BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

A		B		C	X

File Number: T 310/90 - 3.2.1

Application No.: 82 306 334.2

Publication No.: 0 082 611

Title of invention: Fluid pressure operable actuators

Classification: B60T 17/08, F16D 65/32

D E C I S I O N
of 1 September 1992

Proprietor of the patent: BENDIX Limited

Opponent: WABCO Westinghouse Fahrzeugbremsen GmbH

Headword:

EPC Article 56

Keyword: "Inventive step (yes, after amendment)"

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 310/90 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 1 September 1992

Appellant : (Proprietor of the patent)
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Respondent : (Opponent)
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Decision under appeal :
Decision of Opposition Division of the European Patent Office dated 15 February 1990 revoking European patent No. 0 082 611 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : F. Gumbel
Members : P. Alting van Geusau
J. de Preter
S. Crane
W.M. Schar

Summary of Facts and Submissions

I. The mention of the grant of European patent No. 0 082 611 based on patent application No. 82 306 334.2, filed on 29 November 1982 and claiming a priority of 2 December 1981, (GB-8 136 344), was published on 12 November 1986.

II. The Respondent (Opponent) filed an opposition on 6 August 1987 requesting the revocation of the patent for reasons of lack of novelty and inventive step of its subject-matter (Article 100(a) EPC) as well as that the patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC). As regards the objection under Article 100(a) EPC the Respondent cited as state of the art the prior use of a WABCO tristop brake actuator No. 425 327 151 0 by the Respondent himself and by Clayton Dewandre Co Ltd. in Lincoln (GB), supported by the documents:

- WABCO drawing 425 327 151 0 (A)
- WABCO drawing 897 754 290 4 (B)
- Inter-Office Memo Clayton Dewandre (dated 07.07.1981) (D)
- Invoice WABCO (dated 11.09.1979) (F)
- Telex WABCO (dated 11.09.1979 (G)
- Order Ford (dated 12.05.1981) (H)

Further reference was made to

- WABCO publication 470 004 (edition May 1969) (E).

III. By the decision of 15 February 1990 the Opposition Division revoked the patent. The Opposition Division held that the opposed patent was not objectionable under

Article 100(b) EPC but that the subject-matter defined in Claim 1 did not involve an inventive step when taking into account the disclosures in the manual "Handbuch der Dichtungstechnik", pages 191 to 201, expert Verlag Grafenau (DE), published on 27 October 1980 (D2) which disclosed scraping portions of identical shape and function as defined in Claim 1 of the patent as granted (Article 100(a)).

IV. An appeal was lodged against this decision on 11 April 1990 and the appeal fee was paid on 12 April 1990. The Statement of Grounds of Appeal was filed on 20 June 1990 with which the Appellant filed revised claims, further limited in relation to the state of the art.

V. In communications dated 2 May 1991 and 9 September 1991 the Board expressed its provisional opinion that the independent claims filed so far did not appear to meet the requirements of Article 123(2) and (3) EPC.

As regards the requirement of inventive step the Board was of the opinion that a combination of the teachings of DE-A-2 751 607 (D3) cited by the Respondent in response to the Statement of Grounds of Appeal - which was considered to describe the closest prior art - and D2 appeared to provide the skilled person with sufficient details to arrive in an obvious manner at the subject-matter of the amended claims.

VI. Oral proceedings were held on 1 September 1992. At the oral proceedings the Appellant filed a single new claim and an amended description. He requested that the decision under appeal be set aside and that the patent be maintained on the basis of this single claim and amended description together with the drawings as granted.

The single claim reads as follows:

"An air pressure operable diaphragm actuator having a housing (1, 2) containing a pressure chamber one wall of which is formed by a diaphragm, (4), a push plate (10) co-operable with the diaphragm (4) and a push rod (11, 12, 16) connected thereto extending outwardly of the housing via the bore of a tube (6) which is a fixed part of the housing and said push rod being slidably supported in said tube by a first non-sealing packing member (19) and a second non-sealing packing member (20) axially outwardly spaced from the first packing member said packing members providing alignment of the push rod in the tube and being located by annular grooves directly on the push rod for axial movement therewith in the tube, characterised by said first first packing member comprising a one-piece moulding incorporating material for self-lubrication and being provided with an axially extending solid portion (22) of predetermined external diameter (d) and said first member also having an annular resilient skirt-like scraping portion extending further axially inwardly of the solid portion with reducing thickness to a greater natural external diameter (D) to slide non-sealingly in the tube and clearing the inward end (7) of the tube in moving to the fully retracted position of the push rod to protect the packing members and the outward end of the tube against contaminants passing thereto from the actuator whilst avoiding pressure gradients during operation of the actuator."

