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Datasheet for the decision of 18 July 2007

Case Number: T 0919/05 - 3.2.05

Application Number: 01922687.7

Publication Number: WO 01/79730

IPC: F16J 15/12

Language of the proceedings: EN

Title of invention:
Resilient Elastomer and metal retaner gasket for sealing between curved surfaces

Applicant:
PARKER HANNIFIN CORPORATION

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty, inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0919/05 - 3.2.05

D E C I S I O N
of the Technical Board of Appeal 3.2.05
of 18 July 2007

Appellant: PARKER HANNIFIN CORPORATION
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 18 March 2005 refusing European application No. 01922687.7 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: W. Zellhuber
Members: W. Widmeier
C. Rennie-Smith

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the Examining Division refusing European patent application No. 01922687.7.

The Examining Division held in its decision that, on the basis of the then main request, the application did not meet the requirements of Articles 54 or 56 EPC, depending on how claim 1 was interpreted, and that the application on the basis of the then auxiliary request did not meet the requirements of Article 56 EPC.

II. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 13, filed on 18 July 2005 and as amended on 1 June 2007.

III. Claim 1 reads as follows:

"1. An assembly (150) including a gasket (10) interposed between a first (154a) and a second (154b) interface surface of the assembly (150), each of the surfaces (154a, b) having a radial extent (158a,b), said second interface surface (154b) being disposed in mutually-facing opposition with said first interface surface (154a), said gasket (10) comprising:

a resilient primary retainer (12) formed of a metal material and having an inner perimeter (16) and an outer perimeter (18) defining an enclosed geometric shape which extends in a normal state of said gasket (10) within a first plane to a first diametric extent (20) along at least one first axis (22), and to a second diametric extent (24) along at least one second

axis (26) disposed within said first plane generally perpendicular to said first axis (22); and

at least one generally annular primary seal element (14a,b) formed of an elastomeric material and compressible axially intermediate the first (154a) and second (154b) interface surfaces effecting one or more fluid-tight seals therebetween, each said primary seal element (14a,b) being supported on said primary retainer (12) to extend coaxially along at least a portion of said inner (16) or said outer (18) perimeter of said primary retainer (12), and having oppositely disposed first (64a,b) and second (68a,b) radial sealing surfaces disposed in abutting, sealing contact with a corresponding one of the interfaces surfaces (154a,b),

whereby with the gasket (10) being interposed between the first (154a) and second (154b) interface surfaces with the first (64a,b) and second (68a,b) radial sealing surfaces of each said primary seal element (14a,b) being disposed in abutting contact with a corresponding one of the interface surfaces (154a,b), each said primary seal element (14a,b) is compressed axially intermediate the interface surfaces (154a,b) effecting in a stressed state of said gasket (150) one or more fluid-tight seals between the interface surfaces (154a,b), said assembly (150) being characterized in that

each of the surfaces (154a, b) is curved in at least one axial direction (159) normal to said radial extent (158a,b),

said primary retainer (12) of said gasket (10) is flexed in said first diametric extent (20) along at least one first radius of curvature (102) disposed within a corresponding second plane generally

perpendicular to said first plane, and in said second diametric extent (24) along at least one second radius of curvature (104) disposed within a corresponding third plane generally perpendicular to said first and said second plane,

whereby said primary retainer (12) of said gasket (10) is curved along said first and said second radius of curvature (102,104) in said stressed state of said gasket (10) to conform to the interface surfaces (154a,b), and

whereby said gasket (10) is configured substantially to recover to said normal state from said stressed state upon being removed from compression between the interface surfaces (154a,b)."

Independent claim 12 reads as follows:

"12. A method of sealing a first (154a) and a second (154b) interface surface in an assembly (150) according to any preceding claim, said method comprising the steps of:

(a) providing said gasket (10);

(b) interposing said gasket (10) between said interface surfaces (154a,b) such that each said primary seal element (14a,b) abuttingly contacts a corresponding one of the interfaces (154a,b) surfaces;

(c) compressing each said primary seal element (14a,b) axially intermediate said interface surfaces (154a,b) effecting one or more fluid-tight seals between the interface surfaces (154a,b), whereby said primary retainer (12) is curved along one or both said first and said second radius of curvature (102,104) in said stressed state of said gasket assembly (10) by the

compression of said primary seal elements (14a,b) to conform to said interface surfaces (154a,b); and

(d) removing said assembly (10) from compression between said interface surfaces (154a,b), whereby said gasket assembly (10) substantially recovers to said normal state from said stressed state."

