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D E C I S I O N
of 3 November 1994

Case Number: T 1017/92 - 3.4.1

Application Number: 86109705.3

Publication Number: 0209119

IPC: H04N 1/028

Language of the proceedings: EN

Title of invention:
Image read-out apparatus

Applicant:
FUJI PHOTO FILM., LTD.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (denied)"

Decisions cited:
-

Catchword:
-



Case Number: T 1017/92 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 3 November 1994

Appellant: FUJI PHOTO FILM CO., LTD.
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Decision under appeal: Decision of the Examining Division of the European Patent Office dated 30 June 1992 refusing European patent application No. 86 109 705.3 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: G. D. Paterson
Members: Y. J. F. van Henden
R. K. Shukla

Summary of Facts and Submissions

- I. European patent application No. 86 109 705.3 was refused by a decision of the Examining Division on the ground that the subject matter of independent Claim 1 as filed on 11 May 1992 did not involve an inventive step having regard to the prior art described with reference to Figure 21 of the application in suit, also exemplified by EP-A-137 674 (document D2), in combination with document D1: US-A-4 177 487.
- II. Independent Claim 1 forming the basis for the above decision reads as follows.

Claim 1

"An image read-out apparatus including a main scanning means for scanning a stimulable phosphor sheet (3) carrying a radiation image recorded thereon with a light beam in a main scanning direction, the light beam being stimulating rays for causing said stimulable phosphor sheet (3) to emit light in proportion to the stored radiation energy and obtaining light carrying the image information from the sheet, a sub-scanning means (9) for moving the sheet with respect to the light beam in a sub-scanning direction approximately normal to the main scanning direction, a light detection means for detecting the light emitted from the stimulable phosphor sheet, including a long photomultiplier (5, 15) having a light receiving face (52, 152) extending along the main scanning line, having substantially the same length as the width of the phosphor sheet along the main scanning direction and positioned close to said sheet (3), characterized in that said light detection means comprises:

a filter (10) for selectively transmitting light having a wavelength within the wavelength range of the light emitted by said stimuable phosphor sheet (3) and a light guide member (11, 16) for guiding the light, which is emitted by said stimuable phosphor sheet (3) and enters from a light input face of said light guide member (11, 16) positioned to face said stimuable phosphor sheet (3), to said light receiving face (52, 15) of said photomultiplier (5, 15), said filter and said light guide member (11, 16) being positioned on said light receiving face (52, 152)."

III. In the above mentioned decision, the Examining Division held essentially as follows:

The claimed invention concerns an image read-out apparatus for a stimuable phosphor sheet of the kind which is commonly known and which is acknowledged as forming part of the prior art, with reference to Figure 21 of the patent application in suit. An apparatus of this kind is also disclosed in document D2. Such an apparatus, however, does not have a light detection means as specified in Claim 1. The apparatus of Claim 1 solves the objective problem of making the read-out structure more compact, economical and efficient in light transmission.

The skilled person would look in the general field of scanners in order to find a solution to the above problem, since this problem is not limited to the field of stimuable phosphor sheets. The skilled person would thus be led to the scanner described in document D1. This scanner comprises a long photomultiplier having a light receiving face extending along a main scanning line, and an optical system which forms a light guide member. Furthermore, D1 also discloses in column 5 that this scanner is compact, cheap and light efficient. It

would therefore be obvious to the skilled person to provide the photomultiplier known from D1 in a conventional system according to document D2 for scanning a stimuable phosphor sheet in order to solve the problem. Moreover, the feature of Claim 1 concerning a filter for selectively transmitting light emitted by the phosphor sheet only constitutes an obvious routine feature commonly used in the art, as acknowledged on page 4 of the patent application.

IV. The Applicant lodged an appeal against the decision and requested that a patent be granted on the basis of the claims filed on 11 May 1992.

V. Oral proceedings were held on 3 November 1994.

During the hearing, the Board expressed the view that the skilled person would recognize that the light guide used in the read-out apparatus of a stimuable phosphor sheet according to the prior art disclosed in Figure 1 of D2 is cumbersome to use and would require a complicated fabrication process because of its complicated shape.

