

March 31, 1925.

L. SIMMONS

1,531,518

ELECTRICAL HEATING APPLIANCE

Filed Nov. 17, 1923

2 Sheets-Sheet 1

Fig. 1.

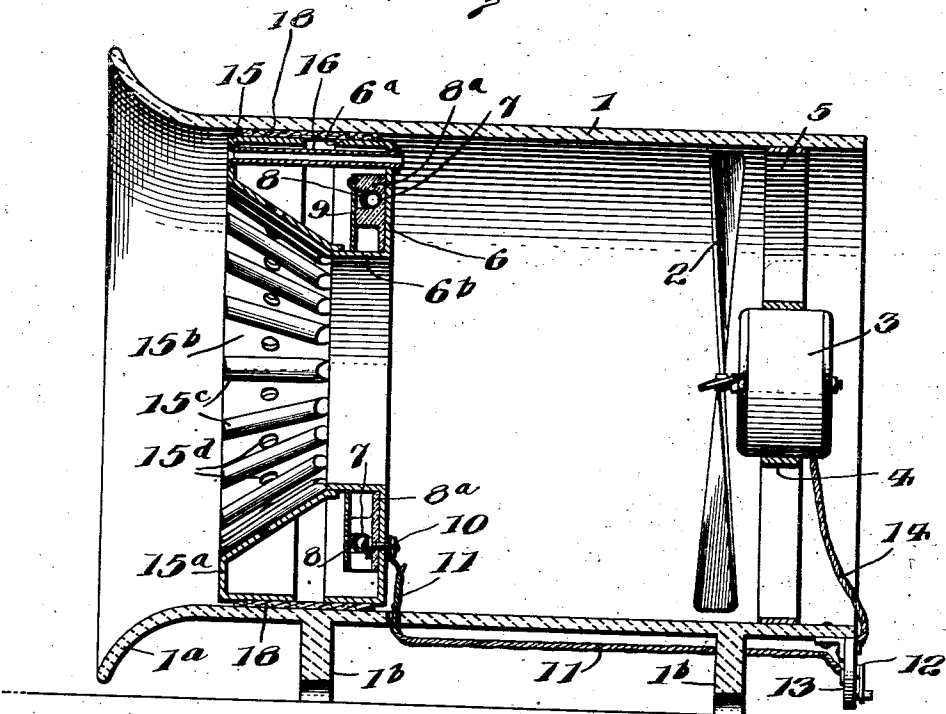


Fig. 2.

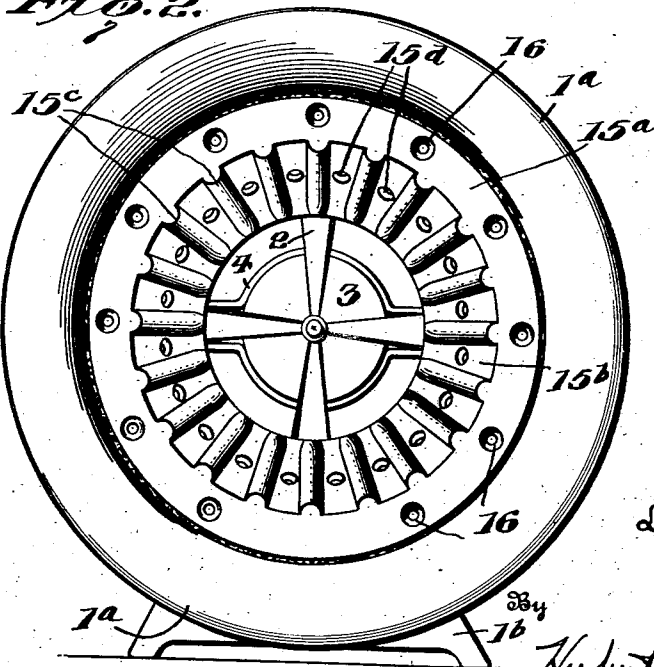
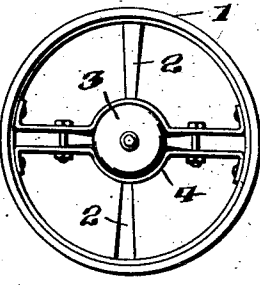


Fig. 3.



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2 Sheets-Sheet 2

Fig. 4.

