

Internal distribution code:

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

D E C I S I O N
of 5 October 2004

Case Number: T 0577/01 - 3.4.2

Application Number: 92309807.3

Publication Number: 0543513

IPC: G01D 5/34

Language of the proceedings: EN

Title of invention:
Opto-electronic scale-reading apparatus

Patentee:
Renishaw Transducer Systems Limited

Opponent:
DR. JOHANNES HEIDENHAIN GmbH

Headword:

-

Relevant legal provisions:
EPC Art. 52(1), 54, 56, 111(1), 123(2)

Keyword:
"New argument under Article 100(c) EPC: filed only one month before oral proceedings"
"Ground of opposition under Article 100(c): already raised in the notice of opposition - remittal"

Decisions cited:
T 0441/92, T 0465/92

Catchword:

-



Case Number: T 0577/01 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 5 October 2004

Appellant: Renishaw Transducer System Limited
(Proprietor of the patent) New Mills
Wotton-Under-Edge
Gloucestershire GL12 8JR (GB)

Representative: Jackson, John Timothy
Renishaw plc
Patent Department
New Mills
Wotton-Under-Edge
Gloucestershire GL12 8JR (GB)

Respondent: DR. JOHANNES HEIDENHAIN GmbH
Postfach 1260
D-83292 Traunreut (DE)

Representative: -

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 30 March 2001
revoking European patent No. 0543513 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: A. G. Klein
Members: A. G. M. Maaswinkel
M. J. Vogel

Summary of Facts and Submissions

- I. European patent No. 0 543 513 (based on application No. 92 309 807.3) was revoked by the decision of the opposition division dated 30 March 2001.
- II. The opposition had been filed against the patent as a whole on the basis of Article 100(a) EPC in combination with Articles 52(1), 54 and 56 EPC. Furthermore the opponent had raised an objection under Article 100(c) and 123(2) EPC, because in its opinion an essential feature from the independent claim as originally filed had been omitted in Claim 1 in the patent as granted. To support its objections the opponent referred *inter alia* to the following documents:
- (E1) DE-A-3 308 841
- (E2) GB-A-1 311 275.
- III. In its decision the opposition division reasoned that the patent fulfilled the requirements of Article 123(2) EPC since its subject-matter did not extend beyond the content of the application as filed. However, according to the opposition division, the subject-matter of Claim 1 was not new over the disclosure in document E1 and it did not involve an inventive step in the light of the combined teachings of documents E2 and E1.
- IV. On 21 May 2001 the patent proprietor filed an appeal against this decision and paid the appeal fee. The statement setting out the grounds of appeal was received on 9 August 2001. In this letter the appellant requested that the decision of the opposition division

be set aside and that the patent be maintained as granted and also filed an auxiliary request for oral proceedings.

- V. With the letter received on 15 December 2001 the respondent requested that the appeal be dismissed. Furthermore the respondent filed an auxiliary request for oral proceedings.
- VI. In a Communication pursuant to Article 11(1) of the Rules of Procedure of the Boards of Appeal sent on 23 July 2004 the board summoned the parties to oral proceedings to take place on 5 October 2004.
- VII. With a letter received on 3 September 2004 the appellant filed a first and a second auxiliary request.
- VIII. In a letter received on 2 September 2004 the respondent repeated its previous objections and raised a new objection under Article 123(2) EPC since, in its opinion, the passage in the characterising portion of Claim 1 that the adjacent elements are spaced apart "*by a distance equal to the sum of non-zero integer multiple of the pitch of the light pattern and a non-zero fraction of said pitch*" was not disclosed in the application as originally filed.
- IX. With a letter filed on 30 September 2004 the appellant filed new second to fifth auxiliary requests.
- X. Oral proceedings were held on 5 October 2004 at the auxiliary requests of both parties. At the oral proceedings the appellant requested that the decision under appeal be set aside and that the patent be

maintained as granted (*main request*) or on the basis of the first auxiliary request filed with the letter of 3 September 2004 or of the second to fifth auxiliary requests filed with the letter of 30 September 2004.

