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D E C I S I O N
of 25 February 2005

Case Number: T 0124/03 - 3.2.1

Application Number: 96203219.9

Publication Number: 0777069

IPC: F16H 55/56

Language of the proceedings: EN

Title of invention:
Pulley

Patentee:
Van Doorne's Transmissie B.V.

Opponent:
LuK GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56, 113(1)

Keyword:
"Inventive step - no (all requests)"
"Basis of decisions - opportunity to comment (yes)"

Decisions cited:
G 0004/92

Catchword:
-

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Case Number: T 0124/03 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 25 February 2005

Appellant: (Proprietor of the patent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 14 November 2002 revoking European patent No. 0777069 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
S. U. Hoffmann

Summary of Facts and Submissions

I. The appeal is directed against the decision posted 14 November 2002 to revoke European patent No. 0 777 069.

II. The following prior art documents were introduced during the opposition procedure:

D1: EP-A-0 462 637

D4: EP-A-0 658 709

D8: GB-A-1 487 241

D11: DE-A-2 050 802

D12: DE-A-32 34 272

D13: DE-B-2 146 298

III. In the impugned decision the Opposition Division was of the opinion that the claims as amended according to the patent proprietor's main and first auxiliary requests resulted in a contravention of the requirement of Article 123(2) EPC and that the subject-matter of claim 1 according to the second auxiliary request did not involve an inventive step when beginning from the prior art known from D8.

IV. With a letter dated 24 March 2003 the appellant requested that the impugned decision be set aside and that the patent be maintained on the basis of amended claims. The Board duly summoned the parties to oral

proceedings to be held on 25 February 2005. In a communication pursuant to Article 11(1) RPBA the Board set out points to be considered in the oral proceedings. It indicated that these were primarily in respect of compliance of the amended claims with the requirement of Article 123(2) EPC and that in the event that any request were found to be formally in order the Board would move on to consider inventive step. With a letter dated 25 January 2005 the appellant filed respective amended claims 1 and 2 according to main and first to third auxiliary requests in which "the observations by the Board of Appeal have been taken into account". Additional fourth and fifth auxiliary requests for maintenance of the patent in amended form were filed.

V. With letters dated 7 November 2003 (D19) and 10 February 2005 (D20, D21) the respondent filed further prior art documents:

D19: Patent Abstracts of Japan & JP-A-61-105368

D20: GB-A-1 603 633

D21: DE-A-29 486 81.

VI. With a letter received by facsimile communication on 18 February 2005 the appellant indicated that "having regard to the latest submission by the Opponent of February 10" it would not attend the oral proceedings. The oral proceedings were held in its absence in accordance with Rule 71(2) EPC. During the oral proceedings the respondent requested that the appeal be rejected. During the consideration of

inventive step the Board indicated its view that the closest prior art was known from D4.

VII. The claims 1 according to the respective requests read:

Main request

"Pulley in a continuously variable transmission in motor vehicles with a first pulley disc (30) provided on a pulley shaft (38) and a second pulley disc (34) provided on a sleeve (39) of the pulley shaft (38), whereby each pulley disc smoothly extends in a predominantly radial direction from a radially inner diameter to a radially outer diameter, the second disc (34) being axially displaceable towards the first disc (30) by means of operating means (12) which comprise a piston/cylinder assembly that may be fed with fluid through a hole (51, 52, 53) in the pulley shaft (38), said pulley being of modular construction whereby the first disc (30) is provided on the pulley shaft (38) as a separate modular component and positive as well as non-positive connection means are provided to immovably fix said first disc (30) and said pulley shaft (38) with respect to each other, said positive connection means being formed by a raised edge (33) joining two adjacent portions of different diameter (31, 32) of the pulley shaft (38), characterized in that the first disc (30) is supported on said both portions (31, 32) of the pulley shaft (38)."

First auxiliary request

"Pulley in a continuously variable transmission in motor vehicles with a first pulley disc (30) provided on a pulley shaft (38) and a second pulley disc (34) provided on a sleeve (39) of the pulley shaft (38), whereby each pulley disc smoothly extends in a predominantly radial direction from a radially inner diameter to a radially outer diameter, the second disc (34) being axially displaceable towards the first disc (30) by means of operating means (12) which comprise a piston/cylinder assembly that may be fed with fluid through a hole (51, 52, 53) in the pulley shaft (38), said pulley being of modular construction whereby the first disc (30) is provided on the pulley shaft (38) as a separate modular component and positive as well as non-positive connection means are provided to immovably fix said first disc (30) and said pulley shaft (38) with respect to each other, said positive connection means being formed by a raised edge (33) joining two adjacent portions of different diameter (31, 32) of the pulley shaft (38) and said non-positive connection means being formed by an adhesive joint, characterized in that the first disc (30) is supported on said both portions (31, 32) of the pulley shaft (38)."

