BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File Number: T 393/90 - 3.2.1

Application No.: 85 109 627.1

Publication No.: 0 174 483

Title of invention: Core for an automobile bumper

Classification: B60R 19/22, C08J 9/18

D E C I S I O N
of 18 February 1992

Proprietor of the patent: KANEGAFUCHI KAGAKU KOGYO KABUSHIKI KAISHA

Opponent: BASF AG

Headword:

EPC Article 56

Keyword: "Inventive step (no)"

Headnote

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 393/90 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 18 February 1992

Appellant : (Proprietor of the patent)
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Respondent : (Opponent)
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Decision under appeal :
Decision of Opposition Division of the European Patent Office dated 16 March 1990 revoking European patent No. 0 174 483 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : F. Gumbel
Members : P. Alting van Geusau
C. Payraudeau

Summary of Facts and Submissions

I. The mention of grant of European patent No. 0 174 483, in respect of European patent application No. 85 109 627.1 filed on 31 July 1985 and claiming a priority of 14 August 1984 (JP 169552/84), was published on 27 January 1988.

II. In a notice of appeal filed on 31 May 1988 the Respondent (Opponent) requested the revocation of the patent on the grounds that its subject-matter lacked novelty and further did not involve an inventive step (Article 100 EPC) in view of the prior art reflected inter alia by the following documents:

D1: EP-A- 0 155 558

D2: EP-A- 0 095 109, considered as comprised in the state of the art pursuant to Article 54(3) and (4) EPC.

III. By a decision of 16 March 1990 the Opposition Division revoked the patent.

The Opposition Division held that the subject matter of the independent Claim 1 as granted was not novel in view of the prior art disclosed in D1, or, respectively, in D2.

IV. An appeal was lodged against this decision on 11 May 1990 with payment of the appeal fee on the same day. The Statement of Grounds of Appeal was filed on 14 July 1990 and contained in addition to a main request for maintenance of the patent as granted three auxiliary requests for maintenance of the patent in amended form with respective new sets of claims.

V. In accordance with auxiliary requests for oral proceedings the Board summoned the parties with communication of 15 July 1991 to oral proceedings which were held on 18 February 1992.

In its communication, the Board expressed the provisional opinion that, as far as inventive step of the subject-matter of the patent was concerned, the documents

D7: EP-A-0 097 504, cited in the opposition procedure and being the equivalent to JP-A-58 221 745 discussed in the contested patent,

D11: EP-A-0 071 981 and

D12: EP-A-0 072 499 both cited by the Respondent in response to the Statement of Grounds of Appeal,

would appear to provide the skilled person with sufficient information to allow him to arrive in an obvious manner at the subject-matter claimed in the sets of claims of the present requests of the Respondent.

VI. At the oral proceedings the Appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of:

Main request: Claims 1 to 3 submitted as second auxiliary request together with the Statement of Grounds of Appeal; or

Auxiliary request: Claims 1 to 3 submitted as third auxiliary request together with the Statement of Grounds of Appeal.

The claims according to these requests read as follows:

Main request

"1. A core (1b) for an automobile bumper (1), consisting of foam having a bulk density of 0,047 to 0,18 g/cm^3 and being made of an ethylene-propylene random copolymer, the ethylene content of said foam being 0,1 to 2,5 % by weight.

2. The core of claim 1, wherein the bulk density of said foam is 0,052 to 0,075 g/cm^3.

3. A core (1b) for an automobile bumper (1), consisting of foam having an apparent bulk density of 0,062 g/cm^3 and being made of ethylene-propylene random copolymer, the ethylene content of said foam being 5,0 % by weight."

Auxiliary request

"1. A core (1b) for an automobile bumper (1), consisting of foam having a bulk density of 0,051 to 0,18 g/cm^3 and being made of an ethylene propylene random copolymer, the ethylene content of said foam being 0,1 to 2,5 % by weight."

Claims 2 and 3 as in main request.

