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Description

This invention relates to heating apparatus including one or more sources of infra-red radiation.

Heating apparatus of this type is described in the later published European publication Nos. EP—A2—0117346, EP—A1—0132888 and EP—A2—0149267, all forming state of the art only within the meaning of Article 54(3) EPC, wherein four quartz-halogen infra-red lamps are supported above a shallow metallic tray containing a layer of insulative material, a layer of glass ceramic material being disposed above the lamps as a hot plate for the heating apparatus, thereby forming a cooking hob.

The infra-red lamp is described in more detail in the later published European publication No. EP—A2—0120639, in the name of THORN EMI plc, forming state of the art only within the meaning of Article 54(3) EPC, wherein the lamp comprises a filament supported within a glass tube, each end of the lamp having a pinch seal with an electrical lead connected to a piece of metal foil which is in turn connected to the filament sealed into the respective end thereof, 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 on flanges provided either side of the metallic tray, when the lamp is incorporated within the above-mentioned heating apparatus.

However, the highly concentrated heat energy within the apparatus may cause the temperature of the pinch seals to rise above the preferred operating temperature thereof, which is usually at or below approximately 350°C, thereby causing oxidation of the pinch seal and thus reducing the life of the lamp.

The ceramic housing has been found to conduct heat to a limited extent from the pinch seal to the supporting flange of the metallic tray, but this may not be sufficient on its own to achieve longevity of the lamp under all operating conditions.

US—A—3355574 also describes a heating unit, for a cooking hob, including for infra-red lamps, the sealed ends of which are each enclosed within an electrically conductive jacket. The jackets pass through openings in a vertically disposed end plate of a metallic reflector, the end plate extending upwardly towards a support ring surrounding a glass ceramic hotplate. It may thus be envisaged that this construction could conduct a limited amount of heat from the jacket upwardly towards the hotplate, via the reflector end plate.

The object of the present invention is therefore to alleviate substantially the problem of maintaining a relatively low temperature of the pinch seals.

According to the present invention there is provided heating apparatus including at least one lamp emissive of infra-red radiation and mounted beneath a hotplate of a glass ceramic material, the or each lamp comprising a filament supported within a generally tubular envelope and having, at each end thereof, a pinch seal with an electrical connection to the respective end of the filament sealed therein, each of said pinch seals being enclosed within a housing, and means thermally conductive of heat from said pinch seals in a substantially upward direction towards said hotplate, characterised in that said housing is made from a ceramic material and is formed with an aperture in an upper surface thereof; and in that said thermally-conductive means comprises a member formed from a thermally-conductive material and arranged to extend through said aperture and be disposed intimately between, and in thermal contact with, the upper surface of said pinch seal and the under surface of said hotplate, such that heat from said pinch seal is conducted via said thermally-conductive member towards said hotplate.

The means for conducting heat may take the form of a stud of suitable heat-conductive material, such as aluminium, which is intimately disposed above the upper surface of the pinch seal and the lower surface of the hot plate, the stud extending through the aperture in the ceramic housing.

Means may also be provided for urging the thermally-conductive means in an upward direction towards the hot plate, and these urging means may comprise a resiliently-mounted support member disposed between the lower surface of the pinch seal, via a second aperture in the ceramic housing, and an upwardly-sprung carrier plate which supports the heating apparatus.

According to a second aspect the invention comprises a heating apparatus as defined in Claim 9.

The invention will now be further described by way of example only with reference to the accompanying drawings, wherein:—

Figure 1 shows a plan view of heating apparatus illustrating two embodiments of the invention,

Figure 2 shows a plan view of heating apparatus illustrating a third embodiment,

Figure 3 shows an enlarged sectional view of the embodiment shown in Figure 2,

Figure 4 shows an enlarged sectional view of a fourth embodiment, and

Figure 5 shows a view in the direction of arrow A in Figure 4.

Referring to the Figure 1, heating apparatus includes a generally circular shallow tray 1, preferably made of metal, which has disposed therewithin a layer 2 of insulative material, preferably a material known as Microtherm. The tray 1 has two extending flanges, 3 and 4, arranged on opposite sides of the rim of the tray 1, each flange having upturned end portions, 5 and 6, respectively.

A number of infra-red lamps, one being shown at 7, are disposed above the layer 2 of insulative material and are supported at each end by the flanges, 3 and 4.

Each infra-red lamp 7 is preferably a quartz-halogenated lamp comprising a tubular quartz envelope 8, within which a tungsten filament 9 is supported. Both ends of each lamp are enclosed within respective ceramic end caps, one being shown at 10, having a location tab 11. The lamps can therefore easily be inserted in apertures provided in the upturned portions, 5 and 6, on the flanges, 3 and 4.

The ceramic end cap, at each end of the lamps, encloses a pinch seal, one being shown generally at 12, having an amp tag connector, one shown at 14, or any other suitable form of male tab connector, which is connected via metal foil 17 to the respective end of the filament 9, sealed therein. Electrical leads (not shown) can then be connected to each amp tag connector, so as to supply power to each infra-red lamp.

The heating apparatus also preferably includes a thermal limiter 40, disposed between the lamps and the layer 2 of insulative material. The thermal limiter 40 is arranged to operate a microswitch 41, so as to disconnect the power to the lamps when the temperature sensed by the thermal limiter 40 reaches a threshold value.

The heating apparatus and infra-red lamp, so far described, are described in greater detail in the above-mentioned EP—A2—0120639.

