

(12) **United States Patent**
Parker

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(54) **LIGHT EMITTING PANEL ASSEMBLIES**

(75) Inventor: **Jeffery R. Parker**, Richfield, OH (US)

(73) Assignee: **Solid State Opto Limited** (VG)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 103 days.

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(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**

F21V 7/04 (2006.01)

(52) **U.S. Cl.** **362/612**; 362/619; 362/632; 362/634

(58) **Field of Classification Search** 362/231, 362/800, 27, 619, 613, 612, 620, 608, 609, 362/621, 600, 632, 634, 26

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,480,178 A 8/1949 Zinberg
3,043,947 A 7/1962 Albinger, Jr.
3,241,256 A 3/1966 Viret et al.
3,328,570 A 6/1967 Balchunas
3,721,815 A 3/1973 Wall

3,752,947 A 8/1973 Baker et al.
3,760,179 A 9/1973 Addington, Jr.
3,781,537 A 12/1973 Ramsey
3,892,959 A 7/1975 Pulles
3,958,113 A 5/1976 Termohlen
4,043,636 A 8/1977 Eberhardt et al.
4,128,332 A 12/1978 Rowe
4,257,084 A 3/1981 Reynolds
4,277,817 A 7/1981 Hehr
4,323,951 A 4/1982 Pasco
4,373,282 A 2/1983 Wragg
4,446,508 A 5/1984 Kinzie
4,519,017 A 5/1985 Daniel
4,573,766 A 3/1986 Bournay, Jr. et al.

(Continued)

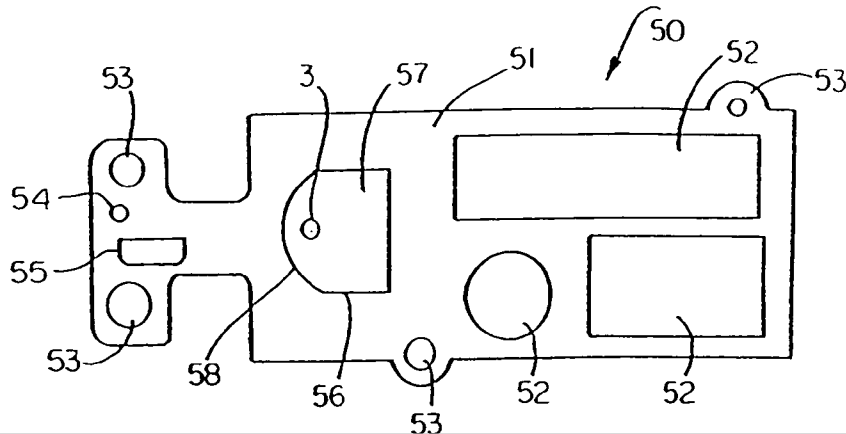
Primary Examiner—Thomas M Sember

(74) *Attorney, Agent, or Firm*—Renner, Otto, Boisselle & Sklar, LLP

(57) **ABSTRACT**

Light emitting panel assembly includes a light emitting panel member received in a cavity or recess in a tray or housing. The panel member has a pattern of light extracting deformities on or in at least one surface of the panel member to cause light received from at least one LED light source positioned near or against the light entrance surface of the panel member to be emitted from a light emitting surface of the panel member. The tray or housing acts as an end edge and/or side edge reflector for the panel member to reflect light that would otherwise exit the panel member through the end edge and/or side edge back into the panel member for causing additional light to be emitted from the panel member.

