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D E C I S I O N
of 12 October 1994

Case Number: T 0110/92 - 3.2.3

Application Number: 83307338.0

Publication Number: 0117346

IPC: F24C 15/10, F24C 7/04

Language of the proceedings: EN

Title of invention:
Heating apparatus

Patentee:
THORN EMI Patents Limited

Opponent:
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(0IV) AEG Aktiengesellschaft Berlin und Frankfurt
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Headword:
-

Relevant legal provisions:
EPC Art. 56, 123, 100(a), 100(c)

Keyword:
"Amendments - time limit"
"Amendments - added subject-matter"
"Inventive step - indicia"

Decisions cited:
G 0006/88; T 0024/81; T 0248/85; T 0162/86

Catchword:
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Case Number: T 0110/92 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 12 October 1994

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 18 November 1991, posted on 19 December 1991 revoking European patent No. 0 117 346 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: H. Andrae
W. Moser

Summary of Facts and Submissions

I. European patent No. 0 117 346 was granted on 29 April 1987 on the basis of European patent application No. 83 307 338.0.

II. The patent was opposed by the Respondents I to VII (Opponents I to VII) on the grounds that the subject-matter of the patent lacked an inventive step with regard to the state of the art (Article 100(a) EPC) and infringes Article 123(2) EPC (Article 100(c) EPC). In support of their requests, the Respondents referred inter alia to the following prior art:

- DE-A-2 546 106

- DE-A-3 004 187

- US-A-3 335 261

- US-A-3 612 828

III. The patent was revoked by a decision of the Opposition Division taken at the oral proceedings on 18 November 1991 with written reasons posted on 19 December 1991.

IV. The Appellant (Proprietor of the patent) filed an appeal against this decision on 10 February 1992 and paid the appeal fee on 11 February 1992. The Statement of Grounds of Appeal was filed on 16 April 1992.

V. In a communication pursuant to Article 11(2) EPC of the Rules of Procedure of the Boards of Appeal dated 16 February 1994, the Board set out a provisional

opinion with regard to the questions of added subject-matter and inventive step of Claim 1. Furthermore, the Board referred in this communication to a contradiction between the argumentation of the Appellant with regard to the material of the reflective means used in the heating assembly and the factual content of Claim 1.

VI. At the oral proceedings held on 12 October 1994 the Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the following documents:

(a) Claim 1 and description, filed on 10 August 1994
(b) Claims 2 to 8 as granted
(c) Drawings as granted

The Respondents requested that the appeal be dismissed.

VII. Claim 1 is worded as follows:

"A heating assembly including heating means (7), a mass (2) of non-metallic, thermally-insulative material located adjacent one side of said heating means (7), a plate (15) covering said heating means (7) adjacent the side thereof remote from said mass (2), and means for reflecting energy, initially emitted from said heating means (7) in a direction away from said plate (15), back towards said plate (15), characterised in that said heating means (7) includes at least one lamp (7) emissive of infra-red radiation, operative at a temperature within the range from 1800 to 3000°K and comprising a tungsten filament (17) supported in a halogenated environment within a sealed, generally tubular envelope formed from an infra-red-transmissive

material; in that said plate (15) has a transmittance characteristic selected to permit infra-red-radiation, substantially without change in its wavelength characteristics as emitted from said at least one lamp (7), to emerge from said assembly through said plate (15); in that said assembly includes optical filter means located relative to said at least one lamp (7) to inhibit emission from said assembly of undesirable visible radiation emitted from said at least one lamp (7), whilst permitting emission from said assembly of sufficient visible radiation to provide a visual indication of the amount of infra-red radiation being emitted from said at least one lamp (7); in that said reflective means is non-metallic and includes a reflective constituent coated upon, or incorporated in said thermally-insulative material and is effective to reflect infra-red radiation emitted from said at least one lamp (7) to enhance the amount of infra-red radiation which emerges from said assembly through said plate (15); and in that said assembly also includes temperature-responsive means (11) responsive to the temperature of said plate (15) and switching means (12) co-operable with said temperature-responsive means (11) to control power supplied to said at least one lamp (7), in dependence on the temperature of said plate (15)."