To prolong the life of the infra-red lamps it is necessary to maintain the pinch seals 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, 3 and 4.

However, to improve substantially the heat conduction away from the pinch seals the present invention provides, in a first embodiment shown on the flange 3, a respective plate of heat-conductive material, preferably aluminium, disposed above each of the ceramic end caps, one such plate being shown at 15.

A layer of glass ceramic (not shown) is disposed above the heating apparatus to provide a glass ceramic cooking hob and the aluminium plates are intimately disposed between the top surface of the ceramic end caps and the under surface of the glass ceramic layer, thereby encouraging heat from the pinch seals to conduct in an upward direction to the glass ceramic layer.

A heat sink compound may also be provided between, and in contact with, each aluminium plate and the glass ceramic layer, and/or between each plate and the top of each ceramic end cap thereby further improving the upwardly directed heat-conductive path. The heat sink compound has an added advantage of being relatively flexible, so as to allow a certain amount of movement, caused by expansion and contraction of the metallic tray, flanges and/or the aluminium plates.

An alternative embodiment of the present invention is shown on the flange 4, wherein each plate, such as 15, provided separately for covering each end cap is replaced by a single aluminium plate 16, which extends over all of the end caps supported on the flange 4. The plate 16 may then be covered with the heat sink compound, above which the glass ceramic layer is placed.

The plates, 15 or 16, may of course be fabricated from any suitable heat-conductive material.

Figure 2 shows a third embodiment of the heating apparatus, wherein like parts are labelled with like reference numerals with respect to Figure 1. However, the flanges 3, 4 are replaced by suitably-shaped pieces of insulative material, 18 and 19, through which the ends of each lamp extend and being shaped so that an equal portion 20 of each lamp is exposed, thereby ensuring that substantially equal amounts of heat are dissipated at the ends of all of the lamps incorporated in the heating apparatus.

To improve substantially the heat conduction away from the pinch seals, the third embodiment is provided with studs, shown at 21 and 22, which extend respectively through an aperture in each of ceramic housings, 23 and 24 of the lamp 7, each stud being in thermal contact with the upper surface of the pinch seal within each housing. The top of each stud, 21 and 22, is in contact with the under surface of a layer of glass ceramic, which is disposed above the heating apparatus, to form a hot plate therefore.

Referring now to Figure 3, wherein like parts are labelled with like reference numerals with respect to Figures 1 and 2, there is shown an enlarged sectional view of the end of the lamp 7 including the ceramic housing 24.

It can clearly be seen from Figure 3 that the stud 22 is intimately disposed between the under surface of layer 25 of glass ceramic material and the top surface of pinch seal 26 which is enclosed within the housing 24, via an aperture 27 in the housing. The stud 22 is fabricated from any suitable heat-conductive material, preferably aluminium, thus providing a good heat-conductive path from the pinch seal 26 to a region of the glass ceramic layer 25 which is relatively cool.

The embodiment shown in Figure 3 also includes a support member 28, which is mounted to a carrier plate 29 by means of a screw fixing 30 and which is in contact with the under surface of the pinch seal 26, via a second aperture 31 in the ceramic housing 24.

The carrier plate 29, which supports the tray 1, is resiliently mounted to a base plate 32 by a number of pin and spring assemblies, such as at 33, which locate the carrier plate 29 and exert an upward force thereon, thereby urging the heating apparatus upwardly towards the glass ceramic layer 25 so that the top of the tray 1 and the insulative material 19 abuts the underside of the layer 25, thus locating and retaining the infra-red heat generated by the lamps.

It can therefore be envisaged that the pin and spring assembly 33 also urges the support member 28, which is mounted on the carrier plate 29, upwardly, thereby urging the pinch seal 26 into good thermal contact with the stud 22, which in turn is urged into good thermal contact with the glass ceramic layer 25.

To optimise heat conduction, the stud 22 may be

cemented into the aperture 27 and/or a heat conducting cement may be provided between the pinch seal and the stud and between the stud and the glass cearmic layer. Support member 28 may also be cemented into aperture 31.

The support member 28 may be formed from a stud of similar shape and size as stud 22 or, alternatively, it may be in the form of a leaf spring, supported by the carrier plate 29 and in contact with the pinch seal 26 via a slot aperture provided in place of circular aperture 31.

The stud 22 and support member 28 may have a cross-section which is circular or any other suitable shape, so as to provide optimum thermal conduction.

It may be preferable to mount all of the support members, which are provided in a common line on each side of the heating apparatus shown in Figure 2, on to a strip plate which is then mounted onto the carrier plate 29, thereby allowing easier fitting of the apparatus into the base plate 32 to form a cooking hob. A limited amount of heat may be conducted downwardly via the support member 28, but since the carrier plate 29 is preferably metallic and therefore most likely to be much hotter than the region of the ceramic layer in contact with the stud 22, downward heat conduction should be discouraged.

Figures 4 and 5 show a fourth embodiment of the invention, wherein the stud 22 has been replaced by an elliptically-shaped ring 34, made from a suitable heat-conductive material, which may be secured above the pinch seal 26, in thermal contact therewith, by means of slots 35 and 36 provided either side of an aperture 37, which extends across the top of the housing 24.

The advantage of this fourth embodiment is that the ring 34 provides a measure of extra resilience for the glass ceramic layer 25, which is mounted above, and in contact with, the top portion of the ring 34, and thus aids in reducing manufacturing tolerances.

