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D E C I S I O N
of 23 June 1999

Case Number: T 1045/96 - 3.5.1

Application Number: 88308144.0

Publication Number: 0308111

IPC: H01Q 13/20

Language of the proceedings: EN

Title of invention:

Radiating coaxial cable with improved flame retardancy

Patentee:

Andrew A.G.

Opponent:

kabelmetal electro GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step - (no)"

Decisions cited:

-

Catchword:

-



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Boards of Appeal

Chambres de recours

Case Number: T 1045/96 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 23 June 1999

Appellant: kabelmetal electro GmbH
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Postfach 260
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ALLEMAGNE

Representative: -

Respondent: Andrew A.G.
(Proprietor of the patent) Zürich
SUISSE

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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 14 October 1996
rejecting the opposition filed against European
patent No. 0 308 111 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: P. K. J. van den Berg
Members: R. R. K. Zimmermann
V. Di Cerbo

Summary of Facts and Submissions

I. The appeal concerns European patent No. 0 308 111 granted with priority of 10 September 1987 on the basis of European patent application No. 88 308 144, the mention of the grant being published on 30 March 1994. Claim 1 of the patent reads as follows:

"A radiating co-axial electric cable comprising only 5 different components, namely
an inner conductor (1),
a dielectric (2) in between said inner conductor (1) and a single, continuous, corrugated outer conductor (3) which surrounds the inner conductor (1) and the dielectric (2) and has apertures (4) milled in the crests (4A) of the corrugations in said outer conductor (3) along its length for the radiation therefrom of electromagnetic radiation,
a wrapping (5) covering the entirety of the outer surface of the outer conductor (3), and
a flame-retardant jacket (6) of non-halogenated and non-crosslinked plastics material extruded over said wrapping (5)

Characterised in that

the dielectric (2) is a filling of cellular foam material which is non-halogenated and non-crosslinked between and in contact with the inner and outer conductors (1,3)

and in that the wrapping (5) is of a mica-containing glass-reinforced tape."

II. The appellant filed an opposition against the patent on 1 December 1994, invoking lack of novelty and inventive step as grounds of opposition (Article 100(a) EPC) and

requesting revocation of the patent in its entirety. In support of the opposition, the appellant cited, *inter alia*, the following documents:

DE-A-2836322 (document D3, published 1 March 1979)

US-A-3691488 (document D8, published 12 September 1972)

US-A-3425865 (document D10, published 4 February 1969)

III. In a decision posted on 14 October 1996, the opposition division rejected the opposition essentially for the reason that none of the prior art documents disclosed a coaxial cable having a mica-containing glass-reinforced tape wrapped around the outer conductor.

IV. Against this decision the appellant filed a notice of appeal on 2 December 1996, requesting reversal of the decision and revocation of the patent. The appeal fee was paid the same day; the grounds of appeal were subsequently filed on 12 February 1997. In public oral proceedings held before the Board of appeal on 23 June 1999, the matters in issue were discussed. The decision on the appeal was then announced on the basis of the following requests:

The appellant requested that the decision under appeal be set aside and that the European patent No. 0308111 be revoked.

The respondent requested that the appeal be dismissed and that the patent be maintained.

V. The appellant argued that the patent had to be revoked

for the reason that the subject-matter of claim 1 did not involve an inventive step. Concerning the pertinent prior art, both documents D3 and D8 would be suitable to serve as a starting point for assessing inventive step. According to the patent under dispute the technical problem intended to be solved was fire resistance of the cable under flame exposure up to temperatures of about 1200°C. Although an insulating wrapping as claimed in the patent under dispute remained effective at this range of temperatures, the additional jacket proposed in the patent did not contribute to the fire resistance of the cable at such high temperatures since its material decomposed or charred already at lower temperatures. A similar fire-resistant cable was disclosed in both prior art documents D3 and D10 so that the subject-matter of claim 1 would not involve an inventive step.

VI. The respondent (patentee) disagreed with the appellant's view that document D8 formed a suitable starting point for assessing the inventive step since unlike the other documents cited, document D8 did not address the problem of fire resistance.