24 Claims, 4 Drawing Sheets



U.S. PATENT DOCUMENTS					
4,630,895	A	12/1986	Abdala, Jr. et al.	5,093,765	A 3/1992 Kashima et al.
4,648,690	A	3/1987	Ohe	5,134,549	A 7/1992 Yokoyama
4,677,531	A	6/1987	Szeles	5,136,480	A 8/1992 Pristash et al.
4,714,983	A	12/1987	Lang	5,136,483	A 8/1992 Schoniger et al.
4,729,067	A	3/1988	Ohe	5,184,888	A * 2/1993 Sakuma et al. 362/136
4,729,068	A	3/1988	Ohe	5,190,370	A 3/1993 Miller et al.
4,729,185	A	3/1988	Baba	5,207,493	A 5/1993 Murase et al.
4,751,615	A	6/1988	Abrams	5,243,506	A 9/1993 Whitehead
4,761,047	A	8/1988	Mori	5,262,928	A 11/1993 Kashima et al.
4,763,984	A	8/1988	Awai et al.	5,283,673	A 2/1994 Murase et al.
4,765,701	A	8/1988	Cheslak	5,339,179	A 8/1994 Rudisill et al.
4,791,540	A	12/1988	Dreyer, Jr. et al.	5,349,503	A 9/1994 Blonder et al.
4,802,066	A	1/1989	Mori	5,375,043	A 12/1994 Tokunaga
4,811,507	A	3/1989	Blanchet	5,377,084	A 12/1994 Kojima et al.
4,825,341	A	4/1989	Awai	5,390,085	A 2/1995 Mari-Roca et al.
4,890,201	A	12/1989	Joft	5,390,276	A * 2/1995 Tai et al. 385/146
4,909,604	A	3/1990	Kobayashi et al.	5,390,436	A 2/1995 Ashall
4,914,553	A	4/1990	Hamada et al.	5,394,308	A 2/1995 Watanabe et al.
4,929,062	A	5/1990	Guzik et al.	5,434,754	A * 7/1995 Li et al. 362/511
4,974,122	A	11/1990	Shaw	5,467,208	A 11/1995 Kokawa et al.
4,975,808	A	12/1990	Bond et al.	5,467,417	A 11/1995 Nakamura et al.
4,978,952	A	12/1990	Irwin	5,477,423	A 12/1995 Fredriksz et al.
4,985,809	A	1/1991	Matsui et al.	5,479,275	A 12/1995 Abileah
5,005,108	A	4/1991	Pristash et al.	5,485,291	A 1/1996 Qiao et al.
5,027,258	A	6/1991	Schoniger et al.	5,485,354	A * 1/1996 Ciupke et al. 362/619
5,050,046	A *	9/1991	Tada 362/26	5,600,455	A 2/1997 Ishikawa et al.
5,055,978	A	10/1991	Rogoff	5,719,649	A 2/1998 Shono et al.
5,070,431	A	12/1991	Kitazawa et al.	5,947,578	A 9/1999 Ayres
				5,999,685	A 12/1999 Goto et al.

