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Datasheet for the decision of 4 December 2009

Case Number: T 0276/08 - 3.2.01

Application Number: 99931544.3

Publication Number: 1015265

IPC: B06G 15/07

Language of the proceedings: EN

Title of invention:
Wheel suspension system and spring therefor

Patentee:
NHK SPRING CO., LTD.

Opponent:
Verband der Deutschen Federnindustrie
Muhr und Bender KG

Headword:
-

Relevant legal provisions:
EPC Art. 123(2)

Relevant legal provisions (EPC 1973):
EPC Art. 56, 83, 84

Keyword:
"Inventive step (yes)"
"Disclosure - sufficiency (yes)"
"Claims - clarity (yes)"
"Amendments - added subject-matter (no)"

Decisions cited:
-

Catchword:
–

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0276/08 **-** 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 4 December 2009

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 10 December 2007 revoking European patent No. 1015265 pursuant to Article 102(1) EPC 1973.**

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
S. Hoffmann

Summary of Facts and Submissions

I. The appeal is directed against the decision posted 10 December 2007 revoking European patent No. 1 015 265.

II. The following state of the art played a role during the appeal procedure:

D5: GB-A-1 288 714;

D6: DE-A-37 43 451;

D10: Dr. Ing. H. Röper, "Berechnung zylindrischer Federn mit progressiver Kennlinie durch veränderliche Steigung", Der Konstrukteur, 3/1995.

III. The opposition division found i*nter alia* that the subject-matter of claim 1 as amended during the opposition procedure did not involve an inventive step in the light of the teaching of D5 or D6 in combination with the general knowledge of the skilled person as represented by D10.

IV. At oral proceedings held on 4 December 2009 the appellant requested that the decision under appeal be set aside and the patent maintained on the basis of claims 1 to 5, description columns 1, 2, 2a and 3 to 8, all filed during the oral proceedings, and figures as granted. Respondent I requested that the appeal be dismissed. Respondent II did not attend the oral proceedings but with a letter of 4 September 2008 had requested that the appeal be dismissed.

V. Claim 1 according to the appellant's request reads as follows, wherein text added to the claim as granted is indicated in bold:

"A vehicle wheel suspension system comprising a tubular shock absorber, and a compression coil spring surrounding the shock absorber, characterized in that the compression coil spring (26) consists of a coil spring which is wound around a true cylinder so as to have **a straight centreline under no load condition and** a cyclically varying pitch angle (α) **in each spring turn, the pitch angle alternating** between **local minima and local maxima, the local minima and the local maxima being at angularly fixed positions, said positions being in each spring turn 180° spaced apart to provide** a single local minimum and a single local maximum for each turn, and **the spring being** retained so as to be extended and compressed along an upright axial line (0) so as to produce lateral forces between two ends thereof as the compression coil spring (26) is extended and compressed."

Claim 4 according to the appellant's request reads as follows, wherein text added to the claim as granted is indicated in bold and text which has been replaced is struck through:

"A compression coil spring (26) which is wound around a true cylinder so as to have **a straight centreline under no load condition and** a cyclically varying pitch angle (α) **in each spring turn**, characterized in that the pitch angle (α) ~~varies~~ **alternates** between **local minima and local maxima, the local minima and the local maxima being at angularly fixed positions, said positions**

being in each spring turn 180° spaced apart to provide a single local minimum and a single local maximum for each turn, ~~so as to~~ **whereby the spring** produce**s** lateral forces between two ends of the spring as it is extended and compressed."

Claims 1 to 3 and 5 specify features additional to those of claims 1 and 4.

VI. The submissions of the respondents as regards clarity, extension of subject-matter and sufficiency of disclosure may be summarized as follows:

Both of claims 1 and 4 according to the appellant's present request are inconsistent as regards the number of minima and maxima in each full turn. Not only are the claims therefore unclear but in the case of a local minimum and a local maximum in each full turn the scope of protection would be greater than that of claims as defended at the conclusion of the opposition procedure. The appellant may defend the patent only on the basis of claims whose scope of protection is not greater than last defended during the opposition proceedings since it otherwise cannot be considered to be disadvantaged by the decision.

