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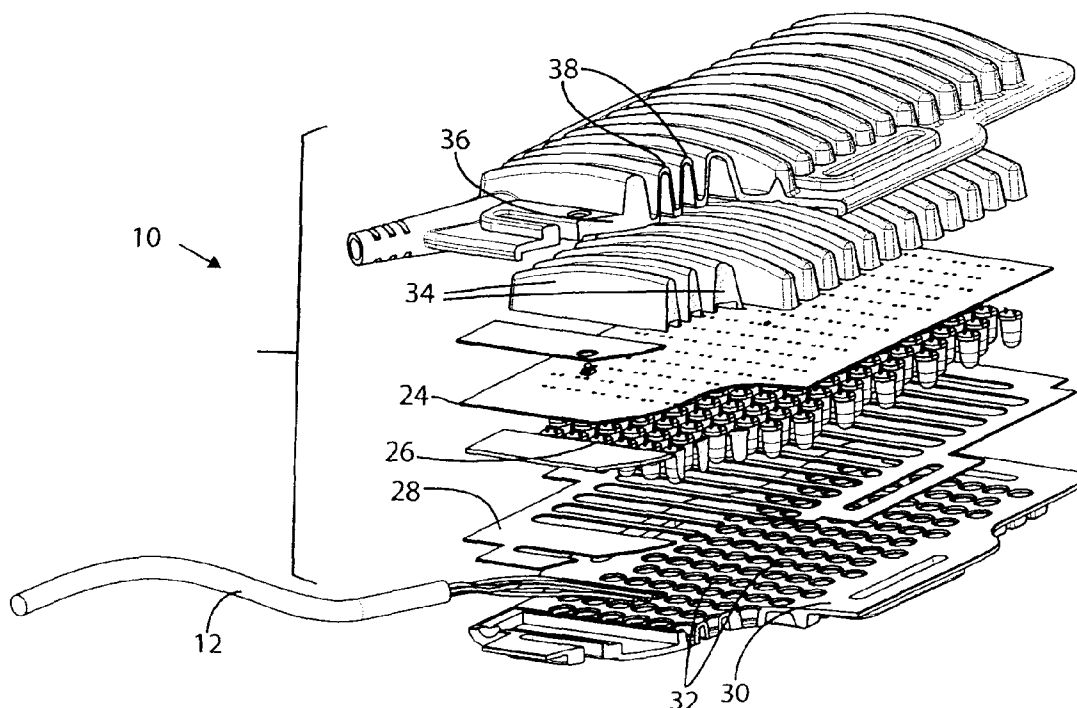
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(54) Title: LIGHT TREATMENT HEAD



(57) Abstract: A light treatment head which incorporates an array of light sources, a flexible power distribution panel, a plurality of heat sink bodies closely associated with the light sources, and a flexible housing enclosing the light sources, the distribution panel and the heat sink bodies.

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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.

LIGHT TREATMENT HEAD

FIELD OF THE INVENTION

The invention relates to the field of light treatment therapy, and equipment for such therapy.

BACKGROUND OF THE INVENTION

Light treatment of patients for various conditions is becoming well known. Light treatment of injuries such as sport injuries, sprains and the like, light treatment of chronic conditions such as arthritis, sciatica and various related conditions, and light treatment of chronic slow healing wounds or sores, are all well known.

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The principle of all these light treatments is the application of low intensity light radiating in the area of the patient's condition. It is found that in order to be effective, the light source should be close in contact with the skin. The light source is usually an array or panel of low intensity light emitting diodes, or in some cases low level laser. It is also found that the treatment becomes more effective over longer periods. The light sources are usually left in contact with the skin for thirty to sixty minutes in many cases. This ensures deep penetration of the light rays into the tissues, and produces the healing results experienced.