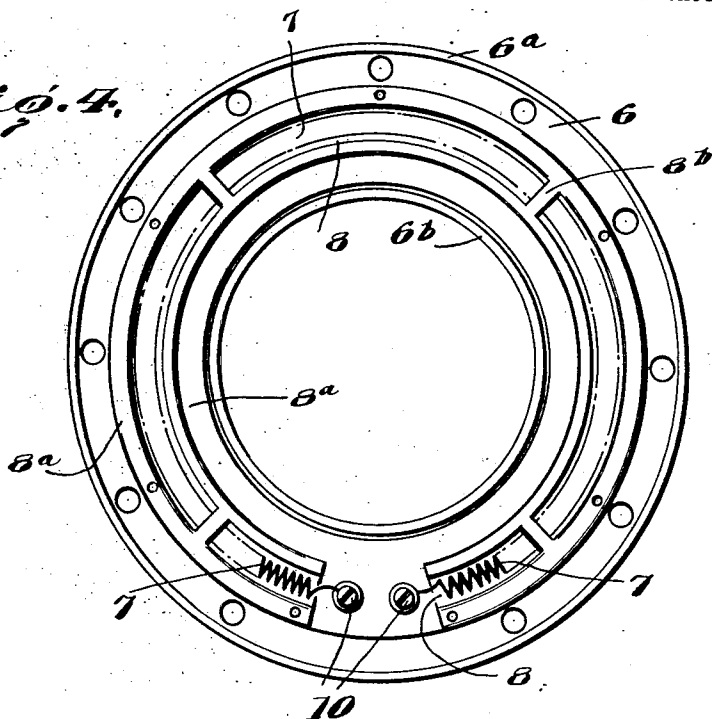
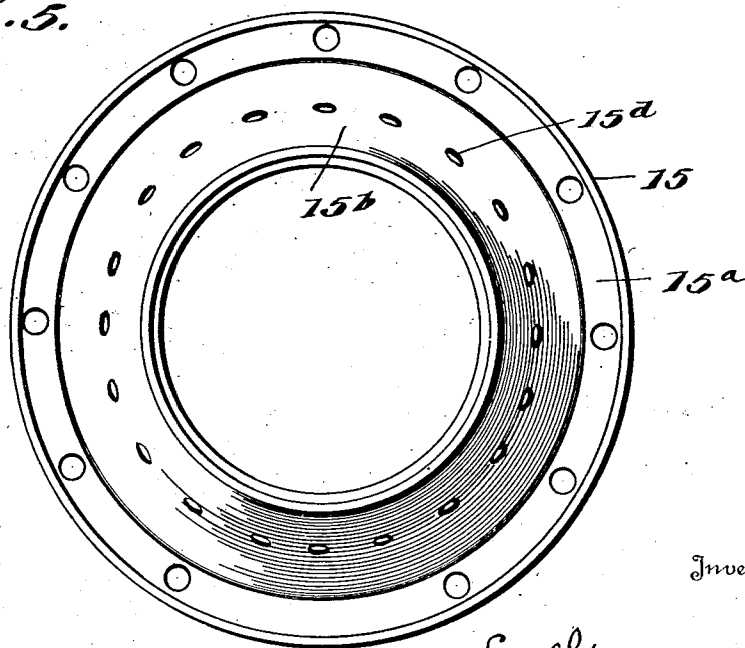


Fig. 5.



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UNITED STATES PATENT OFFICE.

LEO SIMMONS, OF WASHINGTON, DISTRICT OF COLUMBIA.

ELECTRICAL HEATING APPLIANCE.

Application filed November 17, 1923. Serial No. 675,265.

To all whom it may concern:

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

This invention relates to electric heating appliances, 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 of the accompanying drawings that illustrate what I now believe to be the preferred embodiment or mechanical expression of my invention from among other forms, constructions and arrangements within the spirit and scope thereof.

An object of the invention is to provide certain improvements in electrical heating appliances whereby an air heating throat, for the passage of air or an air blast, is provided with air heating and heat radiating surfaces of extensive areas.

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

Referring to the accompanying drawings that form a part hereof:

Fig. 1 is a longitudinal vertical section showing an electrical heating appliance embodying my invention.

Fig. 2 is a front end elevation thereof.

Fig. 3 is a rear end elevation thereof.

Fig. 4 is a detail elevation of the open or front side of the rear section of the throat ring, showing the porcelain or other vitrified ceramic material ring secured in said section and the ring-like heating coil therein, the mica covering for said coil being removed.

Fig. 5 is a detail elevation of the open or rear side of the front section of the throat ring.