In Figure 4, it can be seen that the heating apparatus is provided with a flange 38, as in the embodiment shown in Figure 1, to support the ceramic housing 24, the housing having a locating flange 39 at the end thereof to provide positive location of the housing 24 on the supporting flange 38. The flange 38, which is fixed to the side of the tray 1, is therefore also urged upwardly by the pin and spring assembly 33, thereby urging the ring 34 upwardly into contact with the ceramic layer 25.

Figure 5 shows a view in the direction of arrow A in Figure 4, indicating the end face of the housing 24, within which the pinch seal 26 is contained, and illustrating the ring 34 in contact with the ceramic layer 25 and the top of the pinch seal 26.

A heat-conducting cement may, of course, be provided between the contacting surfaces of the pinch seal and the ring and of the ring and the ceramic layer.

The portion of the housing 24 which has been cut out to form the apperature 37 may be replaced after insertion of the ring 34 into its position in contact with the pinch seal 26, thereby aiding in maintaining good contact between the ring and the pinch seal.

Instead of incorporating an amp tag connector within the pinch seals of each lamp, it may be preferable to join a high temperature flexible cable directly to an outgoing wire from the pinch seal.

It may be clearly envisaged that any suitable combination of the features shown in the above-identified embodiments may be employed in the heating apparatus.

The Figures show a single coil tungsten filament accommodated within each lamp, but it may however be preferable to employ a coiled coil tungsten filament, which generally possesses substantially greater resilience to mechanical shock than single coil filaments.

It can therefore be envisaged that the present invention provides a heat conductive path extending upwards from the ceramic housing, enclosing each pinch seal of the infra-red lamp, towards the glass ceramic layer, thereby forming an efficient heat sink for each pinch seal, so as to reduce the temperature thereof and consequently to prolong the life of the lamp.

Claims

1. Heating apparatus including at least one lamp (7) emissive of infra-red radiation and mounted beneath a hotplate (25) of a glass ceramic material, the or each lamp (7) comprising a filament (9) supported within a generally tubular envelope (8) and having, at each end thereof, a pinch seal (26) with an electrical connection to the respective end of the filamet (9) sealed therein, each of said pinch seals (26) being enclosed within a housing (23, 24), and means (21, 22; 34) thermally conductive of heat from said pinch seals (26) in a substantially upward direction towards said hotplate (25), characterised in that said housing (23, 24) is made from a ceramic material and is formed with an aperture (27; 37) in an upper surface thereof; and in that said thermally-conductive means (21, 22; 34) comprises a member (21, 22; 34) formed from a thermally-conductive material and arranged to extend through said aperture (27; 37) and be disposed intimately between, and in thermal contact with, the upper surface of said pinch seal (26) and the under surface of said hotplate (25), such that heat from said pinch seal (26) is conducted via said thermally-conductive member (21, 22; 34) towards said hotplate (25) (Figs. 2—5).

2. Heating apparatus as claimed in claim 1 and including means (28, 33; 38, 33) for urging said member (21, 22; 34) in a substantially upward direction towards said hotplate (25) (Figs. 3—4).

3. Heating apparatus as claimed in claim 1 or 2 wherein said member comprises a stud (21, 22) of thermally-conductive material (Fig. 3).

4. Heating apparatus as claimed in claim 1 or 2 wherein said member comprises a ring (34) of thermally-conductive material (Fig. 4).

5. Heating apparatus as claimed in claim 2 wherein said urging means comprises a resiliently-mounted support (28) extending through a

further aperture (31) in the underside of said housing (23, 24) and in contact with the underside of said pinch seal (26).

6. Heating apparatus as claimed in claim 2 wherein said urging means comprises a resiliently-mounted support (38) in contact with the underside of said housing (23, 24).

7. Heating apparatus as claimed in claim 2 wherein said urging means comprises a leaf spring mounted beneath said pinch seal (26).

8. Heating apparatus as claimed in any preceding claim and including a thermally-conductive cement provided between the contacting surfaces of said pinch seal (26) and said member (21, 22; 34) and/or said member (21, 22, 34) and the undersurface of said hotplate (25).

9. Heating apparatus including at least one lamp (7) emissive of infra-red radiation and mounted beneath a hotplate (25) of a glass ceramic material, the or each lamp (7) comprising a filament (9) supported within a generally tubular envelope (8) and having, at each end thereof, a pinch seal (12) with an electrical connection (14) to the respective end of the filament (9) sealed therein, each of said pinch seals (12) being enclosed within a housing (10), and means (15; 16) thermally-conductive of heat from said pinch seals (12) in a substantially upward direction towards said hotplate (25), characterised in that said housing (10) is made from a ceramic material and is formed with a substantially flat upper surface; in that said hotplate (25) extends over an area directly above said housing (10); and in that said thermally-conductive means (15; 16) comprises a substantially flat plate member (15; 16) formed from a thermally-conductive material and intimately disposed between, and in thermal contact with, the undersurface of said area of said hotplate (25) and said upper surface of said housing (10), such that heat from said pinch seal (12) is conducted via said ceramic housing (10) and said plate member (15; 16) towards said hotplate (25) (Fig. 1).

10. Heating apparatus as claimed in claim 9 wherein each ceramic housing (10) has a respective plate member (15) associated therewith.

11. Heating apparatus as claimed in claim 9 wherein at least two adjacently-disposed ceramic housings (10) have a common plate member (16) associated therewith, said plate member (16) extending over the uppersurfaces of said ceramic housings (10).

