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Datasheet for the decision of 13 March 2018

Case Number: T 1445/13 - 3.4.02

Application Number: 05006163.9

Publication Number: 1580581

IPC: G02B5/18, G01D5/38, G01D5/347

Language of the proceedings: EN

Title of invention:
Scale for reflective photoelectric encoder and reflective photoelectric encoder

Patent Proprietor:
Mitutoyo Corporation

Opponent:
DR. JOHANNES HEIDENHAIN GmbH

Relevant legal provisions:
EPC 1973 Art. 54(1), 56
EPC Art. 123(2)

Keyword:
Amendments - Added subject-matter (no)
Novelty and inventive step (yes)

Decisions cited:
T 0624/91, T 0594/01

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Case Number: T 1445/13 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 13 March 2018

Appellant: (Opponent)	DR. JOHANNES HEIDENHAIN GmbH Dr.-Johannes-Heidenhain-Str. 5 D-83301 Traunreut (DE)
Respondent: (Patent Proprietor)	Mitutoyo Corporation 20-1, Sakado 1-chome Takatsu-ku Kawasaki-shi, Kanagawa 213-0012 (JP)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 19 April 2013 concerning maintenance of the European Patent No. 1580581 in amended form.**

Composition of the Board:

Chairman	R. Bekkering
Members:	F. J. Narganes-Quijano
	G. Decker

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the interlocutory decision of the opposition decision finding European patent No. 1 580 581 as amended by the respondent (patent proprietor) according to the auxiliary request then on file to meet the requirements of the EPC.

The opposition filed by the appellant against the patent as a whole was based on the grounds for opposition of lack of novelty and lack of inventive step (Article 100 (a) together with Articles 54(1) and 56 EPC 1973).

II. In its decision the opposition division held with regard to the patent amended according to the auxiliary request then on file that

- the amendments made to the patent complied with Article 123(2) EPC, and
- the claimed subject-matter was new and involved an inventive step with regard to documents

E1: EP 0 742 455 B1
E2: DE 100 25 694 A1.

III. With the notice of appeal the appellant requested that the decision under appeal be set aside and that the patent be revoked. The appellant also requested oral proceedings on an auxiliary basis.

IV. By letter dated 4 December 2013 the respondent filed observations in reply to the statement of grounds of appeal filed by the appellant on 24 July 2013.

V. In a communication annexed to summons to oral proceedings the board introduced the following documents into the proceedings

A1: EP 0 387 520 B1
A2: DE 196 52 563 A1,

and presented a preliminary assessment of the case.

VI. With its letter dated 22 January 2018 the appellant withdrew the request for oral proceedings and informed the board that it would not attend the oral proceedings.

VII. With its letter dated 2 February 2018 the respondent filed, among others, a set of claims 1 and 2 labelled "New Auxiliary request 1", and pages 2 and 3 of the description and Figures 1 to 5 according to auxiliary request 1.

VIII. Oral proceedings were held on 13 March 2018 in the absence of the appellant.

The appellant had requested in writing that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the decision under appeal be set aside and that the patent be maintained as amended in the following version:

Claims: Nos. 1 and 2 according to the sole request of the respondent, filed as "New Auxiliary Request 1" with letter dated 2 February 2018;

description: Pages 2 and 3 according to the sole request of the respondent, filed as auxiliary request 1 with letter dated 2 February 2018; and

drawings: Figures 1 to 5 according to the sole request of the respondent, filed as auxiliary request 1 with letter dated 2 February 2018.

At the end of the oral proceedings the chairman announced the decision of the board.

IX. The set of claims of the sole request of the respondent consists of independent claims 1 and 2, these two claims reading as follows:

"1. A scale for a reflective photoelectric encoder comprising

a substrate (10);

a first reflective film (11) uniformly deposited on the substrate; a phase grating (12) formed on the substrate, the phase grating being made of a material the reflectance of which is different from that of the first reflective film; and

a second reflective film (13) formed on a top end of the phase grating, the second reflective film being made of the same material as the first reflective film, and

having no reflective film formed on side faces of phase grating (12), wherein an edge angle (θ) of the phase grating is set to 85 degrees."

