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Aktenzeichen / Case Number / N° du recours : T 286/85

Anmeldenummer / Filing No / N° de la demande : 81 106 177.9

Veröffentlichungs-Nr. / Publication No / N° de la publication : 045 954

Bezeichnung der Erfindung:
Title of invention: Shock Absorber
Titre de l'invention :

Klassifikation / Classification / Classement : F16F 9/34, B60G 13/08

ENTSCHEIDUNG / DECISION

vom / of / du 18.September 1987

Anmelder / Applicant / Demandeur : Nissan Motor Company, LTD

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Art. 54,56

Kennwort / Keyword / Mot clé : "novelty - no measurement from a diagrammatic drawing, inventive step (yes) - dimensioning formula"

Leitsatz / Headnote / Sommaire

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Case Number : T 286/85

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 18 September 1987

Appellant : Nissan Motor Company, LTD.
No. 2, Takara-cho, Kanagawa-ku,
Yokohama-shi, Kanagawa-ken, JP

Representative : Ter Meer, Dr., Dipl.-Chem, Müller, Dipl-Ing,
Steinmeister, Dipl.-Ing, Patentanwälte
Mauerkircherstraße 45
8000 München 80

Decision under appeal : Decision of Examining Division 116 of the European Patent Office dated 10 July 1985 refusing European patent application No 81 106 177.9 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : P. Delbecque
Members : F. Gumbel
G.D. Paterson

Summary of Facts and Submissions

I. European patent application No. 81 106 177.9, filed on 6 August 1981 and published on 17 February 1982 (publication number 0 045 954), was refused by decision of the Examining Division dated 10 July 1985.

II. The decision was based on Claims 1 to 7 received on 27 December 1983. The Examining Division stated in its decision that the subject-matter of Claim 1 is not clear in the sense that the value $\frac{h.Sv}{So}$ indicated in the formula

cannot be dimensionless. Giving it the only sensible interpretation as being in terms of millimetres, the subject-matter of Claim 1 did not involve an inventive step, since the claimed formula could be derived without the exercise of an inventive skill merely from theoretical knowledge and routine experimental ability of a person skilled in the art.

III. On 9 September 1985 the Applicants lodged an appeal against this decision and paid the appeal fee the same day. On 21 November 1985 they filed the Statement of Grounds.

In this statement the Appellants point out that the reflections and calculations leading to the invention as claimed cannot be considered as being obvious in the light of the available prior art.

IV. In reply to a communication of the Board of Appeal pursuant to Article 110(2) EPC the Appellants submitted a revised description (pages 1 to 12) and a new set of claims (Claims 1 to 4) together with an amended sheet 2/4 of the drawings.

Some further amendments to the description pages 7, 9 and 10 and to Claim 4 were agreed to by the Representative in a telephone conversation on 18 September 1987.

V. The Appellants request by implication that the decision of the Examining Division be set aside and a patent be granted on the basis of the newly filed documents with the amendments agreed to.

VI. Consequently, Claim 1 reads as follows:

"1. A hydraulic shock absorber including a piston (3) disposed within a hollow cylinder (2) in movable position responsive to a shock applied thereto, said piston defining at least one hollow vortex chamber (9, 10) therein, said vortex chamber being communicated with an upper and a lower fluid chamber (7a, 7b) defined in the hollow cylinder to introduce a working fluid and to generate a vortex pattern fluid flow therein for producing an absorbing force C H A R A C T E R I S E D in that said vortex chamber (9, 10) is sized to satisfy the specific relationship

$$1 \text{ mm} \leq \frac{h.Sv}{So} \leq 6 \text{ mm}$$

where: h is the depth of the vortex chamber;
Sv is the cross-sectional area of the vortex chamber; and
So is the effective cross-sectional area of the piston acting on the fluid to increase and decrease the pressure thereof.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. Having inserted the dimension "mm" into Claim 1, the Appellants have removed the objection of lack of clarity raised in the decision under appeal. Furthermore, some clarifying amendments suggested by the Board have been adopted. Hence, these is no further objection in this respect.

3. Concerning novelty, also doubted to some extent in the impugned decision, it is to be stated that nowhere in the available prior art is there a written disclosure of the formula indicated in the characterising part of Claim 1 or of a hydraulic shock absorber being dimensioned in accordance with this formula.

