

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

**Datasheet for the decision
of 23 January 2008**

Case Number: T 0896/06 - 3.2.01

Application Number: 98112405.0

Publication Number: 0889257

IPC: F16F 1/18

Language of the proceedings: EN

Title of invention:

Improved-type leaf spring, in particular for a suspension of a vehicle

Applicant:

Rejna S.p.A.

Opponent:

Verband der Deutschen Federnindustrie

Headword:

-

Relevant legal provisions:

EPC Art. 123(2)

Relevant legal provisions (EPC 1973):

EPC Art. 54(1), 56

Keyword:

"Extension of subject-matter (no)"

"Novelty (no, main request)"

"Inventive step (no, auxiliary requests)"

Decisions cited:

-

Catchword:

-



Case Number: T 0896/06 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 23 January 2008

Appellant: Verband der Deutschen Federnindustrie
(Opponent) Goldene Pforte 1
D-58093 Hagen (DE)

Representative: Haverkamp, Jens
Patentanwalt
Postfach 1662
D-58586 Iserlohn (DE)

Respondent: Rejna S.p.A.
(Patent Proprietor) Via Milano, 199
I-10036 Settimo Torinese (TO) (IT)

Representative: Franzolin, Luigi
STUDIO TORTA S.r.l.
Via Viotti, 9
I-10121 Torino (IT)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 3 April 2006
rejecting the opposition filed against European
patent No. 0889257 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: S. Crane
Members: P. L. P. Weber
G. Weiss

Summary of Facts and Submissions

- I. The appeal by the opponent is against the decision of the opposition division posted on 3 April 2006 to reject the opposition.

The notice of appeal was filed 26 May 2006 and the appeal fee paid on the same day. The statement setting out the grounds of appeal was filed on 21 July 2006.

- II. Oral proceedings were held on the 23 January 2008.

- III. The appellant requests the setting aside of the decision under appeal and the revocation of the patent.

The respondent requests that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained in amended form on the basis of the claims according to auxiliary request 2 filed with letter dated 5 February 2007 or auxiliary request 5 filed with letter dated 19 December 2007.

The auxiliary requests 1,3 and 4 were withdrawn.

- IV. The following documents played a role in the appeal proceedings:

D1: DE-A-32 36 330;

D4: "Entwicklungstendenzen bei Fahrzeugfedern", Dr.-Ing. P.-J. Heuer, issued in the magazine ATZ 687, pages 241-246;

D5: "Warmgeformte Federn - Konstruktion und Fertigung", publication by Federnwerk Hoesch Hohenlimburg AG,

pages 64-65 and 2 more pages containing bibliographic information and table of contents, published 1987 for the "IAA 1987";

D7: GB-A- 2 235 033;

D11: EP-A-0 248 603;

D15: page 911 of the "Webster's Dictionary of the English Language"

V. Granted claim 1 reads as follows:

"Leaf spring (1), in particular for a suspension of a vehicle, comprising a first leaf (2) which is provided at respective ends (8, 9) with corresponding attachment eyelets (15, 16), and at least one second leaf (3) which is joined to a surface (4) of the said first leaf (2), wherein the said first leaf (2) is made of metal material, and the said at least one second leaf (3) is made of a composite material ; characterised in that it comprises friction means (51) which are interposed between the said first (2) and the said second (3) leaves, disposed in the vicinity of the said ends (8, 9) of the said first leaf (2) which is provided with the said eyelets (15, 16), and which extends at least partially below the said eyelets (15, 16)."

Claim 1 of the second auxiliary request reads as follows:

"Leaf spring (1), in particular for a suspension of a vehicle, comprising a first leaf (2) which is provided

at respective ends (8, 9) with corresponding attachment eyelets (15, 16), and at least one second leaf (3) which is joined to a surface (4) of the said first leaf (2), wherein that the said first leaf (2) is made of metal material, and the said at least one second leaf (3) is made of a composite material; characterized in that it comprises two buffers (51) made of elastomer material which are interposed between the said first (2) and the said second (3) leaves, disposed in the vicinity of the said ends (9, 9) of the said first leaf (2) which is provided with the said eyelets (15, 16), and which extends at least partially below the said eyelets (15, 16); said buffers (51) having a predetermined thickness and being designed to distribute the load between the leaves, so as the second leaf (3) cooperates with the first."

