BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Publication in the Official Journal [redacted] / No

File Number: T 667/91 - 3.5.2

Application No.: 86 302 854.4

Publication No.: 202 767

Title of invention: Symmetrical fault current detector

Classification: H02H 3/08

# D E C I S I O N
of 28 February 1992

Applicant: The Electricity Council

Headword:

EPC Article 56, 113(1); Rule 67

Keyword: "inventive step - yes"
"opportunity to present comments - yes"
"substantial procedural violation - no"

## Headnote

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number** : T 667/91 - 3.5.2

# D E C I S I O N
## of the Technical Board of Appeal 3.5.2
## of 28 February 1992

**Appellant** : THE ELECTRICITY COUNCIL
30 Millbank
London SW1P 4RD (GB)

**Representative** : Cross, Rupert Edward Blount
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**Decision under appeal** : **Decision of Examining Division 2 207 064 of the European Patent Office dated 19 April 1991 refusing European patent application No. 86 302 854.4 pursuant to Article 97(1) EPC.**

**Composition of the Board** :

**Chairman** : E. Persson
**Members** : W.J.L. Wheeler
A. Hagenbucher

## Summary of Facts and Submissions

I. The appeal contests the decision of the Examining Division to refuse Appellant's European patent application No. 86 302 854.4 on the ground that the subject matter of Claim 1 did not involve an inventive step having regard to the knowledge of the person skilled in the art and the prior art document:

D3: US-A-2 316 289.

II. Claim 1 reads as follows:

"1. A fault current detector comprising current transformer means (2) to provide a signal representative of current flowing in an alternating current power line and means responsive to said signal to provide a fault current indication only if the alternating current flow represented by said signal exceeds a predetermined threshold in each polarity wherein said means responsive to said signal is independently responsive to the current flow in half-cycles of respective polarity of the supply waveform and provides a respective indication of the flow in each polarity exceeding a predetermined threshold characterised in that said means responsive to said signal comprises a full wave rectifier (3) rectifying the output signal of the current transformer means (2), a resistance (4) connected across the output terminals of the rectifier (3) and a respective threshold switch (7, 8) connected to each input terminal of the rectifier (3) and arranged to be triggered in response to the voltage between the respective input terminal and a common output terminal of the rectifier exceeding a predetermined threshold voltage."

III. The Appellant argued that document D3 did not disclose any of the features specified in the characterising part of Claim 1. A problem with the symmetrical fault current detector known from D3 was that it depended on current for its operation, the operating current for the switches (relays A, B) being derived from the current transformer. The DC component of the magnetising inrush current when energising a distribution transformer caused an initial operation of one of the relays A and B. However, the DC component of the current in the secondary winding quickly decayed so that the alternating wave form became more or less symmetrical again and could have sufficient energy in both polarities to energise both relays A and B. For the proper operation of the current detector according to D3 it was essential to provide a third relay C, which connected a resistance 61 across the secondary winding of the current transformer in response to initial energising of one of the relays A and B to desensitise the current detector to prevent operation of the second of relays A and B. All three relays were essential to the functioning of the circuit of the prior art which was an entirely current based circuit. The claimed invention was voltage based and made it possible to use a smaller and cheaper current transformer without loss of performance; it involved much more than simply making use of modern components to reproduce the prior art device.

IV. The Appellant requested (main request) that the decision of the Examining Division be set aside and a patent granted in the form refused by the Examining Division, i.e. on the basis of:

- Claims 1, 2 and 3 (first six lines) as filed with letter of 17 January 1991

- Claim 3 (last two lines) and Claims 4 to 6 as filed with letter of 6 September 1990;

- Description pages 1 and 2 as filed with letter of 17 January 1991, page 3 as filed with letter of 6 September 1990, and pages 4 to 6 as originally filed;

- Drawing (1 sheet) as originally filed.

The Appellant also submitted an auxiliary request (see paragraph 6 below).

The Appellant further submitted a request for reimbursement of the appeal fee, arguing there had been no opportunity to comment substantively on the ground of refusal, because it was based only on an assertion of lack of inventive step over the prior art document D3, unsupported by further documents.

