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D E C I S I O N
of 1 October 2003

Case Number: T 0219/02 - 3.2.4

Application Number: 96308651.7

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Language of the proceedings: EN

Title of invention:
Valve timing control device

Patentee:
AISIN SEIKI KABUSHIKI KAISHA

Opponent:
INA-Schaeffler KG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - (yes)"

Decisions cited:
-

Catchword:
-



Case Number: T 0219/02 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 1 October 2003

Appellant: INA-Schaeffler KG
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Representative: -

Respondent: AISIN SEIKI KABUSHIKI KAISHA
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 25 January 2002
rejecting the opposition filed against European
patent No. 0781899 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: C. A. J. Andries
Members: T. Kriner
H. Preglau

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal, received at the EPO on 18 February 2002, against the decision of the Opposition Division, dispatched on 25 January 2002, on the rejection of the opposition against European Patent No. 0 781 899. The appeal fee was paid simultaneously and the statement setting out the grounds of appeal was filed on 22 May 2002.

II. The opposition was filed against the patent as a whole and based on Article 100(a) together with Articles 52(1) and 56 EPC.

In its decision the Opposition Division held that the ground for opposition did not prejudice the maintenance of the patent unamended and that therefore the opposition was to be rejected.

III. With the letter of 3 September 2003 observations by a third party according to Article 115 EPC were filed which referred to the following documents:

D8: DE-C-703 586

D9: "Vergleichende Untersuchung verschiedener variabler Ventilsteuerungen für Serien-Ottomotoren", Dissertation von Wilhelm Hannibal, Institut für Verbrennungsmotoren und Kraftfahrwesen der Universität Stuttgart, 1993, pages 4, 107 - 111.

IV. Oral proceedings took place on 1 October 2003.

The Appellant requested that the decision under appeal be set aside and the European patent No. 0 781 899 be revoked.

The Respondent (Patentee) requested that the appeal be dismissed and the patent be maintained unamended (main request), or that the decision under appeal be set aside and the patent be maintained on the basis of the sets of claims filed with the letters dated 21 November 2002 (first auxiliary request) and 27 August 2003 (second and fourth auxiliary request).

V. The Appellant's argumentation was based on the following documents:

D1: US-A-4 858 572

D7: JP-A-60-175 738

D7a: English translation of D7.

VI. Claim 1 as granted reads as follows:

"A valve timing control device comprising:
a rotor (17) adapted to be fixed on a cam shaft (2) of an engine;
a housing member (19) adapted to be rotatably mounted on the cam shaft (2) so as to surround the rotor;
at least one chamber (20) defined between the housing member (19) and the rotor (17) and having a pair of circumferentially opposed walls (19a1, 19a2);
for each chamber (20), a vane (18) which is mounted on the rotor (17) and extends radially outwardly therefrom into the chamber (20) so as to divide the chamber (20)

into a first pressure chamber (30) and a second pressure chamber (31); and means (38) for supplying fluid under pressure selectively to the or each first pressure chamber (30) or to the or each second pressure chamber (31); characterized in that a dirt-collecting groove (36, 37) is formed on the radially outer end of each of the opposed walls (19a1 or 19a2) of the or each chamber (20), facing the associated vane (18)."

VII. In support of his request the Appellant relied essentially on the following submissions:

D7 in conjunction with D7a (in the following cited as D7/D7a) disclosed a valve timing control device comprising most of the features of the pre-characterising portion of claim 1 of the patent in suit. Figures 2, 3 and 5 of D7/D7a showed that the protrusions (72a, 72b) were designed in such a way that they formed grooves (66a, 66b, 66c, 66d) on the radially outer end of each of the opposed walls of each pressure chamber, facing the associated vane (62a, 62b, 62c, 62d). These grooves were exactly the same grooves as shown in Figures 2, 5 and 7 of the patent in suit. Although it was not mentioned in D7/D7a that they were provided for collecting dirt, it was obvious that they were at least suitable for this purpose. Moreover, it was well known that the production of the pressure chambers required undercuts in form of grooves at the radially outer edges of the pressure chambers. Hence D7/D7a additionally disclosed the features of the characterising portion of claim 1.

The subject-matter of claim 1 differed from that which was disclosed in D7/D7a in that each chamber was divided into a first and a second pressure chamber. Therefore, starting from the state of the art according to D7/D7a the object to be achieved by the patent in suit could be regarded as to create a valve timing control device having pressure chambers which were effective on both sides of the vanes. However, for the skilled person confronted with this object, the provision of pressure chambers on both sides of each vane was an obvious measure.

