the tunnel and to thereby heat the chamber constituting the tunnel bore, and to confine the heat within the tunnel bore as opposed to the exterior surface of the tunnel casing. To this end the tunnel casing can be composed of inner and outer shells and

interposed asbestos insulating packing, or the casing is otherwise insulated or is composed of vitrified ceramic ware, pottery or earthenware. It is also desirable, to form the tunnel casing with more or less thick or heavy walls, to provide a vibration and noise absorbing, and heat retaining body.

The heat radiating coil casing ring 4, is preferably composed of a more or less thick walled metal casting, that will hold or carry the heat, and I find aluminum well suited for the purpose, whereby the air driven through the tunnel is most effectively and economically heated by contact with and by the heat radiation from the throat formed within the tunnel by the metal coil casing ring.

An electric motor driven blower is provided to rapidly force the circulation of the air of the living space to be heated through the heated tunnel and into contact with hot surfaces and through the zone of heat radiation for the purpose of raising the temperature within said space to the desired degree and thus maintaining the same. For this purpose, I provide rotary air blast or blower 6, within the rear end of the tunnel with its axis alined with the longitudinal tunnel axis. This blower is carried and driven by electric motor 7 removably fixed and supported within the rear end of the tunnel by any suitable means. For instance, I show the motor tightly clamped between the middle portions of a pair of clamp bars or brackets 8, by clamping bolts 9 arranged above and below the motor and extending transversely through the bars, whereby the middle portions of the bars can be drawn toward each other or allowed to spring away from the motor casing. The end portions 8^a, of the bars are bent laterally and fit the inner surface of the tunnel wall and are bolted or otherwise secured thereto.

The blower draws the air from the enclosure or space to be heated, and presses the air forwardly through the tunnel and the heating throat therein and discharges the superheated air from the front end of the tunnel. I find that the elongated casing that provides a long internally heated air draft tunnel, more quickly circulates the blower forced superheated air throughout such enclosure or space to raise the temperature thereof, than where a mere ring or short casing is employed, and furthermore the blower motor is protected from the high temperature of the casing ring and its enclosed heating coil by the provision of the air draft tunnel.

The air pressed forward by the blower is somewhat choked by the hot rear wall 4^d of the tunnel throat (formed by the coil casing ring) and said air expands within the forwardly flaring fluted or corrugated throat along the hot wall 4^e, and

further expands within the enlarged end of the tunnel in advance of front casing ring wall 4°.

The air is efficiently heated and full advantage is taken of the high temperature of the heating coil while said coil is protected and is not cooled down by direct contact with the air blast.

Furthermore, if the coil becomes broken or needs repair or replacing, the radiating coil casing ring can be readily released and removed from the tunnel casing, thereby rendering the coil accessible for repair and renewal.

The blower and heated tunnel are designed to more or less rapidly circulate the entire body of air, in the space or enclosure to be heated, through the tunnel to take up the heat generated within the tunnel, and the air draft tunnel promotes the desired rapid circulation of this hot air throughout such space or enclosure to quickly raise the temperature therein to the point desired and thus maintain the same.

It is evident that various changes, modifications and variations might be resorted to without departing from the spirit and scope of my invention and hence I do not wish to limit myself to the exact disclosures hereof.

What I claim is:—

1. An electric heating machine, comprising an open end air tunnel having means for forcing air forwardly therethrough, said tunnel having an annular internal air heating throat with heat radiating surfaces exposed around the tunnel bore and electrical heating means within and enclosed by said throat.

2. An air draft tunnel having a forwardly propelling air blower and an annular internal heat radiating throat within its air outlet portion provided with and enclosing an electric heating coil.

3. An air tunnel having a blower in its inlet end, and an annular internal heat radiating throat remote from the blower and provided with and enclosing an electric heating coil, said throat having a forwardly flaring bore.

4. An air tunnel having a blower in its air inlet end, and an annular internal heat radiating throat within its air outlet portion provided with and enclosing an electric heating coil, said throat having a forwardly flaring bore with a corrugated radiating surface.

5. An air tunnel having a blower and an annular internal heat radiating throat provided with and enclosing an electric heating coil, the rear portion of said throat forming an annular baffle within the tunnel bore.

6. An air tunnel having a blower at its

air inlet end, and an annular internal metal heat radiating throat provided with and enclosing an electric heating coil, said throat formed by a hollow ring, the heating coil being supported within the ring out of contact with the walls thereof.

7. An electric heating machine, comprising a casing forming an air tunnel having a blower to force the air therethrough and circulate the same throughout a space to be heated, an annular electric heating element within said casing and surrounding the tunnel bore, and a hollow ring within the casing forming heat radiating surfaces surrounding the tunnel bore and exposed to the air therein, said heating element being arranged within said ring and enclosed thereby.

8. In combination, a casing forming an air circulating tunnel, an electric blower for propelling the air through said tunnel and circulating the same throughout a room or the like, the front portion of said tunnel being of enlarged internal diameter, a hollow metal ring set in said enlarged portion providing heat radiating and air contacting surfaces surrounding the tunnel bore, and electric resistance ring-heating means enclosed within said ring.

9. In combination, a casing forming an open end air circulating tunnel, a rotary electric blower for circulating air through said tunnel, a hollow metal ring set in said casing and providing heat radiating surfaces surrounding the tunnel bore and exposed to the air therein, said ring providing an internal annular chamber, an annular electric resistance heating coil enclosed within said chamber for heating the same and said ring, and insulating blocks within said ring supporting said coil from contact with the ring.

10. In combination, a vitrified ceramic material hollow casing forming an open end air circulating tunnel, a rotary air forcing electric blower mounted in said tunnel, a hollow ring mounted in said tunnel and providing heat radiating surfaces around the tunnel bore for heating the air therein, and a red glow electric resistance coil enclosed within said ring for heating the same.

11. In combination, a hollow casing forming an air circulating tunnel open at both ends, clamping bars arranged within the tunnel bore and having transverse clamping bolts, an electric motor arranged and clamped between said bars and provided and driving a blower for forcing air through said tunnel, and electric resistance heating means within said tunnel surrounding the bore thereof to heat the air therein.

Signed at Washington, D. C., this 4th day of October, 1923.

LEO SIMMONS.