

Publication in the Official Journal / No

File Number: T 264/89 - 3.2.1
Application No.: 83 401 931.7
Publication No.: 0 108 663
Title of invention: A heat shield for a brake

Classification: F16D 65/16

DECISION
of 25 February 1992

Proprietor of the patent: Allied - Signal Inc.
Opponent: Alfred Teves GmbH

Headword:

EPC Article 56

Keyword: "Inventive step (yes)"

Headnote



Case Number : T 264/89 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 25 February 1992

Appellant : Alfred Teves GmbH
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Respondent : Allied - Signal Inc.
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Decision under appeal : Decision of Opposition Division of the European
Patent Office dated 10 March 1989 rejecting the
opposition filed against European patent
No. 0 108 663 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : F. Gumbel
Members : M. Ceyte
F. Benussi

Summary of Facts and Submissions

- I. The Respondent is the proprietor of the European patent No. 0 108 663 (patent application No. 83 401 931.7) granted on 18 March 1987.

Claim 1 of the patent reads as follows:

"1. A heat shield for a brake assembly wherein a piston (14) is movably carried within a housing bore (12) such that movement of the piston during braking in one direction imparts movement to a friction element (16) which is engageable with a rotating member (18) to convert kinetic energy for the rotating member into thermal energy for the friction element (16), thereby increasing the temperature of the friction element (16), the heat shield (50) cooperating with the piston (14) to substantially reduce the thermal energy transferred from the friction element (16) to a boot seal (24) engaging the piston (14), and the piston (14) cooperating with the housing seal (24) and the heat shield (50), said heat shield (50) including a first portion (52) extending radially and opposing said boot seal (24), and preventing said boot seal (24) from contacting said friction element (16) whereby the thermal energy for said friction element (16) is dissipated to a spacing (62) between said first portion (52) and said friction element (16), said heat shield (50) including a second portion (54) extending angularly relative to said first portion characterised by, said second portion defining a gripping edge (60) engaging an outer surface (28) of said piston (14) to carry said heat shield (50) on said piston (14) at a location spaced from the caliper housing (10) and said friction element (16), so as to maintain said first portion (52) spaced from said friction element (16), said second portion (54) extending angularly from said gripping edge (60) in a direction away from said

friction element (16) to define the spacing (62) between said first portion (52) and said friction element (16) so that said heat shield first (52) and second (54) portions are spaced from said friction element (16)."

II. The patent was opposed by the Appellant on the grounds that its subject-matter did not involve an inventive step having regard inter alia to the following prior art documents:

(D1) GB-A-2 083 576 and

(D2) DE-U-7 147 508.

III. By a decision dated 10 March 1989 the Opposition Division rejected the opposition.

IV. The Appellant lodged an appeal against this decision on 14 April 1989 and paid the appeal fee the same day.

The statement setting out the grounds of appeal was filed on 8 July 1989.

In this statement the Appellant cited for the first time the prior art document

(D3) DE-A-2 628 614 (corresponding to US-A-3 958 670).

V. In a communication annexed to a summons to oral proceedings, the Board observed that document D3, although belatedly submitted, was to be considered in view of its relevance (Article 114(1) EPC).

In the oral proceedings held on 25 February 1992, the parties defended their cases, whereby documents D1 and D3 were dealt with in detail.

- VI. The Respondent requested that the appeal be dismissed and that the patent be maintained unamended.

The Appellant requested revocation of the patent in its entirety.

- VII. The Appellant's arguments set forth in his written and oral statements can be summarised as follows:

Prior art document D1 describes a heat shield of the type disclosed in the pre-characterising part of Claim 1. The problem which is solved therein appears to be the same as the one underlying the patent in suit. It is stated therein that the known forms of heat shields which are attached to the piston have the shortcoming that the heat shield itself tends to reach high temperatures due to heat conduction from the friction pad.

This problem is solved in this known case by a heat shield which is attached to the cylinder housing of the piston. In this way the heat shield is safely kept spaced from the friction pad.

