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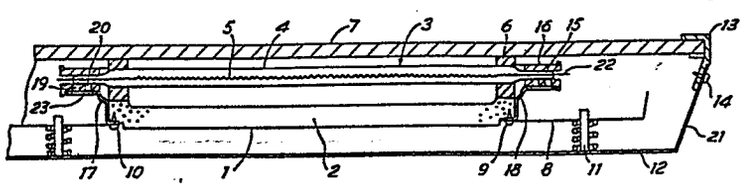
(54) Heating apparatus.

(57) Heating apparatus consists of a generally circular tray 1 containing a layer 2 of insulative material and a number of infra-red lamps 3. Each infra-red lamp 3 comprises a tungsten filament 5 supported within a tubular quartz envelope 4 and a pinch seal 15 is formed, at least at one end of the envelope 4, having an electrical connector 22 sealed therein. The pinch seal 15 is housed within a ceramic 16 and supported by a flange 17 or 18.

To cool the pinch seals 15, apertures 19, 20 are provided in the housing 16 and/or the supporting flanges 17 or 18 to permit dissipation of heat from within the housing 16 to the ambient environment of the apparatus.

Apertures may also be provided in a carrier plate 8, which indirectly supports the housing 16.



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HEATING APPARATUS

This invention relates to heating apparatus and in particular, though not exclusively, to such apparatus including one or more sources of infra-red radiation, as disclosed and claimed in our copending European Application No. 83 307338.0.

In the above-mentioned applications, the sources of infra-red radiation are infra-red lamps, each comprising a filament supported within a quartz tube. The infra-red lamp is described in greater detail and claimed in copending British Application No. 83 08103, in the name of THORN EMI plc, wherein each end of the lamp has a pinch seal with an electrical lead connected to the filament sealed therein, the lead being welded to an appropriate electrical connector. The pinch seal is enclosed within a ceramic housing which is shaped to provide location of the lamp in the correct position in the heating apparatus.

However it is necessary to maintain the pinch seals of the infra-red lamps at a relatively low temperature, for example below 350°C, to prevent oxidisation of the pinch seal, thereby prolonging the life of the lamp.

A solution to this problem of maintaining a relatively low

temperature of the pinch seal has been proposed in our copending British Application No. 83 16306, and a copending British Application No. 83 16304, in the name of THORN EMI plc, which both relate to the upward conduction of heat from the pinch seal towards a layer of ceramic material which forms a hot plate for the heating apparatus to provide a cooking hob.

An alternative solution to this general problem is disclosed in U.K. Patent No. 1,282,656, wherein a blower is provided within the cooking hob to draw cool ambient air into a flow chamber accommodating a number of heating units.

The object of the present invention is to provide an alternative solution to the above-identified problem, which may be more convenient to implement in some circumstances, but which may, if desired, be used in conjunction with the arrangements of the aforementioned co-pending Application Nos. 83 16304 and 83 16306.

According to the invention there is provided heating apparatus including at least one infra-red lamp, the or each lamp comprising a filament supported within a generally tubular envelope closed at least at one end thereof, by a pinch seal with an electrical connection to the filament sealed therein, said pinch seal being substantially enclosed within a ceramic housing, said heating apparatus also including support means for supporting said housing, characterised in that said housing and/or said support means are provided with apertures at predetermined locations for permitting dissipation of heat from within said housing to the ambient environment of the apparatus.

The invention will now be further described by way of example only with reference to the accompanying drawing, the single Figure of which shows a sectional view of an embodiment of the present invention.

Referring to the Figure, heating apparatus, as described and claimed in our above-mentioned copending European Application No. 83 307338.0, consists of a generally circular tray, or so-called "flan casing" 1 having a layer 2 of

insulative material, preferably one known as Microtherm, disposed in the base thereof and a number of infra-red lamps, one being shown at 3, disposed thereabove. The infra-red lamp 3 comprises a tubular quartz envelope 4 having a tungsten filament 5 supported therein, each end of the quartz envelope 4 being supported within a ceramic fibre ring 6.

Disposed above the heating apparatus is a layer 7 of glass ceramic material which forms a hot plate for the apparatus.

The flan casing 1 is connected by screw fixings, 9 and 10, to a carrier plate 8, which is resiliently mounted to a base plate 12 by a number of pin and spring assemblies, such as at 11, which locate the carrier plate 8 and exert an upward force thereon, thereby urging the heating apparatus upwardly towards the glass ceramic layer 2 so that the top rim of the flan case abuts the underside of layer 2, thus locating and retaining the infra-red heat generated by the lamps.

Upstanding side wall 21 of the base plate 12 is connected to the edge of the glass ceramic layer 7 by an aluminium moulding 13, which is fixed to the side wall 21 by a screw fixing 14.

Each end of the lamp 3 is provided with a pinch seal, one being shown at 15, having an amp tag connector, such as at 22, which is connected to the respective end of the filament 5, sealed therein. Electrical leads (not shown) can then be connected to each amp tag connector, so as to supply power to the infra-red lamp 3.

Both pinch seals 15 of the lamp 3 are enclosed within respective ceramic end caps, one being shown at 16, which is supported by flanges, 17 and 18, which are attached to the side wall of the flan casing 1.

It is preferable that the heating apparatus consists of four infra-red lamps disposed substantially parallel to each other and spaced across the circular region above the base of the flan casing 1. It is also preferable that a number, such as four, flan casings, having the lamps disposed thereabove, are

provided below the layer of glass ceramic material, so as to form a cooking hob, the glass ceramic layer also having a user-operable control panel located therein to control the heat required for cooking purposes.

