BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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

D E C I S I O N
of 6 December 2005

Case Number: T 0453/03 - 3.4.02

Application Number: 94117027.6

Publication Number: 0651232

IPC: G01D 5/38

Language of the proceedings: EN

Title of invention:
Rotary encoder

Patentee:
CANON KABUSHIKI KAISHA

Opponent:
DR. JOHANNES HEIDENHAIN GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - main request (no) - auxiliary request 1 (yes)"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0453/03 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 6 December 2005

Appellant: (Opponent)
DR. JOHANNES HEIDENHAIN GmbH
Dr.-Johannes-Heidenhain-Str. 5
D-83301 Traunreut (DE)

Representative:
-

Respondent: (Proprietor of the patent)
CANON KABUSHIKI KAISHA
30-2, 3-chome, Shimomaruko
Ohta-ku
Tokyo (JP)

Representative:
TBK-Patent
Bavariaring 4-6
D-80336 München (DE)

Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 21 February 2003 concerning maintenance of European patent No. 0651232 in amended form.

Composition of the Board:

Chairman: A. Klein
Members: M. Rayner
J. Willems

Summary of Facts and Submissions

I. The opponent has appealed against the decision of the opposition division that, having regards to amendments made, on the basis of the fourth auxiliary request before it, European patent 651 232 (application number 94 117 027.6) meets the requirements of the Convention. The patent concerns an apparatus for detecting relative rotational information.

II. In the decision under appeal, reference was made to inter alia, the following documents

E3 "Dreigitterschrittgeber - photoelektrische Aufnehner zur Messung von Lageänderungen", J. Willhelm, thesis, Hannover, 1978, pages IX and 47 to 50"

E4 A. Ernst, "Digitale Längen und Winkelmeß-technik", Verlag moderne Industrie 1989 pages 16-18.

Independent claim 1 as maintained by the opposition division mentions a separating and a mixing diffraction grating. The opposition division saw novelty over the disclosure of document E3 being given by the feature of a grating line azimuth arranged such that vectors of interference light components outgoing from the mixing grating coincide with each other. There is no hint in the prior art on file that would suggest to the skilled person to develop an arrangement which is configured so that parallel light beams leave the mixing grating. The arrangement shown in document E3 does not give any information about the outgoing light beams and passages describing the basis principle always refer to an

interference pattern being detected. Other documents also disclose an arrangement where an interference pattern is produced. Therefore, there is no hint in the prior art on file that would suggest to the skilled person to develop an arrangement which is configured so that parallel light beams leave the mixing grating.

III. In its appeal, the appellant requests that the decision under appeal be set aside and the patent revoked. The appellant sees a lack of clarity in the claim in relation to a light receiving area rendering obscure how to configure gratings G1 and G3. A further inconsistency is that dependent claims 5 to 7 refer to photosensitive areas 6X,6Y for which there is no correspondence in Figures 6 to 9. Moreover, since it is self evident that parallel light components as shown in the upper two figures on page 78 of document E3 are caused by corresponding adjustment of the gratings, the subject matter of claim 1 is not novel. The feature concerned is also known from Figure 10 of document E4, which means that no inventive step is involved over a combination of the teachings of documents E3 and E4.

IV. The main request of the respondent is maintenance of the patent on the basis of claims 1 to 10 filed with the letter of 4 November 2005, where claim 1 corresponds in substance to the claim maintained by the opposition division. With respect to clarity, the configuration is defined in connection with the gratings, lack of a detailed definition of the light receiving area in the amended portion of the claim does not lead to a lack of clarity thereof. The feature of the claim that the vectors of interference light components coincide with each other is not disclosed in

document E3. Moreover, document E3 is completely silent about configuring the grating line azimuth. The appellant offered no reason for combining the teachings of documents E3 and E4, the latter being directed to a system using three outgoing partial beams and not showing arranging grating line azimuths. The claimed subject matter is thus novel and involves an inventive step.

V. Consequent to auxiliary requests of both parties, oral proceedings were appointed by the board. In a communication accompanying the summons, the board pointed to references 6a,6b used in the claim in the context of clarity and indicated that careful consideration of the feature considered novel by the opposition division would be needed.

During the oral proceedings, the appellant observed that gratings G1, G3 were supposed somehow to be adjusted so that vectors coincided, but no degree of beam overlap is specified. The parallel light is supposed to give rise to a light and dark spot, yet the patent specification refers in numerous places to interference patterns and a comb shaped detector. In any case parallel beams can never be guaranteed, only an approximate parallelism can be provided, i.e. some kind of light and dark pattern is always produced. Page 78 of document E3 shows parallel beams according to the principle of the patent and on page 69 it is recited that beam shearing upon grating tilting provides a measurement scale. Pages 81 and 82 show a rotational system with adjustment values as in the table. According to the bottom of page 77, a radial grating with wedge like ruling towards the centre

provides beam shearing for angled input light using gratings with the same separation. Parallel light vectors of interference light components are therefore obvious according to the angle chosen.