VII. The Appellant essentially submitted the following arguments in support of his requests:

In Claim 1 of both requests the ethylene content has been restricted to avoid the accidental disclosure of D1. The claims differ also from the disclosures of D2 and D11 in that there is nowhere mentioned in these documents that

any of the materials disclosed therein could be suitable as core of an automobile bumper.

From Table 1 of the present patent specification, it can be taken that the energy absorption ratio of foam materials of the kind here in question with an ethylene content of 0.01 to 2.5% by weight and of 5% by weight decreases for apparent densities of foam mouldings below 0.051 g/cm^3 and above 0.18 g/cm^3. Accordingly, a shock absorbing material of the kind disclosed in D2 which is of lower density, would not be suitable for use as the core of an automobile bumper which must be stable in quality, light in weight and superior in energy absorption capacity and should have a high dimensional stability.

The selection as defined in the claims provides particularly suitable material for such bumper cores.

It is to be noted that D7 which concerns automobile bumpers explicitly states that foam materials having densities higher than 0.045 g/cm^3 are not suitable for use as bumper cores. Keeping in mind the fact that D11 which discloses such foam materials of higher density (within a range of 0.026 to 0.060 g/cm^3) but not specially intended to be used as bumper cores is an older document filed by the same applicant as D7, the skilled person would have been lead away from the present invention by the combined teaching of these prior documents.

VIII. The Respondent requested that the appeal be dismissed and submitted essentially the following arguments:

The restriction to an ethylene content range of 0.1 to 2.5% by weight cannot be accepted for reasons of Article 123(2) EPC since this range is not disclosed in

the application as originally filed; rather the originally preferred range was 2 to 5%.

Further, D7 already discloses that ethylene-polypropylene random copolymers with 1 to 5% ethylene are particularly suitable for fabricating automobile bumper cores.

Considering the comparative Example 2 of D7 which has a density of 0.047 g/cm^3 the subject-matter of Claim 1 of the main request lacks novelty since this example falls within the claimed ranges.

This example has in fact a high compression stress value and a very satisfactory efficiency of energy absorption but a low dimensional recovery. Therefore, the skilled person looking for a material having a high shock absorption capacity would immediately recognise from the Table 1 of D7 that materials of this kind with a higher density have also a higher shock absorbing capacity. He would also observe that the dimensional recovery is of course relatively low but he would recognise that the dimensional recovery is a secondary factor when the desired effect is to increase the shock absorbing capacity when the stroke is short. He would not therefore be prevented from using the material of comparative Example 2 of D7 for bumper cores by the fact that this material is considered in D7 as not appropriate for bumper cores having a high dimensional recovery.

Also from D11 it would be clear that in view of the applications suggested on page 5, lines 4 to 7, the use of the disclosed foam material, having densities up to 0.1 g/cm^3, for automobile bumpers is obvious to the skilled person.

As concerns the alleged better properties of the claimed material no other examples than those appearing in the contested patent have been presented and in view of the fact that these examples do not show that the properties of the claimed material are in any way different from what could be expected by the skilled person on the basis of the information disclosed in D7 and D11, there is no evidence that the ranges defined in Claim 1 of the main and auxiliary requests give rise to any unexpected properties.

Reasons for the Decision

1. The appeal is admissible.

2. Formal allowability of the new claims

2.1 The subject-matter of Claim 1 of the main request is based on the originally filed Claim 1, the range of the ethylene content of 0.1 to 8% by weight being restricted to a narrower range of 0.1 to 2.5%.

The Respondent argued that in view of the preferred range of 2 to 5% referred to in the description and in Claim 2 as originally filed, the new range of 0.1 to 2.5% related to a different invention and as such the amendment of the range should be refused under Article 123(2) EPC.

However, the new upper limit of 2.5% is supported by a plurality of examples shown in Table 1 on page 5 of the description as originally filed, the bulk densities of these examples also falling within the claimed range.