The patent provided a cable combining the advantages of high flame resistance, low smoke characteristic and high flexibility with a simple design of only five components. Unlike the invention, the cable of document D3 contained seven components including a reinforced dielectric separating the flame barrier tape from the outer conductor and an additional flame-retardant jacket. This would be, compared with the invention, a relatively complex and stiff design.

Document D10 would not be relevant for the claimed invention since it was related to wires and cables, but not to coaxial cables. In addition, the insulated wire described therein required a higher number of insulating layers than the cable according to the claimed invention.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC and is thus admissible.

2. As to the merits of the case, the issue has to be decided whether or not the subject-matter of claim 1 involves an inventive step or, in terms of Article 56 EPC, whether the invention is obvious to a person skilled in the art, having regard to the state of the art.
 - 2.1 Within the prior art derivable from the cited documents, document D3 is the best starting point for assessing inventive step, and forms thus the closest piece of prior art. In fact, like the patent under dispute, document D3 describes a radiating coaxial cable which combines high flexibility with low flammability and low dielectric loss. Regarding fire safety, the document puts the emphasis on low smoke emission by avoiding halogenated materials (see for example document D3, page 4, 2nd and 3rd paragraphs, page 6, 1st paragraph and claim 1).

For achieving fire resistance, the document proposes a

cable which comprises an inner conductor ("innerer Leiter"), an outer conductor ("äußerer Leiter"), a dielectric ("Dielektrikum") located in between said inner conductor and said outer conductor and an insulating cable covering ("Mantel"). The outer conductor is made from a single, continuous and corrugated tape provided with a series of radiating apertures which are arranged along the length of the cable (see page 9, lines 27 ff.). Unlike the claimed invention, the apertures are located in the segments between the corrugation crests of the tape.

The dielectric is a reinforced alkene polymer. The polymer is preferably polyethylene, optionally in foamed form (see page 5, line 18). The document proposes three possible methods for reinforcing the polymer: cross-linking, introducing small amounts of reinforcing additives into the dielectric, and reinforcing by means of (separate) reinforcing material, preferably a mica tape applied to the outer part of the dielectric (see claims 2 to 6 and page 4, last paragraph with page 5, 1st paragraph). The document does not propose any combination of such methods for reinforcing the polymer but describes them rather as alternative solutions. This is also evident from the claims where all the three methods are individually claimed in dependent claims, which refer only back to claim 1 (see claims 2, 3, and 5 of document D3).

These three methods for reinforcing the polymer are, therefore, exclusive options so that with regard to the embodiment having small amounts of reinforcing additives introduced into the dielectric document D3

advises the skilled person against cross-linking and also against the application of materials like mica tapes. In this embodiment, the dielectric is thus a non-crosslinked polyethylene and stays in direct contact with the inner and outer conductors of the coaxial cable.

In addition, the skilled reader would understand that the dielectric is not halogenated since adding halogens would contravene a main object of document D3, namely to avoid the generation of toxic fumes under fire conditions (see for example page 4, lines 19 ff.).

Furthermore, document D3 indicates that the cable covering may comprise a flame-retardant non-halogenated insulating sheath, optionally enclosed in a wrapping of a mica-containing glass-reinforced tape (and thus covering the entirety of the outer surface of the outer conductor), and for mechanical protection an overlying extruded jacket of a low-smoke polymer (see page 6, lines 14 f. and page 9, lines 14 ff.). The document mentions NYLON as a suitable extruded jacket (see page 9, line 22). Such a jacket is a non-halogenated and non-crosslinked plastics material which apparently would have to be extruded over the wrapping.

Document D3 describes the flame-retardant sheath as the primary insulation of the cable and the wrapping as a fire barrier of an insulating material ("Isoliermaterial"). The various examples given in document D3 (see page 6, lines 25 ff.) indicate that the material is not only thermally but also electrically insulating. Therefore, the wrapping is actually a further electrically insulating component of

the cable covering. On a plain reading of document D3, it even becomes doubtful whether in presence of such an insulating wrapping the flame-retardant sheath has any useful technical function left at all; the insulating sheath appears to be unnecessary and superfluous.