The respondent explained that in the invention the light components derived from the grating G3 were led to the detector, the shape of which is not decisive to its function so that a comb shaped detector is not excluded, whereas according to document E3 no measurement signal was produced from parallel light. It is not possible to identify clearly what is happening in the figure on page 78 of document E3 in three dimensions so it cannot be concluded that the last feature of claim 1 of the main request is known or obvious from this disclosure. As can be seen from for example page 66 of document E3, a collimator is provided in the course of producing the optical input to the detector, but in the patent vectors are parallel and a uniform interference light beam is derived which is led to the detecting section. In reply to the allegation of the appellant that an interference pattern is always present, the patentee stated that the claimed apparatus works.

Consequent to the discussion during the oral proceedings, the respondent filed an independent claim according to a first and second auxiliary request, respectively, indicating that this claim expresses the uniform interference light beam led to the detecting section. The appellant objected against the subject matter of claim 1 according to auxiliary request 1 for reasons analogous to those advanced against the main request. Submissions given in respect to the second

auxiliary request are not given for the reasons mentioned in section 8 of the reasons below.

Both parties filed declarations relating to how they had understood arguments at the oral proceedings in relation to claim 1 of according to the main request.

VI. The independent claims of which it is necessary for the purposes of the present decision to give the wording are the independent claim 1 according to the main and auxiliary request 1, respectively. These claims are worded as follows:

Main Request

"1. An apparatus for detecting relative rotational information with an object to be measured having a radial diffraction grating (G2), comprising:
a light source (1) for emitting a light beam for measurement;
a separating diffraction grating (Gl) for separating said light beam for measurement to a plurality of light beams;
a mixing diffraction grating (G3) for mixing at least one set of diffraction lights from a plurality of diffraction lights generated when said plurality of light beams are diffracted by said radial grating (G2), thereby forming at least one interference light beam; and
a detecting section (6) for detecting the at least one interference light beam and for generating a signal concerning the relative rotational information with said object to be measured, said detecting section (6) having a light receiving area,

wherein at least one of said separating diffraction grating (G1), said mixing diffraction grating (G3) and said light receiving area is configured so that phases of interference light components of the at least one interference light beam entering said light receiving area substantially coincide with each other wherein said configuration comprises an arrangement of the grating line arranging azimuth of at least one of said separating diffraction grating (G1) and said mixing diffraction grating (G3) with respect to each other and/or with respect to said radial grating (G2), such that the vectors of interference light components outgoing from said mixing diffraction grating (G3) coincide with each other."

Auxiliary Request 1

"1. An apparatus for detecting relative rotational information with an object to be measured having a radial diffraction grating (G2), comprising:
a light source (1) for emitting a light beam for measurement;
a separating diffraction grating (G1) for separating said light beam for measurement to a plurality of light beams;
a mixing diffraction grating (G3) for mixing at least one set of diffraction lights from a plurality of diffraction lights generated when said plurality of light beams are diffracted by said radial grating (G2), thereby forming at least one interference light beam; and
a detecting section (6) for detecting the at least one interference light beam and for generating a signal concerning the relative rotational information with

said object to be measured, said detecting section (6) having a light receiving area,
wherein at least one of said separating diffraction grating (G1), said mixing diffraction grating (G3) and said light receiving area is configured so that phases of interference light components of the at least one interference light beam entering said light receiving area substantially coincide with each other wherein said configuration comprises an arrangement of the grating line arranging azimuth of at least one of said separating diffraction grating (G1) and said mixing diffraction grating (G3) with respect to each other and/or with respect to said radial grating (G2), such that the vectors of interference light components outgoing from said mixing diffraction grating (G3) are made parallel with each other and a uniform interference light beam is derived which is led to the detecting section (6)."

The wording of claim 1 according to auxiliary request 2 is not given as it is not subject of the present decision (see section 8 of the reasons below).

VII. At the end of the oral proceedings, the board gave its decision.

Reasons for the Decision

1. The appeal is admissible.

2. *Claim 1 according to the main request*

3. *Interpretation*

3.1 In its assessment of novelty, the opposition division interpreted the last feature of the claim to mean that the light components are parallel thus entailing in the claimed arrangement that no interference pattern is detected. However, the word parallel is not used in the claim and, as pointed out by the appellant, no reference is made to the detector in the last feature of the claim. The board therefore formed the view that the interpretation of the opposition division is too generous towards the patentee. This is because "coincide" as used in the claim does not necessarily mean "are made parallel". Moreover, as the claim does not define what exactly happens on the way from the mixing grating to the detecting section, it is not precise enough to exclude an arrangement somehow producing an interference pattern at the detector, especially as the respondent maintained that it was not intended to exclude a comb shaped detector of the type used for an interference pattern, i.e. a detector of a type like 6a and 6b as referred to in the communication attached to the summons.

3.2 The declaration of the appellant filed during the oral proceedings and concerning claim 1 of the main request can be summarised as follows:

The representative of the patent proprietor confirmed in response to the appeal board, that claim 1 according to the main request is to be interpreted to mean that both interference light components (Teilstrahlenbündel) propagate exactly parallel in the direction of the detector after the grating G3.