12. Heating apparatus as claimed in any one of claims 9 to 11 wherein a layer of a heat sink compound is intimately disposed between the upper surface of said plate member (15; 16) and the under surface of said hotplate (25) and/or the undersurface of said plate member (15; 16) and the uppersurface of said ceramic housing (10).

Patentansprüche

1. Heizgerät mit wenigstens einer Infrarotstrahlung aussendenden Lampe (7), die unterhalb einer Kochplatte (25) aus einem glaskeramischen Material angebracht ist, wobei die oder jede Lampe (7) einen Heizfaden (9) enthält, der innerhalb einer im allgemeinen rohrförmigen Hülle (8) gelagert ist und an jedem Ende eine Klemmdichtung (26) mit einer elektrischen Verbindung zu dem entsprechenden, darin abgedichteten Ende des Heizfadens (9) aufweist, wobei jede der genannten Klemmdichtungen (26) von einem Gehäuse (23, 24) umschlossen ist, und wobei Mittel (21, 22; 34) vorgesehen sind, die thermisch Wärme von den genannten Klemmdichtungen (26) im wesentlichen aufwärts in Richtung auf die genannte Kochplatte (25) leiten, dadurch gekennzeichnet, daß das genannte Gehäuse (23, 24) aus einem keramischen Material besteht und in einer oberen Fläche mit einer Ausnehmung (27, 37) versehen ist; und daß die genannten thermisch leitenden Mittel (21, 22; 34) ein Element (21, 22; 34) umfassen, das aus einem thermisch leitenden Material besteht und so angeordnet ist, daß es sich durch die genannte Ausnehmung (27; 37) erstreckt und innig zwischen und in thermischem Kontakt mit der oberen Fläche der Klemmdichtung (26) und der unteren Fläche der genannten Kochplatte (25) angeordnet ist, derart, daß Wärme von der genannten Klemmdichtung (26) über das genannte thermisch leitende Element (21, 22; 34) zu der genannten Kochplatte (25) geleitet wird (Fig. 2 bis 5).

2. Heizgerät nach Anspruch 1, das Mittel (28, 33; 38, 33) enthält, um das genannte Element (21, 22; 34) im wesentlichen aufwärts in Richtung auf die Kochplatte (25) zu drücken (Fig. 3 bis 4).

3. Heizgerät nach Anspruch 1 oder 2, bei dem das genannte Element einen Stift (21, 22) aus thermisch leitendem Material umfaßt (Fig. 3).

4. Heizgerät nach Anspruch 1 oder 2, bei dem das genannte Element einen Ring (34) aus thermisch leitendem Material umfaßt (Fig. 4).

5. Heizgerät nach Anspruch 2, bei dem die genannten Drückmittel ein nachgiebig gelagertes Lagerelement (28) umfassen, das sich durch eine weitere Ausnehmung (31) in der Unterseite des genannten Gehäuses (23, 24) erstreckt und in Kontakt mit der Unterseite der genannten Klemmdichtung (26) ist.

6. Heizgerät nach Anspruch 2, bei dem die genannten Drückmittel ein nachgiebig gelagertes Lagerelement (38) umfassen, das in Kontakt mit der Unterseite des genannten Gehäuses (23, 24) ist.

7. Heizgerät nach Anspruch 2, bei dem die genannten Drückmittel eine Blattfeder umfassen, die unterhalb der genannten Klemmdichtung (26) gelagert ist.

8. Heizgerät nach einem der vorhergehenden Ansprüche, das einen thermisch leitenden Zement umfaßt, der zwischen den berührenden Flächen der genannten Klemmdichtung (26) und des genannten Elements (21, 22; 34) und/oder dem genannten Element (21, 22; 34) und der Unterseite der genannten Kochplatte (25) angeordnet ist.

9. Heizgerät mit wenigstens einer Infrarotstrah-

lung aussendenden Lampe (7), die unterhalb einer Kochplatte (25) aus einem glaskeramischen Material angebracht ist, wobei die ober jede Lampe (7) einen Heizfaden (9) enthält, der innerhalb einer im allgemeinen rohrförmigen Hülle (8) gelagert ist und an jedem Ende eine Klemmdichtung (12) mit einer elektrischen Verbindung zu dem entsprechenden darin abgedichteten Ende des Heizfadens (9) aufweist, wobei jede der genannten Klemmdichtungen (12) von einem Gehäuse (10) umschlossen ist, und wobei Mittel (15; 16) vorgesehen sind, die thermisch Wärme von den genannten Klemmdichtungen (12) im wesentlichen aufwärts in Richtung auf die genannte Kochplatte (25) leiten, dadurch gekennzeichnet, daß das genannte Gehäuse (10) aus einem keramischen Material besteht und mit einer im wesentlichen ebenen oberen Fläche versehen ist, daß die genannte Kochplatte (25) sich über einen Bereich unmittelbar über dem genannten Gehäuse (10) erstreckt, und daß die genannten thermisch leitenden Mittel (15; 16) ein im wesentlichen ebenes Plattenelement (15; 16) umfassen, das aus einem thermisch leitenden Material besteht und innig zwischen und in thermischem Kontakt mit der Unterseite des genannten Bereiches der genannten Kochplatte (25) angeordnet ist, derart, daß Wärme von der genannten Klemmdichtung (12) über das genannte keramische Gehäuse (10) und das genannte Plattenelement (15; 16) zu der genannten Kochplatte (25) geleitet wird (Fig. 1).

10. Heizgerät nach Anspruch 9, bei dem jedem keramischen Gehäuse (10) ein entsprechendes Plattenelement (15) zugeordnet ist.

