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**D E C I S I O N**  
of 16 February 1994

**Case Number:** T 0499/92 - 3.2.1

**Application Number:** 86402051.6

**Publication Number:** 0217709

**IPC:** B60T 13/52

**Language of the proceedings:** EN

**Title of invention:**

Method of adjusting a vacuum brake booster

**Patentee:**

Bendix Italia S.p.A.

**Opponent:**

Alfred Teves GmbH

**Headword:**

-

**Relevant legal norms:**

EPC Art. 56

**Keyword:**

"Inventive step (yes)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0499/92 - 3.2.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.1  
of 16 February 1994

**Appellant:** Alfred Teves GmbH  
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**Representative:** -

**Respondent:** Bendix Italia S.p.A.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office dated 12 February 1992,  
with written reasons posted on 8 May 1992  
rejecting the opposition filed against European  
patent No. 0 217 709 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** F.A. Gumbel  
**Members:** P. Alting van Geusau  
J.-C. Saisset

## Summary of Facts and Submissions

I. European patent No. 0 217 709 was granted with effect from 10 May 1989 on the basis of European patent application No. 86 402 051.6 filed on 18 September 1986.

II. With notice of opposition filed on 22 July 1989 the Appellant (Opponent) requested revocation of the patent for the reason of lack of inventive step of the claimed subject matter in view of the prior art disclosed in:

D1: DE-A-2 918 913

D2: DE-A-3 015 111.

III. By decision given at oral proceedings held on 12 February 1992, with written grounds posted on 8 May 1992, the Opposition Division rejected the opposition.

The Opposition Division considered that the skilled person would not receive suggestions from D2 to adopt specific adjustment procedure steps for the assembly disclosed in D1 which would lead in an obvious manner to the subject-matter defined in the single claim of the patent in suit.

VI. An appeal was lodged against this decision on 29 May 1992 with payment of the appeal fee on the same day. In his Statement of Grounds of Appeal, filed on 8 September 1992, the Appellant referred to additional prior art disclosed in:

D4: "Bremsen Handbuch", page 77, Bartsch Verlag, Ottobrunn near München, 1977.

V. In a communication dated 5 March 1993 the Board drew the parties attention to a number of obscurities in the

patent description and claim which were considered to be of such a nature that considerations as to inventive step should be postponed until the true content of the patent were clarified.

However, the Board also expressed the provisional opinion that the cited documents did not appear to give a hint to adjustment of a brake booster on a test bed to take account of the master cylinder piston position with respect to the output shaft and by adjusting the length of the output shaft bringing the input shaft into a predetermined position.

In respect of the late-cited document D4 the parties were informed that the Board considered to disregard this document.

Following the Respondent's response with a request for amendment of the patent, the Board specified in its communication of 25 June 1993 some further corrections considered to be necessary so that the amended patent would meet the formal requirements of the EPC.

VI. With letter of 7 July 1993 the Respondent filed a new claim and agreed with the corrections specified in the Board's communication. This claim reads as follows:

"A method of adjusting a vacuum brake booster (10) assembly comprising a brake booster and a hydraulic master cylinder (12), the booster (10) comprising an input rod (14), a valve assembly (28) and piston means (24, 26) defining first and second chambers (30, 32) in the booster (10), the piston means (24, 26) being connected to an output shaft (64) having adjustment means (62) thereon; the master cylinder (12) comprising at least one piston assembly (38, 40) associated with a respective pressure chamber (42, 44) for a vehicle

braking circuit, the piston assembly comprising spring means to urge it towards a rest position, the piston assembly (38,40) and the output shaft (64) being adapted to cooperate when the brake booster assembly is in operation,

characterized in that prior to assembling the master cylinder and the booster the following steps for adjustment of the brake booster are carried out on a test bed:

- setting a stop for the output shaft (64) at the maximum rearward position possible for the master cylinder piston (40);

- applying a vacuum to the working chambers (30, 32) of the booster (10), whereby the piston means (24,26) moves under the influence of atmospheric pressure and the output shaft (64) moves towards the stop, reducing to zero the play between said output shaft and said stop;

- while the vacuum is still applied, adjusting the means (62) on the output shaft (64) to bring the input rod into a predetermined position".

