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Datasheet for the decision of 18 November 2013

Case Number: T 2411/09 - 3.5.02

Application Number: 03728210.0

Publication Number: 1629698

IPC: H05B6/06, H05B6/02

Language of the proceedings: EN

Title of invention:
Induction cooktop

Patent Proprietor:
Tübitak-Uzay (Türkiye Bilimsel ve Teknik Arastirma Kurumu - Uzay Teknolojileri Arastirma Enstitüsü)

Opponent:
Electrolux Rothenburg GmbH Factory and Development

Headword:

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Late-filed argument - admitted (yes)
Late-filed document - admitted (yes)
Inventive step - (yes)

Decisions cited:

Catchword:
See points 2 and 4 of the reasons.

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Case Number: T 2411/09 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 18 November 2013

Appellant: (Opponent)	Electrolux Rothenburg GmbH Factory and Development Fürther Strasse 246 90429 Nürnberg (DE)
Representative:	Schröer, Gernot H. Meissner, Bolte & Partner GbR Bankgasse 3 90402 Nürnberg (DE)
Respondent: (Patent Proprietor)	Tübitak-Uzay (Türkiye Bilimsel ve Teknik Arastirma Kurumu - Uzay Teknolojileri Arastirma Enstitüsü) Odtu Eskisehir Yolu 06531 Ankara (TR)
Representative:	Cayli, Hülya Paragon Consultancy Incorporated Koza Sokak No: 63/2 GOP 06540 Ankara (TR)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 29 October 2009 rejecting the opposition filed against European patent No. 1629698 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman: M. Ruggiu
Members: M. Léouffre
P. Mühlens

Summary of Facts and Submissions

I. The opponent appealed against the decision of the opposition division, posted on 29 October 2009, on the rejection of the opposition against patent No. 1 629 698. The statement setting out the grounds of appeal was received on 24 February 2010.

Opposition was filed and based on Article 100(a) together with Article 56 EPC.
Lack of novelty was objected by the opponent in a further letter dated 29 July 2008.

II. The examining division held that the grounds of opposition did not prejudice the maintenance of the patent unamended, having regard to the following documents:

E1 = DE 4 208 252 A1;
E2 = US 4 467 165 A;
E3 = US 5 648 008 A;
E4 = GB 1 515 722 A;
E5 = GB 1 531 365 A and
E6 = JP 1-95 488 A.

In particular, the opposition division considered that even if the combination of documents E3 and E5 would be regarded as obvious, it would not lead to an induction cooking apparatus wherein the turn-on losses of the power transistor would be minimised.

III. With the statement setting out the grounds of appeal, the opponent introduced further documents

E7 = JP 2 532 355 B2/PAJ 57156680 together with an English translation,
E8 = JP 0727 4534 A and abstract PAJ 072 74534 A
E9 = JP 5 515 0587 A and
E10 = DE 4 232 067 A1.

In the grounds of appeal, the appellant mainly alleged that the subject-matter of claim 1 would lack an inventive step (Article 56 EPC) having regard to the combination of documents E3, E5 and E7.

IV. With a letter dated 10 October 2013, in response to the summons to oral proceedings, the appellant objected the lack of novelty of claim 1 in view of E3.

V. Oral proceedings before the board took place on 18 November 2013.

The appellant (opponent) requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed.

VI. Claim 1 of the patent as granted reads as follows (enumeration of features corresponding to that in the decision under appeal added by the board):

1 "An induction cooking apparatus, comprising:
2 a power inverter circuit (10) drawing essentially a unity power factor current from mains,
3 having an induction heating coil (19) that generates a high frequency magnetic field inducing a removable or non-removable magnetic cookware (20), a resonant capacitor parallel to said heating coil (19), an lGBT as a switching element, and a power diode (Dp) placed in an anti-parallel manner to said lGBT;
4 a microprocessor (18) taking the desired temperature of the cookware or desired power level of the cooking apparatus from a control panel,