Finally the Appellant submitted a conditional request for oral proceedings if the Board was considering refusing both the main and auxiliary requests, but made it clear that oral proceedings were not requested merely to debate the matter of reimbursement of the appeal fee.

**Reasons for the Decision**

1. The appeal is admissible.

2. The present application relates to a fault current detector which can discriminate symmetrical excess currents caused by a fault in the electrical power system from asymmetrical excess currents occurring when one or more distribution transformers are energised (magnetising inrush currents). Only in the case of symmetrical fault

currents does the current induced in the secondary winding of the current transformer 2 cause a voltage drop across the resistance 4 to exceed a predetermined threshold (set by respective threshold switches, e.g. trigger diodes 7 and 8) in both positive and negative half-cycles.

3. The document cited by the Examining Division as the closest prior art, document D3, discloses a fault current detector in accordance with the prior art part of Claim 1 (see paragraph II above) which can distinguish a symmetrical overcurrent from an asymmetrical one. In the prior art, two relays A and B act as threshold switches: when the current exceeds in both polarities the threshold value necessary to energise the windings 34 and 35 both switches 38 and 39 are closed and the circuit breaker in the power lines 12 and 13 is tripped.

4. Although the purpose of the relays A and B may be regarded as broadly equivalent to that of the threshold switches employed in the present invention in some respects, there are substantial differences in the way they operate: the former react to the current in the secondary winding of the current transformer (26 or 29) whereas the latter react to the voltage across the resistance 4 connected across the output terminals of a full wave rectifier 3. Furthermore, as the Appellant has correctly pointed out, the prior art requires means (such as a third relay C which connects a resistor 61 in parallel with the windings of the relays A and B) to reduce the sensitivity of the other one of the relays A and B as soon as one of them is energised. This is because, as explained on page 3 of D3, the asymmetrical component of the current in the secondary winding of the current transformer rapidly decays so that the current tends to become symmetrical and may be strong enough to operate the second relay (if its sensitivity were not reduced) and thus actuate the circuit breaker. In

the circuit according to the present invention no equivalent means are provided for reducing the sensitivity of the other threshold switch when only one of them is actuated. In the preferred embodiment, if only one threshold switch is actuated, the circuit is reset by discharging capacitors 13, 14, without reducing the sensitivity of the circuit.

5. Assuming it to be obvious to a person skilled in the art to seek to update the fault current detector known from D3 by replacing the relays with modern devices (trigger diodes 7, 8 in the preferred embodiment of the present invention), the Board is of the opinion that the skilled person could not have arrived at a current fault detector falling within the terms of Claim 1 of the present application without exercising inventive ingenuity. Indeed, this would entail a fundamental redesign of the whole circuit of D3. The only component of the D3 circuit which appears in the present invention is the current transformer (and that can be made smaller). The full wave rectifier and the resistance across its output terminals have no counterparts in the D3 circuit.

6. Since the subject-matter of Claim 1 cannot be derived in an obvious manner from the state of the art relied upon by the Examining Division, Claim 1, together with dependent Claims 2 to 6, can serve as a basis for the grant of a patent. The Board considers that the Appellant's main request can be granted. Therefore the auxiliary request need not be considered and oral proceedings need not be held.

7. As to the request for reimbursement of the appeal fee, the Board notes that the reasons for the refusal were clearly set out in a communication of the Examining Division dated

27 November 1990, to which the Appellant (then Applicant) replied in a letter dated 17 January 1991. The decision of the Examining Division followed on 19 April 1991. Thus the requirements of Article 113(1) EPC were clearly satisfied. The Board cannot see any procedural violation which would justify the reimbursement of the appeal fee according to Rule 67 EPC.

**Order**

**For these reasons, it is decided that:**

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division to grant a patent in accordance with the Appellant's main request (paragraph IV above).

3. The request for reimbursement of the appeal fee is refused.

The Registrar: The Chairman:

J. Rückert E. Persson