"2. A reflective photoelectric encoder comprising

a scale having no reflective film formed on side faces of phase gratings (12), and in which an edge angle (θ) of the phase grating is set to 85 degrees;

wherein the scale comprises:

a substrate (10);

a first reflective film (11) uniformly deposited on the substrate; the phase grating formed on the substrate, the phase grating being made of a material

the reflectance of which is different from that of the first reflective film; and

a second reflective film (13) formed on a top end of the phase grating, the second reflective film being made of the same material as the first reflective film."

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural matters*

The parties were duly summoned to oral proceedings, and by letter dated 22 January 2018 the appellant withdrew the request for oral proceedings and informed the board that it would not attend the oral proceedings. The board maintained the oral proceedings in order to resolve all outstanding issues and to bring the case to a final decision.

The oral proceedings were then held in the absence of the appellant. According to Rule 115(2) EPC, oral proceedings may continue in the absence of a duly summoned party. Furthermore, pursuant to Article 15(3) RPBA, the board is not obliged to delay any step in the proceedings, including its decision, by reason only of the absence at the oral proceedings of any party duly summoned who may then be treated as relying only on its written case. In view of these considerations and in view of the requests and the submissions of the parties and of the preliminary assessment presented by the board in the communication annexed to the summons, the

board was in a position to announce a decision at the conclusion of the oral proceedings (Articles 15(5) and (6) RPBA).

3. *Respondent's request - Admissibility*

Claim 1 of the present request of the respondent results from claim 1 of the request considered allowable by the opposition division after insertion of the term "comprising" before the wording "a substrate (10); a first reflective film [...]; and a second reflective film [...]", the resulting wording having subsequently been shifted before the wording "having no reflective film [...], wherein an edge angle [...] is set to 85 degrees". This amendment overcomes an objection raised by the board in the communication annexed to the summons to the effect that the claim resulted from a combination, among others, of claims 1 and 2 as granted, and the omission in the claim of the term "comprising" mentioned in claim 2 as granted raised the question of whether the substrate and the phase grating together with the respective reflective films were constituents of the claimed scale (Article 84 EPC 1973).

Independent claim 2 of the present request of the respondent is identical to independent claim 2 of the request considered allowable by the opposition division.

The set of claims of the respondent's request was therefore filed in advance of the oral proceedings and overcomes the objection previously raised by the board. For this reason, the board, exercising its discretionary power under Article 13(1) RPBA, decided

during the oral proceedings to admit the respondent's request into the proceedings.

4. *Claim 1 - Article 123(2) EPC*

4.1 The opposition division held in its decision that the amendments to claim 1 of the auxiliary request underlying the decision under appeal complied with the requirements of Article 123(2) EPC. In particular, the opposition division found that the mentioned claim 1 was based on the combination of granted claim 1 with the features of granted dependent claim 2 (both identical to claims 1 and 2 of the application as originally filed, respectively), the claim further specifying that the "edge angle (θ) of the phase grating is set to 85 degrees". According to the opposition division, this value of the edge angle - interpreted during the proceedings as the internal angle formed by the side faces of the grating elements and the surface of the grating substrate as represented in Fig. 1 and 3 of the patent specification - was based on the value "85" degrees of the edge angle shown in the plot represented in Fig. 4 of the application as originally filed.

Apart from the amendments in the formulation of the claim mentioned in point 3 above, first paragraph, claim 1 of the present request is the same as claim 1 of the request considered allowable by the opposition division. Therefore, the aforementioned assessment made by the opposition division also applies to claim 1 of the present request.

4.2 The appellant has contested the view of the opposition division in this respect and has submitted that, contrary to the finding of the opposition division, the

claimed feature relating to the edge angle of the phase grating being "set to 85 degrees" contravenes the requirements of Article 123(2) EPC.

4.2.1 According to a first argument of the appellant, the application as originally filed disclosed an edge angle of the phase grating "which is set larger than 80 degrees and less than 90 degrees" (cf. paragraph [0008] of the publication of the application, EP 1 580 581 A1), thereby solving the problem of how to "stably obtain high diffraction efficiency and allow variations in the shape and size of the gratings caused by processing" (cf. paragraph [0001]). The appellant submitted that in view of these passages the invention was exclusively directed to an optimal range of the edge angle.