Claim 1 of the fifth auxiliary request reads as follows:

"Leaf spring (1), in particular for a suspension of a vehicle, comprising a first, upper leaf (2) which is provided at respective ends (8, 9) with corresponding attachment eyelets (15, 16), and at least one second, lower leaf (3) which is joined to a surface (4) of the said first leaf (2), wherein that the said first leaf (2) is made of metal material, and the said at least one second leaf (3) is made of a polymer material reinforced with fibers; characterized in that it comprises friction means which comprises two buffers (51) made of elastomer material which are interposed between the said first (2) and the said second (3) leaves, disposed in the vicinity of the said ends (8, 9) of the said first leaf (2) which is provided with the said eyelets (15, 16), and which extends at least

partially below the said eyelets (15, 16); said friction means (E1) being designed to distribute the load between the leaves, wherein the second leaf (3) cooperates with the first by means of said friction means (51); wherein said two buffers (51) are provided each with a coupling tooth (27) which engages in a respective seat (25) of the lower leaf (3); wherein the said attachment eyelets (15, 16) are disposed entirely on one side of a longitudinal axis of symmetry of the said first leaf (2), on the side opposite the said at least one second leaf (3), said at least one second leaf (3) extending longitudinally with its own respective end edges (13, 14) at least as far as the geometric centers of the said eyelets (15, 16); and wherein it further comprises:

(i)- means (52) for clamping the said leaves (2, 3), which means are disposed in the position of respective central, flat sections (5, 10) which have a constant thickness of the said leaves (2, 3), the said clamping means (52) being able to clamp the said leaves (2, 3) in a set against one another;

(ii)- means (53) for angular locking of the said leaves (2, 3), disposed on at least one side of the said leaves (2, 3) relative to the said clamping means (52)."

VI. The arguments of the appellant can be summarized as follows:

Main request

The essential problem with claim 1 of the main request is the meaning of the term "friction means" in the characterising portion. It is usual in patent law that

the patent document itself should define its individual elements. The present patent document defines nothing else but that the friction means are designed to distribute the load between the leaves or in other words that the leaves should cooperate. In the patent there is no other further explanation as to how the friction means should work when the load is applied. In particular the definition given to the term by the opposition division and by the respondent that the friction means should be "friction increasing means permitting relative movement" cannot be found in the patent specification at all.

In the absence of any more precise definition it can only be concluded that the friction means are there to transmit part of the vertical load from the first leaf to the second leaf and that they function as friction reducing or sliding means as is the case in many prior art suspensions of this type.

If another conclusion were reached, the invention would not be sufficiently disclosed for it to be carried out, neither the exact way of working of the suspension nor the exact materials being described.

When giving to the term friction means its normal meaning, the suspensions shown in D11, Figure 3 or in D7, Figure 2 clearly anticipate the subject-matter of claim 1.

Auxiliary request 2

Claim 1 according to this request infringes Article 123(2) EPC since in the application documents as originally filed the feature of the buffers being of a predetermined thickness and made of elastomer is associated with the buffers being circular in shape.

In any case the subject-matter of claim 1 is not inventive over D11 in combination with D5 or D4. These documents clearly show rubber or elastomer buffers which are interposed between two successive leaves of a leaf spring suspension and the man skilled in the art would incorporate such buffers into the device according to D11 without any inventive step.

Auxiliary request 5

All the additional features added to claim 1 of this request are also disclosed either in D11, D7 or D5, so that the lack of inventive step argument against the subject-matter of claim 1 according to auxiliary request 2 remains valid.

VII. The arguments of the respondent can be summarized as follows:

Main request

From a lexical point of view, cf D15, "friction means" must mean "means for adding friction" otherwise the means would be called "anti-friction means".

The purpose of the friction means as explained in the patent in suit is to transfer load. But this transfer of load is only possible if friction is present. The aim of the invention is to avoid sliding to a certain extent. While a complete locking of the leaves relative to one another might have been another solution, this is not what was wanted by the inventors.