Further, as can be derived from the examples in Table 1 of the patent in suit as well as in the tables of D7 and D11,

the ethylene content of the copolymer is not shown to be so closely related to the bulk density of the foam that a significant degree of interaction between these parameters in the original or now claimed range must be considered.

Therefore the restriction of the range of the ethylene content to the present narrower one has only the effect of bringing the scope of the first independent claims of the requests in line with the examples disclosed in the description which is in the present case considered to be in accordance with the requirements of Article 123(2) EPC.

Claim 1 of the auxiliary request is based on the original Claim 1 but contains, in addition to the narrower range of 0.1 to 2.5% of the ethylene content, a restricted range of bulk density of 0.051 to 0.18 g/cm^3.

This amendment is, again, based on the examples disclosed in Table 1 of page 5 of the originally filed description to include only examples in which the energy absorption ratio is more than 88%. This amendment does not give rise to objections under Article 123(2) EPC either.

Claims 2 and 3, which are identical in the main and auxiliary requests, are based respectively on the original Claim 2 and on a particular example given in Table 1 of the patent the parameters of which fall within the ranges of the ethylene content and bulk density as originally claimed in Claim 1. These Claims thus also comply with Article 123(2) EPC.

2.2 Considering that the present claims are restricted in scope when compared to the granted claims they also meet the requirements Article 123(3) EPC.

3. Novelty

3.1 Document D7, which is the equivalent of the JP-A-58 221 745 specification cited in column 1, line 50, of the description of the contested patent is considered to represent the closest prior art.

This document discloses a core for an automobile bumper consisting of a foam made of a base resin of an ethylene/propylene random copolymer with a preferred ethylene content of 1 to 5%, having a bulk density of preferably 0.015 to 0.045 g/cm^3 and a compressive stress value at 50% compression over 1 kg/cm^2.

The Respondent has submitted that the subject-matter of Claim 1 of the main request was not novel in view of the comparative Example 2 of Table 1 of D7 which discloses a bumper core material made from an ethylene/propylene random copolymer having a density of 0.047 g/cm^3 which falls within the claimed range of bulk densities given in this Claim 1.

The Board considers however that the ethylene content effectively used in this specific example is not disclosed in D7. This example cannot therefore take away the novelty of the subject-matter of Claim 1 of the main request.

3.2 The novelty of the subject-matter of the independent claims of both the main and auxiliary requests can also be accepted in respect of the other available documents, including D1 which represents a prior art in accordance with Article 54(3) EPC, none of them disclosing a core for an automobile bumper comprising the combination of parameters of bulk density and amount of ethylene as defined in these independent claims.

4. Inventive step

4.1 As explained by the Appellant, the automobile bumper cores according to D7 are not suitable for satisfactorily absorbing shock energy when the stroke is short (i.e. the strain is small) which property is particularly important for preventing vehicle damage during parking manoeuvres when the bumper of the car hit an obstacle at low speed (see also column 1, line 54 to 59, of the description of the contested patent).

4.2 Accordingly the underlying problem to be solved by the present patent is to improve of the energy absorption capacity while maintaining the properties of stability and low weight of the foam bumper cores disclosed in D7 (see column 2, lines 3 to 9, of the contested patent).

4.3 Considering now whether the skilled person would draw any further information from the disclosure of D7 leading to the subject-matter of the independent claims of the requests under consideration, the Board notes that an upper limit of 0.045 g/cm^3 for the bulk density of the foam was selected in this prior art to maintain a satisfactory balance between the dimensional recovery and the energy absorbing properties (see page 4, lines 3 to 7).

It is however clear from the examples in Table 1 on page 6 of D7 that when the density is increased the compression stress value at 50% compression also increases. Thus, the core according to the comparative Example 2 with a bulk density of 0.047 g/cm^3 has high compression stress and efficiency of energy absorption values but lower dimensional recovery ability.

