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D E C I S I O N
of 27 March 2001

Case Number: T 0963/99 - 3.2.3

Application Number: 93903549.9

Publication Number: 0628117

IPC: E04C 3/34

Language of the proceedings: EN

Title of invention:
Fabric reinforced concrete columns

Patentee:
HEXCEL-FYFE L.L.C.

Opponent:
TORAY INDUSTRIES, Inc.

Headword:
-

Relevant legal provisions:
EPC Art. 52, 54, 100(a)(b), 114(1)(2), 123(2)

Keyword:
"Late-filed document (admitted)"
"Novelty (no)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0963/99 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 27 March 2001

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 23 August 1999 rejecting the opposition filed against European patent No. 0 628 11 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: J. du Pouget de Nadaillac
J. P. B. Seitz

Summary of Facts and Submissions

I. The appeal was lodged by the opponent against the decision dated 23 August 1999 of an opposition division of the European Patent Office, which rejected his opposition filed against patent EP-A-0 628 117.

II. Claim 1 of said patent reads as follows:

"A reinforced concrete column for use in supporting bridges and other structures, said reinforced concrete column comprising:

a concrete column having a top (16), a bottom (18), an axis (20) and a circumferential outer surface (60) extending axially between said column top and bottom; and a composite reinforcement layer (22) surrounding said column wherein said composite reinforcement layer is in direct contact with said circumferential outer surface, said composite reinforcement layer comprising at least one fabric layer (24...32) which is located within a resin matrix;

characterised by said fabric layer having first and second parallel selvedges (34...52) which extend around said circumferential outer surface in a direction substantially perpendicular to the axis of said concrete column to provide said reinforced concrete column."

Independent Claim 15 reads as follows:

"A method for reinforcing a concrete column wherein said column has a top (16), a bottom (18), an axis (20)

and a circumferential outer surface (60) extending axially between said column top and bottom, said method comprising the steps of:

providing a fabric layer (24...32) having first and second selvedges (34...52) extending parallel to each other;

impregnating said fabric layer with a curable resin (58) to form a resin impregnated fabric layer;

applying said resin impregnated fabric layer to the circumferential outer surface of said column to provide a composite reinforcement layer wherein the selvedges of said fabric extend around said outer surface substantially perpendicular to the axis of said column; and

curing said resin in said composite reinforcement layer to thereby reinforce said concrete column."

III. The opponent (appellant) lodged the appeal on the first of October 1999, having paid the appeal fee on 29 September 1999. In the statement of grounds of appeal received on 23 December 1999, he maintained the objections raised before the first instance, namely that:

- the patent does not disclose the invention in a manner sufficiently clear, so that the skilled person does not know how to perform the invention (Article 100(b) EPC);

- and the invention as claimed is neither new nor implies an inventive step (Article 100(a) EPC).

With respect to this last opposition ground, the following new evidence was filed together with the statement of grounds of appeal:

D10: JP-A-04-020522 with an English translation

D11: Toray Product Information, TORAYCA, prospect with its English translation, and samples as well as photographs of TORAYCA woven fabrics, all concerning an alleged prior use.

IV. In a letter dated 10 May 2000, the proprietor of the patent (respondent) raised an objection against the late filing of these documents, which should not be admitted into the proceedings, and argued against the objections of the appellant.

In a communication dated 10 November 2000 accompanying the summons of the parties to oral proceedings, the board of appeal indicated that the admissibility of the new documents was to be decided in the light of their relevance, that document D10 did not seem to be more relevant than D3 (EP-A-0 378 232), which was already cited in the proceedings before the first instance, and that the relevance of D11 and of the samples and photographs was doubtful, whereas the alleged prior uses, which according to the appellant are linked with this last evidence, did not seem to be sufficiently proven.

On 23 January 2001, the appellant filed two statements and a cover page from an "Album of Retrofit Work of Kaseda River bridge Column", all with English translations, as further evidence of the alleged prior uses.

Oral proceedings took place on 27 March 2001. During these proceedings, the respondent filed a new set of claims as auxiliary request, this set of claims comprising only the process claims as granted.

V. The appellant argued as follows:

It cannot be seen how selvedges of a fabric, giving to the term "selvedges" its usual meaning, can extend, at the same time, parallel to one another and at an angle relative to the warp (claim 1 and dependent claim 3). Hence, the skilled person cannot perform the invention.

