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D E C I S I O N
of 29 January 2003

Case Number: T 0743/02 - 3.2.1

Application Number: 97201238.9

Publication Number: 0811786

IPC: F16G 1/12

Language of the proceedings: EN

Title of invention:
Multi-strand cord for timing belts

Applicant:
N.V. BEKAERT S.A.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0743/02 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 29 January 2003

Appellant: N.V. BEKAERT S.A.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 10 April 2002 refusing European patent application No. 97 201 238.9 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: S. Crane
Members: M. Ceyte
H. Preglau

Summary of Facts and Submissions

I. European patent application No. 97 201 238.9 (publication No. 0 811 786) was refused by a decision of the Examining Division posted 10 April 2002.

The reason given for the decision was that the subject-matter of claim 1 lacks an inventive step having regard to the disclosure in

D1: EP-A-0 373 595

II. On 21 May 2002 the appellant (applicant) lodged an appeal against this decision and paid the prescribed appeal fee.

The statement of grounds of appeal was filed on 25 May 2002.

III. In reply to a communication of the Board the appellant filed on 12 December 2002 amended claims 1 to 7 and amended pages 3, 9, 10 and 12 of the description.

It requested that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

Claims: 1 to 7 as filed 12 December 2002 (with letter dated 9 December 2002).

Description: -pages 3, 9, 10 and 12 filed 12 December 2002;
-pages 1, 2, 4 to 8, 11 and 13 as originally filed.

Drawings: Figures 1 to 4 as originally filed.

IV. Amended claim 1 reads as follows:

"1. A steel cord (10) for the reinforcement of timing belts or transmission belts,
said steel cord comprising only two to five strands (12) twisted with each other in a first direction at a cord twisting pitch,
each of said strands (12) comprising only two to seven steel filaments (14) twisted with each other in said first direction at a strand twisting pitch,
said steel filaments (14) having a diameter ranging from 0.03 to 0.40 mm,
the ratio strand twisting pitch to filament diameter being greater than
30,
the ratio cord twisting pitch to filament diameter being greater than
30,
the ratio cord twisting pitch to strand twisting pitch being greater than
1,
wherein said strands are tightly twisted with each other and said filaments are tightly twisted with each other so that the part load elongation at 50 Newton of said steel cord is smaller than 0.40 %."

Reasons for the Decision

1. The appeal is admissible.

2. *Novelty*

The Board is satisfied that the subject-matter of claim 1 is novel over the cited prior art documents. Since this was never disputed during the examination and appeal proceedings there is no need for further detailed substantiation of this matter.

3. *Inventive step*

3.1 The claimed invention relates to a steel cord for the reinforcement of timing belts or transmission belts.

As explained in the introductory part of the European patent application, two properties are *inter alia* required from steel cords in order to make them suitable for the reinforcement of timing belts or transmission belts:

Firstly, the belt must run in the middle of the guide wheels and must show no tendency to rub against either of the upright edges of the guide wheels. If the guide wheels have no edges, the transmission belt must have no tendency to slip off the wheels. As a consequence, the reinforcing steel cords must be free of residual torsion and have a low torsion moment when put under an axial load.

Secondly, the belt must not stretch too much and thus the reinforcing steel cords must have a limited elongation.

The European patent application mentions as prior art the multi-strand S/S cords. Here both the strands and the cords are twisted in the same twisting direction. Such cords can be manufactured in an economical way by means of double twisting machines without substantial loss of twisting energy. It is however said that such cords are not suitable for the reinforcement of transmission belts due to their imbalance in torsion moment and due to their high elongation.

Therefore, the technical problem to be solved by the present invention is to render a multi-strand S/S cord suitable for the reinforcement of timing belts or transmission belts, that is with an acceptable low torsion moment and a limited elongation.

This problem is in essence solved by the features stated in claim 1.

3.2 The steel cord disclosed in D1 comprises only two or five strands twisted with each other in a first direction at a cord twisting pitch, each of the strands comprising two to seven steel filaments twisted with each other at a strand twisting pitch. The steel filaments have a diameter up to 0.25 mm. The ratio of cord twisting pitch to filament diameter is greater than 30. The ratio of the cord twisting pitch to strand twisting pitch is greater than 1.

The steel cord of claim 1 differs from that above in that the ratio strand twisting pitch to filament diameter is greater than 30. D1 does not teach that the combination of the ratio cord twisting pitch to filament diameter (greater than 30) and the ratio strand twisting pitch to filament diameter (greater than 30) leads to the desired low torsion moment which renders the steel cord suitable for the reinforcement of timing belts or transmission belts.

3.3 A further feature of the claimed invention is that the strands are tightly twisted with each other and the filaments are also tightly twisted with each other so that the part elongation load at 50 Newton is smaller than 0.40%. The claimed tightly twisting is made in order to limit the structural or initial elongation of the steel cord which can be determined by the part load elongation at a small load. The parameter describes the behaviour of the steel cord at small loads which

typically occur during vulcanisation. These loads are just enough to unwind the steel cord from the supply tool and to stretch the cord during vulcanisation.

However, the skilled person would not *a priori* not consider the prior art disclosed in D1, in order to solve the problem he was confronted with, since the subject-matter of D1 is a steel cord "suitable for use as reinforcing material for a carcass portion of a radial tyre for a truck or a bus". This citation is wholly silent as to the structural elongation of the disclosed cords and its potential effect on steel cords which might be used as reinforcing material in transmission belts. As shown by the completed Table II filed by the appellant with its statement of grounds of appeal, the part load elongation values cannot be extrapolated from the values of the elongation coefficient E1 given in Table I of D1. Thus D1 by no means teaches that the part load elongation at 50 Newton should be smaller than 0.40% in order to achieve the desired limited structural elongation for making a steel cord suitable for the reinforcement of timing belts or transmission belts.

Accordingly, without retrospective knowledge of the invention it was not possible for a skilled person with the aid of the teaching given in prior art document D1 to arrive at the claimed subject-matter.

3.4 Therefore in the Board's judgement the subject-matter of claim 1 involves an inventive step (Article 56 EPC).

4. Dependent claims 2 to 7 concern particular embodiments of the invention claimed in claim 1 and are likewise allowable.

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 documents indicated in point III above.

The Registrar: The Chairman:

S. Fabiani S. Crane