VII. In support of his request the Appellant essentially submitted the following arguments.

The current claim is now related in its precharacterising portion to the closest prior art as disclosed in D3. In D3 intrusion of contaminants into the tubular part of the

actuator is avoided by a flexible rolling gaiter provided between the tube and the push rod. Such an arrangement, which in D3 requires a conical part on the push rod for support of the gaiter in its compressed state, is notably expensive to produce and its life is relatively short. Further, because of the movement of the gaiter together with the push rod a pumping action of this known arrangement cannot be excluded.

D3 is totally silent about the materials used for the packing members. The present invention as defined in the claim provides a relatively simple and much cheaper to produce arrangement which avoids any pressure build up. Such a pumping action must be avoided because contaminants may otherwise be drawn into the system, also from the brake side of the actuator.

Because of the self-lubricating material selected for the packing members and scraping portion, life of the actuator is extended and when relatively hard plastic material is used it was found that no appreciable sealing of the scraping portion against the cylinder wall takes place so that under such circumstances no further measures are necessary to make the scraping portion non-sealing.

There are several reasons why a skilled engineer resorting to the teachings of the "Handbuch der Dichtungstechnik" (D2), would not arrive at a practical realisation of the present invention without exercising inventive activity. Firstly, known seal members with profiles shown in 6.5.2 of D2 are not carried by a rod to be guidingly movable in a bore. Secondly, since pressure gradients are to be avoided, it is not a part of a practical realisation that seals should be used as the packing members. Moreover, the packing member in an actuator according to the invention does not have a guided surface the totality of which is at

a greater or lesser angle to the guiding surface, such as shown by 6.5.2 of D2.

Moreover D2 primarily concerns hydraulic seals whereas the subject-matter of Claim 1 relates to an air pressure actuator for which other considerations prevail. In view of these differences the skilled person would not look into D2 for a solution to the problem to be solved.

When moving to the fully retracted position of the push rod the scraping portion of the invention clears the inward end of the tube which avoids build up of contaminants at the end of the tube which otherwise might give a sealing effect of the scraping portion. This was not the case with the arrangement of D2, at least if the embodiment with two packing members disclosed in the lower half of Figure 1 thereof is considered.

Also when taking into account the alleged prior use, the public availability of which is contested because usually confidentiality of suppliers designs will be respected, the skilled person needed an inventive activity to arrive at the combination of features of the claim.

VIII. The Respondent requested that the appeal be dismissed and his counterarguments can be summarised as follows:

As regards the requirements of Article 123(2) EPC the claim contains added subject-matter in that it is not specified that both packing members comprise scraping members as in the single embodiment disclosed.

There is further no disclosure in the application as originally filed of the term "skirt-like" as referring to the scraping portion or to the use of different materials

for the packing member and the scraping portion, one now being specified as "solid" and the other as "resilient".

Considering the requirement of inventive step the closest prior art (D3) discloses not only the combination of the precharacterising features of the claim but also the characterising features relating to the first packing member being a one-piece moulding provided with an axially extending solid portion, that it is non-sealing and self lubricating, and that it clears the inward end of the tube in the retracted position of the push rod.

It is further apparent to the skilled person that the use of a gaiter for protection of intrusion of contaminants is an expensive solution and it would be obvious to the skilled person to use a scraper instead, as is well known from D2. The scrapers disclosed in D2 are also substantially non-sealing in the direction of movement to the contacting lip.

It is further well known to the skilled person that such scrapers can also be mounted on a piston to provide the same scraping function as on a rod as well as that they can be used in combination with a packing member which is clearly shown in the prior use document (A).

Deliberate clearing of the tube end must be considered as an obvious measure for avoiding that, due to manufacturing tolerances, the scraper portion does not fully reach the end of the tube. Moreover, this feature is shown in D3.

Thus having regard to the teaching of D2 the skilled person would when starting from an actuator in accordance with D3 arrive in an obvious manner at the actuator defined in the claim of the contested patent.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. It is admissible.

2. Amendments

2.1 The present claim contains all the features of granted Claims 1, 2, 3, 4, 6 and 7 and comprises further details of the preferred embodiment disclosed with respect to Figures 1 and 2 of the originally filed application concerning the location of the packing members by means of annular grooves (see the original application document page 2, line 26 to page 3, line 3) the incorporation of material for self-lubrication in the packing and scraping member (see the original application document page 3, lines 19 to 23), the "solid" configuration of the packing member (see Claim 6 in the original application document), the configuration of the scraper portion to be "skirt" like and extending axially inwardly of the solid portion with reducing thickness to a greater natural external diameter (see the original application document page 3, lines 14 to 19, Claim 6 and Figure 2) and a non-sealing function of the scraper portion (see page 3, line 25 to page 4, line 2 of the original application).