3.3 The declaration of the respondent in reply can be summarised as follows:

The remarks of the representative of the appellant concerning interpretation of claim 1 of the main request are disputed in their entirety. These remarks represent the subjective view of the representative of the opponent. The representative of the patent proprietor has, as a result of the discussions during the oral proceedings, simply clarified the wording of claim 1, as expressed in the wording according to claim 1 of auxiliary request 1 or 2.

3.4 With respect to these statements, the board confines itself to remarking that parallel means parallel, but that the point is moot with respect to claim 1 of the main request as this word is not used therein.

4. *Patentability*

4.1 The board considers the assessment of document E3 made by the opposition division to be correct with respect to the teaching thereof being in the direction that an interference pattern is detected. Moreover, the board agrees with the analysis of claim 1 made by the opposition division with respect to the features it found to lack novelty over document E3. The parties have not disputed this analysis during the appeal proceedings.

4.2 Turning to the figure at the top of page 78 of document E3, as the drawing is rather schematic and two dimensional it is not explicitly disclosed that vectors

of interference light components outgoing from the mixing diffraction grating are parallel with each other. Nor for that matter are all the features of the claim explicitly shown in this figure per se, although they are disclosed in other figures and document E3 as a whole as indicated by the opposition division. Nevertheless, the board found the explanation of the figure according to the appellant that the beams exiting from the mixing grating are parallel more plausible than that of the respondent that this cannot be concluded in two dimensions shown in the figure. At all events, the exit beams result from an arrangement of grating line azimuths, so the appellant persuaded the board that the feature specified in the wording of claim 1 with respect to vector direction is obvious.

4.3 It is true that document E3 teaches that a collimator should be used between the grating and receiver, but, as can be seen from section 3.1 above, the submissions of the parties have led the board to the view that the wording actually used does not rule out detecting an interference pattern as done in document E3. Therefore, the imprecise wording of the claim means that the main line of argument of the respondent, that no measurement signal was produced from parallel light according to document E3, is not persuasive for the subject matter actually contained in the claim. The board thus concluded that the subject matter of the last feature of the claim in the imprecise wording given, would have been obvious to the skilled person.

4.4 The board therefore reached the view that claim 1 according to the main request cannot be considered to involve an inventive step within the meaning of Article 56 EPC.

5. *Claim 1 according to auxiliary request 1*

5.1 Support for the limiting amendment made to claim 1, i.e. the amendment in the last two to three lines starting "are made parallel…" can be found in lines 55-56 and lines 42-43 on page 5 and of the granted specification (lines 56-57 and 43-44 on page 5 of the "A" publication corresponding to the documents as filed). The board is therefore satisfied that the amendment complies with Article 123(2) and (3) EPC. The amendment also results in a further limitation of claim 1 as maintained by the opposition division.

6. *Patentability*

6.1 The focus in the opposition and appeal proceedings has been on the issue of emerging beams being parallel and deriving a uniform light beam led to the detector. The respondent stressed that document E3 does not show a measurement signal produced from parallel light and the idea is said to provide high precision, differing from document E3 where an interference pattern is detected. The appellant is even of the view that it is not possible in practice to provide a uniform beam as there is always an interference pattern. Since the subject matter concerned is explicit in claim 1 according to auxiliary request 1, the board formed the view, in the light of the comments made, that the subject matter concerned cannot be derived from document E3.

6.2 Turning to document E4, a linear system with detectors detecting three interference signals of differing phase to generate an incremental signal is disclosed. Consequently, it does not represent the closest prior art so a question is posed as to whether its disclosure would have been taken into account in connection with that of document E3 at all. In view of the passages of document E3 mentioned by the appellant and referring to angle adjustment, tolerances and the like for the rotational system, the board does not consider it obvious that the skilled person would have turned a rather different system like that of document E4 for hints on changing and adjusting the system of document E3. The question posed can therefore be answered in the negative and there is therefore no need to consider the disclosure of document E4 in further detail.

6.3 Accordingly, the board reached the conclusion that the subject matter of claim 1 is not obvious in the light of documents E3 and E4 and can therefore be considered to involve an inventive step within the meaning of Article 56 EPC.

7. *Documents according to auxiliary request 1*

7.1 Since the dependent claims all depend from claim 1, their subject matter can considered to involve an inventive step for that reason. In passing, the board observes that since Figure 9 contains the reference numerals 6X,6Y, no inconsistency as mentioned by the appellant exists. The description has been amended corresponding to the claim and in accordance with the Rules. The board therefore considers the documents

according to auxiliary request 1 to meet the requirements of the Convention.

8. *Claim 1 according to auxiliary request 2*

8.1 In view of the positive view reached by the board with respect to claim 1 as amended according to auxiliary request 1, it is not necessary to consider further auxiliary request 2 or arguments relating thereto.

Order

For these reasons it is decided that:

– the decision under appeal is set aside.

– the case is remitted to the first instance with the order to maintain the patent in amended form on the basis of claims 1-10 of the first auxiliary request, filed on 6 December 2005, and the description and drawings as maintained by the Opposition Division.

The Registrar: The Chairman:

P. Martorana A. G. Klein