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**D E C I S I O N**  
of 29 November 1994

**Case Number:** T 0389/92 - 3.4.1

**Application Number:** 85102661.7

**Publication Number:** 0169966

**IPC:** G01T 1/29

**Language of the proceedings:** EN

**Title of invention:**

Radiation image read-out apparatus

**Patentee:**

FUJI PHOTO FILM CO., LTD.

**Opponent:**

Siemens AG

**Headword:**

Radiation image read-out apparatus/FUJI PHOTO FILM CO., LTD.

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step - denied; well known and obvious measure in the context of an essential aspect of the problem addressed by the claimed subject-matter"

**Decisions cited:**

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**Catchword:**

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Case Number: T 0389/92 - 3.4.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.1  
of 29 November 1994

**Appellant:** Siemens AG  
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**Representative:** Grosse, Burkhard (authorised employee)  
Siemens AG

**Respondent:** FUJI PHOTO FILM CO., LTD.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office dated 27 February 1992  
rejecting the opposition filed against European  
patent No. 0 169 966 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** G. D. Paterson  
**Members:** R. K. Shukla  
H. J. Reich

**Summary of Facts and Submissions**

I. European patent No. 0 169 966 relates to a radiation image read-out apparatus. It was opposed on the grounds that the subject-matter of the patent was not new, in so far as the designated states DE, FR and NL were concerned, having regard to

E3= EP-A-0 144 856,

and did not involve an inventive step as required under Article 52(1) EPC, having regard to the documents:

E1= DE-A-2 951 501 and

E2= Dr. F. Matossi: "Lehrbuch der Experimentalphysik", Vol. III, "Optik", Berlin 1966, pages 250-251.

The Opposition Division rejected the opposition pursuant to Article 102(2) EPC.

II. The only independent claim of the patent as granted forming the basis of the decision of the Opposition Division has the following wording:

"A radiation image read-out apparatus including a scanning optical system for scanning a stimuable phosphor sheet (3) carrying a radiation image stored therein by stimulating rays (1b), a light guide member (4) having a light input face (4a) positioned in the vicinity of a portion (3a) of said stimuable phosphor sheet (3) scanned by said stimulating rays (1b), said light guide member (4) guiding light, which is emitted by said stimuable phosphor sheet (3) in proportion to the radiation energy stored when said stimuable phosphor sheet (3) is scanned by said stimulating rays

(1b), from said light input face (4a), a photoelectric converter (5) for receiving the light guided by said light guide member (4) and photoelectrically converting it into an electric signal, means (15) for preventing transmission of said stimulating rays (1b) and transmitting the light emitted by said stimuable phosphor sheet (3) in proportion to the radiation energy stored, said means (15) being positioned between said portion (3a) of said stimuable phosphor sheet (3) scanned by said stimulating rays (1b) and said photoelectric converter (5), characterized by stimulating ray reflection preventing means (13; 15) preventing reflection of the stimulating rays back onto the phosphor sheet positioned between said portion (3a) of said stimuable phosphor sheet (3) scanned by said stimulating rays (1b) and said light guide member (4), said stimulating ray reflection preventing means (13; 15) allowing the light emitted by said stimuable phosphor sheet (3) to enter said light guide (4)."

III. The Opposition Division held that document E3 was not comprised in the state of the art pursuant to Article 54(3) EPC, and that the subject-matter of Claim 1 was not obvious to the skilled person having regard to documents E1 and E2, because, although antireflection coatings are known from document E2, it would not be obvious to apply such a coating on the surface of the light guide described in document E1 "for preventing reflection of the stimulating rays back onto the phosphor sheet", since this would lead to increased transmission of the stimulating radiation which would be contrary to the object of improving signal to noise ratio.

IV. The Opponent lodged an appeal against the above decision and requested that the patent be revoked in its entirety on the ground of lack of inventive step having regard to

documents E1 and E2. The patent Proprietor requested that the appeal be dismissed. Oral proceedings were held on 29 November 1994.