The known heat shield according to document D1 includes also a second portion arranged angularly relative to the first portion in order to maintain "said first portion spaced from said friction element" and also "to define the spacing between said first portion and said friction element, so that said heat shield first and second portions are spaced from said friction element" as stated in the characterising part of present Claim 1. Thus the above-quoted features which are known from this nearest prior art document should be included in the pre-characterising part of the claim.

In document D3, there is also disclosed a radially extending heat shield having not only all of the essential features stated in the pre-characterising portion of Claim 1 but also a gripping edge. This gripping edge engages the outer surface of the piston, so as to maintain the heat shield spaced from the friction element and the caliper housing. The definition of the gripping edge as stated in Claim 1 and the angular orientation of the second portion are not clear. An angular orientation of 0° is not excluded by the wording of the claim. In any case document D3 teaches the provision of a heat shield equipped with a gripping edge or a second portion engaging the outer periphery of the piston and extending angularly - even if it is an angle of 0° - relative to the piston. To apply this teaching to the heat shield arrangement of D1 and thus to arrive at the subject-matter of Claim 1 must hence be regarded as obvious.

IX. The Respondent contested the arguments brought forward by the Appellant.

He pointed out that in document D3 there is no disclosure of a gripping edge. On the contrary, a large surface area of the disclosed heat shield is contacting the piston in a press fit relation.

As it is evident from column 3, lines 51 to 53, of the US-version of document D3, the cap (92) which is attached to the front end of the piston is provided with a shield (104). Thus the shield forms an integral part of the cap which directly contacts the backing plate of the friction pad upon brake application.

X. At the conclusion of the oral proceedings the Board decided to dismiss the appeal and thus to maintain the patent unamended.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is admissible.

2. Article 123

The features of present granted Claim 1 are disclosed in the original Claim 1 in connection with the sole figure and the original description, particularly page 3, lines 5 to 11. Present Claims 2 to 7 correspond to Claims 2 to 7 as filed.

Thus, the claims meet the requirements of Article 123(2) EPC.

3. Novelty

None of the available prior art documents discloses a heat shield having all the features specified in Claim 1. Therefore the subject-matter of Claim 1 is novel within the meaning of Article 54 EPC.

Since novelty has never been disputed, there is no need for further detailed substantiation of this matter.

4. Problem and solution

4.1 Document D1 is discussed in the patent in suit as the nearest prior art. The heat shield according to this citation is suitable for a conventional disc brake having a pair of friction pads which can be pushed into contact with a rotating disc by means of a piston slidably mounted in a cylinder formed within a caliper body so as to obtain

the braking force. In such a brake it is considered to be most important that the sliding surfaces of the piston and cylinder are well protected from the ingress of foreign matter in order to ensure smooth operation and to prevent premature failure. Generally, therefore, conventional disc brakes are provided with a boot seal arranged between the piston and the cylinder body. Operation of such brakes yields much heat which tends to cause the boot seal to rupture or to deteriorate the elasticity thereof.

To solve this problem, it is proposed in document D1 that a heat shield of the kind disclosed in the pre-characterising part of Claim 1 is mounted in the mouth of the cylinder housing the piston. The heat shield comprises a first radially inwardly extending portion which is adapted to partially shield the boot seal from thermal radiation. With such an arrangement, the heat shield will not be heated to a high temperature by heat conduction from the piston upon brake application, because the heat shield is mounted on the cylinder body.

An annular gap is defined between the piston and the inwardly extending portion of the heat shield, so that in this area of high temperatures there is no heat barrier for the boot seal. Another type of heat shield is arranged to be attached to the piston so that in this case the boot seal is protected by the heat shield also in the peripheral zone of the piston. This type has, however, the shortcoming that the heat shield directly engages the friction pad and thus tends to reach high temperatures due to heat conduction from the friction pad (cf. column 1, lines 20 to 25 of the patent in suit).

In addition, the heat shield is attached to the piston such that a large surface area of the heat shield is contacting the piston in a press fit relation, so that

heat transferred to the piston is readily transmitted by heat conduction to the large surface area, to further increase the temperature of the heat shield (column 1, lines 30 to 36 of the patent in suit).