2.2 The Respondent submitted that the word "skirt" was not originally disclosed and since it could not be given a clear meaning, should be deleted.

He also submitted as regards the terms "solid" and "resilient" for a one-piece moulding, the application as originally filed does not comprise a disclosure that this one-piece moulding is made of different materials for the respective parts of it. Further, since the particular

embodiment described comprises two identical packing-scraping members the claim should be limited to such an arrangement.

However, the word "skirt" when considered together with and in the context of the further details concerning the definition of the scraper portion in the claim is, in the Board's opinion, nothing more than a technical clarification of the configuration of the scraper without there being an introduction of new subject-matter by the use of this term.

As regards the terms "solid" and "resilient" it is, in the Board's opinion, sufficiently clear from the original disclosure that these functions are achieved by the configuration of the respective portions (massive for the packing member and thin and flexible for the scraper portion) rather than that their material is different.

Further, as is clear from Claims 2 and 3 of the originally filed application as well as Claims 5 and 6 of the patent neither the subject-matter of the application nor the patent as granted was limited to an arrangement comprising two identical packing-scraping members.

There are, therefore, no objections to the current claim under Article 123(2) and, since the subject-matter claimed in the patent as granted was further limited, also not with respect to Article 123(3) EPC.

3. Prior art

3.1.1 The closest prior art, as also agreed by the parties, is disclosed in D3, which relates to an air pressure operable diaphragm actuator of the type as claimed in the contested

patent. Although not directly concerned with the guiding of the push rod and avoidance of intrusion of contaminants and in this respect lacking any reference in the description, on the basis of the details of Figure 1 the skilled person immediately recognises that the actuator comprises a housing (1), containing a pressure chamber one wall of which is formed by a diaphragm (17), a push plate co-operable with the diaphragm (17) and a push rod connected thereto extending outwardly of the housing via the bore of the tube which is fixed to the housing. The push rod is - in one embodiment shown in the lower half of the push rod arrangement - slidably supported in said tube by a first packing member and a second packing member axially outwardly spaced from the first packing member, said packing members providing alignment of the push rod in the tube and is located by annular grooves directly on the push rod for axial movement therewith in the tube.

The packing members have axially extending holes so that it may be concluded that they are "non-sealing".

In a further embodiment shown in the upper half of the push rod arrangement a single packing member alignment arrangement is shown in which the packing member clears the end of the tube.

Obviously, intrusion of contaminants from the vented chamber of the housing is avoided by the use of a gaiter fixed at one end to the tube and at its other end to the push rod. The push rod is provided with a conical extension evidently for giving support to the gaiter when rolling over the conical surface when the push rod is moved into the tube.

3.1.2 The Respondent's view that D3 discloses further features of the claim under discussion cannot be followed.

Considering the first packing member it is stated in the claim that it is a one-piece moulding being provided with a solid (guiding) portion and an annular resilient skirt-like scraping portion and should therefore, in the Board's opinion, be considered in its entirety rather than, as was done by the Respondent, splitting this feature up into single parts some of which might be in themselves known from D3.

In D3 no disclosure is contained about the material used for the packing members, let alone a reference to incorporation of material for self-lubrication. The opinion expressed by the Respondent that such material is likely to be used is considered to be an unacceptable interpretation of the disclosure of D3.

Although the upper part of the push rod shown in Figure 1 of D3 shows a packing member clearing the end of the tube no reference to the function of this feature is contained in the description. Moreover, this embodiment is different from the claimed subject-matter in that only one packing member provides the alignment of the push rod and, further, it is not the scraping portion that clears the end of the tube.

3.1.3 For these reasons the subject-matter of the claim is correctly delimited with respect to this prior art in that it comprises in its precharacterising part the combination of features known from the closest embodiment of this single prior art document and in this respect the claim meets the requirement of Rule 29(1) EPC.

3.2 D2, "Handbuch der Dichtungstechnik" pages 191 to 201 cited by the Opposition Division in the opposition procedure discloses on page 200 in paragraph 6.5.2 scraping members

of different forms which are meant to be used for protection against intrusion of contaminants into the seal between a reciprocating shaft and a housing.

3.3 The Board does not consider it to be appropriate to discuss the further available prior art according to the European search report since these documents clearly lie further away from the claimed subject-matter than D3 and D2 and also because the Respondent did not base any argument on this further prior art.

4. Alleged prior use

4.1 In the appeal procedure the Respondent referred to the alleged prior use for support of his argument that combinations of packing and scraping members on a piston part rather than in a cylinder and used in an actuator of the type defined in the claim of the patent in suit were already known.