With such a technical solution, when the suspension is working the lower leaf will advantageously be under

longitudinal compression for a certain time. This increasing of the frictional force also helps to minimise the inconvenience of having the eyelets on one side of the upper leaf. This is disclosed in paragraph 0003 and in paragraph 0014 where it is mentioned that the lower leaf cooperates, by means of the friction means ... , with the upper leaf ...

This technical effect can also be concluded from the materials chosen, since the coefficient of friction between rubber and metal (as used in the invention) is higher than the one between metal and metal or between metal and nylon.

D7 and D11 can by no means anticipate the subject-matter of claim 1 since it is clear in both documents that a sliding of the shoes on the lower surface of the upper leaf is what is wanted there and not an increase of the friction.

Auxiliary request 2

In the device of D11 there is no distribution of load in the sense of the invention. The term "since the lower leaf cooperates, by means of friction means.." in paragraph 0014 of the patent in suit implies that forces are transmitted horizontally through the friction means and this is not the case in D11 in which a wear reduction and easy sliding between the leaves are aimed at.

In the invention the combination of the rubber material for the buffer with the metal of the upper leaf inherently increases friction.

The combination of the rubber buffer of D5 with the device of D11 would thus go against the teaching of D11

which is to reduce friction. The man skilled in the art would thus not do it. On top of that D5 does not relate to hybrid springs.

Auxiliary request 5

The additional features of claim 1 according to the fifth auxiliary request have several advantages. The coupling tooth of the buffer allows a good mechanical coupling between the two elements, the angular locking is to avoid the so called scissoring effect which is also improved by the buffers being made of rubber and the eyelet arrangement is advantageous for the construction.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Understanding of the term "friction means"
 - 2.1 In the present case the parties disagree on the meaning to be given to the term "friction means" used in claim 1, the appellant considering that it refers to means which facilitate relative movement between two elements by reducing the friction between them, while the respondent considers that this term should have the meaning of "friction increasing means".

In the board's judgement, when the meaning of a term in a claim is at stake, the first source of interpretation

should be the patent itself. A patent is a teaching on how a problem existing in the state of the art can be solved. Hence, as a rule the vocabulary used in a patent is unitary, depending on the technical field of the invention and on the writer's own preferences. A term in a claim can therefore not be given a specific meaning which, when considering the whole of the patent, does not appear to have been meant.

In the description of the patent the term at stake in the present case appears essentially at two places, in paragraphs 0014 and 0022. In the first of these paragraphs it is explained that the lower leaf cooperates by means of the friction means with the upper leaf, while in the second it is explained that there are friction means 51 interposed between the leaves 2 and 3 and that they are designed to distribute the load between the leaves themselves.

The term friction means is a general term and in the detailed embodiment of the invention described in the patent in suit it is embodied as the friction means 51 comprising two buffers 21, 22 which are meant to distribute the load between the leaves. It may thus be helpful to make a short mechanical analysis of the particular embodiment as understandable from what is described and look at the function of the buffers 21 to try and understand what the skilled man would conclude as being the meaning of the term friction means.

The embodiment described comprises two leaves, an upper one of metal and the lower one made of polyamide reinforced with glass fibers. Both leaves, as shown in Figures 2 and 3 and as explained in paragraph 0017,

have a flat central section of constant thickness, from which there extend the lateral sections having a thickness decreasing towards their respective free ends. In a rest position of the suspension there will thus be a space between the free ends of the leaves. Without any buffers, the rigidity of the suspension at the beginning of its deflection path under load would be equivalent to the rigidity of the upper leaf alone and the upper leaf would bear all the load, the second bearing nothing. By interposing buffers between the leaves close to the free ends of the lower leaf, the lower leaf will take up a part of the load and participate in the rigidity of the whole suspension right from the beginning.

The load is thus distributed between the leaves.

The two leaves having a fixed longitudinal dimension and being parallel to one another, when the suspension is in use there will be a relative movement of the ends of the respective leaves, the leaves forming successive parallel arcs of circle. This is a well known and obvious mechanical consequence of the construction and means that the buffers placed between the free ends of the leaves must allow a relative movement of these ends.

