

**Internal distribution code:**

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

**D E C I S I O N**  
**of 23 April 2004**

**Case Number:** W 0021/03 - 3.5.2

**Application Number:** PCT/IT 02/00653

**Publication Number:** WO 03/043170

**IPC:** H02M 7/155

**Language of the proceedings:** EN

**Title of invention:**

System for storing and/or transforming energy from sources at variable voltage and frequency

**Applicant:**

Squirrel Holdings Ltd.

**Opponent:**

-

**Headword:**

-

**Relevant legal provisions:**

PCT Art. 17(3)(a)

PCT R. 13.1, 40.1, 40.2(c)

**Keyword:**

"Lack of unity a posteriori - invitation to pay additional fees - sufficiently reasoned (no)"

**Decisions cited:**

G 0001/89

**Catchword:**

-



Case Number: W 0021/03 - 3.5.2

International Application No. PCT/IT 02/00653

**D E C I S I O N**  
of the Technical Board of Appeal 3.5.2  
of 23 April 2004

**Applicant:**

Squirrel Holdings Ltd.  
The Bank of Nova Scotia Building  
P.O. Box 268  
George Town,  
Grand Cayman (KY)

**Representative:**

Pellegri, Alberto  
Societa' Italiana Brevetti S.p.A.  
Piazza Repubblica, 5  
I-21100 Varese (IT)

**Decision under appeal:**

Protest according to Rule 40.2(c) of the Patent  
Cooperation Treaty made by the applicants  
against the invitation (payment of additional  
fees) of the European Patent Office  
(International Searching Authority) dated 11  
February 2003 .

**Composition of the Board:**

**Chairman:** W. J. L. Wheeler  
**Members:** R. G. O'Connell  
B. J. Schachenmann

## Summary of Facts and Submissions

I. International patent application PCT/IT02/00653 was filed with twenty-one claims. The claims drafted in independent form, viz 1, 6, 11, and 21 are worded as follows:

"1. A method of storing electric energy from an AC power source in one or more redox flow batteries composed of a plurality of elementary cells electrically in series and having a certain cell voltage, characterized in that it comprises:

rectifying the AC voltage by means of a full wave rectifier;

providing for a number N of voltage taps along said electrical series of elementary cells;

providing for a number N of power switches each connecting a respective intermediate tap or the positive terminal of the electrical series of elementary cells to the output node of said rectifier;

connecting the negative terminal of said electrical series of elementary cells to a common potential node of the circuit;

detecting the null voltage of the rectified voltage producing a first conditioning and reset signal of a second conditioning signal;

detecting the peak of the rectified voltage producing said second conditioning and reset signal of said first conditioning signal;

switching sequentially and cyclically in a continuous mode and without overlappings said N switches one at a time from the instant of detection of the null voltage of the rectified wave established by the activation of said first conditioning signal each for a certain interval, up to said switch connecting the positive terminal, inverting the scan direction upon detecting a peak of said rectified voltage, established by the activation of said second conditioning signal.

6. An electrochemical storage system of electric energy from an AC source in one or more redox flow batteries composed of a plurality of elementary cells electrically in series and having a certain cell voltage, comprising

at least a full wave rectifier coupled to said AC source;

at least a redox battery composed of a plurality of elementary cells electrically in series and having a first array of a number N of intermediate voltage taps along said electrical series of elementary cells;

a number N of first power switches each connecting a respective intermediate tap of said first array or the positive terminal of the electrical series of elementary cells to an output node of said rectifier, and the negative terminal of said electrical series of elementary cells being connected to a common potential node;

means for detecting the null value of the rectified AC voltage producing a first conditioning and reset signal disabling a second conditioning signal;

means for detecting the peak of the rectified AC voltage producing said second conditioning and reset signal disabling said first conditioning signal;

means switching sequentially and cyclically in a continuous mode and without overlappings, for a certain interval said N switches one at a time starting from the instant of detection of the null value of the rectified voltage waveform as established by the activation of said first conditioning signal, up to said switch connecting the positive terminal of said electrical series, inverting the scan direction at the instant of detection of peak of the rectified voltage waveform as established by the activation of said second conditioning signal.