In the board's view, however, the mere fact that, as submitted by the appellant, the application as originally filed discloses an optimal range of values of the edge angle for solving the primary problem considered in the application does not detract from the fact that a grating according to the disclosure of the application would have a specific effective or average value of the edge angle falling within the mentioned range of values. This conclusion is also supported by the passage of the publication of the application in column 3, lines 21 to 39 in which reference is made to gratings having a specific value of the edge angle.

4.2.2 The appellant, without actually contesting that the value "85" degrees is explicitly shown in the plot represented in Fig. 4 of the application as originally filed, has disputed that the skilled person would be in a position to derive directly and unambiguously the specific value "85" degrees and the corresponding

technical function from the plot of Fig. 4. More particularly, the appellant has disputed that the claimed value was disclosed, or could be identified, as being optimal in the context of the application as originally filed.

The board notes that the plot of Fig. 4 is a representation of simulation values of the magnitude of the relative diffraction efficiency of a phase grating having a value of the edge angle set to 70, 75, 80, 85 and 90 degrees. In addition, the application as originally filed explicitly discloses that the "optimal edge angle is 80 degrees < θ < 90 degrees" (paragraph [0015], last sentence, of the application as published). As submitted by the respondent, the skilled person would consider working with the specific value 85 degrees shown in Fig. 4, and in the board's view this conclusion does not further require a specific disclosure of the value 85° as being particularly optimal over other values within the range "80 degrees < θ < 90 degrees". It is also noted that in the context of the disclosure of the application as originally filed any specific value within the mentioned range, and in particular the value 85°, can be considered "optimal" in respect of a particular compromise between the diffraction efficiency and the different manufacturing considerations mentioned in the application (see paragraph [0015] of the publication of the application), and that in any case, as submitted by the respondent by reference to the plot of Fig. 4, an edge angle of 85 degrees has particularly high values of the diffraction efficiency.

4.2.3 The appellant has also submitted that the skilled person would understand that the problem solved by the invention was to allow variations in the form of the

grating elements, and therefore also variations in the edge angle, while obtaining a high diffraction efficiency, and that this problem would have deterred the skilled person from picking out a single point value of the edge angle from the continuous range of values represented in the plot of Fig. 4 of the application as originally filed. In support of these submissions the appellant referred to paragraph [0003] of the publication of the application disclosing that variations in the shape and size of the gratings, and in particular "variations in the edge angle $\Delta\theta$ = approximately 5 degrees", occurred in processing the scale, and also to paragraph [0001] according to which the invention was directed to "stably obtain high diffraction efficiency and allow variations in the shape and size of the gratings caused by processing".

The board notes that the processing variations in the edge angle of the grating of ± 5° mentioned in the application (paragraph [0003]) relate to local manufacturing variations in the value of the edge angle at portions of the grating introduced by the processing conditions - in particular, by the etching process, see paragraph [0015] of the publication of the application, and also document E1, column 2, lines 49 to 58, and column 3, lines 23 to 29 - during the manufacture of a grating with uniform characteristics (see publication of the application, paragraph [0003]: "[...] it is difficult to uniformly process the shape and size of the gratings over a wide area" [*emphasis by the board*]), and not - as the appellant's submissions appear to presuppose - to manufacturing variations or tolerances in the effective or average value of the edge angle of the resulting grating. Accordingly, the manufacture of a grating with a nominal value of the edge angle of 85° might well result in a grating having

portions with an edge angle deviating from the nominal value of 85° by an amount of up to ± 5°, but the average or effective edge angle of the resulting grating would still be of 85°. It is also noted in this respect that a grating with an effective or average value of the edge angle of 85° is technically distinguishable from a grating having an effective or average value of 80° or 90°, even if both gratings present local manufacturing deviations of the edge angle of up to ± 5°. In view of these considerations, the board cannot follow the submissions of the appellant, as these would rely on a grating having, in principle, a nominal value of the edge angle of 85°, but having in a considerable number of portions of the grating a value of the edge angle departing from the value of 85° by an amount of up to + 5° (or of up to - 5°) to an extent such that the average or effective value of the edge angle of the grating would considerably deviate from its nominal value.

