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Datasheet for the decision of 12 May 2011

Case Number: T 1422/09 - 3.2.08

Application Number: 99120567.5

Publication Number: 0994271

IPC: F16F 15/134

Language of the proceedings: EN

Title of invention:
Torque fluctuation absorbing apparatus

Patentee:
AISIN SEIKI KABUSHIKI KAISHA

Opponent:
ZF Sachs AG

Headword:
-

Relevant legal provisions:
EPC Art. 56
RPBA Art. 13(1)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Main request and auxiliary requests 1 to 5 (inventive step - no)"
"Auxiliary request 6 (not admitted)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1422/09 **-** 3.2.08

D E C I S I O N
of the Technical Board of Appeal 3.2.08
of 12 May 2011

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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 27 May 2009 concerning maintenance of European patent No. 0994271 in amended form.

Composition of the Board:

Chairman: T. Kriner
Members: M. Alvazzi Delfrate
A. Pignatelli

Summary of Facts and Submissions

I. By interlocutory decision posted on 27 May 2009 the opposition division held that European patent no. 994 271, amended according to the first auxiliary request then on file, and the invention to which it related met the requirements of the EPC.

II. Appellant I (opponent) lodged an appeal against this decision on 30 June 2009, paying the appeal fee on the same day. The statement setting out the grounds for appeal was filed on 15 September 2009.

III. A further appeal was lodged by appellant II (patent proprietor) on 4 August 2009, paying the appeal fee on the same day. The statement setting out the grounds for appeal was filed on 28 September 2009.

Oral proceedings before the Board of Appeal were held on 12 May 2011.

IV. Appellant I requested that the decision under appeal be set aside and that the patent be revoked.

V. Appellant II requested that the decision under appeal be set aside and that the patent be maintained as granted (as main request) or be maintained on the basis of the sets of claims according to one of the auxiliary requests 1 to 5 filed with letter of 11 April 2011, or according to auxiliary request 6 filed during oral proceedings.

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

"An engine having an output shaft to which a torque fluctuation absorbing apparatus (10, 110) is attached, the torque fluctuation apparatus being constructed such that a guide surface (21a) which is directed in a radially inward direction is formed on a driving side rotating member (20) which is integrally rotated with the engine, a circumferential space (50) is defined between an outer periphery of a driven side rotating member (30) which is disposed coaxially and rotatably relative to said driving side rotating member (20) at the inner diameter side of said guide surface (21a) and said guide surface (2la), plural torque transmitting portions (31a) which protrude in said circumferential space (50) are respectively mounted on said driving side rotating member (20) and said driven side rotating member (30), coil springs (70-77) being slidably guided by said guide surface (21a) are mounted in the circumferential space (50) defined between the torque transmitting portions (31a) in a circumferential direction and in series, wherein a maximum value of the spring load of at least one of said springs (70, 71, 72, 74, 76) out of said series positioned between said springs (75, 77) at the end portions out of circumferential end portions of said circumferential space (50) is set to a value smaller than maximum values of said springs (75, 77) at the end portions, characterized in that
the maximum value of the spring load of said spring (75) out of said series positioned at the end portion of the normal rotating direction (F) side out of circumferential end portions of said circumferential space (50) is set to a value greater than the value

necessary for transmitting the maximum driving torque of the engine in the normal rotating direction, and the maximum value of said spring load of said spring (77) out of said series disposed at the end portion of the reverse rotating direction (R) side out of circumferential end portions of said circumferential space (50) is set to a value greater than the value necessary for transmitting the maximum brake torque of the engine in the reverse rotating direction."

VII. Claim 1 of auxiliary request 1 differs from claim 1 of the main request by the addition of the following features:

"… the minimum spring load of said spring (75) out of said series positioned at the end portion of the normal rotating direction (F) side, which is the spring load at the time of setting said spring (75) is set to values smaller than the value necessary for transmitting the maximum driving torque of the engine,…"

"… the minimum spring load of said spring (77) out of said series disposed at the end portion of the reverse rotating direction (R) side, which is the spring load at the time of setting said spring (77) is set to a value smaller than the value necessary for transmitting the maximum brake torque of the engine."

