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**Datasheet for the decision
of 19 January 2012**

Case Number: T 1143/10 - 3.2.04

Application Number: 02752310.9

Publication Number: 1423610

IPC: F04B 39/10, F16J 15/00,
F16K 15/08

Language of the proceedings: EN

Title of invention:
Elastomeric sealing element for gas compressor valve

Applicant:
Delaware Capital Formation, Inc.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - all requests - no"

Decisions cited:
-

Catchword:
-



Case Number: T 1143/10 - 3.2.04

D E C I S I O N
of the Technical Board of Appeal 3.2.04
of 19 January 2012

Appellant: Delaware Capital Formation, Inc.
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 21 December 2009
refusing European patent application
No. 02752310.9 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: C. Scheibling
Members: A. de Vries
C. Heath

Summary of Facts and Submissions

- I. This appeal is against the decision of the Examining Division dated 21 December 2009 to refuse the patent application. The Examining Division considered that the subject-matter of claim 1 as amended did not involve an inventive step. The Appellant's notice of appeal was received on 22 February 2010 and the appeal fee was paid the same day; the statement setting out the grounds of appeal was received on 20 April 2010.
- II. The following documents played a role in the present proceedings:
- D1: US-A-5 052 434
D2: GB-A-2 071 818
E2: US-A-4 596 839
- III. Oral proceedings took place on 19 January 2012 before the Board of Appeal.
- IV. The Appellant (applicant) requests that the decision under appeal be set aside and that a patent be granted on the basis of the claims of a main request, or of auxiliary requests 1, 2 and 4 to 6, all filed with letter dated 19 December 2011, or of auxiliary requests 3 and 7 filed during the oral proceedings before the Board.
- V. Claim 1 according to the main request reads as follows:
- "A reciprocating gas compressor valve comprising a sealing element, the sealing element (10) being entirely of elastomeric material, wherein said sealing

element operably engages a seating surface (12) with surface contact when the valve is closed and disengages the seating surface (12) when the valve is opened."

Claim 1 according to auxiliary request 1 adds to claim 1 of the main request the following features:
"wherein the elastomeric material is selected from the group consisting of natural rubber, fluoro-elastomer, thermoset elastomer, thermoplastic elastomer, elastomeric copolymers, elastomeric terpolymers, elastomeric polymer blends and elastomeric alloys."

Claim 1 according to auxiliary request 2 adds to claim 1 of the main request the following features:
"wherein the elastomeric material is selected from the group consisting of hydrogenated nitrile rubber, fluoroelastomer and perfluoroelastomer."

Claim 1 according to auxiliary request 3 adds to claim 1 of the main request that the valve is "operable at a piston speed of at least 4m/s (800ft/min)".

Claim 1 according to auxiliary request 4 reads as follows:
"A reciprocating gas compressor comprising:
a crankshaft,
one or more compressor cylinders attached to the crankshaft, and
valves to intake and expel gases,
at least one of said valves comprising a sealing element, the sealing element (10) being entirely of elastomeric material, wherein said sealing element operably engages a seating surface (12) with surface

contact when the valve is closed and disengages the seating surface (12) when the valve is opened."

Claim 1 according to auxiliary request 5 adds to claim 1 of auxiliary request 4 the same additional features as those added to claim 1 in auxiliary request 1.

Claim 1 according to auxiliary request 6 adds to claim 1 of auxiliary request 4 the same additional features as those added to claim 1 in auxiliary request 2.

Claim 1 according to auxiliary request 7 adds to claim 1 of auxiliary request 4 the same additional features as those added to claim 1 in auxiliary request 3.

VI. The Appellant mainly argued as follows:

Although elastomeric seals were state of the art at the priority date of D1 and D2, these documents propose compressor valves comprising a mechanically complicated sealing element, made of plastic which in case of D1 can even comprise an elastomeric O-ring. This is a clear indication that there was a prejudice at that time against using seals made entirely of elastomeric material in reciprocating gas compressors. Therefore D1 and D2 teach away from the invention and there is no hint in the prior art, including E2, that a seal made of elastomeric material would be suitable in the working conditions of reciprocating gas compressors valves.

Auxiliary requests 1 specifies the most suitable elastomeric materials and auxiliary request 2 indicates

that the sealing element is entirely made of elastomers.

Auxiliary request 3 specifies that the valve is intended for a high speed reciprocating gas compressor and thus must be suitable for frequent closing.

Auxiliary requests 4 to 7 relate to a reciprocating gas compressor comprising a valve as defined in the main request and in auxiliary requests 1 and 2 and thus further limits the use of the specific type of valve.

Reasons for the Decision

1. The appeal is admissible.
2. *Inventive step - main request:*
 - 2.1 D1 which undisputedly can be considered as a starting point for the invention, discloses a gas compressor valve, see title which is implicitly suitable for reciprocating gas compressors as may be inferred from the various citations in column 1, e.g. D2 mentioned in column 1, lines 59 to 62. The valve comprises a sealing element (10) made of plastic or similar elastic material (column 6, lines 28 to 30), and which operably engages a seating surface (14) with surface contact when the valve is closed and which disengages the seating surface (14) when the valve is opened.
 - 2.2 The valve of claim 1 differs from that of D1 in that the sealing element is entirely of elastomeric material. This is specific example of D1's more general teaching of using plastic or similar elastic material for the sealing element.