The respondent requested that the appeal be dismissed.

XI. Claim 1 according to the patent as granted (*main request*) reads as follows:

"Opto-electronic scale reading apparatus comprising a scale defined by a series of spaced apart lines, and a readhead, moveable relative to the scale in the direction of spacing of the lines, for generating an output signal from which the magnitude and direction of relative movement of the scale and the readhead may be determined, the readhead comprising:
means (10,12) for illuminating the scale and generating, in an image plane, a periodic light pattern which varies cyclically in intensity in the direction of spacing of the scale lines, said light pattern having a pitch equal to or smaller than the pitch of said scale lines; a corresponding cyclic variation in light intensity at a given point on said plane resulting from relative movement of said scale and said readhead;
an analyser (16), positioned in said plane, comprising an array of elongate elements (24) having a photo-sensitive surface exposed to said periodic light pattern, said elements being spaced apart in the direction of spacing of the scale lines and in a direction transverse to their length, said elements being grouped in a plurality of sets (A,B,C) with elements (24A, 24B, 24C) of a given set being connected in common, all said elements being interleaved with

elements of a different set in a repeating pattern and wherein, the centres of area of the exposed photosensitive surfaces of all elements in a given set are spaced apart by a distance equal to non-zero integer multiple of the pitch (P) of the light pattern;

characterised in that:

the centres of area of the exposed photosensitive surfaces of adjacent elements are spaced apart by a distance equal to the sum of non-zero integer multiple of the pitch of the light pattern and a non-zero fraction of said pitch corresponding to a predetermined phase angle between said adjacent elements with respect to the periodic light pattern".

The contents of the auxiliary requests are not relevant for the purpose of this Decision.

- XII. The arguments of the appellant insofar as these are relevant for the present Decision may be summarised as follows:

The opponent has objected that the absence of the feature "said photo-sensitive array and said light-emitting regions are provided on the same substrate" in Claim 1 in the patent as granted is objectionable under Article 123(2) EPC since it had been defined in the independent Claim 1 of the application as filed and therefore represented an essential feature. However, as is readily visible from the description, the original application disclosed three independent aspects of the invention, the first aspect being summarised in column 1, line 43 to column 2, line 12 of the published application; a second aspect in column 2, line 39 to column 3, line 11; and a third aspect in column 3,

line 31 to column 4, line 2. The objected feature appears only in the second statement of invention and is not included in the first or in the third aspect. During the examination stage leading to the present patent the applicant choose to pursue the first aspect of the invention which is now defined in Claim 1 as granted. Since the requirements of Article 123(2) EPC relate to the application as a whole and not only to the claims as originally filed this is permissible, which is also established case law of the boards of appeal, see, for instance, decision T 441/92, in particular paragraphs 4.7 and 4.8 of the Reasons, where in the context of filing a divisional application the board noted that *"...after a European patent application has been filed, the content of that application cannot thereafter be extended, but that, nevertheless, while the application is pending, the protection sought by the claims may be extended beyond that sought in the claims as originally filed"*.

With respect to the issue of novelty the case law repeatedly emphasises that for a finding of lack of novelty, a prior art document must contain a "clear and unmistakable disclosure" of the invention, see for example T 465/92. This implies that the alleged anticipation must be clearly and directly derivable from the document. However, the disclosure in document E1 describing two embodiments is extremely unclear, and the opposition division had to make several assumptions in its assessment that E1 anticipated the present invention. In the embodiment in Figure 1 the apparatus has four receiver arrangements 1, each comprising a single receiver element labelled I, II, III and IV. According to page 8, lines 22 and 23 these elements are

strip-shaped and they are not interleaved as defined in Claim 1. Rather, as is readily visible in Figure 1, the arrangement is not interleaved or repeating but in a random sequence. On the same page, starting on line 25, document E1 discloses a further embodiment in which, instead of individual receiver elements I - IV, groups of such elements are used. The likely arrangement of this embodiment is shown in a diagram enclosed with the grounds of appeal of 9 August 2001. On page 9, lines 9 and 10 of document E1 it is disclosed that each group comprises fifteen receiver elements. Between the elements of two groups or areas, for instance areas II and III, there is a phase shift of $\frac{1}{4}$ period of the scale image as shown in the diagram. Therefore it is clear that all elements within one group or area, for instance all areas designated I, have the same phase relationship and the elements of different areas are not interleaved in the claimed manner. The reference to the term "verschachtelt" on page 6, line 27 is with respect to the device shown in Figure 2 of E1 and is not an interleaving of the elements with elements of a different set in a repeating pattern as in Claim 1.

