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Title of invention:
Vehicle wheel suspension

Patent Proprietor:
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Opponents:
Verband der Deutschen Federnindustrie
Ikuo SAKAI

Headword:

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Case Number: T 0177/12 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 11 March 2015

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Respondent: (Patent Proprietor)	CHUO HATSUJO KABUSHIKI KAISHA 68, Kami-shioda, Aza, Narumi-cho, Midori-ku Nagoya-shi, Aichi-ken, 458 (JP)
Representative:	Winter, Brandl, Fürniss, Hübner, Röss, Kaiser, Polte - Partnerschaft mbB Patent- und Rechtsanwaltskanzlei Bavariaring 10 80336 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 9 December 2011 concerning maintenance of the European Patent No. 0976591 in amended form.**

Composition of the Board:

Chairman	G. Pricolo
Members:	C. Narcisi
	P. Guntz

Summary of Facts and Submissions

I. The European patent No. 976 591 was maintained in amended form by the decision of the Opposition Division posted on 9 December 2011. Against this decision an appeal was filed by Opponent II (Appellant I) on 23 January 2012 and by Opponent I (Appellant II) respectively on 1 February 2012, the appeal fees being paid by the Appellants at the same time of filing their notice of appeal. The statement of grounds of appeal was filed by Appellant I on 17 April 2012 and by Appellant II on 29 March 2012 respectively.

II. Oral proceedings were held on 11 March 2015. The Appellants requested that the decision be set aside and the patent be revoked. The Respondent (Patentee) requested that the appeals be dismissed or, in the alternative, that the patent be maintained in amended form on the basis of auxiliary requests 1 to 3, filed as auxiliary requests 3 to 5 with letter of 14 March 2014.

III. Claim 1 of the main request reads as follows:

"A vehicle wheel suspension comprising:
a strut (2) mounted at the upper end thereof on a vehicle body (1) for supporting a wheel (8); a lower seat (4) fixed to said strut (2); an upper seat (3) mounted on said vehicle body (1); and
a helical compression spring (5) mounted between said lower seat (4) and said upper seat (3), with said strut (2) enclosed in said spring (5), said spring (5) having a coil axis (CA) substantially curved at a predetermined radius of curvature in an unloaded state of said spring (5), characterized in that

said lower seat (4) is tilted at a first predetermined angle in such a direction that the longitudinal length of said spring (5) at the outside of said vehicle body (1) is shortened when said spring (5) is mounted between said upper seat (3) and said lower seat (4), and/or said upper seat (3) is tilted at a second predetermined angle in such a direction that the longitudinal length of said spring (5) at the inside of said vehicle body (1) is shortened when said spring (5) is mounted between said upper seat (3) and said lower seat (4), wherein said spring (5) is held in such a state that the coil axis (CA) of said spring (5) is curved with the center of curvature being on an inner side of the vehicle with respect to said strut (2) so that the coil axis of the spring is curved to extend in the direction to the lateral outside of said vehicle body."

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the wording "in an unloaded state of said spring (5)" is replaced by the wording "in an unloaded state of said spring (5) to have an arch shape".

Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 in that the wording "said lower seat (4), and/or said upper seat (3) is tilted" is replaced by the wording "said lower seat (4), and said upper seat (3) is tilted".

Claim 1 of auxiliary request 3 differs from claim 1 of the main request in that the wording "a helical compression spring (5) mounted between" is replaced by the wording "a helical compression spring (5) having an upper end plane and a lower end plane and mounted between", and the wording "at the inside of said

vehicle body (1) is shortened when said spring (5) is mounted between said upper seat (3) and aid lower seat (4)" is replaced by the wording "at the inside of said vehicle body (1) is shortened when said spring (5) is mounted between said upper seat (3) and said lower seat (4), wherein the first and second predetermined angles are predetermined such that the point of application of a reaction force axis (RA) of said spring (5) is positioned approximately on the centre of the upper end plane of said spring (5), and".