Independent claim 13 reads as follows:

"13. A gasket assembly (10) for interposition between a first interface surface (154a) and a second (154b) and a third (154c) interface surface, said second and said third interface surface (154b,c) being disposed in mutually-facing opposition with said first interface surface (154a), said assembly (10) comprising:

a primary retainer (12) having an inner perimeter (16) and an outer perimeter (18) defining an enclosed geometric shape which extends to a first diametric extent (20) along at least one first axis (22), and to a second diametric extent (24) along at least one second axis (26) disposed generally perpendicular to said first axis (22);

a generally annular primary seal element (14a) formed of an elastomeric material and compressible axially intermediate the first and second interface surfaces (154a,b) for effecting a generally-continuous fluid-tight seal therebetween, said primary seal element (14a) being supported on said primary retainer (12) to extend coaxially along substantially the entirety of said inner perimeter (16) of said primary retainer (12), and having oppositely-disposed first (64a.b) and (68a,b) second radial sealing surfaces configured for abutting, sealing contact with a

corresponding one of the interfaces surfaces (154); and

at least one divider member (202) disposed within the enclosed geometric shape of said primary retainer (12) to extend across one of the diametric extents (20,24) thereof for interposition between the first interface surface (154a) and the second and third interface surfaces (154b,c), each said divider member (202) including:

a secondary retainer (12') extending intermediate opposite first (206) and second (208) ends, and having an outer margin; and

a generally annular secondary seal element (14c) formed of an elastomeric material and compressible axially intermediate said first interface surface (154a) and said third interface surface (154b) for effecting a second fluid-tight seal within said first fluid-tight seal, said secondary seal element (14c) being supported on said secondary retainer (12') to extend along at least a portion of the outer margin thereof, and having oppositely-disposed first (64c) and second (68c) radial sealing surfaces configured for abutting, sealing contact with a corresponding one of the interfaces surfaces (154), said assembly (10) being characterized by:

a first and a second diaphragm member (210) each integrally-formed of an elastomeric material with said first primary seal element (14a) and said secondary seal element (14c), each said diaphragm member (210) extending intermediate said first primary seal element (14a) and said secondary seal element (14c) adjacent a corresponding one of said opposite first and second ends (206,208) of said secondary retainer (12') to flexibly join said one of said ends to said primary retainer (12)."

IV. This decision refers to the following document:

D1: CH-A-681 043

V. The appellant's arguments can be summarized as follows:

Document D1 only describes arrangements for sealing planar surfaces, thus it does not disclose surfaces which are curved in at least one axial direction normal to the radial extent of the surfaces, and it does not disclose a gasket which has a primary retainer which is flexed. Furthermore document D1 does not disclose a gasket which is configured to recover to a normal state from a stressed state. Thus, document D1 does not disclose all features of the assembly of claim 1 so that this assembly is novel.

The novel features of the assembly of claim 1 that the primary retainer of the gasket is flexed and that the gasket is configured to recover from its stressed to its normal state upon removal from compression between the interface surfaces enable sealing of curved surfaces and reuse of the gasket in another assembly with differently curved surfaces. Document D1 neither refers to nor suggests these advantageous features so that the assembly of claim 1 involves an inventive step. Since claim 12 relates to a method for using the apparatus of claim 1, this finding also applies to this method. No objections have been raised with respect to claim 13. Therefore, the assembly of this claim also is novel and involves an inventive step.

Reasons for the Decision

1. In the following analysis of novelty and inventive step, the Board for convenience designates the features of the characterising portion of claim 1 of the application as follows:

feature (a): each of the surfaces (154a, b) is curved in at least one axial direction (159) normal to said radial extent (158a,b)

feature (b): said primary retainer (12) of said gasket (10) is flexed in said first diametric extent (20) along at least one first radius of curvature (102) disposed within a corresponding second plane generally perpendicular to said first plane, and in said second diametric extent (24) along at least one second radius of curvature (104) disposed within a corresponding third plane generally perpendicular to said first and said second plane

feature (c): whereby said primary retainer (12) of said gasket (10) is curved along said first and said second radius of curvature (102,104) in said stressed state of said gasket (10) to conform to the interface surfaces (154a,b)

feature (d): whereby said gasket (10) is configured substantially to recover to said normal state from said stressed state upon being removed from compression between the interface surfaces (154a,b).