4.2 In the light of the above the technical problem underlying the patent in suit may be seen in improving the known device according to document D1 in such a manner that a highly effective heat shielding of the boot seal is achieved while retaining the advantage displayed by this known device concerning the reduced heat transmission to the shield by conduction.

4.3 This problem is in essence solved by the following features stated in the characterising part of Claim 1:

- (a) the second portion of the heat shield defines a gripping edge engaging the piston, to carry the heat shield on the piston at a location spaced from the friction element;
- (b) the second portion of the heat shield extends angularly from its gripping edge on the piston in a direction away from the friction element.

5. Interpretation of the claim

The Appellant has contended that the above-characterising feature (b) is not clear.

It has already been well established by a number of decisions of the Boards of Appeal, that the question of whether a claim is "clear" can lead to the re-drafting of a claim in opposition proceedings only if the patent proprietor has made amendments referred to in Article 102(3). Otherwise, the claim should be understood

as it stands having regard, if necessary, to the description and drawings (see in particular Decision T 23/86, OJ EPO 1987, 316). In this respect Article 69 stipulates in its protocol that the description and the drawings may be inter alia employed "for the purpose of resolving an ambiguity found on the claims".

In particular at column 3, lines 34 to 37 of the patent in suit, it is specified that the gripping edge of the second portion is the only part of the heat shield which engages the piston in order to minimize heat transfer to the heat shield via conduction. This necessarily implies that the angle defined between the second portion and the periphery of the piston cannot be equal to 0°. The angle which is depicted on the drawings is an acute angle of about 45°. Thus, it is only the edge of the second portion and not the whole surface area of the second portion which engages the piston. Reference is also made to the background part of the patent in suit, where the attachment of the heat shield on the piston by a "large surface area" was considered as a drawback in regard of the resulting elevated heat conduction.

6. Inventive step

6.1 There is no disclosure or suggestion in the cited prior art documents of a heat shield mounted on the piston such that the only part which engages the piston is the peripheral gripping edge, that is to say almost a linear area, in order to minimize transmission of heat to the heat shield via conductivity:

6.2 As it is evident from column 3, lines 41 to 53, and Figure 2 of the US-version of document D3 a "cap (92)" i.e. a body having a top wall and a skirt (96), is arranged to be attached to the front end of the piston.

The cap is said to be provided with an "annular shield" extending radially therefrom to shield the boot seal from the baking plate of the friction pad. The annular shield hence forms a part of the cap. The skirt (96) is not inclined to the piston but its whole surface area is contacting the piston, so that heat transferred to the piston is readily transmitted to the heat shield through this large area.

In addition, the top wall of the cap which covers the front end of the piston is contacting the backing plate of the friction element upon brake application and is thus heated to high temperatures. This thermal energy is transmitted by heat conduction to the heat shield to further increase its temperature.

Furthermore, this document recommends a more complicated and costly way of attaching a heat shield on the piston and cannot lead to the simple solution claimed in the patent in suit.

- 6.3 Document D2 teaches the attachment of the heat shield to the front end of the piston so that the heat shield tends to reach high temperature due to heat conduction from the friction pad, upon brake application. Thus this teaching cannot lead in any way to the solution of Claim 1.
- 6.4 Therefore, in the Board's judgment the subject-matter of Claim 1 involves an inventive step in the sense of Article 56 EPC.
7. Dependent Claims 2 to 7 which concern a particular embodiment of the invention claimed in Claim 1 are likewise allowable.

8. The Board is thus of the opinion that the grounds for opposition pursuant to Article 100 EPC do not prejudice the maintenance of the patent unamended.

Order

For these reasons, it is decided that:

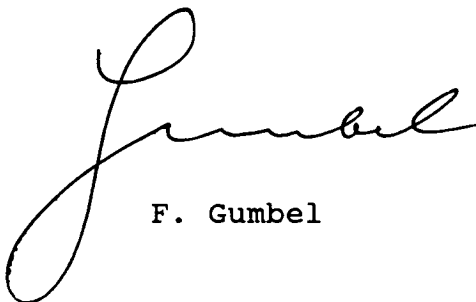
The appeal is dismissed.

The Registrar:



S. Fabiani

The Chairman:



F. Gumbel