The person skilled in the art is well aware, see e.g. D5, that buffers between the leaves of a leaf spring are essentially of two types. In one type the friction between the upper surface of the buffer and the adjacent surface of the leaf is intended to be low so as to facilitate sliding between the two. In the other type the friction between these surfaces is intended to be high so that no sliding occurs. Instead relative

movement between the ends of the leaves is accommodated solely by shearing of the buffer. There is nothing in the patent specification which would unequivocally lead the skilled person to the belief that the "friction means" of granted claim 1 can only be one or other of these two types. In other words both of these types of "friction means" fall within the ambit of the claim.

In this context the board notes that the dictionary excerpt D15 does not give unambiguous support to the respondent's interpretation of the term "friction means". There can be found there for example the term "friction jewel" which is a bearing jewel used in watchmaking and clearly intended to reduce rather than increase the friction between moving parts.

- 2.2 The respondent considered that the choice of the materials and the sentence in paragraph 0014 that the lower leaf cooperates by means of the friction means with the upper leaf are clear indications for the skilled man that the buffers have not only to transfer vertical load but also horizontal load and that they thus behave as friction increasing means until the static friction is overcome.

The board has a different judgement. In a leaf spring suspension of the kind disclosed in D7 or D11, the static friction has to be overcome before the sliding can begin so that the phenomenon talked about by the respondent is well known and mechanically unavoidable. There is however no indication whatsoever in the patent in suit that this phenomenon should be more pronounced in the disclosed embodiments to make it a special feature of the invention. The simple fact of choosing

an elastomer as a buffer or friction means is not sufficient to prove any intention since the coefficient of friction will depend on many factors such as the type of elastomer and the respective materials and surface structures of the leaves.

In addition, elastomer buffers may be used for their damping qualities and thus their influence on the vertical rigidity of the suspension or on the noise development. It is to be noted that even if such higher friction were present between the buffer and the metal leaf it might have some influence on the damping properties of the suspension but hardly influence on the distribution of the load between the leaves since the horizontal force developed by friction is small compared to the vertical component of the load.

In other words it appears highly unlikely that the distribution of load referred to in the patent in suit only concerned this horizontal component and there is nothing in the description which can lead to such conclusion.

3. *Novelty*

The board agrees with the appellant that the subject-matter of claim 1 of the main request is anticipated by D7 or D11.

In its Figure 2, D7 discloses a leaf spring comprising a first leaf 10 made of steel (see page 3, last paragraph) which is provided at respective ends with corresponding attachment eyelets 12, and a second leaf 11 which is joined to a surface of the said first leaf. The second leaf 11 is made of a composite material (see page 4 first paragraph).

Wear resistant sliding elements 17 (see Figure 2 and page 4, second paragraph) are interposed between the first and the second leaves. These elements are disposed in the vicinity of the ends of the first leaf which is provided with the eyelets and they extend partially below the eyelets. Having regard to what is said in point 2.1 above it is apparent that these elements comprise "friction means" within the terms of claim 1.

The subject-matter of claim 1 is thus anticipated by D7.

Figure 3 of D11 discloses a similar construction, namely a leaf spring comprising a first leaf 110 made of steel (see column 5, last paragraph) which is provided at respective ends with corresponding attachment eyelets 112, and a second leaf 111 which is joined to a surface of the said first leaf. The second leaf 111 is made of a composite material (see column 5, last paragraph).

Bearing members 121 (see Figure 3 and column 6, second paragraph) are interposed between the said first and the said second leaves. These members are disposed in the vicinity of the ends of the first leaf which is provided with the eyelets and they extend partially below the eyelets and, as explained above, constitute "friction means" as defined in claim 1.

The subject-matter of claim 1 is thus also anticipated by D11.

The respondent did not present any argument against the lack of novelty apart from the interpretation of the term "friction means" which has been discussed above.

Since the subject-matter of claim 1 lacks novelty the patent cannot be maintained in granted form (Article 100(a) and Article 54(1) EPC 1973.

Second auxiliary request

4. Claim 1 according to the second auxiliary request additionally comprises the feature that the friction means are two buffers made of elastomer material, having a predetermined thickness and being designed to distribute the load between the leaves, so as the second leaf cooperates with the first.

