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File Number: T 231/91 - 3.4.1

Application No.: 84 302 896.0

Publication No.: 0 126 564

Title of invention: Method for reproducing a radiation image

Classification: G21K 4/00

D E C I S I O N
of 26 August 1992

Proprietor of the patent: Konica Corporation

Opponent: Siemens Aktiengesellschaft, Berlin und München

Headword:

EPC Article 56

Keyword: "Inventive step (yes)"



Case Number : T 231/91 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 26 August 1992

Appellant : Siemens Aktiengesellschaft, Berlin und München
(Opponent) Postfach 22 16 34
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Representative : Grosse, Burkhard (authorised employee)
Siemens Aktiengesellschaft

Respondent : Konica Corporation
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Representative : Hayes A.C.
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Decision under appeal : Decision of Opposition Division of the European
Patent Office dated 18 January 1991 rejecting the
opposition filed against European patent
No. 0 126 564 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : G.D. Paterson
Members : U.G. Himmler
Y. van Henden

Summary of Facts and Submissions

I. The Respondent is owner of European patent No. 0 126 564.

II. Claim 1 of this patent reads:

"A method of reproducing a radiation image stored on a radiation image storage panel having a stimuable phosphor layer, wherein the stimuable phosphor is contained in discrete cells partitioned by partitioning wall members, which comprises stimulating the phosphor with an excitation ray which is scanned over the surface of the panel and detecting the stimulated phosphor emission in synchronization with the scanning of the excitation ray".

The remaining Claims 2 to 16 are dependent on Claim 1.

III. The patent was opposed by the Appellant on the grounds mentioned in Article 100(a) EPC, referring inter alia to the prior art which can be derived from documents

D1: DE-A-2 363 995

D2: DE-C-764 195

D3: DE-C-570 003.

IV. The Respondent commented on the opposition in a letter dated 17 April 1990 and, to this purpose, introduced the additional documents

D8: US-A-4 350 893

D9: US-A-4 394 581

D10: US-A-4 368 390

D11: US-A-4 380 702

into the proceedings.

- V. The Opposition Division rejected the opposition.
- VI. The Appellant lodged an appeal against the decision of the Opposition Division.
- VII. The Board summoned the parties to attend oral proceedings, and indicated its preliminary view in a communication pursuant to Article 11(2) RPBA that the claimed invention lacked an inventive step.
- VIII. With a telefax dated 19 August 1992, the Respondent submitted three versions of a new Claim 1 forming the respective bases of auxiliary requests to be examined during the oral proceedings if the Board were not intending to maintain the patent as granted.
- IX. Oral proceedings were held on 26 August 1992.
- X. The Appellant requested the decision under appeal to be set aside and the European patent to be revoked. In support of his view, he substantially argued as follows:

Document (D1) discloses a method of reproducing a radiation image stored on a panel having a layer of stimuable phosphor, which method comprises scanning the panel surface with an infrared light ray and detecting the stimulated phosphor emission in synchronism with the scan. Documents (D2) and (D3) describe X-ray intensifying screens comprising an alveolar support structure with discrete cells separated by light reflective wall members, each of said cells containing a phosphor which emits light in response to X-ray irradiation. From these latter documents, the skilled person learns how to reduce light spreading within the bulk of a luminescent material.

The problem underlying the present invention is the same as in (D2) and (D3), namely how to reduce the spreading of visible light in a phosphor. In the case of the intensifying screens of (D2) and (D3), said visible light is the one emitted in response to the incident X-rays, whereas in the present case it is the excitation ray itself. Nevertheless, the same laws apply in both cases. Therefore, the skilled person would expect that with a cellular configuration, exciting light as well as emitted light would be prevented from spreading. In this respect, attention should be paid to Decision T 206/89, in which the view was taken that no inventive step is required to transpose to devices making use of a stimulable phosphor sheet the teachings known in the field of radiography.

