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Datasheet for the decision of 20 September 2018

Case Number: T 2091/15 - 3.4.02

Application Number: 05755574.0

Publication Number: 1889014

IPC: G01F3/10, G01F15/06

Language of the proceedings: EN

Title of invention:
OVAL GEAR METER

Applicant:
ECOLAB INC.

Headword:

Relevant legal provisions:
EPC 1973 Art. 56
EPC 1973 R. 103(1)

Keyword:
Inventive step - (yes)
Reimbursement of appeal fee - substantial procedural violation (no)

Decisions cited:
J 0007/82

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 2091/15 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 20 September 2018

Appellant: (Applicant)	ECOLAB INC. Ecolab Center 370 North Wabasha Street St. Paul, MN 55102-2233 (US)
Representative:	Von Rohr Patentanwälte Partnerschaft mbB Rüttenscheider Straße 62 45130 Essen (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 1 June 2015 refusing European patent application No. 05755574.0 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	A. Hornung
	T. Karamanli

Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing European patent application No. 05755574.0 on the basis of Article 97(2) EPC because the requirements of Article 56 EPC were not fulfilled.

II. With its the statement setting out its grounds of appeal, the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to the main request or one of the first to thirteenth auxiliary requests, all requests filed with the grounds of appeal and being identical to the sets of claims underlying the appealed decision. In addition, the appellant requested that the appeal fee be reimbursed since such reimbursement was equitable by reason of a substantial procedural violation.

III. In a phone conversation held on 2 July 2018, the rapporteur informed the appellant about certain non-compliances of claim 1 and the description then on file as well as on the board's preliminary opinion with respect to the alleged substantial procedural violation (see attendance note dated 3 July 2018).

IV. In response thereto the appellant, with letter of 11 July 2018, filed an amended set of claims 1 to 4 and amended description pages 4, 6 and 10 to 12 on which the further proceedings should be based. In addition, the request for reimbursement of the appeal fee was withdrawn.

V. In a phone conversation held on 12 July 2018, the appellant was invited to clarify its final requests, including all parts of the request filed with letter of 11 July 2018 (see attendance note dated 12 July 2018).

VI. In a reply dated 12 July 2018, the appellant clarified its requests.

VII. In a phone conversation held on 6 September 2018, further amendments to the application documents were discussed with the appellant (see attendance note dated 12 September 2018).

VIII. In a reply dated 7 September 2018, the appellant filed amended application documents and requested that a patent be granted based on the following documents:

- Pages 2, 3, 5, 7 to 9 and 13 as originally filed,
- Pages 6 and 10 to 12 as filed with the letter of 11 July 2018,
- Pages 1 and 4 as filed with the letter of 7 September 2018,
- Claims 1 to 4 as filed with the letter of 7 September 2018,
- Drawings as originally filed.

IX. The present decision refers to the following documents:

D1: JP 62269014 and corresponding Patent Abstracts of Japan,
D2: JP 63095321 and corresponding Patent Abstracts of Japan,
D5: WO 01/63221 A
D9: US 2004/0027732 A1
D10: US 5,992,230
D11': WO 2004/017086 A1.

X. Independent claim 1 of the main and sole request reads as follows:

"Oval gear meter for volume flow measurement comprising a housing (1) with an oval gear chamber (2) with a fluid inlet (3) and a fluid outlet (4),
a pair of oval gear wheels (5, 6) positioned in the chamber (2) and together forming an intermeshing involute toothing,
a contactless sensor means (7) with magneto-resistive sensor elements, said sensor means (7) being positioned outside of the chamber (2), and
an evaluation electronics (8) for evaluating the signals of the contactless sensor means (7),
wherein at least one of the oval gear wheels (5, 6) or of the timing gears is provided with at least one permanent magnet (9) to form a trigger wheel (6) and the permanent magnet (9) generates a generally homogeneous magnetic field along one axis of symmetry of the trigger wheel (6), the magnetic field being generally symmetrical relative to the rotational axis (6') of the trigger wheel (6), and
wherein the sensor means (7) is positioned generally concentrically relative to the rotational axis (6') of the trigger wheel (6), in an appropriate position relative to the trigger wheel (6) so that the sensor means (7) is adapted to measure the rotation of the oval gear wheels (5, 6) by measuring the rotation of the trigger wheel (6),
wherein the sensor means (7) is a GMR-spin valve bridge sensor with four GMR-spin valve sensor elements at 90° positions in two half-bridges,
the two half-bridges are configured to provide a sine output and a cosine output to the evaluation electronics, and
the evaluation electronics (8) comprises a memory means to store a table assigning each specific value of the output sine and cosine signals to a specific angular position of the trigger wheel (6)."