VIII. The Appellant's arguments set forth in his written and oral statements can be summarised as follows:

Having regard to the admissibility of Claim 1 to the proceedings the amended documents were filed a considerably long time before the date of the oral proceedings and cannot therefore, be considered to have

been filed at the last minute. Moreover, the amended documents have to be regarded as a response to observations made in the Board's communication. Such a response from the Patentee must always be allowed in order to meet the objections raised.

The alternative solutions in respect of the reflective means indicated in Claim 1 are clearly supported by page 8, lines 14 to 21 of the originally filed description. The new feature of Claim 1 that the reflective means is non-metallic is in essence a disclaimer, i.e. a limitation of the scope of protection to a particular type of the reflective means for which no source of disclosure is required. Besides, from the introductory portion of the original description in which the prior art is criticised it is perfectly clear that only non-metallic reflectors are envisaged according to the patent in suit.

As regards the issue of patentability, the Enlarged Board of Appeal found in its Decision G 6/88 of 11 December 1989 that a claim to the use of a known compound for a particular purpose which is based on a technical effect which is described in the patent, should be interpreted as including that technical effect as a functional feature. Such a functional feature must be regarded as a novel teaching if it has not previously been made available to the public.

In a combination invention as in the present case an individual assessment of the features of the claim in respect of the effects obtained is not appropriate as confirmed by the case law of the Boards of Appeal as

well as by other sources such as, for example, the commentary of BRUCHHAUSEN on the patent law.

The technical problem underlying the invention is to provide an efficient and improved tungsten lamp heating assembly emitting near infra-red radiation, of relatively slim construction, having a rapid thermal response time which is at least comparable with that of a gas-fuelled heating apparatus, having reduced heat and radiation losses and increased reflectivity at higher frequency radiation, and which allows the use of cooking utensils of any material, wherein the infra-red heating means can be easily and inexpensively replaced. According to further aspects of the problem, a heating assembly should be provided in which overheating is avoided and the energy loading per unit surface area is significantly increased.

The solution to this problem as laid down in Claim 1 leads to the surprising effect that the "Microtherm" - material used as the thermally-insulative material reflects exactly the infra-red waves emitted by the halogenated tungsten filament lamp.

The teaching of the document US-A-3 612 828 according to which the reflective fibrous-ceramic heater block material will reflect infra-red energy having a wavelength within the range of 1 to 5 µm is based upon wrong calculations so that the skilled person would not make use of this disclosure. This citation gives no indication that the heater block is universally useful for any kind of radiation heating assemblies, in particular tungsten-halogen heating means emitting near infra-red radiation around 1.3 µm (2209°K) as used in

the heating apparatus of the patent in suit. Although the document US-A-3 612 828 discusses the more expensive prior art glass-top cooking units using tungsten filament quartz lamps operating around 2482°C this is in terms of its disadvantages and the expert is directed away from this type of cooking unit.

The invention described in the document GB-A-2 044 057 and the corresponding document DE-A-3 004 187 relates to electric radiant heaters (far infra-red open coil heaters) for smooth top cookers. The chemical composition and optical properties of the insulating material "Microtherm" to be used for the base in the metal dish are not disclosed. Thus, these documents do not suggest that the "Microtherm"-material would be suitable for use as the reflector with a high spectral reflectance in the near infra-red radiation emitting heating apparatus of the patent in suit that provides a high energy loading per unit surface area.

The document DE-A-2 546 106 relates to an apparatus for heating food with near infra-red radiation (0.6 to 0.9 µm) emitted from a bright emitter, preferably a halogen incandescent lamp that may be covered by a glass-ceramic plate. This document does not contain any suggestions pointing in the direction of the technical problems and their solution as claimed by the patent in suit.

Nobody can explain why the solution according to the patent in suit was not found if it was so simple as alleged by the Respondents. Also a simple solution can be inventive. This applies all the more in the present case as the patentee discovered the suitability of

"Microtherm" as a reflector for short wave infra-red radiation. Furthermore, the enormous economical success of the invention is to be regarded as an evidence of inventive step.