Claim 1 of auxiliary request 2 differs from claim 1 of the main request by the addition of the following features:

"… said coil springs (70-77) having both ends thereof supported by spring seats (60-68) being slidably guided by said guide surface (21a),…"

"… the construction of said torque fluctuation apparatus is such that, if the relative rotation between said driving side rotating member (20) and said driven side rotating member (30) exceeds a predetermined angle, said at least one of said springs (70, 71, 72, 74, 76) positioned between said springs (75, 77) at the end portions of said circumferential space (50) is restricted to be compressed by protruding portions of spring seats supporting its both ends coming into contact with each other, while said springs (75, 77) disposed at the end portions still deform."

Claim 1 of auxiliary request 3 differs from claim 1 of auxiliary request 2 by the following amendment (emphasis added):

"… the construction of said torque fluctuation apparatus is such that said at least one of said springs (70, 71, 72, 74, 76) positioned between said springs (75, 77) at the end portions of said circumferential space (50) is compressed as much as possible when protruding portions of spring seats supporting its both ends come into contact with each other, if the relative rotation between said driving side rotating member (20) and said driven side rotating member (30) exceeds a predetermined angle, while said springs (75, 77) disposed at the end portions still deform."

Claim 1 of auxiliary request 4 differs from claim 1 of auxiliary request 3 by the addition of the following features:

"… said protruding portions of said spring seats come into contact with each other at a torque smaller than the maximum driving torque of the engine and smaller than the maximum brake torque."

Claim 1 of auxiliary request 5 differs from claim 1 of the main request by the addition of the following features:

"… the minimum spring load of two springs (75, 76) out of said series positioned at the end portion of the normal rotating direction (F) side and the minimum spring load of said spring (77) out of said series positioned at the end portion of the reverse rotating direction (R) side, which are the spring loads at the time of setting said springs (75, 76, 77) are set to values smaller than the value necessary for transmitting the maximum driving torque of the engine,…"

Claim 1 of auxiliary request 6 differs from claim 1 of auxiliary request 2 by the addition of the following features:

"… protruding portions protrude from said spring seats (60-68) into inner sides of said coil springs (70-77)),…"

"… the construction of said torque fluctuation apparatus is such that, if the relative rotation between said driving side rotating member (20) and said driven side rotating member (30) exceeds a predetermined angle, said springs (70, 71, 72, 74) positioned between said springs (75, 77) at the end portions of said circumferential space (50) are restricted to be compressed by said protruding portions of said spring seats coming into contact with each other, while said springs (75, 77) disposed at the end portions still deform."

VIII. The following documents are relevant for the present decision:

D2: GB -A- 2 315 111 and
D9: DE -A- 198 10 500.

IX. The arguments of appellant I relevant to the present decision can be summarised as follows:

Admissibility of D9

Document D9 had been filed with the statement setting out the grounds for appeal as reaction to the auxiliary request underlying the appealed decision, which was filed one month in advance of the oral proceedings before the opposition division. Moreover, as this document was prima facie highly relevant, it should be admitted into the proceedings.

Main request

D9 disclosed all the features recited in claim 1 of the main request, apart from the values at which the maximum values of the spring load of the springs out of the series positioned at the end portions were set. The problem solved thanks to this feature was to assure torque fluctuation over the whole range of driving speed. It was obvious to solve this problem by setting the maximum values of the spring load of at least the stronger springs to a value higher than the maximum torque values which arise in operation. This was suggested for instance by D2, page 21. Therefore, the subject-matter of claim 1 of the main request did not involve an inventive step.

Auxiliary requests 1 to 5

The additional features of claim 1 of each of the auxiliary requests 1 to 5 were all known from D9.