If this term is interpreted as meaning any longitudinal edges, then the subject-matter of either Claim 1 (product) or Claim 15 (process) is not new in view of the content of D10, which describes a reinforced concrete column with a composite reinforced layer being in direct contact with and extending around the circumferential outer surface of said column. Figure 1 of this document and the description of this prior art disclose at least one resin impregnated reinforcement fabric layer, which has longitudinal edges arranged perpendicular to the axis of the column.

VI. The respondent essentially replied as follows:

The term "selvedges" in the patent in suit is to be understood as meaning the longitudianl edges of the fabric layer, whether uncut or cut.

D10 is totally irrelevant, since it contains no reference to the edges or selvedges of the wounded strips of material. Further, it requires an initial layer of unidirectional yarn between the column and the

reinforcement fabric layer, so that there is no direct contact of the reinforcement layer with the column. A further distinguishing feature is that the three fabric layers disclosed in this prior art are distinct from each other. Hence, this prior art should not be admitted into the proceedings and it cannot be novelty-destroying.

None of the cited documents teaches to have the selvedges of the reinforcing fabric layer parallel to each other and perpendicular to the axis of the column. D5 (US-A-4786 341) and D4 (US-A-5 043 033), cited during the examination procedure, show that the tendency was to strengthen a column by wrapping a fiber-reinforcing plastic around it at an angle, that is to say spirally.

VII. The appellant requested the decision under appeal to be set aside and the patent to be revoked.

The respondent requested that the appeal be dismissed and that the patent be maintained as granted or on the basis of his auxiliary request filed during the present oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

2. *Sufficiency of disclosure (Article 100(b)EPC)*

Although the term "selvedges" is many times used through the whole description of the patent in suit, no definition of this term is given. The dictionaries provide different definitions of this term ranging from

a restricted one, namely the two longitudinal, non fraying side edges of a length of fabric **as created by** the original production process, to a broad interpretation, namely each side edge of a woven fabric.

In the oral proceedings before the board of appeal, the respondent has clearly indicated that the term, as used in the patent in suit, means the longitudinal edges of the fabric layer, whether said layer is in its original state or has been cut to a given size. The board has then examined whether such a definition is supported by the patent in suit (Article 123(2) EPC and came to the conclusion that this was the case, since Figures 5 and 6 by showing an edge of a fabric layer, which is designated as being a "selvedge" in the description and which limits a weave made of inclined wefts and warps, clearly indicates to the person skilled in the art that only the broad interpretation of this term can apply.

With this broad interpretation of the term "selvedge", the appellant's objection as to the insufficiency of disclosure is no longer relevant, since any edge of a fabric, whether cut or not and whatever the direction of cut relative to the warp is, can be considered as being a selvedge.

3. *Late filed documents and evidence.*

For the reasons set out in the following paragraphs the board considers document D10 to be so relevant to its decision, that it must be admitted into the proceedings, Article 114(1) EPC.

As regard the late-filed prior use and the

corresponding documents, e.g. D11, this evidence is not essential to the decision and in accordance with Article 114(2) EPC it is not admitted into the proceedings.

Main request (Claims as granted)

4. The citation D10 concerns a column for use in supporting bridges or roads (page 1, first line of the paragraph concerning the prior art), thus having a top, a bottom and a circumferential outer surface. The aim of this prior art is to reinforce this column against earthquakes in particular. The reinforcement consists of a composite reinforcement layer, which comprises three fibre reinforced fabric layers surrounding the column. Each of these fabric layers is made of a woven fabric of carbon fibre yarns with a resin as matrix. Therefore, they each correspond to the definition of the fabric layer which is located within a resin matrix according to Claim 1 of the patent in suit. On page 6 of D10, it is indicated that it is preferable first to wind around the column one of these fabric layers, however chosen so as to have the carbon fibre yarns extending in the longitudinal direction of the column; the second surrounding fabric layer, which is wound over the first one, should be chosen with carbon fibre yarns disposed in a range of ±30°- ±60° with reference to the longitudinal direction of the column, and finally the third fabric layer, which is wound over both already wound layers, should have fibre yarns extending in the circumferential direction of the column, that is to say perpendicular to the axis of the column. On page 7, lines 5 and 6, it is taught that, "even if the order of the winding is reversed", the same reinforcing effect is obtained. Although no

mention of edges or selvedges appears in the text of this prior art, the single figure of this document shows the three superposed layers with apparently their lower and upper edges arranged perpendicular to the axis of the column.