In order to overcome the complicated shape of this light guide, it would, according to the Board's opinion, appear obvious to the skilled person to use an elongate photomultiplier instead of the photomultiplier shown in D2, since with an elongate long photomultiplier the light guide would not have to be so cumbersome and would not have to be cylindrical at one end in order to be connectable to the photomultiplier.

The Appellant requested, as an auxiliary request, that Claim 1 be modified to include a feature stating that the light guide does not constitute a focusing means.

VI. The Appellant's arguments in support of the patentability of the claimed subject matter may be summarized as follows:

The prior art disclosed in D2 comprises a specifically designed light guide. Furthermore, there is no filter disclosed in this prior art. There is therefore no statement in this document which would suggest that a light guide and a filter could be disposed as stated in the characterizing part of Claim 1.

D1 discloses a photomultiplier having a plurality of segments for detecting picture elements. Such a photomultiplier would not be suitable for use with a stimuable phosphor sheet, which emits light of low intensity. Furthermore, a segmented photomultiplier as disclosed in D1 requires an optical system for forming an image of the picture elements of the read-out medium on the segments of the photomultiplier. In a read-out apparatus for a stimuable phosphor sheet, on the other hand, there is no need to form an image of the phosphor sheet on the light receiving face of the photomultiplier. The optical system of D1, which the Examining Division interpreted to constitute a light guide, would not be suitable for use in connection with a read-out apparatus for a stimuable phosphor sheet, since it would not collect a sufficient amount of the emitted light. Furthermore, in connection with a stimuable phosphor sheet, the light guide must be connected to the input face of the photomultiplier as also stated in the last lines of Claim 1. However, the optical system of D1, as shown in Figures 4 and 5, is necessarily positioned at a distance from the light receiving face of the photomultiplier, since the optical system is constructed to form an image on the row of photocathode segments.

Moreover, the light guide of D2 is essential for the photomultiplier described there, since in this case the light input face of the photodetector is remote from the scanning line. However, if the skilled person were to use an elongate photomultiplier in connection with the detection of light from a stimuable phosphor sheet, the reason for this would be to dispense with the light guide known from D2. He would therefore completely omit the light guide if he considered the use of a long photomultiplier. Consequently, it cannot be considered obvious to the skilled person to provide the specific combination of an elongate photomultiplier, a light guide and a filter claimed in Claim 1.

The amended wording of Claim 1 of the auxiliary request makes it clear that the light guide of the invention is not a focusing means as disclosed in D1.

VII. At the end of the proceedings the decision was announced that the appeal is dismissed.

Reasons for the Decision

1. Main request

1.1 In the wording of Claim 1 of the main request, D2 discloses (see in particular Figure 1 and page 2 line 10 to page 3, line 23) an image read-out apparatus including a main scanning means (2) for scanning a stimuable phosphor sheet (3) carrying a radiation image recorded thereon with a light beam (1a) in a main scanning direction (A), the light beam being stimulating rays for causing said stimuable phosphor sheet (3) to emit light in proportion to the stored radiation energy

and obtaining light carrying the image information from the sheet, a sub-scanning means (10) for moving the sheet with respect to the light beam in a sub-scanning direction (B) approximately normal to the main scanning direction, a light detection means for detecting the light emitted from the stimuable phosphor sheet, including a photomultiplier (5) having a light receiving face and a light guide member (4) for guiding the light, which is emitted by said stimuable phosphor sheet (3) and enters from a light input face (4a) of said light guide member (4) positioned to face said stimuable phosphor sheet (3), to said light receiving face of said photomultiplier (5), said light guide member (4) being connected to said light receiving face.

The subject matter of Claim 1 thus differs from what is disclosed in D2 in that :

- (a) the apparatus includes a filter positioned at said light receiving face for selectively transmitting light having a wavelength within the wavelength range of the light emitted by said stimuable phosphor sheet; and in that
- (b) the photomultiplier is a long photomultiplier extending along the main scanning line, having substantially the same length as the width of the phosphor sheet along the main scanning direction and positioned close to said sheet.