11. An electrochemical system for transforming electrical energy from an AC source of any frequency in electrical energy deliverable to an electrical load at a certain AC voltage and frequency comprising

at least a full wave rectifier coupled to said AC source;

at least a redox battery composed of a plurality of elementary cells electrically in series and including a first array of a number N of intermediate voltage taps along said electrical series of elementary cells;

a number N of first power switches each connecting a respective intermediate tap of said first array or the positive terminal of the electrical series of elementary cells to an output node of said rectifier, and the negative terminal of said electrical series of elementary cells being connected to a common potential node;

means for detecting the null value of the rectified voltage generating a first conditioning and reset signal disabling a second conditioning signal;

means for detecting the peak of said rectified voltage producing said second conditioning and reset signal disabling said first conditioning signal;

means switching sequentially and cyclically in a continuous mode and without overlappings, for a certain interval said N switches one at a time starting from the instant of detection of the null value of the rectified voltage waveform as established by the activation of said first conditioning signal, up to said switch connecting the positive terminal of said electrical series, inverting the scan direction at the instant of detection of a peak of the rectified voltage waveform as established by the activation of said second conditioning signal;

a second array of a number M of intermediate voltage taps along said series of elementary cells such that the number of elementary cells comprised between a certain intermediate tap and another tap or an end terminal of the battery adjacent thereto of said series of elementary cells corresponds to a voltage value

represented by the maximum voltage value in a respective phase interval of a number M of discretization phases of the waveform of said certain AC voltage in a quadrant;

a number M of second power switches each connecting either a respective tap or a first terminal of a first polarity of said electrical series of elementary cells to a common voltage node of said electrical load circuit;

a bridge stage for inverting the output current path, composed of at least four power switches, having a first pair of nodes coupled respectively to said common voltage node and to the other terminal of said electrical series of elementary cells of polarity opposite to said first polarity and a second pair of nodes constituting an AC power output;

means switching sequentially and cyclically in continuous mode one at a time said M second switches, each for a time interval corresponding to  $1/(4M)$  the period of said output AC voltage and for switching by pairs said four switches of said bridge stage at every half-period of said output AC voltage.

21. An aeolian power plant comprising a plurality of photovoltaic panels electrically in series and at least an inverter for transforming the DC electrical energy at the voltage generated by said panels in electrical energy at the mains voltage and frequency, characterized in that said inverter comprises

at least a redox battery composed of a plurality of elementary cells of a certain cell voltage electrically in series and including a number N of intermediate voltage taps along said series of elementary cells that constitute the battery;

a number N of power switches each connecting either a respective tap or the positive node of the battery to a first input of a bridge stage for inverting the output current path composed of four switches driven in pairs having a second input connected to the negative terminal of the battery, and to the negative terminal of a first photovoltaic panel of said plurality of panels connected in series;

the positive terminal of each of said photovoltaic panels being connected to a respective intermediate voltage tap of the battery at a voltage lower than the DC voltage generated on the relative positive terminal of the panel of said series, referred to the potential of said negative terminal of the battery, and of the first photovoltaic panel of the series;

means switching sequentially and cyclically in continuous mode one at a time said M second switches, each for a time interval corresponding to  $1/(4M)$  the period of said AC voltage and for switching by pairs said four switches of said bridge stage at every half-period of said AC voltage."

- II. The European Patent Office (EPO), acting as the International Searching Authority (ISA), issued a communication pursuant to Article 17(3)(a) PCT dated 11 February 2003 informing the applicant that the



application did not comply with the requirement of unity of invention (Rule 13.1, 13.2 and 13.3 PCT) and invited the applicant to pay two additional fees. The annex to the invitation indicated that the ISA found that the application related to three inventions, no two of which were linked so as to form a single general inventive concept, as follows:

Claims 1-10: Redox flux battery based storage system and method thereof

Claims 11-20: AC/AC converter

Claim 21: Aeolian power plant.