Claim 1 specifies that the spring in unloaded condition has a "straight centreline" but is extended and compressed along an "upright axial line". The term "upright" was used only in respect of embodiments which are explicitly excluded from the scope of the claims but in which the coil spring is wound around an oblique cylinder and retained so as to have an upright axial line by applying a lateral load thereto. The wording of

the claim now leaves open the possibility that the spring may be installed in a sloping condition or even deformed by lateral loading such that the axis is not in the direction of vertical loading and creates increasing lateral forces under compression. As a result, the subject-matter of the claim is insufficiently disclosed for the skilled person to put it into effect.

There is also no basis in the application as originally filed for the introduction into claims 1, 4 of the feature of the minima and maxima being 180° spaced apart.

VII. The appellant's rebuttal of the objections regarding clarity, extension of subject-matter and sufficiency of disclosure was essentially that:

In claims 1, 4 it is firstly specified that there is a series of maxima and minima in the spring and subsequently that there is a single one of each in each turn. The wording of the claims is therefore clear when they are read as a whole.

The terms "upright" and "straight" do not lead to any difficulty in putting the subject-matter of the claims into effect because both terms have the same meaning, namely that the spring is not bent.

A clear original disclosure of the feature that the minima and maxima are 180° spaced apart may be found in figure 6 and the corresponding description.

VIII. The appellant submitted as regards inventive step essentially that:

The opposition division's combination of the closest state of the art known from D5 or D6 with the disclosure of D10 relies on *ex post* considerations. The matter is correctly analysed by using the problem/solution approach. It was already known to employ the spring to exert a lateral load on a suspension strut but as may be appreciated from D6 figure 6 the axis of the known springs bends during compression. As a result, the spring may be loaded less on one side and it becomes difficult to accommodate the spring in a tight space. These problems are solved by the spring as presently claimed. D10, however, relates only to progressive rate springs and in applications in which a lateral load would be undesirable. It primarily teaches changing wire thickness in achieving a progressive rate and contains no general teaching of any equivalence between that feature and pitch angle. In the teaching of D6 the spring applies moments to the suspension strut but these would be lost if the teaching of D10 were to be applied. The skilled person faced with the problems resulting from D5/D6 therefore would not consider D10 and even if he were to, would not arrive at the subject-matter of present claims 1, 4.

IX. As regards inventive step the respondents countered essentially that:

The opposition division was correct in finding that the subject-matter of claims 1 and 4 does not involve an inventive step. The closest state of the art is known from D6 figure 5 for present claim 1 and figure 6 for

present claim 4. D5 may be seen as an alternative, equivalent state of the art. The problem is to improve the suspension performance by reducing the lateral loading on and resultant friction between the piston rod and housing of the strut. This is achieved by providing a higher load on one side of the spring, in the case of D6 by providing maxima and minima in wire diameter. D10 represents the general technical knowledge of the skilled person as relating to vehicle springs. It teaches in particular that whilst a progressive rate may be achieved by changing the wire thickness along the length of the spring it may be achieved more simply by maintaining constant thickness but changing pitch angle. This teaching to the skilled person extends to a general one of equivalence between variations in wire thickness and pitch angle. Indeed, D10 begins with general considerations relating to spring rates and only later applies these to the particular condition of progressive rate springs. The skilled person would therefore be encouraged by D10 to employ pitch angle as an alternative parameter in achieving the result provided by D5 or D6.

Reasons for the Decision

1. The patent relates to a suspension arrangement known as a McPherson strut commonly employed in the front suspension of passenger cars. The suspension strut is connected at its upper end to the vehicle body. At its lower end it is connected to a vertically pivoting lateral suspension arm and mounts the wheel. The strut essentially consists of a damper having a housing and an axially extending piston rod, surrounded by a

compression coil spring to react the weight of the vehicle body. A lateral offset between the line of action of the vertical load introduced through the wheel and the axis of the strut induces a bending moment in the strut which results in a lateral force between the piston rod and the damper housing. Friction resulting from the lateral force degrades the ability of the suspension to accommodate relative movement between the wheel and the body and reduces the service life of the strut. In accordance with the patent the coil spring is induced to create a compensating lateral force by varying the pitch angle within each coil.