5 controlling the power transferred to said cookware (20) by adjusting the turn-on duration of gating pulses (520, 540),
6 controlling the temperature of said cookware (20) by interrupting the operation of the system when the temperature of said cookware (20) reaches desired value or by re-starting the system after waiting for a preset duration once it has been interrupted,
7 adjusting the turn-off durations of gate pulses by observing zero-cross instants of current flowing through heating coil via zero-cross detector means (22),
8 and interrupting the operation of the power stage (10) for a preset duration when a warning signal (570A, 570B, 590) from pan detection circuit (17) or protection circuits block (15) is received;
9 a pan detection circuit (17) detecting if a suitable cookware (20) is placed on the cooktop by observing DC link voltage (500)
10 and comprising a 50 Hz zero-cross detector (23) means for detecting zero crosses of AC input voltage (V_{ac}) signal;
11 a block of analog protection circuits (15) protecting the power stage (10) against overcurrents by observing the current flowing through heating coil (19)
12 and against inappropriate gating signals by observing the collector voltage of lGBT (510) and gating signals (540) at the same time."

Claims 2 to 7 of the patent are dependent on claim 1.

VII. The appellant essentially argued as follows:

Claim 1 contained process features like e.g. the "microprocessor (18) taking the desired temperature of the cookware" or "controlling the power transferred to said cookware (20)". Process features could only be used as characterising features for a claim if the use of the feature could be seen at the product ("product-by-process-claim"), as expressed throughout the jurisdiction of the EPO, for example in T 0675/10 on page 6, No.3 (cf. appellant's letter dated 10 October 2013). A product-by-process claim could not be recognised in claim 1, as the features referred to a method of operating an induction cooking apparatus, not to a manufacturing method of an induction cooking apparatus. Actually the features mentioned above should be understood as defining a microprocessor (18) that is merely potentially suitable for taking the desired temperature of the cookware, or implementing a control of the power transferred to said cookware (20). Therefore, many features of claim 1 as granted could not be used for the characterisation of the induction cooking apparatus as a product, so that the patent should be revoked, as claim 1 was not new with respect to E3 (Article 54 EPC).

The objection of lack of novelty was raised in the appeal procedure in reaction to the annex of the summons to oral proceedings, wherein claim 1 was considered as novel. A lack of novelty objection was first raised during the opposition proceedings with a letter dated 29 July 2008 and admitted into the procedure as acknowledged in the decision at page 4. Consequently, the lack of novelty objection should be admitted in the appeal procedure. As soon as claim 1 was considered as comprising process features, the lack of novelty became "prima facie" evident and a corresponding objection relevant.

Documents E7 to E10 were cited with the grounds of appeal in reaction to the decision of the opposition division. E7 and E8 were equivalent. E7 was particularly relevant with respect to the features relating to the turn-on and turn-off durations of the gate pulses (features 5 and 7 of claim 1). Actually claim 1 should not be read too restrictively and what mattered were the functions implemented by features 5 and 7 to which the passages of the English translation of E7, page 4, paragraph 3 and figures 2 to 4, were relevant. The circuit of E7 processed signals and comprised integrated digital devices, like the NAND gates 415 and 430 shown in figure 2. Thus, the circuit of E7 could be considered as a digital processing device similar to a microprocessor device. Furthermore, a microprocessor was disclosed in E3. A combination of E3 and E7 was therefore obvious for a person skilled in the art who would have desired to implement the functions disclosed in E7 in a microprocessor controlled cooking apparatus as shown in E3. Claim 1 was therefore obvious in the sense of Article 56 EPC.

VIII. The arguments of the respondent can be summarised as follows:

The novelty of claim 1 was largely discussed during the opposition proceedings and not objected in the grounds of appeal. The board in its annex to the summons to oral proceedings announced that the "oral proceedings will provide an opportunity to discuss the question of inventive step in the light of E3, E5 and E7". Thus the board did not consider reopening the debate on novelty. Furthermore, the objection of novelty raised by the appellant in his letter dated 10 October 2013 had no relation with the discussion on novelty which took

place during the opposition proceedings, and which concerned the novelty of the subject-matter of claim 1 having regard to E3. The objection was a completely new objection based on the allegation that features of claim 1 would be features of a process. This late filed objection would launch a completely new discussion and therefore should not be admitted into the procedure.

