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D E C I S I O N
of 16 May 2002

Case Number: T 1121/00 - 3.2.1

Application Number: 94917730.7

Publication Number: 0704029

IPC: F16C 35/07

Language of the proceedings: EN

Title of invention:
Tolerance Rings

Patentee:
LILLESHALL PLASTICS AND ENGINEERING LTD.

Opponent:
Deutsche Star GmbH
Straub Werke AG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
-



Case Number: T 1121/00 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 16 May 2002

Appellant: LILLESHALL PLASTICS AND ENGINEERING LTD.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 19 October 2000
revoking European patent No. 0 704 029 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: F. Gumbel

Members: S. Crane
M. Aúz Castro

Summary of Facts and Submissions

- I. European patent No. 0 704 029 was granted on 18 February 1998 on the basis of European patent application No 94 917 730.7.
- II. The granted patent was opposed by the present respondents (opponents 01 and 02) on the ground that its subject-matter lacked inventive step (Articles 100(a) and 56 EPC).

Of the prior art documents relied upon in the opposition proceedings only the following have played any significant role on appeal:

(D2): DE-A-2 018 367

(D3): US-A-4 286 894

(D6): An extract from the catalogue "Toleranzhülsen" of Dr Tretter Maschinenelemente Göppingen.

- III. With its decision posted on 19 October 2000 the Opposition Division revoked the patent.

A notice of appeal against this decision was filed on 27 November 2000 and the fee for appeal paid at the same time. The statement of grounds of appeal was received on 27 February 2001.

- IV. Oral proceedings before the Board were held on 16 May 2002.

The appellants (proprietors of the patent) requested that the decision under appeal be set aside and the

patent maintained in amended form on the basis of claims 1 to 6 according to the main request or claims 1 to 5 according to the auxiliary request, both requests having been filed on 9 April 2002.

Claim 1 according to the main request is as follows:

"Using of a single tolerance ring for communicating torque between a steering column and a sleeve located around the steering column and for enabling the steering column and the sleeve to slip relative to one another when the torque applied to the steering column exceeds a predetermined limiting torque value wherein the tolerance ring has a plurality of axially spaced apart tracks of teeth on its surface, the tracks of teeth running around the circumference of the tolerance ring."

Claim 1 of the auxiliary request contains the additional feature that the teeth in adjacent tracks are aligned with each other.

V. The arguments put forward by the appellants in support of their requests can be summarised as follows:

The Opposition Division had only reached the decision it did through oversimplification of the issues and the unallowable application of hindsight. In a conventional steering column locking mechanism, such as disclosed in document D6, the locking sleeve is mounted on the steering column by means of two separate spaced tolerance rings. The object of the invention was to simplify the known arrangement without sacrificing performance and this was achieved by the replacement of the two separate tolerance rings by a single tolerance

ring having two tracks of teeth. The Opposition Division had combined the teachings of documents D6 and D2 to arrive at the claimed subject-matter but in reality the person skilled in the art would have no cause to refer to document D2 since this was primarily concerned with increasing the amount of torque which could be transferred by a tolerance ring, something which ran counter to the whole principle of a steering column locking mechanism. A strong indication that document D2 had not been seen as relevant by the person skilled in the art was the fact that it was of the order of 20 years older than document D6. Another factor which would in any case have inhibited the person skilled in the art from replacing the two tolerance rings of document D6 by a single one was the fact that the latter would better prevent tilting of the locking sleeve with respect to the steering column.

Document D2 clearly taught that the preferred arrangement was to have the teeth in the respective rows staggered rather than aligned as specified in claim 1 of the auxiliary request. Thus on the assumption that the person skilled in the art would have combined the teaching of documents D6 and D2, he would certainly not arrived at the subject-matter of this claim. The Opposition Division had referred to a third piece of prior art in this respect, document D3, but this mosaicing of documents was inappropriate since documents D2 and D3 were mutually contradictory.

VI. The respondents requested dismissal of the appeal and argued substantially as follows:

With respect to Figures 6 and 7 document D2 unambiguously referred to the space-saving to be

achieved by the use of a single tolerance ring with a plurality of tracks of teeth in comparison with a corresponding plurality of separate tolerance rings. When then in the course of automobile development it became necessary to reduce the space requirement of the type of steering column locking mechanism disclosed in document D6 it was obvious to turn to the proposal of document D2 to use only a single tolerance ring.

As for the auxiliary request, the benefit of having aligned teeth in the two tracks, ie that there would only be one set of grooves cut into the component fitted over the tolerance ring, was something of which the person skilled in the art was well aware and as could be seen from document D3 tolerance rings with two tracks of teeth in which the teeth of the tracks were aligned were known *per se*. The person skilled in the art was therefore free to adopt this arrangement of the teeth rather than that said to be preferred, to achieve a different purpose, in document D2.

