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**Datasheet for the decision
of 19 November 2024**

Case Number: T 1364/21 - 3.4.02

Application Number: 13784269.6

Publication Number: 2845290

IPC: H02J7/02, A61N1/378, G05B13/02,
H02J5/00, H04B5/00

Language of the proceedings: EN

Title of invention:

System and method for triggering power transfer across an inductive power coupling and non resonant transmission

Patent Proprietor:

Powermat Technologies Ltd.

Opponent:

IKEA Supply AG

Relevant legal provisions:

EPC Art. 100(c), 56

Keyword:

Grounds for opposition - extension of subject-matter (yes)
Inventive step - auxiliary request 1 (yes)



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Case Number: T 1364/21 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 19 November 2024

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 8 June 2021
revoking European patent No. 2845290 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman G. Flyng
Members: C.D. Vassoille
G. Decker

Summary of Facts and Submissions

- I. The patent proprietor filed an appeal against the decision of the opposition division revoking European patent no. 2 845 290.
- II. The following documents are relevant to the present decision:
- E2: WO 2005/109598 A1
E5: US 2008/0157603 A1
- III. In the decision under appeal, the opposition division concluded *inter alia* that:
- the maintenance of the patent was prejudiced by the ground for opposition under Article 100(c) EPC, as claim 1 of the main request (patent as granted) included subject-matter which extended beyond the content of the application as filed;
 - the subject-matter of claim 1 of auxiliary request 1 did not involve an inventive step within the meaning of Article 56 EPC in view of the combination of documents E2 and E5.
- IV. In a communication under Article 15(1) RPBA annexed to the summons to oral proceedings, the board set out its preliminary observations, according to which the ground for opposition under Article 100(c) EPC prejudiced the maintenance of the patent as granted and the subject-matter of claim 1 of auxiliary request 1 did involve an inventive step with regard to a combination of documents E2 and E5.

V. Oral proceedings before the board took place on 19 November 2024.

The appellant (patent proprietor) requested that the decision under appeal be set aside and:

- the patent be maintained as granted (main request);
- as an auxiliary measure, the patent be maintained in amended form on the basis of the claims according to one of the auxiliary requests 1, 1A to 1F and 2 to 12 underlying the decision under appeal in that order.

The respondent (opponent) requested that the appeal be dismissed.

VI. Claim 1 of the main request reads as follows (feature numbering in square brackets added by the board):

"**[1.1]** A method for controlling power transmission in inductively coupled power transmission system comprising:

[1.2] a. waiting a time duration;

[1.3] b. electrically exciting a primary coil (220) in a power transmitter (210);

[1.4] c. receiving at least one signal indicative of resonance properties of said primary coil (220);

[1.5] d. determining if a secondary coil (260) in a power receiver (290) is inductively coupled to said primary coil (220) by determining a change in effective inductance of said primary coil; and

[1.6] e. repeating steps a-d if said secondary coil (260) is not inductively coupled to said primary coil

[1.7] characterized in that said determining if a secondary coil (260) in a power receiver (290) is

inductively coupled to said primary coil (220) further includes:

[1.8] determining a change in effective resistance of said primary coil (220); and

[1.9] determining a match between values indicative of effective inductance of said primary coil (220) and values indicative of effective resistance of said primary coil (220) to at least one set of values associated with a primary coil (220) coupled to a secondary coil (260)."

VII. Compared to claim 1 of the main request, claim 1 of auxiliary request 1 includes the following additional feature (feature numbering in square bracket added by the board):

"**[1.10]**; further comprising triggering power transmission from said primary coil to said secondary coil if said secondary coil is inductively coupled to said primary coil".

Claims 2 to 11 of auxiliary request 1 are dependent on claim 1.

