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**Datasheet for the decision
of 18 June 2013**

Case Number: T 0271/10 - 3.5.02
Application Number: 02761629.1
Publication Number: 1446860
IPC: H02K 7/09, F16F 15/315
Language of the proceedings: EN

Title of invention:
Flywheel energy storage systems

Applicant:
Sibley, Lewis B.

Headword:
-

Relevant legal provisions:
EPC Art. 84, 111(1)

Keyword:
"Clarity and essential features - yes (after amendment)"
"Remittal for further prosecution"

Decisions cited:
-

Catchword:
-



Case Number: T 0271/10 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 18 June 2013

Appellant: Sibley, Lewis B.
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Representative: Friese, Martin
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 29 July 2009
refusing European patent application
No. 02761629.1 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: M. Ruggiu
Members: M. Rognoni
P. Mühlens

Summary of Facts and Submissions

- I. The appellant (applicant) appealed against the decision of the examining division refusing European patent application no. 02 761 629.1.
- II. In the contested decision, the examining division found that the application did not meet the requirements of Article 84 EPC because claim 1 then on file lacked essential features of the invention.
- III. Oral proceedings were held before the Board on 18 June 2013.
- IV. The appellant requested that the decision under appeal be set aside and that the case be remitted to the department of first instance for further prosecution on the basis of claim 1 of the main request filed at the oral proceedings of 18 June 2013.
- V. Claim 1 of the appellant's request reads as follows:

"Energy storage apparatus comprising:
 - a. a frame;
 - b. a flywheel;
 - c. means for selectably rotating said flywheel responsively to electrical power input or producing electrical power upon rotation thereof by said flywheel;
 - d. bearing means facilitating rotation of said flywheel and said flywheel rotation/power production means respecting said frame;
 - e. means for connecting said flywheel and said means for selectably rotating said flywheel or producing

electrical power output to said bearing means, comprising:

- i. a first member fixedly rotatable with a bearing means portion which is rotatable respecting said frame;
 - ii. a second member concentric with said first member, fixedly connected to said flywheel and flywheel rotation/power production means combination;
 - iii. said members contacting when stationary;
 - iv. flexible coupling means for connecting said members and thereby facilitating continued unitary rotation thereof as centrifugal force separates said members;
- f. said flywheel-flywheel rotation/power production means-second member combination flexibly coupled to the first member having resonant frequency below rotational frequency at which said members separate due to centrifugal force; and
- g. said flywheel-flywheel rotation/power production means-second member-first member combination having resonant frequency above rotational frequency at which said members separate due to centrifugal force."

VI. The appellant argued that claim 1 was in compliance with Article 123(2) EPC because it was based on claim 16 of the application as originally filed and further comprised some clarifications which were fully supported by the original disclosure. As claim 1 now specified all the essential features of the invention, it satisfied the requirements of Article 84 EPC.

Reasons for the Decision

1. The appeal is admissible.

- 2.1 The present application relates essentially to flywheel energy storage systems and deals, *inter alia*, with the problem of facilitating the passage of the accelerating flywheel through a critical rotation frequency so as to prevent the flywheel bearings from being subjected "*to the high unbalance loads such as occur at the critical speed of a conventional rotor*" (see application as published, page 13, penultimate paragraph).

- 2.2 The gist of the present invention consists essentially in providing an elastic coupling between the rotating member of the flywheel bearing, shown in Figure 1 as an annular sleeve 38, and the central hub 40 which supports the flywheel 12.

As explained in the last paragraph of page 26 of the published international application, "*centrifugal force on the rotating parts causes the flywheel central hub 40 to separate from annular sleeve 38 at the region of contact therebetween. This phenomenon is illustrated in Figures 6, 7, 8 and 9. Specifically, in Figures 6 and 8 the flywheel energy system according to the invention is shown with the flywheel central hub 40 in facing contact with annular sleeve 38. This is the configuration of annular sleeve 38 and central hub 40 at speeds well below the critical or resonant frequency.*

Figures 7 and 9 illustrate the configuration of the flywheel energy storage system and specifically annular sleeve 38 and central hub 40 with a small gap

or clearance having formed therebetween as central hub 40 has moved radially outwardly from annular sleeve 38. First and second 0-rings 110,120 provide a continuing elastic couple between the inner rotating member defined by annular sleeve 38 and the outer rings of upper and lower bearing assemblies 36, and the outer rotating member defined by spool 34, flywheel 12 and the parts associated therewith.

