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File No.: T 0081/92 - 3.5.2
Application No.: 81 302 149.0
Publication No.: 0 040 933
Classification: H01H 33/66
Title of invention: Vacuum-housed circuit interrupter

D E C I S I O N
of 5 July 1993

Applicant: -
Proprietor of the patent: Kabushiki Kaisha Meidensha
Opponent: Siemens Aktiengesellschaft, Berlin und München

Headword: -

EPC: Art. 56, 99, 104(1), 107; R. 55

Keyword: "Appellant adversely affected by decision under appeal (yes)" -
"Inventive step (yes)" - "Could or would" - "Apportionment of
costs ordered by Opposition Division set aside"

Headnote
Catchwords



Case Number: T 0081/92 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 5 July 1993

Appellant: Siemens Aktiengesellschaft,
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Representative: -

Respondent: Kabushiki Kaisha Meidensha
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office dated 2 January 1992
concerning maintenance of European patent
No. 0 040 933 in amended form.

Composition of the Board:

Chairman: R.E. Persson
Members: W.J.L. Wheeler
M.R.J. Villemin

Summary of Facts and Submissions

- I. The Appellant contests the interlocutory decision of the Opposition Division that account being taken of the amendments made during the opposition proceedings, European Patent No. 0 040 933 and the invention to which it related met the requirements of the EPC. The Appellant also contests the order charging to the Appellant the costs incurred by the Respondent in attending the oral proceedings held before the Opposition Division.
- II. The Respondent challenged the admissibility of the appeal, arguing that the Appellant had declined to make a formal request at the end of the oral proceedings before the Opposition Division and had left it to the Opposition Division to reach its conclusion. The Appellant was therefore not adversely affected by the decision and consequently had no right to appeal against the findings of the Opposition Division.
- III. The Appellant replied to this that having opposed the patent in its entirety with the intention of having it revoked, the Appellant was adversely affected by the Opposition Division's interlocutory decision. The fact that the Appellant had not made a formal request for revocation during the oral proceedings before the Opposition Division did not mean the opposition had been withdrawn.
- IV. In a communication of the Board of Appeal accompanying the summons to oral proceedings, it was stated inter alia that the appeal was admissible.

V. Claim 1 reads as follows:

"1. A vacuum interrupter including:

(a) a ceramic insulation disk (2) having a hole (6) at the center thereof;

(b) a metal casing (1, 16) joined hermetically by brazing to the ceramic insulation disk (2);

(c) a fixed contact (4);

(d) a bellows (11) disposed concentrically with said casing (1) and joined hermetically to said ceramic insulation disk (2);

(e) a movable electrode rod (12) loosely inserted into the central hole of said ceramic insulation disk (2) and joined hermetically to the bellows (11); and

(f) a movable contact (5) fixed to said movable electrode rod (12), and wherein:

said metal casing (1, 16) is bell-shaped and provided with an inwardly-projecting fixed contact mounting means (8, 17) to which said fixed contact (4) is joined,

said metal casing (1, 16) is either:

(i) formed of copper with the copper casing (1) being joined by brazing directly to the insulation disk (2),
or

(ii) formed of stainless steel or non-magnetic metal of higher mechanical strength than copper with a ring-shaped copper stress-reducing member (18) being joined hermetically by brazing between the end surface of the opening of the casing (16) and the insulation disk (2),

the radial thickness of the wall of the open end portion is equal to or greater than the radial thickness of the portion of said metal casing (1, 16) other than the open end portion,

the melting point of the open end portion is higher than the temperature, lying between 500° and 1050°C, of the melting point of the brazing metal, and the open end portion of the copper casing (1) or the copper member (18) has deformed plastically through gradual cooling after brazing."

VI. The following documents cited in the proceedings before the Opposition Division were referred to by the Appellant during the appeal proceedings:

- E1: EP-A-0 029 691
- E2: DE-B-1 020 081 (& GB-A-833 386)
- E9: H. Widmann: "Keramik-Metall-Verbindungen" in Glas-Email-Keramo-Technik, June 1963, pages 205 to 210
- E10: DD-Z-101 056
- E15: GB-A-1 148 978
- E17: US-A-3 996 437
- E18: US-A-3 674 958.