In the particular example illustrated for purposes of explanation, I provide a tubular or open-end hollow housing to form an air tunnel provided with the heat radiating and air heating throat of my invention and an electric motor driven blower, whereby the air from living quarters or any other enclosure in which the appliance is located, is circulated through the tunnel and its

heating throat. The air is thereby kept in circulation through the tunnel and throughout the enclosure to raise the temperature within the enclosure and approximately maintain such temperature at the desired degree.

In this example, the open-end tubular housing that forms the air blast tunnel, is composed of a longitudinally elongated hollow one-piece body 1, of vitrified earthenware or other ceramic material preferably having comparatively thick walls and usually cylindrical throughout its length except for a flaring or approximately bell-shaped front end 1^a. However, I do not wish to limit all features of my invention to an air tunnel or housing composed of ceramic material or the like. In the example shown, the hollow ceramic body 1, is portable and supported in a horizontal position by front and rear feet 1^b, adapted to rest on the floor or other support and hold the body against rolling and spaced upwardly from the floor.

In this example, I show a rotary blower 2, carried and driven by electric motor 3, both being arranged within the rear open end of the tunnel with the axes of the motor shaft and blower approximately alined with the longitudinal axis of the air tunnel, and with the blower fan in diameter, usually, but slightly less than the internal diameter of the rear end of the tunnel. This blower is intended to circulate the air of the enclosure through the tunnel from front to rear.

The electric motor and the blower carried and driven thereby are preferably removably mounted and supported in the rear end of the tunnel, by any suitable clamping means 4, gripping and holding the motor and carried by any suitable supporting means 5, held within the tunnel and fitting the inner surface thereof.

Within the front end of the tunnel I fit and secure an annular casing or ring enclosing the electric heating coil or other resistance, designed to become incandescent or glow at an approximately red heat when the electric power current is passed there-through. This annulus or annular casing is concentrically arranged within the tunnel with its longitudinal axis or central opening or bore approximately alined with the longitudinal axis of the tunnel, to form a throat within the tunnel through which the air blast or air circulation must pass on its way through the tunnel.

In the example shown, this heating coil-enclosing ring that forms the throat, is composed of two vertical annular metal sections arranged side by side and suitably clamped or otherwise secured together. The rear section of this ring is in the form of an annular trough, approximately U-shape in radial section, with a flat bottom vertical wall 6, that forms the rear end wall of the ring, an outer cylindrical circumferential wall 6^a, and with an inner cylindrical wall 6^b, around the central air passage through the section. The annular trough formed by this section of the ring is open at the front while the floor or rear thereof is closed by wall 6.

In the example shown, the heating element is arranged within the open front trough formed by this rear section of the throat forming and heat radiating ring. In this instance, the electric resistance is in the form of a coil 7, annular or circular in form, and confined within a groove or annular channel 8, in the front side of a vertical porcelain or other insulating material annulus 8^a, arranged within said trough and secured against the rear wall 6 of the ring section.

The otherwise open front of the channel 8, is preferably covered by mica 9 or other approximately transparent material to protect the heating coil from the air blast and from injury. The terminal posts 10 of the coil 7 are here shown extending rearwardly through the porcelain annulus 8^a, and through holes in the rear wall 6 of the throat ring for the attachment of the electric power leading in wires 11 which are here shown as extending outwardly through a radial hole in the bottom of the tunnel housing 1, and extending rearwardly below said housing to a suitable switch 12, carried by a bracket 13 depending from the rear end of said housing and from which electric power wires 14 extend to the motor 3.

The front annular section of the throat ring is of annular trough like formation with open side of the trough at the rear face of the section and registering with the open front of the rear section to form the annular chamber or enclosed annular space within the throat ring. This front section is formed with cylindrical circumferential wall 15 of the same diameter as and alined with rear section wall 6^a, and with vertical annular front side wall 15^a, and with rearwardly contracting central longitudinal conical wall 15^b, extending rearwardly from the inner edge of front wall 15^a, to and at its small rear end edge fitting the front end of the inner wall 6^b of rear section.

These front and rear sections of the throat ring are usually composed of castings, each section formed by one casting, although I do not wish to so limit all features of my invention.

These two sections can be secured together by any suitable means, although I prefer securing means that will permit separation of the sections to render the heating element accessible for inspection or replacement. In the particular example illustrated for this purpose, I show fore and aft clamping bolts 16 extending transversely through the sections. These bolts are shown arranged in a circular series just within the rims 6^a, 15, and extending through the rear vertical wall 6 and the front vertical wall 15 and having ring nuts on their rear ends. In this instance, these clamping bolts are formed by hollow metal tubes open at their front ends through wall 15^a and at their rear ends through wall 6, to form a multiplicity of air heating passages through the throat rim and cut off from the interior of said ring.