IX. The Respondent contested the Appellant's arguments and argued essentially as follows:

The new request presented by the Appellant was filed very late. The amendment to the claim constituted a surprise as it shifted the alleged invention in a different direction and the new Claim 1 should not therefore be admitted.

The feature according to an alternative solution of Claim 1 that the reflective means is incorporated in the thermally-insulative material has no basis of disclosure in the originally filed application so that the claim infringes Article 123(2) EPC. This applies also to the feature of Claim 1 that the reflective means is non-metallic since the original application documents teach in this respect only the use of metal oxides.

The document, DE-A-3 004 187 is the most relevant citation with regard to the subject-matter of Claim 1. It describes all the features of Claim 1 except for the arrangement of a halogenated lamp comprising a tungsten filament. This latter feature is, however, known from US-A-2 546 106. The skilled person confronted with the inherent problem indicated in the patent in suit, namely to provide a more efficient heating apparatus having a rapid response time, would inevitably combine the teachings of these two documents since DE-A-

2 546 106 deals also with the issue of obtaining an efficient heating apparatus with a short cooking time.

The use of halogenated tungsten filament lamps within the temperature range claimed for cooking purposes was known before the priority date of the patent in suit and the alleged invention does not concern anything more than the use of a known means in a known arrangement for achieving a characteristic aim. In particular, DE-A-3 612 828 teaches the skilled person that a thermally-insulative material having dispersed in it opacifiers consisting of metal oxides is appropriate for reflecting infra-red radiation within the range of wavelength of 1 to 5 µm, this material being a diffuse reflector.

The question of why the alleged invention was not found by anyone else before the relevant priority date can be answered in the light of the technical development of the short wave infra-red lamps. The manufacture of such lamps was expensive in the years before the relevant priority date so that nobody took the risk of producing heaters that might not be sold. Having regard to the appreciation of the inventive step with the yardstick of the alleged economical success caution should be observed as so far it is not the practice of the Boards of Appeal to base their decisions on such a vague secondary consideration.

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural issues*

There is some justification for the amendments of Claim 1 and the description as filed on 10 August 1994 because they were submitted in order to meet observations, made by the Board in its communication dated 16 February 1994, regarding inconsistencies between Claim 1 and the description. Furthermore, these amendments have been submitted in good time (i.e. two months) before the date of oral proceedings. Consequently, these amended documents now on file have to be considered on their merits by the Board.

3. *Article 123 EPC*

The subject-matter of Claim 1 derives essentially from the original Claims 1, 3, 5, 8, 10 and 12.

The feature of the original Claim 1 that the support means of the heating apparatus is provided for supporting a utensil containing food to be heated has been eliminated from Claim 1. The deletion of this feature does not infringe Article 123(2) EPC since it is clear from the original Claim 1 in combination with the passage bridging pages 11 and 12 of the original description that placing a utensil containing food to be heated on the support means concerns rather a possible than an obligatory use of the heating apparatus.

As regards the disclosure of the passage in Claim 1 "... a reflective constituent ... incorporated in said thermally-insulative material ...", the support therefor in the original description, page 8,

paragraph 3, reads: "... the surface of the insulative material may be provided with a reflective coating, such as a metallic oxide, or the surface layer of the insulative material may be enriched therewith, so that a reflective layer is disposed between the lamps and a major part of the body of the insulative material thereby ensuring that the insulative material is substantially opaque to infra-red radiation". In the Board's judgement, there is no doubt that enriching the surface layer of the insulative material with reflective material means that the reflective material is incorporated in a portion of the insulative material. Thus, the above-cited original disclosure teaches the skilled person to ensure that the insulative material is substantially opaque to infra-red radiation by disposing a reflective layer between the lamps and the body of the insulative material or by enriching the surface layer of the insulative material between the lamps and a major part of the body of the insulative material with the reflective means, i.e. incorporating the reflective constituents in the insulative material. On page 8, paragraph 3 of the original description, reflective means in the form of a metallic oxide which is a non-metallic component has been disclosed. Additionally, the passage from page 1, lines 5 to page 2, line 14, of the original description teaches that the use of a metallic reflector raises a number of problems, such as melting of the reflector, that jeopardise the operation of the heating apparatus. The skilled person interprets these passages of the disclosure in such a manner that a metallic reflector must be avoided, i.e. the reflective means has to be non-metallic. Therefore, no objection to Claim 1 under Article 123(2) EPC is justified.