11. Heizgerät nach Anspruch 9, bei dem wenigstens zwei benachbart angeordneten keramischen Gehäusen (10) ein gemeinsames Plattenelement zugeordnet ist, wobei das genannte Plattenelement (10) sich über die oberen Flächen der genannten keramischen Gehäuse (10) erstreckt.

12. Heizgerät nach einem der Ansprüche 9 bis 11, bei dem eine Schicht aus einer wärmeleitenden Masse innig zwischen der oberen Fläche des genannten Plattenelements (15; 16) und der unteren Seite der genannten Kochplatte (25) und/oder der Unterseite des genannten Plattenelements (15; 16) und der Unterseite des genannten keramischen Gehäuses (10) angeordnet ist.

Revendications

1. Appareil de chauffage comprenant au moins une lampe (7) émissive dans l'infrarouge et montée en dessous d'une plaque chaude (25) d'un matériau de vitrocéramique, la ou chacune des lampes (7) comprenant un filament (9) soutenu dans une enveloppe (8) généralement tubulaire et ayant, à chacune de ses extrémités, un joint serti (26) avec une connexion électrique vers l'extrémité respective du filament (9) qui y est scellée, chacun des joints sertis (26) étant renfermé dans un boîtier (23, 24) et des moyens (21, 22; 34) thermiquement conducteurs transmettant la chaleur en provenance de chacun des joints sertis (26) sensiblement vers le haut vers la plaque chaude (25), caractérisé en ce que le boîtier (23, 24) est constitué de matériau céramique et est muni d'une ouverture (27; 37) dans une surface supérieure; et en ce que les moyens thermiquement conducteurs (21, 22; 34) comprennent un élément (21, 22; 34) constitué d'un matériau thermiquement conducteur et disposé pour s'étendre en travers l'ouverture (27; 37) et être disposé en contact intime entre, et en contact thermique avec, la surface supérieure du joint serti (26) et la surface inférieure de la plaque chaude (25), de sorte que la chaleur en provenance du joint serti (26) est conduite par l'intermédiaire de l'élément thermiquement conducteur (21, 22; 34) vers la plaque chaude (25) (figures 2 à 5).

2. Appareil de chauffage selon la revendication 1, comprenant des moyens (28, 33; 38, 33) pour solliciter ledit élément (21, 22; 34) sensiblement vers le haut, vers la plaque chaude (25) (figures 3—4).

3. Appareil de chauffage selon l'une des revendications 1 ou 2, dans lequel l'élément comprend une tige (21, 22) de matériau thermiquement conducteur (figure 3).

4. Appareil de chauffage selon la revendication 1 ou 2, dans lequel l'élément comprend une bague (34) de matériau thermiquement conducteur (figure 4).

5. Appareil de chauffage selon la revendication 2, dans lequel les moyens de sollicitation comprennent un support monté élastiquement (28) s'étendant à travers une autre ouverture (31) du côté inférieur du boîtier (23, 24) et en contact avec le côté inférieur du joint serti (26).

6. Appareil de chauffage selon la revendication 2, dans lequel les moyens de sollicitation comprennent un support monté élastiquement (38) en contact avec le côté inférieur du boîtier (23, 24).

7. Appareil de chauffage selon la revendication 2, dans lequel les moyens de sollicitation comprennent un ressort en feuille monté en-dessous du joint serti (26).

8. Appareil de chauffage selon l'une quelconque des revendications précédentes, comprenant une colle thermiquement conductrice prévue entre les surfaces de contact du joint serti (26) et de l'élément (21, 22; 34) et/ou de l'élément (21, 22; 34) et de la surface inférieure de la plaque chaude (25).

9. Appareil de chauffage comprenant au moins une lampe (7) émissive dans l'infrarouge et montée en-dessous d'une plaque chaude (25) d'un matériau de vitrocéramique, la ou chacune des lampes (7) comprenant un filament (9) soutenu dans une enveloppe de forme générale tubulaire (8) et ayant, à chacune de ses extrémités, un joint serti (12) avec une connexion électrique (14) vers l'extrémité respective du filament (9) qui y est scellée, chacun des joints sertis (12) étant compris dans un boîtier (10), et des moyens (15; 16) thermiquement conducteurs conduisant la chaleur à partir des joints sertis (12) sensiblement vers le haut vers la plaque chaude (25), caracté-

risé en ce que le boîtier (10) est constitué de céramique et présente une surface supérieure sensiblement plane; en ce que la plaque chaude (25) s'étend sur une surface se trouvant directement au-dessus du boîtier (10); et en ce que les moyens thermiquement conducteurs (15; 16) comprennent un élément en forme de plaque sensiblement plat (15; 16) constitué d'un matériau thermiquement conducteur et intimement disposé entre, et en contact thermique avec, la surface inférieure de la plaque chaude (25), et la surface supérieure du boîtier (10), de sorte que la chaleur en provenance du joint serti (12) est conduite par l'intermédiaire du boîtier de céramique (10) et de l'élément en forme de plaque (15; 16) vers la plaque chaude (25) (figure 1).

10. Appareil de chauffage selon la revendication 9, dans lequel chaque boîtier de céramique (10) comprend un élément respectif en forme de plaque (15) qui lui est associé.

11. Appareil de chauffage selon la revendication 9, dans lequel au moins deux boîtiers de céramique disposés de façon adjacente (10) présentent un élément en forme de plaque (16) commun qui leur est associé, l'élément en plaque (16) s'étendant au-dessus des surfaces supérieures des boîtiers de céramique (10).

