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 288/89 - 3.2.4

Application No.: 82 400 755.3

Publication No.: 0 064 457

Title of invention: Cylinder block of internal combustion engine

Classification: F02F 7/00, F02B 77/13, F01L 1/04

D E C I S I O N
of 15 January 1992

Proprietor of the patent: NISSAN MOTOR CO., LTD

Opponent: Klöckner-Humboldt-Deutz AG

Headword:

EPC Article 56, Rule 29(4)

Keyword: "Inventive step - yes"
"Independent and dependent claims combined without higher dependent claims - no relationship - allowable."

Headnote

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 288/89 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 15 January 1992

Appellant : (Proprietor of the patent)
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Representative :

Decision under appeal :
Decision of Opposition Division of the European Patent Office dispatched on 20 February 1989 revoking European patent No. 0 064 457 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : O.P. Bossung
Members : M.G. Hatherly
H.P. Ostertag

Summary of Facts and Submissions

I. European patent application No. 82 400 755.3, filed on 27 April 1992 and published with the publication No. 0 064 457, was granted on 6 February 1985.

II. The patent was opposed by the Respondent and a decision was taken by the Opposition Division at oral proceedings on 26 October 1988 to revoke the patent for lack of inventive step for the subject-matter of all the claims of the main request and the subsidiary request. The reasons for the decision were dispatched on 20 February 1989.

III. An appeal against this decision was received on 18 April 1989, the fee having been paid the day before. The Statement of Grounds of Appeal was received on 27 June 1989.

IV. The following documents were referred to in the appeal proceedings:

(D1) DE-A-2 618 241

(D2) British Diesel Engine Catalogue, 2nd Edition, 1950, pages 228 - 235

(D3) GB-A-2 044 852

(D4) SAE Technical Paper - An Analysis of the Movement of the Crankshaft Journals during Engine Firing - presented 8 - 12 June 1981

(D5) Japanese text book - Aircraft Engine - pages 517, 647 and 11π - published 25 May 1944

(D6) French text book Techniques de l'Ingénieur - Mécanique et Chaleur - Moteurs Thermiques Alternatifs page B 397-1 - no proof of date of this edition

(D7) French text book Eléments de Construction à l'usage de l'Ingénieur, Tome X, Moteurs à combustion interne, Dunod, Paris 1965, Fig. VI.5 and page 70

(D8) Entscheidung des Bundesgerichtshofes der Bundesrepublik Deutschland vom 19 Jan 1965 - Bolzenschießgerät - GRUR 1965, 355

(D9) Die Änderung des europäischen Patents nach seiner Erteilung und das Verbot der Erweiterung des Schutzbereichs - Schulte - GRUR-International 1989, Heft 6, Seiten 460-468.

V. Both parties requested oral proceedings which were accordingly held on 15 January 1992.

VI. Amended claims and description were presented at the end of the oral proceedings, Claim 1 reads as follows:

"Cylinder block (20) of internal combustion engine having cylinder barrels (22) and a crankcase inner chamber (36) and comprising a plurality of bearing sections (42A, 42B) for supporting a rotatable shaft disposed within the crankcase inner chamber (36), said bearing sections (42A, 42B) being spaced from each other and from main bearing sections (40) for supporting a crankshaft (34); characterized by a plurality of generally cylindrical or prismatic hollow beam members (44A, 44B, 44C) each of which is interposed between two opposite bearing sections (42A, 42B) so as to connect both opposite bearing sections in a manner to cover the rotatable shaft supported by said bearing sections (42A, 42B), said hollow beam members (44A, 44B, 44C) being aligned in the

direction of the row of the cylinder barrels (22), a part of each hollow beam member (44A, 44B, 44C) constituting a part of a cylinder block skirt section (32) which defines thereinside the crankcase inner chamber (36), each hollow beam member (44A, 44B, 44C) being formed at its wall with an opening (46A, 46B, 46C) for preventing the interference with the outermost loci of the rotating system including the crankshaft (34) and for allowing lubricating oil to drop therethrough."

VII. The Appellant (Proprietor) argues essentially that:

- the interpretation of page 235 of document D2 by the Respondent and in the impugned decision is incorrect, and

- the plurality of hollow members of the invention differ from the hollow member around the camshaft disclosed on page 229 of document D2 in number, position and function. The plurality of hollow members between bearing sections provides better vibration reduction than a single hollow member supporting the bearings.

VIII. The Respondent (Opponent) objects to the present set of claims under Article 123(3) EPC maintaining that, when introducing features from the granted Claims 5 and 6 into Claim 1, it is necessary to introduce also the features of the granted Claims 2 to 4. He argues that each dependent claim when granted was appended to the claim immediately above it. Rule 6.4(b) PCT states that "Any dependent claim shall be construed as including all the limitations contained in the claim to which it refers". German patent law also prohibits the removal of an appendancy after grant of the patent (see document D8). This must also apply if the appendancy is merely a drafting mistake.