When separation occurs as illustrated in Figures 7 and 9, the reduced spring constant of the bearing support system for the rotating assembly defined by spool 34 and flywheel 12 and the parts rotating unitarily therewith has a critical frequency which drops relative to the critical frequency of the rotating parts when spool 34 and flywheel 12 were in tight engagement with sleeve 38. When the gap opens, the 0-rings provide the only connection between annular sleeve 38 and central hub 40 of spool 34 so that the critical speed of the rotating assembly defined by spool 34 and flywheel 12, and the parts rigidly connected thereto and rotating therewith, and the critical speed of the rotating assembly defined by annular sleeve 38 and the outer rings of the upper and lower bearing assemblies 36, drop below the respective rotational speeds of these two assemblies" (underlining added)."

3.1 Claim 1 according to the appellant's request differs from independent claim 16 of the application as originally filed in that:

- a) the member recited in feature i.) has been specified as a "first" member;

- b) the term "*elastomeric means*" in feature iv.) has been replaced by "*flexible coupling means*";
- c) in feature f.) the expression "*flexibly coupled to the first member*" has been inserted after "*said flywheel-flywheel rotation/power production means-second member*".

3.2 Amendment a) is justified by the fact that claim 1 identifies another member as "*a second member*".

Amendment b) is supported by the last paragraph on page 13 of the published application which specifies that the annular contact space between the rotor and the rotating bearing means can be bridged by "*a flexible decoupling element such as an elastomeric O-ring or a vulcanized elastomeric element or a flexible metallic element having suitable compliance*". In the context of claim 1, the term "*coupling*" is indeed more suitable than the term "*decoupling*" to define means whose function is to facilitate "*continued unitary rotation*" of the first and second members after separation.

As to amendment c), it is consistent with the way the present invention is described in the original application (see for instance page 27, second full paragraph of the published application).

3.3 In summary, the Board is satisfied that claim 1 does not contain subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).

4.1 Claim 1 essentially specifies in features e.) and i.) to ii.) that the energy storage apparatus of the

invention comprises, *inter alia*, means for connecting the flywheel and the "rotating portion of the motor/generator 14" to the bearing assemblies 36. Such connecting means comprises a first member 38, which rotates with the rotating part of the bearing, and a second member ("hub 40") concentric with the first member and connected to the flywheel and the motor/generator 14".

According to features iii.) and iv.) the rotatable first member 38 and the hub 40 are in contact when they are stationary. When they separate due to the centrifugal force, they remain mechanically linked through flexible coupling means.

As specified in features f.) and g.), when the first and second members separate due to the centrifugal force, the resonant frequency of the rotating assembly comprising the flywheel, the "rotating portion of the motor/generator 14" and the first and second members decreases below the "rotational frequency" at which such separation occurs due to the flexible coupling between the first and second members.

As pointed out above (see item 2.2. of the decision), this combination of features reflects the gist of the present invention.

- 4.2 In summary the Board is satisfied that claim 1 defines in a clear and concise manner the matter for which protection is sought and, in particular, contains all the essential features of the invention, as specified in detail in the description.

4.3 Hence, the Board finds that the appellant's request meets the requirements of Article 84 EPC.

5. In the first instance proceedings the present application was only examined with respect to Article 84 EPC, whereas other requirements of the EPC, such as Article 52 in combination with Articles 54 and 56 were never considered by the examining division. In these circumstances, the Board finds it appropriate to make use of its power under Article 111(1) EPC and remit the case to the department of first instance for further prosecution on the basis of claim 1, in accordance with the appellant's request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution on the basis of claim 1 of the main request filed at the oral proceedings of 18 June 2013.

The Registrar:

The Chairman:

A. Counillon

M. Ruggiu