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Application No.: 82 105 583.7

Publication No.: 0 070 413

Title of invention: A circuit breaker with arc restricting device

Classification: H01H9/38

**D E C I S I O N**  
of 14 November 1991

Proprietor of the patent: MITSUBISHI DENKI KABUSHIKI KAISHA

Opponent: Siemens Aktiengesellschaft, Berlin und München

Headword:

EPC Article 56

Keyword: "Inventive step, yes after amendment"

**Headnote**



Case Number : T 410/89

**D E C I S I O N**  
**of the Technical Board of Appeal 3.5.2**  
**of 14 November 1991**

**Appellant :**  
(Proprietor of the patent)

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**Respondent :**  
(Opponent)

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**Decision under appeal :**

**Decision of Opposition Division of the European  
Patent Office dated 27.04.89 revoking European  
patent No. 0 070 413 pursuant to Article 102(1)  
EPC.**

**Composition of the Board :**

**Chairman :** R.E. Persson  
**Members :** J.A. van Voorthuizen  
W.J.L. Wheeler

## Summary of Facts and Submissions

- I. The Appellant contests the decision of the Opposition Division revoking European patent No. 0 070 413 on the ground that Claim 1 did not involve an inventive step.
- II. The following prior art documents were considered in the proceedings before the Board of Appeal:

D1: DE-A-1 765 999

D3: US-A-3 402 273

D5: US-A-3 997 746

D6: DE-A-2 005 742

- III. During oral proceedings before the Board of Appeal, which were held on 14 November 1991, the Appellant filed a new set of Claims 1 to 6.

Claim 1 reads as follows:

"1. A circuit breaker with an arc restricting device having a stationary (2) and a movable (3) contactor each comprising a rigid conductor (201, 301) with a contact (202, 302) secured thereto wherein on a least one of said contactors (2) in proximity to said contact (202) there is disposed a second electrically conductive portion (203) to enable the foot of an arc drawn across the gap between said contacts (202, 302) to shift from said contact (202) to said second portion (203) and wherein at least one contactor (2, 3) is provided with an arc shield (6, 7) made of a material having a resistivity higher than that of said conductors (201, 301), said arc shield (6, 7) being disposed in such a way as to surround the periphery of said contact (202, 302) characterised in

- that the second conductive portion is a projection (203) disposed on the conductor (201),
- that said contacts (203, 302) and said projection (203) are located in a space provided in an arc extinguishing plate assembly (5) for cooling and extinguishing the arc,
- that the arc shield (6) is provided on the conductor (201) formed with the projection (203) and surrounds said projection (203) and
- that within the arc shield (6) there is formed a narrow slit (605) exposing a path on the contactor (2) leading from the contact (202) to the projection (203)."

Dependent Claims 2 - 4 and Claims 5 - 6 are respectively derived from Claims 2 - 4 and Claims 8 - 9 of the patent as granted.

IV. The Appellant's arguments can be summarized as follows:

D1 relates to a circuit breaker having a contactor 10 (fig. 1) provided with a contact 12, an arc shield 26 and a metal strip 22 placed on the latter. The electrical contact between the strip 22, which has the function of guiding the arc, and the contactor 10 is ensured only by the rivet 24. There is no suggestion in D1 that the metal strip could be substituted by a slit in the arc shield exposing the underlying conductive surface of the contactor. D6 also teaches to provide a conductive path for the foot of the arc from the main contact 22 to the arcing contact 12. This is obtained, however, by means (metal plates 9 and 10) which are not comparable with the features of the present invention. D3 and D5 disclose only arc shields surrounding their respective contacts.

The Respondent argued as follows:

From both D1 and D6 it is known to provide a conductive path to move the arc foot away from the main contacts. In D1 this is achieved by providing a metal strip 22 which is effectively equivalent to the slit of the present invention, as far as its guiding effect on the arc is concerned. The two plates 9 and 10 according to D6 also provide a path for the arc from the main contacts to the arcing contacts. They are effectively equivalent to the arc shield with a slit of the present invention in so far as they confine the movement of the arc foot within a given path. Therefore for the skilled person it would be obvious starting from either D1 or D6 to arrive at the solution proposed by the Appellant.

