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D E C I S I O N
of 19 August 1993

Case Number: T 0031/98 - 3.5.1

Application Number: 92305123.9

Publication Number: 0517517

IPC: H04N 9/31

Language of the proceedings: EN

Title of invention:

Single light valve full-colour projector display

Applicant:

Hughes-JVC Technology Corporation

Opponent:

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Headword:

-

Relevant legal provisions:

EPC Art. 56, 123(2)

Keyword:

"Inventive step (yes, second auxiliary request)"

"Added subject-matter (first auxiliary request)"

Decisions cited:

-

Catchword:

-



Case Number: T 0031/98 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 19 August 1998

Appellant:

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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 1 September 1997
refusing European patent application
No. 92 305 123.9 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: P. K. J. van den Berg
Members: A. S. Clelland
C. Holtz

Summary of Facts and Submissions

I. This appeal is against the decision of the examining division to refuse the application on the formal ground that it did not meet the requirements of the EPC. The applicant, the present appellant, had requested a decision according to the state of the file. The decision refers to a communication dated 22 August 1996 in which an objection of lack of inventive step was raised on the basis of the following documents:

D1: US-A-4 611 245

D2: EP-A-26 129.

II. The appellant has maintained the claims considered by the examining decision with minor amendments. Following a communication from the Board the appellant made proposals for claims of first and second auxiliary requests and at the oral proceedings, held on 19 August 1998, filed claims corresponding to these proposals.

III. The appellant has requested that the decision under appeal be set aside and in accordance with his **main request** that a patent be granted on the basis of the following documents:

Claims: 1 to 10 filed on 2 May 1996, with the amendments to claim 1 requested in the statement of grounds filed on 29 December 1997

Description: pages 1 and 6 to 10 as originally filed;
pages 2, 3, 5 and 5a filed on 2 May 1996;
and
pages 4 and 11 filed at the oral
proceedings on 19 August 1998

Drawings: as originally filed.

In accordance with the **first auxiliary request** the above claims are replaced by claims 1 to 6 filed at the oral proceedings on 19 August 1998.

In accordance with the **second auxiliary request** the above claims are replaced by claims 1 to 5 filed at the oral proceedings on 19 August 1998.

IV. Claim 1 of the main request reads as follows:

"A colour projection apparatus (10) for displaying an image on a screen (12) in accordance with first and second colour video signals derived from a single full-colour input signal (14), said projection apparatus (10) having a laser (22) for providing a beam of coherent light, a liquid crystal light valve (26) in optical alignment with said coherent beam for modulating light illuminating an output layer (44) thereof in response to the incidence of said coherent beam on an input layer (40) thereof, an optical arrangement for illuminating said output layer (44) with a broadband light source,
scanning electronics (20) for controlling the intensity of said coherent beam in response to said first and second colour video signals;

a raster scanner (24) for deflecting the coherent beam to a first set of areas on said input layer (40) in response to said first colour video signal and for deflecting said coherent beam to a second set of areas on said input layer (40) in response to said second colour video signal;

a polarizing beam splitter arrangement (46) and (50) positioned in an optical path between said illuminating light source and said output layer (44) for polarising and directing said illuminating light onto said output layer (44) and for relaying modulated light reflected by said output layer (44) to an image plane; and

a colour-stripe filter (18) arranged in the optical path between said output layer (44) and said display screen and having first and second sets of filter elements in optical alignment with said first and second sets of areas on said input layer (40), respectively, for transmitting radiant energy from said output layer (40) in first and second wavelength bands, respectively, to said display screen (12)."

V. Claim 1 of the first auxiliary requests adds to claim 1 of the main request the following features:

"wherein each of said first and second areas are rectangular and said first and second sets of areas are interleaved, and wherein each of said first and second filter elements are rectangular and said first and second sets of filter elements are interleaved, the first and second sets of areas being parallel to the first and second sets of filter elements, said raster scanner being arranged to scan the coherent beam across the first and second sets of areas in a direction orthogonal to said parallel direction"

VI. Claim 1 of the second auxiliary requests adds to claim 1 of the main request the following features:

"wherein each of said first and second areas are rectangular and said first and second sets of areas are interleaved, and wherein each of said first and second filter elements are rectangular and said first and second sets of filter elements are interleaved, the first and second sets of areas being parallel to the first and second sets of filter elements, said raster scanner being arranged to scan the coherent beam across the first and second sets of areas in a direction orthogonal to said parallel direction; the filter elements being vertically oriented."

Reasons for the Decision

1. *Amendments*

1.1 Claim 2 of the main request and claim 1 of each of the auxiliary requests refers to the first and second areas on the input layer as being "rectangular"; similar language occurs in claim 6 of the main request and claim 1 of each of the auxiliary requests as regards the filter elements.

1.2 In the Board's view, no objection arises to the use of the word "rectangular" in respect of the stripes which in fact extend for the height of the image; it can be seen from Figures 3 and 4 that in the preferred embodiment the stripes are shown schematically as being rectangular and the skilled person, interpreting the claims in the light of the description would have no difficulty in understanding this feature.

- 1.3 The claims of all three requests accordingly comply with Article 84 EPC.
- 1.4 Claim 1 of the first auxiliary request refers to the raster scanner being arranged to scan the coherent beam across the first and second sets of areas "in a direction orthogonal to said parallel direction". In the Board's view the expression in inverted commas constitutes - unless further qualified - an impermissible extension of the disclosed subject-matter. Scanning in a direction orthogonal to the stripes is not specifically disclosed in the originally filed application and embraces not merely the case that the stripes are orthogonal to the normal horizontal scanning direction but implies a case not envisaged in the originally filed application, namely the provision of horizontal stripes in conjunction with a non-standard vertical scanning. Such an arrangement is not disclosed in the originally filed application. The Board accordingly considers that claim 1 of the first auxiliary request adds subject-matter to the application, Article 123(2) EPC, and is for this reason not allowable. This objection does not apply to the second auxiliary request, which is limited to standard scanning.