4.2.4 According to a further argument of the appellant, the plot represented in Fig. 4 of the application as originally filed was obtained by carrying out a simulation with a simulator program (application as published, paragraphs [0014] and [0017]) on the basis of a p-polarized light source of a wavelength of 633 nm and on the basis of specific values of the parameters of the grating, and in particular on the basis of a ratio between the grating width and the pitch in the range of 0.40 to 0.58, and a grating height in the range 110 to 160 nm (application as published, paragraph [0014]). According to the appellant, the fact that claim 1 specified the value "85 degrees" without requiring the specific features of the simulation mentioned above went over the content of the application as originally filed because according to

the established case law it was not normally admissible under Article 123(2) EPC to extract isolated features from a set of features which have originally been disclosed in combination.

The board does not find this argument persuasive. Each of claims 1 to 4 and also paragraphs [0008] and [0009] of the application as published already mentioned values of the edge angle larger than 80° and less than 90°, without these values - in particular, without any specific value within the disclosed range - being restricted to the conditions underlying the simulation mentioned in paragraphs [0014] to [0016] of the application. In addition, according to paragraph [0017] of the application as published the aforementioned simulation was based on the specific features mentioned above, but "the present invention is applicable to a general scale in which a reflective film is not formed on the side faces of the grating", i.e. to a scale as defined in present claim 1. For these reasons, the board does not see an unallowable generalization in the fact that claim 1 specifies a value of the edge angle "set to 85 degrees", without the claim being limited to the specific conditions underlying the simulation specified in the description of the application.

4.3 In view of all these considerations, the board concludes that the amendment objected to by the appellant does not contravene the requirements of Article 123(2) EPC, and that claim 1 complies with the requirements of Article 123(2) EPC.

5. *Claim 1 - Novelty*

5.1 In its decision the opposition division held that the subject-matter of claim 1 of the first auxiliary

request then on file was new over each of documents E1 and E2.

It has been undisputed during the appeal proceedings that

- document E1 discloses a scale for a reflective photoelectric encoder (Fig. 1, together with claim 1), the scale being constituted by a phase grating formed on a substrate, the substrate and the top end of the phase grating having deposited thereon a reflective film of a material having a reflectance different from the reflectance of the material of the phase grating (claims 3 to 7), and the side faces of the grating elements having no reflective film deposited thereon; and

- document E2 discloses scales for a reflective encoder (cf. paragraph [0046] and claim 15), and more particularly

  - a first embodiment in which the scale is constituted by a grating formed on a substrate (Fig. 7), the substrate and the top end of the phase grating having deposited thereon a reflective film (115), and the side faces of the grating elements having no reflective film deposited thereon (paragraphs [0041] and [0047]), and

  - a second embodiment in which the scale is constituted by a grating formed on a substrate (Fig. 8 and the corresponding description), the grating elements having an edge angle (taken as the internal edge angle, see point 4.1 above, first paragraph) below 90°, and in particular between 75° and 90° (paragraph [0042]).

5.2 In its decision the opposition division found that the claimed scale differed from the scale disclosed in document E1 only in that, while in document E1 the side

faces of the phase grating were perpendicular to the substrate and they therefore had an edge angle of 90° (Fig. 1 and column 3, lines 17 to 20), claim 1 required an edge angle of 85°. Since present claim 1 is directed to essentially the same subject-matter (see point 3 above, first paragraph), this conclusion of the opposition division also applies to present claim 1.

The appellant has contested the opposition division's view in this respect and has submitted that the claimed value of the edge angle of the phase grating was also anticipated by document E1. In particular, the appellant has submitted that the description of the patent referred to "allow[ing] variations in the shape and size of the gratings caused by processing" (paragraph [0001]), and in particular to variations in the edge angle of approximately 5° (paragraph [0003]), during the manufacture of the scale, and that consequently the claimed edge angle value "85 degrees" was to be interpreted in its technical context not as a point value, but as a range of values reaching the value 85° + 5°, i.e. the value 90° disclosed in document E1. Alternatively, in view of the manufacturing tolerances mentioned in the patent in suit, according to the appellant the value 90° disclosed in document E1 was to be interpreted not as a point value, but as a range of values extending to the value 90° - 5°, i.e. to the value 85° required by the claimed subject-matter. The appellant has also referred to decisions T 624/91 and T 594/01 in support of these submissions.