VII. The Appellant requested setting aside of the impugned decision and revocation of the patent. In support of his request he relied upon the following submissions:

A vacuum brake booster of the type defined in the claim of the patent in suit is disclosed in D1. A comparison of the vacuum brake booster disclosed in D1 with the very-similar one disclosed in D4 shows that the output shaft has adjusting means, apparently in the form of washers.

Although the document D1 is silent about the necessary adjustment steps, the skilled person is well aware of the fact, that when assembling a vacuum brake booster, adjustments are necessary to take account of the

manufacturing tolerances of the different parts to be assembled. In this respect there is disclosed in D2, which specifically relates to adjustment of a vacuum brake booster, that adjustment should be carried out under conditions which are similar to the working circumstances, in particular adjustment should be carried out while applying a vacuum to the working chambers (Claim 2 of D2).

In view of the adjustment means being provided on the output shaft of the vacuum brake booster disclosed in D1, it would be obvious to the skilled person to apply the teachings of D2 and carry out the necessary adjustments of the known vacuum brake booster by applying a vacuum to the working chambers and setting the input shaft in the required position by the adjusting means on the output shaft. The subject-matter of the Claim of the patent in suit is therefore the immediate and thus obvious consequence of the teachings of D1 and D2 and as such lacks an inventive step in accordance with Article 56 EPC.

VIII. The Respondent, having filed a new claim and expressing his agreement to amendments in the description for bringing the patent in line with the requirements of the EPC, requested by implication maintenance of the patent on the basis of the claim filed on 12 July 1993 and the amended description.

In support of his request the Respondent relied upon the following arguments:

The pushrod 14 of D2 does not show any washer which could, even allegedly, be identified as length adjustment means, so that the obviousness of the combination of D1 and D2 is still to be demonstrated. In this respect the Opponent has based all his

argumentation on a combination of D1 with D2, the sole merit of the latter, with regard to the challenged patent, being to disclose, generally speaking, a length adjustment of a pneumatic booster, performed while the booster is under vacuum. Even if the pushrod of D1 were considered to bear length adjustment washers, the difficulty of adjusting the length of the pushrod by the insertion or removal of such washers while the brake booster is under vacuum is such that the Opponent's suggestion concerning these documents is obviously not legitimate and thus not acceptable.

### 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 current Claim 1 is based on the granted claim (which is in substance identical to the originally filed claim) and comprises a number of clarifications as to the actual set up of the adjustment steps of the vacuum brake booster that are carried out on a test bed (see column 2, from line 61 to column 3, line 37 of the patent specification, respectively page 4, line 5 to the end of page 5 of the originally filed description).
  - 2.2 The amendments carried out in the description (columns 1 and 3) concern typographical corrections and corrections which follow directly from the technical explanations of the adjustment method, taking into account the information available in the patent and application as originally filed considered as a whole.

2.3 In view of the above conclusions no objections arise against the claim or amended description. It is noted that in this respect the Appellant has not raised any objections either.

3. *Novelty*

Novelty of the subject-matter of the claim can be concluded for the reason that none of cited documents discloses a method of adjusting a vacuum brake booster assembly in itself on a test bed, carrying out the method steps specified in the claim.

Novelty was in fact not contested by the Appellant.

4. *Inventive step*

4.1 The closest prior art is considered to be disclosed in EP-A-0 143 270 (D3) cited in the description in which, in accordance with the acknowledgment in the patent, the vacuum brake booster may be adjusted by means of adjustment means on the output shaft. This document thus discloses the combination of features of the precharacterising portion of the claim of the patent in suit.

4.2 It is noted that the Appellant considered D1 to be the closest prior art for the subject-matter of the claim.

However, D1 does not relate to a method of adjusting a vacuum brake booster assembly but rather discloses the constructional features of such an assembly only.

Furthermore, the feature that the output shaft has adjustment means is not shown in D1.