Furthermore, the subject-matter of claim 1 did not involve an inventive step with respect to the teachings of D1 and D7/D7a, since the provision of the grooves shown in D7/D7a in the pressure chambers of the valve timing control device according to D1 was obvious when intending to exclude bad effects due to dirt contained in the pressure chambers.

VIII. The Respondent disputed the views of the Appellant. His arguments can be summarized as follows:

The most relevant state of the art was represented by D1 which disclosed a valve timing control device according to the pre-characterising portion of claim 1 as granted. The Patentee found that it was not possible to obtain the maximum advanced or retarded condition of such a valve timing control device, if dirt was accumulated between the vanes and the opposed walls. In order to overcome this drawback, the patent in suit suggested the provision of dirt-collecting grooves as defined in the characterising portion of claim 1 as granted. The state of the art neither disclosed the

problem underlying the patent in suit, nor any dirt-collecting groove which was suitable to solve this problem.

D7/D7a disclosed a valve timing control device, wherein the protrusions (72a, 72b) were arranged in line with the springs (74a, 74b) to balance the force applied to the vanes (62a, 62,b, 62,c, 62d). The protrusions were no walls, but discrete elements, which were provided in the surfaces of the fixed vanes (64a, 64b, 64c, 64d), so that the fluid in the pressure chambers could flow around these discrete elements. Otherwise the spaces radially outward of the protrusions could not form part of the pressure chambers as described in D7a.

Therefore, these spaces could not be regarded as grooves. Moreover, the production of the pressure chambers did not require any undercut, since hydraulic actuators were produced by sintering.

Hence D7/D7a did not disclose or suggest the provision of a dirt-collecting groove in a pressure chamber in a valve timing device, and the subject-matter of claim 1 as granted was based on an inventive step.

Reasons for the Decision

1. The appeal is admissible.
2. *State of the art*
 - 2.1 As agreed by the parties, D1 discloses a valve timing control device as defined in the preamble of claim 1 as granted.

2.2 D7/D7a discloses a valve timing control device (see D7a, page 18, paragraph 2 to page 19, paragraph 1) comprising:

- a rotor (36) adapted to be fixed on a cam shaft of an engine;
- a housing member (46) adapted to be (indirectly) rotatably mounted on the cam shaft so as to surround the rotor;
- at least one chamber defined between the housing member and the rotor and having a pair of circumferentially opposed walls (see Figures 2, 3 and 5);
- for each chamber, a vane (62a, 62b, 62c, 62d) which extends radially outwardly from the rotor into the chamber so as to divide the chamber into a first pressure chamber (66a, 66b, 66c, 66d) and a second chamber (68a, 68b); and
- means (204, 206, 208, 210, 78, 82, 84, 96, 38, 88a, 88b) for supplying fluid under pressure to each first pressure chamber.

However, D7/D7a does not disclose that

- (a) the vanes are mounted on the rotor;
- (b) the second chambers are pressure chambers;
- (c) the means for supplying fluid under pressure are suitable for selectively supplying fluid to each first pressure chamber or each second chamber;
- (d) a dirt-collecting groove is formed on the radially outer end of each of the opposed walls of each chamber, facing the associated vane.

With respect to feature (a), it is clear that the vanes according to D7/D7a are not mounted on the rotor, but form part of this element. With respect to features (b) and (c) it is clear that the second chambers according to D7/D7a are spring chambers which are not supplied with any fluid under pressure.

2.3 The Appellant's view, according to which D7/D7a disclosed feature (d) is not convincing.

In accordance with the case law of the Boards of Appeal of the EPO (see Case Law of the Boards of Appeal of the EPO, 4th edition 2001, English version, I.C.2, page 54), the finding that a feature of an invention lacks novelty, requires that this feature is clearly and directly derivable from the prior art. In the present case, D7/D7a does not unequivocally show or describe the design of the protrusions or stoppers for the vanes, so that their shape is not clear. Figures 2, 3 and 5 of D7/D7 merely show a cross-section of the protrusions, and the description of D7a is silent with respect to their shape, in particular with respect to their axial extension. Therefore, D7/D7a does not provide any basis for the Appellant's assumption that the stoppers were designed as stretched elements so that they formed a groove on the radially outer end of each of the opposed walls of each chamber, and that therefore feature (d) was disclosed in D7/D7a. On the contrary, it is more likely that the protrusions are discrete elements which do not form any kind of groove. According to D7a, the spaces (66a, 66b, 66c, 66d) lying radially outward of the protrusions are portions of the actuator chambers (see page 12, lines 23 to 27, and

page 20, line 23), the protrusions are provided in the leading-side side surfaces of the fixed vanes, and the provision of the protrusions results in an easy separation of the swinging vanes from the fixed vanes (see page 10, lines 9 to 22). With respect to this information the skilled person would assume that the protrusions are discrete elements arranged within the pressure chambers so that the spaces lying radially inward and radially outward of each protrusion are connected to each other and form a single actuator chamber accommodated around each protrusion, and that the pressure in the pressure chamber acts on nearly the whole surface of the swinging vane.