The additional feature is disclosed in paragraphs 0014 and 0022 of patent in suit which are identical to the corresponding originally filed ones.

- 4.1 The appellant alleged that the feature infringes Article 123(2) EPC since in the original description the buffers were said to have a circular shape.

The board cannot agree with this since in the sentence of interest this shape was optional "...*which preferably have a substantially circular shape...*".

The amendment thus does not contravene Article 123(2) EPC.

Since the amendment introduces additional features, claim 1 according to the second auxiliary request also fulfils Article 123(3) EPC.

- 4.2 Novelty has not been disputed by the appellant and the board is satisfied that the subject-matter of claim 1

is novel since D7 as well as D11 disclose buffers made of suitable plastics material, of metal or comprising an elastomer (metal-rubber-metal sandwich), but not specifically made of elastomer as required by the present claim.

4.3 The board considers however that the subject-matter of claim 1 is not inventive.

D7 and D11 both suggest that numerous materials may be adapted for use as a buffer or friction means. By generally mentioning plastics material or metals these documents already invite the skilled man to consult the state of the art and try and find out the material best adapted for the intended application.

Hence the person skilled in the art would automatically consider what is well known in the art namely as exemplified for instance in D5 (see page 65, second paragraph, left column, Figure 3.1-38) to use either buffers of rubber or buffers of plastics between adjacent leaves of a leaf spring.

Depending on the use which will be made of the leaf spring the skilled man will chose the one or the other of the known solutions. If high rigidity is more important then metal or hard plastics will be used for the friction means and if dampening and noise reduction is more important then softer materials such as rubber will be used.

The board cannot see any inventive step in choosing one out of well known materials for the well known purpose.

The fact that the buffer should be of a predetermined thickness cannot change this finding since it is self-evident that to be able to distribute the load between the leaves the space between the ends of the adjacent

leaves must be compensated for, which corresponds to a predetermined thickness of the buffers.

The respondent considered that D5 could not hint towards the adopted solution since it is only concerned with metal leaf springs and not with so called hybrid leaf springs as the present invention.

In the board's judgement since the problem of load distribution between the adjacent leaves of a leaf spring is not limited to hybrid leaf springs but is general to all leaf springs, the above argument is not convincing.

Claim 1 according to the second auxiliary request is thus not allowable, its subject-matter not involving any inventive step contrary to the requirement of Article 56 EPC 1973.

Fifth auxiliary request

5. When compared to claim 1 according to the second auxiliary request claim 1 according the fifth auxiliary request additionally comprises the following features:
 - a) the two buffers are provided each with a coupling tooth which engages in a respective seat of the lower leaf;
 - b) the attachment eyelets are disposed entirely on one side of a longitudinal axis of symmetry of the first leaf, on the side opposite the second leaf,
 - c) the second leaf extends longitudinally with its own respective end edges at least as far as the geometric centers of the eyelets;

- d) means for clamping the said leaves, which are disposed in the position of respective central, flat sections which have a constant thickness of the said leaves, the said clamping means being able to clamp the said leaves in a set against one another;
- e) means for angular locking of the said leaves, disposed on at least one side of the leaves relative to the clamping means.
- f) the composite material used for the second leaf is a polymer reinforced with fibers.

In the board's judgement these features cannot contribute to inventive step since they are already known from the cited documents D11 and D5 used in connection with claim 1 of the second auxiliary request or they constitute straightforward possibilities the person skilled in the art would select, in accordance with circumstances, without the exercise of inventive skill.

In particular, feature a) is known from D5 (see page 65, right column, last paragraph or Figure 3.1-38) and features b), c) and e) are known from D11 (see Figure 3 and the corresponding description part). It is to be noted in this context that the provision of means for angular locking of the leaves is well known in the art, this being in order to avoid the so called scissoring effect. The leaves of the leaf spring must be connected together in one way or another and feature d) is a straightforward manner to do it.

Feature f) is just as straightforward when fiber-reinforced plastics are mentioned in D11 as possible material for the second leaf.

For these reasons the board does not see any inventive contribution in the amendments included in the subject-matter of claim 1 according to the fifth auxiliary request as compared to the one of claim 1 according to the second auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

A. Vottner

S. Crane