In this respect the Appellant introduced with the Statement of Grounds of appeal the further document D4 to show that the actuating pin of D1 comprises "adjustment means". However, no proof was given that this document relates to the same assembly as document D1 and even if document D4 is considered in itself its disclosure does not come closer to the subject-matter claimed in the patent in suit than the prior art acknowledged by the Respondent in respect of D3. Since document D4 is thus not more relevant than the prior art already in the proceedings, this document is disregarded in accordance with Article 114(2) EPC.

- 4.3 In the prior art method of adjustment, account is taken of the maximal possible combination of tolerances for both the master cylinder and the booster in order to be sure that the push rod would not actuate on the rear of the master cylinder piston when assembled. However this method of adjustment has the disadvantage that there might be considerable play between the push rod and the piston which results in an undesirable long brake pedal travel experienced by the vehicle driver.

The problem underlying the patent in suit can be seen in the provision of a method of adjusting a vacuum brake booster to allow the position of the brake pedal linkage to be optimised and to allow motor manufacturers' requirements to be more closely met than was previously possible (see also the patent description column 1, lines 21 to 58).

- 4.4 This problem is solved by the features of the claim. By carrying out the adjustment on a test bed prior to assembly of the master cylinder and the booster while applying vacuum to the working chambers of the booster, the actual working conditions in the assembled state can

be simulated and an accurate adjustment can be made (see column 3, lines 20 to 34).

- 4.5 The Board observes that none of the cited documents discloses adjustment of a brake booster output shaft on a test bed to take account of the maximum rearward position possible for the master cylinder piston and thereby bringing the input shaft into a predetermined position.

The Appellant considered D2 to be of relevance in this respect because this prior art concerns the same problem of adjustment of the brake booster output shaft to a predetermined position in respect of the master cylinder piston.

However, the solution disclosed in D2 is different in that during assembly of the booster the two booster halves are pressed together to a position in which the actuating pin has the required position with respect to a measuring feeler 19, and then the halves are connected to each other in this position. During positioning the booster is evacuated to give a working condition simulation.

Although this prior art thus indeed discloses an alternative solution to the above stated problem, with working condition simulation during adjustment, no disclosure or suggestion is derivable that the desired adjustment could also be obtained by providing adjustment means on the output shaft and carrying out the adjustment on a test bed.

- 4.6 The Appellant also argued that the skilled person, being aware of the necessity of compensation of the manufacturing tolerance, would easily recognise that the principles of the method disclosed in D2 could be

applied to prior art boosters with an adjustable output shaft.

In this respect the Board considers that the cited prior art does not disclose adjustment means on the output shaft that are suitable to be adjusted under working conditions on the test bed and as such cannot give the skilled person a lead to the claimed subject-matter.

Furthermore, the assembling machine for assembling the vacuum brake booster of D2, which carries out during the assembling of the booster the adjustment procedure, cannot be considered to give any suggestion to an adjustment of an already assembled booster on a relatively simple test bed with a stop for the output shaft only.

4.7 The Board therefore comes to the conclusion that the subject-matter of the single claim cannot be derived in an obvious manner from the cited prior art and accordingly involves an inventive step (Article 56 EPC). This claim thus forms a suitable basis for maintenance of the patent in amended form.

5. The description with the amendments requested by the Respondent and the drawing are in agreement with the wording and scope of the current claim. Hence these documents are also suitable for maintenance of the patent in amended form.

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

**Order**

**For these reasons, it is decided that:**

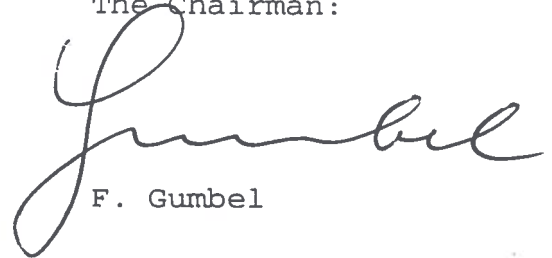
1. The contested decision is set aside.
2. The case is remitted to the first instance with the order to maintain the patent with the claim as filed on 12 July 1993, the description and drawing as granted, with the corrections to description requested by the Respondent.

The Registrar:



S. Fabiani

The Chairman:



F. Gumbel