* cited by examiner

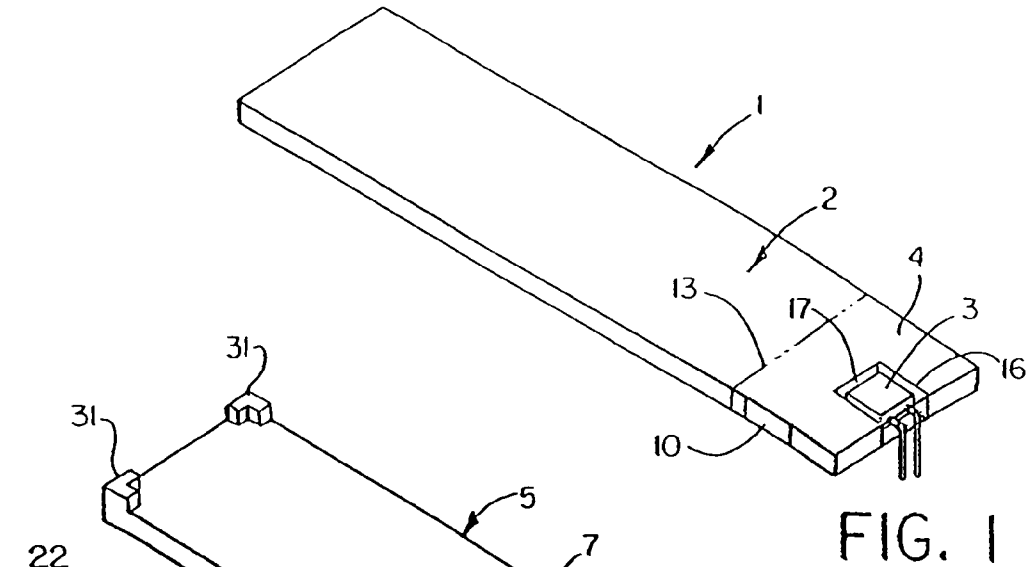


FIG. 1

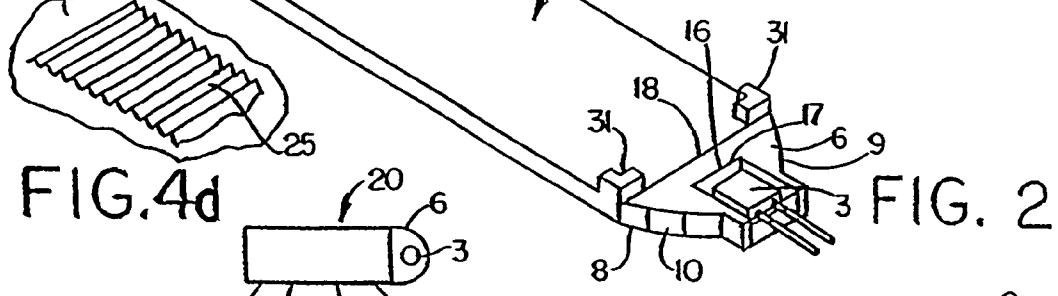


FIG. 2

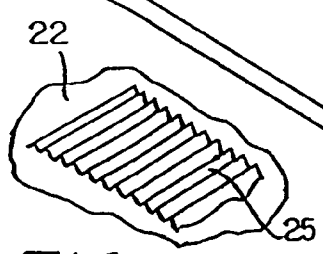


FIG. 4d

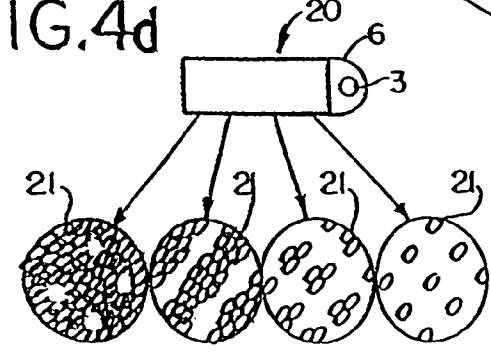


FIG. 4a

