

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 October 2004 (07.10.2004)

PCT

(10) International Publication Number
WO 2004/084752 A3

(51) International Patent Classification⁷:

A61N 5/06

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number:

PCT/US2004/003951

(22) International Filing Date: 10 February 2004 (10.02.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/446,342	10 February 2003 (10.02.2003)	US
60/446,300	10 February 2003 (10.02.2003)	US
60/449,188	21 February 2003 (21.02.2003)	US

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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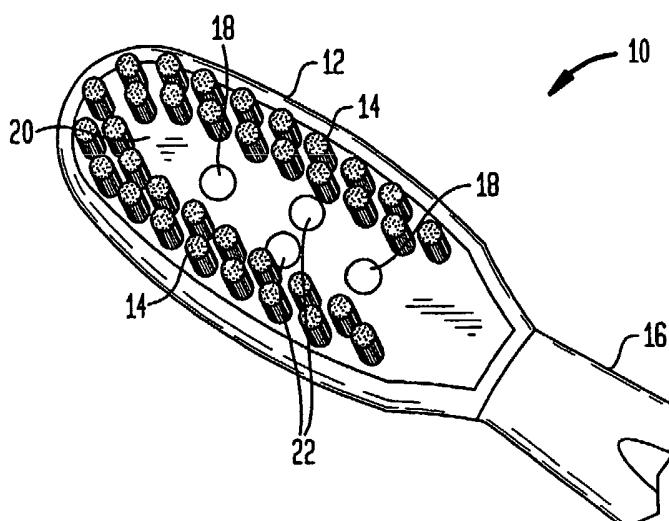
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(88) Date of publication of the international search report:
9 December 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LIGHT EMITTING ORAL APPLIANCE AND METHOD OF USE



(57) Abstract: Oral phototherapy applicators are disclosed that are sized and shaped so as to fit at least partially in a user's mouth with a plurality of bristles of elongate shape coupled to an apparatus body. The applicators can be adapted to brush the user's teeth and further include at least one radiation emitter to the body to provide phototherapeutic radiation to a portion of the oral cavity other than tissue in contact with the bristles. In one embodiment, the phototherapy emitter irradiates both a region of tissue in contact with the bristles and a portion of the oral cavity that is not in contact with the apparatus. For example, the apparatus can include at least one emitter that irradiates tooth tissue in contact with the bristles and gum tissue surrounding the tooth tissue.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/003951

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61N5/06

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 A61N A46B A61Q A61B

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)

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	<p>US 1 590 283 A (CATLIN DE FOREST B) 29 June 1926 (1926-06-29)</p> <p>page 1, column 2, line 58 – line 64 page 1, column 1, line 1 – line 5</p> <p>-----</p> <p style="text-align: center;">-/--</p>	<p>1,7,14, 44,46, 55,90, 101,144, 145,171, 183</p>

 Further documents are listed in the continuation of box C. 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
- *E* earlier document but published on or after the International filing date
- *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)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

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

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

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.

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Date of the actual completion of the International search

18 October 2004

Date of mailing of the International search report

04 NOV 2004

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INTERNATIONAL SEARCH REPORT

Int'l Application No
PCT/US2004/003951

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/10046 A (BIEL MERRILL A ; ADVANCED PHOTODYNAMIC TECHNOLOGY (US)) 4 March 1999 (1999-03-04) page 10, line 15 - line 28; figures 11-14 -----	1-3,7, 14,26, 29,30, 43-46, 55, 85-92, 101, 128-132, 144,145, 167-169, 171,183
X	US 6 471 716 B1 (PECUKONIS JOSEPH P) 29 October 2002 (2002-10-29) column 11, line 63 - column 12, line 65; figure 3 -----	1-3,7, 14,26, 29,30, 43,44, 46,55, 85-87, 89,90, 92,101, 128,129, 144,145, 167-169, 171,183
X	WO 98/06456 A (LIGHT SCIENCES LP) 19 February 1998 (1998-02-19) page 3, line 4 - line 32 page 5, line 5 - line 14 -----	1-3,7, 14,26, 29,30, 43,44, 46,55, 85-87, 89,90, 92,101, 128-130, 132,144, 145, 167-169, 171,178, 183,206, 210
		-/-