The closest prior art for the issue of inventive step is disclosed in document E2 which shows a measuring device having interleaved groups or sets of elements. In the embodiments shown in Figures 1 to 9 the adjacent elements are separated by $\frac{1}{2}$ of the pitch of the light pattern while in the device shown in Figure 10 the elements are separated by a $\frac{1}{4}$ of the pitch. The subject-matter of Claim 1 differs from the disclosure in document E2 in that the adjacent elements from different sets are spaced apart by a distance equal to the sum of a non-zero multiple of the pitch plus a non-

zero fraction of the pitch (P). This is illustrated in Figure 2 of the patent, where the elements of set A are spaced from the elements of set B by the distance $1\frac{1}{4} P$. Whereas the interleaving of the electrodes solves the problem of avoiding output signal drop by selective contamination of the electrodes, the characterising feature defined in Claim 1 of the patent enables an easy manufacture of the detector, especially when the light pattern has a small pitch, which is the case for high resolution position measurement. There is clearly no suggestion of this in document E2 nor can document E1 be combined with E2 to produce this result. In particular the passages in document E1 on page 6, lines 18 to 24 and to page 8, last line, to page 9, line 4 which were referred to in the decision under appeal do not disclose a separation between one individual element of one group and an adjacent individual element of another group but only to separations between whole groups of elements. This teaching in document E1 can be summarised as increasing the distances between individual elements or between groups of elements in order to prevent crosstalk. However, in the patent the problem of crosstalk is alleviated by the use of guard diodes 26 and not by the positioning of the elements as defined in the characterising portion of Claim 1, which rather is directed to the problem of enhancing the measuring resolution of the device for light pattern with short pitches. Furthermore, a separation of the groups, for instance groups III and IV as shown in document E1, is completely incompatible with interleaving of their individual elements and interleaving of the elements as proposed in document E2 would be contrary to the teaching of document E1, since interleaving would lead

to increased crosstalk, not reduce it. Therefore a combination of the teachings of documents E2 and E1 is not obvious and would furthermore not result in the subject-matter of Claim 1.

XIII. The arguments of the respondent can be summarised as follows:

From the patent application as originally filed it is clear that the feature "*said photo-sensitive array and said light emitting regions are provided on the same substrate*" in the single independent Claim 1 is an essential feature, whence its deletion in the granted Claim 1 is objectionable under Article 123(2) EPC. In this respect the published application disclosed three independent aspects of the invention. The first aspect in column 1, line 26 to column 2, line 23 relates to an embodiment wherein the effects of contamination on the detector elements is minimised by the selection of the distances between the detector elements (*column 2, lines 10 to 12*). The second aspect relating to a coplanar arrangement of the index grating and the detector array is disclosed in column 2, line 24 to column 3, line 14 solves the problem of the mutual positioning of these parts. A third aspect concerns the possibility of obtaining appropriate signal amplitudes and phases by using movable shutters, see column 3, line 15 to column 4, line 10. Actually, the only independent claim of the application as filed was directed to the second aspect and for this aspect, the only one claimed, the later deleted feature is clearly essential. In this context it is noted that the original set of claims did not include a dependent claim defining the particular spacing between the

detector elements which was the subject of the granted claim. During the examination phase the applicant deleted from the independent claim the original feature defining the second aspect of the invention and introduced the feature concerning the spacings between the detector elements, which related to the first aspect of the invention. The deletion of this feature from the single independent claim which is essential for the originally singly claimed aspect of the invention is therefore inadmissible under Article 123(2) EPC.

