Dec. 6, 1960 O. W. ROTH 2,963,567

HEAT OVEN OF THE REFLECTOR TYPE

Filed Nov. 19, 1959 2 Sheets-Sheet 1

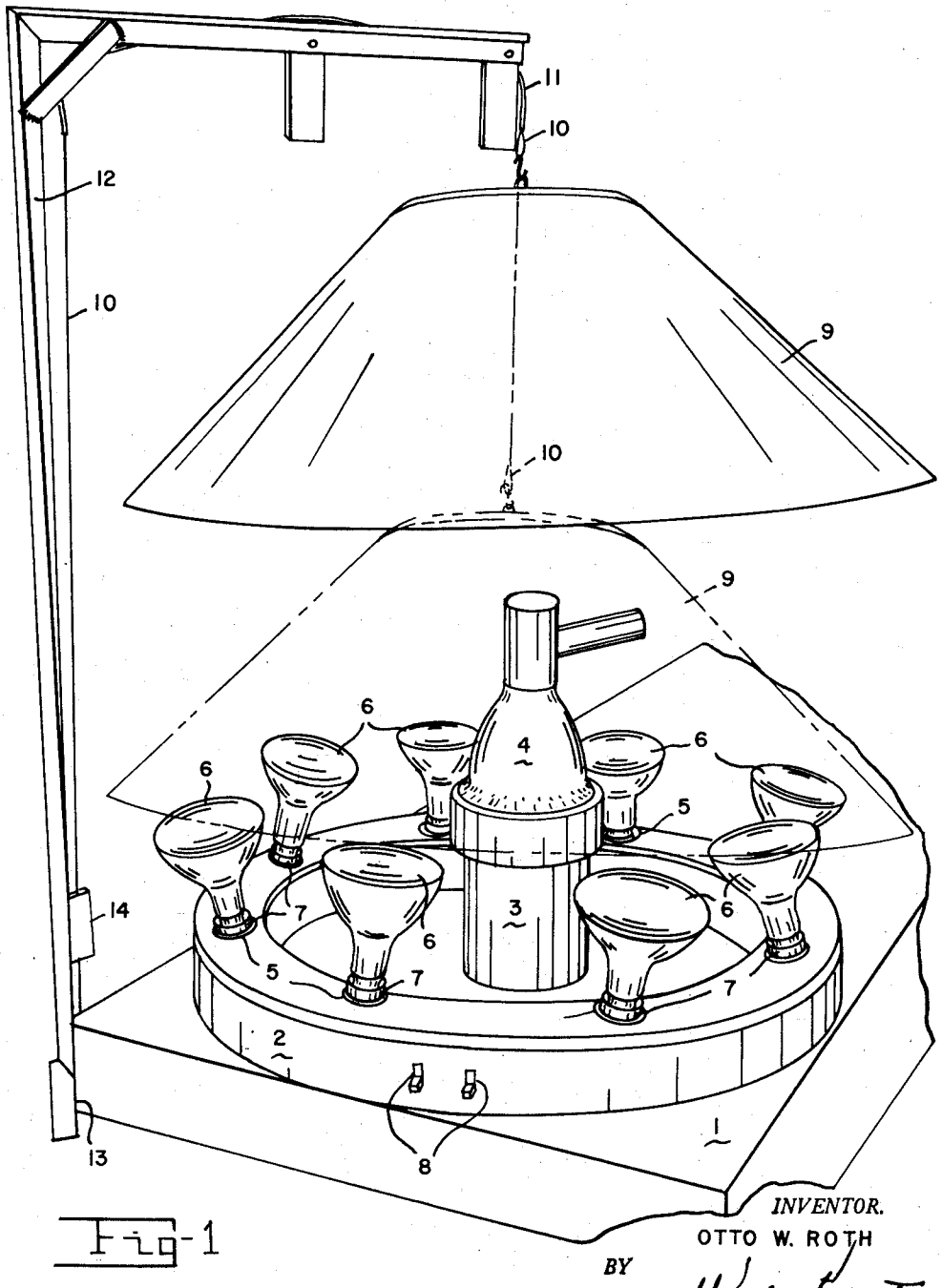

Fig-1

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HEAT OVEN OF THE REFLECTOR TYPE