The Appellant filed the following documents during the appeal proceedings:

- Translation into English of JP-A-53-135 467
- E19: C.H. Flurscheim: "Power circuit breaker theory and design", 1975, pages 321 to 331.

VII. Oral proceedings, which were attended only by the Appellant, were held on 27 April 1993.

VIII. The Appellant argued that the subject-matter of Claim 1 did not involve an inventive step. The essential points can be summarised as follows:

E15 was the closest prior art and disclosed, inter alia, a vacuum interrupter comprising the features (a) to (f) of Claim 1 wherein the metal casing was bell-shaped and was provided with an inwardly projecting fixed contact mounting means to which the fixed contact was joined. At the top of the right hand column of page 3 of E15, there was a reference to direct brazing of the metal casing, when formed of titanium, to the ceramic insulation disk. A vacuum interrupter whose casing comprised a hollow metal cylinder closed at each end by a an insulation disk was already known from D10. Vacuum interrupters with bell-shaped metal casings were known from E1 (Figure 1 of which related to the prior art according to JP-A-53-135 467) and E2. It was known from E9 that its ductility made copper a suitable alternative to titanium for use in directly brazed metal-ceramic joints for electron tubes. E19 (which had been introduced in response to doubts raised by the Board) explained that assembly methods used in the vacuum tube industry were also generally applied to vacuum interrupters. Furthermore, copper had already been used for the casing of a vacuum interrupter (E18) and direct copper to ceramic joints had already been used in the casing of a vacuum interrupter (E17). The skilled person, starting from E15 and wishing to replace titanium by a cheaper material able to be hermetically sealed to the ceramic disk, was in a position to make a bell-shaped copper casing of uniform wall thickness and braze it directly to a ceramic disk thereby arriving at a vacuum interrupter covered by Claim 1 of the patent in suit, it being noted that the last three features of Claim 1 were trivial and did not involve any inventive activity. The alternative embodiment according to Claim 1 in which the casing was formed of stainless steel or non-magnetic metal of higher

mechanical strength than copper with a ring-shaped stress-reducing member whose thickness was greater than that of the casing was obvious having regard to E2.

Though the object of the present opposition and appeal proceedings was the revocation of the patent, it was not considered necessary to formulate the main request in such terms. It was left to the Board's discretion to revoke the patent or send the case back to the Opposition Division, once it had found that the patent did not meet the requirements of the EPC.

In charging the costs incurred by the Patentee to the Opponent, the Opposition Division had underestimated the relevance of E15 and had not taken into account the fact that it had been filed as soon as it was found. It had not been easy to find: the EPO's own search had not found it. The other documents had been filed in the course of the opposition proceedings to demonstrate the skilled person's general knowledge. They had not been submitted to delay the procedure or to increase the Patentee's costs.

- IX. The Appellant requested that the decision under appeal, including the order for the apportionment of costs, be set aside and that the Board declare that the patent does not comply with the requirements of the EPC (main request), or that the patent be revoked (auxiliary request).
- X. The Respondent requested that the decision under appeal be upheld and relied on the written submissions already made before the Opposition Division.
- XI. The Board reserved its decision.

Reasons for the Decision

1. Admissibility

Although the Appellant did not make any particular request for revocation at the oral proceedings before the Opposition Division, there is no support for the idea that the opposition was actually withdrawn. According to Article 99 and Rule 55 EPC an opponent is required, inter alia, to file a notice of opposition containing a statement of the extent to which the European patent is opposed. The Opponent did this. However, no provision of the EPC requires that the opposing party should make any explicit request. If, as in this case, an opposition is directed against the granted patent in its entirety, any decision of the Opposition Division short of revocation adversely affects the Opponent. In the present case, the patent was not revoked and the Appellant is therefore a party to the opposition proceedings adversely affected by the decision of the Opposition Division and has the right to appeal according to Article 107 EPC. Thus, the appeal is admissible.

