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Aktenzeichen / Case Number / N° du recours : T 82/83

Anmeldenummer / Filing No / N° de la demande : 79 301 620.5

Veröffentlichungs-Nr. / Publication No / N° de la publication : 8235

Bezeichnung der Erfindung: Semi-conductive polymeric compositions suitable
Title of invention: for use in electrical heating devices; flexible
Titre de l'invention : heating cables made by using said compositions and
method for making the like cables
Klassifikation / Classification / Classement : H 01 B3/10

ENTSCHEIDUNG / DECISION

vom / of / du 9 February 1987

Anmelder / Applicant / Demandeur : Eaton Corp.

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPO / EPC / CBE Articles 52(1), 56

Kennwort / Keyword / Mot clé : "Inventive step"

Leitsatz / Headnote / Sommaire



Case Number : T 82/83

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 9 February 1987

Appellant : EATON CORPORATION
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Decision under appeal : Decision of Examining Division 052
of the European Patent Office
dated 21.12.1982 refusing European
patent application No. 79 301 620.5
pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : P. van den Berg
Member : W. Oettinger
Member : G. D. Paterson

Summary of Facts and Submissions

- I. European patent application No. 79 301 620.5 filed on 10 August 1979 claiming a priority of 10 August 1978 and published under number 8235 was refused by a decision of Examining Division 052 dated 21 December 1982.

The reason given for the refusal was that the subject-matter of the independent Claims 1, 3, 5 and 10 filed on 10 September 1981 lacked an inventive step having regard to the prior art. No inventive step was seen also in the dependent Claims 2, 4, 6-9 filed on 10 September 1981, and 11-15 as originally filed.

- II. The independent claims read (without reference numerals):

"1. A melt-processable, radiation cross-linkable, electrically semi-conductive composition having a positive temperature coefficient of electrical resistance and adapted for use in a self-temperature regulating electrical heating device, said composition containing one or more polymeric components therein to provide sufficient crystallinity to promote the self-temperature heat regulating characteristics thereof, said composition being characterised in that it does not contain a monomer and further characterised in that it contains an amount of electrically conductive particles dispersed therein that is controlled within the range of 17% to 25% by weight to the total weight of the composition, and said composition having been annealed for a period of time sufficient to promote the electrical characteristics desired thereof at temperature that is at or above its melt point temperature subsequent to its having been melt processed and cross-linked by radiation.

3. A self-temperature regulating electrical heating device having heating means comprising a melt processed, radiation cross-linked, electrically semi-conductive composition having a positive temperature coefficient of electrical resistance and electrically interconnecting two or more spaced-apart electrical conductors, said composition containing one or more polymeric components therein to provide sufficient crystallinity to promote the self-temperature heat regulating characteristics thereof, said device being characterised in that the composition does not contain a monomer and does contain an amount of electrically conductive particles dispersed therein that is controlled within the range of 17% to 25% by weight to the total weight of the composition, and said composition having been annealed for a period of time sufficient to provide the electrical characteristics desired thereof at a temperature that is at or above its melt point temperature subsequent to its having been melt processed and cross-linked by irradiation.

5. A flexible self-temperature regulating electrical heating cable having heating means comprising two or more substantially parallel spaced apart elongate electrical conductors electrically interconnected by means of an extruded, radiation cross-linked, electrically semi-conductive composition having a positive temperature coefficient of electrical resistance, said composition containing one or more polymeric components therein to provide sufficient crystallinity to promote the self-temperature heat regulating characteristics thereof, said cable being characterised in that said composition does not contain a monomer and does contain an amount of electrically conductive particles dispersed therein that is controlled within the range of 17% to 25% by weight to the total weight of the composition, and said composition having been annealed for a period of time sufficient to promote the

electrical characteristics desired thereof at a temperature that is at or above its melt point temperature prior and subsequent to its having been cross-linked by radiation following its extrusion.