However, to prolong the life of the infra-red lamps, it is necessary to maintain the pinch seals of the lamp at a relatively low temperature, this being achieved to a certain extent by the ceramic end caps which conduct a limited amount of heat from the pinch seals to the respective flanges, 17 and 18.

To improve substantially dissipation of heat from the pinch seals, the present invention provides one or more apertures, such as at 19 and 20, bored through the lower surface of the ceramic end cap enclosing each pinch seal, and also preferably one or more apertures, such as at 23, within the flanges, 17 and 18, upon which the ceramic end caps are supported.

The apertures are preferably provided adjacent the under surface of the pinch seal, so that they can act as ventilation holes, thereby dissipating heat from within the ceramic end cap, around the pinch seal, to the surroundings of the flan casing within the cooking hob and subsequently causing heat to dissipate generally from the holes to the ambient environment.

It can clearly be seen that the optimum effect of the present invention would be achieved when all the apertures in the ceramic end caps are in alignment with all the apertures in the flanges, 17 and 18, so as to allow a direct escape path for the heat trapped around the pinch seals. To this end, the flanges may be provided with a single relatively large aperture, which is aligned with substantially all of the smaller apertures in each of the ceramic end caps supported thereon, thereby permitting easier construction of the apparatus.

In accordance with the present invention, apertures may be provided only in the flanges, 17 and 18, and not in the ceramic end caps, or alternatively only in the ceramic end caps and not in the flanges. In a further embodiment of the invention apertures are provided in the carrier plate 8, which also

indirectly supports the ceramic end caps. Any combination of these embodiments may, of course, also be utilised.

It can therefore be envisaged that the present invention provides a simple and inexpensive technique, which can be easily implemented during manufacture of the heating apparatus for reducing the temperature of the pinch seals so as to increase substantially the life of the infra-red lamps.

CLAIMS

1. Heating apparatus including at least one infra-red lamp (3), the or each lamp (3) comprising a filament (5) supported within a generally tubular envelope (4) closed, at least at one end thereof, by a pinch seal (15) with an electrical connection (22) to the filament (5) sealed therein, said pinch seal (15) being substantially enclosed within a ceramic housing (16), said heating apparatus also including support means (17 or 18) for supporting said housing (16), characterised in that said housing (16) and/or said support means (17 or 18) are provided with apertures (19, 20) at predetermined locations for permitting dissipation of heat from within said housing (16) to the ambient environment of the apparatus.

2. Heating apparatus as claimed in Claim 1 wherein said apertures (19, 20) in said housing (16) are located in a lower surface thereof adjacent said support means (17 or 18).

3. Heating apparatus as claimed in Claim 1 or 2 wherein said apertures (19, 20) provided respectively in said housing (16) and said support means (17 or 18) are aligned so as to form an unobstructed path for dissipation of heat from said housing (16).

4. Heating apparatus as claimed in any preceding claim wherein the envelope of the or each of said lamps is formed as a cylinder and is closed at both ends by a pinch seal, said support means including a respective support member for each end of the cylinder and consisting of first and second flanges (17, 18).

5. Heating apparatus as claimed in any preceding claim wherein a carrier plate (8) is provided to support said apparatus, thereby indirectly supporting said housing (16), said carrier plate (8) being provided with apertures to aid in said dissipation of heat.

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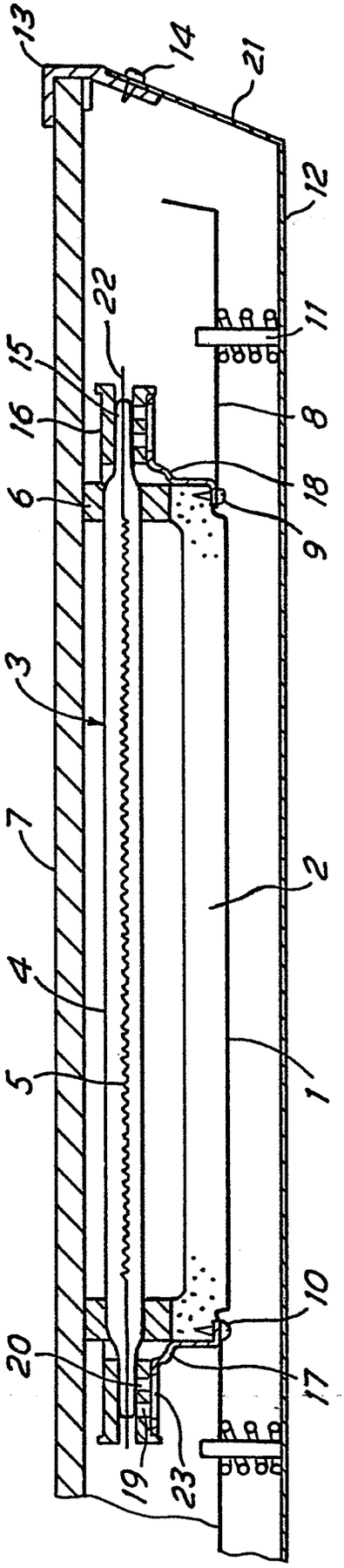

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Application number

European Patent Office

EUROPEAN SEARCH REPORT

EP 84303424.0

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	US - A - 3 355 574 (A.T. BASSETT) * Totality *	1-4	H 05 B 3/68 F 24 C 7/06 F 24 C 15/10
D,A	GB - A - 1 282 656 (THERMO ELECTRON CO.) * Page 2, lines 8-105; fig. 1, 2 *	1,4	
A	DE - B - 1 042 785 (GENERAL ELECTRIC) * Column 3, lines 9 - column 4, line 19, fig. 1,2 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

H 05 B 3/00
F 24 C 7/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	02-09-1984	TSILIDIS

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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