Now, that various other solutions have been proposed before the priority date of the patent does not yet mean that the invention was not obvious. It is indeed clear that making storage panels with sufficiently small cells was not easy, so that only economical reasons have hitherto deterred those skilled in the art from envisaging the use of such panels. Finally, the argument that an intensifying screen would work in an analog manner and the claimed panel in a digital manner is not relevant either, since digitalisation appears only in the circuitry.

- XI. The Respondent requested that the appeal be dismissed and that the patent be maintained as granted or in accordance with one of the three auxiliary requests filed on 19 August 1992. His argumentation may be summarised as follows:

In use, an X-ray intensifying screen is simply placed either side of a photographic film and X-rays are passed through the screen onto the film or conversely. Thereby, only the light emitted by the phosphor is scattered.

However, the emission of light is weak and the fraction thereof coming from deep within the phosphor layer does not contribute to the emission detected outside the panel. Therefore, the spread is not great. Storage panels, however, are scanned with radiations having a wavelength around 500 to 800 μm , i.e. greater than the diameter of the spot, which is about 150 μm . The consequence thereof is that the excitation ray is immediately scattered at the surface of the storage panel, which means that the phosphor is also excited in surrounding areas. In contrast thereto, any scattering of the light emitted by the stimuable phosphor is irrelevant since all the light emitted at a particular instant is collected at that time. Thus, the direction of emission of that light does not affect the sharpness of the image.

It is clear, therefore, that the mechanisms by which the images are degraded in storage panels and intensifying screens are fundamentally different. Consequently, (D2) and (D3) would not be regarded as being relevant by one skilled in the art of storage panels. As a matter of fact, it is noteworthy that, among the documents cited, all those addressing the same problem as the invention disclose other solutions than the claimed one. One reason therefor may be that the use of discrete cells in intensifying screens provides several disadvantages, in particular a loss in resolution owing to the presence of the partition walls. Nevertheless, using the phosphor in discrete cells in storage panels unexpectedly improves the sharpness. This is because information is stored there in a digital format, i.e. as discrete elements which are read out individually by the excitation ray.

XII. At the end of the oral proceedings, the Chairman gave the decision that the appeal was dismissed and the patent maintained with the text as granted.

Reasons for the Decision

1. The only matter at issue was that of inventive step.
2. Document (D1) discloses a method of reproducing a radiation image stored on a panel having a layer of stimuable phosphor, which method comprises stimulating the phosphor with an excitation ray and scanning the panel surface and detecting the stimulated phosphor emission in synchronism with the scan - see: column 3, lines 47 to 58; column 4, lines 13 to 30 and 41 to 53.

The method according to Claim 1 of the patent in suit is thus distinguished over the prior art known from (D1) in that the stimuable phosphor is contained in discrete cells separated by wall members. None of the parties contested this conclusion.

3. Documents (D2) and (D3) pertain to intensifying screens for use in radiography, which screens comprise a phosphor emitting light in response to X-ray irradiation. In use, such screens are placed on either side of, and in close contact with, a photographic film exposed to X-ray irradiation. The light emitted by the phosphor corresponds to the incident X-ray flux and reinforces the action thereof on the radiation sensitive material of the film. The light emitted in response to the incident radiation being subject to scattering within the phosphor, a reduction of image sharpness is, however, to be expected. To alleviate this drawback, both documents (D2) and (D3) propose to dispose the phosphor in a cellular support structure.

It is true that, according to (D2), the cell walls would also reduce the consequences of X-rays scattering within the phosphor. Because of the high energy of the incident photons, it is nonetheless unlikely that they could be so deviated as to strike the photographic film at locations situated at an appreciable distance from the points which otherwise would be struck in the absence of intensifying the screen. It is indeed worth noting that the phosphor layer has to be thin, or else the emitted light photons would not escape the bulk of the phosphor. Therefore, the Board concurs with the Respondent that the cellular support structure disclosed in (D2) has as its sole function to limit the spread of the secondary emission. The Board also concurs with the Respondent that, because of the thinness of the phosphor layer and the proximity of the photographic film, the gain in sharpness provided by an intensifying screen with a honeycomb support structure remains anyway limited.

