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**D E C I S I O N**  
**of 19 November 2003**

**Case Number:** T 1051/01 - 3.2.1  
**Application Number:** 94117689.3  
**Publication Number:** 0657683  
**IPC:** F16L 51/02, F01N 7/18  
F16L 27/11, F16L 27/10  
**Language of the proceedings:** EN

**Title of invention:**

Flexible vibration-damping joint, particularly for vehicle exhaust pipes

**Patentee:**

FLEXIDER S.p.A.

**Opponent:**

Witzenmann GmbH

**Headword:**

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**Relevant legal provisions:**

EPC Art. 54, 56

**Keyword:**

"Novelty (yes)"  
"Inventive step (yes)"

**Decisions cited:**

T 0007/86, T 0305/87

**Catchword:**

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Case Number: T 1051/01 - 3.2.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.1  
of 19 November 2003

**Appellant:** FLEXIDER S.p.A.  
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**Respondent:** Witzenmann GmbH  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
24 July 2001 concerning maintenance of European  
patent No. 0657683 in amended form.

**Composition of the Board:**

**Chairman:** M. Ceyte  
**Members:** J. Osborne  
H. Preglau

## Summary of Facts and Submissions

- I. The patent proprietor's appeal is directed against the interlocutory decision of the Opposition Division posted 24 July 2001 according to which it was found that European patent No. 0 657 683 and the invention to which it relates, when account was taken of the amendments made by the patent proprietor according to the second auxiliary request during the opposition proceedings, satisfied the requirements of the EPC.
  
- II. The following prior art played a role during the appeal procedure:  
  
D6: EP-B-0 458 011.
  
- III. The Opposition Division was of the opinion that the subject-matter of claim 1 as granted lacked novelty with respect to the disclosure of D6. It furthermore considered that the subject-matter of claim 1 according to the patent proprietor's first auxiliary request did not involve an inventive step in the light of the same prior art disclosure.
  
- IV. During the oral proceedings held 19 November 2003 the appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or on the basis of the new first auxiliary request filed with a letter dated 17 November 2003. The respondent requested that the appeal be dismissed.

V. Claim 1 as granted (appellant's main request) reads as follows:

"A flexible vibration-damping joint (1;101;102;103;104) for mechanical, fluidtight connection of two pipe portions, in particular two portions (2,3) of a vehicle exhaust pipe; the joint comprising: a pair of substantially rigid, tubular end pieces (4,5) fittable to respective opposite facing ends of the pipe portions (2,3); a metal bellows sleeve (6) presenting a number of undulations (7) for rendering it elastically deformable, and the opposite ends (9,10) of which are connected integral with respective said end pieces (4,5); a braided wire sheath (8) externally covering the bellows sleeve (6) and also connected at opposite ends (11,12) to said end pieces (4,5); and at least one annular pad (16;161;163) made of compressed wire; characterized in that said annular pad (16;161;163) is inserted between the bellows sleeve (6) and the braided wire sheath (8), gripped in direct contact between the latter and at least one of the undulations (7) of the bellows sleeve (6) or at least with the peak (17) thereof, so as to act effectively as a vibration-damping element."

Claims 2 to 8 define features additional to those of claim 1.

VI. The appellant's arguments in respect of the main request may be summarised as follows:

The Opposition Division was wrong to interpret the term "gripped" in claim 1 as meaning merely "attached" or

"connected". The term "gripped" means that the pad is firmly held and interference fitted.

Although D6 relates to a vibration-damping joint, it does not disclose the particular combination of features presently claimed. Claim 1 of D6 describes the three essential elements of the joint very generally and each is further defined in dependent claims by a list of the possible forms that the element can take. According to decision T 7/86 (OJ EPO 1988, 381) a class of chemical compounds defined only by a general structural formula having at least two variable groups does not specifically disclose each of the individual compounds which would result from the combination of all possible variants within such groups; this case law is applicable to the present case. Neither does D6 disclose the feature that the pad is gripped as defined in claim 1; it is merely disclosed that the pads are inserted between the inner and outer elements. In the particular arrangement according to figure 5 the insertion of the ends of the pad between the undulations of the bellows serves only to locate the pad. The teaching of D6 relates to damping provided by the pad in the radial direction; if it were gripped as defined in present claim 1 the radial damping would be ineffective. Moreover, the problem solved by the subject-matter according to present claim 1 is different to that addressed by D6 and there is nothing to lead the skilled person to the subject-matter of present claim 1.