Document E1 anticipates the subject-matter of Claim 1 since it does not only disclose the use of groups of interconnected elements but also the claimed arrangement. With respect to the features of Claim 1 it is undoubted that the apparatus according to E1 is an opto-electronic scale reading apparatus as defined in the preamble with means for illuminating the scale and an analyser. The only controversial features are those of the characterising portion and the feature of the preamble that the detector elements are interleaved. These, however, are also known from document E1. For instance, in the penultimate sentence on page 8 it is disclosed that the spacing between detector elements or groups of detector elements is $\frac{1}{4}$ of the pitch. In the next sentence the document continues that in order to avoid a crosstalk between different detector elements the spaces between elements can be increased with an integer multiple of pitches of the scale. This corresponds to the feature of the characterising portion of Claim 1 which is therefore known from document E1. Furthermore, with respect to the feature that the elements are interleaved, document E1

discloses for the case of single detector elements that adjacent phase-different detector elements are arranged at a distance of a fraction of the pitch, for instance $\frac{1}{4}$ pitch. This implies that these elements can be arranged in an interleaved manner. The interleaving of the detector elements is also disclosed in document E1 on page 6, line 27. Therefore the subject-matter of Claim 1 is not new.

The subject-matter of this claim is furthermore obvious. Document E2 discloses a scale reading apparatus comprising the features of the preamble of Claim 1. As shown in the Figures in this document, the apparatus comprises interleaved and repeating groups of detector elements. The only difference to the claimed device is the distance between adjacent phase-different detector elements which in the device of document E2 is a fraction of the pitch, whereas according to Claim 1 the distance should be a fraction of the pitch plus an integer multiple of the pitch. However, as set out before, the increasing of the spacings between different detector elements with an integer multiple of the pitch is a measure known from document E1 for solving the problem of avoiding crosstalk. Therefore, for minimising the problem of crosstalk between the detector elements the skilled person would use the teaching of document E1 and modify the known apparatus of document E2 to increase the distance between the detector elements and thereby arrive at the subject-matter of Claim 1 without an inventive step being involved.

Reasons for the Decision

1. The appeal is admissible.
2. *Article 123(2) EPC*
 - 2.1 As explained in point 6.1 *infra*, in this Decision only the original objection pertaining to Article 123(2) EPC will be addressed. The opponent/respondent had raised this objection because of the deletion from Claim 1 as originally filed of the feature "*said photo-sensitive array and said light emitting regions are provided on the same substrate*".
 - 2.2 There is agreement between the parties that the description of the application as originally filed discloses different embodiments respectively shown in Figures 1 and 2a-2c (*first embodiment*); Figures 3 and 4 (*second embodiment*); Figure 5 (*third embodiment*); and a fourth embodiment shown in Figures 6 and 7. The above recited feature in original Claim 1 was a feature in embodiment 2, illustrated in Figure 3. The board has not found any indication that this feature would be essential in any of the other embodiments, for instance in the embodiment shown in Figure 1 it is clearly not included.
 - 2.3 The provision in Article 123(2) EPC reads "*a European patent application or a European patent may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed*". The "*content of the application as filed*" includes the claims, the description and the drawings.

2.4 In the present case the description of the application as originally filed included several embodiments and the set of claims defined the subject-matter of one of these embodiments. During the examination procedure the applicant choose to pursue a different embodiment and accordingly filed an independent claim directed to this embodiment. This procedure *as such* is not objectionable as long as the provisions of Article 123(2) EPC are respected, see Decision T 441/92 cited by the appellant.

2.5 Since Claim 1 in the granted patent seeks protection for disclosed embodiments which do not necessarily include the omitted feature this feature cannot be regarded as essential and its omission from the independent claim is therefore not objectionable under Article 123(2) EPC.

