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(12) **United States Patent**  
**Parker et al.**

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(54) **LIGHT EMITTING PANEL ASSEMBLIES**

3,070,913 A 1/1963 Miller  
3,328,570 A 6/1967 Balchunas

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(Continued)

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**FOREIGN PATENT DOCUMENTS**

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 247 days.

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This patent is subject to a terminal disclaimer.

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(57) **ABSTRACT**

(65) **Prior Publication Data**

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**Related U.S. Application Data**

(60) Continuation of application No. 09/256,275, filed on Feb. 23, 1999, now Pat. No. 6,712,481, which is a continuation-in-part of application No. 08/778,089, filed on Jan. 2, 1997, now Pat. No. 6,079,838, which is a division of application No. 08/495,176, filed on Jun. 27, 1995, now Pat. No. 5,613,751.

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.

(51) **Int. Cl.**

**F21V 7/00** (2006.01)

(52) **U.S. Cl.** ..... **362/606**; 362/613; 362/618;  
362/619

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

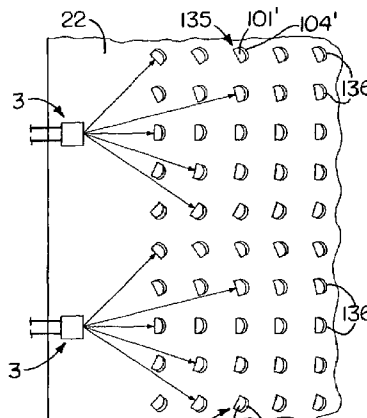
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

