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) [X] To Chairmen

D E C I S I O N
of 25 July 1995

Case Number: T 0910/93 - 3.4.2

Application Number: 86308836.5

Publication Number: 0223558

IPC: G02B 27/22

Language of the proceedings: EN

Title of invention:
Imaging system

Applicant:
LEICESTER POLYTECHNIC

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty (yes)"
"Inventive step - (no) known equivalent"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0910/93 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 25 July 1995

Appellant: LEICESTER POLYTECHNIC
P.O. Box 143
Leicester
Leicestershire LE1 9BH (GB)

Representative: McNeight, David Leslie
McNeight & Lawrence
Regent House
Heaton Lane
Stockport
Cheshire SK4 1BS (GB)

Decision under appeal: **Decision of the Examining Division of the European Patent Office dated 28 June 1993 refusing European patent application No. 86 308 836.5 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: W. W. G. Hofmann
B. J. Schachenmann

Summary of Facts and Submissions

I. The Appellant (Applicant) lodged an appeal against the decision of the Examining Division on the refusal of the application No. 86 308 836.5.

The Examining Division had held that the subject-matter of Claim 1 lacked novelty, having regard to

(D6) EP-A-0 084 998.

The further documents

(D1) US-A-3 657 981
(D2) US-A-2 701 503
(D3) "Appl. Opt." Vol.17, No. 24, 15 December 1978, pages 3895 to 3902,

had been taken into account regarding inventive step of the subject-matter of the dependent claims.

During the appeal procedure, the Appellant cited

(D10) "Takanori Okoshi: Three-Dimensional Imaging Techniques", Academic Press, 1976, pages 124 to 140,

which citation was extended by the Board to include pages 141 to 153. The Board furthermore cited

(D9) US-A-4 552 442.

II. Oral proceedings were held, at the end of which the Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the set of Claims 1 to 4 filed at the oral proceedings.

III. The wording of Claim 1 according to the single request on file at the time of the present decision reads as follows:

"1. Apparatus for producing an orthoscopically viewable parallax panoramagrammic (read "panoramagramic") image in encoded form in a single stage, comprising a wide aperture lens (1; 4; 7) and a stereoscopic encoding screen (2) receiving light transmitted by the lens (1; 4; 7) and forming an image for direct viewing or for recording on a sensitive film or other medium applied behind the screen (2),
characterised by comprising an autocollimating transmission screen (3; 6; 8) placed in front of a wide aperture positive lens (1; 7) or behind a wide aperture negative lens (4), the wide aperture lens and autocollimating screen forming a pseudoscopic image at the stereoscopic encoding screen (2) which encodes the pseudoscopic image as discrete parallactic information on a single plane for viewing, using a lenticular or integral viewing screen, as an orthoscopic image."

Claims 2 to 4 are dependent on Claim 1.

IV. The Appellant essentially argued as follows:

The term "autocollimating transmission screen" is clear for a skilled reader of the application. Although the expression "autocollimating" strictly speaking only applies to the case of reflection, it can nevertheless be seen from the description of the application and from D10 that there are transmission screens which are equivalent to retroreflective screens regarding their symmetrical direction-selective properties, and that these are meant by the term "autocollimating transmission screen".

The subject-matter of Claim 1 is novel over D6 since D6 does not disclose an autocollimating transmission screen, and the objective (1) shown in D6 is not a wide aperture lens in the sense of the present application.

Starting from the teaching of D1 or D9, it was not obvious to replace the retroreflective mirror by an autocollimating transmission screen. Although D10 shows these optical elements to be equivalent regarding their theoretical direction selectivity, D10 does not suggest any practical use of the transmission screen, in particular not in optical systems as the one described in D1. Contrary to retroreflectors, autocollimating transmission screens were not easily available on the market. Going from a reflective system as the one according to D1 to a transmissive system reverses the trend usually observed in the history of the development of optical apparatuses, where usually transmissive systems were developed first and reflective systems only came later. In the present case, the use of transmission instead of reflection leads to a smaller arrangement.