5.2.1 The board does not find this argument convincing. It is noted by reference to the considerations already presented in point 4.2.3 above that the processing variations of ± 5° in the edge angle mentioned in the

patent specification do not relate to tolerances or variations in the average or effective value of the edge angle of the grating resulting from the manufacture of the grating, and that a distinction should be made between allowing in the manufacture of such gratings local manufacturing deviations of ± 5° at both sides of the nominal value of the edge angle while maintaining the nominal value as the effective or average value in the whole grating, and allowing manufacture deviations of ± 5° in the average or effective edge angle of the resulting grating. Consequently, a grating of the type disclosed in document E1 possibly having at different portions of the grating an edge angle deviating from the nominal value 90° by an amount of up to ± 5°, but still having an average or effective edge angle of 90°, would not anticipate a grating as claimed possibly having at different portions of the grating an edge angle deviating from the nominal value 85° by an amount of up to ± 5°, but still having an average or effective edge angle of 85°.

5.2.2 In addition, none of decisions T 624/91 and T 594/01 cited by the appellant support a different conclusion for the following reasons:

According to decision T 624/91, "the nominal composition [of an alloy] not only discloses the composition as a specific point, which nobody would be able to realise in practice, but also a certain range around this average or nominal composition, into which the majority of the analyses of those alloys fall, which were prepared aiming at the nominal composition and using the care usual in this art when producing and analysing the alloy" (see reasons for the decision, point 3.2). This statement of decision T 624/91 would,

as far as applicable to the present case, mean that document E1 would not only disclose a grating with a nominal value of the edge angle of 90°, but also gratings with an effective or average value of the edge angle within "a certain range around" the nominal value 90°. However, contrary to the appellant's submissions, this "certain range around" the nominal value of the values of the effective or average values does generally not correspond to the processing variations of ± 5° mentioned in the patent specification, as these processing variations define local variations between + 5° and - 5° at portions of the grating and they do not necessarily result in variations of the effective or average value of the grating of the order of ± 5°.

Decision T 594/01 refers to the margins of experimental and measurement errors in the determination of values, in particular in the field of quantitative analytical chemistry (see reasons for the decision, point 4.1.5; see also the catchword). In the present case, however, the appellant has submitted no evidence as regards the magnitude of the experimental or measurement error in the measurement or determination of the effective or average value of the edge angle of the gratings under consideration, let alone that such magnitude would reach a value of the order of ± 5°.

5.2.3 For these reasons, the board cannot follow the appellant's submissions that, taking into account the variations in the edge angle of about 5° during the manufacture of the phase grating, the claimed value 85° of the edge angle would be anticipated by the value of 90° disclosed in document E1.

5.3 The board concludes that, as already found by the opposition division, the scale of claim 1 differs from

the scale disclosed in document E1 in that the edge angle of the phase grating is set to a value of 85 degrees.

5.4 It has been undisputed during the proceedings that the claimed scale is new over the disclosure of document E2, and in particular over the two embodiments disclosed in document E2 and referred to in point 5.1 above. In particular, the scale of the first embodiment of document E2 has an edge angle of 90° (Fig. 7), and not of 85° as required by claim 1, and the scale of the second embodiment (Fig. 8) has no reflective film deposited on portions of the grating elements as required by claim 1.

5.5 Claim 1 is therefore new over documents E1 and E2 (Article 54(1) EPC 1973).

6. *Claim 1 - Inventive step*

6.1 In its decision the opposition division held that neither a combination of document E1 as closest state of the art with the teaching of document E2, nor a combination of document E2 as closest state of the art with the teaching of document E1, rendered obvious the subject-matter of claim 1 of the auxiliary request underlying the decision under appeal. Since present claim 1 is essentially directed to the same subject-matter (see point 3 above, first paragraph), the same conclusion of the opposition division would apply to present claim 1.