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

**10 Claims, 14 Drawing Sheets**

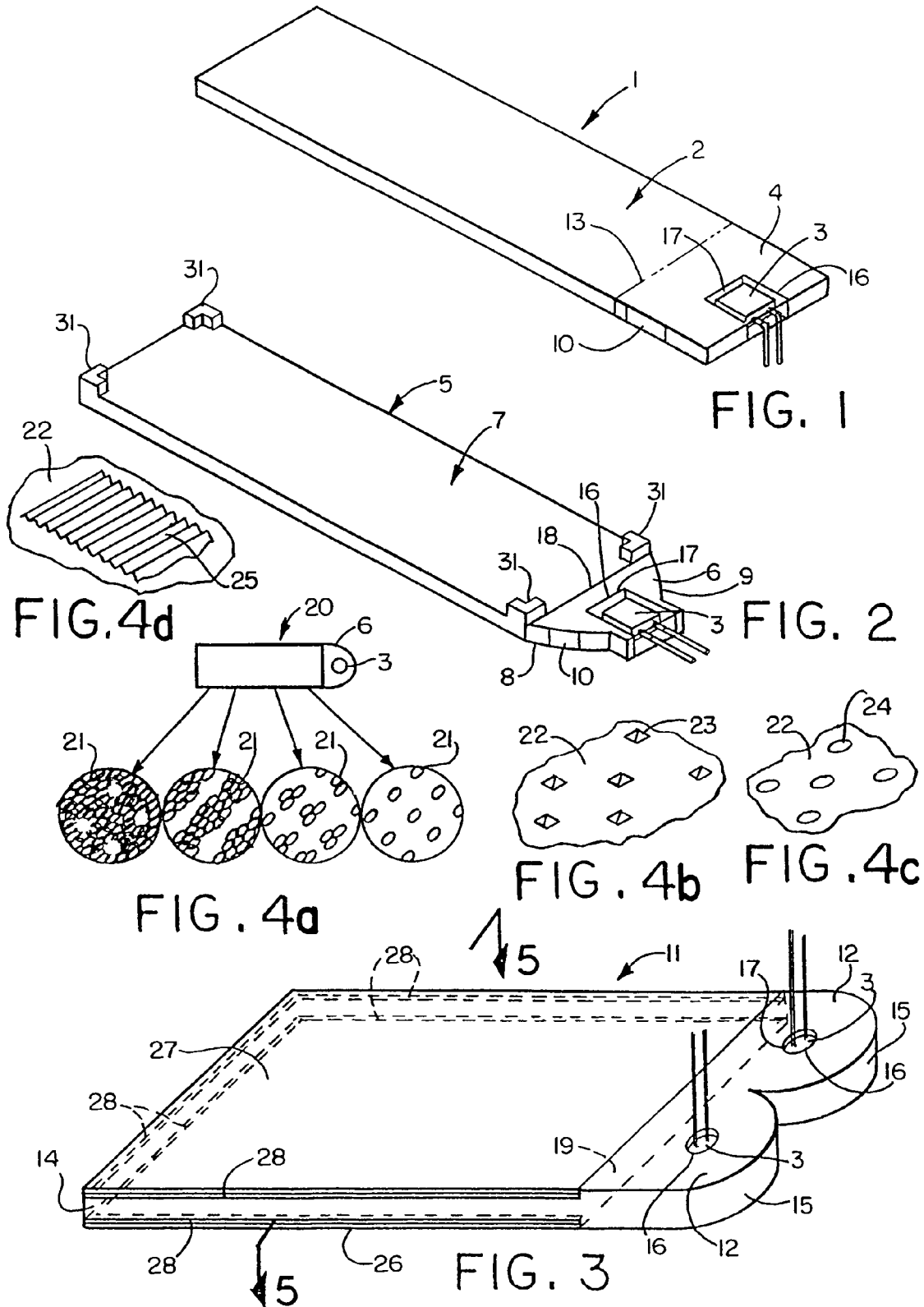


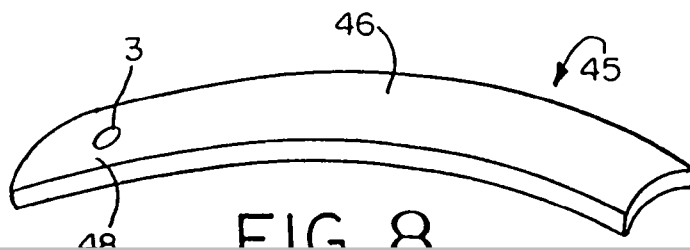
