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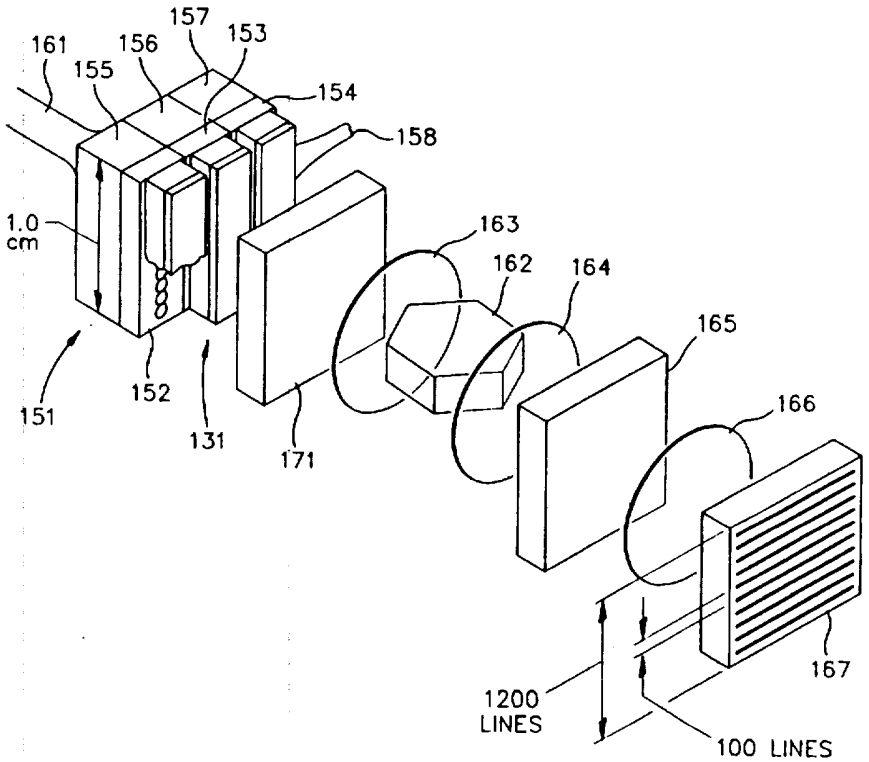
(88) Date of publication of the international search report:
29 June 1995 (29.06.95)

(54) Title: HIGH RESOLUTION IMAGE PROJECTION SYSTEM AND METHOD EMPLOYING LASERS

(57) Abstract

An image projection system employing microlaser and/or diode laser arrays (11). Each laser in each array is individually addressable. The system includes three linear laser arrays, one red (12), one green (13), and one blue (14), each individually addressable laser being powered and modulated in accordance with the input image signal (21). When microlaser arrays, which are energized by laser diode pumps, are used, the laser diode pumps are formed in equivalent arrays (15, 16, 17). The laser output beams are combined in a dichroic prism (31) and reflected off a rotating multifaceted scanning mirror (22) which effects two dimensional scanning as it rotates. The image beam reflected from the scanner passes through an imaging lens (24), a speckle eliminator (25) and then onto the projection screen (27). The invention also includes the method of generating and scanning the image beam, as well as the novel speckle eliminator and the microlaser array configured for optimally close spacing to achieve the desired result. In one embodiment, the laser diode pumps are directly modulated by the video signal, while in another embodiment the microlaser outputs are modulated utilizing a spatial light modulator array.



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# INTERNATIONAL SEARCH REPORT

Internat Application No
PCT/US 94/11181

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N9/31

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N G02B H01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X<br>Y | FR,A,2 577 371 (CENTER NATIONAL DE LA RECHERCHE SCIENTIFIQUE) 14 August 1986<br>see the whole document<br>--- | 1-3,15, 16,23, 26,27<br>4,9-13, 16,28, 30,32,33 |
| X<br>Y | GB,A,2 252 472 (SAMSUNG ELECTRONICS CO LTD) 5 August 1992<br>see page 3, line 5 - page 8, line 7<br>--- | 1-3,16, 23,26,27<br>4,9-13, 16,28, 30,32,33 |
| Y | WO,A,90 13158 (PHASED ARRAY LASERS PTY LTD) 1 November 1990<br>see the whole document<br>---<br>-/-- | 4,9-13, 16,28, 30,32,33 |

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 15 May 1995 | 24.05.95 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax (+31-70) 340-3016 | Pigniez, T |

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | US,A,4 930 849 (TANAKA) 5 June 1990<br>see abstract | 1,23,28,<br>30 |
| Y | US,A,4 035 068 (RAWSON) 12 July 1977 | 34 |
| A | see column 3, line 12 - column 4, line 23 | 35 |
| Y | PATENT ABSTRACTS OF JAPAN<br>vol. 14, no. 484 (P-1120) 22 October 1990<br>& JP,A,02 195 388 (MAZDA MOTOR CORP) | 34 |
| A | see abstract | 35 |
| A | US,A,4 155 630 (IH) 22 May 1979<br>see abstract | 34,35 |
| P,X | EP,A,0 589 179 (TEXAS INSTRUMENTS INC) 30 March 1994<br>see column 2, line 39 - column 3, line 9 | 34 |
| X | EP,A,0 523 861 (MITSUI PETROCHEMICAL INDUSTRIES) 20 January 1993<br>see page 2, line 8 - line 13<br>see page 10, line 53 - page 11, line 2<br>see page 15, line 13 - line 22 | 39,40 |
| A | WO,A,91 11820 (MASSACHUSETTS INSTITUTE OF TECHNOLOGY) 8 August 1991<br>see abstract<br>see page 8, line 14 - line 24 | 39,40 |
| A | WO,A,92 03862 (MASSACHUSETTS INSTITUTE OF TECHNOLOGY) 5 March 1992<br>see abstract | 39,40 |

# INTERNATIONAL SEARCH REPORT

Int tional application No.
PCT/US94/11181

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1. claims 1-33: high resolution image projection system and method
2. claims 34-38: speckle eliminator for a laser projector
3. claims 39,40: constructional details of a microlaser array

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat. Application No
PCT/US 94/11181

| Patent document cited in search report | Publication date | Patent family member(s) | | Publication date |
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| GB-A-2252472 | 05-08-92 | DE-A- | 4139842 | 06-08-92 |
| WO-A-9013158 | 01-11-90 | NONE | | |
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