The main request further comprises claims 2 to 4, all referring back to claim 1.

Reasons for the Decision

1. Amendments

Present claim 1 is essentially based on claims 1, 6 and 7 as originally filed. No objection of added subject-matter was raised in the contested decision against the claims of the then main request which essentially correspond to the claims of the present sole request. The board does also not see any reason for objecting to the amendments to the claims and is thus satisfied that the present amended set of claims 1 to 4 fulfils the requirements of Article 123(2) EPC.

2. Inventive step

2.1 During the first-instance proceedings, the examining division and the applicant considered that D1 represented the closest prior art. The board agrees with the corresponding finding in the decision under appeal.

2.2 The board accepts the appellant's argument submitted with the statement of grounds of appeal, page 13, according to which the claimed subject-matter differs from the oval gear meter for flow measurement of D1 by the following features of claim 1:

1.1 the sensor means (7) is designed as a GMR-spin valve bridge sensor
1.2 with four GMR-spin valve sensor elements
1.3 at 90° positions
1.4 in two half-bridges,

2. the two half-bridges are configured to provide a sine output and a cosine output to the evaluation electronics, and

3.1 the evaluation electronics (8) comprises a memory means
3.2 to store a table assigning each specific value of the output sine and cosine signals to a specific angular position of the trigger wheel (6).

In addition, the board notes that the subject-matter of claim 1 differs from the device of D1 in that the pair of oval gear wheels form an intermeshing involute toothing.

2.3 The differing features 1.1 to 3.2 in combination enable the conversion of the angular movement of the trigger wheel into a sine output and a cosine output corresponding to specific angular positions of the trigger wheel stored in a table of the evaluation electronics. Hence, the technical effect of the distinguishing features is the identification of the angular position of the trigger wheel within a single rotation, as suggested by the appellant in its statement of grounds of appeal, page 14.

2.4 The board further agrees with the appellant that the corresponding objective technical problem may, therefore, be considered as how to provide an oval gear meter for volume flow measurement with improved accuracy, in particular with increased resolution of the measuring system. See patent application, page 4, lines 19 to 21.

2.5 D1 relates to flow meters comprising a pair of oval gear wheels. In particular, D1 is concerned with obtaining "certain rotational information simply and inexpensively, by detecting the rotational information of a flowmeter as the specific analogue signal proportional to the number of

rotations and digitizing the same corresponding to the magnitude of the number of rotations" (see the abstract of D1). Since the resolution of the measurement in D1 is one complete turn of the gear wheel, or one period of the sine signal, the flow meter of D1 is not suitable for applications with very low flow volume inducing less than one revolution of the gear wheels. In other words, there is no hint in D1 to modify the flow meter in order to increase its resolution.

Actually, D1 is not concerned with increasing the resolution of the measurement but with measuring more accurately the total number of rotations. For achieving this objective, D1 discloses an electrical circuitry for bringing the amplitude of the sine signal to a constant value independently of the frequency of the signals (see the abstract of D1 and figures 1 and 4).

If the skilled person would nevertheless contemplate increasing the resolution of the measurement, the appellant convincingly submitted (statement of grounds of appeal, page 15) that "before the priority date of the present invention it was, however, well known to increase a resolution using systems producing more than one pulse per turn. (...) However, this approach leads completely away from the present invention". See, for instance, the dual rotor flow meter of D10, figure 1, comprising a magnetic star gear (50) with a series of spaced apart magnetic radial protrusions (50c). Indeed, such an output signal would consist of a series of individual pulses instead of the two sine and cosine signals as defined in present claim 1.