The feature "non-metallic" narrows down the scope of protection of Claim 1 as granted. Claim 1 satisfies therefore also Article 123(3) EPC.

Further points concerning the issue of Article 123 EPC were not maintained for discussion in the oral proceedings before the Board.

The subject-matter of Claim 1 complies, therefore, with the requirements of Article 123 EPC.

4. *Novelty*

None of the subject-matter of the prior art cited in the opposition and appeal proceedings describes a heating assembly comprising all the features specified in Claim 1. Therefore, the subject-matter of Claim 1 is novel within the meaning of Article 54 EPC. The issue of novelty was, in fact, not challenged during opposition and appeal proceedings so that no further consideration of this question is necessary.

5. *Inventive step*

5.1 The documents DE-A-3 004 187 and US-A-3 335 261 describe heating assemblies that come approximately equally near to the subject-matter of Claim 1. In the course of the oral proceedings before the Board, it became evident that DE-A-3 004 187 was somewhat more relevant insofar as it uses a thermally-insulative material with opacifiers dispersed therein as a carrier material for the heating elements, whereas the other document does not describe such a material; it teaches, however, the use of a tungsten filament lamp

energizable to a temperature within the range claimed in the patent in suit.

DE-A-3 004 187 describes a heating assembly including heating means (10, 12), a mass of non-metallic, thermally-insulative material (4) located adjacent one side of the heating means, a plate covering the heating means adjacent the side thereof remote from said mass, and means for reflecting energy, initially emitted from the heating means in a direction away from the plate, back towards the plate, whereby the heating means is emissive of infra-red radiation, the plate has a transmittance characteristic selected to permit infra-red radiation, substantially without change in its wavelength characteristics as emitted, to emerge from the assembly through the plate, the reflective means includes a reflective constituent incorporated in the thermally-insulative material and is effective to reflect infra-red radiation emitted to enhance the amount of infra-red radiation which emerges from the assembly through the plate, and the assembly also includes temperature-responsive means (16) responsive to the temperature of the plate and switching means co-operable with the temperature-responsive means to control power supplied to the heating means in dependence on the temperature of the plate.

The reflective constituents incorporated in the thermally-insulative material are formed by opacifiers of metal oxides, cf. the description of "Trübungsmittel" on page 11, paragraph 2 of the citation. As illustrated by the Respondent V in the oral proceedings by means of a reference to "Römpps Chemie Lexikon", 8th edition, 1979, Franckh'sche

Verlagshandlung Stuttgart (DE), Catchword "Trübungsmittel", such opacifiers serve the purpose of reflection and diffusion of radiation.

5.2 Claim 1 differs from the disclosure of DE-A-3 004 187 by the following features:

(a) the heating means includes at least one lamp emissive of infra-red radiation operative at a temperature within the range from 1800° to 3000°K and comprising a tungsten filament supported in a halogenated environment within a sealed, generally tubular envelope formed from an infra-red transmissive material.

(b) the heating assembly includes optical filter means located relative to the lamp to inhibit emission from the assembly of undesirable visible radiation emitted from the lamp, whilst permitting emission from the assembly of sufficient visible radiation to provide a visual indication of the amount of infra-red radiation being emitted from the lamp.

5.3 According to the description of the patent in suit (cf. column 1, lines 1 to 45), the underlying problem is to provide an efficient heating apparatus having a rapid response time which is at least comparable with that of gas-fuelled heating apparatus whilst retaining the inherent advantage of cleanliness. A further aspect of the problem is to provide to the user a visible indication of the power level (cf. column 4, paragraph 2 of the patent in suit).