20

It is of course obvious that the light sources will develop heat. During the course of one application or treatment the heat developed by the light sources may become too great, and produces patient discomfort. It is then necessary to discontinue treatment for a moment, and exchange the one light treatment head with another, so that the treatment can continue. As a result of this light treatment in the past has been expensive. The

need for providing multiple treatment heads for the treatment of each patient, significantly adds to the initial investment required to set up a clinic providing the treatment. Also, it is necessary to have paramedical or nursing assistants inspecting the various treatment stations regularly, to ensure that the patients are not suffering any discomfort from the treatment, and to change the treatment head before the patient suffers discomfort. This too adds to the cost of the treatment and the operation of the clinic. Clearly it is desirable to provide a light treatment head for this type of treatment which is capable of dissipating at least some of the heat generated by the light sources, and treatment heads also that are of such a design that they can be manufactured at a more reasonable cost.

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Another factor in the design of such treatment head is that the treatment is preferably applied over a fairly large area of the body. Light treatment heads usually measure about four inches by ten inches, but could be even bigger if a suitable design was available. In order to provide a light treatment head of this large footprint, it is desirable to make the treatment head flexible. This ensures that the light sources in the light treatment head can all lie in contact with the skin, with the light treatment head flexing and conforming to the shape of the body.

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BRIEF SUMMARY OF THE INVENTION

The invention provides a light treatment head which incorporates an array of light sources, characterised by a flexible contact distribution network board, and a plurality of heat sink bodies closely associated with the light sources, and a flexible housing for enclosing the light sources, the distribution board and the heat sinks.

Preferably there will be a flexible face panel formed with a plurality of holes for receiving light sources, and a plurality of individual heat sink bodies are provided.

Preferably there will be a back panel provided, overlying the heat sink bodies .

10 Preferably the back panel and the face panel are bonded together around the flanges.

Preferably the heat sink bodies are typically secured in the recesses by adhesive.

Preferably the heat sink body recesses are formed in the back panel and thus form an array of fin like bodies, with air spaces between them, and defining a substantial surface area in contact with the air.

Preferably the face panel and back panel are formed of synthetic flexible material, such as a silicon type material which can be moulded to the desired shape, and which can be subjected to heat, and which will remain flexible.

IN THE DRAWINGS

20 Figure 1 is a perspective illustration of a light treatment head illustrating the invention;

Figure 2 is an exploded perspective of Figure 1;

Figure 3 is a section corresponding of the treatment head exploded; and,

Figure 4 is a perspective illustration of a typical heat sink body.

DESCRIPTION OF A SPECIFIC EMBODIMENT

A typical light treatment head illustrating invention is shown as (10) in Figure 1. The treatment head will be seen to be of rectangular shape, and having a connection cable (12) extending from one corner for convenience. The treatment head has a light source side (14), and a heat sink side (16) opposite to the light source side.

Edge flanges (18) may advantageously be arranged around the edge of the head, and slots (20) may be formed in such flanges. Any suitable form of attachment straps (22) can be slipped through the slots, so that the treatment head can be temporarily
10 secured in a location on a patient's body.

As shown in Figure 2, the treatment head is made up of a light source circuit panel (24), provided with wiring suitable for supplying a plurality of light sources (26). An intermediate non-conductive panel (28) is located beneath the panel (24). A flexible face panel (30) is formed with a plurality of holes (32) for receiving light sources (26). A plurality of individual heat sink bodies (34) are provided. The heat sink bodies (34) are in this case formed of aluminum, or other metal having suitable heat transfer properties may be used. They are preferably formed, in section, in the shape of elongated wedges, so as to provided for ease of assembly (Fig. 4).

20 A back panel (36) is provided, overlying the heat sink bodies (34). The back panel (36) and the face panel (30) are bonded together around the flanges (18) by any suitable adhesive or chemical bonding agent, or by heat sealing.

The back panel (36) is formed with a plurality of heat sink body recesses (38), defining recesses shaped to fit and receive individual heat sink bodies (34). The heat sink bodies (34) are typically secured in the recesses (38) by adhesive. The heat sink body recesses (38) are formed in the back panel (36) and thus form an array of fin like bodies, with air spaces between them, and defining a substantial surface area in contact with the air. In this way heat can be transferred from the heat sink bodies (34), through the back panel (36), to atmosphere, and thus dissipated from the treatment head.