It is true, as the Examining Division pointed out in its decision, that the shock absorber shown in Figure 4 of DE-C-697 799 could be considered as comprising a value of $\frac{h.Sv}{So}$ which is within the claimed range, if measured from the drawings (the value would be about 2.1 in the downward direction of the piston and about 4.0 in the upward direction). However, such a conclusion would not be correct in the present case, since dimensions obtained merely by measuring a diagrammatic representation in a document do not form part of the disclosure (see T 204/83 published in OJ 10/85, 310). In the present case the shock absorbers shown in Figure 4 of DE-C-697 799 are obviously not drawn to scale but rather represented in a diagrammatic way in the sense of the above decision. Consequently, in the

absence of any novelty destroying prior art, and taking into account that there is no sound reason for assuming that vortex chambers in pistons of existing hydraulic shock absorbers according to the preamble of Claim 1 necessarily must be sized according to the relationship specified in the characterising portion of that claim, the subject-matter of Claim 1 is to be considered as novel.

4. Having regard to the question of inventive step the following is to be observed:

4.1 The present application is concerned with the problem of providing a shock absorber of the type indicated in the preamble of Claim 1 (such a shock absorber is known both from DE-C-697 799 and US-A-3 220 517) in which the damping force created by the vortex chamber is maximised when the vehicle driving conditions are relatively unstable (e.g. abrupt turning, rapid acceleration) and minimised in stable driving conditions (e.g. smooth road).

4.2 None of the documents of the available prior art specifically mentions this problem or gives a solution thereto. The document US-A-3 220 517 deals with the problem of providing a damping element which is completely reliable in operation as a result of the absence of movable parts. It recommends inter alia the use of a shock absorber piston having one or two vortex chambers and is based on the assumption that the damping force depends on the piston speed. The document DE-C-697 799 is concerned with the problem of rendering the damping force independent of the viscosity of the damping fluid.

4.3 The only document dealing with a similar problem to the present application is US-A-4 082 169. However, while the solution specified in the present Claim 1 is based on the

idea that the damping force is mainly dependent on the piston stroke, the known shock absorber of the US patent is designed in order to make use of varying accelerations of the piston motion resulting from differing road and driving conditions. Responsive to the degree of acceleration of the piston there are means for causing the fluid either to enter the vortex chamber radially, which means at low damping effect, or tangentially, i.e. at a high damping effect. Hence, the means suggested in that prior art document are totally different from what is claimed in Claim 1.

4.4 As follows from the foregoing, the most pertinent documents do not give any hint of the idea underlying the invention as claimed, according to which shock absorbers comprising a vortex chamber produce the damping force mainly dependent on the piston stroke, and not on the motion speed or the acceleration of the piston. The other documents cited in the Search Report are even further away, both with respect to the problem and to the solution as claimed.

4.5 Although the present description sets out on page 1, paragraph 3 that shock absorbers comprising a vortex valve produce the absorbing force mainly depending on the piston stroke and not substantially depending on the piston speed, this does not necessarily mean that this knowledge was part of the prior art as meant by Article 54(2) EPC.

4.6 But even if so, i.e. if a skilled person was able to start from this knowledge, it was in the opinion of the Board not obvious to arrive at the solution as claimed, since then still some steps had to be made which are without any lead in the prior art and which cannot be considered as coming within general technical knowledge and routine experimental ability of a person skilled in the art.

4.7 Firstly, there had to be conceived the idea of making use of the knowledge about the stroke dependency of the damping force in the claimed sense, that is in the sense of dimensioning the vortex chamber in a certain relationship with respect to the effective cross-sectional area of the piston. Nowhere in the available prior art is there any suggestion in the sense that the vortex chamber should be given a specific size in order to obtain varying damping forces dependent on differing road and driving conditions.

4.8 Furthermore, in order to arrive at the relationship according to the formula in Claim 1, the skilled man had in a second step to establish the values for the piston stroke at which at the earliest and the latest the full damping force should be produced and - in a third step - he had to determine the flow factor α_{crit} (mentioned in the decision under appeal) to be 5. Although those establishments of values are basically of an empirical nature, that does not mean that they are plainly obvious in the present case, where the prior art does not give any guidance as to how those values should be approximately chosen.

4.9 For all those reasons, the Board comes to the conclusion that the subject-matter of Claim 1 could not be found without the exercise of an inventive step pursuant to Article 56 EPC.

5. Claim 1, therefore, is allowable (Article 52 EPC).

6. Claims 2 to 4 are related to particular embodiments of the shock absorber according to Claim 1 and are likewise allowable (Rule 29(3) EPC).

7. The description is in agreement with the wording of the claims and indicates the most relevant background art.

Since it also meets the other requirements of Rule 27 EPC and is now free of inconsistencies, it is no longer open to objection.

Order

For these reasons, it is decided that:

1. The decision of the Examining Division is set aside.

2. The case is remitted to the first instance with the order to grant a European patent on the basis of the following documents:

Claims 1 to 4 and description, pages 1 to 12, received on 1 June 1987, with amendments as agreed to by the Representative;

original drawings sheets 1/4, 3/4 and 4/4; sheet 2/4 of the drawings received on 1 June 1987.

The Registrar: The Chairman:

F. Klein P. Delbecque

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