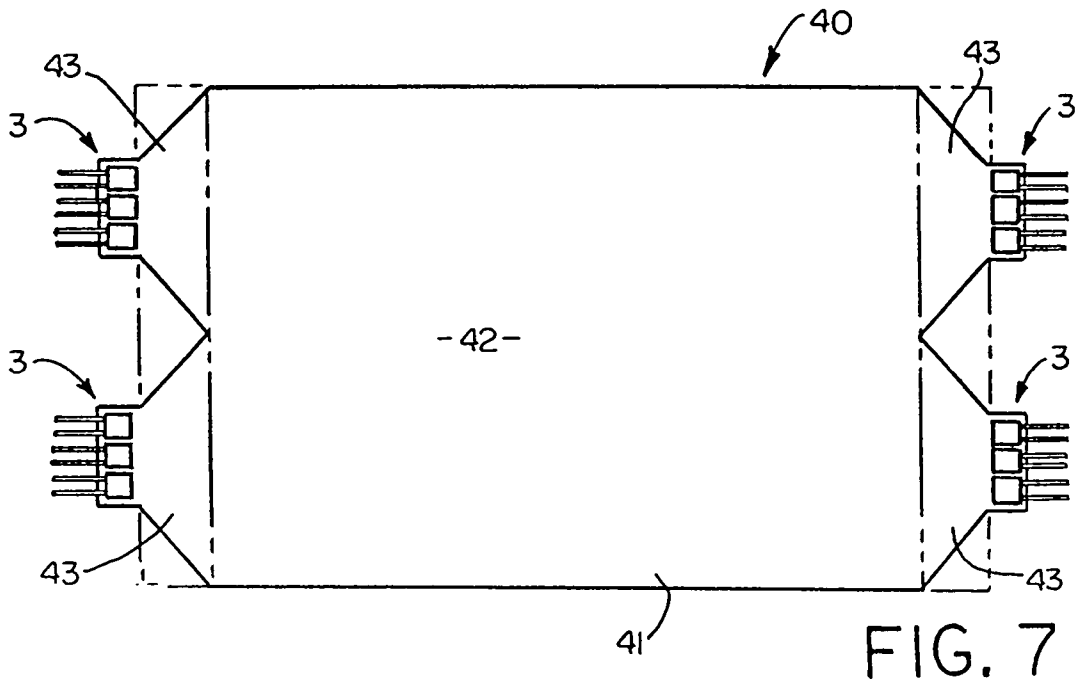
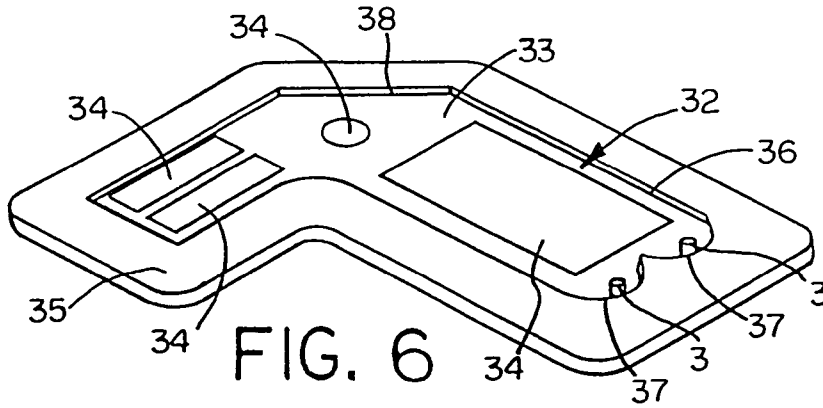
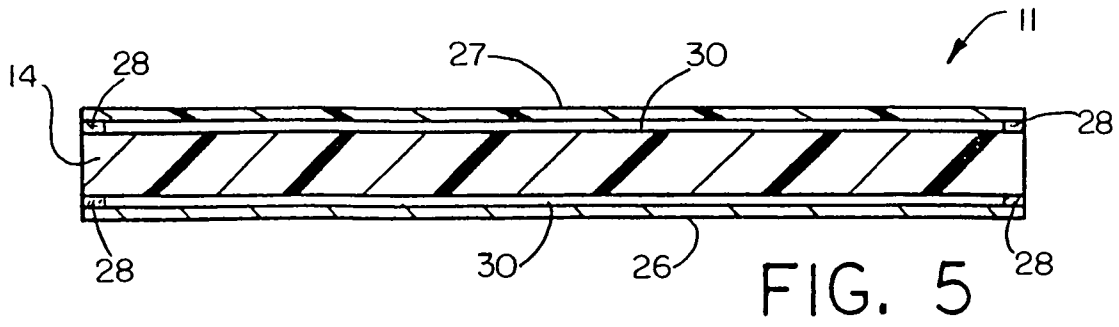
U.S. PATENT DOCUMENTS