Second auxiliary request

"Pulley in a continuously variable transmission in motor vehicles with a first pulley disc (30) provided on a pulley shaft (38) and a second pulley disc (34) provided on a sleeve (39) of the pulley shaft (38), whereby each pulley disc smoothly extends in a predominantly radial direction from a radially inner

diameter to a radially outer diameter, the second disc (34) being axially displaceable towards the first disc (30) by means of operating means (12) which comprise a piston/cylinder assembly that may be fed with fluid through a hole (51, 52, 53) in the pulley shaft (38), said pulley being of modular construction whereby the first disc (30) is provided on the pulley shaft (38) as a separate modular component and positive as well as non-positive connection means are provided to immovably fix said first disc (30) and said pulley shaft (38) with respect to each other, said positive connection means being formed by a raised edge (33) joining two adjacent portions of different diameter (31, 32) of the pulley shaft (38), characterized in that the first disc (30) is supported on said both portions (31, 32) of the pulley shaft (38), in that the choice of material of the pulley shaft is optimised for transmitting torque and in that the choice of material and the nature of the surface of the first disc is optimised for transmitting a contact force on the drive belt."

Third auxiliary request

"Pulley in a continuously variable transmission in motor vehicles with a first pulley disc (30) provided on a pulley shaft (38) and a second pulley disc (34) provided on a sleeve (39) of the pulley shaft (38), whereby each pulley disc smoothly extends in a predominantly radial direction from a radially inner diameter to a radially outer diameter, the second disc (34) being axially displaceable towards the first disc (30) by means of operating means (12) which comprise a piston/cylinder assembly that may be fed with fluid through a hole (51, 52, 53) in the pulley shaft (38),

said pulley being of modular construction whereby the first disc (30) is provided on the pulley shaft (38) as a separate modular component and positive as well as non-positive connection means are provided to immovably fix said first disc (30) and said pulley shaft (38) with respect to each other, said positive connection means being formed by a raised edge (33) joining two adjacent portions of different diameter (31, 32) of the pulley shaft (38) and said non-positive connection means being formed by an adhesive joint, characterized in that the first disc (30) is supported on said both portions (31, 32) of the pulley shaft (38), in that the choice of material of the pulley shaft is optimised for transmitting torque and in that the choice of material and the nature of the surface of the first disc is optimised for transmitting a contact force on the drive belt."

Fourth auxiliary request

"Pulley in a continuously variable transmission in motor vehicles with a first pulley disc (30) provided on a pulley shaft (38) and a second pulley disc (34) provided on a sleeve (39) of the pulley shaft (38), whereby each pulley disc smoothly extends in a predominantly radial direction from a radially inner diameter to a radially outer diameter, the second disc (34) being axially displaceable towards the first disc (30) by means of operating means (12) which comprise a piston/cylinder assembly that may be fed with fluid through a hole (51, 52, 53) in the pulley shaft (38), said pulley being of modular construction whereby the first disc (30) is provided on the pulley shaft (38) as a separate modular component and positive as well as

non-positive connection means are provided to immovably fix said first disc (30) and said pulley shaft (38) with respect to each other, said positive connection means being formed by a raised edge (33) joining two adjacent portions of different diameter (31, 32) of the pulley shaft (38), said raised edge (33) facing towards the second pulley disc (34), characterized in that the first disc (30) is supported on said both portions (31, 32) of the pulley shaft (38)."

Fifth auxiliary request

"Pulley in a continuously variable transmission in motor vehicles with a first pulley disc (30) provided on a pulley shaft (38) and a second pulley disc (34) provided on a sleeve (39) of the pulley shaft (38), whereby each pulley disc smoothly extends in a predominantly radial direction from a radially inner diameter to a radially outer diameter, the second disc (34) being axially displaceable towards the first disc (30) by means of operating means (12) which comprise a piston/cylinder assembly that may be fed with fluid through a hole (51, 52, 53) in the pulley shaft (38), said pulley being of modular construction whereby the first disc (30) is provided on the pulley shaft (38) as a separate modular component and positive as well as non-positive connection means are provided to immovably fix said first disc (30) and said pulley shaft (38) with respect to each other, said positive connection means being formed by a raised edge (33) joining two adjacent portions of different diameter (31, 32) of the pulley shaft (38), said raised edge (33) facing towards the second pulley disc (32) and said non-positive connection means being formed by an adhesive joint,

characterized in that the first disc (30) is supported on said both portions (31, 32) of the pulley shaft (38)."