Reasons for the Decision

1. The appeal is admissible.

2. The term "autocollimating transmission screen" contained in Claim 1 (as well as in the description) is not technically correct as such since autocollimation in the true sense of the word means that the light rays are collimated back into themselves and thus could refer only to reflection, and not to transmission. However, upon the Appellant's argumentation, the Board accepts that a skilled reader of the application, knowing, eg from D10, about the equivalence of autocollimating

reflectors (retroreflectors) and direction-selective double transmission screens deflecting all incident rays in a symmetrical way with respect to the plane of the screen, and seeing that in the description of the application (eg page 5, lines 23/24, and page 6, lines 12 to 14 and 16/17, of the original document) the "autocollimating transmission screen" and the retroreflective unit are mentioned quite in parallel to each other, would understand from the context that actually the transmissive equivalent of a retroreflector, ie an (afocal) transmission screen deflecting each beam of light symmetrically to the plane of the screen, was meant.

The Board, therefore, does not raise against Claim 1 an objection under Article 84 EPC.

3. *Novelty*

3.1 D6 (see in particular Figures 1, 2, 5, 6 and page 5, line 10 to page 6, line 14; page 17, line 28 to page 18, line 29) describes an apparatus for producing an orthoscopically viewable parallax panoramagramic image in encoded form in a single stage, comprising a positive lens and a stereoscopic encoding screen receiving light transmitted by the lens and forming an image for direct viewing or for recording on a sensitive film applied behind the screen. Contrary to the view expressed by the Appellant, the Board is of the opinion that the positive lens (1) shown in the said figures of D6 is a wide aperture lens in the sense of present Claim 1 since it is wide enough to transmit within its aperture beams corresponding to parallactically quite different views of the object. At (more precisely speaking: behind) the stereoscopic encoding screen (eg (9) in Figure 6 of D6) a pseudoscopic image is formed which encodes the pseudoscopic image as discrete parallactic information

on a single plane for viewing, using a lenticular or integral (ie cylindrically or spherically structured) viewing screen (eg (10) in Figure 6), as an orthoscopic image.

However, although the known image producing apparatus comprises altogether three cylindrical or spherical lenticular transmission screens (eg (3), (9) and (10)), none of the individual screens or possible pairs of screens are explicitly mentioned or implicitly recognizable as forming an autocollimating transmission screen in the above-mentioned sense (cf paragraph 2.). Moreover, none of these screens is arranged in front of the wide aperture positive lens.

3.2 D1 (see in particular Figure 1, columns 1 to 3, and Claim 1) discloses an apparatus for producing an orthoscopically viewable parallax panoramagramic image in encoded form in a single stage which, undisputedly, corresponds to the preamble portion of present Claim 1. This known apparatus further comprises an autocollimating screen (16) placed in front of a wide aperture positive lens (designated (18) in the text and (10) (erroneously) in Figure 1), the wide aperture lens and the autocollimating screen forming a pseudoscopic image at the stereoscopic encoding screen (21) which encodes the pseudoscopic image as discrete parallactic information on a single plane for viewing, using a lenticular viewing screen, as an orthoscopic image.

However, the autocollimating screen is not a transmission, but a reflection screen (retroreflector 16).

3.3 The relevant teaching of D9 (see in particular Figure 5 and column 7, line 29 to column 8, line 41) is similar to that of D1, so that everything that has been said

above with respect to D1 is equally true for D9. (It may be mentioned that D9, additionally, clearly expresses that the lenticular encoding screen in front of the photosensitive layer may have cylindrical lenticules or an array of spheroidal lenticules, giving rise to horizontal and vertical changes of perspective, cf eg column 3, lines 7 to 12. D9 also underlines the well known fact that a retroreflector has autocollimating properties, cf column 7, lines 48 to 51).

Thus, the subject-matter of Claim 1 differs from the apparatus according to D9 by the fact that the autocollimating screen is a transmission screen.

3.4 D10 deals with direction-selective retroreflective and transmissive screens for projecting three-dimensional images. However, it does not relate to single stage panoramagramic imaging apparatuses comprising a wide aperture lens.

The further documents cited in the decision of the Examining Division or in the European search report are less relevant.

3.5 The subject-matter of Claim 1 is therefore novel in the sense of Article 54 EPC.

4. *Inventive step*

4.1 As shown above, the apparatus according to Claim 1 fully corresponds to the apparatus described in D1 (cf in particular Figure 1), except for the fact that the retroreflector screen is replaced by the corresponding transmissive screen. (The same is true with respect to D9.)