V. The Appellant (Opponent) has presented essentially the following arguments in support of the appeal.

Document E1 discloses a radiation image read-out apparatus having all the features of the preamble of Claim 1. In any optical device, it is a normal design feature to apply an antireflection coating on an optical surface transmitting radiation, since radiation which is partly reflected has disadvantageous effects.

Document E2 discloses that a typical antireflection coating is formed by applying a quarter wavelength thick layer of a material with a suitable refractive index onto the optical surface in question.

It would be in accordance with the normal practice in the art to apply an antireflection coating as disclosed in document E2 onto the input surface of the light guide of the device disclosed in E1. In particular, it would be obvious to apply an antireflection coating for increasing the transmission of the stimulated radiation emitted by the phosphor sheet, since it is the emitted radiation which is to be detected. An antireflection coating known from document E2 and having its thickness adapted to the emitted radiation would also function as an antireflection coating for the **stimulating** radiation, because the antireflection coatings known from E2 exhibit antireflection property over a relatively wide wavelength range including the wavelength of the stimulating radiation. The skilled person would thus, as a routine measure, apply an antireflection coating for the stimulating rays. Consequently, the subject-matter of Claim 1 of the patent in suit does not involve any inventive step.

VI. The patent Proprietor presented essentially the following arguments.

The inventor found that some of the incident stimulating radiation which is reflected from the phosphor sheet impinges on the input surface of the light guide and is reflected back onto unscanned portions of the phosphor sheet causing the unscanned portions to emit radiation. The emitted radiation is detected and processed as if it were image information from the scanned portion, which results in an incorrect reproduction of the stored image. In the prior art, it was not recognised that the reflection of the stimulating radiation impairs the quality of the reproduced image, so that an inventive step was involved in the identification of the cause of the poor quality of the image.

Furthermore, document E1, discusses various solutions for improving signal to noise ratio during the read-out of the stored image (see pages 6 and 7) which are different from the one proposed by the claimed invention. E1 therefore points away from the present invention.

Moreover, in the radiation image read-out apparatus according to document E1 means are provided to prevent stimulating radiation from reaching the detector. However, an antireflection coating on a glass surface as known from document E2 has the purpose of increasing the transmission of the incident radiation. Therefore, it would be contrary to the teaching of document E1 to provide an antireflection coating onto an input surface of a light guide for preventing reflection, and thereby for increasing transmission, of the **stimulating** radiation. The features of the characterizing portion of

Claim 1 therefore go against the normal measures in the art, and cannot therefore be considered to be obvious to a skilled person.

VII. At the conclusion of the oral proceedings a decision was announced that the decision of the Opposition Division is set aside and that the patent is revoked.

### **Reasons for the Decision**

1. The only question to be considered in the appeal is that of inventive step.

1.1 Document E1, which constitutes the closest prior art, discloses a radiation image read-out apparatus having all the features of the precharacterising portion of Claim 1 of the patent in suit (see document E1, Figure 2 and the corresponding part of the description on pages 17 and 18) including "means for preventing transmission of said stimulating rays and transmitting the light emitted by said stimuable phosphor sheet" (see document E1, page 18, third paragraph, describing a filter which is transparent only to the light emitted by the stimuable phosphor sheet).

The radiation image read-out apparatus according to Claim 1 of the patent in suit is thus distinguished over the apparatus according to document E1 by a stimulating ray reflection preventing means located between a stimuable phosphor sheet and a light guide, which means

(i) prevent reflection of the stimulating rays back onto the stimuable phosphor sheet, and

(ii) allow the light emitted by the stimuable phosphor sheet to enter the light guide, as set out in the characterising part of the claim.

The technical problem addressed by the present invention, namely, poor quality of the image caused by the reflection of the stimulating rays back onto unscanned portions of stimuable phosphor sheet, is described in the patent in suit (see column 3, lines 29 to 64 and Figure 2), and the Board agrees with the Patent Proprietor that one of the properties of the reflection preventing means as specified in item (i) above provides a solution to this problem.