1.2 In order to prevent unwanted light from reaching the photomultiplier of a read-out apparatus for a stimuable phosphor sheet, it is a normal measure, as is also stated on page 4, line 21 of the application in suit, to use a filter positioned at the photomultiplier for selectively transmitting light having a wavelength within the wavelength range of the light emitted by said

stimulable phosphor sheet. It would thus be obvious to the skilled person to include such a filter in the device of D2. No contribution to an inventive step can therefore be seen in feature (a) above.

- 1.3 Starting from the closest prior art as disclosed in D2, the claimed subject matter, having regard to the feature (b), solves the problem of making the apparatus more compact and the construction of the light guide less complicated and more light efficient (as is also stated on pages 5-6 of the application in suit). This problem can therefore be seen to constitute the objective problem underlying the claimed invention.

In the Board's view, in any technology, it is a general design goal to reduce size and to make an apparatus more compact. Furthermore, it is evident that the rather complicated light guide of D2, which is gradually shaped into a cylindrical shape towards the photomultiplier (see page 3, lines 5-10 of D2) would be quite complicated to fabricate. Moreover, the structure of the light guide, changing from a flat to a cylindrical shape, includes some sharply bent portions from which internally reflected light may escape, since the angle of incidence of the internally reflected light may thereby fall below the critical angle; in other words the efficiency of the light guide may be low.

The skilled person would thus seek to avoid the complicated structure of the light guide of D2. Furthermore, it would be evident to the skilled person that the complicated structure of the light guide is required so as to adapt its light output face to the rather small light input face of the photomultiplier. The skilled person would thus immediately realize that if the light guide did not have to be shaped to fit the rather small input face of the photomultiplier disclosed

in D2, it would not have to provide such a complicated structure. The skilled person would thereby be led to look for photomultipliers of other shapes.

Photomultipliers having an elongated light receiving face, however, were known to the skilled person before the priority date of the patent application in suit. This fact is also evidenced by D1, where it is shown, for example, in Figure 4, that the photomultiplier has an elongated input face overlying a row of photocathodes.

In the Board's view, therefore, faced with the above problem and with knowledge of long photomultipliers, it would be obvious to the skilled person that, if a photomultiplier with a long input face is used, then there is no need for the cumbersome, complicated structure of the light guide of D2, since the light guide's section would then not have to become cylindrical at the other end. The skilled person would therefore be led to use an elongated photomultiplier, having substantially the width of the sheet to be scanned, to position this photomultiplier closer to the phosphor sheet and to attach it to a short flat light guide so that the part of the light guide of D2 having a gradually changing shape can be dispensed with. The skilled person would thus arrive at the subject matter of Claim 1 without the exercise of any inventive skill.

- 1.4 The Board agrees with the Appellant that a skilled person would not regard the focusing system of D2 to be suitable for use in a read-out apparatus for a stimuable phosphor sheet. In the Board's view, however, this would not deter the skilled person from using an elongate photomultiplier in such an application.

Furthermore, the Board cannot agree with the Appellant's submission that, if the skilled person were to use an elongate photomultiplier, he would not use a light guide at all. This is because the skilled person would realize that in the absence of a light guide it may be difficult to position the input face of the elongate photomultiplier close enough to the sheet, and furthermore, the geometrical construction of the photomultiplier may not be exactly optimized for collecting the emitted light from the phosphor sheet. The skilled person would therefore use a relatively compact light guide between the input face of the photomultiplier and the phosphor sheet. It would be evident to the skilled person that the use of such a light guide, having a simple construction, would not prevent solving the objective problem, since such a light guide would be relatively easy to fabricate, it would not take much space, and consequently it would make the apparatus compact, and, moreover, because of its construction the loss of internally reflected light would be precluded.

- 1.5 In the Board's judgement, therefore, the subject matter of Claim 1 of the main request does not involve an inventive step as required by Articles 52(1) and 56, EPC.

2. *Auxiliary request*

The additional feature of the auxiliary request only disclaims the use of a light guide of the focusing type, as known from D1. The reason set out above leading to a finding of lack of inventive step in respect of the main request is not dependent upon the nature of the light guide, and such a disclaimer cannot therefore make the

main request inventive. Claim 1 of the auxiliary request does not meet the requirement on inventive step for the same reasons as set out in connection with the main request.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Beer

G. D. Paterson