The conical bore or inner longitudinal wall 15^b, of the front throat ring section, is preferably slightly elongated rearwardly so that when its rear edge is tightly drawn by bolts 16, against the front edge of inner wall 6^b, the two throat ring sections will be held with their rims 6^a, 15, spaced apart, leaving an intervening annular space, allowing for expansion and contraction.

The external diameter of the rims 6^a, 15 is preferably a fraction of an inch less than the internal diameter of the portion of the tunnel housing within which the throat ring is located to permit easy fitting and removable securing of the ring in said tunnel housing, and particularly to allow for expansion of the ring without exerting such bursting pressure on the tunnel housing as might tend to split or damage the same. I preferably arrange a layer or sleeve 18 of more or less compressible insulating material, such as asbestos, externally around the rim of the throat ring, bridging the gap between the section rims 6, 15. This packing 18 is intended to more or less insulate the throat ring from the surrounding tunnel wall as well as to form an approximately air tight and cushioning packing between said tunnel wall and the rim of the throat ring.

The throat ring when located in the cylindrical front end portion of the tunnel housing forms an annular contraction or baffle (rear face wall 6) within the tunnel bore located a substantial distance in advance of the blower 2. The annular series of longitudinal air tubes 16, open at their rear ends through this annular baffle and discharge at their front ends into the tunnel housing bell outlet in front of the throat ring.

The abutting inner longitudinal annular walls 6^b, 15^b, of the ring sections form a central longitudinal contracted throat extending forwardly from the center of this baffle and discharging forwardly into the

tunnel housing bell outlet. This throat flares or enlarges forwardly and the exposed surface of the conical or flared wall 15^b, of this throat is formed with an extensive heat radiating and air contacting surface by an annular series of longitudinal spaced ribs or corrugations 15^c, and by an annular series of spaced transverse ornamental openings or perforations 15^d, opening from the bore of the throat into the highly heated air chamber within the throat ring.

When the proper power current is passed to the heating coil 7, said coil glows, and although the coil is protected from injury by mica 9, the red glow is visible from in front of the tunnel housing through openings 15^d. The approximately incandescent coil highly heats the air within the throat ring and the walls of the throat ring and the metal tubes 16, become highly heated and radiate heat within the tunnel bore and the air throat through the ring. I find that advantages are gained by forming the ring sections of aluminum or aluminum alloy because of the high conductivity thereof, although I do not wish to so limit my invention. The blower motor is remote from the throat ring and is thereby protected against injury by the heat generated within the throat ring, particularly as the casing 1, is preferably vitrified ceramic material—a poor conductor of heat and as the throat ring is insulated therefrom by packing 18.

The constantly-acting relatively-large-diameter blower tends to build up an air pressure in the chamber of the tunnel between the blower and the baffle or contraction in the tunnel formed by the throat ring slipped into the cylindrical portion of the tunnel behind the tunnel flare. Under this pressure, the air finds relief by forward flow through the multiplicity of hot heat-radiating air tubes 16 and the central throat of the ring. The air expands as it flows through the throat and is subjected to contact with and heat radiation from the flaring and ribbed surfaces of the conical wall 15^b. The heated air from the tubes and the throat is discharged into the flared front end of the tunnel and is driven therefrom into the room or other enclosure to be warmed. The room or other enclosure can thus be rapidly and economically warmed.

The multiplicity of heat radiating air discharge tubes 16, opening through the throat ring from rear to front and forming an annular series just within the rim of said ring and surrounding the annular heating coil 7 and its porcelain ring, perform an important function. These tubes absorb heat that would otherwise be partially wasted or partially conducted to the exteriorly exposed or unguarded outer surface of the casing 1, and the heat of said

tubes is largely absorbed or carried off by the air rushing forwardly therethrough.

Advantages are also gained by the annular coil and its porcelain ring holder surrounding the throat and in contact with the walls 6 and 6^b. By this arrangement, the air heating capacity of the throat ring is increased, a strong durable easily assembled structure is produced, and the porcelain ring and its contained heating coil can be handled and applied and removed as a unit. The porcelain ring is strong and comparatively heavy and thoroughly protects the coil. The coil is in the form of an approximate ring more or less loosely confined in the groove 8, in a vertical position and free to expand and contract without injury. The groove 8, is crossed at intervals by bridges or cross pieces 8^b, integral with the porcelain ring, which loosely confine the coil from sliding forwardly from the groove.