2. Inventive step

The main question to be considered is whether the subject-matter of Claim 1 involves an inventive step within the meaning of Article 56 EPC.

- 2.1 The Board agrees with the Appellant that the prior art closest to the subject-matter of Claim 1 of the patent in suit is disclosed in E15 (GB-A-1 148 978). A vacuum interrupter comprising fixed and movable contacts and a bellows arranged as described with reference to Figures 1 and 2 of E15 and an envelope constructed in accordance with one of several alternative constructions briefly

with one of several alternative constructions briefly mentioned on page 2, lines 42 to 57, constitutes the closest prior art and has the following features:

an envelope comprising a metallic member (which must be generally cup-shaped) joined hermetically to an end-wall member in the form of a disk, a portion of which is of high-voltage insulator material; a hole at the centre of the disk; a bellows disposed concentrically with said envelope and joined hermetically to said disk; a movable electrode rod loosely inserted into the central hole of said disk and joined hermetically to the bellows; a movable contact fixed to said movable electrode rod; and a fixed contact joined to a fixed contact mounting means projecting inwardly from the metallic member.

2.2 Furthermore, it may be assumed that the metallic member is "bell-shaped" within the meaning to be given to this term in the context of the patent in suit, it being noted that the metal casing shown in the drawings comprises a disk-shaped closed end and a cylindrical portion, the transition between the cylindrical portion and the disk portion being rounded, so that the term "bell-shaped" must be construed broadly enough to cover such a cup-shaped form.

2.3 As pointed out by the Appellant, E15 mentions a direct metal to ceramic seal between titanium and a forsterite ceramic. However, the Board notes that this is described specifically in connection with the vacuum interrupter shown in Figure 1 of E15, where the envelope comprises a hollow ceramic cylinder with metallic end-wall disks. As far as the construction constituting the closest prior art is concerned (summarised in paragraph 2.1 above),

there is no disclosure of which metal or insulator to use, or any details of how to seal the metal casing to the insulation disk.

- 2.4 Thus, the person skilled in the art, starting from E15 and wishing to implement the vacuum interrupter with an envelope comprising a cup-shaped metallic member and an insulation disk would face the problem of selecting a suitable metal and a suitable insulator material. In the opinion of the Board, in view of the reference in E15 to titanium and forsterite ceramic, it would be obvious to try titanium for the cup-shaped metallic member and a forsterite ceramic as the insulator material and to seal them directly to each other by any known process, such as brazing. Furthermore, the Board agrees with the Appellant that in view of the high cost of titanium, it would be obvious to look for a cheaper material.
- 2.5 The Appellant referred to E1, E2, E10 and JP-A-53-135 467 to show that vacuum interrupters were known in which the envelope comprised a metallic cylindrical or cup-shaped member whose open end(s) is/are sealed directly to an insulator disk. None of these documents discloses such a metallic member being made of copper. E1 belongs to the state of the art by virtue of Article 54(3) EPC and cannot be considered in deciding whether there has been an inventive step.
- 2.6 The Appellant referred to E17 and E18 to show that it was known to use copper for part of the envelope of a vacuum interrupter. E17 discloses a vacuum interrupter in which the envelope comprises a hollow ceramic cylinder and two stainless steel disks. Copper rings having thinner walls than the cylinder are sealed (brazing not mentioned) to each end of the cylinder and brazed to the edges of the disks. E18 discloses a vacuum interrupter in which the

envelope comprises a hollow copper cylinder, sealed at one end to a ceramic disk via a Kovar ring having a thinner wall than the cylinder.

2.7 None of the documents cited by the Appellant during the appeal which concern vacuum interrupters discloses a bell-shaped part of the envelope formed of copper brazed directly to a ceramic disk (as defined in feature (i) of Claim 1 of the patent in suit) or formed of stainless steel or non-magnetic metal of higher mechanical strength than copper with a ring-shaped copper stress-reducing member brazed between it and a ceramic disk (as defined in feature (ii) of Claim 1 of the patent in suit).

