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Bezeichnung der Erfindung:

Title of invention: Sealing cup for hydraulic cylinder device

Titre de l'invention :

## ENTSCHEIDUNG / DECISION

vom / of / du 9 October 1984

Anmelder/Patentinhaber: AISIN SEIKI K.K.  
Applicant/Proprietor of the patent: KABUSHIKI KAISHA TOYOTA  
Demandeur/Titulaire du brevet : TOYOTA JIDOSHA KOGYO K.K.

Stichwort / Headword / Référence : "late submission/AISIN"

EPÜ / EPC / CBE Articles 52(1), 56

"Disregarding alternative claim newly submitted at outset of oral proceedings"

### Leitsatz / Headnote / Sommaire

If an applicant for a patent or a patentee desires to submit amendments to the description, claims or drawings of a European Patent application or a European Patent in the course of appeal proceedings, this should be done at the earliest possible moment (OJ EPO 6/1981, 176; 8/1984, 376). It is only in the most exceptional circumstances, where there is some clear justification both for the amendment and for its late submission, that it is likely that an amendment not submitted in good time before oral proceedings will be considered on its merits in those proceedings by an Board of Appeal.



Case Number: T

95 / 83

**DECISION**

**of the Technical Board of Appeal 3.2.1**

**of 9 October 1984**

**Appellant:**  
(Opponent)

Alfred Teves GmbH  
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**Representative:**

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**Respondent:**  
(Proprietor of the patent)

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**Decision under appeal:**

**Decision of the Opposition Division of the European Patent Office  
dated 28 April 1983 rejecting the opposition filed against  
European patent No. 0 000 516 pursuant to  
Article 102(2) EPC**

**Composition of the Board:**

**Chairman:** G. Andersson

**Member:** M. Huttner

**Member:** P. Ford

SUMMARY OF FACTS AND SUBMISSIONS

- I. European Patent No. 516 was granted on 28 October 1981 comprising an independent Claim 1 and dependent Claims 2 to 6. It was based on European Patent application No. 78 100 391.8 filed on 13 July 1978, published on 7 February 1979 under No. 0 000 516 and claiming priority from a prior national application made in Japan on 15 July 1977.

Claim 1 reads as follows:

1. A sealing cup for a hydraulic piston-cylinder device which comprises

an annular body of a resilient material including an annular base (3)

an annular sealing lip (2) extending from said annular base and having an inner sealing surface adapted to be engaged with a wall to be sealed, and

an annular outer sealing lip (21) extending from said annular base so as to encircle said inner sealing lip in spaced relation therewith and having an outer sealing surface (4) adapted to be engaged with a wall surface to be sealed,

at least one of said inner and outer sealing surfaces being slidably movable with respect to corresponding one of said piston (P) and cylinder walls (Cy) to be sealed, said movable sealing surface (2,4)

being formed with a single circumferentially extending groove whereby lubricating oil is retained in said groove and reduces the drag force against movement of said sealing cup characterised in that said groove (4a) is v-shaped and defined by two annular surfaces having straight-line axial profiles intersecting at an obtuse angle, the groove starts at the point producing the maximum sealing pressure when the cup is mounted, and the point (C) of maximum depth of said angular groove is in an area having an external or internal diameter, when the sealing cup is unmounted, greater than the internal diameter of the cylinder wall or smaller than the external diameter of the piston wall respectively.

II. The European Patent was opposed in due time and form by

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and the revocation of the Patent was requested pursuant to Article 102 (1) EPC for lack of novelty in view of opponents' prior use of a brake master cylinder including a sealing cup as shown in opponents' drawing 3.3301 1934. The opponents subsequently also relied upon GB-A-994 230 and EP-B1-0 000 517.

III. After considering the grounds of opposition, the Opposition Division did not agree with the opponents' allegations of lack of novelty and further concluded that the subject matter of the Claim 1 could not be derived in an obvious manner from the state of the art. It therefore rejected the opposition by its decision dated 28 April 1983.