The known apparatus comprises a semi-transparent mirror which is necessary to separate the light rays reflected back into themselves by the autocollimating, retroreflecting mirror, from the optical path of the incident light. It is well known and clearly expressed in D1 (eg column 1, lines 69 to 75) that such a beam separating, semi-transparent mirror causes a loss of light energy and thus to some extent impairs the quality of the parallax orthoscopic panoramagramic image and limits the practical application of the apparatus (cf the object of the present application, stated on page 4, lines 20 to 25 of the original description). It is moreover evident that - as the Appellant has pointed out - such a folded light path gives rise to a more bulky arrangement, as far as the transverse dimension is concerned.

Since these disadvantages are evidently a direct consequence of reflecting the path of light back into itself at the plane of the direction-selective screen, it is obvious for a person skilled in the art to consider whether the purpose of the retroreflective screen, ie the inversion from pseudoscopy to orthoscopy of the viewed image, could be fulfilled by means of a transmissive optical element as well, which solution would then render unnecessary the folding of the light path and the semi-transparent mirror. It should be pointed out that it is quite usual in optics to have, for principally the same optical apparatus, alternative constructions based on reflection and on transmission, so that, in the view of the Board, a person skilled in the art would always be aware of this possible choice.

4.2 A transmissive optical element fully equivalent to the retroreflective mirror mentioned in D1 is described in D10. This transmissive optical element is a double fly's-eye lens screen or, for the case of only

horizontal stereoscopic effect, a (cylindrically) double-lenticular screen (Figures 5.10 and 5.16, respectively). As the Appellant has pointed out himself, these types of screen are autocollimating transmission screens in the sense of present Claim 1. It is immediately apparent from the comparison of Figures 5.2 (b) and 5.10 of D10 and is also indicated on page 140, second paragraph, that the trace of the rays is, except for the switching to the other side of the screen, identical to that of the retroreflective mirror. Moreover, in the paragraph 5.4 relating to the inversion between orthoscopic and pseudoscopic images, in particular in the last lines of page 147 and the first lines of page 149, D10 equates double-lenticular screens with autocollimating (reflection) screens regarding their orthoscopic-pseudoscopic inverting properties.

It was therefore obvious for a skilled person to replace the retroreflective mirror of D1 by the ("autocollimating") transmission-type double-lenticular (or fly's eye lens) screen according to D10, in order to avoid the disadvantages connected with the reflective system.

4.3 It is true that D10 does not show the transmission-type double-lens screens in the context of a camera of the type described in D1 (and claimed in present Claim 1). However, the teaching relating to the equivalence of retroreflectors and double-lens transmission screens is of general relevance independent of a particular apparatus concerned. D10 is part of a basic handbook dealing with three-dimensional imaging techniques and the said transmission screens are mentioned in the context of producing three-dimensional pictures (ie they relate to the same field as the present application), so

that an expert designing a single stage panoramagramic camera can be expected to take this prior art into account.

The Appellant further argued that transmissive direction-selective screens were only theoretically known, and not available on the market at the priority date of the application. Leaving aside economic aspects (which could not contribute to the **technical** merits of the claimed subject-matter), this argument can only be meant to indicate either an (unfounded) technical prejudice of the prior art against the use of transmissive direction-selective screens, or real problems with sufficiently precise manufacture which might have deterred the skilled person from using such screens. The Board is not convinced by either one of these arguments. A general prejudice has not been shown since the non-availability of optical elements on the market may have a number of other (eg economic) reasons, and regarding real technical disadvantages, there is nothing in present Claim 1 which would help to overcome them. Simply tolerating known disadvantages does not involve an inventive step.

The Board also cannot concur with the Appellant's argument that the claimed apparatus could not be obvious since it reversed the usual course of historical development which had always gone from transmissive to reflective optical instruments. In the Board's view, long before the priority date of the present application, the experts in optics had learned to be simultaneously aware of both of these possibilities and to choose the one or the other depending on its suitability in a given case.

4.4 For these reasons, the Board comes to the conclusion that the subject-matter of Claim 1 lacks an inventive step in the sense of Article 56 EPC. Claim 1 is therefore not allowable (Article 52(1) EPC), and consequently the Appellant's request for grant of a patent has to be refused.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier E. Turrini