2.8 E9 is a paper concerning metal to ceramic joints in general and its disclosure may be considered to represent part of the skilled person's general knowledge. According to E9 (page 209, left hand column, lines 9 to 23, and right hand column, lines 5 to 10) copper is particularly suitable for brazing to alumina ceramic, because copper's ductility reduces the forces arising during cooling, due to the different coefficients of thermal expansion. E9 also mentions that brazed metal to ceramic joints are used in electron tubes. Furthermore, according to E19 (which may also be considered to represent part of the skilled person's general knowledge) "metal ceramic seals - used in vacuum interruptors - are exactly as used in the power tube industry" and "usual assembly methods as used in the tube industry suffice for the components of the interrupter". Thus, it may be safely assumed that persons skilled in the art knew that metal to ceramic joints were used in the casings of vacuum interrupters and that copper could be brazed to alumina.

2.9 E9 was published in 1963. In other words, it had been known for at least seventeen years before the claimed priority of the patent in suit that is was possible to braze copper to alumina. Nevertheless the Appellant has not produced any evidence that a vacuum interrupter had been made in which a substantial part of the envelope was made of copper brazed directly to a ceramic part. In the opinion of the Board, this is a "could or would" type of situation: a person skilled in the art could have implemented the construction outlined in E15 summarised in paragraph 2.1 above taking copper for the cup-shaped metallic member and alumina as the material for the insulation disk, but it appears that no one actually did, despite the fact that there was a lot of activity in this field. In these circumstances, the Board hesitates to say it was obvious to do it.

2.10 In the result, the Board decides that the subject-matter of Claim 1 of the patent in suit involves an inventive step within the meaning of Article 56 EPC and the patent can be maintained with this claim.

3. Apportionment of costs

3.1 The Opposition Division decided as stated above that the costs incurred by the Patentee in attending the oral proceedings before the Opposition Division should be charged to the Opponent on the ground that the latter had frequently cited new documents, which had caused delay and expense to the Patentee, and had maintained his request for oral proceedings, even after the Opposition Division had clearly stated the opinion that the patent should be maintained with amended Claim 1.


- 3.2 Under Article 104(1) EPC, each party to the proceedings shall meet its own costs unless an Opposition Division, or a Board of Appeal, for reasons of equity, orders a different apportionment of costs incurred during taking of evidence or in oral proceedings.
- 3.3 The right to oral proceedings provided for under Article 116 EPC is a fundamental procedural right. A party may not be penalized for requesting oral proceedings before an Opposition Division, even if there is only a remote chance of reversing the Opposition Division's preliminary opinion.
- 3.4 As far as the filing of documents by the Appellant, including E15 as referred to above, after the expiry of the period for opposition laid down in Article 99(1) EPC is concerned, it appears that this was mainly in response to submissions made by the Patentee and observations made by the Opposition Division in the course of the proceedings and the circumstances are not such that it reasonably can be held that the Appellant acted in bad faith or otherwise unduly going beyond the proper arguing of its case.
- 3.5 In these circumstances, an apportionment of costs as ordered by the Opposition Division was not justified for reasons of equity. The decision has therefore to be set aside in this respect.

Order

For these reasons, it is decided that:

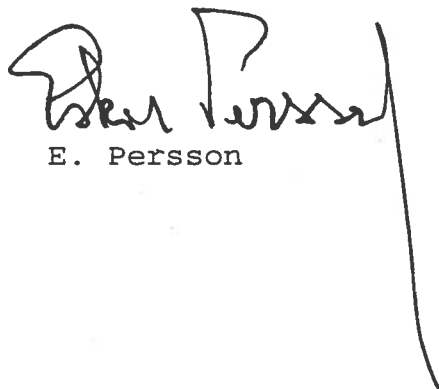
1. The decision of the Opposition Division that the patent as amended before the Opposition Division and the invention to which it relates meet the requirements of the European Patent Convention is confirmed.
2. The apportionment of costs as ordered by the Opposition Division is set aside.

The Registrar:



M. Riehl

The Chairman:



E. Persson