12. Appareil de chauffage selon l'une quelconque des revendications 9 à 11 dans lequel une couche d'une composition servant de puits thermique est intimement disposée entre la surface supérieure de l'élément en plaque (15; 16) et la surface inférieure de la plaque chaude (25) et/ou la surface inférieure de l'élément en plaque (15; 16) et la surface supérieure du boîtier de céramique (10).

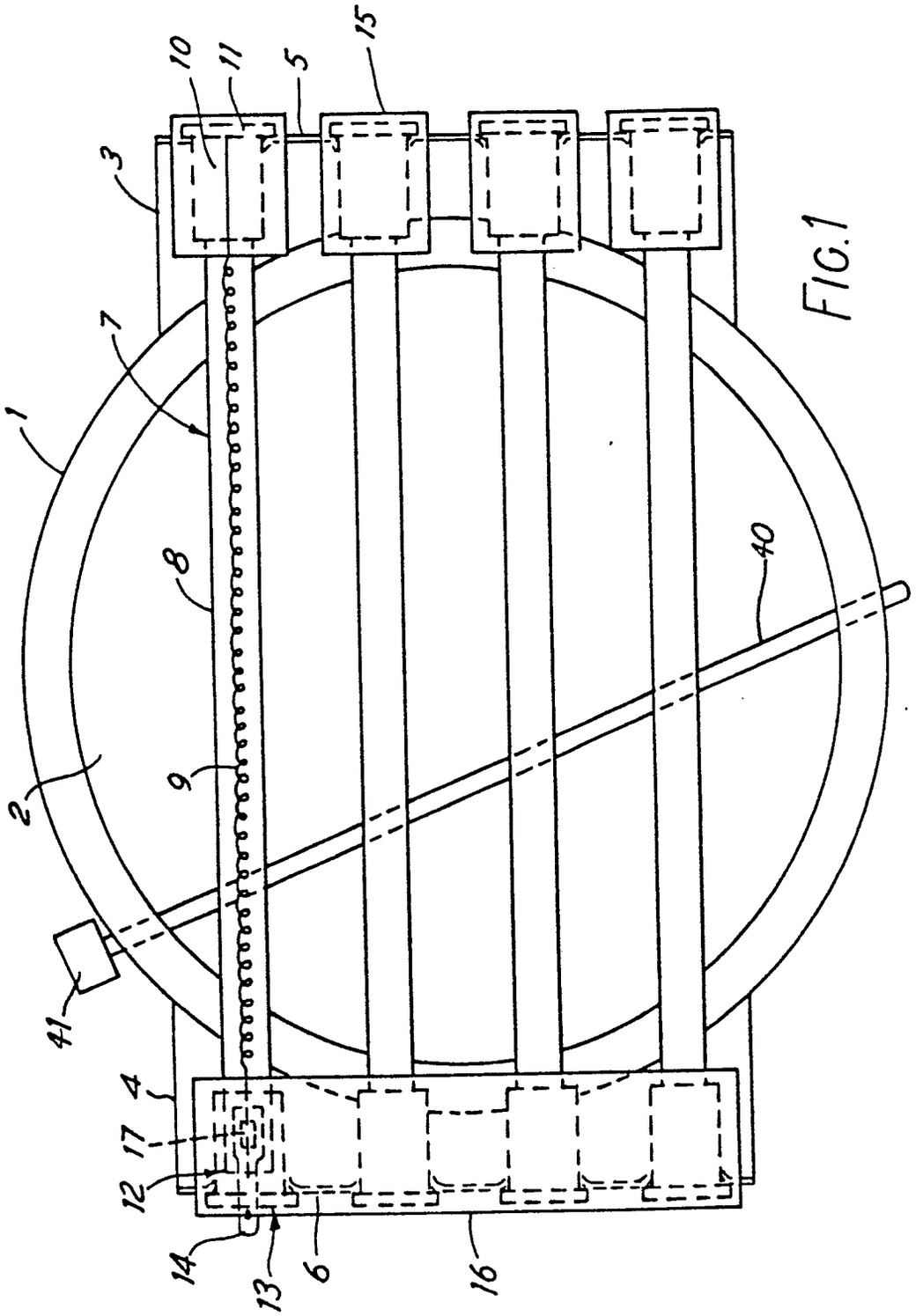

FIG.1

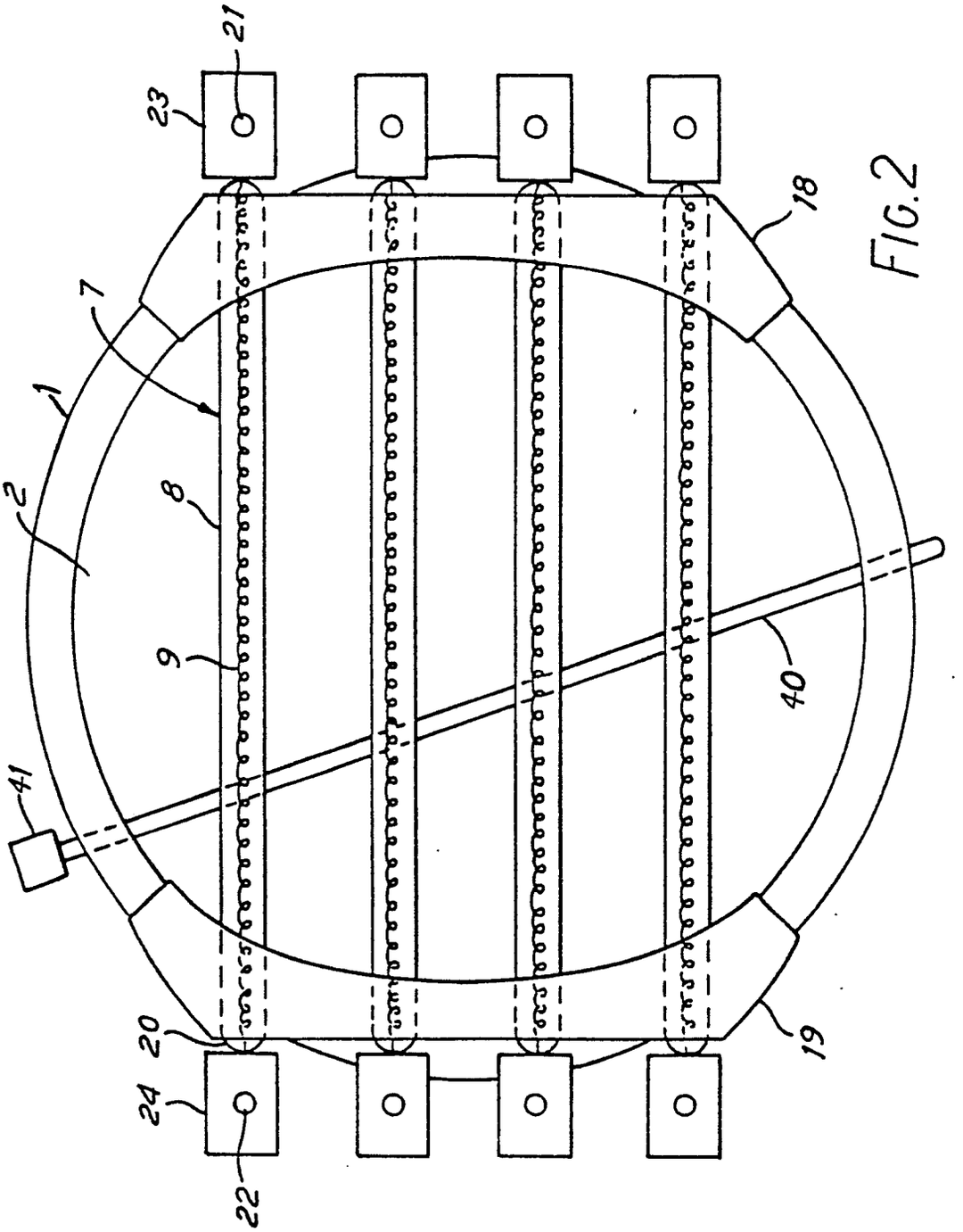

FIG.2

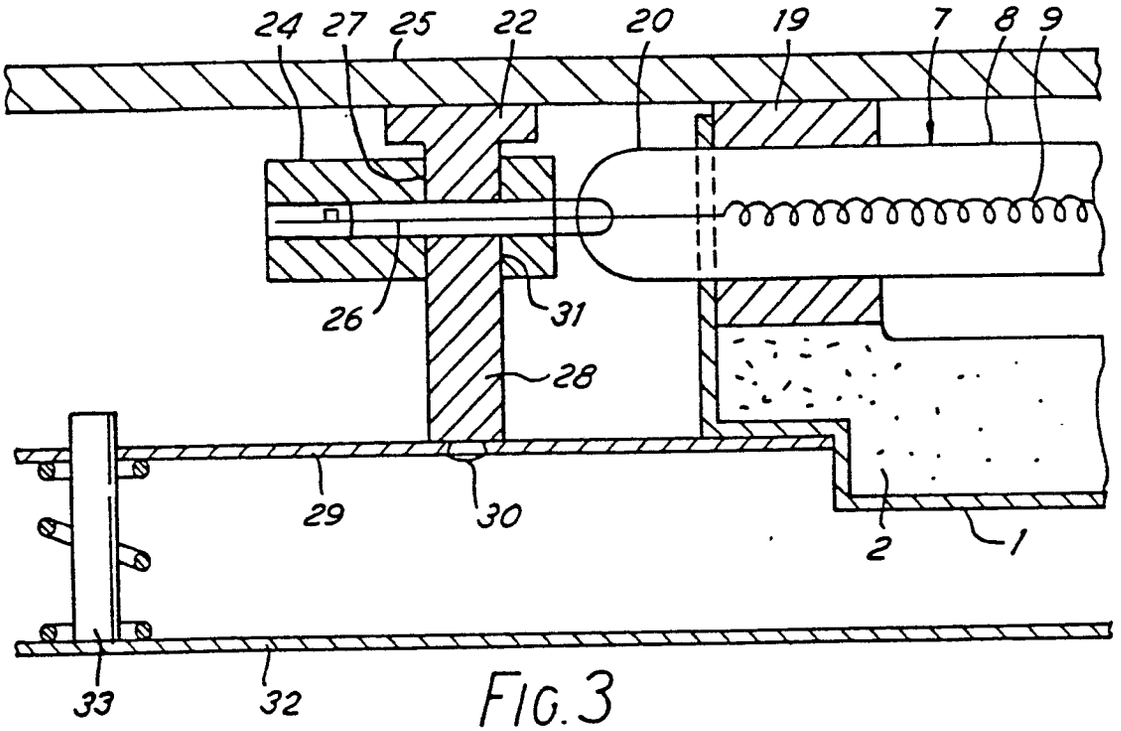
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FIG. 3