10. A method of making a flexible self-temperature regulating electrical heating cable comprising two or more substantially parallel spaced-apart elongate electrical conductors electrically interconnected by means of an extruded, radiation cross-linked, electrically semi-conductive composition having a positive temperature coefficient of electrical resistance, said composition containing no monomeric components, one or more polymeric components therein to provide sufficient crystallinity to promote the self-temperature heat regulating characteristics thereof and an amount of electrically conductive particles dispersed therein that is controlled within the range of 17% to 25% by weight to the total weight of the composition, the method being characterised by the steps of:

- (a) extruding the cross-linkable composition about two or more substantially parallel spaced apart elongate electrical conductors in such a manner as to provide a form having a cross-sectional shape thereof transverse to its longitudinal axis that is suitable for use as a heating cable with the semi-conductive composition electrically interconnecting the spaced apart conductors;
- (b) disposing a radiation penetrable shape retaining covering in encompassing relationship about the extruded composition and conductors having a melt point temperature thereof which is higher than the temperature chosen to anneal the composition such that the covering prevents or minimizes distortion of the composition during the annealing process;

- (c) annealing the covered cross-linkable semi-conductive composition at a temperature that is at or above its melt point temperature for a period of time sufficient to promote the electrical characteristics desired thereof;
- (d) cross-linking the annealed semi-conductive composition by means of radiation; and
- (e) annealing the radiation cross-linked composition at a temperature that is at or above its melt point temperature for a period of time sufficient to promote the electrical characteristics desired thereof."

The dependent claims concern particular embodiments of the composition, the heating device, the heating cable, or the method of making a heating cable, respectively, claimed in the independent claims.

III. The Examining Division held that the subject-matter of these claims is obvious on the basis of the teachings of prior documents

- (1) FR-A-2 368 127
- (2) US-A-4 074 222
- (3) FR-A-2 320 617.

IV. The Appellant filed an appeal against this decision on 18 February 1983 and paid the appeal fee on the same day.

A Statement of Grounds of Appeal was filed on 19 April 1983.

In the Statement of Grounds the Appellant essentially argued that it is unreasonable to combine the two FR-citations above.

Even if the expert contemplated using in the context of document (1) the second annealing step of document (3) he would have no reason to ignore the main point of the latter which consists in adding a monomer to the composition.

Referring also to the prior art cited in the application description, viz.

US-A-3 243 753
(erroneously cited as 3 243 573)
US-A-3 793 716
US-A-3 861 029
US-A-3 914 363

the Appellant submitted that the expert would be most unlikely to consider a carbon black content range of 17-25%.

- V. In a communication dated 22 April 1985 the Rapporteur raised the point that the Board might consider the amendments made on 10 September 1981 to be inadmissible under Article 123(2) EPC.

No basis in the original application documents was seen for the introduction into Claim 1 of the feature that "it (the composition) does not contain a monomer" and of corresponding features in Claims 3, 5 and 10.

In responses filed on 10 May 1985, 19 August 1985 and 18 January 1986, and in communications dated 18 June 1985, 19 November 1985 and 13 May 1986, the Appellant and the Rapporteur discussed this objection.

The Appellant submitted that there was a basis for said feature in the "example of a flexible heating cable made in accordance with the invention" described - in comparison with other heating cables - on page 18 of the description. The compositions there described are stated to be "blends of low density polyethylene and ... carbon black without additional additives" (emphasis added).

He referred to the test for novelty (Guidelines for Examination in the European Patent Office, C.IV 7.2) as a model for the test for added subject-matter (Guidelines C.VI 5.4) and submitted that, correctly applied on a negative feature such as the one in question, this test proves the disclosure of said feature.

For the purpose of interpreting the term "additives" reference was also made to the following further prior documents:

- (4) FR-A-2 374 357
 - (5) FR-A-2 077 021
- (and corresponding US-A-3 976 600)

and to a late published equivalent (US-A-4 188 276) of document (3).

Further, on 18 January 1986, the Appellant proposed to clarify Claim 1 on file by inserting, in the introduced feature, "polymerisable" before "monomer".

VI. In the communication dated 22 April 1985 the Rapporteur also commented on the question of inventive step which formed the ground of refusal of the application in the decision under appeal. Reference was made to the documents cited at paragraph III above, and the Rapporteur stated his provisional opinion that with the introduced feature deleted

from Claim 1, there was no inventive step in the subject-matter of Claim 1. In the responses filed on 10 May 1985 and 19 August 1985, and in the communications dated 18 June 1985 and 13 May 1986, this question was discussed further. In particular, in the communication dated 13 May 1986 reasoning was set out which pointed to the view that Claim 1 did not define an inventive step, whether or not the feature of the absence of monomer was introduced into it by amendment.

A further document, FR-A-2 374 357 (4), which had been mentioned for other purposes in the Appellant's response filed on 18 January 1986, was also referred to as being of particular relevance in relation to the issue of inventive step in that communication.