The Appellant's argumentation, according to which even a discrete rectangular protrusion would form a short groove which was suitable for collecting dirt, is also not convincing. The skilled person would interpret a "dirt-collecting groove" as a long narrow channel for collecting dirt within this channel. However, the portion of the pressure chamber lying between a discrete rectangular protrusion and the actuator housing of the actuator shown in the figures of D7/D7a could not be regarded as a long narrow channel, since the radial and axial extension of such a portion would be essentially the same. Moreover, such a portion would not be suitable for collecting dirt, since there was always a connection to the remaining portions of the pressure chamber.

Furthermore, the Board can not agree to the Appellants's statement, according to which the production of the pressure chambers of an actuator according to D7/D7a required undercuts in form of

grooves at the radially outer edges of the pressure chambers. As clearly shown in Figures 2, 3 and 5 of D7/D7a, the radially outer edges of the pressure chambers are formed by two separate elements, the housing (46) and the fixed vanes (64a, 64b, 64c, 64d). Independent of the question whether or not the actuator according to D7/D7a is produced by sintering, such a design does not require any undercut which could be regarded as a groove.

With respect to the above assessment, the Board comes to the conclusion, that the feature (d) is not clearly and directly derivable from D7/D7a and cannot be considered as being disclosed in D7/D7a. Additionally the Board wants to emphasize that anyway an ambiguous disclosure of a document cited by a party cannot be interpreted in favour of this party, in particular if this interpretation is as likely as another one.

3. *Inventive step*

- 3.1 The closest prior art for assessing inventive step is normally a prior art document disclosing subject-matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant features in common, i.e. requiring the minimum of structural modifications (see Case Law of the Boards of Appeal of the EPO, 4th edition 2001, English version, I.D.3.1, page 102).

In the present case D1 and D7/D7a both refer to devices for controlling the valve timing of an engine. Nevertheless, D1 is representing the most relevant state of the art, since the subject-matter of claim 1

as granted differs from the valve timing control device according to D1 only by feature (d), while it differs from the valve timing control device according to D7/D7a by features (a) to (d), and since a modification of the spring chambers shown in D7/D7a to pressure chambers would require essential structural modifications of the fluid supplying means.

- 3.2 The valve control timing device according to D1 is designed so that the vanes (35) in the maximum advanced or retarded condition contact with their radially outer ends the side-walls of the chambers (23). The Respondent has found that if dirt contained in the fluid within the chambers gets in between the vanes and the radially outer ends of the side-walls, it is no longer possible to exactly obtain the maximum advanced or retarded condition and therefore it is impossible to exactly control the valve timing.

Therefore, starting from the state of the art disclosed in D1, the object to be achieved by the patent in suit has to be regarded as to provide a valve timing control device which can exclude bad effects due to foreign matter in the fluid (see column 2, lines 14 to 17).

This object is achieved by the provision of a dirt-collecting groove which is formed on the radially outer end of each of the opposed walls of the or each chamber, facing the associated vane (feature (d)).

- 3.3 The present state of the art neither describes the problem underlying the patent in suit, nor - as shown in section 2 above - any suggestion for solving this problem, let alone by the provision of a dirt-

collecting groove formed on the radially outer end of each of the opposed walls of each chamber, facing the associated vane.

Therefore the Board comes to the conclusion that the subject-matter of claim 1 of the patent in suit as granted cannot be derived in an obvious manner from the cited prior art and accordingly involves an inventive step (Article 56 EPC).

4. Since the patent in suit therefore can be maintained on the basis of the Respondent's main request, there is no necessity to consider his auxiliary requests.
5. Documents D8 and D9 cited by the third party have not been used by the Appellant or the Respondent for the support of their argumentation. Furthermore, prima facie these documents are not more relevant than D1 or D7/D7a. Therefore, they have not been considered in the present case.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Magouliotis

C. A. J. Andries