Documents E7 to E10 should also not be admitted into the procedure, since they were cited by the appellant for the first time with the grounds of appeal. Appeal proceedings with new legal and factual framework would constitute a new opposition procedure and that was not the purpose of appeal proceedings. Hence, the new lack of novelty objection and the new documents E7 to E10 should not be admitted into the procedure.

Furthermore E7 was not prima facie relevant, because it did not disclose a microprocessor. A microprocessor comprised memories storing program instructions. In the patent in suit, the microprocessor determined the turn-on and turn-off durations of the gating pulses, which durations were programmable and therefore easily variable. The circuit of E7 was hard-wired and the turn-on and turn-off durations could not be varied. A person skilled in the art willing to change the amount of power delivered by each pulse, would have had to develop and to complete the circuit of E7 with a new hardware.
The use of a microprocessor made it possible to increase the reliability and the flexibility of the circuit, and lower the costs of maintenance. Actually, the determination of the turn-on and turn-off durations of the inverter transistor by the microprocessor made it possible to vary the amount of power applied to the cooking apparatus in a more flexible way. In the

contested patent, functions usually delegated to analog circuits as in E3 were performed by the microprocessor. It followed that the number of analog components could be reduced as well as the faults probability. A further advantage was that a technician needed much less tools to maintain the induction cooking apparatus. Equally, at production level where a quality control was necessary, the control steps were much easier. Finally E3 pointed out to some disadvantages of using a microprocessor, like the difficulty of controlling all the processes and the risk of malfunctioning of the power converter. These disadvantages had been overcome. The possible overload of the microprocessor was limited by determining the turn-off duration only once per half cycle, i.e. once every 10ms. The converter was protected by the protecting measures recited in claim 1. Combining the teachings of E3 and E7 would not have led to an induction cooking apparatus, according to claim 1, presenting the above mentioned advantages.

Reasons for the Decision

1. *The appeal is admissible.*

2. *Admissibility of the novelty objection*

A lack of novelty objection was discussed and admitted into the procedure by the opposition division, as indicated in the decision. Nevertheless, in the appeal, lack of novelty was only objected in the appellant's letter dated 10 October 2013, in response to the summons to oral proceedings from the board. It is generally admitted that, based on the same ground of opposition, an appellant may develop an entirely fresh case based on new arguments (cf. Case Law of the Boards of Appeal of the European Patent Office, 7th edition

2013, IV.E.2.6.5 page 964). The objection of lack of novelty was therefore admitted into the procedure.

3. *Novelty (article 54 EPC):*

3.1 The appellant argued that some of the features of claim 1 are formulated as actions undertaken by the microprocessor e.g. "the microprocessor (18) taking the desired temperature of the cookware" or "controlling the power transferred to said cookware (20)." According to the appellant, these features are process features which do not define the claimed device but define solely a device suitable for undertaking or implementing said actions.

3.2 The novelty objection of the appellant sounds to the board rather as a clarity objection (Article 84 EPC) and clarity is not a ground for opposition (Article 100 EPC). While it is a common practice to address and correct the unclear features arising from amendments filed by the patent owner during the opposition proceedings, potentially unclear features in a claim as granted cannot be amended but need to be interpreted. In the present case, the alleged process features are immediately understood as defining functions of the claimed induction cooking apparatus. The said features are therefore not considered as optional features for the assessment of the novelty of claim 1 in the light of the closest prior art, which, the parties agree, is represented by E3.