In view of these teachings it is, in the Board's opinion, immediately apparent to the skilled person that the properties of the core foam, when considering the dimensional recovery and energy absorption abilities, depend principally on the density which, when only compression stress and energy absorption are concerned, should be selected in the higher range.

In this respect also the document D11, by the same applicant as D7 but of earlier date, teaches that foamed ethylene/propylene random copolymer has ideal cushioning properties for use in automotive parts and that the cushioning properties are mainly dependent upon the density of the foamed article. In D11, a density of 0.026 to 0.060 g/cm^3 is preferred because if it is less than 0.026 g/cm^3, the compression hardness is too low and if it exceeds 0.060 g/cm^3 the cushioning property is not sufficient (see page 3, lines 21 to 29).

These teachings are considered to give the skilled person a clear lead to the solution of the underlying problem of the contested patent by selecting higher density foam to improve the energy absorption properties at low strain in cases where the dimensional recovery is considered less important.

4.4 The appellant submitted that D7 pointed in a direction away from the solution proposed in the patent because a foam of high bulk density such as disclosed in the earlier document D11 was not considered suitable for use in automobile bumpers (page 4, lines 6 and 7).

However, this particular statement does not contradict the general information presented in both D7 and D11 that higher bulk density values result in better energy absorption. Only when flexibility or dimensional recovery

are concerned, upper limits of the bulk density should be observed to avoid that the foam becomes too hard to have still good cushioning properties.

If such flexibility or dimensional recovery are not essential for the intended use, the skilled person is, in the Board's opinion, capable to recognise from these documents that full advantage can be taken of the better energy absorption properties of foam of higher densities i.e. densities of 0.060 g/cm^3 or even 0.1 g/cm^3 (see the comparative Example No. 1 of D11).

4.5 The Board notes that the Appellant contended that the cores of the patent would have superior static energy absorption and that experimental data demonstrating this fact would be filed (see page 4, 4th paragraph, of the Statement of Grounds of appeal). However no experimental data other than the examples disclosed in the patent have been provided and on the basis of these examples and the examples in the relevant prior art documents there is no reason to suppose that the properties in the ranges now claimed would unexpectedly differ from the foam properties disclosed in the available prior art.

4.6 Hence, for solving the underlying problem of the present patent, that is to make an automobile bumper core having a high energy absorption, the skilled person had at his disposal a number of examples of high density foams disclosed in D7 and D11 (see, in particular, the examples disclosed in these document having a bulk density of 0.047, 0.055 and 0.1 g/cm^3).

All these bulk densities fall within the bulk density range of Claim 1 of the main request, the latter two also within the range of Claim 1 of the auxiliary request and

the last one also falling in the claimed range of the ethylene content.

As regards the ethylene content, D7 discloses a preferred content of 1 to 5% whereas D11 discloses a number of examples with 2.5% ethylene having bulk densities of 0.019, 0.028 and 0.1 g/cm3 showing - as was already indicated in point 2.1 above - that the bulk density is not directly dependent upon the ethylene content and therefore should be considered in itself rather than in combination with the bulk density.

The ethylene content in the new range in Claim 1 or the value of 5% in Claim 3 of the requests clearly do not lead to properties which are different from the properties in the range of 1 to 5% preferred in D7 as far as the properties taken into consideration for the intended use are concerned and therefore no inventive significance can be attributed to either the new range or to the value of 5%.

4.7 Summarising, the Board comes to the conclusion that in view of the prior art disclosed in D7 and D11 and the above stated problem to be solved, automobile bumper foam cores made of an ethylene-propylene random copolymer with bulk densities and ethylene contents falling within the ranges of bulk density and ethylene content claimed in the first as well as last independent Claims of the main and auxiliary requests would be arrived at in an obvious manner by the skilled person and that therefore the subject-matter of these Claims cannot be considered to involve an inventive step.

Hence, neither the main nor the auxiliary request can form the basis for maintenance of the patent in amended form.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

S. Fabiani

S. Fabiani

The Chairman:

F. Gumbel

F. Gumbel

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