3. *Novelty*

3.1 Document E1, which in the opinion of the opposition division anticipates the subject-matter of Claim 1, discloses an opto-electronic scale reading apparatus comprising a scale (*Figures 3, 4 and 5; scales 4, 5 and 7*) defined by a series of spaced apart lines; and a readhead (*Figures 1, 2: photoelectric scanning unit 3*) of the type as defined in Claim 1 of the patent in suit. The arrangement disclosed in document E1 also comprises a means for illuminating the scale (*see Figure 5, light source 6*) and generating a light pattern having a pitch equal to the pitch of the scale lines (*see, e.g., page 8, lines 26 to 30*). The arrangement furthermore includes an analyser (3) comprising an array of elongate elements ("*streifenförmig*", *see page 8, line 22*) being arranged in a plurality of sets (I - IV)

the elements of a given set (e.g. set I) being connected in common (see page 8, lines 20 and 21).

3.2 As to the exact disclosure of document E1 the appellant has argued that its disclosure is extremely unclear, that the embodiments are not described in adequate detail, and that the opposition division had used hindsight in interpreting the disclosure. During the oral proceedings the respondent used the expression "unübersichtlich" (i.e. confusing). The board understands the disclosure as follows:

3.3 According to document E1 on page 8, starting on line 14, the apparatus may comprise different embodiments:

- a) In a first embodiment the receiver elements I-IV have a striplike shape and are separated by light-insensitive strips of the same width (lines 22-24);
- b) In a further embodiment the symbols I - IV represent groups of elements wherein each group "I" to "IV" comprises a number of striplike elements arranged at one pitch distance (lines 27-30).

The single receiver elements (embodiment a) or groups of elements (embodiment b) I - IV have a mutual displacement of a quarter pitch ($\frac{1}{4} P$) (lines 23 -36). This ensures that the signals $I_1 - I_4$ have a phase shift of 90° (page 8, lines 16 to 18). Furthermore, according to page 8, line 35 to page 9, line 4, these displacements may be increased by an integer number of pitches P , which does not influence the mutual phase shifts but is beneficial for avoiding crosstalk.

3.4 In the embodiment a) the unit 3 in Figure 1 of E1 comprises single striplike receiver elements labelled I, II, III and IV, wherein all elements of the same labelling within unit 3 are electrically connected and wherein the elements of different labelling are arranged with shifts of $\frac{1}{4} P$ or this distance plus an integer pitch P. In the embodiment b) each group of elements I to IV comprises a number of striplike elements arranged at one pitch distance within each set. Hence it appears that in neither of these embodiments the "sets of elements" I, II, III and IV are "interleaved with the elements of a different set in a repeating pattern" because in embodiment a) the arrangement of the single elements is random and not repeating (see *Figure 1 and 2*) and single elements cannot be "interleaved". In embodiment b) each set comprises a number of elements wherein two adjacent elements within one set are at a distance of one pitch; the board has not found any teaching, explicit or implicit, that these sets are arranged in an interleaved way. Rather it appears from the lay-out of these sets of elements I to IV shown in Figures 1 and 2 that the sets I to IV are arranged adjacently in a random pattern left-right and up-down. Therefore the board does not concur with the opposition division which argued in point 3.1 of the Reasons that "*when using striplike detecting elements instead of matrix elements it is evident to interleave them with elements of a different set in a repeating pattern in a similar way as is done with the matrix elements*" because firstly there is no teaching in document E1 that the "matrix" elements (set or group consisting of a plurality of elements) are interleaved at all; secondly

the expression "*it is evident*" appears to relate to inventive step, rather than to an assessment of novelty, which, according to established practice, must rely on a clear and unambiguous disclosure in the relevant prior art.

3.5 Hence in the opinion of the board the subject-matter of Claim 1 is novel over the disclosure document E1.

3.6 There is agreement between the parties that the subject-matter of Claim 1 differs from the teaching of document E2 by virtue of the features in its characterising portion. Concurring with these assessments the board finds that the subject-matter of Claim 1 is also novel over the disclosure in this document.