For example, claim 1 of auxiliary request 1 did not define any minimum preload of the spring. Hence, the claimed engine did not differ in this respect from the engine of D9, whose torsion-absorbing apparatus had clearly preloaded springs.

Therefore the subject-matter of claims 1 of the auxiliary requests 1 to 5 did not involve an inventive step either.

Admissibility of auxiliary request 6

Auxiliary request 6 had been filed at a very late stage of the proceedings. Moreover, it was contrary to Article 123(2) EPC, since the torque fluctuation apparatus recited in claim 1 comprised only two springs with a high spring load disposed at the end portions, whilst the embodiment of the application as filed on which the amendment was based comprised three of them. Therefore, this request should not be admitted into the proceedings.

X. The arguments presented in reply by appellant II can be summarised as follows:

Admissibility of D9

D9 had been filed late. Moreover, it was not prima facie relevant. On the contrary, it led away from a torsion fluctuation absorbing apparatus in accordance with claim 1, since the damper shown in this document comprised a friction device. Therefore, D9 should not be admitted into the proceedings.

Main request

Starting from D9, the person skilled in the art had no motivation to set the maximum values of the spring load of the springs positioned at the end portions of the series of springs in accordance with present claim 1. In particular, document D2 could not provide this motivation, since its teaching did not apply to a device wherein a plurality of springs were arranged in series, as was the case for the device shown in D9.

Hence, the subject-matter of claim 1 involved an inventive step starting from D9.

Auxiliary requests 1 to 5

Claims 1 of auxiliary requests 1 to 5 related to subject-matter involving an inventive step for the same reasons as given above.

Moreover, according to claim 1 of auxiliary request 1 the springs at the end portions of the series of springs were preloaded. As this feature was neither disclosed nor suggested by D9, the engine according to claim 1 of the auxiliary request 1 involved an inventive step for that reason also.

Admissibility of auxiliary request 6

It was true that auxiliary request 6 had been filed at a very late stage of the proceedings. However, it was similar in scope to the previous auxiliary request 6 as filed with letter of 11 April 2011, which it replaced, and was intended to overcome the objections under Articles 84 and 123(2) EPC raised against it. Moreover, claim 1, which was based on the embodiment shown in Figures 1 and 2, was clearly formally allowable. Therefore, auxiliary request 6 should be admitted into the proceedings.

Reasons for the Decision

1. The appeals are admissible.

2. Admissibility of document D9

Document D9 was filed together with the statement setting out the grounds of appeal. However, since the request underlying the appealed decision had been filed only one month in advance of the oral proceedings before the opposition division, the late filing of this document can be considered as a reaction to the belated filing of said request.

Moreover, filing with the statement setting out the grounds of appeal new documents which reinforce the line of attack already made before the department of first instance has to be considered as the normal behaviour of a losing party and does not constitute an abuse of procedure (see Case Law of the Boards of Appeal of the EPO, 6th edition 2010, page 716, VII.C.1.6, fifth paragraph).

Furthermore, contrary to the view of appellant II, D9 does not lead away from the torsion fluctuation absorbing apparatus in accordance with claim 1, since the wording of the present claims does not exclude the presence of a friction device. On the contrary, this document is prima facie highly relevant for the assessment of inventive step, as it discloses already in the drawings a device having all the features of the preamble of claim 1 of the main request.

In view of the considerations above, D9 is admitted into the proceedings.

3. Main request

3.1 D9 discloses an engine having an output shaft (8) to which a torque fluctuation absorbing apparatus ("Torsionschwingungsdämpfer") is attached, the torque fluctuation apparatus being constructed such that a guide surface which is directed in a radially inward direction is formed on a driving side rotating member (1) which is integrally rotated with the engine, a circumferential space is defined between an outer periphery of a driven side rotating member (23) which is disposed coaxially and rotatably relative to said driving side rotating member at the inner diameter side of said guide surface and said guide surface, plural torque transmitting portions (30,31) which protrude in said circumferential space are respectively mounted on said driving side rotating member and said driven side rotating member, coil springs (28) being slidably guided by said guide surface are mounted in the circumferential space defined between the torque transmitting portions in a circumferential direction and in series.