The replacement of the unprotected resistance wires of the heating assembly known from DE-A-3 004 187 by at least one lamp emissive of infra-red radiation within the temperature range according to the above-cited feature (a) clearly leads to a more efficient apparatus having a rapid response time comparable to gas-fuelled heating apparatus whilst retaining the characteristic of cleanliness. The arrangement of optical filter means in accordance with the above-cited feature (b) enables part of the visible radiation to be transmitted so that the power level of the heating assembly can be assessed optically.

The problem as indicated above is therefore regarded as the objectively underlying problem with the relevant prior art known from DE-A-3 004 187 forming the starting point in the examination as to the inventive step.

The aspect of the problem of providing a cooking apparatus which is efficient and has a rapid response time will basically be envisaged by the designer of such a device for reasons of saving energy and cooking time. Furthermore, the interest of the user of a cooking apparatus to be informed about the question whether and to what extent there is an actual power output arises from practical considerations in operating the cooking apparatus such as the desire of a visual check of the operation.

Hence, the recognition of the inherent technical problem as such does not require any inventive skills and cannot, therefore, contribute to an inventive step of the claimed subject-matter.

5.4 DE-A-2 546 106 describes a cooking apparatus comprising an infra-red halogenated tungsten lamp which radiates primarily in the wavelength range from 0.6 µm to 0.9 µm with at least 75% of the entire radiation energy being emitted at wavelengths below 1.4 µm (cf. Claim 1 of the citation). The cooking apparatus comprises a glass ceramic cooking plate which is absorbent of wavelengths below 0.6 µm to prevent disruptive blinding when the cooking apparatus is in use (cf. page 3 (original numbering), paragraph 2 of the citation).

As explained by the Appellant himself on page 3, last paragraph, of his letter dated 10 August 1994, the temperature range of 1800 to 3000°K at which the lamp is operative according to Claim 1 corresponds to a radiation wavelength of 1.6 to 0.97 µm. Thus, the radiation wavelength range of the known lamp with at least 75% of the entire radiation being emitted at wavelengths below 1.4 µm falls within the range of wavelengths and temperatures, respectively, of the lamp as claimed.

Being faced with the underlying problem as identified in above section 5.3 the person skilled in the art would be induced to modify the heating assembly according to DE-A-3 004 187 such that it incorporates the lamp and the optical filter means (cf. the above cited features (a) and (b)) known from DE-A-2 546 106.

By such a substitution, he would expect to obtain a high cooking efficiency in combination with an extremely short cooking time and avoid a disturbing blinding effect on use of the cooking apparatus, whilst maintaining a certain degree of visualisation of the

level of the cooking operation, cf. DE-A-2 546 106, page 2 penultimate paragraph and page 3, second paragraph (original numbering of the pages).

In accordance with the alternative solution of Claim 1, the reflective means, instead of being incorporated in the thermally-insulative material, is coated upon the carrier material. The arrangement of a coating layer on a reflector plate for reflecting infra-red radiation is, however, also known, see e.g. US-A-3 335 261 referred to in the Board's communication dated 16 February 1994, section 4. The measure according to the alternative solution of Claim 1 would, therefore, lie within the design choice of the skilled person. Even in the case that Claim 1 were restricted to the above-cited alternative solution, such restriction would nevertheless not provide any basis for recognising an inventive step.

5.5 The Appellant argues that the solution according to Claim 1 leads to the surprising effect that the "Microtherm"-material used as the thermally-insulative material reflects exactly the infra-red waves emitted by the halogenated tungsten filament lamp.

First of all, the Board notes that the subject-matter of Claim 1 does not specify "Microtherm"-material, but in general a mass of non-metallic thermally-insulative material located adjacent one side of the heating means. The relevant prior art, i.e. DE-A-3 004 187, describes such a non-metallic thermally-insulative material as the carrier of the heating means with opacifiers of metal oxides dispersed in the material. The skilled person being aware that opacifiers have the

property of reflecting electromagnetic radiation and cooperate with the thermally-insulative material to counteract the flow of heat downwards away from the cooking plate, would be motivated to make use of this material in order to reflect radiation of the lamp back to the cooking plate.