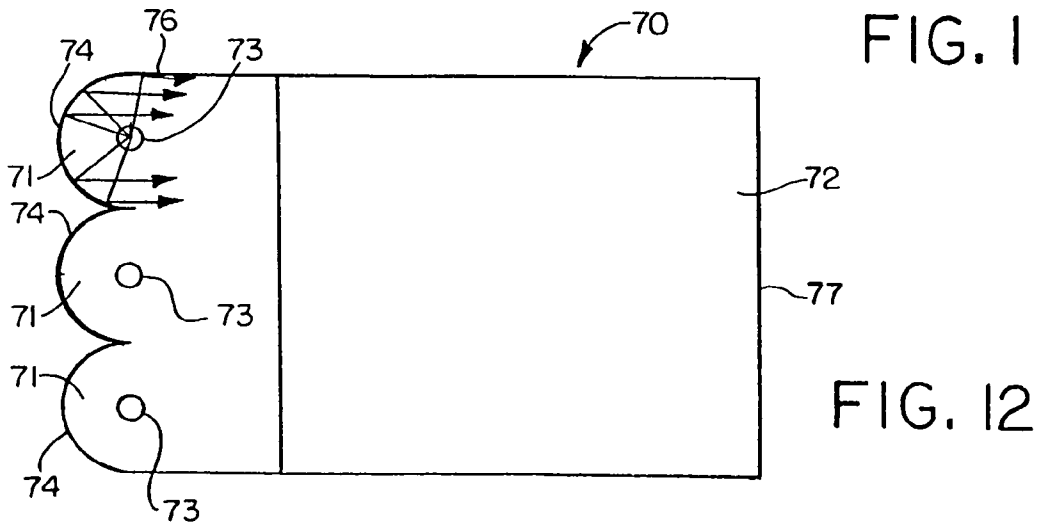
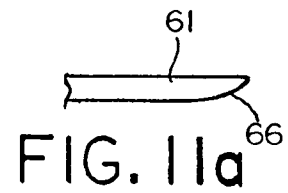
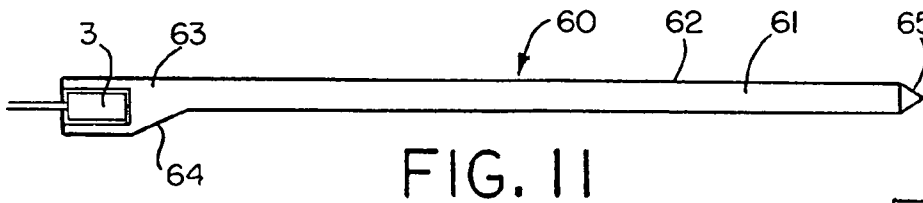
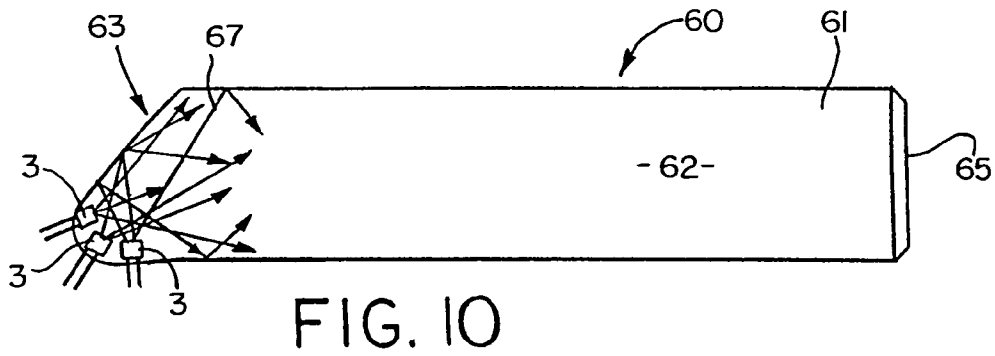
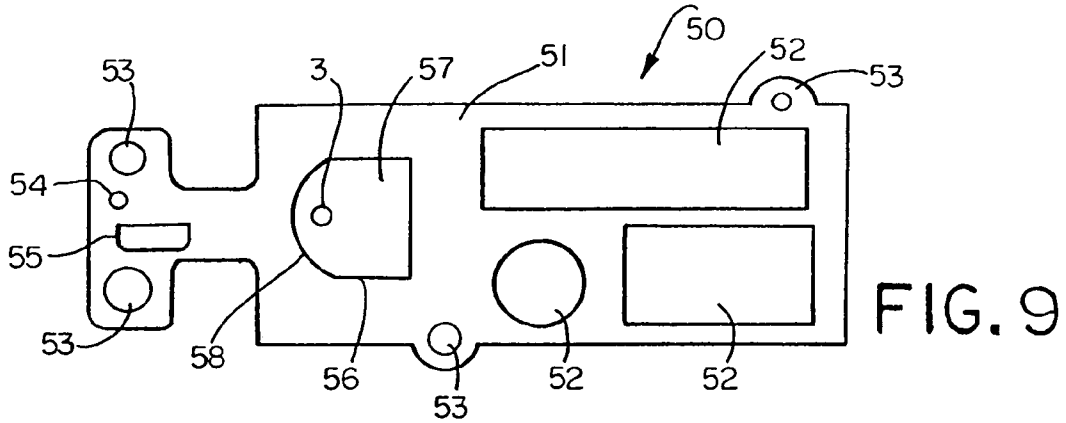
3,543,014 A	11/1970	Bustad	5,394,308 A	2/1995	Watanabe et al.
3,571,585 A	3/1971	Schermerhorn	5,396,350 A	3/1995	Beeson et al.
3,752,974 A	8/1973	Baker et al.	5,442,523 A	8/1995	Kashima et al.
3,761,703 A	9/1973	Mund et al.	5,467,208 A	11/1995	Kokawa et al.
3,892,959 A	7/1975	Pulles	5,467,417 A	11/1995	Nakamura et al.
3,958,113 A	5/1976	Termohlen	5,485,291 A	1/1996	Qiao et al.
4,043,636 A	8/1977	Eberhardt et al.	5,506,929 A	4/1996	Tai et al.
4,118,111 A	10/1978	Laesser	5,521,342 A	5/1996	Barley et al.
4,177,501 A	12/1979	Karlin	5,576,078 A	11/1996	Schatz
4,183,628 A	1/1980	Laesser	5,579,134 A	11/1996	Lengyel
4,257,084 A	3/1981	Reynolds	5,590,945 A	1/1997	Simms
4,282,560 A	8/1981	Kringel et al.	5,598,281 A	1/1997	Zimmerman et al.
4,290,093 A	9/1981	Thompson et al.	5,600,462 A	2/1997	Suzuki et al.
4,446,508 A	5/1984	Kinzie	5,618,095 A	4/1997	Kashima et al.
4,542,449 A	9/1985	Whitehead	5,649,754 A	7/1997	Matsumoto
4,573,766 A	3/1986	Bournay, Jr. et al.	5,664,862 A	9/1997	Redmond et al.
4,630,895 A	12/1986	Abdala, Jr. et al.	5,671,994 A	9/1997	Tai et al.
4,714,983 A	12/1987	Lang	5,711,592 A	1/1998	Hotta
4,729,185 A	3/1988	Baba	5,719,649 A	2/1998	Shono et al.
4,751,615 A	6/1988	Abrams	5,771,328 A	6/1998	Wortman et al.
4,763,984 A	8/1988	Awai et al.	5,775,791 A	7/1998	Yoshikawa et al.