2. Document D1 discloses an assembly having the features of the preamble of claim 1. Document D1 does not

disclose that each of the surfaces to be sealed by the gasket is curved in at least one axial direction normal to the radial extent of the surfaces. In all embodiments shown in document D1 the surfaces to be sealed are planar. Consequently, the curved parts of sealing elements (gaskets) shown in Figures 1a and 7a of document D1 have to be interpreted as parts of annular sealing elements which are curved in the plane of their radial extent but which are not curved, however, in a direction normal to their radial extent. Thus, document D1 does not disclose the three-dimensional properties of the surfaces to be sealed and of the primary retainer as specified in features (a) and (b). Consequently, document D1 cannot show either, as specified in feature (c), that the primary retainer is curved along first and second radii of curvature in the stressed state of the gasket, i.e. when the gasket is compressed between the two surfaces to be sealed.

Document D1 mentions in column 2, lines 1 to 10, that a certain adaptability ("eine gewisse Anpassungsfähigkeit"), elastically or plastically, of the assembly, or parts of it carrying elastomeric sealing elements, perpendicular to the sealing surface is desirable. However, there is no disclosure that the assembly is used for sealing curved surfaces. Therefore, one cannot conclude from this passage that the gasket is flexed and configured to recover to its normal state from a state in which it is curved as specified in features (b) and (c). Thus, document D1 does also not disclose feature (d).

For these reasons, the subject-matter of claim 1 differs from the sealing assembly disclosed in document

D1 by the features of the characterising portion of claim 1 and is therefore to be considered novel.

3. Document D1 is to be considered closest prior art among the documents cited in the International Search Report. As stated above in point 2, document D1 discloses only embodiments of sealing assemblies where the surfaces to be sealed are planar, and Figures 1a and 7a do not show gaskets which are flexed or curved as specified in features (b) and (c). Document D1 also does not offer any hint to a person skilled in the art to modify the assembly such that the surfaces to be sealed are curved or that the gaskets shown in document D1 might be used for sealing curved surfaces. Also the hint in column 2, lines 1 to 10, of document D1, that a certain elastic or plastic property of the gasket is desirable would not prompt a person skilled in the art to perform such modifications. Any such conclusion would only be made with hindsight. Thus, features (a) to (c) are not rendered obvious by document D1.

Whilst it is clear that a sealing element must be deformable to a certain extent to compensate for unavoidable roughness or unevenness of the surfaces to be sealed, the elastic property mentioned in document D1 cannot be understood as a hint to construct the gasket in such a way that it will substantially recover from a stressed state to its normal state which it had before it was deformed to seal curved surfaces such as specified in feature (a). In the absence of any disclosure of curved surfaces and correspondingly curved gaskets, such a conclusion would also be made only with hindsight. Thus, feature (d) is also not rendered obvious by document D1.

The Board is therefore satisfied that the subject-matter of claim 1 involves an inventive step.

4. Independent claim 12 relates to a method for the use of the assembly of claim 1. Since this assembly is considered novel and involving an inventive step, the same finding applies to the method of claim 12.

5. Independent claim 13 corresponds to claim 33 of the application as filed. The gasket assembly of this claim was considered novel and involving an inventive step in the International Preliminary Examination Report (IPER) and was not objected to in the succeeding European examination procedure. The Board concurs with this finding. The common inventive concept with claim 1 is to be seen in the flexible joint of the primary and the secondary retainer by the diaphragm member, specified in the characterising portion of claim 13, which enables the gasket to recover to its normal state when removed from compression between the surfaces to be sealed.

6. The description has been adapted to the amended claims. The amendments made to the application do not extend beyond the content of the application as filed. The Board is thus satisfied that the application meets the requirements of the EPC.

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 grant a patent on the basis of the following documents:

(a) claim 1, lines 1 to 29 (page 14), filed on 18 July 2005;

claim 1, lines 30 to 34 (page 15), and claims 2 to 6, filed on 1 June 2007;

claims 7 to 9 and claim 10, lines 1 to 15 (page 16), filed on 18 July 2005;

claim 10, lines 16 to 25 (page 17), claim 11, and claim 12, lines 1 to 10 (page 17), filed on 1 June 2007;

claim 12, lines 11 to 15 (page 18), and claim 13, filed on 18 July 2005.

(b) description, pages 1, 4, 5, and 9 to 12 as published;

description, pages 6, 7, and 13, filed with the entry into the regional phase before the EPO;

description, pages 3, 3A, and 8, filed on 27 October 2004;

description, page 2, filed on 18 July 2005;

description, page 2A, filed on 1 June 2007.

(c) drawings, Figures 1 to 9 as published.

The Registrar: The Chairman:

D. Meyfarth W. Zellhuber