- IV. On 21 June 1983, the opponents lodged an appeal against this decision. The Statement of Grounds was received in time and the appeal fee duly paid. The appellants did not dispute the findings of the Opposition Division regarding the alledged prior user but argued that the subject matter of Claim 1 differed from the most pertinent piece of the prior art which is acknowledged in NL-A-273 853 only by the point of maximum depth of the annular groove being greater or smaller than the internal or external diameter of the cylinder or piston wall respectively. They contended that to make this change was nothing more than an obvious constructional modification which in fact would not confer any advantage. The appellants therefore requested that the decision of the Opposition Division be set aside and that the patent be revoked.
- V. The patentees contended in reply that the groove according to the invention achieves a pressure relief in the area of the maximum contact pressure of the seal to afford the formation of a lubricating cushion without however maintaining a positive recess when in position and facing the surface to be lubricated. This was not suggested by any citation considered in the proceedings. The patentees requested that the appeal be rejected and the patent be maintained in unchanged form or, as a first alternative, in a slightly merely clerically amended form.
- VI. Auxiliary requests for oral proceedings were made by both parties.

VII. At the outset of the oral proceedings held on 9 October 1983, the patentees submitted a newly amended version of Claim 1 in which the feature of the movable sealing surface being formed with a single circumferentially extending groove had been transferred to the characterising part of the claim and the "whereby clause" in the preamble with its functional statements as to lubricating oil being retained in said groove had been omitted. They contended that the new Claim 1 would better reflect the measures taken at the annular sealing lip proper to create a pressure relief area at the critical location. In addition, they argued that they had reformulated Claim 1 to avoid the danger of misinterpretation and for the sake of improved clarity. Hence as a second alternative, they requested the maintenance of the patent on this basis with the description and drawings as granted.

VIII. The appellants asserted that they were taken by surprise by this new auxiliary request and they first asked that if the newly reformulated Claim 1 was to be considered at all, it should not be dealt with immediately but a new date for a further oral proceedings ought to be fixed in order to allow the appellants ample time thoroughly to study the new request. The allowability of the submission of the amendment at such a very late stage in the appeal proceedings was discussed with the parties and the Board ruled against it.

REASONS FOR THE DECISION

1. The appeal complies with Articles 106 to 108 EPC and Rule 64 and is, therefore, admissible.
  
2. In the opinion of the Board, it is not necessary to consider any cited prior art documents other than the two British patent specifications. Dealing with the question which of the two documents GB-A-944 921 and GB-A-944 230 are more closely related to the subject matter of the patent under attack, it must be born in mind that they both deal with a cup shaped seal construction having a disk-like circular bottom constituting the annular base and an annular outflaring sealing lip. GB-A-944 230 discloses moreover a plurality of circular grooves spaced along the length of the outer frusto-conical portion of the lip which, when mounted, fits with the opposed surface of the cylinder bore. This arrangement is stated to be applied at the sealing area proper in order to reduce not only sliding friction and undue attrition, but also alternate sticking and slipping of the seal, causing brake chatter.

Since the object of the patent in suit is likewise to overcome such drawbacks by measures similarly applied at the sealing area proper, the Board follows the patentees and concludes that from the purposes of considering novelty the prior art document GB-A-944 230 is more pertinent than GB-A-944 921, which in fact does not disclose a groove precisely confined to the sealing surface.

3. The sealing cup according to GB-A-944 230 does not disclose a single circumferential groove provided in the sealing surface, nor any individual groove in that surface which conforms in shape with the V-shaped groove as defined in the characterising clause of the patentee's Claim 1.

The same applies with respect to citation GB-A-944 921 since the Board cannot follow the appellants' contentions that the apex of the groove defined by both the cylindrical and the conical straight line portions would inevitably be located in an area outside the cylindrical surface defined by the base.

Hence the Board sees no reason to doubt the novelty of the subject matter of Claim 1.

4. The question now to be considered is whether the device according to Claim 1 involves an inventive step. The following points emerge:
  - 4.1 According to the patent in suit, the underlying problem of the invention resides in the provision of a sealing cup for a hydraulic piston cylinder device which ensures a smooth and stable operation and can maintain lubricating oil on the sliding (i.e. sealing) surface. This problem results from the drawbacks observed in the most pertinent prior art device having a plurality of semi-circular grooves leaving lands between them (GB-A-944 230) that lead to a concentration of contact pressure and thus to increased frictional resistance and impediment of the effective lubrication cushion.



- 4.2 The solution to this problem suggested in the present patent is to provide a single groove of v-shaped form at a location as defined by the characterising clause of Claim 1.

According to the patentees' arguments, it is based on the idea of providing a pressure relief in the area of maximum contact pressure to allow for the formation of a lubricating film without having to preserve the initially available positive recess or gap between the deformed sealing surface of the sealing lip when mounted and the surface to be lubricated. This allegedly new principle is said to be based on the recognition that upon biasing a v-grooved sealing surface is biased by resilient deformation into contact with the cooperating wall surface to be sealed, an area of reduced contact pressure is created, which, so the patentees assert, suffices to provide an adequate lubrication film or cushion.