2. *Background to the invention*

- 2.1 An image projection system making use of a liquid crystal light valve is acknowledged in the application as being known.

In such a system a polarised projection beam from a high-intensity light source is reflected off a liquid crystal and by means of projection optics displayed on a screen. A low intensity scanned image is projected onto a photoresponsive layer associated with the liquid

crystal and causes polarisation-sensitive variations in the reflectivity of the liquid crystal, so that the high-intensity light source is modulated in accordance with the scanned image. The application includes in its description of the background art a number of published patents making use of such a liquid crystal light valve.

2.2 It was common ground at the oral proceedings that the single most relevant document is D1 and that this document discloses, in effect, a monochrome version of the colour projection apparatus of the application. Using the terminology of claim 1 of the main request, D1 discloses in connection with Figure 1 a monochrome projection apparatus for displaying an image on a screen 11, the projection apparatus having a laser 12 for providing a beam of coherent light, a liquid crystal light valve 20 in optical alignment with the coherent beam for modulating light illuminating an output layer of the light valve in response to the incidence of the coherent beam on an input layer, an optical arrangement 30, 31 for illuminating the output layer with a broad band light source, scanning electronics 25 for controlling the intensity of the coherent beam in response to an input video signal, a raster scanner 17, 18 for deflecting the coherent beam to an input layer of the light valve in response to the input signal, and a polarising beam splitter arrangement 31 positioned in the optical path between the light source 30 and the output layer of the light valve for polarising and directing the illuminating light onto the output layer and for relaying modulated light reflected by the output layer to an image plane 11.

2.3 It is clear from the art - and indeed stated in D1 at column 1 line 68 to column 2 line 4 - that a colour projection apparatus employing a plurality of laser sources in order to produce a colour display is known per se. The Board also notes that various of the documents cited in the introduction to the application acknowledge as known the use of dichroic prisms in conjunction with three television image tubes, each for a primary colour, in order to produce a full-colour display. The problem set out in the application is the provision of a colour display making use of only a single light valve and, implicitly, requiring only a single input image.

2.4 Such a device is known from D2, which discloses at Figure 1 what is in effect a line-sequential scanning system in which a high-intensity light source illuminates a liquid crystal display. Each scanning line of the liquid crystal display has an associated triplet of RGB colour stripes. From page 1 lines 26 to 28 of D2 it appears that the image is scanned with thrice the normal number of lines, there being a line corresponding to each colour stripe.

3. *Inventive step (main request)*

3.1 At the oral proceedings the discussion centred on the question of whether the skilled person, starting out from D1 and faced with the applicant's problem, would find the solution in D2 and would modify the D1 arrangement to provide the claimed features. It was common ground that if the skilled person were to derive from D2 the scanning of specific areas in accordance with colour information and the provision of a colour stripe filter in which the stripes are optically

aligned with corresponding colour areas, then the resulting arrangement would fall within the scope of claim 1. It was argued by the appellant that the skilled person, faced with the problem of providing colour in monochrome projection apparatus, would derive the complete solution from D2 and would have no reason to seek to modify the D1 arrangement. Deriving from D1 merely the use of specific scanning areas and a colour stripe filter could only be done on the basis of an ex-post-facto analysis and ignored the fact that the mind-set of the skilled person, starting out from D1, was that three separate colour sources were needed in order to arrive at a colour image; this could clearly be seen from the prior art acknowledged in D1 itself.

3.2 The Board does not find this argument convincing. D2 shows what is in effect a line-sequential scanning system; such systems have been known since the earliest days of colour television and can be expected to be part of the common general knowledge of the person skilled in the art. D2 thus merely teaches the skilled person that it is feasible to apply such a scanning method to a projection system. The skilled person, deriving from D2 this knowledge, can be expected to try to solve his problem by implementing it in the D1 arrangement. When this is done in the context of the D1 apparatus all the remaining features of claim 1 follow since the claim does not exclude line-sequential scanning.

3.3 The subject-matter of claim 1 of the main request accordingly lacks an inventive step, Articles 52(1) and 56 EPC.

4. *Inventive step (second auxiliary request)*

4.1 Claim 1 of the second auxiliary request adds to claim 1 of the main request the use of first and second interleaved areas with corresponding first and second interleaved filter elements. This subject-matter necessarily follows if the colour stripe filter of D2 is used in the D1 arrangement. The claim includes the further feature that the raster scanner is arranged to scan the beam across the first and second sets of areas "in a direction orthogonal to said parallel direction, the filter elements being vertically oriented".

4.2 Claim 1 of the second auxiliary request thus relates to a standard scanning arrangement in which the elements are orthogonal to the scanning direction. The skilled person, incorporating the filter arrangement of D2 in D1, could be expected to arrange the element parallel to the scanning direction and to scan at thrice the normal rate. The additional feature of arranging the elements orthogonally to the scanning direction in the context of standard scanning involves an extra step not derivable either from D1 or from D1 when taken in combination with the filter elements of D2.

4.3 The Board accordingly concludes that the subject-matter of claim 1 of the second auxiliary request involves an inventive step.

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 with the order to grant a patent on the basis of the appellant's second auxiliary request.

The Registrar:



M. Kiehl

The Chairman:



P. K. J. van den Berg