INTERNATIONAL SEARCH REPORT

In Application No
PCT/US2004/003951

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 927 544 A (ALTSHULER GRIGORY BORISOVICH) 7 July 1999 (1999-07-07) the whole document -----	1,4-9, 13,14, 16,21, 25, 31-33, 41,47, 51-57, 59-65, 69,72, 73,83, 93, 97-108, 115,116, 126, 136-148, 151, 153-155, 165,172, 176-184, 186-188, 191,193, 194,205, 206,210
X	US 3 261 978 A (BRENNAN HENRY S) 19 July 1966 (1966-07-19) column 2, line 6 - line 66 -----	1,6,8, 16,32, 33,47, 56-59, 61,62, 93,98, 102,103, 105-107, 140,146, 155,172, 177,180, 205,206
X	US 6 290 496 B1 (AZAR ZION ET AL) 18 September 2001 (2001-09-18) column 5, line 46 - column 2, line 27; figures 1,3 -----	1,4,6, 16,32, 33,47, 52,56, 59,61, 93,98, 99,102, 105,106, 140,172, 205,206
		-/-

INTERNATIONAL SEARCH REPORT

I oinal Application No
 , JS2004/003951

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 086 363 A (MORAN KELLY ET AL) 11 July 2000 (2000-07-11) column 4, line 40 - line 47 -----	1,4-6, 32,47, 52,53, 61,93, 98-100, 105,106, 140,142, 143,172, 181,182, 205,206
X	US 4 930 504 A (DIAMANTOPOULOS ET AL) 5 June 1990 (1990-06-05) column 6, line 45 - column 7, line 33 -----	1,4,6, 32,47, 52-54, 61,93, 98-100, 105,106, 140,142, 143,172, 181,182, 205,206
X	EP 0 593 375 A (LASER MED TECH INC) 20 April 1994 (1994-04-20) column 2, line 35 - column 3, line 33; figures 1-3 ----- -/-	1,6,8, 13,25, 31,32, 47,51, 61,62, 72,93, 98, 105-107, 115,136, 140,146, 153,172, 177,205, 206,210

INTERNATIONAL SEARCH REPORT

Application No

US2004/003951

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 030 090 A (IMANAKA KOICHI ET AL) 9 July 1991 (1991-07-09)	1,6, 8-11,13, 32,47, 61-64, 66-70, 73,93, 98, 105-109, 111-113, 116,140, 146-148, 150,151, 154,172, 177, 186-191, 194,195, 205,206
	column 2, line 40 - column 3, line 37 -----	
X	WO 95/10243 A (BIO BRUSH IND LTD ; AMRON LTD (IL); MAIRON OMRI (IL); MENDES EMANUEL () 20 April 1995 (1995-04-20)	1,5-8, 13,14, 32,47, 55,61, 62,98, 101, 105-107, 137,138, 140,141, 144-146, 155,172, 177-180, 183,195, 205,206
	pages 3,4; figures 4,9 -----	
X	EP 0 563 953 A (ORALIA DENTALPRODUKTE GMBH) 6 October 1993 (1993-10-06)	1,17,35, 77,120, 159,199
	column 5, line 1 - line 12 column 5, line 51 - column 6, line 6 column 6, line 11 - line 22 -----	
X	US 6 029 304 A (HULKE STUART ET AL) 29 February 2000 (2000-02-29)	1,17,34, 75,76, 118,119, 157,158, 197,198
	column 4, line 16 - line 47; figures 1,2 -----	
X	US 2002/081555 A1 (WIESEL PETER E) 27 June 2002 (2002-06-27) paragraph '0028! - paragraph '0034!	291,292, 294,296
Y	-----	293-295
	-/-	