If there were still to remain some doubts as to whether opacifiers in the form of metal oxides were appropriate for reflecting radiation energy in the range of temperatures and wavelengths of the lamp as claimed, the disclosure of US-A-3 612 828 (cf. column 7, lines 26 to 43), which deals also with an infra-red radiation heating unit in the domestic range, would eliminate them because it teaches that a thermally-insulative material contacting the heating element and having dispersed in it an opacifier substance of metal oxides is appropriate for reflecting the majority of infra-red energy having a wavelength within the range of 1 to 5 µm. As the wavelength of radiation indicated in Claim 1, i.e. 1.6 to 0.97 µm corresponding to 1800 to 3000°K (see above section 5.4), comes almost completely within the above-cited range of 1 to 5 µm according to the citation, the disclosure of US-A-3 612 828 would remove the last possible doubts of the skilled person as to whether opacifiers of metal oxides embedded in a thermally-insulative material are in fact promising in view of an efficient reflection of the infra-red radiation emitted. The argument of the Appellant that the teaching of US-A-3 612 828 in this context is based on wrong calculations has not been corroborated by any evidence so that this argument cannot be taken into consideration.

The Board is, therefore, convinced that in the question of reflection of the infra-red radiation by opacifiers consisting of metal oxides there was no surprising effect whatsoever for the person skilled in the art.

5.6 Having regard to the further arguments relating inter alia to the economical success and the circumstance that the alleged invention had not been found before, the following is noted:

In the present case, the problem-solution approach as recommended in a number of decisions of the Boards (cf. e.g. T 248/85 (OJ EPO 1986, 261) and T 162/86 (OJ EPO 1988, 452) has been applied for examination of the claimed subject-matter as to the inventive step. As outlined in Decision T 24/81 (OJ EPO 1983, 133) a mere investigation for so called "indications" of the presence of inventive step is no substitute for the technically relevant assessment of the inventions vis-à-vis the state of the art, involving the recognition and solution of the technical problem in the case.

The Board does not dispute that the heating assembly according to Claim 1 may have become a commercial success. However, such a commercial success alone, with the technically relevant examination of the claimed subject-matter leading to a negative result, cannot be regarded as forming the basis for an indication of inventive step even if the Board were convinced that the success derives from technical features of the heating assembly and not from other causes such as of commercial nature.

The question of why no person skilled in the art has hit on the idea of combining the teachings of DE-A-3 004 187 and DE-A-2 546 106 before the priority date of the patent in suit can be asked with regard to any invention that satisfies the requirement of novelty. The reasons why can be many and various. The Respondents referred for example to the technical development in the field of infra-red lamps in the range of short waves and set out that the manufacture of these lamps was expensive in the years before the priority date of the patent in suit. Hence, the manufacturers of heating assemblies were not prepared to offer products which might not have been competitive for reasons of costs.

In the absence of evidence to the contrary, the Board shares the opinion of the Respondents that it was not due to technical reasons but due to the production costs of the lamps that the claimed subject-matter had not been proposed before, all the more so as no difficulties have been put forward convincingly that may have impeded the skilled person from combining the teachings of the above-cited two prior art documents. Furthermore, the Appellant had referred to the Decision G 6/88 of the Enlarged Board of Appeal with regard to the presence of a functional technical feature which has not previously been made available to the public. This decision deals with a claim directed **to the use** of a known compound and **not to a product** as actually claimed. Already for this reason, the Appellant's argument does not apply to the present case. Besides, decision G 6/88 as illustrated in its Headnote is not concerned with the issue of inventive step but with

that of novelty. The question of novelty has not, however, been at stake in the present case.

5.7 For the above reasons, the Board comes to the conclusion that the subject-matter of Claim 1 is the result of routine development within the technical field of heating devices and does not involve an inventive step within the meaning of Article 56 EPC. Claim 1 cannot, therefore, be maintained.

6. Since the Appellant has only submitted a single request which has to be decided upon "in toto", it would serve no purpose to consider the merits of the subject-matter of dependent Claims 2 to 8 since these claims must inevitably fall together with Claim 1.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin C. T. Wilson