- 4.3 Such an idea, however, has already been suggested to the skilled reader prior the patentees' effective application date in GB-A-944 921, which describes a seal having an annular base with a cylindrical outer surface adapted to be in sliding relationship with a bore in which it is mounted. When the seal is in the free state, there is a peripheral frusto-conical flange flaring outwards at an obtuse angle forming a v-shaped groove, but the flange is resiliently deformable so that the outer surface becomes cylindrical upon mounting engaging the corresponding inner surface of the cylinder right up to the free edge of the flange (page 1, lines 22-28). Such resilient deformation of the flange inevitably leads to a small clear-

ance or gap, i.e. a pressure relief area in the zone of intersection of the two adjoining annular surfaces forming the groove, as has been depicted in the form of an exaggerated gap discernable in Figure 2, which makes the formation of a lubrication cushion possible. Hence, the generation of a pressure relief area by deformation of an initially v-shaped groove has already been suggested by this citation and it does not matter whether this functional attribute has been expressly disclosed or not as long as to a skilled person versed in the field of elastic seals, this idea becomes immediately apparent when reading the document (cf. Decision T06/80, EPO OJ 10/81, 434).

- 4.4 The patentees' arguments, put forward during the oral proceedings, that there is no v-shaped groove in the sense of the invention discernable in GB-A-944 921 are not persuasive, because the patentees are not in a position to disprove the existence of a pressure relief whose cause can only be a gap or groove, no matter how small. They thus merely rely on the fact that the groove is not confined to the actual sealing surface of the flange. Such reasoning, however, must be rejected as irrelevant, due to the patentees' failure to define the limit of extension of the groove, the reason for which becomes readily apparent when looking at the embodiments depicted in Figures 15 and 16 of the patent, wherein the v-groove likewise extends as far as the front end of the base.
- 4.5 Once the drawbacks of having a plurality of grooves in the sealing area of the flange have been recognised, it is only logical that the skilled person would take advantage of the teachings in G-A-944 921 and benefit

from the proposal to use in exchange for a plurality of grooves one single v-shaped obtuse angled groove, free of any objectionable lands, to further improve the lubrication of the seal according to GB-A-944 230 by placing such a groove at the sealing surface. Considering this as logical, then in the Board's opinion, the determination of a particularly suitable size, shape and location of the single v-shaped groove causes no unsurmountable difficulties for the skilled person, all the more because GB-A-944 230 already discloses a group of grooves that starts at the free edge of the flange and terminates in proximity to the point where the frusto-conical lip joins the annular cylindrical surface portion at the base.

As to the location of the apex point (c) as the remaining feature claimed, it is also evident that there would be no inducement to deviate from the depth range indicated in this citation (0.025 - 0.050 mm) to determine the maximum depth of the single groove. The skilled person would select the depth at about the same magnitude, which, with a pronounced outflaring flange, leads to a bottom necessarily remaining in an area outside the (imaginary) diameter of the wall to be sealed.

Therefore, the Board cannot subscribe to the position adopted by the Opposition Division in their decision that the obvious way to avoid undue wear of the intervening lands would be to increase their axial length, thus leading away from the invention. Such a view is not consistent with the correct interpretation of GB-A-944 921 pointed out above. The Board reaches the concludes that, for the skilled person the subject matter of Claim 1 is therefore obvious (Article 56 EPC).

4.6 The patentees further assert that if the seal according to GB-A-944 921 necessarily produces a pressure relief area in the region where the cylindrical and conical surface join, as contended by the rapporteur, and argued by the appellants, then any further measures to improve lubrication such as providing a plurality of grooves proposed by GB-A-944 230 would not make sense. This cannot be accepted, however, as the displacement of the relief zone from the location shown in GB-A-944 921 to one where the maximum pressure is exerted i.e. completely into the sealing flange, would clearly improve lubrication effect and so justify itself.