VIII. The appellant argued in respect of inventive step of the claims 1 essentially as follows:

It is known in the art to provide a modular construction for the first pulley disc and shaft. However, the prior art arrangements were dictated by the desire to simplify construction and function was a secondary consideration. By contrast, the pulley arrangements presently claimed are optimised in respect of functional requirements. The support of the disc on the two adjacent portions of the shaft is more stable than the arrangement shown in D8. As regards the feature in the second and third auxiliary requests concerning choice of material and nature of the disc surface, the inventor realised that the disc and the shaft are subjected to quite different loading. The prior art contains no indication to optimise the components according to their function in this way. The feature in the fourth and fifth auxiliary requests relating to the direction of the raised edge contrasts with the disclosure of D19 according to which the raised edge would not help to resist the axial force resulting from the discs clamping the belt.

IX. The respondent countered essentially as follows:
The mounting of the disc on the shaft must be capable of both transferring torque and reacting axial load. The skilled person knows from his general technical knowledge that non-positive and positive connection means as claimed may be used individually to fulfil the

respective functions and there is no evidence of any surprising effect resulting from the combination. As regards the first auxiliary request adhesive is a well known example of non-positive connection means. The feature of the second auxiliary request regarding optimisation of materials and finish is no more than a statement of the problem facing each skilled person when designing a product to fulfil an intended use. The subject-matter of claim 1 according to the third auxiliary request is merely the features according to the first and second auxiliary requests in juxtaposition. The feature of claims 1 according to the fourth and fifth auxiliary requests which is additional to the subject-matter of claim 1 according to the main request is known from both D20 and D21. It follows that the subject-matter of none of the claims 1 according to the appellant's requests involves an inventive step.

Reasons for the Decision

1. Since initiation of the appeal case the attention of both the parties and the Board has concentrated on compliance of the claims according to the appellant's requests with the requirement of Article 123(2) EPC. However, with the claims according to the main and first to fifth auxiliary requests filed with the letter of 25 January 2005 the requirements of Article 123(2) EPC were satisfied, leaving the way open for the Board to consider inventive step during the oral proceedings, as it had indicated that it would in its communication annexed to the summons. Moreover, it was in response to the filing of D20 and D21 that in its letter of 18 February 2005 the appellant stated that it would not

appear at the oral proceedings without comment as to either the relevance of D20 and D21 or the matter of their introduction into the procedure. It was therefore clear to the appellant that considerations during the oral proceedings would include inventive step and that the content of D20 and D21 might play a role in those considerations. The Enlarged Board of Appeal in its decision G 4/92 (OJ EPO 1994, 149) determined the conditions under which a decision may be taken at oral proceedings against a party who has been duly summoned but who fails to appear, in order to ensure compliance with the party's rights under Article 113(1) EPC. Before it considers substantive matters of the case the present Board finds it appropriate to determine that these conditions are fulfilled in the present case.

1.1 The Enlarged Board of Appeal indicated in its opinion firstly that a decision against a party who has been duly summoned but who fails to appear at oral proceedings may not be based on facts put forward for the first time during those oral proceedings. Similarly, new evidence may not be considered unless it has been previously notified and it merely supports the assertions of the party who submits it. The appellant in the present case was aware of the evidence D20 and D21 before it decided that it would not appear at the oral proceedings and indeed indicated that it was in the light of this evidence that it took that decision. The use of D20 and D21 in support of the present decision therefore does not contravene the requirements set out by the Enlarged Board of Appeal.

1.2 The Enlarged Board further considered that in the case that a party who has been duly summoned but fails to appear at oral proceedings new arguments may in principle be used to support the reasons for the decision insofar as these do not change the grounds on which the decision is based. The use during the oral proceedings for the first time in the appeal procedure of D4 as the closest prior art for consideration of the existing ground of lack of inventive step and its combination with the documents D20 and D21 therefore also complies with the opinion of the Enlarged Board. Moreover, D4 forms the starting point of the invention as set out in the patent specification and the elements of the prior art transmission described in figure 1 of the specification correspond to those disclosed in D4.

2. The respondent argues that D20 and D21 are not to be regarded as being late filed because *inter alia* they are a response to the amended requests of the appellant filed with the letter of 25 January 2005. The Board cannot accept this view. Although in the claims filed with the letter of 25 January 2005 the feature of the raised edge and adjoining shaft portions was for the first time correctly described in the light of the original disclosure, this feature was present in the claims which formed the basis of the impugned decision and D20, D21 were as relevant to the appellant's requests then on file as they are to its present requests. Nevertheless, the appellant has not opposed the introduction of D20 and D21 into the procedure and they are the first documents to have been filed from which this feature is known. Under these circumstances the Board exercises its discretion and admits the documents into the procedure.