Furthermore, the skilled person could in principle have envisaged to replace the magnetic resistance sensor of D1 by a better sensor such as a GMR-sensor. However, in view of the fact that in D1 the sine output provided by the sensor

is input into a comparator, the final result would remain exactly the same, as convincingly explained by the appellant (statement of grounds of appeal, page 15). Therefore, there is no incentive for the skilled person to exchange the sensor of D1 by a more complex and expensive GMR-sensor.

It follows that the skilled person would have no incentive to replace the sensor of D1 by a GMR-sensor for providing sine and cosine signals, nor to implement a memory means assigning angular positions of the trigger wheel to specific values of the sine and cosine signals.

2.6 In its decision, the examining division comes to the conclusion that the subject-matter of claim 1 lacks an inventive step over D1 in view of D5, D9 and D11' (see point 1 of the appealed decision), essentially for the reasons that it is well-known that GMR-sensors have increased sensitivity and that unambiguous determination of the angular position from the output of GMR-sensors is achievable (see point 1.5 of the appealed decision).

2.7 This reasoning of the examining division is not found persuading by the board because it fails to take account of the actual teaching of D1 according to which not the specific angular position of the oval gear wheels is measured by the flow meter to determine the flow rate of the liquid passing through the flow meter but the number of revolutions of the gear wheels.

Therefore, the board agrees with the appellant that the skilled person would have no incentive to implement a GMR-sensor having four sensor elements at 90° in two half-bridges to provide a sine output and a cosine output, so that a specific angular position of the gear wheel can be looked up in a stored table.

2.8 D2 discloses essentially the same type of flow meter as D1 and, therefore, is not more relevant than D1.

2.9 The decision under appeal refers to further prior-art documents D5, D9 and D11' which, in combination with D1, would render obvious the claimed subject-matter (see point 1.5 of the decision under appeal). However, the board is not persuaded by these arguments. In particular, while D5 discloses a GMR-sensor in a flow meter, it uses a paddle wheel flow sensor having bi-directional flow measurement capability, which is a completely different kind of flow meter as compared to the oval gear flow meter of D1 and of present claim 1. D9 and D11' disclose GMR-sensors in magnetic data storage systems and in motor vehicle engines, respectively, which are technical fields unrelated to the technical field of flow meters. Therefore, the board sees no reason why the skilled person would consider these prior-art documents at all.

2.10 In view of the above considerations, the board comes to the conclusion that the oval gear meter of claim 1 involves an inventive step over the available prior art (Article 56 EPC 1973).

3. In conclusion, the board is satisfied that the documents according to the present sole request and the invention to which they relate meet the requirements of the EPC and that a patent can be granted on the basis thereof.

4. Request for reimbursement of the appeal fee

Since the present appeal is allowable, reimbursement of the appeal fee would have to be ordered, if such reimbursement were equitable by reason of a substantial procedural violation (Rule 103(1)(a) EPC).

The appellant withdrew its request for reimbursement of the appeal fee. However, according to established jurisprudence, the boards of appeal may, even in the absence of a request to this effect, examine ex officio whether the reimbursement of the appeal fee is equitable (see for example J 7/82, OJ EPO 1982, 391).

In its statement of grounds of appeal, the appellant alleged several procedural deficiencies. The board, having also taken into account these alleged deficiencies, is of the opinion that the examining division has not committed any substantial procedural violation.

Therefore, the board sees no reason to order reimbursement of the appeal fee.

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 with the order to grant a patent on the basis of the following documents:

Description: Pages 2, 3, 5, 7 to 9 and 13 as originally filed; Pages 6 and 10 to 12 as filed with the letter of 11 July 2018; Pages 1 and 4 as filed with the letter of 7 September 2018,

Claims: Nos. 1 to 4 as filed with the letter of 7 September 2018,

Drawings: Sheets 1/3 to 3/3 as originally filed.

The Registrar: The Chairman:

M. Kiehl R. Bekkering

Decision electronically authenticated