4,765,701 A	8/1988	Cheslak	5,779,337 A	7/1998	Saito et al.
4,906,070 A	3/1990	Cobb, Jr.	5,779,338 A	7/1998	Ishikawa et al.
4,974,122 A	11/1990	Shaw	5,808,784 A	9/1998	Ando et al.
4,975,808 A	12/1990	Bond et al.	5,844,720 A	12/1998	Ohara et al.
4,978,952 A	12/1990	Irwin	5,890,791 A	4/1999	Saito
5,005,108 A	4/1991	Pristash et al.	5,917,664 A	6/1999	O'Neill et al.
5,027,258 A	6/1991	Schoniger et al.	5,919,551 A	7/1999	Cobb, Jr. et al.
5,056,892 A	10/1991	Cobb, Jr.	5,931,555 A	8/1999	Akahane et al.
5,070,431 A	12/1991	Kitazawa et al.	5,961,198 A	10/1999	Hira et al.
5,093,765 A	3/1992	Kashima et al.	5,971,559 A	10/1999	Ishikawa et al.
5,134,549 A	7/1992	Yokoyama	6,011,602 A	1/2000	Miyashita et al.
5,136,483 A	8/1992	Schoniger et al.	6,036,329 A	3/2000	Imura
5,178,447 A	1/1993	Murase et al.	6,091,547 A	7/2000	Gardiner et al.
5,207,493 A	5/1993	Murase et al.	6,120,280 A	9/2000	Mimura et al.
5,262,928 A	11/1993	Kashima et al.	6,130,730 A	10/2000	Jannson et al.
5,283,673 A	2/1994	Murase et al.	6,151,169 A	11/2000	Kim
5,303,322 A	4/1994	Winston et al.	6,172,809 B1	1/2001	Koike et al.
5,307,244 A	4/1994	Gaudette			
5,339,179 A	8/1994	Rudisill et al.			
5,349,503 A	9/1994	Blonder et al.			
5,375,043 A	12/1994	Tokunaga			
5,377,084 A	12/1994	Kojima et al.			
5,390,085 A	2/1995	Mari-Roca et al.			

FOREIGN PATENT DOCUMENTS

TW	368610	9/1999
WO	WO 96/17207	6/1996
WO	WO 96/27757	9/1996
WO	WO 98/50806	11/1998
WO	WO 99/42861	8/1999







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