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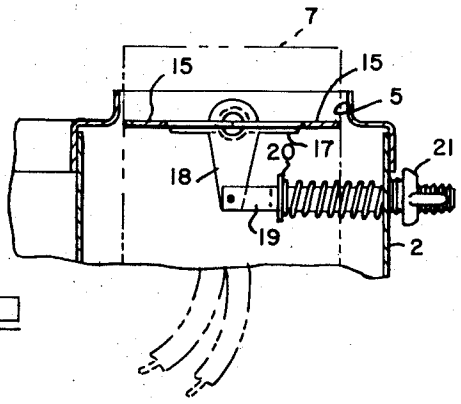

Fig-2

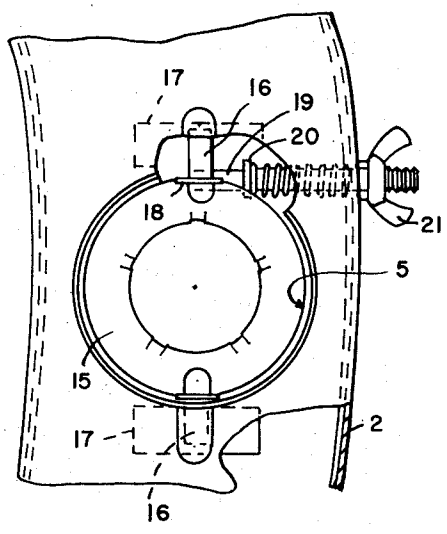

Fig-3

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HEAT OVEN OF THE REFLECTOR TYPE

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7 Claims. (Cl. 219—35)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to a heat oven, and more particularly to a reflector type of heat oven.

An object of the invention is the provision of a heat oven having an annular reflector and a plurality of heating units disposed to surround the item being heated to concentrate the heat on the annular reflector for reflection and concentration by the reflector on the item being heated.

Another object is the provision of means for individually adjusting the heating element to selectively concentrate the reflected heat on the item being heated.

A further object is the provision of an annular conical heat reflector disposed above the item and the heating units and means for raising and lowering the conical heat reflector above the heating units and the item to be heated whereby the item being heated is adapted to be inclosed by the reflector and the reflector can be raised to gain access to the heating elements and to the item being heated.

A further object includes a construction in which the heating elements are electric heat lamps which are adjustable in two degrees of freedom for concentrating the heat therefrom directly on any part of the item to be heated or on any part of the internal reflecting surface of the conical reflector for reflection on any part of the item to be heated.

A further object includes manual positive adjustment means for independent adjustment of the lamp whereby the heat of a plurality of the lamps surrounding the item to be heated can be concentrated thereon in any predetermined manner.

A further object therefore is to allow the required amount of heat to reach substantially all areas of the surface of the part or item being heated.

A further object is the provision of a conical reflector disposed above the item to be heated having an upwardly and inwardly inclined reflecting surface with adjustable "heat ray" lamp equally spaced below the reflector and around the item to be heated, the lamps being adjustable for directing the heat rays against the inclined reflecting surface for reflection onto the outer surface of the item to be heated, in which the reflector can be raised and lowered to increase or decrease the length of the heat ray between the heat lamp and the item being heated, to regulate the intensity of the rays.

A further object of the invention is to provide a simple and efficient heat concentration means utilizing a plurality of heat lamps equally spaced around the item to be heated in which the lamp bulbs are disposed in a substantially vertical position to insure longer life of the lamp due to operating temperature of the bulb, also replacement of the lamp receptacles and wiring is negligible because of the lower operating temperatures.

A further object is the provision of a balanced reflector cone adjustable vertically which requires only sufficient force during adjustment to overcome the friction between a provided guide wire tubing and the hoist and suspension line cable for the reflector.

A further object is the provision of a simple and inexpensive heating device utilizing a minimum of specially fabricated equipment.

Other objects and advantages of the invention will become apparent from the following description and accompanying drawings in which like reference characters refer to like parts in the several figures:

Fig. 1 is a perspective view of the invention showing the conical reflector elevated in full lines and lowered to one of its operative positions in dotted lines, parts being broken away and shown in section;

Fig. 2 is a transverse sectional view taken in a vertical plane through the lamp mounting ring or channel and showing the adjustable features for adjusting the lamps to change the directions of the heat rays; and

Fig. 3 is a top plane view of parts shown in Fig. 2.