The exact technical significance of specifically using an elastomeric material against plastic or similar elastic material is not immediately apparent from the application as filed. The published application lists various advantages, cf. paragraph [0017] relating to an elastomer's ability to resiliently conform to various shapes and its versatility, but these are presented in comparison to the metal and thermoplastic seals described in paragraph [0007] of the published application as closest prior art. Similarly, where the application, see paragraph [0015], identifies its objective of improving reliability and durability this is with respect to metal and thermoplastic seals, see the preceding paragraph. Given the wide range of elastomeric materials which vary considerably in their properties it is thus difficult to associate any particular advantage with the use of an elastomer per se as specific example of a plastic or similar elastic material. At best therefore it provides a specific way of realizing D1's teaching regarding the sealing element. The objective technical problem could then be formulated accordingly as how to realize a reciprocating gas compressor valve as in D1.

That rubber is a well-known example of an elastomeric material behoves no further comment, nor that it is commonly used in seals, e.g. O-rings. In the light of such common knowledge the use of an elastomer for the sealing element in a valve as in D1 is already considered obvious.

- 2.3 E2 provides another example of an elastomeric material, namely a blend that combines the properties of an

elastomer with those of PTFE (Teflon), giving it remarkably increased durability, see column 1, lines 13 to 20. It also expressly mentions application for O-ring seals and valves, see column 4, line 31. If it were to be assumed that the skilled person's main concern is to improve the seal's reliability and durability (cf. paragraph [0015] of the published application), then he need only draw, as a matter of obviousness, on this teaching of E2. By using E2's blend with increased durability as suggested for a seal in a valve such as that of D1 he would also arrive at the subject-matter of claim 1 without an inventive step.

- 2.4 The Appellant contended that there was no hint in the prior art that seals made of elastomeric material would be suitable for reciprocating gas compressor valves. However, D1 indicates that the seal should exert a spring action, contribute to damping the impact of the sealing element on the valve seat (column 3, lines 2 to 5). In particular it suggests that its seals be made of plastic or similar elastic material (column 6, lines 29 to 31). This statement clearly hints a skilled person to use an elastomeric material.

The Appellant submitted also that there was a prejudice against using seals made of elastomeric material in reciprocating gas compressor valves and referred in this respect to D1 and D2, which do not expressly mention sealing elements made of elastomeric material. However, there is no indication in D1 or D2 express or otherwise, that sealing elements of elastomeric material would be unsuitable. In any case, two isolated patent publications cannot establish that an alleged prejudice really exists. This is normally demonstrated

by reference to the literature or encyclopedias published before the priority date, see Case Law of the Boards of Appeal, 6th edition, 2010, I.D.9.2.

3. *Inventive step - auxiliary requests:*

3.1 Auxiliary requests 1 and 2 limit the possible elastomeric material to specific groups. These groups only comprise commonly known elastomers. Moreover, the description of the application does not indicate any specific advantage related to the elastomers of these groups with respect to elastomers in general. Therefore, selecting groups of elastomers which are generally available on the market and suitable for the intended purpose cannot be considered as inventive.

3.2 Claim 1 of auxiliary request 3 further specifies with respect to claim 1 of the main request, that the valve is operable at a piston speed of at least 4m/s.

The specific feature which renders the valve suitable for being used in a compressor operated at high speed, i.e. with a piston speed of at least 4m/s, is that the sealing element is entirely of elastomeric material. This point has been confirmed by the Appellant.

However, as explained with respect to claim 1 of the main request, it was obvious for a skilled person to arrive at a reciprocating gas compressor valve with a sealing element being entirely of elastomeric material. Consequently, such a valve is also necessarily suitable for being used in a compressor where the piston is operated at a piston speed of at least 4m/s.

Accordingly, the subject-matter of claim 1 of auxiliary request 3 does not involve an inventive step either.

3.3 Auxiliary requests 4 to 7:

In these requests claim 1 is directed to a reciprocating gas compressor comprising a crankshaft, one or more compressor cylinders attached to the crankshaft and valves to intake and expel gases, at least one of said valves being as defined in claim 1 of the main request, respectively auxiliary requests 1 or 2 or 3.

The gas compressor as defined in these requests is, as is acknowledged by the Appellant, a state of the art compressor and all reciprocating gas compressors are fundamentally the same (see application as published, page 29, lines 10 to 12).

Consequently the fact that a reciprocating gas compressor, which is known per se, is equipped with a valve that does not involve an inventive step, cannot result in an inventive subject-matter.

4. Accordingly, the subject-matter of claim 1 of none of the auxiliary requests 2 to 7 involves an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The registrar:

The Chairman:

G. Magouliotis

C. Scheibling