III. This finding was a *posteriori* relative to prior art document W09965100. The ISA referred to claim 14 of the latter and stated that this document disclosed a redox battery system for storing electrical energy comprising a plurality of elementary cells electrically in series and having a number of intermediate voltage taps, means for monitoring a predetermined parameter of each cell and means for storing a predetermined amount of the power being transferred into the battery.

IV. The ISA found the invention(s) of claims 1 to 10 to be characterised by the following special technical features (STFs) over the prior art:

- (i) power switches each connecting a respective tap to an output node of an input rectifier,

- (ii) means for detecting the null value and the peak of the rectified voltage and producing conditioning signals,
- (iii) means switching sequentially and cyclically in a continuous mode and without overlapping the switches based upon the conditioning signals.

The ISA identified the objective technical problem solved by the above features as: to provide an improved redox type battery charging system with high efficiency without using any intermediate converter.

V. The ISA found the invention(s) of claims 11 to 20 to be characterised by the following special technical features (STFs) over the prior art:

- (i) two arrays of power switches each connecting either a respective tap to an input rectifier or a terminal of the electrical series of elementary cells to a common node,
- (ii) bridge stage for inverting the output current path,
- (iii) means for providing appropriated *[sic]* driving signals,
- (iv) means switching sequentially and cyclically in a continuous mode the two arrays of switches based upon the driving signals.

The ISA identified the objective technical problem solved by the above features as: to provide an electrochemical system for transforming electrical energy from an AC source of any frequency in electrical energy deliverable to a load at any AC voltage and frequency.

VI. The ISA found the invention of claim 21 to be characterised by the following special technical features (STFs) over the prior art:

- (i) aeolian power plant,
- (ii) plurality of photovoltaic panels,
- (iii) inverter.

The ISA identified the objective technical problem solved by the above features as: to provide a versatile aeolian power plant operating with photovoltaic panels.

VII. On the basis of these findings, it was then concluded that "the only common concept to be found between the above three sets of claims is that they relate to systems that employ batteries of the redox type with multiple series connected cells and intermediate taps. In consequence, neither the objective problem underlying the subjects of the three claimed inventions, nor their solutions defined by the technical features allow for an unambiguous relationship to be established between said inventions, as required by Rule 13 PCT."

- VIII. With a letter dated 25 February 2003, the applicant paid two additional fees under protest (Rule 40.2(c) PCT). The payment of the second fee (in respect of claim 21) was made subject to the condition that the search take account of the "transcription error" which inadvertently resulted in "aeolian" being recited in claim 21 instead of "solar", the former term being clearly inconsistent with the subject-matter defined in the claim. The applicant further observed that claims 11 to 20 and claim 21 claimed embodiments of the invention of claims 1 to 10.
- IX. The ISA, pursuant to Rule 40.2(e) PCT, issued a communication dated 18 July 2003 informing the applicant that the ISA had reviewed the justification for the invitation to pay additional search fees and invited the applicant to pay a protest fee because the invitation was justified. The review panel confirmed the reasoned statement given in the invitation to pay and noted, *inter alia*, that
- "1. The search is only carried out on unamended originally filed claims; the applicant cannot now submit that the additionally paid search fees be used to search for subject-matter not in the claims as filed."
  2. ..."The applicant's arguments do not specify what the applicant considers to be the single general inventive concept linking the three inventions and therefore cannot be held to show that the claims comply with Rule 13.1 PCT."
- X. The applicant paid the protest fee and submitted in a letter dated 25 July 2003, faxed on 28 July 2003, *inter alia* that the single general inventive concept was

defined in independent claims 1 (directed to a method) and 6 (directed to an electrochemical storage system) both defining the novel and inventive way of charging (storing energy) in a redox flow battery.