6.2 When considering document E1 as the closest state of the art, the opposition division held that

- according to the description of the patent the relative diffraction efficiency is high, and the

fluctuations small, when the edge of the phase grating elements is larger than 80° and approaches the value 90° (column 3, lines 23 to 25 together with Fig. 4), but the fabrication process of grating elements approaching the value 90° is difficult (column 3, lines 25 to 27),

- the sole distinguishing feature of the claimed scale over the scale disclosed in document E1, i.e. the value 85° of the edge angle of the grating, solved the problem of simplifying the fabrication process of the scale while maintaining a high diffraction efficiency, and

- the skilled person would not take into account document E2 when faced with the mentioned problem.

The appellant has contested the view of the opposition division in this respect.

6.2.1 According to a first line of argument of the appellant, the difference between an edge angle of 85° and an edge angle of 90° was so small that no contribution to inventive step could be seen in the subject-matter of claim 1 over the disclosure of document E1 because the patent specification disclosed that the optimal values of the edge angle were in the range of 80° to 90°.

This line of argument cannot be followed by the board because it omits consideration of the technical effects mentioned in the patent specification (see in particular paragraph [0015] of the description) and discussed in the decision under appeal (see point 6.2 above). In particular, the claimed value 85° does not constitute an arbitrary selection within the range of 80° to 90° because, as submitted by the respondent, while the diffraction efficiency in the interval between 80° and 90° is almost as good as that at 90°, a

grating with an edge angle of 85° is easier to manufacture and has a diffraction efficiency close to that at 90°, and the value 85° constitutes a compromise between different technical considerations.

6.2.2 According to a second line of argument of the appellant, document E2 disclosed in paragraph [0042] that the edge angle of the grating elements could be lower than 90° and that this lower value would improve the efficiency of the reflective grating when used as a scale for a reflective encoder as claimed, and this teaching would render obvious the claimed value of the edge angle.

Paragraph [0042] of document E2, however, refers explicitly to the grating disclosed with reference to Fig. 8 and, therefore, its disclosure pertains to a grating having uniform reflectivity on all the portions of the faces of the grating, and not to a grating having portions of its faces with a different reflectivity as it is the case of the grating disclosed in document E1 and also of the grating disclosed in document E2 with reference to Fig. 7. In addition, paragraph [0042] of document E2 specifically addresses the issue of the diffraction efficiency of blazed gratings (see column 6, lines 6 to 10), and more particularly of reflective gratings operating in a Littrow configuration (column 6, lines 10 to 15), i.e. operating with incoming light at a specific angle of incidence corresponding to the diffraction angle for which the diffraction efficiency has been optimized; there is no indication, however, that the specific teaching of this passage of document E2 would be applicable to other reflective gratings, and in particular to the phase grating of document E1 which is not designed to operate as a blazed grating, let alone

in a Littrow configuration. It is noted in this respect that the phase shift values mentioned in paragraph [0018] of document E1 are independent of the angle of incidence of the light, and this disclosure indicates - as submitted by the respondent - that the grating of document E1 is designed to operate with normal incidence of the light - as also supported by Fig. 1a, 1b and 2 to 4 of document A1 cited in paragraph [0020] of document E1 -, thus excluding the operation of the grating in the Littrow configuration referred to in paragraph [0042] of document E2.

It is also noted that paragraph [0042] of document E2 teaches an improved diffraction efficiency as the edge angle gradually departs from 90° (column 6, lines 6 to 15). This dependency of the diffraction efficiency on the edge angle of the grating elements is confirmed by Fig. 4 of document A2 - constituting the priority document of document JP 10 318 793 A referred to in paragraphs [0004], [0006] and [0016] of the description of the contested patent -, the document disclosing a reflective phase grating having uniform reflectivity on all the portions of the faces of the grating elements and also configured to operate in a Littrow configuration (document A2, abstract, and phase grating 2 in Fig. 1 to 3 together with the corresponding description). The mentioned dependency, however, runs in the opposite direction as that represented in Fig. 4 of the patent specification, in which the relative diffraction efficiency decreases as the edge angle gradually departs from 90°. This difference in the dependency of the diffraction efficiency on the edge angle constitutes a further indication that the grating disclosed in paragraph [0042] of document E2 is designed to operate under conditions different to those considered in document E1

and that, therefore, there is no reason for considering the application of the corresponding teaching to the grating of document E1.

