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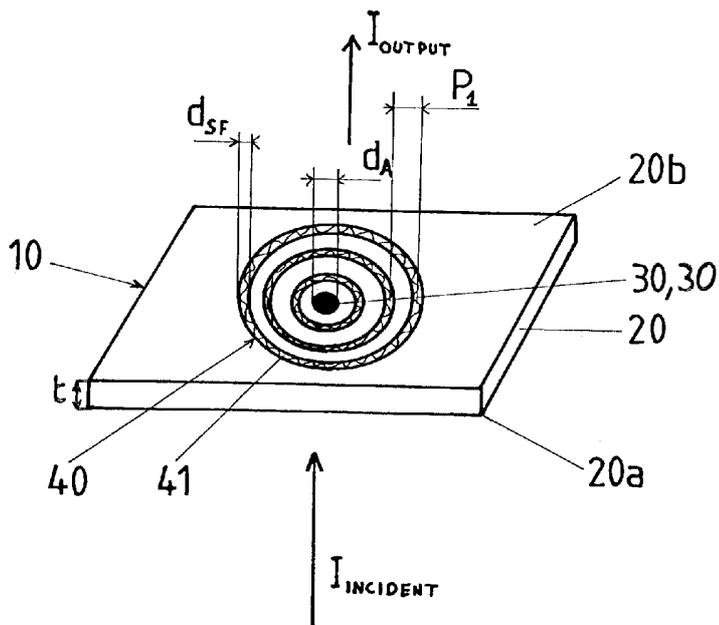
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- (74) Agent: CABINET NUSS; 10 Rue Jacques Kablé, F-67080 Strasbourg Cedex (FR).
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[Continued on next page]

(54) Title: OPTICAL TRANSMISSION APPARATUS WITH DIRECTIONALITY AND DIVERGENCE CONTROL



(57) Abstract: The present invention concerns an apparatus for emitting light with a controlled directionality and optical divergence from at least one opening. Said apparatus (10) comprises: a light impervious surface structure (20) comprising said at least one opening (30'), a periodic or quasi-periodic surface topography comprising one or several surface feature(s) (40) and associated with said at least one opening on said surface structure, whereby light (I_{OUTPUT}) emerging from said opening(s) (30') interacts with surface waves on said surface structure (20) thereby providing controlled directionality and optical divergence of the emitted light (I_{OUTPUT}).



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 02/11047

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G02B5/18 G02B5/20 G02B26/08 G12B21/06 G02B21/00 G02B6/34 G02B27/56		
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 7 G02B G12B		
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) INSPEC, EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	T. THIO, H.J. LEZEC, T.W. EBBESEN: "Strongly enhanced optical transmission through subwavelength holes in metal films" PHYSICA B, vol. 279, 2000, pages 90-93, XP002236331	1-3,8,9, 17,18, 23,25, 26,32
Y	abstract page 91, paragraph 2 -page 92, paragraph 3; figure 2 --- -/--	5
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.		
<input checked="" type="checkbox"/> Patent family members are listed in annex.		
° Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier document but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search <p style="text-align: center; font-size: 1.2em;">23 July 2003</p>	Date of mailing of the international search report <p style="text-align: center; font-size: 1.2em;">04.09.03</p>	
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer: <p style="text-align: center; font-size: 1.2em;">Mollenhauer, R</p>	

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 02/11047

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GHAEMI H F ET AL: "Surface plasmons enhance optical transmission through subwavelength holes" PHYSICAL REVIEW, B. CONDENSED MATTER, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 58, no. 11, 15 September 1998 (1998-09-15), pages 6779-6782, XP002133008 ISSN: 0163-1829 cited in the application page 6780	1
X	EP 1 008 870 A (NIPPON ELECTRIC CO) 14 June 2000 (2000-06-14) cited in the application page 10, paragraph 57	1-3,32
Y	figure 1 -----	5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 02/11047

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:

see additional sheet

As a result of the prior review under R. 40.2(e) PCT,
no additional fees are to be refunded.

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 searched 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.:

1-26, 32, 35
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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-4,8,9,17,18,23-26,32

apparatus for emitting light with a controlled directionality comprising several spaced apart openings, each provided with a corresponding particular periodic or quasi-periodic surface topography

2. Claim : 5

apparatus for emitting light with a controlled directionality comprising several spaced apart openings, provided with at least a partially common periodic or quasi-periodic surface topography

3. Claims: 6,7,35

apparatus for emitting light with a controlled directionality comprising a recess or a cavity for accommodating a light source

4. Claims: 10-16,19-22

apparatus for emitting light with a controlled directionality comprising at least two structural surface features

5. Claim : 27

wavelength multiplexing device

6. Claim : 28

wavelength dispersion device

7. Claim : 29

angular wavelength filter

8. Claims: 30,31

read/write head

9. Claim : 33

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

photolithographic mask

10. Claim : 34

optical switching device

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 02/11047

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1008870	A	14-06-2000	US 6236033 B1	22-05-2001
			EP 1008870 A1	14-06-2000
			JP 2000171763 A	23-06-2000