XI. The applicant requests reimbursement of all the additional search fees and the protest fee.

### **Reasons for the Decision**

1. The Board of Appeal is competent to decide upon the present protest (Article 154(3) EPC).
2. The protest is admissible.
3. If, pursuant to Article 17(3)(a) PCT, the ISA invites the applicant to pay additional fees, it shall, according to Rule 40.1 PCT, specify the reasons for which the international application is not considered as complying with the requirement of unity of invention.
4. The Enlarged Board of Appeal, when confirming that the PCT International Search Guidelines were binding guidance for the EPO acting as an ISA and for the EPO Boards of Appeal when deciding on protests against the charging of additional fees under the provisions of Article 17(3)(a) PCT (cf. G 1/89 OJ EPO 1991, 155 at point 6), added, at point 8.2, that such fees should be charged only in clear cases. In the view of the present board what is meant by a clear case in this sense is best expressed in the PCT International Preliminary Examination Guidelines (in force from 9 October 1998) at III-7.6, according to which lack of unity should

neither be raised nor persisted in on the basis of a narrow, literal or academic approach. Moreover, the benefit of any doubt should be given to the applicant. The board is, of course, mindful of the fact that the latter guidelines are not formally applicable to the ISA, but, nevertheless, in the light of the reasoning of the Enlarged Board of Appeal in G 1/89, it judges that it would not be appropriate, as a rule, for the ISA to operate to a stricter standard in the assessment of lack of unity *a posteriori* in the application of Rule 13.2 PCT than the IPEA. The board is confirmed in this view by the fact that in the new consolidated PCT International Search and Preliminary Examination Guidelines (PCT/GL/ISPE/1, in force from 25 March 2004), this guidance is repeated in relation to the application of Rule 13.2 PCT at paragraph 10.04, thus making it explicitly formally applicable to the ISA. These are passages which have been in the PCT guidelines from the earliest days of the PCT and have frequently been cited in the decisions of the boards of appeal in relation to Rule 13.2 PCT.

5. Furthermore Rule 33.3 PCT provides that:
  - (a) International search shall be made on the basis of the claims, with due regard to the description and the drawings (if any) and with particular emphasis on the inventive concept towards which the claims are directed.
  - (b) In so far as possible and reasonable, the international search shall cover the entire subject-matter to which the claims are directed or

to which they might reasonably be expected to be directed after they have been amended.

In the judgement of the board this rule applies *mutatis mutandis* to the examination of the international application with regard to the requirements of Rule 13.1 PCT since the question of what subject-matter would have to be searched is a major factor in deciding the appropriateness of raising an objection of lack of unity of invention.

6. In the present case the ISA interpreted the word "aeolian" in the first line of claim 21 literally, at its face value, despite its evident incongruity in a claim which otherwise relates only to a photovoltaic generator. A cursory glance at the description and drawings would have sufficed to conclude that the word "solar" must have been intended. Such a formalistic literal interpretation as applied by the ISA in the present case complies neither with the general standard of good faith which the EPO is required to observe vis-à-vis applicants, nor with the specific provisions of the rules and guidelines cited above. An objection of lack of unity of invention based on such an interpretation does not meet the standard of reasoning required by Rule 40.1 PCT.
  
7. In relation to the first two groups of inventions the ISA bases its finding of lack of unity of invention *a posteriori* on WO9965100 as closest prior art, but refers only to claim 14 of that document and derives the special technical features (STFs) of the alleged non-unitary inventions by comparing the features of the claims of the present international application with

the said claim 14 of the prior art document. The board observes that this is a procedure which is fraught with danger. A claim is normally a generalisation of what is specifically disclosed in the description on which it is based and therefore encompasses more than is specifically disclosed in that description. Hence the fact that a later (application) claim is subsumed by an earlier (prior art) claim does not as such yield any conclusion about novelty or inventive step of the subject-matter of the later (application) claim. Such an argument represents at best a rebuttable presumption that there is an enabling disclosure in the description which could be invoked properly to found the allegation; it is a shortcut argument which may be a defensible procedural economy in some circumstances, ie with some types of claims in some technical fields at some stages of the examination procedure. The case of mere overlap of features, however, has so little probative value as to be almost meaningless. It represents an undue burden for the applicant to have to rebut such a presumption about the actual disclosure in the prior art document. Hence this objection of lack of unity of invention *a posteriori* also fails to meet the standard of reasoning required by Rule 40.1 PCT.



**Order**

**For these reasons it is decided that:**

The two additional search fees and the protest fee shall be reimbursed.

The Registrar:

The Chairman:

D. Sauter

W. J. L. Wheeler