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D E C I S I O N
of 14 May 1998

Case Number: T 0899/96 - 3.2.4

Application Number: 91103986.5

Publication Number: 0450362

IPC: F04D 5/00

Language of the proceedings: EN

Title of invention:
Toric pump

Patentee:
Borg-Warner Automotive, Inc.

Opponent:
Siemens AG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"

Decisions cited:
-

Catchword:
-

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Case Number: T 0899/96 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 14 May 1998

Appellant: (Opponent)
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Representative:
-

Respondent: (Proprietor of the patent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 6 August 1996 rejecting the opposition filed against European patent No. 0 450 362 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: C. A. J. Andries
Members: M. G. Hatherly
J. P. B. Seitz

Summary of Facts and Submissions

I. The opposition division's decision rejecting the opposition against European patent No. 0 450 362 was dispatched on 6 August 1996.

On 1 October 1996 the appellant (opponent) filed an appeal against this decision, paid the appeal fee and submitted the statement of grounds of appeal.

II. Claim 1 of the patent as granted reads:

"Toric pump including a housing (20), a disc like impeller (46) mounted inside the housing (20) for rotation about an axis (A) and having vanes (58, 60) on its outer peripheral portion operable upon rotation of the impeller (46) to pump fluid along a toroidal pump chamber in the housing (20) extending circumferentially of the axis (A) in operative relationship to the rotary path of movement of the vanes (58, 60) of the impeller (46), the impeller (46) and the housing (20) having facing opposed flat side surfaces normal to the axis (A) and located radially inwardly of the vanes (58, 60) and of the pump chamber (28, 38), there being a clearance gap of sufficient width to accommodate free rotation of the impeller (46) relative to the housing (20), the impeller (46) comprising a plurality of pockets (80, 82, 84) in its side surfaces for inhibiting leakage of fluid through the gap during rotation of the impeller (46), characterized by the following features:

(1.1) the pockets are blind holes (80, 82, 84);

(1.2) the blind holes (80, 82, 84) are provided on both flat sides of the impeller (46)."

III. The following documents were relied upon during the appeal proceedings:

D1: US-A-4 872 806
D2: DE-C-1 528 823
D3: US-A-2 604 852
D4: US-A-1 096 186

IV. Oral proceedings were held on 14 May 1998 in the presence of the parties.

In the appeal proceedings the appellant argued that the closest prior art was not document D1 but document D3 and that it would be obvious to solve a sealing problem in the pump of document D3 by replacing the spiral grooves in its impeller by blind holes as known from document D4 (or document D2), thus arriving at the claimed subject-matter.

In the appeal proceedings the respondent countered the appellant's arguments.

V. The appellant (opponent) requests that the decision rejecting the opposition be set aside and the patent revoked.

The respondent (proprietor) requests that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Novelty*

The board is satisfied that none of the cited documents discloses a toric pump having all the features set out in claim 1. Moreover, novelty has not in fact been in dispute in the appeal proceedings.

The subject-matter of claim 1 is thus to be considered as novel within the meaning of Article 54 EPC.

3. *Closest prior art*

In the appeal proceedings, the appellant maintains that the closest prior art is document D3 and that this discloses all the features of the pre-characterising portion of claim 1.

4. *Inventive step*

4.1 The appellant argues that, although the pumps according to documents D3 and D4 are of different types, the skilled person for each is the same, at least as far as problems (e.g. sealing problems) which occur in both the types of pump are concerned. This skilled person knows from document D3 that by specially forming the faces of the impeller of a toric pump, leakage can be reduced. Thus document D3 not only deals with the same problem as that dealt with by the present invention but also provides a solution to this problem. It is known from document D4 to provide blind holes in the impeller to solve a leakage problem and it is part of the prior art acknowledgement in document D2 that pump wheels with blind holes in hub were known. Thus it would be obvious to the skilled person wishing to solve a

sealing problem in the pump according to document D3 to replace the spiral grooves in its impeller with blind holes as known from document D4 or D2 and so arrive at a toric pump satisfying the definition of claim 1.

4.2 Document D3

4.2.1 Document D3 relates to a peripheral type pump whose impeller 26 has a disc body 30 of a flexible, resilient material such as rubber, a shaft mounting hub 31 and a body reinforcing member or disc 32 (see column 2, lines 5 to 9 and Figures 1 and 2). It is explained in column 2, lines 38 to 52 that "in order to afford greater flexibility of the impeller inwardly of the bucket zone thereof, the opposite faces 42 of the body 30 may be recessed as shown, to provide alternate ribs 43 and channels 44 ... on each side, as a single spiral channel directed with respect to the direction of impeller rotation, such as to utilize centrifugal force to carry fluid along the channels toward the bucket zone of the impeller. This will tend to reduce to a material degree, the extent of fluid leakage from the impeller channel 14 to the central casing chamber 40."

4.2.2 The impeller of document D3 is flexible because it is made of a flexible, resilient material such as rubber, and is even more flexible inwardly of the bucket zone because it has recesses to provide alternate ribs and channels. The reason for the flexibility is to reduce damage by solid objects and abrasive material being pumped (see column 1, lines 20 to 24).

4.2.3 The board can find no direct statement in the document that the improved seal between the impeller channel 14 and the central casing chamber 40 is due to the flexibility of the rubber impeller, or to recesses to provide alternate ribs 43 and channels 44 in general terms. The reason given in the document for the

improved seal seems instead to be the specific form of these ribs and channels, namely a single spiral channel on each side of the impeller to carry fluid towards the bucket zone (see column 2, lines 41 to 52).