Such an arrangement is shown in document (A) provided by the Respondent but this lacks any reference to the materials of the moulding, whether the arrangement is non-sealing and whether the packing member clears the inward end of the tube in the fully retracted position of the push rod. Furthermore, only one packing member is available for aligning the push rod. Moreover the configuration of the scraper portion is different from the one defined in the claim.

5. Novelty

5.1 As follows from the above analysis of the relevant prior art documents and even taking into account the alleged prior use none of the available pieces of prior art discloses an air pressure operable diaphragm actuator

comprising the combination of all the features of the claim under discussion. Therefore, the subject-matter of the claim is novel.

As the novelty of the claimed actuator was no longer in dispute in the appeal proceedings further elucidations on this point are unnecessary.

6. Inventive step

6.1 When considering the arrangement disclosed in D3 it will be clear that the solution for avoiding intrusion of contaminants by means of a gaiter has drawbacks associated with relatively high manufacturing costs and comparatively low life of the gaiter. Moreover such an arrangement does not fully avoid a pumping action during operation of the actuator and thus gives rise to a risk of drawing in contaminants from the brake mechanism side which reduces life of the actuator.

6.2 The features of the characterising part of the claim of the patent in suit avoids these drawbacks in that at least the first packing member is adapted to and provided with a scraper portion of particular shape and function so that contaminants are scraped out of the guiding tube while avoiding appreciable pumping action.

6.3 The underlying problem of the patent in suit can therefore be seen in the provision of an actuator giving a high operation life with relatively low manufacturing costs.

6.4 Looking for a solution to this problem the skilled person, in the Board's opinion, would consider the use of sealing or scraper rings of the form as disclosed in D2 since the use of such rings is a well known generally applicable alternative in the mechanical art for gaiters or bellows

when intrusion of dirt and other contaminants is to be avoided.

However, the scraper rings of the type disclosed in D2 in paragraph 6.5.2 are used separately and in combination with a guide for the shaft to be protected and thus no teaching can be derived from this paragraph for combining the guide and scraper to become one unit. Further, although it would, in the Board's opinion, not need an inventive activity to realise that the scraper rings shown in the above referred to paragraph could be used with the same effect in the bore of a cylinder when mounted on a piston, there is no suggestion that the scraper should clear the end of the cylinder or slide non-sealingly in the cylinder.

It is noted, as was also referred to by the Respondent, that in one direction of movement the known scraper is non-sealing because of the flexibility of the scraper lip. However no reference whatsoever can be derived from D2 that the scrapers disclosed are non-sealing in both directions of movement as is the case with the actuator of the claim under consideration.

Therefore a combination of the teachings of D3 and D2 does not lead to an arrangement with the combination of features of the claim of the patent in suit.

6.5 Considering the alleged prior use it will be clear that the claimed subject-matter includes more than just a combined packing and scraping member and that in respect of the further features defined in the claim the alleged prior use does not provide any information.

Therefore even if this prior use were sufficiently substantiated it cannot, in the Board's opinion, be

considered pertinent for the combination of features of the currently claimed subject-matter.

6.6 Attention is also drawn to the fact that the characterising features of the claim work together to achieve a solution to the above-cited problem in a manner not hinted at or derivable from any of the available documents.

In this respect the incorporation of material for self-lubrication adds to the service life of the actuator and, as was convincingly explained by the Appellant, avoids the need for fluid lubricants which would make it more difficult to provide a non-sealing scraper portion without further measures being taken. The feature that the scraper portion clears the tube also adds to this non-sealing function of the scraper by avoiding build-up of a ring of contaminants in the tube.

The latter feature was considered obvious by the Respondent but he failed to give a reference to relevant prior art in this respect.

It is noted that in Figure 1 (upper half) of D3, a packing member "clears" the end of the tube but, in the Board's opinion, this disclosure cannot be considered pertinent in giving the skilled person a teaching in the direction of the function achieved in the claim under discussion. Firstly the packing member shown does not have a scraper portion and secondly, in view of the protection by means of a gaiter, there is no need for scraping away contaminants in this prior art.

7. Summarising, in the Board's judgment, the proposed solution to the technical problem underlying the patent in suit defined in the independent claim is inventive and

therefore this claim can form the basis for maintenance of the patent (Article 52(1) EPC).

The description and drawings are in agreement with the actual wording and scope of the current claims. Hence these documents are also suitable for maintenance of the patent in amended form.

Thus taking into account the amendments made by the Appellant, the patent and the invention to which it relates meet the requirements of the EPC and the patent as amended may be maintained in the form as requested (Article 102(3) EPC).

Order

For these reasons, it is decided that:

1. The contested decision is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the single claim and the description as presented at the oral proceedings of 1 September 1992 together with the drawings as granted.

The Registrar: The Chairman:

S. Fabiani F. Gumbel