Moreover he maintains his arguments regarding the interpretation of page 235 of document D2 and requests an expert be consulted should the Board not accept that the left and right halves of the sectional view in the camshaft areas are taken at different positions along the crankshaft axis.

He considers that it would be obvious for the person skilled in the art knowing of page 229 or page 235 of document D2 to arrive at the cylinder block of the present Claim 1. Openings in the respective hollow member are disclosed and oil exit openings would necessarily be provided. Once the cylinder block is assembled there is no vibration-reducing advantage of a plurality of hollow members between bearing sections over the prior art single hollow member supporting the bearings.

IX. The Appellant requests that the decision under appeal be set aside and that the patent be maintained on the basis of documents presented at the end of the oral proceedings.

X. The Respondent requests that the appeal be dismissed i.e. the patent be revoked.

Reasons for the Decision

1. The appeal is admissible.

2. Amendments

2.1 The present Claim 1 consists of:

- the granted Claim 1 (which consists of the originally filed Claim 1 with an alternative of the hollow beam members being prismatic added from page 8, lines 16 to 1 of the original description), and

- the wording of the granted Claims 5 and 6 (but not including the features of the Claims 2, 3 and 4 to which granted Claims 5 and 6 were appendant).

The present Claims 2, 3 and 4 correspond to Claims 2, 3 and 4 both as originally filed and as granted.

The granted Claims 5 and 6 correspond to Claims 5 and 6 as originally filed.

2.2 The Board cannot accept the Opponent's argument that the present claims contravene Article 123(3) EPC. It is correct that a dependency cannot be removed if doubt exists as to whether the claims of a patent are only to be understood in the restricted fashion resulting from the dependency. However this does not apply if a feature of a dependent claim (an example is the openings of the granted Claim 6) can be readily combined with individual preceding claims (see in this respect the decisions T 181/84 and T 235/90). The cited rule of the PCT is a definition of a dependent claim for the purposes of the PCT, it does not prohibit the removal of a dependency and the introduction into a independent claim of a feature from a dependent claim - regardless of other features or other dependent claims - as long as the skilled person recognises that there is clearly no close functional or structural relationship between the one dependent claim (here Claims 5 and 6) and the other features or other dependent claims (here Claims 2, 3 and 4).

2.3 The German decision (see document D8) concerns a different situation (further independent claim in revocation proceedings).

2.4 The description has been adapted to the present Claim 1, to acknowledge the relevant prior art and to correct obvious errors.

2.5 The Board is satisfied that the present patent documents do not contain subject-matter extending beyond the content of the application as originally filed (Article 123(2) EPC).

3. Novelty

No prior art document discloses all the features of the present Claim 1. The camshaft 22 shown in Figure 3 of document D1, the single hollow member surrounding the camshaft of the engine shown on page 229 of document D2, and the camshaft axis 59 shown in Figure 1 of document D3 are not in the respective cylinder block skirt section. Regarding page 235 of document D2 see section 4.6 below. Therefore the subject-matter of Claim 1 is novel (Article 54 EPC).

4. Document D2, page 235

4.1 The parties agree that in the engine shown at the top of this page the left and right cylinders of each V-shaped pair lie in one single plane perpendicular to the longitudinal axis of the crankshaft (this type of construction being shown on page B 397-13 of document D6 and also in documents D5 and D7), instead of being spaced along the crankshaft.

4.2 The parties differ however as to where along the crankshaft axis the sectional view is taken.

The Opponent points out that, while the left cylinder is sectioned, the right cylinder is shown in outside view; moreover the injection nozzles, the push rods, the push

rod rollers, the valves and the rockers are depicted differently on the left and right halves of the Figure. He concludes that the left and right halves of the sectional view in the camshaft areas are taken at different positions along the crankshaft axis. It is this point that he wishes to prove with the help of an expert if the Board does not accept his conclusion.

The Proprietor maintains that, since the distance between the side walls of the left cylinder is the same as the distance between the side walls of the right cylinder, there is a single cutting plane which passes through the longitudinal axis of the right cylinder and the longitudinal axis of the left cylinder and which contains the left and right camshaft areas.

4.3 The Board points out that it is customary to select drawings for a catalogue to give its readers (as opposed to the people constructing the engine) as much useful information as possible, standard draughting practice need not always be followed in all respects. Since the engine in this catalogue D2 is largely symmetrical about a vertical plane through the crankshaft, the draughtsman had the opportunity in the sectional view to show duplicated components once in section and once from the outside, it being standard draughting practice in a sectional view to show some components (e.g. shafts and rods) from the outside. A common practice in many sectional views is to have one cutting plane to the left of the vertical centre line and another cutting plane to the right but this is not the case here because the right (shorter) connecting rod crosses the vertical centre line without its depiction changing.

