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D E C I S I O N
of 24 July 2000

Case Number: T 1000/98 - 3.5.2

Application Number: 90912490.1

Publication Number: 0440764

IPC: H02H 3/08

Language of the proceedings: EN

Title of invention:

Microcomputer based electronic trip system for circuit breakers

Applicant:

SQUARE D COMPANY

Opponent:

Siemens AG

Headword:

-

Relevant legal provisions:

EPC Art. 56, 114(2)

Keyword:

-

Decisions cited:

-

Catchword:

-



Case Number: T 1000/98 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 24 July 2000

Appellant: Siemens AG
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Representative: -

Respondent: SQUARE D COMPANY
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 31 July 1998
rejecting the opposition filed against European
patent No. 0 440 764 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: W. J. L. Wheeler
Members: F. Edlinger
J. H. P. Willems

Summary of Facts and Submissions

I. The opponent filed this appeal against the decision of the opposition division rejecting the opposition against European patent No. 440 764.

II. Claim 1 of the patent as granted is worded as follows:

"A tripping system for interrupting a three phase current path (106) having a ground path coincident therewith, comprising:

 interruption means (112) for interrupting the three phase current path (106);

 a set of current sensors (108, 110), each situated adjacent the current path (106) for sensing a respective phase of current therein and each providing a respective current signal therefrom;

 summation means (508), coupled to the set of current sensors (108), for adding the current signals from the set of current sensors (108) and for producing an output current signal therefrom in the presence of a ground fault;

 a set of gain circuits (134), each responsive to a respective one of the current signals and each having:

 a first gain section (532, 534) for amplifying the respective current signal by a first predetermined gain factor, and

 a second gain section (532, 536) for amplifying the respective current signal by a second predetermined gain factor; and

 a processor (120), responsive to the output current signal and the set of gain circuits (134), for analyzing the three phase current path (106) by selectively receiving the respective current signal from either the first gain section (532, 534) or the

second gain section (532, 536) at each gain circuit according to a predetermined resolution criteria, and for engaging the interruption means (112) to interrupt the current path; and

data memory means (144) coupled to said processor for storing data representative of tripping characteristics, wherein the processor (120) compares the respective current signal to the data and engages the interruption means (112) if the respective current signal exceeds a threshold data level."

Claim 2 as granted is dependent on claim 1.

III. The essence of the reasoning given in the contested decision may be summarised as follows:

The subject-matter of claim 1 was novel. Document (a), US-A-4 717 985, reflected the closest prior art because it disclosed a tripping system for interrupting a three phase current path with overcurrent and ground fault detection, comprising a processor which was selectively responsive to current signals from either a first gain section or a second gain section, according to predetermined resolution criteria, for engaging interruption means if the respective current signal exceeded a threshold data level. In this tripping system a maximum value detecting circuit only passed on a maximum value out of the three individual phase current values to the processor.

The subject-matter of claim 1 of the contested patent differed from the state of the art disclosed in document (a) in that respective gain circuits were responsive to respective ones of the phase current signals, so that there was a total of six gain sections

in the three phase tripping system. Contrary to the opponent's opinion, the purpose of the two gain sections was clearly set out in the contested patent (claim 1; page 3, lines 22 and 23; page 4, lines 4 to 6), ie selecting one of the gain sections in accordance with predetermined resolution criteria.

None of the cited documents hinted at dispensing with the maximum phase current selection circuit disclosed in document (a).

IV. In addition to document (a) US-A-4 717 985, document (d) US-A-4 819 124, cited by the appellant during the opposition procedure is relevant for this decision.

V. In the statement of grounds of appeal the appellant referred to three new prior art citations:

(f) DE-A-3 128 306

(g) "Elektronische Überstromauslöser für Niederspannungs-Leistungsschalter 3WE", Siemens Energietechnik, vol. 12, December 1980, pages 499 - 502

(h) US-A-4 423 459.

VI. The appellant essentially argued as follows:

Tripping systems for interrupting a three phase current path comprising current sensors, gain circuits and a processor for evaluating the output signals of the current sensors, as specified in claim 1 of the patent, were generally known. This had been shown in the

opposition proceedings. However, the opposition division was of the opinion that it was not obvious to provide two gain sections in order to solve the problem of accurate analog to digital (A/D) conversion so that the microprocessor could handle both small and large current values with the required resolution (cf contested patent, page 4, lines 4 to 6).

These features constituted obvious embodiments of generally known tripping circuits. This concept had already been used in analog tripping systems. Document (g), for instance, showed an analog tripping system in which the current signal from the current sensor was input to three different gain sections in order to ensure, for both small and large current values, signal processing with the required resolution (cf Figures 3 and 5 of document (g)). In digital electronic tripping systems, the current signals had to be converted to a suitable format for processing by a microprocessor. Document (f) disclosed a solution to this problem comprising a gain selection circuit the output of which was connected to the input of an A/D-converter (Figure 2 of document (f)). Finally this problem of accurate current sampling was also solved in digital tripping systems as evidenced by document (h), which disclosed a continuous adjustment of the current gain.