Reasons for the Decision

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

2. The invention as claimed relates to a steering column locking mechanism for a vehicle. In order to prevent the locking mechanism being broken by excessive force applied to the steering wheel it had become practice to attach the sleeve with which the actual lock member cooperated via a torque limiting coupling to the steering column. Thus if a thief sought to break the

locking mechanism by force the steering column would, at a certain threshold torque level, rotate with respect to the locking sleeve, leaving the locking mechanism intact. The threshold torque level was however so high to make driving the vehicle in this manner impossible. The type of steering column locking mechanism with which the invention is specifically concerned is disclosed in document D6, wherein the torque limiting coupling takes the form of two separate tolerance rings interposed between the locking sleeve and the steering column.

As explained in the patent specification the type of arrangement disclosed in document D6, with its two separate tolerance rings, requires (depending on the manner of mounting the tolerance rings) either high machining costs for the shaft, the necessary machining also possibly weakening the shaft, or high assembly costs. The aim of the invention is therefore to simplify the known arrangement whilst at the same time maintaining the same threshold torque level.

Document D2 is directed to improvements in tolerance rings. As stated in column 1, lines 54 to 57, the technical problem addressed by the document is to increase the torque transfer capacity of such a ring, at constant overall ring width. To do this a particular range of depth to length ratio for the teeth of the ring is proposed, it being explained that the previous belief that increasing the length of the teeth increase torque transfer capacity was wrong. As a consequence the tolerance rings of document D2 have a plurality of axially spaced apart tracks of relatively short teeth. similar considerations are found in the present patent specification at column 2, lines 35 to 39, and in the

description of Figure 8, where it is indicated that the performance of a single tolerance ring with a wide track of teeth was not acceptable.

With respect to Figures 6 and 7 document D2 explains how a single tolerance ring with a plurality of axially spaced tracks of teeth is preferable from a space-saving point of view in comparison with a corresponding plurality of separate tolerance rings.

For the person skilled in the art seeking to improve the arrangement of document D6 in the manner indicated above, document D2, especially its Figures 6 and 7, gives the clear teaching to replace the two separate tolerance rings of the prior art by a single tolerance ring having two or more axially spaced tracks of teeth. The Board cannot accept the argument that the person skilled in the art would disregard document D2 as this was primarily concerned with increasing torque transfer capacity, whereas the arrangement of document D6 was already sufficient in this respect. It namely goes hand in hand with the teaching of document D2 that if an increase in the torque transfer capacity at constant tolerance ring width can be obtained, then for a specified torque transfer level the width of the tolerance ring can be reduced. Thus for that reason alone document D2 would have been of interest to the person skilled in the art.

The Board can also find nothing convincing in the argument of the appellants that the person skilled in the art would have been inhibited by general engineering considerations from replacing the two spaced tolerance rings of the prior art arrangement as disclosed in document D6 by a single tolerance ring. It

is true that the two spaced rings will in principle provide the benefit of a more stable mounting of the locking sleeve on the steering column but if the prime concern of the person skilled in the art is simplification and space saving he will be prepared to sacrifice that benefit. In this context it has to be noted that the patent specification contains no indication of any means intended to compensate for this potential loss of stability.

As for the argument that document D2 had already been around for 20 years or so at the date the claimed invention was made, the respondents have rightly pointed out that there has been no demonstration of a long-felt need for a reduction in the space requirement of the steering column locking mechanism and that is was only fairly recent developments in this area of automobile design which had imposed this requirement.

Having regard to the above the Board has come to the conclusion that the subject-matter of claim 1 according to the main request was obvious for the person skilled in the art and thus lacks inventive step (Article 56 EPC).

3. In comparison with claim 1 of the main request claim 1 of auxiliary request contains the additional feature that the teeth in adjacent tracks are aligned with each other.

The advantage associated with this feature is explained in the patent specification at column 3, lines 15 to 42 and column 5, line 50 to column 6, line 3. This lies in the fact that on assembly of the steering column locking mechanism the locking sleeve is drawn over the

tolerance ring and the teeth of tolerance ring cut shallow grooves in the surface of the locking sleeve. If the teeth in the tracks are axially aligned only one set of such grooves will be formed, thereby minimising weakening of the locking sleeve. It is however also explained there that the corresponding state of affairs was known in the context of separate tolerance rings and that special care had to be taken when mounting these with their teeth aligned if the formation of a single set of cut grooves was to be achieved, see column 3, lines 18 to 23. Having regard to this it was thus obvious for the person skilled in the art when adopting the teaching derivable from document D2 to replace the separate tolerance rings of document D6 by a single tolerance ring with a plurality of tracks of teeth, to arrange those teeth in axial alignment.

The fact that document D2, in the context of a preferred embodiment, proposed arranging the teeth in respective tracks in staggered fashion, in order to achieve a specific effect concerned with avoiding eccentricity, cannot be seen as barring the person skilled in the art from departing from the preferred embodiment and taking the obvious step described above for achieving a different desired effect. In this context it should be noted that the space-saving to be achieved, as discussed with respect to Figure 6 and 7 of document D2, is wholly independent of whether the teeth in adjacent tracks are staggered or aligned, and that tolerance rings with aligned teeth in adjacent tracks were known *per se*, see for example document D3.

Thus the subject-matter of claim 1 of the auxiliary request also lacks inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

S. Fabiani

F. Gumbel