10 The face panel (30) and back panel (36) are preferably formed of synthetic flexible material, such as a silicon type material which can be moulded to the desired shape, and which can be subjected to heat, and which will remain flexible.

When power is supplied to the light circuit panel (24), the lights (26) in the array attached to the panel are illuminated. When the treatment head is placed in contact with the skin, some of the heat generated by the lights will be transferred through circuit panel (24) to the heat sink bodies (34). As these heat sink bodies (34) heat up, some heat from them will be re-radiated or conducted to the exterior of the back panel (36), and will be dissipated from the back panel (36) by radiation and convection. This will
20 assist in avoiding excessive heat from the lights being applied to the skin.

The material from which the face panel (30) and the back panel (36) are made is flexible, and allows the treatment head to fold around and lie against an area of the

body to be treated.

The foregoing is a description of a preferred embodiment of the invention which is given here by way of example only. The invention is not to be taken as limited to any of the specific features as described, but comprehends all such variations thereof as come within the scope of the appended claims.

CLAIMS

1. A light treatment head (10) having a plurality of light sources(26) for the application of light therapy to a living body, and characterised by;
a flexible power distribution board (24),
a plurality of light sources (26) connected to said board;
a heat sink body assembly (34) closely associated with the light sources; and,
a flexible housing (30,36) for enclosing the light sources, the distribution board and the heat sink body assembly .
- 10 2. A light treatment head for the application of light therapy to a living body, as claimed in Claim 1 and further characterised by a flexible face panel (30) being formed with a plurality of holes (32) for receiving said light sources
3. A light treatment head for the application of light therapy to a living body, as claimed in Claim 2 and further characterised by said heat sink body assembly (26) comprising a plurality of individual separate heat sink bodies (26).
4. A light treatment head for the application of light therapy to a living body, as claimed in Claim 3, further characterised by further including a back panel (36)
20 overlying the heat sink bodies .
5. A light treatment head for the application of light therapy to a living body, as claimed in Claim 4 further characterised by the back panel (36)and the face panel (30)