Referring to Fig. 1, the reference numeral **1** denotes a supporting base member on which is mounted an inverted U-shaped circular channel member or lamp supporting ring **2** in the center of which is support or pedestal **3** on which the item or article to be heated is mounted, the article being indicated at **4**, which might consist of parts made of laminated fiber glass cloth or other fibers impregnated with polystyrene resins, the resins being evenly distributed through the cloth and the excess resins drawn off either by displacement or by vacuum. When the vacuum method is used the part or item is covered with a polyvinyl alcohol sheet envelope and a vacuum created between the part and the envelope. Heat is then applied which in turn raises the viscosity of the resin allowing the excess to be drawn off by vacuum and manually operated squeegee in the depressed parts.

Heat, as applied by my invention, also hardens the resin, so excess resin must be removed in a relatively short period of time which means that frequent access to the enveloped part and visual inspection of the part is a necessity.

Returning to Fig. 1 the annular lamp supporting ring **2** is provided with a plurality of lamp receiving openings **5** equally spaced from each other and the pedestal **3**. In the drawings light openings are provided in the top surface of the ring.

A heat ray electric lamp **6** is adjustably mounted in each of the apertures **5**, in a conventional electric lamp socket **7**.

The lamps are disposed substantially vertically and the sockets are tiltable in vertical planes passing substantially through the central axis of the ring **2**. Suitable switches may be provided as indicated at **8** and connected in an appropriate conventional power circuit for lighting and extinguishing the lamps or for selectively controlling groups of the lamps.

Movable vertically above the ring **2** and item **4** on the vertical axis of the ring is a conical polished reflector **9**.

This reflector **9** carries a ring in the top center thereof which is connected to a suitable cable **10** which is carried in a guide tube **11** supported by an angle frame **12**, the lower or vertical side of the frame being of angle iron shape and securely fastened at **13** to the corner of the base **1**. A suitable counter weight **14** may be provided to balance the weight of the reflector **9** if desired.

By manual manipulation of the cable **10** the reflector **9** may be raised or lowered to any position between the full and dotted line positions shown in Fig. 1 of the drawings and the friction between the cable **10** and the tube **11** will be sufficient to hold the reflector **9** in any of its adjusted positions.

Vertical adjustment of the reflector quickly renders the piece 4 being heated, accessible for manipulation and inspection and removal, also it provides better access to the heat lamps 6, but in addition and also most important it provides means for regulating the intensity of the heat rays from the lamps 6 on the test item. Lowering the reflector increases the intensity because the distance the ray travels to the article being heated is less, while raising the reflector increases the distance that the heat rays travel from the lamps 6 to the article 4. It is of course evident that the rays travelling upward from the lamps strike the upwardly and inwardly inclined inner conical polished surface of the reflector and are all reflected or concentrated substantially inwardly toward the central axis of the reflector and the lamp mounting ring 2.

By tilting the lamps the rays may be changed somewhat in elevation along the axis and surface of the heated article to cover a greater vertical surface area.

The adjusting means for the lamp is best shown in Figs. 2 and 3. A lamp socket supporting plate 15 is disposed in each lamp opening 5 by trunnions 16 journalled in clips or brackets 17 on the under surface of the top of the ring 2. A conventional two-piece lamp socket is clamped on the plate 15 and through the hole in the plate in an evident manner. One of the trunnions 16 has a depending actuating arm 18 to which is pivoted an actuating rod 19 having a shoulder 20. The arm or rod 19 passes horizontally through an aperture in the outer peripheral side of the ring and is threaded to receive an adjusting wing nut 21 impinging against the outside of the ring 2, with a compression coil spring disposed on the rod 19 between the shoulder 20 and the inner surface of the side of the ring.

The wing nut lamp adjusting means 21 is disposed for easy and cool access below the reflector at all times so that the angular adjustment of the lamps can be made at any time desired, while the device is in use or out of use.

By combining the vertically adjustable conical reflector and the individually adjustable heat lamps the degree of heat application and the area can be controlled by the combined adjustment of these parts, also the item being heated is most quickly made accessible for manipulation and removal from all sides by simply pulling down on the cable 10. The reflector is preferably fabricated from sheet aluminum having polished surfaces.

Having thus described the invention and the advantages thereof what I claim is:

1. A lamp supporting member having an annular top surface, a plurality of heat lamps disposed in spaced relation around a central axis disposed at the center of said top surface normal thereto, said heat lamps facing in a direction substantially normal to said top surface for directing heat rays in a direction surrounding said central axis substantially parallel thereto, a conical reflector having an axis substantially parallel and concentric to said central axis of said top surface, said conical reflector having an inner upwardly and inwardly inclined annular reflecting surface disposed in the path of the rays from said heat lamps for reflecting said heat rays from said heat lamps inwardly toward said central axis and above said top surface, and means for adjusting said conical reflector to different distances along said central axis from said top surface to vary the length of the heat rays from said heat lamps to said central axis to vary the intensity of the heat rays on an object when disposed on said central axis above said top surface.