4.3 Document D4

4.3.1 Document D4 discloses a gear pump. It is explained on page 2, lines 22 to 44 that to avoid pumped water returning from the discharge side 16 to the inlet side 4 between the intermeshing teeth 8 of the gear wheels 1 and 2, a vent or by-pass 19 is provided in either or both of the covers 20 of the housing 3. Lines 52 to 66 on page 2 continue that the gear wheels are maintained laterally centred, to prevent undue friction between their faces and the casing, by rows of slight pockets or recesses 25 in each face of the gear which are filled with fluid when running over or past the by-pass 19. Lines 78 to 82 on page 2 conclude that "the pockets 25 arranged in one or more rings as shown in Figure 1 act as an effective means for preventing the water to slip past the gear wheel faces from the discharge to the suction side."

4.3.2 Thus document D4 also concerns a sealing problem (as part of the general problem of preventing pumped water returning from the discharge side to the inlet side of the pump). The pockets 25 (i.e. blind holes) are stated in lines 78 to 82 of page 2 to prevent water slipping past the gear wheel faces from the discharge to the suction side.

4.4 The combination of the teachings of documents D3 and D4

4.4.1 The key difference of the present invention over the prior art pump according to document D3 is in fact known from document D4. The question to be decided is therefore whether the skilled person would use the blind holes of document D4 in the pump of document D3.

4.4.2 The feature solving the sealing problem between the impeller channel 14 to the central casing chamber 40 in document D3 is the spiral groove in each face of the impeller. This feature is specified in each of the claims of document D3 and therefore is essential to the pump of document D3. Accordingly, while the skilled person wishing to develop the pump of document D3 would not be limited to keeping all of its details, he would be unlikely to change one of the central ideas behind the pump design, namely the spiral grooves which carry fluid along the channels toward the bucket zone of the impeller and so reduce fluid leakage from the impeller channel to the central casing chamber 40. The spiral grooves are not merely a barrier to fluid leakage but a pumping back of leaked fluid i.e. the spiral grooves are more effective than a conventional seal. For him nevertheless to replace the spiral grooves by something else, he would need to see that either a clear advantage or at least the same effect could be achieved by this something else.

4.4.3 While both types of pumps have sealing problems, the pump types are very different and operate at very different speeds. Thus the skilled person might not be led to transfer a feature from one pump type to the other. To this point must be added that the age of the documents (D3 patented in 1952 and D4 in 1914) prima facie go against their combination being obvious at the priority date of the patent (1990).

4.4.4 If the skilled person however were to make the combination proposed by the appellant then he would lose the pumping effect of the spiral grooves of document D3 and would replace it by the sealing function of the blind holes of document D4. This sealing function is however only alleged in document D4, with no clear explanation as to how it works. Thus the skilled person would not know how the sealing effect in other circumstances is to be produced.

He might even conclude that the bypass 19 was an essential part of the seal but this would scarcely be applicable to a toric pump. However further thought would throw up a further doubt since, while the blind holes 25 on the gear wheel 2 run past the bypass 19 and can there be filled with water, the blind holes 25 on gear wheel 1 do not come into contact with the bypass.

He would in any case have no reason to believe that he could achieve either a better sealing effect or at least the same pumping effect in the pump according to document D3 by the use of blind holes known from document D4 instead of the spiral grooves, since, as stated before, the pumping effect of the spiral grooves would certainly be lost.

4.4.5 In view of these uncertainties, the board considers that the skilled person would not be encouraged or even tempted to make the combination of documents D3 and D4 envisaged by the appellant.

4.5 Document D2

4.5.1 The invention set out by this document D2 is to provide **through** holes in the hub of a toric pump impeller but the prior art acknowledgement (column 1, lines 60 to 63) states that it was already known to provide pump wheels with individual recesses, such as grooves or blind holes, wherein this was only in the wheel hub.

4.5.2 The last statement is very short, not stating for example whether this pump was a toric pump (or perhaps a completely different type of pump such as the gear pump of document D4) and not stating the purpose of the recesses (perhaps to save weight). The information in document D2 is thus too vague for it to encourage the skilled person to use its teaching in the pump according to document D3. Furthermore, the board considers that, if the person skilled in the art were to use a teaching contained in document D2, then it would be likely that he would choose the teaching of its preferred embodiment and unlikely that he would use a teaching relating to the prior art which document D2 sets out to improve, since this prior art is, as document D2 points out in column 2, lines 4 to 6, not as good as the invention presented by document D2.

4.6 Accordingly the board finds that it would not be obvious to modify the pump of document D3 using the teachings of document D4 or document D2 in such a way as to arrive at a toric pump satisfying the definition in claim 1.

5. In the appeal proceedings the appellant has provided no reasons for doubting the opposition division's finding (in sections 3.7, 3.8 and 3.15 of the decision) that the claimed subject-matter was not obvious over document D1 (which the opposition division considered to be the closest prior art, see section 3.1 of the

decision). Indeed the appellant argues that document D1 is not even the closest prior art. Thus the board need not consider inventive step over this document but confines itself to the documents and arguments relied upon by the appellant in the appeal proceedings. These documents and arguments however do not convince the board that the claimed subject-matter is obvious, thus they do not prejudice the maintenance of the patent unamended and so the board must dismiss the appeal.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin C. Andries