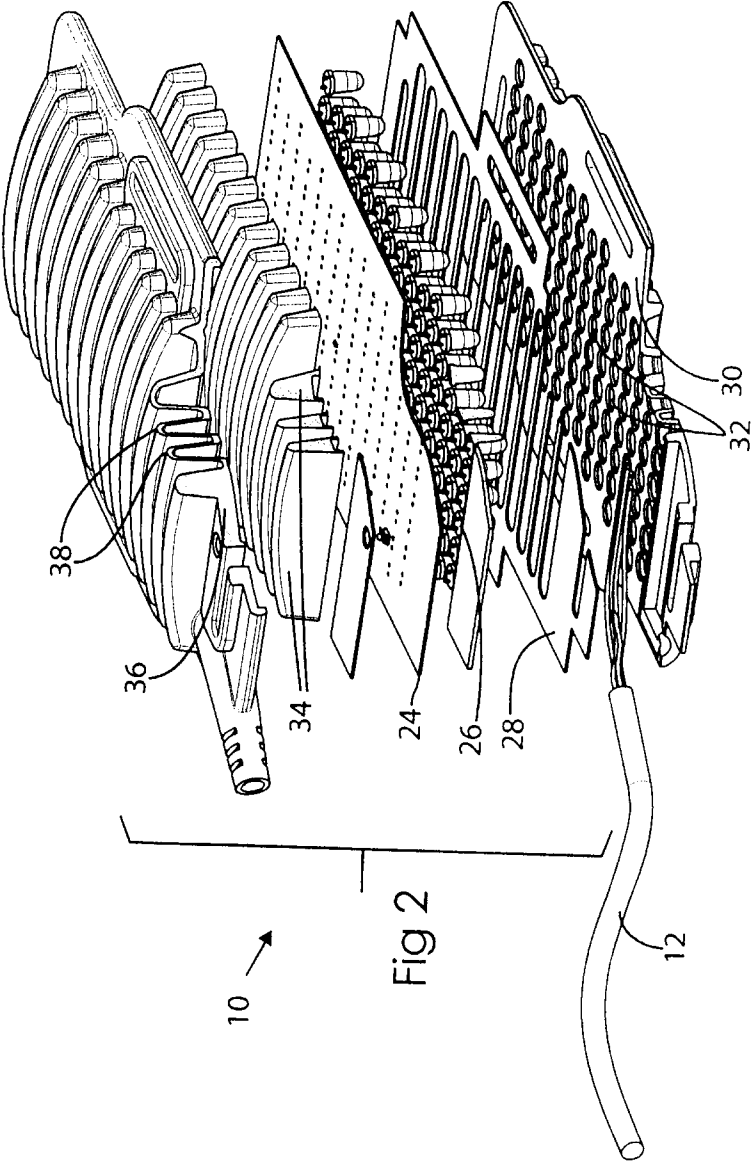
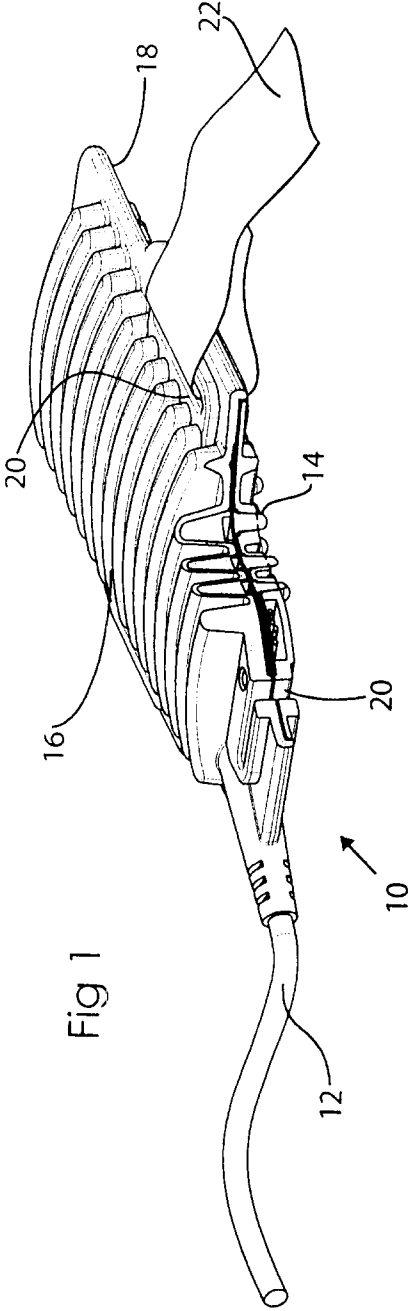
having edge flanges(18) and being bonded together around the flanges.