4. When scanning an image storage panel comprising a layer of stimuable phosphor, separate image elements on the panel are struck by the scanning light beam at different times. The respective light flux corresponding to these image elements are thus emitted by the stimuable phosphor at different times. The photoelectric transducer which, in response to the luminous flux from the storage panel, outputs an electrical image signal is, however, at a distance from said panel which is too small for the light travel between them to be of appreciable duration. Therefore, the respective luminous flux corresponding to separate image elements cannot be received simultaneously by the photoelectric transducer. This entails in turn that, as the Respondent pointed out, scattering of the light emitted by the stimuable phosphor does not play any part.

With regard thereto, the Board shares the Respondent's view that those skilled in the art of making image storage panels having a stimuable phosphor layer would not take into consideration such documents as (D2) or (D3), which deal with means for reducing the spread of light emitted by luminescent screens. The Appellant's argument that identical physical laws apply to such light and to incident light striking the stimuable phosphor represents indeed, in the Board's judgment, an abstract approach which is removed from a thinking oriented towards practicalities - cf. decision T 5/81 (OJ EPO 1982, pp. 249-255), point 11 of the reasons for the decision. Furthermore, in the Board's judgment, although X-ray irradiation is contemplated in (D1), the skilled person would not combine the teachings of (D1) and (D2) - whereby he would arrive at the claimed method - since the disclosure of (D2) as regards X-ray scattering is irrelevant. As a matter of fact, this clearly shows that the view taken in the passage of Decision T 206/89 to which the Appellant drew the Board's attention - to wit that the possibility of exposing a patient to a reduced X-ray dose represents an incentive to use a stimuable phosphor sheet in an apparatus carrying a subtraction process - does not apply systematically to all features of imaging systems.

5. The problem underlying the present invention is also addressed in documents (D8) to (D11) - see: column 1 of (D8), lines 41 to 49; column 2 of (D9), lines 20 to 26; column 2 of (D10), lines 20 to 27; column 2 of (D11), lines 17 to 27. Nevertheless, none of these documents approaches the solution claimed in the patent in suit. Document (D8) proposes to disperse in the stimuable phosphor a white powder selected from a group comprising, inter alia, TiO_2 , ZnS , Y_2O_3 and Ta_2O_5 ; document (D9) proposes to colour the storage panel with a colorant such

that the mean reflectance of said panel is lower for the stimulating ray than it is for the light emitted by the stimuable phosphor; documents (D10) and (D11) propose to provide a light reflecting metallic layer or a layer of light reflective white pigment, respectively, on the side of a storage panel opposite the one which receives the stimulation rays - see the first claim of each.

~~Documents (D8, D10, D11), however, were published shortly~~ before the priority date of the patent in suit, whereas document (D9) was published shortly after said priority date. Furthermore, all of them claim a priority from 1979. It is thus established that skilled people working in the field of storage panels with layers of stimuable phosphor were, in the years immediately preceding the priority date of the patent in suit, far away from the idea forming the basis of the present invention. The latter, however, presents the decisive advantage of making a digital processing of the image signals easier, and this without involving such a dramatic rise in cost as the Appellant submits. It is indeed known that, in particular with the development of integrated circuits, considerable progress has been made in the production of all kinds of microstructures.

6. Therefore, in the Board's judgment, Claim 1 of the patent in suit involves an inventive step.
7. Claim 1 of the patent in suit is allowable - Article 52(1) EPC in relation to Article 56 EPC. The same conclusion applies to Claims 2 to 16 of the patent in suit, since they all are appended to Claim 1.
8. Under these circumstances, there is no need to examine the Respondent's auxiliary requests.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Beer

G.D. Paterson