3. The only substantive matter which remains to be considered in this case is inventive step. The patent relates in general terms to a transmission for a motor vehicle of the type commonly known as a constantly variable transmission ("CVT") in which power is transmitted by a continuous member running between two pulleys. Each pulley comprises two discs which define a V-shaped space between them and by varying the mutual spacing of the discs of a pulley its effective diameter and consequently the gear ratio of the transmission may be changed. The patent specification itself acknowledges the prior art known from D4 according to which a first disc of each pulley is formed integrally with the pulley shaft. A second pulley disc is provided on a sleeve of the pulley shaft and each pulley disc smoothly extends in a predominantly radial direction from a radially inner diameter to a radially outer diameter. The second disc is axially displaceable towards the first disc by means of operating means which comprise a piston/cylinder assembly that may be fed with fluid through a hole in the pulley shaft.

4. *Main request*

The subject-matter of claim 1 according to this request differs from that of D4 by the following features:

– the pulley is of modular construction whereby the first disc is provided on the pulley shaft as a separate modular component;

– positive as well as non-positive connection means are provided to immovably fix the first disc and the pulley shaft with respect to each other; and

– the positive connection means are formed by a raised edge joining two adjacent portions of different diameter of the pulley shaft, the first disc being supported on both portions of the pulley shaft.

4.1 A modular construction of the first disc on the pulley shaft is known *per se*, as evidenced by each of D1, D8, D11, D12, D13, D19, D20 and D21. It is within the general technical knowledge of the skilled person that the connection means between the disc and the shaft must be capable of stably locating the disc and transmitting both the axial and torsional loads applied between the shaft and the disc. D20 and D21 both show a joint between a first disc and a pulley shaft being formed by a raised edge joining two adjacent portions of different diameter of the pulley shaft with the disc extending along and, implicitly being supported on both portions. The disc is thereby stably supported and the raised edge is able to react the axial load. Non-positive connection means such as an adhesive joint for the transmission of the torsional loads are well known to the skilled person and are plainly suitable for use in combination with the positive connection means in the form of the raised edge.

4.2 It follows from the above that the subject-matter of claim 1 according to this request does not involve an inventive step (Article 56 EPC).

5. *First auxiliary request*

The subject-matter of claim 1 according to this request differs from that of the main request by the feature that the non-positive connection means are formed by an adhesive joint. As set out above in respect of the main request, an adhesive joint is a well known form of non-positive connection means which is clearly suited to the purpose. The subject-matter of claim 1 according to this request therefore also fails to involve an inventive step.

6. *Second auxiliary request*

The subject-matter of claim 1 according to this request differs from that of the main request by the features that the choice of material of the pulley shaft is optimised for transmitting torque and that the choice of material and the nature of the surface of the first disc is optimised for transmitting a contact force on the drive belt.

6.1 These features emphasise the selection of materials and surfaces according to function which according to the appellant is the conceptual difference between the presently claimed subject-matter and previous modular arrangements of a first disc on the pulley shaft. However, it is a fundamental part of the conventional design process to consider all aspects which impact on the construction and use of a product. Such consideration may involve balancing conflicting aspects and the emphasis to be placed on particular apects may be a matter of design policy based on factors such as economical aspects. There is no evidence on file to

support the appellant's view that conventional modular constructions are optimised for assembly rather than function but even if that were so the alternative design emphasis presently claimed does not result from inventive activity. Given that it would be obvious for the skilled person to modify the pulley known from D4 to result in the subject-matter of claim 1 of the main request, the additional specification of the design emphasis used in that process does not add an inventive step.

7. *Third auxiliary request*

The subject-matter of claim 1 according to this request is essentially a combination of that according to the first and second auxiliary requests, i.e. in comparison with D4 it contains the differentiating features set out under 4, 5 and 6 above. These features exist in juxtaposition and, as set out above, individually involve no inventive step.

8. *Fourth and fifth auxiliary requests*

The subject-matter of claim 1 according to these requests essentially differs from that according to the main and first auxiliary requests by the additional feature that the raised edge faces towards the second pulley disc. Since the discs apply a compressive force on the belt or chain between them the axial load which must be reacted by the raised edge is directed away from the second disc. The most logical arrangement of a surface to react this load is in the direction opposing the force, namely facing towards the second disc and, indeed, this is the arrangement already known from D20

and D21. The appellant refers to an oppositely directed raised edge in D19. However, this is not relevant to the matter of inventive step of the subject-matter of the present claims because in that arrangement the disc is friction welded to the shaft. Also the additional feature according to these requests therefore fails to establish an inventive step in the subject-matter of the respective claims 1.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

A. Counillon S. Crane