4.7 As the appellants submitted, there must also exist a lubricating film in the device disclosed in GB-A-944 230, which is of similar effectiveness to that produced by the invention. In reaching this conclusion, they relied on the results shown in Figure 4, wherein the curves are depicted on a direct comparison basis with standard smooth lipped seals. It can be gathered therefrom that the forces required to initiate the brake applying movement and thereupon to maintain said movement at less resistance have been subject to a reduction about 50% with the concomitant result of avoiding slip sticking and thereby achieving a smooth piston operation. These results, and here the Board fully agrees, would never have been attainable without an appropriate lubricating film. Considering now the curves depicted in Fig. 4 of the patent in suit, which are likewise based on a direct comparison with a standard smooth lipped seal, such as the conventional SAE-type sealing cup shown in Fig. 2 of the

patent, it can be readily gathered that there is no significant difference in the magnitude of the reduction in drag force imparted to the sealing cup embodying the features of the invention. Hence, an objective evaluation of the results respectively shown in Figures 4 clearly demonstrates that the reduction of the drag force and moreover the elimination of the slip-stick phenomena ascribed to the patentee's v-shaped groove is merely marginal and therefore the elimination of the lands only insignificantly improves the build-up of an effective oil cushion or film.

- 4.8 In view of these facts, in conjunction with those pointed out on page 2, lines 24-35 of GB-A-944 230, the Board considers it established that the plurality of grooves known in the art are nearly as efficient in improving the performance of the sealing cup as the single groove of the invention. Thus it is not possible to make a meaningful appraisal of the technical advance allegedly attained. While it is true that, pursuant to Article 52 EPC, such advance is no requirement for patentability, it nevertheless could still be favourably considered in the assessment of obviousness if proven to be substantial. This, however, has not been established by the patentees in the present case.

Therefore, the patentees cannot derive any benefit from the results of the comparative tests set forth in the patent in suit so as to tip the balance of the issue of inventive step in their favour.

- 4.9 For the foregoing reasons, the subject-matter of Claim 1 lacks an inventive step as required by Article 56

EPC. Therefore the claim cannot be allowed to stand having regard to Article 52(1) EPC.

5. Claims 2 to 6 are dependent on Claim 1, and having as subject matter special embodiments of the invention according to Claim 1, are not allowable either, since their validity is contingent on that of Claim 1, which has been denied. There are also no auxiliary requests from the patentees to consider them separately, and the rapporteur's arguments, expressed in a communication, that none of them introduces a feature which would be apt to impart non-obviousness to the subject matter of Claim 1, have not been repudiated by the patentees.
6. As to the first alternative request, involving some merely clerical amendments to the wording of Claim 1, it is self-evident that all the previously presented arguments with respect to the lack of inventive step in the subject matter of Claim 1 are equally applicable to that of the so amended Claim 1. Therefore the amended Claim 1 is not allowable either.
7. In the revised Claim 1 presented as the second alternative request at the commencement of the scheduled oral proceedings before this Board the essence of the invention was shifted from a single groove still maintained in the movable seal in the mounted position in the form of a slight gap for retaining lubricating oil to a single groove that is not present as a groove when the same is mounted but still ensures a pressure relief as a means for making the lubricating cushion or film possible.

Although the patentees had argued in their written submissions that the invention ought to be seen in having a pressure relief area not requiring a positive recess in the installed condition of the sealing cup, the Board and the appellants alike had no reason to expect that a new claim specifically directed to this principle would be presented during the oral hearing and put forward for decision.

8. In paragraph 2.2 of the official "Guidance for appellants and their representatives" published in 1981 (OJ EPO 6/1981, 176) and recently republished, with a note that it applies mutatis mutandis to appeals in opposition proceedings (OJ EPO 8/1984, 376), the Boards of Appeal have sought to make it clear that if it is desired to submit amendments to the description, claims or drawings of a patent application or a patent "this should be done at the earliest possible moment". In the paragraph referred to, applicants for patents and patentees are specifically warned to bear in mind that a Board may disregard amendments not submitted in good time before oral proceedings. For the avoidance of doubt in future cases, the Board takes the opportunity of saying that it is only in the most exceptional circumstances, where there is some clear justification both for the amendment and for its late submission, that it is likely that an amendment not submitted in good time before oral proceedings will be considered on its merits in those proceedings by a Board of Appeal. In the present case, there was no apparent reason for the late submission of the amendment sought. The Board observes that the last written submissions of the patentee to which the amendment could be related were filed on 6 June 1984, more than three

months before the hearing. Furthermore, it may be observed obiter that it is not apparent that the amendment sought, even if otherwise allowable, could have cured the defect in the patent which, in the judgement of the Board, must lead to its revocation.

ORDER

For these reasons, it is decided that:

The decision under appeal of the Opposition Division dated 28 April 1983 is set aside and the European patent No. 0 000 516 is revoked.

The Registrar:

The Chairman

*J. 16/84*

*[Handwritten signature]*