VII. In a response filed on 29 July 1986, the Appellant did not file any further observations on the points at issue.

According to earlier submissions he requests that the decision under appeal be set aside and the case remitted to the first instance with an order to grant the patent applied for on the basis of the claims as on file (cf. paras. II and V above) and the description and drawings as originally filed and amended on 10 September 1981 and 18 January 1986.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. In the Board's view the present case is one in which the outcome of the issue of patentability (Article 52 EPC) is the same whether or not the proposed amendment is allowed. This will be fully clear from the subsequent discussion of that issue.

In this circumstance, it is unnecessary to decide upon the question whether under Article 123(2) EPC the proposed amendment could be allowed.

3. The subject-matter of Claim 1, both as originally filed and as proposed to be amended, may be regarded, in a strict sense, as new (Article 54 EPC) but lacks an inventive step (Article 56 EPC).

The same applies to the independent Claims 3, 5 and 10.

Further, nothing appears in the file that would point to a different outcome in respect of the dependent claims.

For these reasons, in either formulation, the claims on file have to be considered as unallowable under Article 52(1) EPC.

For Claim 1 this will be set out in detail below.

- 3.1 FR-A-2 374 357 (4), which was not cited by the Examining Division but in the Search Report and which was cited by the Rapporteur (22 April 1985) and by the Appellant (18 January 1986, para. 12) has been found to be of particular relevance for the issue of patentability, in particular inventive step.

3.2 Document (4) concerns melt-processable, radiation cross-linkable, electrically semi-conductive compositions having a positive temperature coefficient of electrical resistance and adapted for use in a self-temperature regulating electrical heating device, said compositions containing one or more polymeric components therein to provide sufficient crystallinity to promote the self-temperature heat regulating characteristics thereof, in accordance with the precharacterizing portion of both the original and the amended Claim 1.

3.3 Among the compositions disclosed in (4) are ones having the following features:

- they contain an amount of electrically conductive particles dispersed therein that is controlled within a range of more than 15% up to 25% - as the upper of two specifically distinguished subranges of a generally preferred range - by weight to the total weight of the composition (page 7, lines 13-14 and 24-25);
- to their advantage they may, subsequent to their having been melt processed and cross-linked by radiation, have been annealed for a period of time sufficient to promote the electrical characteristics desired thereof at temperature that is above its melt point temperature (page 7, lines 30-34).

3.4 Clearly, the claimed conductive particles content range of 17% to 25%, although new in a strict sense, substantially coincides with the said upper subrange of more than 15% up to 25% in (4); and the claimed second annealing step, after the cross-linking step, is practically identical with the corresponding step described in (4) as being to the advantage of the composition.

As the only difference, namely the formal discrepancy in the lower limits (more than 15% versus 17%) of said range, is, to the person skilled in the art, obviously neglectable, no inventive step can be considered as being involved in the subject-matter of Claim 1 as originally filed.

3.5 Document (4) clearly discloses further (page 4, lines 12-19) that the advantage achieved by adding, according to an earlier US proposal corresponding to document (3), a monomer to a certain polymer would not be achieved with other polymers, and based on this experience proposes compositions of other constitution (page 4 line 20 ff.). To these it is stated as being "often useful" to add a non-saturated compound (page 8, lines 9-13). Both the reference to the earlier proposal of adding monomers and the reference to its now being often (only) "useful" to add non-saturated compounds, clearly imply that non-saturated compounds, i.e. monomers, need not necessarily be present in said compositions of other constitution, but may be absent, like before their addition had been proposed.

3.6 As a consequence, among the compositions with the features mentioned in paragraph 3.3 above, can also be ones which have the additional feature that they do not contain a monomer.

The lack of inventive step objection above (para. 3.4) applies therefore to Claim 1 on file, including the amendment proposed, as well as to the original Claim 1.

3.7 This reason for not allowing Claim 1 and the principal facts underlying it were fully communicated to the Appellant in particular by paragraphs 3 (d) and (g) of the Communication dated 13 May 1986, to which the Appellant decided not to present counter-arguments.

Article 113(1) EPC has thus been observed.

3.8 The above finding, based on an analysis of document (4) including its background represented by document (3), confirms in effect the conclusion - lack of inventive step - in the decision under appeal, which was based though on other documents.

In the circumstances, it is unnecessary to decide whether that other basis justified the rejection of Claim 1 on file as well.

Clearly none of the Appellant's earlier arguments in favour of an inventive step would seem to be apt of refuting the above view based on document (4).

Order

For these reasons it has been decided that:

the appeal is dismissed.

The Registrar:

The Chairman:

B.A. Norman

P.K.J. van den Berg