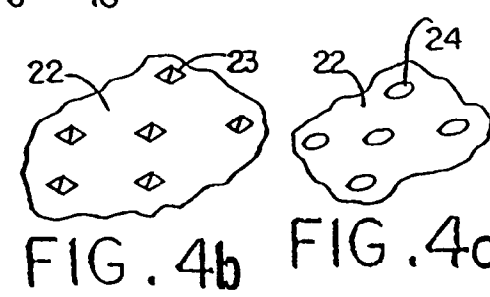


FIG. 4b

FIG. 4c

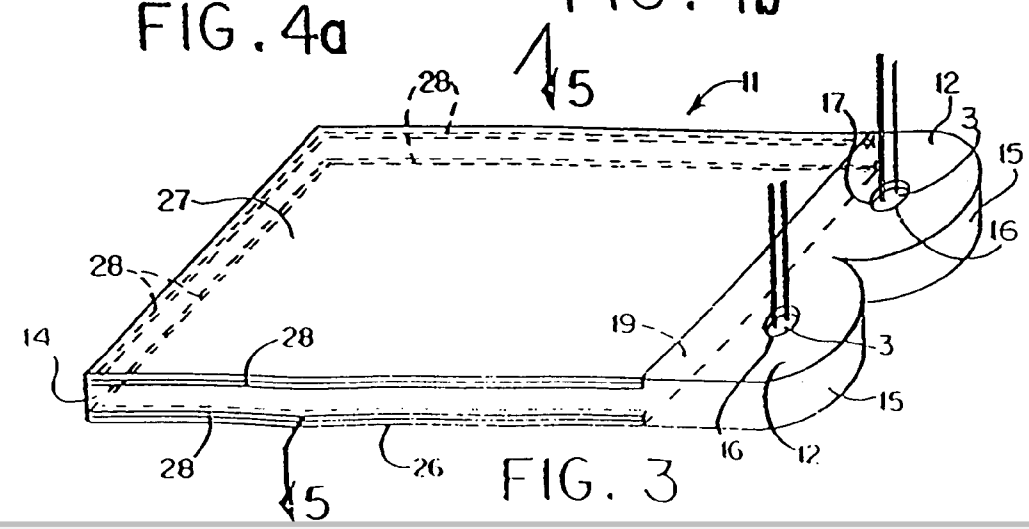
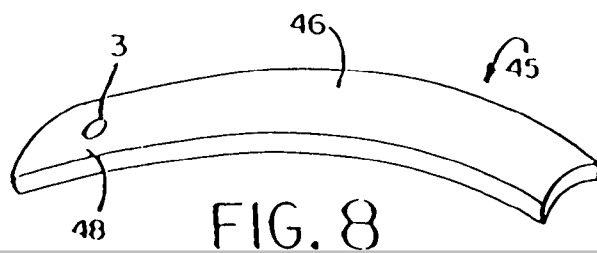
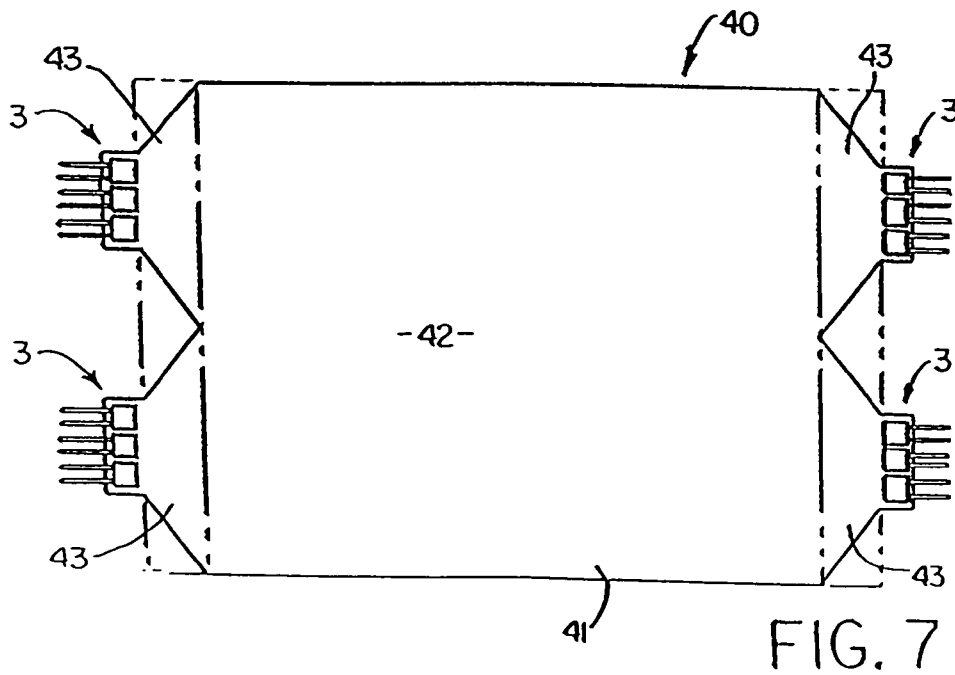
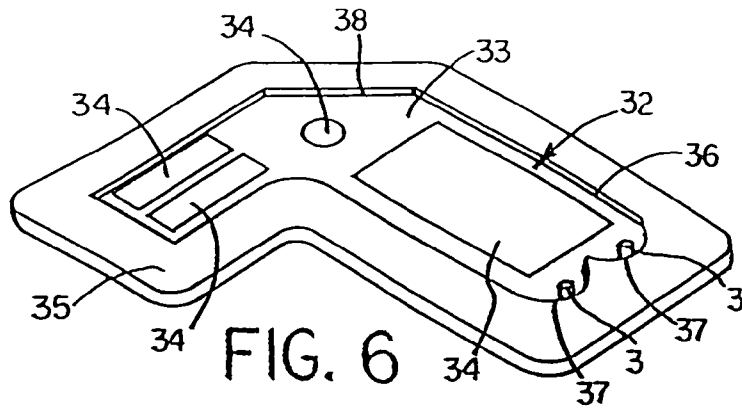
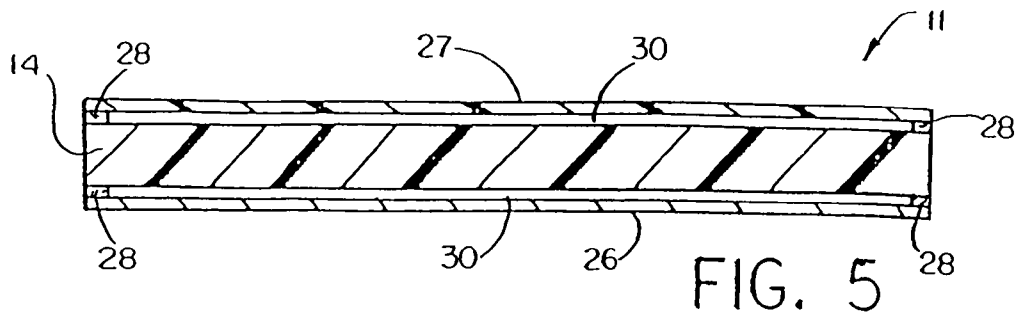