VII. The respondent essentially argued as follows:

The opposition division gave detailed reasons for the rejection of the opposition on the basis of the documents cited in the opposition proceedings. The respondent entirely supported these reasons. The invention was not distinguished from the prior art by

the mere provision of first and second gain sections *per se*. Rather, the invention was distinguished in that the gain circuits were provided individually for each of the three phases, and measurements were taken of the individual phases and used in further numerical processing. In the prior art the current signals from all three current phases were combined into a single value for digitisation and processing. The separate processing of signals of the individual phase currents made it possible to determine the heating effect in individual phases more accurately. This advantage of accuracy was lost by the selection of the maximum value in the prior art devices.

The appellant did nothing to challenge the reasons given in the decision under appeal. Documents (f) to (h) were filed late and were even less relevant than the documents cited in the opposition procedure. They should therefore not be taken into account.

- VIII. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

- IX. The respondent requested that the appeal be rejected. In the event that substantive issues were deemed to arise from the documents (f), (g) and (h), an apportionment of costs against the appellant was requested. If the Board intended to allow the appeal in any degree, oral proceedings were requested.

Reasons for the Decision

- 1. The Board notes that the statement of grounds does not

attack the main reason given in the contested decision for acknowledging the presence of an inventive step. In particular, it does not explicitly mention any of the documents on which the decision is based, but rather argues that the decision is incorrect when due account is taken of the general knowledge in the relevant technical field. Nevertheless, the statement of grounds sets out an arguable case at least to the extent of meeting the requirements of Article 108 EPC, last sentence. Since the other requirements for admissibility are satisfied the Board concludes that the appeal is admissible.

2. Novelty was not contested by the appellant.

3. *Inventive step*

3.1 The Board concurs with the view expressed in the contested decision that document (a) reflects the closest prior art. The appellant has not contested this view. "Generally known tripping systems" are further from the present invention than the specific prior art disclosed in document (a) because the latter includes essential features of the contested patent, ie two gain sections (26, 28) to perform a high gain or low gain measurement depending on the resolution needed (document (a), column 5, line 45 to column 6, line 15; contested patent, page 4, lines 4 to 6).

3.2 The respondent's explanation that the distinguishing features of claim 1, in a nut-shell individual gain circuits and phase current measurements, were identified in the contested decision is correct. Claim 1 of the contested patent recites, *inter alia*:

- (i) a set of gain circuits (134), each responsive to a respective one of the current signals and each having:
- (ii) a first ... and a second gain section ... for amplifying the respective current signal by a first and a second predetermined gain factor; and
- (iii) a processor (120), responsive to ... the set of gain circuits (134), for analyzing the three phase current path (106) by selectively receiving the respective current signal from either the first gain section (532, 534) or the second gain section (532, 536) at each gain circuit.

3.3 The subject-matter of the contested patent makes it possible to achieve a higher accuracy of measurement for compliance with tripping characteristics stored in a data memory means, in particular in the presence of non-linear loads (cf page 3, line 56 to page 4, line 1 and page 7, line 45 to page 8, line 22 of the patent specification).

3.4 The appellant did not contest the opinion expressed in the contested decision that the documents cited in the opposition proceedings do not suggest that individual gain circuits and current measurements could replace the means for selecting the maximum current value flowing in a three-phase electrical distribution system (cf document (a), column 2, lines 36 to 43; document (d), column 1, line 62 to column 2, line 21). The Board agrees with the opposition division's assessment of the relevance of these documents.

3.5 The documents (f), (g) and (h) filed with the statement

setting out the grounds of appeal do not suggest this concept either. As explained by the appellant, these documents relate to details and advantages of providing a plurality of gain sections to perform a high gain or low gain measurement. Since two gain sections form part of the closest prior art and the purpose and advantage of these features is also disclosed in document (a) (column 5, line 45 to column 6, line 15), none of the documents (f), (g) and (h) is considered to be highly relevant to the question that has to be decided. The Board therefore exercises its discretion under Article 114(2) EPC to disregard these documents.

- 3.6 The subject-matter of claim 1 of the contested patent is therefore not obvious to a person skilled in the art, having regard to the state of the art presented in support of the opposition, and shall thus be considered as involving an inventive step (Article 56 EPC). The same applies to the subject-matter of dependent claim 2.
4. The appellant has not shown that the grounds for opposition invoked prejudice the maintenance of the patent unamended (Article 102(2) EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Kiehl

W. J. L. Wheeler