With regard to the property or function of the reflection preventing means as in item (ii) above, it follows from the description of the invention in column 5, lines 4 to 7; column 6, lines 22 to 27, 46 to 60, and column 7, lines 1 to 4, that the reflection preventing means prevents reflection of the radiation **emitted** by the phosphor sheet. Since there is hardly any absorption of the emitted radiation by the reflection preventing means, it follows that the reflection preventing means enhances transmission of the emitted radiation which is to be detected by a photoelectric converter. This increase in the input intensity of the emitted radiation improves signal to noise (S/N) ratio of the radiation image read-out apparatus.

In view of the above, the present invention is concerned not only with the problem of low image quality but additionally improves signal to noise ratio during the read-out of the stored image in an apparatus such as known from document E1.

1.2 Document E2 is a standard text book on optics and describes antireflection coatings of materials such as cryolite and magnesium fluoride which are normally used to reduce unwanted reflections of visible radiation at glass surfaces. As is evident from Figure 260 and the description on page 251, lines 2 to 4 and 15 to 18, an antireflection coating on a glass surface for a specific wavelength in the visible range of the spectrum is, in practice, effective as an antireflection coating for the entire visible range of the spectrum between 0.4 and 0.7 micron. Thus, for instance, in Figure 260 an antireflection coating of cryolite having a thickness of 0.55/4 micron (see curve (c)) considerably reduces the reflectivity of a glass surface over a wavelength range 0.45 to 0.65 micron in comparison with the reflectivity of an uncoated glass (see curve (a)), and thereby enhances the transmissivity of the coated glass surface over the same wavelength range.

1.3 In the discussion of the prior art in document E1, the problem of low signal to noise ratio and various solutions to improving this ratio are discussed (see pages 6 and 7). Since the amount of light emitted by the stimuable phosphor is proportional to the amount of radiation energy stored and is inevitably small (see page 6, second paragraph), the document suggests, inter alia, that as much light emitted from the phosphor as possible should fall onto the photodetector. Hence, when further developing the apparatus according to document E1, a skilled person would clearly consider improving its signal to noise ratio.

1.4 The teaching of document E2 as discussed in paragraph 1.2 above forms part of the common general knowledge in the field of optics, so that a skilled person would in accordance with a routine practice in the art, consider applying an antireflection coating on

the input face of the light guide to maximise the transmission of the emitted light. Depending upon the wavelength of the emitted light (which according to document E1 lies between 300 nm and 500 nm - see page 25, second paragraph), the skilled person would provide the antireflection coating of an appropriate thickness. Such an antireflection coating would inevitably have antireflection properties for a rather wide wavelength range. As shown in curve (b) of Figure 260 of document E2, a 0.45/4 micron thick cryolite coating reduces the reflectivity from 8 % to below 2 % over the wavelength region of 400 to 700 nm. It is to be noted that in the patent in suit, the stimulating radiation and the emitted radiation may have the wavelength of 633 nm and 390 nm, respectively (see column 7, lines 23 to 25). Thus, in the obvious use of the conventional antireflection coating according to the curve (b) in the apparatus of document E1 for increasing the transmittance in the 300 to 500 nm region, reflectivity is inevitably lowered at 633 nm, i.e. at the wavelength of the stimulating rays of the embodiment described in the patent in suit. Therefore, the obvious measure of applying an antireflection coating onto the input face of the light guide of E1 in order to increase the transmission of the emitted radiation, and thereby to increase signal to noise ratio, would automatically result in the provision of "means for preventing reflection of the **stimulating** rays back onto the phosphor sheet" as claimed in Claim 1. For these reasons, in the Board's view, the skilled person would arrive at the subject-matter of Claim 1 without the exercise of any inventive skills.

- 1.5 The Board does not agree with the submission of the patent Proprietor that the skilled person would be deterred from using an antireflection coating as disclosed in document E2 on the input face of the light

guide, since the apparatus according to document E1 is provided with a filter which transmits only the emitted radiation (and thereby absorbs the stimulating radiation) to the photoelectric converter. The skilled person would therefore be aware that the increased transmission of the stimulating radiation through the light input face due to the provision of the antireflection coating would not deteriorate the quality of the reproduced image.

- 1.6 For the foregoing reasons, in the Board's judgement, the subject-matter of Claim 1 does not involve an inventive step within the meaning of Article 56 EPC.

### **Order**

#### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

M. Beer

G. D. Paterson