IV. The submissions of Appellants I and II may be summarized as follows:

The subject-matter of claim 1 of the main request is not new over D1 (GB-A-1 198 713). D1 discloses in figure 1 in conjunction with figure 2 or 3 respectively two distinct vehicle wheel suspensions which both include all of the features of claim 1. In particular, the springs shown in figures 2 and 3 both have "a coil axis substantially curved at a predetermined curvature radius in an unloaded state of said spring" (see contested claim 1), and when mounted between the upper and lower seat of the suspension assembly illustrated in figure 1 the spring's mounted state (or configuration) will entirely correspond and will be equivalent to feature (i) of claim 1 (i.e. that "said lower seat is tilted at a first predetermined angle in such a direction that the longitudinal length of said spring (5) at the outside of said vehicle body (1) is shortened when said spring (5) is mounted between said upper seat (3) and said lower seat (4), and/or said upper seat (3) is tilted at a second predetermined angle in such a direction that the longitudinal length of said spring (5) at the inside of said vehicle body (1) is shortened when said spring (5) is mounted

between said upper seat (3) and said lower seat (4)"). Further, as was also set out in detail in document D11 (technical expert opinion by Prof. Dr.-Ing. H. Wallentowitz), the configuration of the illustrated spring (according to figure 2 or 3) in its mounted position according to figure 1 of D1 will also correspond to feature (ii) of claim 1 (i.e. it will be "held in such a state that the coil axis (CA) of said spring (5) is curved with the centre of curvature being on an inner side of the vehicle with respect to said strut (2) so that the coil axis of the spring is curved to extend to the lateral outside of said vehicle body"). In effect, figure 1 of D1 is only a schematic drawing which neglects the fact that said spring will generally and in all likelihood not assume an exact cylindrical shape (in its mounted state), for a given minor amount of curvature will always inevitably be left over. This is specifically suggested by claim 4 of D1, stating that the disclosed method "consists in winding said helical spring with an arcuate axis and mounting said spring to reduce the curvature of said arc". Therefore the claimed subject-matter lacks novelty over D1, all remaining features of the claim being undisputedly known from D1.

The subject-matter of claim 1 of the auxiliary requests is also not new over D1. As regards the further added feature (iii) in claim 1 of auxiliary request 3, i.e. "wherein the first and second predetermined angles are predetermined such that the point of application of a reaction force axis (RA) of said spring (5) is positioned approximately on the centre of the upper end plane of said spring (5)", it is likewise known from D1. In its mounted and compressed state the spring will generate a reaction force whose direction is such that the force is due to act in the immediate neighbourhood

or vicinity of the centre of the upper plane or seat of the spring. This fact is generally known to the skilled person, given that the reaction force of the spring has to act on the location where the suspension assembly is mounted and connected to the vehicle frame 3 (D1, figure 1; page 2, lines 24-32), that is the location near the centre of upper seat 10 (D1, figure 1). This ensures that the reaction force of the spring is adequately countered and compensated by the vehicle's body. By way of example, the disclosure of prior art document D2 (EP-B1-319 651) confirms that the mounted spring in a suspension assembly of the same kind as according to D1 generally produces a reaction force acting in the aforesaid manner (D2, column 2, lines 20-26). Hence, the term "approximately" being vague and allowing a broad interpretation, the added feature is known from D1 and the subject-matter of claim 1 lacks novelty.

V. The Respondent's arguments may be summarized as follows:

The subject-matter of claim 1 of the main request is new over D1, since the mentioned features (i) and (ii) are not disclosed therein. As to feature (ii) it cannot be inferred from D1 that in their mounted state according to figure 1 the springs shown in figures 2 and 3 assume a shape with a coil axis "curved to extend in the direction to the lateral outside of said vehicle body". As stated by the Appellants, figure 1 is merely a schematic drawing and therefore no specific technical features relating to geometrical forms or shapes, e.g. such as spring- or seat-shape, can be deduced with sufficient accuracy from figure 1 of D1. Moreover, as was set out in D12 (technical expert opinion by Dipl. Ing. Prof. Dr. rer. pol. Georg Urban), the exact shape

of the spring in its mounted state is not predictable and depends on several factors, such as for instance diameter and cross sectional shape of the spring, winding pitch, winding cross section and stiffness of the spring. Consequently, it is definitely not possible to determine whether any curvature of the spring axis is present in the mounted state of the spring according to figure 1 of D1. Also, the wording of claim 4 of D1 does not exclude that the curvature of the spring axis is reduced to zero or even goes over to negative values, i.e. that the curvature centre may be located on the inner lateral side of the vehicle, contrary to what is implied by feature (ii) of claim 1.
Concerning feature (i) of claim 1 it appears that D1 does not disclose that said lower seat and/or said upper seat is tilted at a "predetermined angle" within the meaning of the invention. In effect, the term "tilted at a first (second) predetermined angle" according to the invention has to be construed such that the spring, which is substantially curved in an unloaded state, generates in its mounted state a reaction force, due to its compression and to said seats tilted at "predetermined angles", which is not only shifted along the lateral outside direction of said vehicle body (see figure 7 of the patent specification) but likewise has an inclination with respect to said upper and lower seats, as shown in figures 5 and 7. This technical measure is not disclosed in D1, for figure 1 of D1 shows a geometrical configuration wherein at best merely an approximately parallel arrangement, if any, of the upper and lower seats is illustrated. This arrangement gives merely rise to a substantially parallel shift of said reaction force of the spring with respect to the coil axis, without any inclination whatsoever of the reaction force resulting therefrom. Hence, feature (i) is not