3.7 The further documents cited during the opposition procedure are less relevant.

3.8 Therefore it is concluded that the subject-matter of this claim is new (Articles 52(1) and 54 EPC).

4. *Inventive step*

4.1 Both parties consider document E2 to disclose the closest prior art. In the second embodiment of this document, see page 2, line 91 to page 3, line 19, the scale reading device comprises sets of interleaved photoreceivers, wherein the centres of area of the exposed photosensitive surfaces of adjacent elements are spaced apart by a distance of a non-zero-fraction of the pitch (P) of the light pattern corresponding to a predetermined phase angle. In the example shown in

Figure 9 this distance is $\frac{1}{2} P$ leading to a phase angle between two adjacent elements of 180° (see page 2, line 130); the arrangement shown in Figure 10 is a four-output arrangement having a distance between adjacent elements of $\frac{1}{4} P$; and according to page 3, lines 15 to 19, as many as ten phases may be obtained.

4.2 The subject-matter of Claim 1 differs from the apparatus known from document E2 in that the centres of area of the surfaces of adjacent elements are spaced apart by a distance equal to a non-zero fraction of the pitch corresponding to a predetermined phase angle (as in document E2) plus a distance equal to the sum of non-zero multiple of the pitch.

4.3 According to the appellant the technical problem solved by this feature is to simplify the manufacture of the detector when the apparatus is used for high precision position measurement in which case the light pattern has a small pitch.

In the opinion of the respondent the increased spacings between the detector elements solve the problem of reducing crosstalk. Since this problem and its solution are already known from document E1 the skilled person would implement this measure in the apparatus known from document E2 and arrive at the subject-matter of Claim 1 in an obvious way.

4.4 The board agrees with the respondent that increasing the spacings between the adjacent detector elements has a favourable influence on possible crosstalk, firstly because of the larger distance between elements, and secondly because this allows for the interposition of

insulating guard diodes as shown in Figure 2b (*diodes 26, see patent specification column 3, lines 38 and 39*); see also the embodiment of Figure 5 (*column 5, lines 33 and 34*).

- 4.5 The board does, however, not concur with the position of the respondent that the skilled person *would* arrive at the claimed solution by combining the teachings of document E1 and E2. Rather it appears that document E1 follows a different design philosophy than the one in document E2. Whereas in document E2 the use of interleaved detector elements is proposed in order to minimise the problems related to the presence of defects or foreign matter on the scale surface (*see E2, page 1, line 86 to page 2, line 7*), document E1 teaches that in order to avoid the problem of crosstalk the receiver elements should be arranged in groups, as is shown in Figures I and 2 (*groups I, II, III, IV, see the discussion on page 6, lines 1 to 24*).

Hence, in the opinion of the board the teachings of documents E1 and E2 are incompatible at least in respect of the lay-out of the detector elements. Therefore a combination of these teachings would not be considered by a skilled person, at least not without having the benefit of hindsight.

- 4.6 It follows that the subject-matter of Claim 1 involves an inventive step (Articles 52(1) and 56 EPC).
5. Therefore already for these reasons the decision under appeal has to be set aside.

6. *Further prosecution*

6.1 With the letter dated 1 September 2004 and received on 2 September 2004 the respondent has advanced a further argument under Article 100(c) EPC against an expression in the characterising portion of Claim 1 of the granted patent (*see point VIII supra*). This new argument is presented in support of a ground of opposition already raised in the notice of opposition, and it does not form "facts or evidence" which could be disregarded by the board under Article 114(2) EPC if not submitted in due time. This argument must therefore be admitted in the procedure. Should it, after consideration by the competent body, be found to be persuasive, it would be relevant to the outcome of the appeal case.

6.2 Therefore the board, after having heard at the oral proceedings the opinion of the parties on remittal to which both expressed their agreement, considers it appropriate to remit the case to the opposition division for addressing the new objection so as to avoid the loss of an instance by the parties (*Article 111(1) EPC*). It is noted that this remittal should not cause any undue delay of the proceedings, since the issue to be addressed is restricted to whether the objected expression in Claim 1 causes it to define subject-matter extending beyond the content of the application as filed, all further previous objections having been decided in the present appeal and therefore being *res iudicata*.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance for further prosecution.

The Registrar:

The Chairman:

P. Martorana

A. Klein