From Figures 8 and 9, showing the device in partially loaded state, it can be seen that a maximum value of the spring load of at least one of said springs out of said series positioned between said springs at the end portions out of circumferential end portions of said circumferential space is set to a value smaller than the maximum values of said springs at the end portions.

3.2 Starting from the engine disclosed in D9, the object underlying the claimed invention can be seen in

providing an engine which assures torque fluctuation over the whole range of driving speed.

This object is achieved by the claimed engine in that the maximum value of the spring load of the spring out of the series positioned at the end portion of the normal rotating direction side out of circumferential end portions of the circumferential space is set to a value greater than the value necessary for transmitting the maximum driving torque of the engine in the normal rotating direction, and the maximum value of the spring load of the spring out of the series disposed at the end portion of the reverse rotating direction side out of circumferential end portions of the circumferential space is set to a value greater than the value necessary for transmitting the maximum brake torque of the engine in the reverse rotating direction.

3.3 It is a standard requirement that a torque fluctuation absorbing apparatus can perform its function over the whole range of possible application conditions. To achieve this it is inevitably necessary to set, for at least the more resilient springs, the maximum value of the spring load to a value greater than the value necessary for transmitting the maximum torque of the engine, i.e. the maximum driving torque. Moreover, this is suggested for instance by D2, which discloses on page 21, first full paragraph, that the torque required to effect a maximum compression of the spring shown in the drawings can be set to at least 1.1 times the maximum engine torque. Although the drawings of D2 show a single spring, it is obvious for the person skilled in the art that this teaching is also applicable to a

device wherein a plurality of springs are arranged in series.

D9 does not draw any distinction between the two high load springs positioned at the two ends of the series of springs. Hence, it was also obvious to set for both of them a maximum value of the spring load to a value greater than the value necessary for transmitting the maximum driving torque. Since the maximum brake torque of the engine in the reverse rotating direction is smaller than the maximum driving torque of the engine in the normal rotating direction, the maximum value of said spring load would in this case also be greater than the maximum brake torque of the engine in the reverse rotating direction.

As a consequence, it was obvious to solve the problem above starting from D9 by setting the maximum value of the spring load of the spring out of the series positioned at the end portion of the normal rotating direction side out of circumferential end portions of the circumferential space to a value greater than the value necessary for transmitting the maximum driving torque of the engine in the normal rotating direction, and the maximum value of the spring load of the spring out of the series disposed at the end portion of the reverse rotating direction side out of circumferential end portions of the circumferential space to a value greater than the value necessary for transmitting the maximum brake torque of the engine in the reverse rotating direction. Hence, the subject-matter of claim 1 of the main request does not involve an inventive step.

4. Auxiliary requests 1 to 5

As explained hereafter, the features added to claim 1 of auxiliary requests 1 to 5 are all disclosed in D9.

4.1 In order to perform their torque fluctuation absorbing function all the springs of the torque fluctuation absorbing apparatus shown in D9, in particular those positioned at the end portions of the series of springs, cannot be preloaded at a load greater than the value necessary for transmitting the maximum driving torque and maximum brake torque of the engine. Therefore, D9 discloses at least implicitly the features according to which the minimum spring load of the spring out of said series positioned at the end portion of the normal rotating direction side, which is the spring load at the time of setting said spring, is set to values smaller than the value necessary for transmitting the maximum driving torque of the engine, and that the minimum spring load of the spring out of said series disposed at the end portion of the reverse rotating direction side, which is the spring load at the time of setting said spring, is set to a value smaller than the value necessary for transmitting the maximum brake torque of the engine (**auxiliary request 1**).