known from D1. All in all, the subject-matter of claim 1 is therefore new over D1.

As to the subject-matter of claim 1 of auxiliary requests 1 and 2 essentially the same arguments apply as in relation to claim 1 of the main request.

The subject-matter of claim 1 of auxiliary request 3 is new over D1, given that the aforementioned feature (iii) (see point IV above), introduced into claim 1 by way of amendment, is likewise not known from D1. Indeed, according to figure 1 of D1 the reaction force of the spring is substantially shifted parallel to the coil axis and thus the point of application of the reaction force of said spring cannot be positioned approximately on the centre of the upper end plane of said spring. Thus, feature (iii) cannot be regarded as being an implicit feature which is generally known to the skilled person. Quite to the contrary, figure 5 of D2 illustrates that the reaction force of the spring in its mounted state does not necessarily have to be directed according to said feature (iii). Finally, feature (iii) makes a very specific statement, indicating clearly and unambiguously that the direction of the reaction force actually passes very near to and almost exactly through the centre of the spring's upper plane. The claimed subject-matter therefore clearly distinguishes from the disclosure of D1.

Reasons for the Decision

1. The appeals are admissible.

2. The subject-matter of claim 1 is not new over D1. Figure 1 of D1 undoubtedly is a schematic drawing and not a technical drawing exactly drawn to scale, as is usually the case for drawings of patent specifications. As a consequence no definite conclusions can be drawn e.g. as to exact geometrical shapes or angles in such a drawing, or as to exact geometrical proportions. In the present case this means in relation to feature (ii) of claim 1, for instance, that the spring's shape as shown in figure 1 can only be taken to be generally cylindrical and certainly not exactly cylindrical, this all the more so if there are sound physical reasons which evidently point to this direction. In effect, mounting the spring of figures 2 or 3 in the suspension assembly of figure 1 causes according to D1 (as is also plain from the figures) a greater amount of compression on the side of the helical spring facing the outside of the vehicle than on the side facing the inside of the vehicle (D1, page 2, lines 60-65; lines 80-85). This certainly also reduces but in general does not completely eliminate the curvature of the spring, which has a curved axis in its unloaded state. This is confirmed by claim 4 of D1, stating that the method disclosed in D1 consists in "winding said helical spring with an arcuate axis and mounting said spring to reduce the curvature of said arc". Therefore D1 clearly contemplates the case in which the spring's curvature is reduced as compared to the unloaded state but still non-vanishing. On physical grounds a vanishing curvature would possibly only be obtained if the compression force (resulting inter alia from the applied weight load) were sufficiently large, depending upon various specific spring parameters. However, even though this possibility is not excluded in D1 (see claim 4, as mentioned), no explicit indication or suggestion is derivable from D1, that a mounted state

with vanishing spring's curvature is actually intended, or preferred, according to the technical teaching of D1. On the contrary, clearly a given amount of compression in the mounted state with consequent reduction of the spring's curvature generally leads according to the disclosure of D1 to a non-vanishing curvature of the spring axis. It is therefore concluded that feature (ii) is known from D1.

The technical expert opinions D11 and D12 were considered by the Board not as evidence produced by the parties but rather as a part of their line of arguments. The above conclusions of the Board with respect to feature (ii) are in agreement with D11 and D12, insofar as these both acknowledge and confirm that the curvature of the coil axis in the mounted state may either assume a non-zero value or vanish, depending on the specific mounting conditions (e.g. compression force) and on the physical structure and physical parameters of the spring. In the Board's view the first mentioned case (as set out hereinbefore), namely that of a non-zero curvature in the mounted state, is undoubtedly disclosed in D1.