VII. In respect of the main request the respondent countered essentially as follows:

In the description of the present patent the term "gripped" is used synonymously with "inserted"; there is no basis for the appellant's notion of an interference fit.

As regards the embodiment of D6, figure 5 the pad is inserted between the inner and outer elements but the illustration is purely schematic; extension of the inner element in use results in the outer element contracting radially onto, and therefore gripping, the pad. Furthermore, figure 1 illustrates the pad in contact with both the sheath and the bellows. Unlike the typical situation in the technical field of chemistry, the range of alternatives disclosed in D6 is easily comprehended. Moreover, according to decision T 305/87 (OJ EPO 1991, 429) relating to the technical field of mechanics, although when considering novelty it is not permissible to draw from a reservoir of features pertaining to separate embodiments in order to create artificially a particular embodiment, this is not the case if the document itself suggests such a combination of features. The embodiment of figure 5 of D6 has the particular combination of features which is contained in present claim 1.

Even if the subject-matter of claim 1 were considered to be novel with respect to the disclosure of D6 because the latter does not explicitly disclose the feature of the pad being gripped, this feature would be obvious for the skilled person. He knows that in order to provide the progressive damping which according to

D6 is desirable, it would be necessary to maintain the outer element in contact with the pad, even when the joint is contracted.

## **Reasons for the Decision**

### *Main request*

1. The flexible vibration-damping joint which forms the subject-matter of the patent is typically used for providing a connection between one portion of a vehicle exhaust pipe which is directly connected to the engine and a second, more downstream portion which is connected to the chassis. In addition to the basic function of providing a fluid-tight connection between the two pipe portions the joint serves to decouple them in order to permit relative movement between them and also to reduce the transmission of vibrations. The bellows permits the relative movement whilst the braided sheath provides a protective outer cover and prevents over-extension of the bellows by reducing in diameter and tightening onto the bellows and/or annular pad. Frictional losses within the pad serve to damp vibrations.
  
2. *Interpretation of the term "gripped"*
  - 2.1 The meaning to be given to the term "gripped" in claim 1 is crucial to the outcome of this appeal. The Opposition Division interpreted the term in the light of the description column 4, line 22, where it is stated that the pad is "inserted" into an annular gap between two corrugations, and understood the term to

mean "attached" or "connected". In particular, the Opposition Division rejected the patent proprietor's arguments that the term implied compression of the pad.

2.2 The text in the description on which the Opposition Division based its interpretation of the term "gripped" relates to the embodiments of figures 3 and 4 in which the pad is located within the space between undulations of the bellows. This text does not relate to the fit of the pad between the sheath and the bellows and so provides no information as regards the meaning of the term "gripped". Moreover, contrary to the view of the respondent, the terms "gripped" and "inserted" are not used synonymously in the patent but in order to define two separate conditions, see both column 3, line 18 "inserted and gripped" and claim 1 "inserted between ..., gripped in direct contact ...".

2.3 According to claim 1 the annular pad is "gripped in direct contact between [the sheath] and at least one of the undulations of the bellows sleeve ... so as to act effectively as a vibration-damping element". Similarly, it is stated in the description column 2, lines 7 to 12 that "a highly effective vibration-damping ... element is gripped firmly between parts of the braided wire sheath ... and parts of the bellows sleeve". It is implicit that the annular pad is gripped between the sheath and the bellows when the joint is in the normal, unstressed condition. Since the annular pad forms the primary damping element in the joint, effective damping requires that the pad be effectively coupled to a vibrating part of the joint so that energy can be fed into and dissipated in the pad. In view of the need to mechanically couple the non-rigid, compressed wire pad



so that it will "act effectively as a vibration-damping element" (claim 1) the Board is of the opinion that the term "gripped" means that the pad is to be held in compression.

3. *Novelty*

3.1 D6 relates generally to a vibration-damping joint for coupling two pipe portions of a vehicle exhaust system, i.e. a joint which can help to isolate engine induced vibrations from reaching the vehicle body (page 2, lines 3 to 12). In the description there is acknowledgement of a prior art joint which comprises a flexible inner element and an outer metal braided sheath acting to limit the extension of the inner element. As discussed under 1 above, such a sheath has the property that when it is longitudinally extended it reduces its diameter. According to D6 a problem which arose in the use of the prior art joint was that the sheath was susceptible to being overstressed when the joint suddenly reached the limit of its extension. The solution to this problem according to D6 is to provide a barrel-shaped sheath and to provide a damping pad between the sheath and the inner element. Upon elongation of the joint, contraction of the sheath progressively compresses the damping pad and avoids the sudden generation of high loads.