The Board is of the opinion that, as further information (e.g. a longitudinal view) is absent from the catalogue, it cannot be decided with certainty whether there is a

single cutting plane or a plurality of planes and in the latter case where each of these lies. The Board considers that the expert requested by the Opponent would not be able to remove the Board's uncertainty on this point. The catalogue is a publication within the meaning of Article 54(2) EPC, it is within the competence of the Board to interpret it.

4.4 Even if the Opponent is right in the above-discussed first part of his argument that the camshaft area views are axially spaced, the Board's view is that the second part of his argument (which relies on the first part) is doubtful. He goes on to argue that the sectional view of the left camshaft area is the same as that on the right and, since these two views are axially spaced, then they must be representative of the arrangement throughout the engine length. The Board however cannot accept that one can conclude without reasonable doubt that two identical cross-sectional views - assuming they are not views in the same transverse plane - can prove that all views therebetween and beyond (throughout the engine length) are also identical.

4.5 The remaining parts of the Opponent's argument rely on the first and second parts. He maintains that:

- the generally circular line surrounding the camshaft and its bearing represents a closed housing covering the camshaft, the outer part of this housing being shown running along the engine shown in the photograph at the top left of the page,

- part of this housing constitutes a part of the cylinder block skirt section, and

- openings are shown in the housing for the push rods, moreover openings would necessarily be provided in the housing so that oil could leave it, otherwise the housing would fill up with oil provided for lubricating the bearings.

4.6 As the Board cannot accept the first and second parts of the Opponent's argument, the remaining parts, since they rely thereon, must also fail. In any case the housing - if there is one - is not in such a position that it would be hit by the outermost loci of the rotating system including the crankshaft if openings in the housing were not provided (compare the last part of the present Claim 1). The openings shown in the Figure are for the push rods, these openings are neither for preventing interference with the housing of the outermost loci of the rotating system including the crankshaft nor for allowing lubricating oil to drop therethrough, let alone does one and the same opening fulfil both functions (once again compare the last part of the present Claim 1).

4.7 Summarising, the Board finds that page 235 of document D2 does not show beyond reasonable doubt those features which the Opponent alleges. A further reason to that given in paragraph 4.3 above why the Board considers that it is unnecessary to consult an expert as requested by the Opponent is that even if the first part of the argument were to be proved, the second and remaining parts of the argument do not satisfy the Board.

5. Closest prior art

5.1 Documents D1 and D3

5.1.1 The cross-sectional views of Figures 2 and 3 of document D1 each show an opening for receiving a camshaft 22 but the document gives no information concerning the area between the sectional views in the way that a longitudinal section would do.

5.1.2 Figure 2 of document D3 shows apertures 58 for a camshaft in spacing webs 56 but there is no housing between these webs. What might appear in Figures 1 and 3 to be a wall below where the camshaft would lie can be seen from Figure 2 to be in fact merely a transverse tube.

5.1.3 Since in the engines disclosed by documents D1 and D3, the respective camshaft is not in the cylinder block skirt section, the Board considers that neither of these documents is the closest prior art and would not be the appropriate starting point for a skilled person in the art wishing to overcome a problem concerned with a cylinder block skirt section.

5.2 Document D2, page 229

5.2.1 The engine shown on page 229 of document D2 (which is not of the same type as that shown on page 235) has a hollow member (numbered 100A on the copy of the cross-sectional view submitted by the Proprietor with his Statement of Grounds of Appeal dated 26 June 1989) which houses the camshaft. The hollow member is formed integral with a section having cylinder barrels (numbered 22A on said copy) and thus the hollow member has a common wall with

the cylinder barrels. There is apparently a single hollow member and it does not constitute a part of the cylinder block skirt section (numbered 32A on the copy). Openings are provided in the housing for the push rods.

5.2.2 While the engine disclosed by page 229 of document D2 is very relevant, the Board does not consider it the closest prior art or starting point for the invention for similar reasons to those set out in section 5.1.3 above.

5.3 The Board considers the closest prior art or starting point for the invention to be a conventional engine as described in the first two columns of the description of the specification of the patent as granted and shown in Figures 1A and 1B. Such an engine has the features set out in the pre-characterising portion of the present Claim 1.

6. Problem and solution

6.1 According to the patent specification the problem to be solved by the present invention is to reduce vibration noise from the cylinder block skirt section (see patent specification, column 2, lines 3 to 45). This is to be done without increasing wall thickness and without using a different metal.