Appellant II argued that these features were not to be found in D9, since this document did not disclose that the springs at the end portions of the series of springs were preloaded. However, this argument is not convincing. Since no minimum values for the minimum spring load are defined by said features, said loads can also be zero. Therefore, according to the wording of claim 1 of auxiliary request 1 the springs do not

need to be preloaded. Moreover, it is clear from Figures 6 and 7 of D9, which show the device in the unloaded state, that the springs are fixed between the valve seats, i.e. that they have some, albeit possibly very small, preload.

4.2 In the torque fluctuation absorbing apparatus shown in D9 the coil springs have both ends thereof supported by spring seats (50,51) being slidably guided by the guide surface (21a). Moreover, as shown in Figures 8 and 9, the construction of said torque fluctuation absorbing apparatus is such that, if the relative rotation between said driving side rotating member and said driven side rotating member exceeds a predetermined angle, said at least one of said springs positioned between said springs at the end portions of said circumferential space is restricted to be compressed by protruding portions (45) of spring seats supporting its both ends coming into contact with each other, while said springs disposed at the end portions still deform (**auxiliary request 2**).

4.3 When the protruding portions of the valve seats shown in Figures 8 and 9 of D9 are in contact, the spring between said valve seats is compressed as much as possible. This condition is achieved in partially loaded condition (see column 5, lines 22-28), i.e. at a torque smaller than the maximum driving torque of the engine and smaller than the maximum brake torque. Therefore, D9 discloses that the construction of said torque fluctuation apparatus is such that said at least one of said springs positioned between said springs at the end portions of said circumferential space is compressed as much as possible when protruding portions

of spring seats supporting its both ends come into contact with each other, if the relative rotation between said driving side rotating member and said driven side rotating member exceeds a predetermined angle, while said springs disposed at the end portions still deform, wherein said protruding portions of said spring seats come into contact with each other at a torque smaller than the maximum driving torque of the engine and smaller than the maximum brake torque (**auxiliary requests 3 and 4**).

4.4 As explained above, to perform its function each of the springs of the torque fluctuation absorbing apparatus shown in D9 cannot be preloaded at a load greater than the value necessary for transmitting the maximum driving torque of the engine. Therefore, D9 discloses also that the construction of said torque fluctuation absorbing apparatus is such that said at least one of said springs positioned between said springs at the end portions of said circumferential space is compressed as much as possible when protruding portions of spring seats supporting its both ends come into contact with each other, if the relative rotation between said driving side rotating member and said driven side rotating member exceeds a predetermined angle, while said springs disposed at the end portions still deform, wherein said protruding portions of said spring seats come into contact with each other at a torque smaller than the maximum driving torque of the engine and smaller than the maximum brake torque (**auxiliary request 5**).

4.5 In view of the above, the subject-matter of claims 1 of the auxiliary requests 1 to 5 does not involve an

inventive step for the same reasons as those given in respect of the main request.

5. Auxiliary request 6

According to Article 13(1) of the Rules of Procedure of the Boards of Appeal (OJ EPO 11/2011, page 536), any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the Board's discretion. That discretion is to be exercised in view of inter alia the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

In the present case, auxiliary request 6 was filed at a very late stage of the proceedings, namely towards the end of the oral proceedings. The need for procedural economy requires that a request filed at such a late stage be admitted only if it at least complies without doubt with the formal requirements of the EPC.

This is not the case with respect to present auxiliary request 6, whose claim 1 recites a construction of the torque fluctuation absorbing apparatus which seems to comprise only two springs disposed at the end portions of the series of springs which still deform while the compression of the remaining springs is restricted by the contact of the protruding portion. Conversely, the embodiment of the application as filed which allegedly disclosed this construction (see Figures 1 and 2) seems to comprise three of them. Therefore, contrary to the opinion of appellant II, it is prima facie not apparent that this late-filed request complies with Article 123(2) EPC.

Under these circumstances, auxiliary request 6 is not admitted into the proceedings.

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:

V. Commare T. Kriner