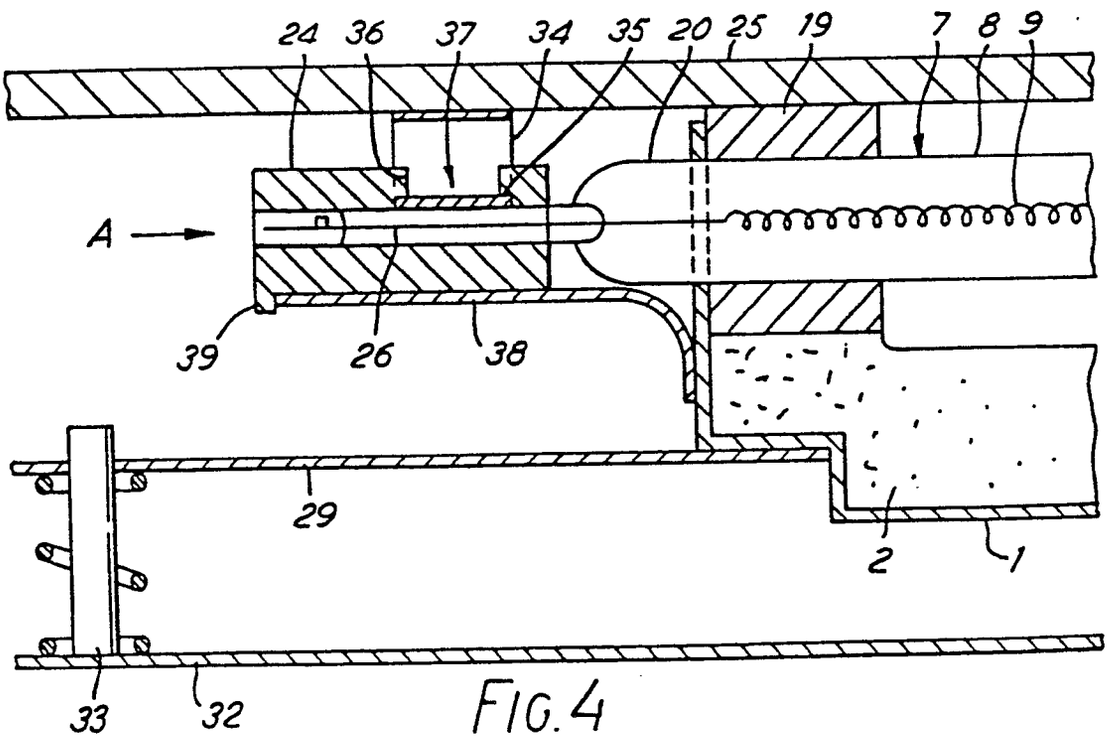
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FIG. 4

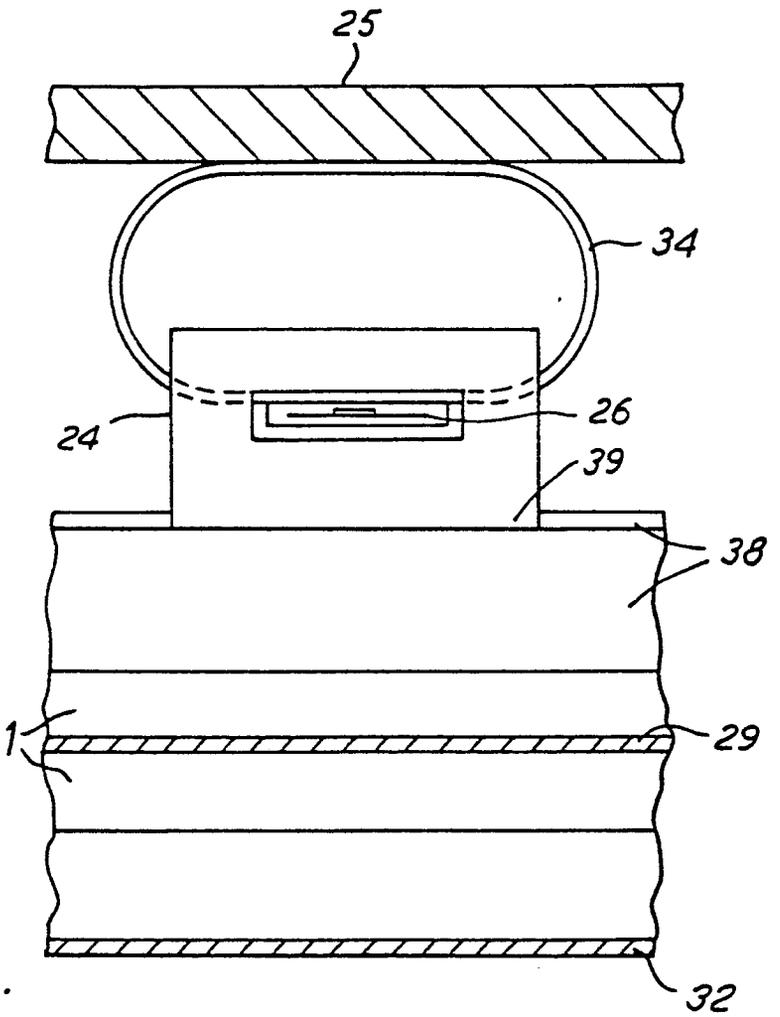

FIG. 5