Amendments

2. Claim 1 specifies a "coil spring which is wound … so as to have … a cyclically varying pitch angle in each spring turn, the pitch angle alternating between local minima and local maxima, the local minima and the local maxima being at angularly fixed positions". The introduction during the appeal procedure of some of this wording has led to objections. Both respondents argue that it is not clear whether the spring has only one maximum and one minimum per turn. Respondent II further argues that if indeed the spring does have only one maximum and one minimum per turn, the scope of protection would have been extended beyond that afforded by the claims last defended in the opposition procedure and that the appellant would not be disadvantaged by the decision.

2.1 The concept of being disadvantaged by a decision arises in Article 107 EPC 1973 which states that "any party to proceedings adversely affected by a decision may

appeal", whereby the argument of respondent II implicitly would put the admissibility of the appeal into question. In the present case, however, irrespective of any change in the scope of protection afforded by claims in accordance with various requests of the appellant there can be no doubt that it was adversely affected by the decision because its patent was revoked. Moreover, the appellant/patent proprietor in this case did not surrender its main request for maintenance of the patent as granted. Any comparison with the situation which may arise when during an opposition procedure a patent is maintained in amended form on the basis of the highest order request of a patent proprietor and which can lead to considerations of prohibition of ***reformatio in peius*** (cf. Case Law of the Boards of Appeal of the EPO, VII.D.6.1) is therefore without foundation. This argument of respondent II therefore fails. In accordance with Article 123(3) EPC, of course, the scope of protection afforded by the present claims may not extend beyond that of the claims as granted. However, neither respondent has raised any such objection against the present claims and the board is satisfied that none would be valid.

2.2 The amendments anyway do not introduce a lack of clarity. The relevant wording of claim 1 specifies:

(i) a cyclically varying pitch angle in each spring turn,

(ii) the pitch angle alternating between local minima and local maxima, the local minima

and the local maxima being at angularly fixed positions,

(iii) said positions being in each spring turn 180° spaced apart to provide a single local minimum and a single local maximum for each turn.

Whereas the wording of (i) relates to each spring turn, that of (ii) contains no mention of a spring turn and relates to the plurality of maxima and minima which result from the presence of there being one of each per turn. The final wording of (iii) is a clear statement that there is only one maximum and one minimum per turn and the remainder of the wording of the claim does not contradict that statement. The same reasoning applies to the essentially identical wording of claim 4.

3. The respondents argue that there is no basis in the application as originally filed for the feature which has been introduced into claims 1 and 4 specifying that the minima and maxima are 180° spaced apart. Figure 7 is a graph in which the ordinate corresponds to the number of nodes defined along the length of the wire of the spring and the abscissa corresponds to pitch angle at each point along the wire. The corresponding description (page 8, lines 8 to 11) states: "As shown in this graph, the pitch angle (α) of the coil spring alternates between a local maximum and a local minimum for each 180 degrees in relation with the number of nodes or the angle (β) of the nodal point on the coil wire as indicated by the solid line A." Line A shows a cyclical variation of a maximum pitch angle at 10 nodes and every 20 nodes thereafter together with a minimum

pitch angle at 20 nodes and every 20 nodes thereafter. It follows that there is a clear original disclosure of the added feature.