For these reasons, the board concurs with the opposition division's view and also with the submissions of the respondent, according to which the skilled person would not consider the application of the teaching of document E2 to the grating of document E1 in order to solve the problem under consideration.

6.2.3 It is finally noted that paragraph [0042] of document E2 teaches departing from a value of the edge angle of 90° and adopting a value below 90° within a range extending down to the value 75°, and that there is no concrete teaching pointing towards the specific claimed value of 85°.

6.2.4 In view of the above, the board is of the opinion that the skilled person confronted with the objective problem under consideration would not see in the specific disclosure of document E2 a teaching applicable to the grating of document E1, let alone a disclosure pointing towards the use in the grating of document E1 of an edge angle having a value of 85° as required by the claimed subject-matter.

The board concludes that the claimed subject-matter is not rendered obvious by document E1 as closest state of the art in combination with the teaching of document E2.

6.3 In its decision the opposition division also found that claim 1 was not rendered obvious by the grating disclosed in paragraph [0042] of document E2 with reference to Fig. 8 when considered as the closest

state of the art, as the application on this grating of a reflective film as taught in document E1 or in the embodiment disclosed in document E2 with reference to Fig. 7 would be disadvantageous. The appellant has not disputed this view of the opposition division, and the board concurs with the opposition division's conclusion in view of the different structural and functional characteristics of the grating disclosed in paragraph [0042] of document E2, and of the grating disclosed in document E1 or in document E2 with reference to Fig. 7 (cf. point 6.2.2 above).

6.4 In view of the above considerations, the board concludes that claim 1 involves an inventive step over documents E1 and E2 (Article 56 EPC 1973).

7. *Independent claim 2 - Article 123(2) EPC, novelty and inventive step*

While claim 1 is directed to a scale for a reflective photoelectric encoder, independent claim 2 is directed to a reflective photoelectric encoder comprising a scale having all the features of the scale defined in claim 1. Independent claim 2 results from the combination of independent claim 3 and dependent claim 4 as granted with the value "85 degrees" of the edge angle disclosed in the plot represented in Fig. 4 of the application as originally filed (Article 123(2) EPC).

The appellant has submitted that independent claim 2 contravenes the requirements of Article 123(2) EPC and that its subject-matter was anticipated, or at least rendered obvious, by documents E1 and E2. The arguments presented by the appellant in support of these submissions are essentially the same as those presented

in respect of claim 1. Therefore, the same reasons given in points 4 to 6 above in respect of claim 1 also apply to independent claim 2. The board concludes that also independent claim 2 satisfies the requirements of Article 123(2) EPC, and that its subject-matter is also new and involves an inventive step over the prior art under consideration.

8. *Description*

The description consists of pages 2 and 3 of the patent specification, the pages containing amendments identical to those made to the description of the first auxiliary request considered allowable by the opposition division. These amendments bring the description in conformity with the invention as defined in claims 1 and 2 (Article 84 and Rule 27(1)(c) EPC 1973) and they also satisfy the requirements of Article 123(2) EPC. The drawings (Fig. 1 to 5) are identical to the corresponding drawings of the patent as granted.

9. In view of the above, the board concludes that the patent amended according to the present request of the respondent and the invention to which it relates meet the requirements of the EPC within the meaning of Article 101(3)(a) EPC.

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 maintain the patent as amended in the following version:

Claims: Nos. 1 and 2 according to the sole request of the respondent, filed as "New Auxiliary Request 1" with letter dated 2 February 2018;

Description: Pages 2 and 3 according to the sole request of the respondent, filed as auxiliary request 1 with letter dated 2 February 2018; and

Drawings: Figures 1 to 5 according to the sole request of the respondent, filed as auxiliary request 1 with letter dated 2 February 2018.

The Registrar: The Chairman:

M. Kiehl R. Bekkering

Decision electronically authenticated