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D E C I S I O N
of 6 March 1996

Case Number: T 0381/93 - 3.5.1

Application Number: 86302176.2

Publication Number: 0196857

IPC: H04N 3/195

Language of the proceedings: EN

Title of invention:

Transformer winding arrangement especially for video display

Applicant:

RCA Thomson Licensing Corporation

Opponent:

-

Headword:

Transformer winding/RCA Thomson

Relevant legal provisions:

EPC Art. 52(1), 56

Keyword:

"Inventive step (yes)"

Decisions cited:

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Catchword:

-





Case Number: T 0381/93 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 6 March 1996

Appellant: RCA Thomson Licensing Corporation
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Representative: Ahrens, Thomas
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Decision under appeal: Decision of the Examining Division of the European
Patent Office posted 20 November 1992 refusing
European patent application No. 86 302 176.2
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: P. K. J. van den Berg
Members: R. Randes
G. Davies

Summary of Facts and Submissions

I. European patent application No. 86 302 176.2, filed on 25 March 1986 claiming a priority of 29 March 1985 and published under No. 0 196 857, was refused by a decision of the examining division dated 20 November 1992.

II. The reason for the refusal was that the subject-matter of claims 1 to 7 filed on 4 April 1992 lacked an inventive step having regard to the prior art document

D1: FR-A-2 404 358.

III. On 14 January 1993 the applicants filed a notice of appeal against this decision and paid the prescribed appeal fee. The statement of grounds was, by interlocutory decision of the Board dated 12 August 1994, deemed to have been filed in time. Together with the grounds new sets of claims were filed according to a main request and two auxiliary requests. Independent claims 1 and 7 of the main request were slightly amended versions of the refused claims. As a precautionary measure, oral proceedings were requested.

IV. In support of the allowability of claim 1, the appellants argued essentially in the following way.

The invention concerns a high-voltage transformer mainly intended for a TV display. The transformer is of the kind having a primary winding and a plurality of secondary windings. One of the secondary windings, referred to in the application as the "tertiary" winding, serves to generate a high voltage and is wound on a separate coil form; a further secondary winding, referred to as an "additional" winding, is wound on the primary coil form. The technical problem addressed is to

facilitate tuning of the tertiary winding to a single harmonic. The solution resides in ensuring that the coupling between the primary and additional windings is uniform. This is expressed in claim 1 by the feature that the winding turns of the primary winding and of the additional winding are evenly distributed over the winding region. The examining division believed this feature to be disclosed in D1 because of the formulation "également réparti" used to describe the additional winding shown in Figure 2. However, "également" must in this case be understood as "also" rather than "evenly", which could be verified by comparison with a UK patent application (GB-A-2 007 030) claiming the same Japanese priority as D1. Considering the context, the intended meaning was clearly that the primary winding was distributed within channels of a bobbin, and that the additional winding was also - "également" - situated in the channels. Furthermore, the examining division was wrong in asserting that the representation of a coil as a block with a cross, shown in the figures of D1, implied an even distribution of coil turns. The drawings were purely schematic and disclosed nothing as to the evenness of the windings.

As to an inventive step, neither the problem underlying the present invention nor its solution could be deduced from D1. D1 concerned the problem of ringing in the high-voltage output signal and proposed to reduce it by coupling the additional winding more tightly to the high-voltage winding than to the primary winding. The necessary insulative spacers would if anything result in an uneven distribution of the winding turns.

V. In a communication dated 14 July 1995, the rapporteur expressed the preliminary opinion that claim 1 of the main request could not be objected to under

Article 52(1) with Article 56 EPC. However, the subject-matter of claim 7 was regarded as possibly not new with respect to

D2: DE-A-1 538 046,

a document cited in the search report but not referred to in the decision under appeal.

VI. In the reply filed on 12 October 1995 the appellants maintained that the subject-matter of claim 7 was inventively distinguished from that of D2. At the same time they filed amended claims 1 to 7 according to a new main request and claims 1 to 6, excluding independent claim 7 to which the rapporteur had objected, according to a new auxiliary request. The description was accordingly amended.

VII. Claim 1, common to both requests, reads (omitting the reference signs):

A high voltage transformer comprising:
a tertiary coil form having a tertiary, high voltage, winding wound thereon;
a magnetically permeable core disposed within the interior of said tertiary coil form; and
disposed between said tertiary coil form and said core a primary winding assembly comprising:
a primary coil form;
a primary winding wound on said primary coil form over a predetermined winding region; and
at least one additional winding wound on said primary coil form and overlaying said primary winding, characterized in that said primary winding and said additional winding each comprise a plurality of winding turns evenly distributed over said predetermined winding region.

VIII. On 8 January 1996 the Board summoned the appellants to oral proceedings. In the annex to the summons, the rapporteur, while recognising the novelty of the subject-matter of claim 7, expressed doubts as to its inventiveness. Possible problems under Articles 82 and 84 EPC were also mentioned.

IX. On 24 January 1996 the appellants withdrew their main request and requested that the application be allowed on the basis of the auxiliary request. In case this request was deemed allowable, the request for oral proceedings was cancelled.