6.2 The Board is satisfied that these demands can be met by the cylinder block as defined in Claim 1, and in particular by the features appearing in its characterising portion.

6.3 The plurality of hollow beam members interposed between the bearing sections of the rotatable shaft and which are in part common with the cylinder block skirt section increase the flexural and torsional rigidities of the cylinder block thus lowering its vibration level and thus

engine noise. The openings in the hollow beam members prevent the rotating system contacting the hollow beam members (which have been introduced to solve the noise problem) and at the same time permit lubricating oil to escape from the hollow beam members.

7. Inventive step

7.1 The problem of reducing vibration noise from the cylinder block skirt section of the conventional engine as shown in Figs. 1A and 1B of the present patent is one that could be expected to concern the person skilled in the art.

7.2 It is known from page 229 of document D2 to house a camshaft - for an unspecified reason - in a hollow member having a common wall with the cylinder barrels i.e. not in the cylinder block skirt section. The hollow member could well be provided merely to support the bearings and to protect the camshaft. If so, there would be no hint to the person skilled in the art to use such a hollow member in the conventional engine whose camshaft is already supported in bearings and already protected by its location in the cylinder block skirt section.

7.3 However it seems at least possible that the person skilled in the art would consider applying the teaching of the hollow member disclosed on page 229 of document D2 to the cam shaft in the cylinder block skirt section of the conventional engine for the purpose of stiffening.

7.4 It is normal to design such conventional engines to occupy the minimum of space. Thus to keep the cylinder block skirt section as compact as possible, the camshaft is located close to the outermost loci of the rotating system including the crankshaft, without being so close that the rotating system contacts the camshaft. This space saving

design however would present a difficulty if the camshaft were to be encased by a hollow member such as that shown on page 229 of document D2, since the rotating system would then hit the hollow member. This might deter the person skilled in the art from encasing the camshaft at all. Alternatively he might decide to move the camshaft further away from the crankshaft which however would then increase the size of the cylinder block skirt section and possibly increase vibration noise. In the invention however the rotatable shaft (e.g. the camshaft) can remain in its original position since openings prevent the rotating system hitting the hollow member.

7.5 While it is known in the general field of mechanical engineering that the collision of components cannot be permitted and can be prevented by cutting away part of one or both components, this method is not as readily applicable in the present case as at first appears. The person skilled in the art, in the process of considering whether to add a hollow member for stiffening purposes, would realise that cutting away part of the hollow member would reduce its effectiveness for this purpose. Also this might deter him from providing the hollow member in the first place.

7.6 While the hollow member disclosed on page 229 of document D2 has openings therein, these openings are for the push rods (and would also be provided in the present engine if the hollow member houses a camshaft). Such openings are therefore located in different positions (generally above the camshaft) to those needed for interference prevention (generally below the camshaft). Moreover the invention can then make use of the openings being generally towards the lower part of the hollow

member by using them also allow lubricating oil to drop therethrough thus avoiding oil accumulation in the hollow member. This function could not be fulfilled by the push rod openings in the hollow member disclosed on page 229 of document D2.

7.7 The Board considers that the particular combination of features set forth in Claim 1 could only be arrived at as a result of ex post facto analysis, there being no hints in the prior art being considered here to lead the person skilled in the art to make the specific choices necessary to arrive at the combination set out in Claim 1 (whose features have a functional interrelationship and constitute a true combination) in expectation of some improvement or advantage.

7.8 The arguments regarding the difference between the single hollow member shown on page 229 of document D2 which carries the bearings and the plurality of hollow beam members interposed between the bearings need not be further considered since the subject-matter of Claim 1 is held to be inventive regardless of the outcome of such a consideration.

7.9 The Board has also considered the further available documents and found them non-prejudicial to the present Claim 1, either alone or in combination with the documents cited above. The Proprietor cited document D4 to show that cylinder block skirt sections vibrate and so emit noise; this effect is not doubted by the Board and the document was published after the priority date of the present patent so the document need not be discussed.

8. For the reasons given above, the subject-matter of Claim 1 involves an inventive step (Article 56 EPC) and is patentable within the meaning of Article 52 EPC. Claims 2 to 4 are dependent upon Claim 1 and are therefore also patentable. The patent can thus be maintained with these claims.

9. A communication under Rule 58(4) EPC is unnecessary in the present case since the Proprietor and Opponent had adequate opportunity during the oral proceedings to comment on the present set of amended patent documents. The Opponent, while still requesting revocation of the patent on the grounds of Articles 56 and 123(3) EPC, had no further comments on its present form.

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 maintain the patent with the description and claims presented at the end of the oral proceedings and the drawings of the patent as granted.

The Registrar: The Chairman:

N. Maslin O. Bossung