5. According to the respondent, the term selvedges in Claim 1 means any longitudinal edge of a fabric, which either has been cut to an appropriate width or remains as produced. In D10, it is specified that, at least for one fabric layer, the carbon fibre yarns are wound in the **circumferential** direction of the concrete column. Normally, fabrics are produced with or cut along longitudinal edges, which are parallel to the warp yarns, so that, when it is specified as in D10 that the yarns are wound in the circumferential direction, the warp yarns and thus the longitudinal edges of the fabric follow circumferential lines of the column and, as a consequence, are perpendicular to the axis of the column. The drawing of D10 clearly is a confirmation of this view. Thus, even if not explicitly mentioned, the last feature of Claim 1 of the patent in suit is disclosed in D10.

6. The respondent has argued that this interpretation of the board is made with hindsight, since two other prior art documents, namely D4 and D5, show that the tendency was to arrange the reinforcing means at an angle relative to the axis of the column, that is to wind them spirally on the column. However, the alleged tendency is not confirmed by these documents: D5 teaches the use of a long fiber strand as reinforcing means, which cannot be compared with reinforcing fabric layers. As to D4, which was filed a few months after D10, it first discloses a rather different reinforcing

method which mainly consists of forming injection channels in the column surface, wrapping circumferentially a liquid-impermeable membrane around said column, over-wrapping this impermeable membrane with a fabric layer or a fiber tape which is then coated with a curable epoxy resin and finally injecting a hardenable liquid between the column surface and the wrapped layers, so as to stretch these layers. More important is the fact that, in this prior art, a circumferential wrapping of the layers or a spiral winding of a narrow fiber tape are disclosed as two different possibilities, contradicting thus the assertion of the respondent. It is even disclosed that, when a wide fabric layer is used, it is better to wrap it at right angles to the column axis in order to facilitate the wrapping steps.

7. The respondent has also submitted that D10 is not relevant, since it teaches an intermediate layer between the outer surface of the column and the reinforcement layer, so that said reinforcement layer is not in direct contact with said outer surface. Apparently, the respondent has considered that the only reinforcing layer in D10 is that having the crossed warp and weft yarns, that is to say the second layer. This argument is not relevant for the following reasons:

- Claim 1 of the patent in suit does not require that the layer having the selvedges perpendicular to the axis of the column should be the layer "in direct contact" with the outer surface of the column. Only the "composite reinforcement layer" is required to be so and, according to the description of the patent in suit, said composite

can include several fabric layers, as is the case in D10.

- In D10, the layer in direct contact with the outer surface of the column is- as already seen above- a carbon reinforced fabric layer with resin and thus complies with the definition of the "at least one fabric layer" of Claim 1. Claim 1 of the patent in suit gives no indication about the orientation of the yarns, so that any of the three layers disclosed in D10 can be considered as being part of a "composite reinforced layer" and they each have longitudinal edges perpendicular to the axis of the column. Thus, contrary to the respondent's opinion, there is no intermediate layer disclosed in D10 between the composite and the column.

Moreover, as indicated above, D10 teaches that the **order** of winding **can be reversed.** It clearly means that the fabric layer having the yarns in the circumferential direction of the column can be the layer which is in direct contact with the column, so that even in the case of a fabric used as originally produced and having unidirectional yarns, the longitudinal edges are perpendicular to the axis of the column.

8. The last argument of the respondent, namely that the fabric layers in D10 are distinct, is irrelevant, since Claim 1 of the patent in suit does not require a composite reinforcement layer having identical fabric layers.

9. For all these reasons, the board sees no difference between the reinforced column according to D10 and the

subject-matter of Claim 1 of the patent in suit. Therefore, this subject-matter is not new (Articles 52 and 54 EPC). Claim 1 of the main request falls, and with it also all the other claims. Hence, the main request does not fulfil the requirements of the EPC.

Auxiliary request

10. Claim 1 of this request corresponds to the above given Claim 15 of the main request and concerns a process, which comprises all the features of Claim 1 of the main request with additionally two process features, namely that it is an already resin impregnated layer which is applied to the column and that the resin is cured after the application.

The above first additional process feature can however be found on page 5 of D10, in which it is stated that the fabric is impregnated by a resin before application. The second additional process feature is also disclosed on the same page, in which it is said that the resin can be a thermosetting or thermoplastic resin, while on page 6 it is specified that, when a reinforced fabric layer prepreg is used, it is heated after its application on the column, so as to harden the resin.

Thus, all the features of the process claim 1 according to the auxiliary request are also disclosed in D10 and this claimed process is therefore not novel. As a consequence, the auxiliary request also does not comply with the requirements of the EPC (Articles 52 and 54 EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent EP-A-0 628 117 is revoked.

The Registrar: The Chairman:

A. Counillon C. T. Wilson