FIG. 3



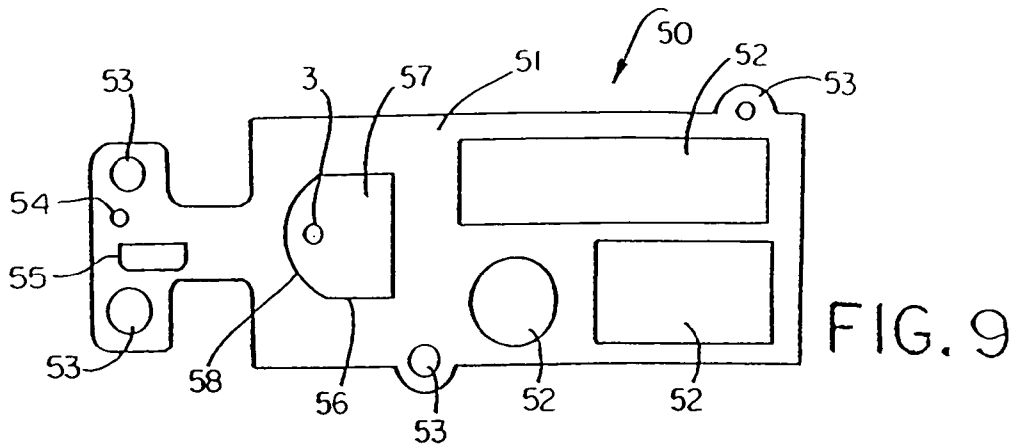


FIG. 9

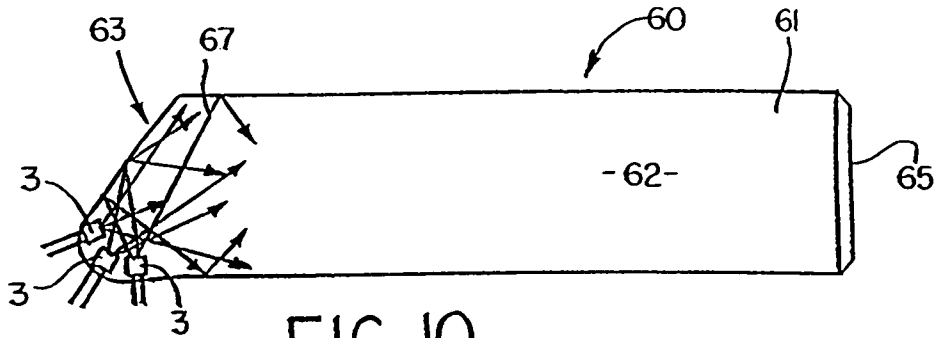


FIG. 10

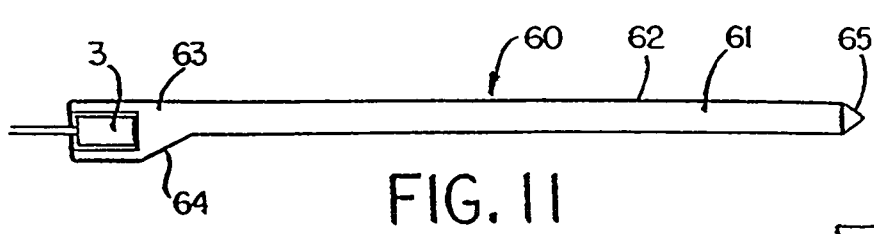


FIG. 11

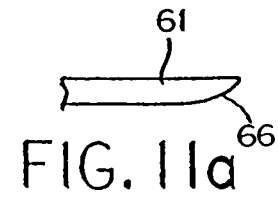


FIG. 11a

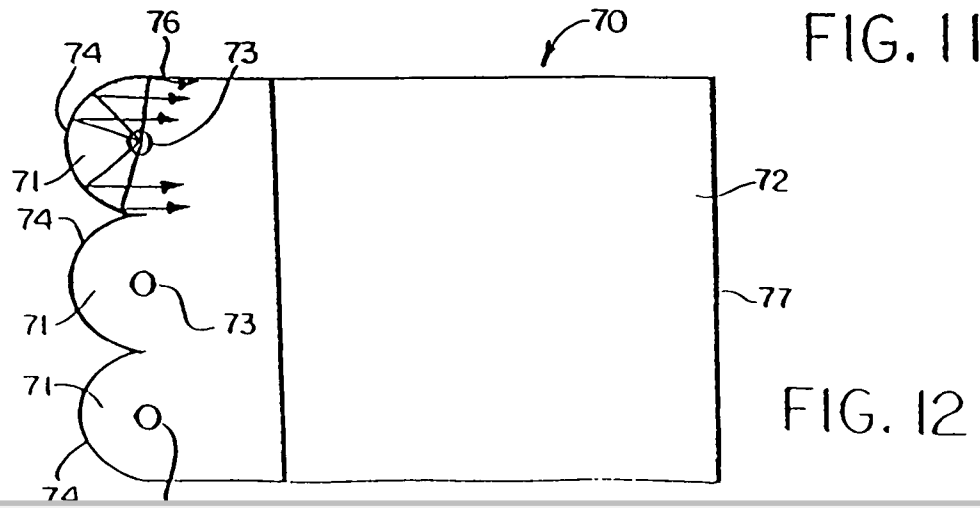


FIG. 12

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