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 air heating throat ring, for the tunnel of an electric heating appliance, embodying front and rear annular sections forming a hollow ring with a central longitudinal air heating throat, and an annular insulating heating element carrier secured within said ring and provided with an annular electric resistance heating element, said ring providing air heating passages through said ring and separated from said throat.

2. An air heating throat ring, for the forced air tunnel of an electric heating appliance, said ring forming a central air heating throat extending through the ring from rear to front and an annular interior chamber surrounding said throat, an annular electric resistance heating element in said chamber and around said throat, and an annular series of air heating tubes extending from rear to front through said ring and chamber.

3. An air heating and heat radiating throat ring, for the forced air circulating tunnel of an electric heating appliance, said ring having a central longitudinal forwardly flaring air heating throat opening therethrough from rear to front, and an annular enclosed chamber surrounding said throat, said throat having transverse openings through its flaring wall into said chamber, and annular electric resistance heating means in said chamber and surrounding said throat.

4. An air heating and heat radiating throat ring, for the forced air circulating tunnel of an electric heating appliance, said ring having a central longitudinal air heat-

ing throat opening therethrough and an annular enclosed chamber surrounding said throat and electric resistance heating means in said chamber, said ring embodying annular sections and tubular clamping bolts securing the sections together and forming air heating tubes for the flow of air through the ring from rear to front.

5. An air heating and heat radiating throat ring, for the forced air circulating tunnel of an electric heating appliance, said ring having a central longitudinal air heating throat opening therethrough and an annular enclosed electric heating resistance chamber surrounding said throat, said ring providing air heating passages opening therethrough from rear to front and traversing said chamber.

6. An air heating and heat radiating throat ring for electric heaters, comprising annular trough like sections secured together with their annular troughs facing each other to form an annular enclosed chamber surrounding an air heating throat opening through said ring from front to rear, and electric resistance heating means enclosed within said chamber and surrounding said throat.

7. An air heating and heat radiating throat ring for electric heaters, comprising walls forming a front, a back, a rim, and a central longitudinal air heating throat opening through the ring from front to rear and flaring forwardly, said throat formed with a surrounding series of exposed radiating longitudinal ribs or corrugations, said ring walls forming an enclosed annular chamber around said throat, and electric resistance heating means in said chamber and arranged around said throat.

8. An air heating and heat radiating throat ring for electric heaters, comprising walls forming a front, a back, a rim, and a central longitudinal air heating throat opening through the ring from front to rear, said ring walls forming an enclosed chamber surrounding said throat, electric resistance heating means in said chamber, and cushioning and insulating packing exteriorly surrounding said rim.

9. An air heating throat ring for an elec-

tric heating appliance, embodying walls forming an air heating throat opening centrally and longitudinally through said ring from rear to front and a rim having an opening extending annularly around the rim intermediate the ends thereof, cushioning packing exteriorly surrounding said rim and bridging said opening, said walls providing an enclosed chamber surrounding said throat, and electric resistance heating means in said chamber.

10. A throat ring for an electric heating appliance, having walls forming an annular enclosed chamber and an air heating throat surrounded by said chamber and opening through the ring from rear to front, and electric resistance heating means in said chamber, embodying an insulating material ring secured in said chamber around said throat and an electric resistance coil within and extending around said insulating material ring and carried thereby.

11. A heating ring for an electric heating appliance, embodying a trough like rear annular section, and a trough-like front annular section, said sections being secured together with the open sides of their troughs together to form an enclosed annular chamber surrounding a longitudinal air heating bore, and electric resistance heating means in said chamber and embodying an insulating ring surrounding said bore and secured in the trough of one of said sections and provided with and carrying an electric resistance coil.

12. An electric heating appliance, comprising a hollow ceramic housing forming an air tunnel, an air heating ring in the front end portion of said tunnel, and a blower in the rear end of said tunnel to draw air thereinto and force the same through and from the tunnel, said ring being spaced forwardly from the blower and forming an annular baffle in the tunnel and a central longitudinal air throat, said ring forming an annular chamber surrounding said throat, and electric resistance heating means within said chamber.

Signed at Washington, D. C., this 8th day of November, 1923.

LEO SIMMONS.