3.2 In the embodiment of figure 1 the joint comprises an inner element which may be a corrugated tube i.e. a bellows, a braided wire sheath and an annular pad which may be of compressed wire mesh. In the illustration which shows a longitudinal section of the joint the pad is represented merely by a series of curled lines

within the boundaries of the sheath and the bellows. The pad has a cylindrical bore and a barrel shaped outer form which is achieved by compressing the end portions (page 2, lines 31 to 33). However, it is not disclosed how the compression of the end portions of the pad is achieved, in particular it is not disclosed that the pad is compressed between the sheath and the bellows; it follows that it is also not disclosed that the pad be gripped in this way so as to act effectively as a vibration-damping element within the meaning of present claim 1.

3.3 Figure 5 illustrates a variation in the form of the pad. The outer surface is shown separated from the inner surface of the sheath and the inner diameter of the pad comprises projections which enter into spaces between the corrugations of the bellows in order to locate the pad longitudinally. Because of the separation of the pad and the sheath it is not disclosed that the pad is gripped within the meaning of present claim 1. Indeed, if the pad were gripped in that way its location by means of the projections would be superfluous.

3.4 Whereas D6 clearly discloses that the pad should be compressed by the sheath when it is elongated, there is no teaching that this should occur when the joint is in the unstressed condition. Moreover, it is not implicit that compression of the pad would be the inevitable result of extension of the joint due to thermal expansion or internal pressure in use because the skilled person when putting the teaching of D6 into effect would design the joint to function in the way disclosed when it is in its normal operating condition.

3.5 The Board concludes from the foregoing that the subject-matter of present claim 1 is novel (Article 54 EPC).

4. *Inventive step*

4.1 The Board agrees with the respondent that in the embodiments of figures 1 and 5 D6 does disclose the particular claimed combination of a bellows, braided wire sheath and a vibration-damping pad of compressed wire since this combination of features is explicitly suggested (cf. T 305/87 *supra*). The Board disagrees with the appellant's assertion in respect of the applicability of decision T 7/86 (*supra*) to this case firstly because the disclosure of D6 is not restricted to the content of the claims and secondly because the teaching of specific embodiments cannot be compared to that of a general formula representing a class of chemical compounds. The subject-matter of present claim 1 differs from that of D6 by the feature in the characterising portion of claim 1 that the pad is "gripped in direct contact between the latter and at least one of the undulations of the bellows sleeve or at least with the peak thereof." Starting from this prior art the technical problem to be solved by the present invention may be seen in modifying the known joint in order to more effectively damp vibrations passing into the joint from the exhaust portion connected to the engine and so prevent their transmission into the portion connected to the vehicle chassis.

4.2 Although the joint according to D6 is intended to damp vibrations originating in the engine, this function was already achieved by joints which were known in the art and D6 does not claim to offer any improvement in this respect. The improvement in the joint according to D6 relates to the avoidance of impact loading when the joint is extended and there is no indication in D6 to lead the skilled person to think that gripping the pad in the way defined in present claim 1 would be beneficial in that way. Indeed, in view of the fact that radial compressibility of the pad according to the teaching of D6 is essential, the idea of gripping the pad as presently claimed, necessarily resulting in pre-compressing the pad in a radial direction, would not readily occur to the skilled person. The Board recognises that in the joint according to D6 the sheath does press the pad against the bellows when the joint is extended. However, there remains no disclosure or suggestion that the compression of the pad would cause it to be gripped in a way to positively influence the pad's ability to act as a vibration-damping element.

4.3 The Board concludes from the foregoing that the subject-matter of claim 1 also involves an inventive step (Article 56 EPC). Since claims 2 to 8 contain all features of claim 1 this conclusion applies equally to those claims. Consideration of the auxiliary request therefore is superfluous.

**Order**

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

1. The decision under appeal is set aside.
2. The patent is maintained as granted.

The Registrar:

The Chairman:

S. Fabiani

M. Ceyte