VIII. The independent apparatus claim 12 of auxiliary request 1 has the following wording:

"A triggerable power transmitter (210) for power transmission from a primary coil (220) in the power transmitter (210) to an inductively coupled secondary coil (260) in a power receiver (290) comprising: said primary coil (220), capable of being inductively coupled to said secondary coil (260) in said power receiver (290); a driver (230), capable of electrically driving said primary coil (220);

a front end (170), capable of receiving an analog signal indicative of resonance properties of said primary coil (220) and capable of generating digital information in response to said analog signal; and a processor (150), receiving said digital information and capable of:

determining if said primary coil (220) is coupled to a secondary coil (260) based on said digital information, and

controlling said driver (230) to transmit power from said primary coil (220) to said secondary coil (260) when said primary coil (220) is inductively coupled to said secondary coil (260);

characterized in that

said processor (150) is configured to establish, when a change is detected in the resonance properties of the primary coil (220), whether said resonance properties match a valid receiver (290) by a matching between values indicative of effective inductance of said primary coil (220) and values indicative of effective resistance of said primary coil (220) to at least one set of values associated with a primary coil (220) coupled to a secondary coil (260), in which case power transmission is started."

Claim 13 of auxiliary request 1 is dependent on claim 12.

IX. The parties' arguments were in essence as follows:

The appellant argued that the amendments to claim 1 of the main request did not constitute an unallowable intermediate generalisation.

The respondent argued that the subject-matter of claim 1 of auxiliary request 1 did not involve an

inventive step in view of a combination of documents E2 and E5.

The detailed arguments of the parties will be discussed in the reasons for the decision below.

Reasons for the Decision

1. Main request - Amendments (Article 100(c) EPC)

1.1 The ground for opposition under Article 100(c) EPC prejudices the maintenance of the patent as granted.

1.2 In the course of the examination proceedings, the original claim 1 (reference is made to the international publication no. WO 2013/164831 A1) was amended, *inter alia*, as follows:

~~"A method of triggering power transmission for controlling power transmission in inductively coupled power transmission system comprising:
[...]~~

~~e. triggering power transmission from said primary coil to said secondary coil if said secondary coil is inductively coupled to said primary coil, or repeating steps a-d if said secondary coil (260) is not inductively coupled to said primary coil
[...]" (emphasis added by the board).~~

1.3 As a result, claim 1 of the patent as granted no longer contains a reference to "triggering power transmission".

1.4 The respondent argued that the deletion of the reference to "triggering power transmission" in claim 1 of the granted patent constituted an inadmissible

amendment within the meaning of Article 100(c) EPC, and the board agrees.

- 1.5 In particular, the board concluded that the original application as a whole did not disclose a method for controlling power transmission that did not involve triggering of the power transmission from the primary coil to the secondary coil if the secondary coil was (determined to be) inductively coupled to the primary coil.
- 1.6 The appellant argued that the original application described ways of determining an inductively coupled coil which were not explicitly described in the context of triggering the power transfer. The board does not find the appellant's arguments persuasive. In the board's view, a person skilled in the art would have considered the feature "triggering power transmission..." to be inextricably functionally related to the alternative originally disclosed in connection therewith, viz. "or repeating steps a-d if said secondary coil is not inductively coupled to said primary coil".
- 1.7 The method of claim 1 as granted, on the other hand, does not include any definition of what happens after determining that the secondary coil is in fact inductively coupled to the primary coil. Consequently, claim 1 as granted allows for alternative approaches and thus comprises technical subject-matter which the skilled person cannot directly and unambiguously derive from the original application documents as a whole.
- 1.8 It may be true that the original application described ways of determining an inductively coupled coil which were not explicitly described in the context of

triggering the power transfer, as argued by the appellant. However, the skilled person would have understood that the specific way in which an inductively coupled state of a secondary coil is determined was independent of the question of what would happen in the method after a secondary coil had been detected as inductively coupled (by whatever means). As far as the latter is concerned, only a triggering of power transmission was originally disclosed. The omission of this feature therefore constitutes an unallowable generalisation.

1.9 In the light of the above considerations, the board concluded that the ground for opposition under Article 100(c) EPC prejudices the maintenance of the patent as granted.