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/003951

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/62472 A (WOLF ROBERT O) 9 December 1999 (1999-12-09) page 3, line 5 – page 4, line 12 -----	291, 292, 296
Y	US 5 171 564 A (NATHOO SALIM A ET AL) 15 December 1992 (1992-12-15) column 3, line 55 – line 57 column 4, line 22 – line 27 -----	293, 295
Y	US 2002/018754 A1 (SAGEL PAUL ALBERT ET AL) 14 February 2002 (2002-02-14) paragraph '0038! -----	294
X	DE 198 03 460 C (DORNIER MEDIZINTECHNIK) 12 August 1999 (1999-08-12) abstract; figure 1 -----	1, 83, 84, 126, 127, 165, 166, 184, 185
X	US 4 784 135 A (BLUM ET AL) 15 November 1988 (1988-11-15) column 4, line 31 – line 35; figure 1 -----	1, 15

INTERNATIONAL SEARCH REPORTnational application No.
PCT/US2004/003951**Box II Observations where certain claims were found unsearchable (Continuation of item 2 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.: 211-274, 288-290
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by therapy
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 III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

see additional sheet

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.:
**1-17, 21, 25-35, 41, 43-47, 51-77, 83-93, 97-120, 126-132, 136-159, 165-172, 176-199
205, 206, 210, 291-296**
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

Continuation of Box II.1

Claims Nos.: 211-274, 288-290

Rule 39.1(iv) PCT - Method for treatment of the human or animal body by therapy

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, 2, 3, 7, 14, 26-30, 43-46, 55, 85-92,
101, 128-132, 144, 145, 167-171, 183

Oral phototherapy applicator having specific shape

2. claims: 4, 16, 33, 52-54, 56-59, 99, 100, 102, 103, 142, 143,
181, 182

Oral phototherapy applicator having a specific spectrum

3. claims: 18-20, 36-40, 78-82, 121-125, 160-164, 200-204,

Oral phototherapy applicator having means for applying or
extracting heat

4. claims: 5, 6, 8-13, 15, 21, 25, 31, 32, 41, 47, 51, 60-74, 83,
84, 93, 97, 98, 104-117, 126, 127,
136-141, 146-156, 165, 166, 172,
176-180, 184-196, 205, 206, 210

Oral phototherapy applicator having means for directing or
guiding radiation

5. claims: 17, 34, 35, 75-77, 118-120, 157-159, 197-199

Oral phototherapy applicator having monitoring means
providing feedback

6. claims: 22-24, 42, 48-50, 94-96, 133-135, 173-175, 207-209

Oral phototherapy applicator having means for additional
therapy

7. claims: 275-287, 297

Method of whitening teeth

8. claims: 291-296

Tooth-whitening film

INTERNATIONAL SEARCH REPORT

Information on patent family members

Final Application No

PCT/JS2004/003951

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 1590283	A	29-06-1926	NONE			
WO 9910046	A	04-03-1999	AU CA EP WO US US US US	9294298 A 2302044 A1 1009483 A1 9910046 A1 6083487 A 6048359 A 6251127 B1 2003009205 A1		16-03-1999 04-03-1999 21-06-2000 04-03-1999 04-07-2000 11-04-2000 26-06-2001 09-01-2003
US 6471716	B1	29-10-2002	NONE			
WO 9806456	A	19-02-1998	AU WO	3578497 A 9806456 A1		06-03-1998 19-02-1998
EP 0927544	A	07-07-1999	WO AU DE DE EP US	9810711 A1 7101396 A 69626136 D1 69626136 T2 0927544 A2 6026828 A		19-03-1998 02-04-1998 13-03-2003 09-10-2003 07-07-1999 22-02-2000
US 3261978	A	19-07-1966	NONE			
US 6290496	B1	18-09-2001	AU WO US	2071599 A 9943387 A1 2001024777 A1		15-09-1999 02-09-1999 27-09-2001
US 6086363	A	11-07-2000	US	5941701 A		24-08-1999
US 4930504	A	05-06-1990	AT CA DE EP IN JP JP	92351 T 1329416 C 3882933 D1 0320080 A1 167659 A1 1136668 A 2690952 B2		15-08-1993 10-05-1994 09-09-1993 14-06-1989 01-12-1990 29-05-1989 17-12-1997
EP 0593375	A	20-04-1994	US EP	5306143 A 0593375 A1		26-04-1994 20-04-1994
US 5030090	A	09-07-1991	JP	3073106 A		28-03-1991
WO 9510243	A	20-04-1995	AU WO	7931194 A 9510243 A1		04-05-1995 20-04-1995
EP 0563953	A	06-10-1993	DE AT DE EP	9204621 U1 138816 T 59302790 D1 0563953 A2		30-07-1992 15-06-1996 11-07-1996 06-10-1993
US 6029304	A	29-02-2000	AT AU AU BG BG BR	247913 T 768772 B2 6309899 A 64203 B1 105118 A 9911081 A		15-09-2003 08-01-2004 30-12-1999 31-05-2004 31-08-2001 20-02-2001