2. An annular lamp supporting ring having a top surface disposed substantially in a horizontal plane, a circular ring of heat ray lamps mounted in said top surface in spaced relation concentric to said supporting ring facing in a direction substantially normal to said top surface for directing heat rays therefrom in directions substantially parallel to said central axis in radially spaced relation to said central axis, a conical reflector having an axis substantially concentric to said central axis and the center of said circular ring of heat ray lamps, said conical reflector havng an inner upwardly and inwardly inclined annular reflecting surface disposed in the path of the heat rays from said heat lamps for reflecting the heat rays from said heat lamps inwardly toward said central axis above the plane of said top surface, and means for adjusting said conical reflector to different elevations above said top surface to vary the length of the heat rays from said heat ray lamp to said central axis to vary the intensity of the heat rays on an object to be heated when disposed on said central axis above the plane of said top surface.

3. Apparatus as claimed in claim 2 including means for individually adjusting the direction of the axis of each heat ray lamp in a different plane normal to said top surface and substantially extending through said central axis.

4. In an electric heat lamp heating apparatus, a main horizontal support, a circular heat lamp mounting support carried by said main horizontal support having a circular top surface disposed in a substantially horizontal plane and having a substantially vertical central axis, a circular ring of heat lamp sockets adjustably carried on said heat lamp mounting support in equally spaced circumferential relation and equally radially spaced relation about said central axis for supporting the electrical heat ray lamps with their heat ray axes extending upwardly in substantially vertical directions for directing the heat rays upwardly in substantially vertical planes, adjusting means between said heat lamp sockets and said circular heat lamp support for adjusting said heat lamps in said vertical planes extending radially substantially through said central axis, a reflector supporting frame fixed to said main support and extending upwardly therefrom and laterally toward said central axis, reflector supporting cable means slidably carried by said reflector support extending from a point adjacent said main support to the end of said laterally extending supporting frame and depending downwardly on said central axis toward said main support, a conical reflector suspended from the end of said cable means substantially on said central axis, said conical reflector having a conical inner reflecting surface inclining upwardly and inwardly toward said central axis and located above said heat ray lamp sockets, said cable means being adjustable longitudinally for raising and lowering said conical reflector vertically away from and toward said heat ray lamp sockets, and a pedestal carried by said main support on said central axis for supporting an article adapted to be heated by the rays from heat ray lamps when inserted in said heat ray lamp sockets.

5. Apparatus as claimed in claim 4 including counterbalancing means for said conical reflector connected to said cable means below said laterally extending reflector supporting frame, whereby said conical reflector will stay in any vertically adjusted position above said heat lamp sockets.

6. Apparatus as claimed in claim 5 in which said heat ray lamp sockets are pivoted to said circular heat lamp mounting support on horizontal pivots extending at right angles to radial planes passing through said central axis and said sockets and said adjusting means each comprises a crank arm fixed to said socket, a threaded rod pivoted to the end of said arm and extending radially outward through said circular heat lamp mounting means, a wing nut threaded on said arm for impingement against the periphery of said circular heat lamp mounting means for tilting each heat ray lamp socket in one direction and spring means between said arm and said mounting means for tilting said socket in the opposite direction when the wing nut is loosened.

7. An electrical heat oven comprising a circular ring of heat lamp sockets having their longitudinal axes disposed in a substantially vertical direction about a central axis, means for supporting an article to be heated on said central axis above a horizontal plane including said sockets, whereby when heat ray lamps are inserted in said sockets the rays therefrom are projected upwardly in a vertical direction, means for individually ad-

justing angular relation of said lamp sockets in vertical radial planes passing through said central axis, a conical reflector suspended above said circular ring of lamp sockets having a periphery greater in diameter than the diameter of said circular ring of sockets, said conical reflector having an annular inner heat reflecting surface extending upwardly and inwardly from said periphery

toward said central axis, means for adjusting the elevation of said reflector along said central axis above said sockets to different positions, above said sockets and switch means connected to said sockets to energized heat lamps when inserted in said sockets.

No references cited.