X. On 13 February 1996 the Board cancelled the oral proceedings.

XI. The application now consists of the following documents:

Claims:

Claims 1 to 6 filed on 12 October 1995 as
"auxiliary request"

Description:

Pages 1, 1A, 2-6 filed on 12 October 1995 as
"auxiliary request"

Drawings:

Sheets 1/3 to 3/3 as originally filed

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

The Board is satisfied that the application as amended does not contain subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).

3. *Novelty*

Although the examining division formally based its decision on Articles 52(1) with 56 EPC, the rejection of claim 1 consists only of an enumeration of features. There is thus reason first to examine the novelty of the claimed subject-matter with respect to D1, which is the closest prior art document.

The key feature of claim 1 is the evenness of the windings. The examining division was of the opinion that D1 disclosed this feature because of the words "également réparti" to characterise the disposition of a secondary winding in the grooves of a coil form (page 4, lines 26, 27; Figure 2). However, the Board has no doubts that the appellant is right in translating "également" by "also" rather than "evenly". Furthermore, the conventional representation of a coil as a block with a cross cannot be taken as disclosing anything about the properties of the coil, and in particular about the evenness of the winding. This difference is sufficient to establish novelty in respect of D1.

4. *Inventive step*

4.1 It is not under dispute that D1 describes a high-voltage transformer having the features set out in the first part of claim 1 of the application under consideration. The question is therefore whether D1, alone or in combination with other pieces of prior art, renders obvious the features in the characterising part of the claim.

4.2 Claim 1 specifies that both the primary winding and the "additional" winding comprise a plurality of winding turns evenly distributed over the (common) winding region. The evenness of the windings permits a uniform or constant degree of magnetic coupling between the additional winding (or windings) and the primary winding, resulting in uniform loading of the primary winding and, as a consequence, uniform loading of the tertiary winding as well. This is said to allow the transformer to be tuned to a single harmonic (apparently of the TV line frequency), for example the ninth harmonic (description, page 4).

4.3 The aim of the present invention is thus to improve the tuning characteristics of the transformer. The appellants have submitted that this problem is different from the one considered in D1, which regards the ringing ratio of a fly-back transformer. However, it seems to the Board that the problems are perhaps not entirely unconnected. It is stated in D1 that "the resonance frequency, namely the ringing frequency" is increased (page 18, lines 7 to 11), and that the desired "smaller ringing amplitude is caused through the higher frequency" (page 17, lines 20 and 21; the quoted English passages are from the corresponding UK application). The tuning characteristics of the transformer are thus apparently considered in D1.

- 4.4 However, even if the problem underlying the present invention would be related to the one in D1, it seems that the offered solution is not. In order to decrease the ringing, D1 suggests a transformer design such that the magnetic coupling between the additional winding and the primary winding is lower than the coupling between the additional winding and the tertiary, high-voltage, winding. This is said to be achieved by proper dimensioning of the insulation layers between the respective windings. There is however no indication as to the evenness of the windings. A skilled man, reading D1, would thus turn his attention to the insulation layers between windings rather than to the windings themselves. This being the case, the Board concludes that D1 alone does not render the invention obvious.
- 4.5 It should be noted that, even if D1 does not mention the evenness of the windings, this feature is of course known per se. The question therefore arises whether the skilled man would nevertheless have arrived at the invention merely by following standard practices in the art of winding transformer coils.
- 4.6 In one of the communications of the Board, attention was drawn to document D2, which stresses the importance of the coil space factor ("Kupferfüllfaktor"). The coil space factor of a winding is defined as the ratio of the total cross-section of the conductors to the disposable winding area, the ideal limit being equal to one. D2 is concerned with minimising the thickness of the insulation around the wires. It is clear, however, that the coil space factor will depend also on the disposition of the coil turns. An evenly wound coil will be more efficient than one having disordered turns with relatively large gaps between them. It might therefore

appear that the present invention would have been obvious to a skilled man who simply desired to employ maximally efficient coils in his transformer.

- 4.7 The above considerations, however, would apply only if no competing constraints existed. It is noted that claim 1 does not relate to a transformer in general but to a particular kind, having a primary winding and one or more additional windings wound on a first coil form and a high-voltage winding wound on a second coil form. According to the description the transformer is particularly suited for TV displays and designed to overcome problems occurring in this technical application. It is conceivable that for this type of transformer the coil space factor is only of secondary importance. In fact, the available prior art contains a hint that this might be the case. According to US-A-4 247 889, concerning a television line transformer which - like the present invention - is to be tuned to a certain high harmonic, the tuning "is obtained by matching the secondary /high-voltage/ and primary by the shape of the primary winding" (column 3, lines 62 to 64). Exactly how the primary winding should be adjusted seems not to be described, but it is at least clear that its geometry is involved. This implies that the skilled man was not free to design a TV line transformer in order to optimise, in particular, the coil space factor since he knew that first of all the coupling characteristics of the winding had to be considered. Therefore, in this particular case, the even distribution of the primary (and additional) winding turns over the winding region, as defined in claim 1, can hardly be regarded as merely a conventional design choice.

- 4.8 The subject-matter of claim 1 can thus not be regarded as obvious in view of D1, either taken alone or in the light of the teachings of the other available documents. It is deemed to involve an inventive step.
5. Since the appellants' request for the grant of a patent is allowed, their auxiliary request for oral proceedings is void.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to grant a patent on the basis of the current application documents (see point XI above).

The Registrar:

The Chairman:

M. Kiehl

P. K. J. van den Berg