- V. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of Claims 1 to 6 as filed during the oral proceedings and a description to be amended accordingly, figures 12 to 16 having been dropped.

The Respondent requested that the appeal be dismissed.

#### Reasons for the Decision

1. The appeal is admissible.
2. Claims 1 to 6 filed during the oral proceedings comply with the requirements of Article 123 (2) and (3) EPC.
3. The relevant question to be decided by the Board is whether the subject-matter of new Claim 1 (see paragraph III) involves an inventive step.

- 3.1 The features of the preamble of Claim 1 are covered by D1, which represents the closest prior art.

The first feature of the characterising part of Claim 1 ("an arc extinguishing plate assembly (5) for cooling and extinguishing the arc") would appear obvious in combination with D1, since in this document it is stated that the arc is guided towards arc extinguishing means (see D1, page 2, lines 1 - 3) and it is common to implement such means as a plate assembly (see, e.g. D5, fig. 8).

- 3.2 Though it is known to protect the contactors with arc shields surrounding the respective contacts (see D3, figure 4 and D5, figure 11), the last feature of the characterising part of Claim 1 ("a narrow slit" formed in the arc shield) is not disclosed in any of the available prior art documents.

- 3.3 The Board agrees with the Respondent that the metal strip 22 according to D1 serves a similar purpose as the conductive path obtained by forming a slit in the arc shield according to the teaching of the present invention: both delimit the movement of the foot of the arc in a direction parallel to the contactor's longitudinal axis. According to the Respondent, it would be obvious for the skilled person to realise that in D1 the metal strip could be substituted by a slit in the insulating layer exposing part of the underlying conductive surface. This interpretation of the prior art, however, does not take into account what in fact appears to be the essential teaching of D1, namely that a current loop from the terminal 14 through the contactor 10 and the rivet 24 to the foot of the arc may be established by interposing an insulating layer 26 between the contactor 10 and the metal strip 22. As pointed out in D1 (page 5, lines 3 to 8) in

this arrangement the magnetic field associated with the current loop promotes the translation of the arc along the metal strip 22 (D1, page 5, lines 3 to 8). This effect is not present in the circuit breaker of the present invention. The Board cannot agree that it would have been obvious to the skilled person starting from D1 to disregard the particular teaching of this document and to modify the disclosed circuit breaker on his own initiative in such a way as to arrive at the present invention.

- 3.4 D6 relates to a circuit breaker having a conductive path linking the main contact 22 and the arcing contact 12. The conductive path, however, is formed by two metal plates 9 and 10 (fig. 1) which are joined at one end and support the arcing contact. Even if it is possible, with hindsight, to see a certain analogy between the conductive path according to the present invention and the two metal plates 9 and 10 disclosed in D6, as far as their function is concerned, there is no correspondence between the constructional features of the two circuit breakers which would point to the obviousness of the present invention.
- 3.5 The Board agrees with the Appellant that it would not have been obvious for the skilled person starting either from D1 or D6 to arrive at the circuit breaker of the present invention. Therefore the subject-matter of Claim 1 involves an inventive step within the meaning of Article 56 EPC. The same applies to the dependent Claims 2 to 6 which relate to particular embodiments of the subject-matter of Claim 1.
4. In the result, the Board is of the opinion that the patent may be maintained in amended form as requested by the Appellant. The amendments to the description which are required to bring it in accordance with the scope of the

present claims may entail consequential amendments to Figures 1 to 11 as appearing in the patent.

**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 in amended form on the basis of:

Claims 1 to 6 as filed during the oral proceedings;

A description to be amended accordingly, taking into account inter alia that Figures 12 to 16 have been dropped.

**The Registrar:**

**The Chairman:**

**M. Kiehl**

**E. Persson**