Concerning feature (i) it results already from the reasons given above, that according to D1, due to the outwardly curved axis of the helical spring in the unloaded state, the length of the mounted spring is reduced more on the side of the spring facing the outside of the vehicle than on the side facing the inside of the vehicle. Further, it is evident from figure 1 in conjunction with figures 2 and 3 that the spring in its assembled state has an upper and a lower end plane which is tilted or inclined at a "predetermined angle" with respect to the upper and lower seats of the spring as illustrated in figure 1.

No indication is given in claim 1 as to the meaning of said "predetermined angle", hence it must obviously be assumed that this angle is determined in the manner known, for instance from D1, such that the reaction force of the spring applies a bending moment to the strut in opposition to the bending moment applied by the wheel (see D1, page 1, lines 64-71; page 2, lines 61-71; see specification of the contested patent (designated hereinafter as EP-B), column 8, lines 33-39). Contrary to the opinion of the Respondent no other more specific or restrictive interpretation of the wording "predetermined angle" is possible and appropriate, given that no specific definition of said wording is included in the description of EP-B or in the claim, and in particular no general relation can be established and is disclosed, which links any "predetermined angle" in an unequivocal and unambiguous manner to a particular direction (or inclination) of the spring's reaction force. This is due to varying possible structural configurations of the suspension assembly which may occur in practice, such as for instance concerning the axial direction of the strut, and/or the inclination (tilt) of the seats of the spring relative to the strut or of the upper and lower end planes of the spring relatively to their respective seats. It is therefore concluded that feature (i) is likewise known from D1, as does feature (ii), and therefore the claimed subject-matter lacks novelty over D1, the remaining features being undisputedly known from D1.

3. The subject-matter of claim 1 according to auxiliary request 1 and 2 is not new over D1. Indeed, the further added features, relating to the unloaded spring having an "arch shape" and to both said lower and upper seat being tilted at a "predetermined angle" (see feature

(i), point 2 above) are known from D1. In particular figure 3 shows a spring having an arch shape and figure 2 shows a spring having a generally arched shape (the same as shown for instance in figure 17 of EP-B). Further, as it can be seen from figures 2 and 3 in conjunction with figure 1, both the upper and the lower seat are tilted according to feature (i) (see reasons given under point 2) with respect to the upper and lower end planes of the spring. Therefore, the subject-matter of claim 1 according to auxiliary requests 1 and 2 lacks novelty over D1.

4. The subject-matter of claim 1 of auxiliary request 3 is also not new over D1. The further added feature (iii) (i.e. "wherein the first and second predetermined angles are predetermined such that the point of application of a reaction force axis (RA) of said spring (5) is positioned approximately on the centre of the upper end plane of said spring (5)", see point IV above) is known from D1. To begin with, the term "approximately on the centre of the upper plane" is vague and undefined and there is no indication in EP-B or in the claim on how it is to be construed. In particular, EP-B indicates no adequate parameter (e.g. tilt angle or similar) or any adequate reference point or reference location, situated nearby or on said upper plane of said spring, representing a measure of the distance to the centre as implied by the mentioned term "approximately on the centre". Thus, for instance, any point closer to the centre than to the outer perimeter of the upper plane could be regarded as fulfilling feature (iii).
Furthermore, as set out by the Appellants, it is generally known to the skilled person (and almost self-evident) that the reaction force of the spring has to be directed such as to pass either through or in the

immediate vicinity of the location of attachment of the suspension assembly to the vehicle body. In effect, how could this be any different, given that the reaction force of the spring has to be compensated and countered by a corresponding and equivalent force (from the vehicle's body) at the location of attachment of the suspension assembly, no other structural part of the vehicle body being usually provided for this purpose. This is confirmed by document D2, which clearly states in its introductory part of the description that it is known to have the direction of the spring's reaction force going through the attachment point of the suspension assembly (D2, column 2, lines 20-26). D1 specifically shows that the attachment point of the suspension assembly (D1, figure 1, page 2, lines 24 to 32) is positioned at the centre of the upper plane of the spring, the spring's reaction force therefore having necessarily to act on a point in the immediate vicinity of and close to the centre of the spring's upper plane, no other constructional part being disclosed in D1 being apt to serve this purpose. For these reasons it is concluded that feature (iii), particularly on account of its vague and unspecific definition, is implicitly derivable and hence known from D1. The other features of claim 1 being known from D1, it ensues that its subject-matter lacks novelty (Article 54 EPC).

Order

For these reasons it is decided that:

1. The appealed decision is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

A. Vottner G. Pricolo

Decision electronically authenticated