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/003951

Patent document cited in search report	Publication date	Patent family member(s)		Publication date	
US 6029304	A	CA CN CZ DE DE EP EP ES HU ID JP NO NZ PL SK TR TW WO	2334655 A1 1131690 B 20004539 A3 69910773 D1 69910773 T2 1364594 A1 1083806 A1 2207302 T3 0102278 A2 28322 A 2002517267 T 20006246 A 508640 A 345286 A1 18772000 A3 200003649 T2 426509 B 9963859 A1	16-12-1999 24-12-2003 12-12-2001 02-10-2003 17-06-2004 26-11-2003 21-03-2001 16-05-2004 28-10-2001 10-05-2001 18-06-2002 07-02-2001 25-07-2003 03-12-2001 10-07-2001 21-06-2001 21-03-2001 16-12-1999	
US 2002081555	A1	27-06-2002	US	6343932 B1	
WO 9962472	A	09-12-1999	AU WO	4545899 A 9962472 A1	
US 5171564	A	15-12-1992	AT AU AU BR CA CN DE EP FI GR HK JP JP KR MX NO NZ PT TR	210958 T 660691 B2 2131292 A 9203534 A 2077609 A1 1070335 A ,B 69232301 D1 0535816 A2 924089 A 1001363 B 1013961 A1 3490725 B2 5194165 A 239675 B1 9205015 A1 923537 A 244175 A 100861 A ,B 28886 A	15-01-2002 06-07-1995 18-03-1993 13-04-1993 14-03-1993 31-03-1993 31-01-2002 07-04-1993 14-03-1993 29-10-1993 13-09-2002 26-01-2004 03-08-1993 01-02-2000 01-04-1993 15-03-1993 26-07-1995 30-11-1993 17-07-1997
US 2002018754	A1	14-02-2002	AT AU AU BR CA CN CZ DE DE EP ES HU JP NO	247932 T 763529 B2 3743600 A 0009075 A 2367148 A1 1343109 T 20013285 A3 60004796 D1 60004796 T2 1161198 A1 2200850 T3 0200573 A2 2002538887 T 20014472 A	15-09-2003 24-07-2003 04-10-2000 18-12-2001 21-09-2000 03-04-2002 13-02-2002 02-10-2003 17-06-2004 12-12-2001 16-03-2004 29-06-2002 19-11-2002 13-11-2001

INTERNATIONAL SEARCH REPORT

Information on patent family members

In	International Application No
	PCT/US2004/003951

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 2002018754	A1	NZ	514139 A	28-09-2001
		PL	349808 A1	09-09-2002
		RU	2219895 C2	27-12-2003
		SK	13092001 A3	04-04-2002
		TR	200102685 T2	21-12-2001
		WO	0054699 A1	21-09-2000
		US	2003068284 A1	10-04-2003
		US	2002006387 A1	17-01-2002
DE 19803460	C	12-08-1999	DE 19803460 C1	12-08-1999
			WO 9938571 A1	05-08-1999
			DE 59909087 D1	13-05-2004
			EP 0973583 A1	26-01-2000
US 4784135	A	15-11-1988	AT 28974 T	15-09-1987
			AU 598135 B2	14-06-1990
			AU 1761588 A	08-09-1988
			AU 570225 B2	10-03-1988
			AU 2165583 A	07-06-1984
			BR 8306654 A	31-07-1984
			CA 1238690 A1	28-06-1988
			DE 3373055 D1	24-09-1987
			EP 0111060 A1	20-06-1984
			ES 8504444 A1	16-07-1985
			JP 1838057 C	11-04-1994
			JP 4053540 B	26-08-1992
			JP 59118147 A	07-07-1984