2. Auxiliary request 1 - Amendments (Article 123(2) EPC)

2.1 Claim 1 of auxiliary request 1 comprises the additional feature 1.10 of the granted claim 2.

2.2 In the light of this amendment, the respondent did not raise any objection under Article 123(2) EPC against auxiliary request 1 and the board also concluded that the amendment overcomes the objection under Article 100(c) EPC against the main request.

3. Auxiliary request 1 - Inventive step (Article 56 EPC)

3.1 The subject-matter of claim 1 of auxiliary request 1 involves an inventive step with regard to a combination of documents E2 and E5.

Distinguishing features

- 3.2 In the contested decision, the opposition division concluded that feature 1.9 was the only distinguishing feature of the subject-matter of claim 1 with respect to document E2. The board, however, agrees with the appellant that document E2 additionally does not disclose at least feature 1.8, according to which a change in the effective resistance of the primary coil is determined.
- 3.3 The respondent essentially argued that feature 1.8 was disclosed in document E2 and referred in this respect to page 26, lines 1 to 3 and page 23, lines 1 to 10 of that document. They further argued that the energy decay rate determined in document E2 could be considered an indirect measure of the effective resistance of the primary coil, pointing to the disclosure on page 26, lines 26 and 27 which equated the rate of decay of energy to "the loss".
- 3.4 According to the teaching of document E2, the decay measurement unit 18 measures the energy decay in the resonant tank by measuring the current flowing through the primary coil 12. The measurement is made during a ring-down condition, which is defined in E2 as an undriven resonating condition, where electrical drive signals to the primary coil are suspended (see page 19, lines 1 to 4). Furthermore, during the ring-down condition, the secondary device is arranged not to take any load so that the decay measurement will only include losses in the primary unit and losses due to parasitic loads (see E2 on page 25, line 25 to 26, line 3). As further disclosed in document E2, the rate of decay of energy (and thus the loss) from the resonant tank can be calculated by measuring E_1 at time

T_1 and E_2 at another time T_2 (see page 26, lines 26 and 27). The energy stored in the resonant tank of the primary unit at any given moment is calculated on the basis of the inductance and the peak current, wherein the inductance can be deduced by observing the natural resonant frequency during ring down (see page 26, lines 17 to 22).

- 3.5 The essential idea of document E2 is therefore to consider an energy decay, which is indeed associated with losses in the primary unit. However, document E2 does not indicate at any point that a change in the effective resistance is actually determined, as is required by feature 1.8. At most, the inductance is determined and, based on this, the energy E stored in the resonant circuit at different points in time T .

Furthermore, the board considers that the mere fact that document E2 takes into account losses that are reflected in the measured energy decay rate cannot be interpreted as determining a "change in effective resistance", as explicitly required by feature 1.8.

Finally, the board notes that even if an effective resistance could theoretically be derived from the energy decay rate or from calibrated and stored losses in the primary unit, this does not meet the requirements of a direct and unambiguous disclosure for feature 1.8, according to which a "change in the effective resistance" of the primary coil is actually (actively) determined. Rather, further analyses would have been necessary to determine the effective resistance and, in particular, a change in the effective resistance based on the values measured in document E2.

3.6 As regards feature 1.9, it is not in dispute that determining a match between values indicative of effective inductance of the primary coil and values indicative of effective resistance of the primary coil to at least one set of values associated with a primary coil coupled to a secondary coil is not disclosed in document E2.

3.7 In the light of the above considerations, the board concluded that the subject-matter of claim 1 at least differs from document E2 by the features 1.8 and 1.9. Similar distinguishing features are present in the independent claim 12.

Objective technical problem

3.8 The parties agreed that, on the basis of document E2 and in the light of the distinguishing feature 1.9, the objective technical problem could be considered to be how to provide a system that is capable of adapting to different types of power receivers.

Obviousness

3.9 The respondent's main arguments were that the distinguishing feature 1.9 was rendered obvious by document E5 and that it also disclosed the determination of a change in the effective resistance of the primary coil according to feature 1.8 by measuring the reflected impedance in the primary coil.