Sufficiency of disclosure

4. Claim 1 specifies that the coil spring is wound around a true cylinder that the spring is retained "so as to be extended and compressed along an upright axial line". Contrary to the view taken by respondent I, this wording either alone or together with that earlier in the claim specifying "so as to have a straight centreline under no load condition" does not require that the spring axis be vertical in an installed condition. This is clear to the skilled person in the light of the description and figures taken as a whole. He is aware from his general technical knowledge that the axis of a spring installed on a McPherson strut suspension commonly is not vertical and figure 1 of the patent specification is consistent with that knowledge, see also D5, figures 1, 2 and D6, figure 5. Figure 1 is the only illustration in the patent specification of a suspension system and shows the spring axis at an angle of some degrees from the vertical. Whilst the spring of that figure falls outside of the scope of the present claims it is evident that the suspension system itself is representative. A reasonable interpretation of the wording of claim 1 in the light of the description and drawings leaves the skilled person with no doubt that it relates to the installation of a spring as shown in figure 5 in a suspension system such as shown in figure 1. No argument has been presented which suggests that the skilled person would be unable to put such an

arrangement into effect and the board is satisfied that no such argument would be valid.

Inventive step

5. The closest state of the art for consideration of inventive step of the subject-matter of claims 1 and 4 is known from D5 or D6. Each of D5 and D6 relates to the McPherson strut type of suspension and relates to the problem of reducing the lateral force applied to the damper assembly as a result of the offset mounting of the wheel. Both solve the problem by cyclically varying the wire diameter of the spring in such a way that the diameter on the outboard side of the spring is greater than on the inboard side. As a result the spring creates a lateral force in opposition to that created by the offset geometry of the suspension assembly. The subject-matter of each of claims 1 and 4 essentially differs from that of D5 or D6 by the features that the springs are wound so as to have a cyclically varying pitch angle in each spring turn. This difference has the advantage that the spring is easier to manufacture than one employing wire of varying diameter.

5.1 D10 relates to the creation of progressive rate coil springs having a variable pitch. Upon compression a region of reduced pitch becomes increasingly coil-bound, thereby shortening the effective length of the spring and so increasing the rate. D10 states in an introduction that such springs are commonly used in internal combustion engines and vehicles and gives examples of springs for controllers or valves. It further states that whilst a combination of constant

wire diameter and variable pitch, whose theory is considered in detail, is the simplest route to achieving a progressive rate another possibility is to employ variable wire diameter. It is this equivalence which the opposition division and the respondents see as representative of general technical knowledge which the skilled person would apply in an obvious manner to arrive at the subject-matter of the present claims 1 and 4.

5.2 The teaching of D10 is directed at compression coil springs having a progressive rate and whilst it does teach equivalence between constant pitch with variable wire diameter and variable pitch with constant wire diameter, this is only in the context of a progressive rate spring. It is inherent that in a spring of otherwise unchanged parameters reducing the wire diameter in some coils will cause them to become coil-bound before others during the compression of the spring, thereby resulting in a progressive rate and this is acknowledged in D10, cf. Introduction, 4th and 5th sentences. D10 does state that that same coil-bound condition is achievable by reducing the pitch of some coils and it is inherent that reducing the pitch can be achieved by changing the pitch angle. However, that is not tantamount to a teaching regarding effects achievable by varying the pitch angle *per se* without causing the coil to become coil-bound, on which matter D10 is wholly silent. It is not the pitch angle but the pitch which is the critical parameter in achieving the desired coil-bound condition in D10. For that same reason D10 cannot be regarded as an example of the general technical knowledge of the skilled person as regards any equivalence between varying wire diameter

and pitch angle other than in the particular conditions to which D10 relates. The board therefore considers that the respondents' view of inventive step in the light of D10 relies on *ex post* considerations.

6. On the basis of the foregoing and since there is no evidence that the skilled person is aware of a general equivalence between the effects of varying wire diameter and pitch angle the respondents' case falls. The subject-matter of claims 1 and 4 therefore is considered to involve an inventive step. Since claims 1 to 3 and 5 contain all features of claims 1, 4 respectively the same conclusion applies equally to those claims.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent in amended form on the basis of the following documents:

   – claims 1 to 5 and amended description columns 1, 2, 2a, 3 to 8 submitted during the oral proceedings and drawings as granted.

The Registrar: The Chairman:

A. Vottner S. Crane