

(12) United States Patent

Parker et al.

(54) LIGHT EMITTING PANEL ASSEMBLIES

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Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35

U.S.C. 154(b) by 247 days.

This patent is subject to a terminal dis-

claimer.

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(52)362/619

Field of Classification Search 362/231, 362/545, 800, 608, 609, 610, 612, 613, 617, 362/618, 624, 606, 607, 619

See application file for complete search history.

(56)References Cited

U.S. PATENT DOCUMENTS

3,043,947 A 7/1962 Albinger, Jr.

US 7,195,389 B2 (10) **Patent No.:**

(45) Date of Patent: *Mar. 27, 2007

3.070,913 A 1/1963 Miller 3,328,570 A 6/1967 Balchunas

(Continued)

FOREIGN PATENT DOCUMENTS

0 453 092 A1 EP

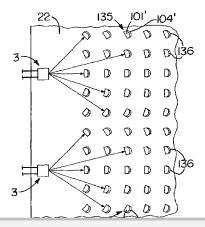
(Continued)

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(57)ABSTRACT

Light emitting panel assemblies include a light emitting panel member having a uniform or variable pattern of light extracting deformities of well defined shapes in or on one or more surface areas of the light emitting panel member. The size and shape as well as the depth and angular orientation and position or location of the light extracting deformities may vary along the length and/or width of a panel surface area to obtain a desired light output distribution from the panel surface area. Also, at least some of the deformities may have planar surfaces in parallel spaced relation to a panel surface area. A focused light source may be insert molded or cast within a light transition area of the light emitting panel member to focus the light on an input surface of the light transition area with predetermined ray angles to fit a particular application. Molded supports may be provided on the panel member for supporting other parts or components in spaced relation therefrom. In another embodiment of the invention, an array of light sources may be mounted on a printed circuit board for directing light through a diffuser or lens mounted in spaced relation to the light sources for use in phototherapy treatment or the like.