3.3 It is not disputed that E3 discloses (cf. figure 2):
an induction cooking apparatus, comprising:
a power inverter circuit 12 drawing essentially a unity power factor current from mains (the same assumptions as in the patent description section [0024] may be

made), having an induction heating coil 40 that generates a high frequency magnetic field inducing a removable or non-removable magnetic cookware 16, a resonant capacitor 42 parallel to said heating coil, an IGBT 44 as a switching element (cf. column 12, lines 21 and 22), and a power diode 46 placed in an anti-parallel manner to said IGBT;
a microprocessor 54 taking the desired temperature of the cookware or desired power level of the cooking apparatus from a control panel 70 (cf. column 12, lines 62 to 64), controlling the temperature of said cookware 16 by interrupting the operation of the system when the temperature of said cookware reaches a desired value or by re-starting the system after waiting for a preset duration once it has been interrupted (cf. column 14, lines 12 to 24), and interrupting the operation of the power stage 12 for a preset duration when a warning signal 56, 66 from a pan detection circuit 82 or a protection circuits block 78 is received (cf. column 9, line 65 to column 10, line 9; column 13, lines 23 to 29); and
a pan detection circuit 82 detecting if a suitable cookware 16 is placed on the cooktop by observing DC link voltage (cf. column 15, line 48 to column 16, line 8).

The subject-matter of claim 1 differs from E3 in that:
- the microprocessor provides for "*controlling the power transferred to said cookware (20) by adjusting the turn-on duration of gating pulses (520, 540)*" (feature 5);
- the microprocessor provides for "*adjusting the turn-off durations of gate pulses by observing zero-cross instants of current flowing through heating coil via zero-cross detector means (22)*" (feature 7),

- the pan detection circuit comprises "*a 50 Hz zero-cross detector (23) means for detecting zero crosses of AC input voltage (V_{ac}) signal*" (feature 10), and by
  a block of analog protection circuits (15)
- for "*protecting the power stage (10) against overcurrents by observing the current flowing through heating coil (19)*" (feature 11), and
- for protecting the power stage "*against inappropriate gating signals by observing the collector voltage of IGBT (510) and gating signals (540) at the same time*" (feature 12).

The subject-matter of claim 1 is therefore novel (Article 54 EPC).

4. *Admissibility of document E7:*

Feature 7 aims at reducing the power losses of the inverter switching element when switching on (cf. patent publication, section [0044]).
E7 addresses the same problem (cf. English translation of E7, page 7, lines 2 to 6) and discloses a circuit functioning according to feature 7, namely "adjusting the turn-off durations of gate pulses by observing zero-cross instants of current flowing through heating coil via zero-cross detector means" (cf. E7, page 4, paragraph 3 and page 6, paragraph 6, of the English translation and figures 1 to 4). Hence document E7, which proposes a solution according to feature 7 to one of the problems addressed by the patent in suit, is considered as prima facie relevant.
E7 was filed together with the grounds of appeal. The patent proprietor was therefore not taken by surprise and had sufficient time to study the content of the document and prepare for the oral proceedings. Document E7 was therefore admitted into the procedure.

5. *Inventive step (Article 56 EPC)*
The combination of documents E3 and E7 does not make the subject-matter of claim 1 obvious (Article 56 EPC).

5.1 Microprocessor 54 of E3 adjusts the number of powerline half cycles corresponding to a desired cooking temperature (cf. column 3, lines 50 to 59). The microprocessor 54 of E3 does not send gating pulses to the inverter transistor 44 except that it generates "start" and "soft-start" signals to start the power inverter circuit 12, in particular when "determining during an initial portion of each powerline half cycle whether acceptable cookware is positioned near the work coil" (cf. column 6, lines 20 to 22 and column 13, line 60 to column 14, line 41). Microprocessor 54 does not generate the gating pulses during each half cycle of the power source. This task is delegated to analog portion 14B and in particular to phase detector 80 that supplies triggering pulses to gate generator 86 (cf. column 10, lines 58 to 62 and column 13, lines 29 to 32, column 15, lines 18 to 46, column 21, lines 51 to column 22, line 3 and column 19, lines 30 to 40).