3.10 Given the board's conclusion that the determination of a change in the effective resistance according to feature 1.8 is not disclosed in document E2 (see the board's findings under point 3.5 above), it is not necessary for the board to discuss here the

respondent's further argument according to which the person skilled in the art would only have had to take from document E5 the idea of providing a look-up table and incorporate that idea into the method of document E2 in order to arrive at the subject-matter of claim 1 of auxiliary request 1. Rather, the essential question is whether the skilled person would immediately and unambiguously identify the distinguishing feature 1.8 from document D5.

- 3.11 Document E5, identifying the presence of a secondary coil by sensing reflected impedance and obtaining corresponding operating parameters from a look-up table (see e.g. paragraphs [0007], [0011], [0028], [0037] and [0038]), indeed appears to solve the objective technical problem.
- 3.12 However, the board found that the solution of document E5 does not correspond to what is defined in features 1.8 and 1.9 of claim 1 of auxiliary request 1. In particular, document E5 does not disclose the determination of a change in effective resistance of the primary coil and determining a match not only between the values indicative of effective inductance and at least one set of values associated with a primary coil coupled to a secondary coil, but also between values indicative of effective resistance of the primary coil and the at least one set of values.
- 3.13 According to the teaching of document E5, a short pulse of power is applied to the secondary coil at an identification frequency, thereafter a period of time is waited and the current in the primary coil is sensed to determine if a remote device is present that has a resonant frequency at the frequency of the short pulse of power. If so, the remote device is identified and

the operating parameters can be taken from a lookup table or other memory device. If not, the adaptive inductive power supply (hereinafter: "AIPS") can move to the next identification frequency and repeat the process (see E5 in paragraph [0011]). Hence, in document E5 various frequencies are cycled through until the correct remote device is found (see e.g. paragraph [0037]). As further disclosed in paragraph [0024] of document E5, the AIPS 12 applies power to the primary coil 18 at an identification frequency and then evaluates the reflected impedance of the remote device 14 using the current sensor 16. If the remote device 14 has a resonant frequency at the identification frequency, then the AIPS 12 knows what type of remote device is inductively coupled to AIPS 12 and the AIPS 12 can recover operating parameters from a look-up table or other memory device.

3.14 The board agrees with the appellant that the determination of the reflected impedance in document E5 cannot be equated with the determination of the change in resistance as defined in feature 1.8. As they further argued, the method of document E5 only determines an absolute impedance using a sensor output, in particular by using a current sensor described in paragraph [0038] of document E5.

3.15 Whilst the respondent was correct to argue in this context that an impedance includes resistance as one component and reactance as another component, it cannot be said that the resistance component is a direct measure resulting from the measured impedance. Rather, to determine resistance, and in particular to determine a change in the resistance of the primary coil, additional analysis would be required which is not disclosed in document E5.

- 3.16 In conclusion, neither document E2 nor document E5 directly and unambiguously discloses the determination of a change in the effective resistance of the primary coil as defined in feature 1.8 of claim 1 of auxiliary request 1. It follows that feature 1.9 is also not directly and unambiguously derivable from either document E2 or document E5.
- 3.17 The person skilled in the art considering the teaching of document E5 as a solution to the objective technical problem would therefore still not arrive at the subject-matter of claim 1 of auxiliary request 1.
- 3.18 In the light of the above considerations, the board concluded that the subject-matter of claim 1 of auxiliary request 1 is not rendered obvious by a combination of documents E2 and E5 and therefore involves an inventive step within the meaning of Article 56 EPC. The same applies to the independent apparatus claim 12, which comprises features similar to features 1.8 and 1.9 of claim 1.

4. Result

In the absence of any other objection, in particular under Article 56 EPC, against auxiliary request 1, the board had to accede to the appellant's auxiliary request 1.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent as amended with the following claims and a description to be adapted thereto:

Claims 1 to 13 of auxiliary request 1 filed with the letter of 23 October 2019.

The Registrar:

The Chairman:



D. Meyfarth

G. Flyng

Decision electronically authenticated