2.2 It follows that the only features of claim 1 which distinguish the invention from the closest prior art are the following:

- (a) the apertures are milled in the crests of the corrugations of said outer conductor

- (b) the cable comprises only the 5 different components inner and outer conductor, dielectric, wrapping, and jacket, i.e. the insulating sheath between outer conductor and the wrapping is missing or left out

2.3 From the above analysis of document D3, it becomes clear that the prior art is far closer to the claimed invention than the reader may conclude from the introductory part of the patent specification. Despite the fact that document D3 is cited in the patent specification as relevant prior art, the various technical problems and objects to which the invention is alleged to be directed are rather pointless vis-à-vis document D3. For example, improved flame resistance, reduced smoke generation, and high mechanical flexibility of the cable are already goals explicitly set in document D3 and solved by the construction proposed therein. In addition, such qualities of the cable are not effected by any modifications of the type defined by features (a) and

(b) and do thus not form a proper basis for formulating the objective technical problem solved vis-à-vis document D3.

Regarding in particular feature (a), it has to be noted that the patent does not indicate any technical effect (or advantage) which is achieved by changing the arrangement of the radiating apertures on the outer conductor, and nor did the parties forward any information or argument to this end. Finding an alternative to the construction of the outer conductor of the prior art cable is the only technical problem left which can be said to be objectively solved by the claimed invention vis-à-vis document D3 on the basis of feature (a).

Finding an alternative again is the only realistic result which might be considered to be achieved on the basis of feature (b). Flame resistance, mechanical flexibility, and low weight, qualities about which the parties argued, are neither related causally to the mere number of components present nor to the feature that a particular layer is left out; such features are rather determined by the overall construction of the cable. Even the effect which a modification according to feature (b) has on the complexity of the cable construction remains unclear since the structures of the individual components of the cable are not completely defined by claim 1.

Finally, there is no indication that by the interaction or combination of features (a) and (b) any combinatorial or synergistic effects are achieved. Features (a) and (b) are rather technically

independent; their contribution to inventive step, therefore, has to be assessed separately and independently from each other.

- 2.4 Looking for an alternative to a part or an element which is functionally or structurally well defined and clearly discernible from the other parts and elements of a device belongs to the realm of normal technical activities and does not involve an inventive step on its own. Accordingly, in the present case, the objective technical problems underlying feature (a) and (b) do not contribute positively to inventive step.
- 2.5 Document D8, Figures 1 to 3 with column 2, lines 32 ff. discloses a corrugated outer conductor for a radiating cable having the radiating apertures milled into the crests of the corrugations, leaving the corrugation troughs intact. This renders feature (a) an obvious alternative to the construction of document D3.
- 2.6 Furthermore, document D3 describes as an embodiment a cable covering having a fire barrier tape in addition to an electrically insulating sheath. The fact that the fire barrier tape is disclosed also as an electrically insulating component suggests to the skilled reader that the insulating sheath is superfluous and could be dispensed with.

In addition, document D10 discloses a wire covering comprising a mica-containing glass-reinforced tape which is directly (i.e. without any intermediate sheath) applied to the outer surface of the conductor (see column 2, lines 18 to 26). Since such a covering is, without any doubts, also suitable for protecting

the outer conductor of a coaxial cable, the skilled person has any reason to take such a construction into consideration as an alternative, thereby arriving in an obvious manner at a modification of the prior art cable as defined by feature (b).

- 2.7 It follows that features (a) and (b) derive in an obvious manner from the closest prior art and do thus not contribute positively to an inventive step. Since both features are technically independent the same conclusion holds for the claimed invention as a whole.

3. Because of lack of inventive step, the subject-matter of the patent under dispute is not patentable, prejudicing the maintenance of the patent unamended. Therefore, in absence of any requests for amendment, the patent must be revoked (Article 102(1) with Article 111(1) EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

M. Kiehl

P. K. J. van den Berg