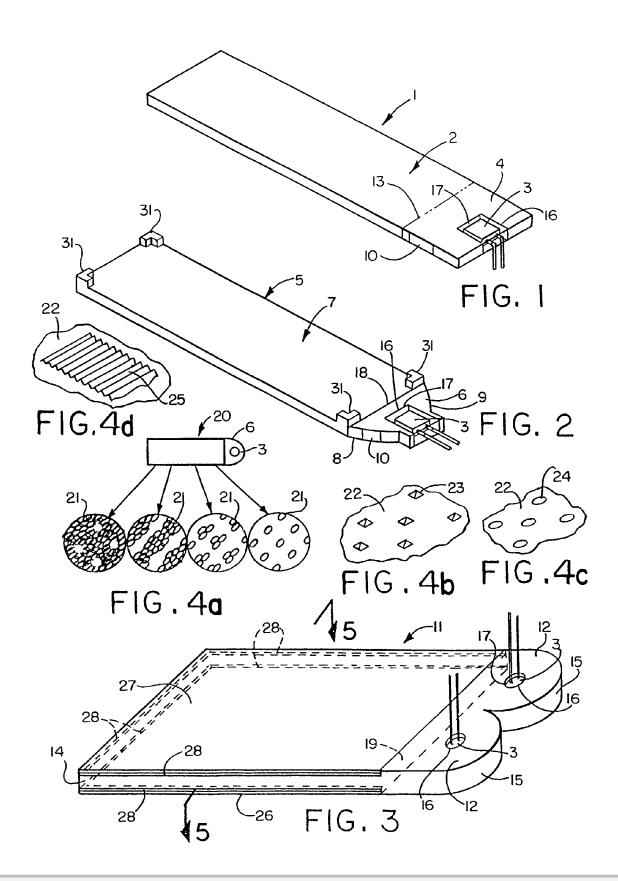
10 Claims, 14 Drawing Sheets



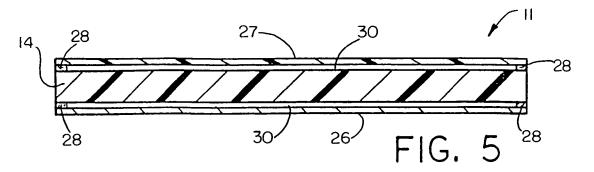


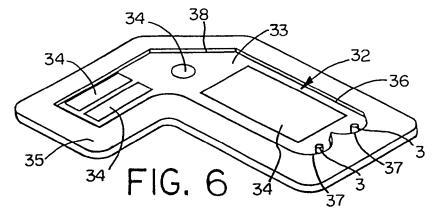
US 7,195,389 B2 Page 2

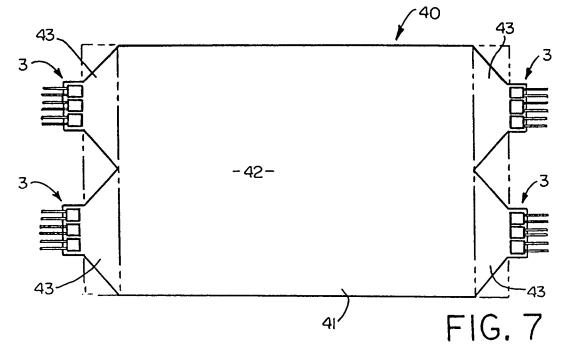
U.S. PATEN	T DOCUMENTS		5,394,308 A	2/1995	Watanabe et al.
			5,396,350 A	3/1995	Beeson et al.
3,543,014 A 11/197) Bustad		5,442,523 A		Kashima et al.
3,571,585 A 3/197	l Schermerhorn		5,467,208 A		Kokawa et al.
3,752,974 A 8/197	Baker et al.		5,467,417 A		Nakamura et al.
3,761,703 A 9/197	3 Mund et al.		5,485,291 A		Qiao et al.
3,892,959 A 7/197	5 Pulles		5,506,929 A		Tai et al.
3,958,113 A 5/197	5 Termohlen		5,521,342 A		Barley et al.
4,043,636 A 8/197	7 Eberhardt et al.		5,576,078 A		•
4,118,111 A 10/197	8 Laesser		5,579,134 A		Lengyel
4,177,501 A 12/197	9 Karlin		5,590,945 A		CV
4,183,628 A 1/198) Laesser		5,598,281 A		Zimmerman et al.
4,257,084 A 3/198	1 Reynolds		5,600,462 A		Suzuki et al.
4,282,560 A 8/198	l Kringel et al.		5,618,095 A		Kashima et al.
4,290,093 A 9/198			5,649,754 A		Matsumoto
	4 Kinzie		5,664,862 A		Redmond et al.
	5 Whitehead		5,671,994 A		Tai et al.
	6 Bournay, Jr. et al.		5,711,592 A		
	6 Abdala, Jr. et al.		5,711,552 A 5,719,649 A		Shono et al.
	7 Lang		5,771,328 A		Wortman et al.
	8 Baba		5,775,791 A		Yoshikawa et al.
4,751,615 A 6/198			5,779,337 A		Saito et al.
	8 Awai et al.		5,779,337 A		Ishikawa et al.
, ,	8 Cheslak		5,808,784 A		Ando et al.
	Cobb, Jr.				Ohara et al.
	O Shaw		5,844,720 A 5,890,791 A		
	Dond et al.		5,890,791 A 5,917,664 A		O'Neill et al.
4,978,952 A 12/199					
	Pristash et al.		5,919,551 A		Cobb, Jr. et al. Akahane et al.
, ,	Schoniger et al.		5,931,555 A		
	Cobb, Jr.		5,961,198 A		Hira et al.
5,070,431 A 12/199	· · · · · · · · · · · · · · · · · · ·		5,971,559 A		Ishikawa et al.
, ,	2 Kashima et al.		6,011,602 A		Miyashita et al.
	2 Yokoyama		6,036,329 A		Iimura
5,136,483 A 8/199	,		6,091,547 A		Gardiner et al.
	3 Murase et al.		6,120,280 A		Mimura et al.
5,207,493 A 5/199			6,130,730 A		Jannson et al.
	3 Kashima et al.		6,151,169 A		
5,283,673 A 2/199			6,172,809 B	1 1/2001	Koike et al.
	Winston et al.		EODI	CICNI DATE	NET DOCLINGENITO
	4 Gaudette		FORI	EIGN PALE	NT DOCUMENTS
	4 Rudisill et al.	TW		368610	9/1999
		WO	WO 0	6/17207	6/1996
, , ,		WO		6/27757	9/1996
5,375,043 A 12/199	2	WO		8/50806	11/1998
5,377,084 A 12/199	+ Kojima et al. 5 Mari-Roca et al.				
5,390,085 A 2/199	o iviari-koca et al.	WO	wo 9	9/42861	8/1999

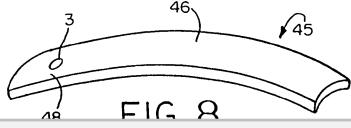


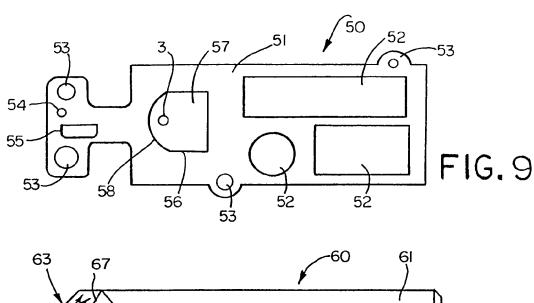


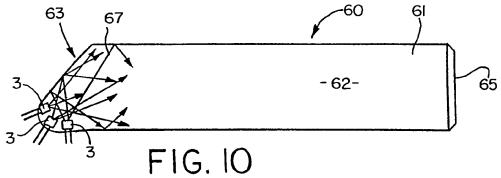


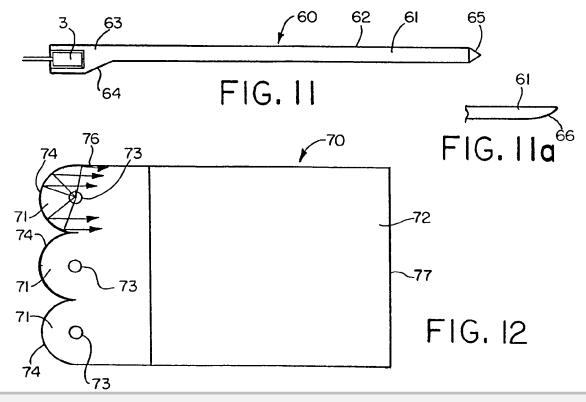














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