5.2 In E3, the turn-on duration depends on a preset value (bias voltage at inverting input of op-amp 126), which may be adjusted with a value issued from a current measurement (cf. E3, column 20, lines 20 to 62 and figure 7). In the same way the turn-on duration of the gating pulses of E7 is adjusted by comparing a preset current value adjusted with element 47' as shown in figure 2, with the actual current value measured by the current sensing device 44 (cf. translation of E7, page 3, last paragraph). The preset current value of E7 may be adjusted by a user (cf. translation of E7, page 4, lines 1 to 3). Hence, a person skilled in the art could

think of adjusting the power delivered by the cooking apparatus of E3 in dependence on the turn-on duration of the gating pulses as taught in E7, in order to gain flexibility in adjusting the required power. Actually, in order to render the turn-on duration adjustable by a user, it might be possible to modify the voltage divider 140, 142 of figure 7 of E3 to include a potentiometer like the element 47' of E7 (cf. figure 2). The cooking apparatus of E3 would thereby adjust the turn-on duration of gating pulses (feature 5). However, in this way, the number of functionalities provided by the microprocessor would be reduced.

5.3 Feature 7 is not disclosed by E3. Neither the microprocessor 54 of E3 nor the analog circuit of E3 do adjust the turn-off durations of gate pulses by observing zero-cross instants of current flowing through heating coil via zero-cross detector means. The turn-off durations of inverter transistor 44 of E3 are regulated by the part of the analog circuit 14B built around phase detector 80 and op amp 126 (cf. E3, figure 7).

A person skilled in the art aiming at reducing the power losses of the inverter transistor 44 of E3 could think of applying the teaching of E7 to the cooking apparatus according to E3. He would thus determine the turn-on time point and thereby the turn-off duration of the gating pulses by observing the zero-cross instants of the current flowing through the heating coil (cf. translation of E7, page 6, paragraph 6, of the English translation and figures 1 to 4). However it does not appear to be immediate to modify the circuit of E3 in order to apply the teaching of E7 and reduce the power losses.

5.4 Furthermore, the circuit of E7 does not include any programmable component and thus cannot be considered as comprising a microprocessor, so that the combination of the teachings of documents E3 and E7 would not result in a microprocessor providing more functionalities. It would not lead, indeed, to an induction apparatus wherein the microprocessor would control the amount of power transmitted to the cooking ware by adjusting the duration of the gating pulses.

5.5 None of the other documents cited along the procedure suggests adjusting the gating pulse durations and thereby controlling the required level of power directly by a microprocessor.

A microprocessor controlling the amount of power transmitted to the cookware by adjusting the turn-on and turn-off durations of the gating pulses makes it possible to simplify the hardware of the analog circuit attached to the microprocessor. The reliability of the cooking apparatus may be thereby increased and the quality control as well as the maintenance costs reduced.
Furthermore, the claimed invention circumvents the risk mentioned in E3 (cf. column 2, lines 46 to 59) of damaging the power inverter circuit stage by erroneous microprocessor commands by means of feature 12: a block of analog protection circuits (15) protecting the power stage (10) "*against inappropriate gating signals by observing the collector voltage of IGBT (510) and gating signals (540) at the same time*".

Finally the microprocessor of the invention is not overloaded because it determines the turn-off duration of the gating pulses only once every half cycle of the power supply (cf. patent section [0045]).

5.6 Thus, the invention defined by the subject-matter of claim 1 is not obvious having regard to the combination of documents E3 and E7 and considered as involving an inventive step in the sense of Article 56 EPC.

6. The appellant did not bring forward any further argument against the inventive step involved by features 5 and 7 of claim 1. It is therefore not necessary to discuss features 10 to 12.

7. The subject-matter of claims 2 to 7, which are dependent on claim 1, is thereby also to be considered as being new and involving an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

U. Bultmann M. Ruggiu

Decision electronically authenticated