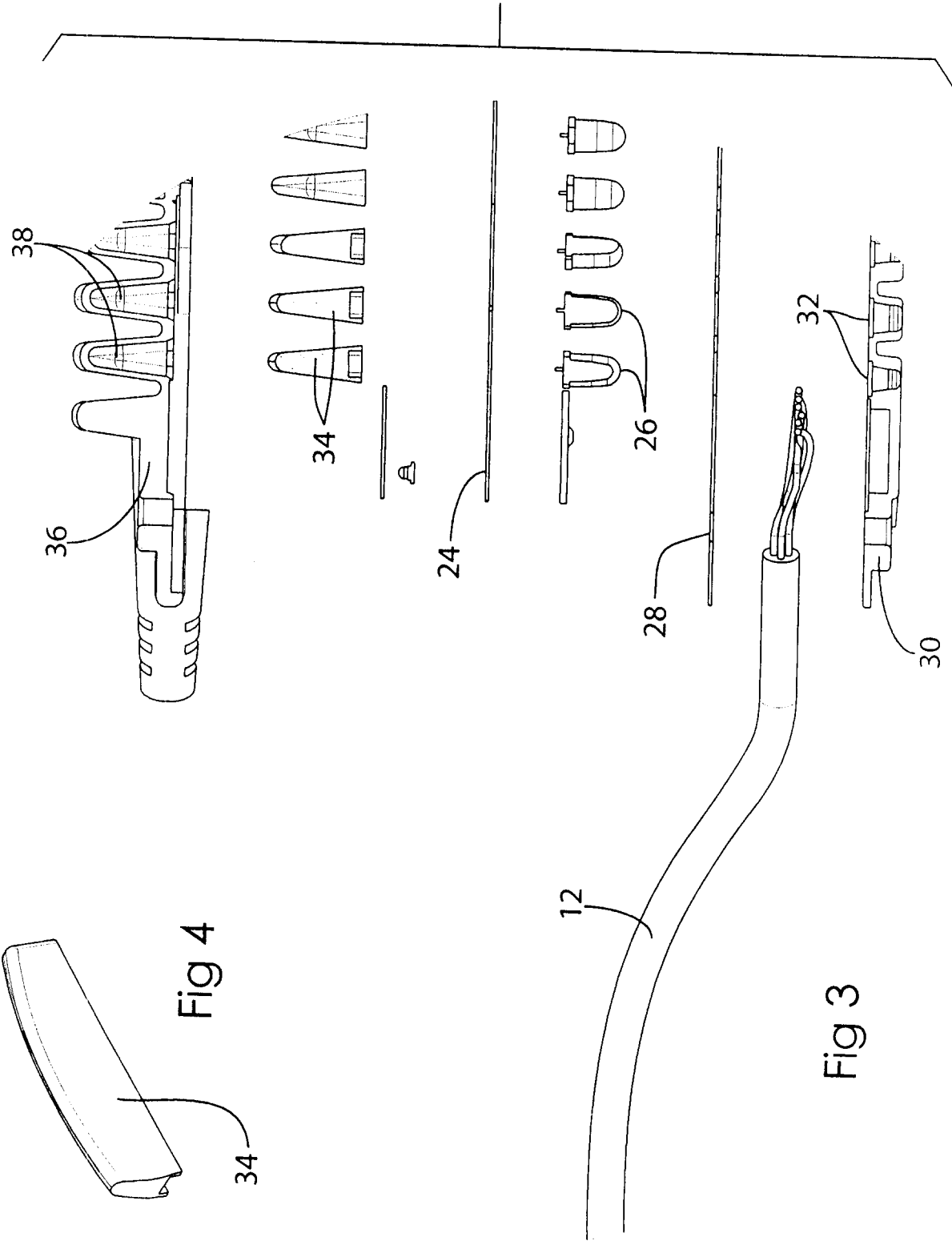
6. A light treatment head for the application of light therapy to a living body, as claimed in Claim 2, further characterised by said back panel (36) being formed with a plurality of heat sink body recesses(38), shaped to received respective said heat sink bodies (34), and defining free air spaces between said recesses , on the exterior of said back panel.

7. A light treatment head for the application of light therapy to a living body, as claimed in Claim 6 further characterised by said heat sink bodies (34) being secured in said recesses (38) by adhesive.

8. A light treatment head for the application of light therapy to a living body, as claimed in Claim 6 further characterised by said heat sink body recesses (38) being formed in the back panel (36) and defining an array of fin like bodies, with air spaces between them, and defining a substantial surface area in contact with the air.

9. A light treatment head for the application of light therapy to a living body, as claimed in Claim 6 further characterised by said face panel(30) and back panel(36) being formed of synthetic flexible material, selected from the group of silicon type materials which can be moulded to the desired shape, and which can be subjected to heat, and which will remain flexible.





INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER IPC: A61N 5/06 (2006.01) , F21V 29/00 (2006.01) , G12B 15/06 (2006.01) , H05K 7/20 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC		
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used) USPTO WEST, Canadian Patent Database: Keywords: laser therapy, light therapy, LLLT, photon therapy, LLPT, phototherapy, hand held, flexible, heat sink, bilirubin, treatment head, housing		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US6221095 Van Zuylen et al (Meditech International Inc) 24 April, 2001 (24-04-2001) See the abstract and col. 3, line 59 - col. 4, line 63	1 - 9
Y	US2005/0182460 Kent et al 18 August 2005 (18-08-2005) See the whole document	1 - 3, 5 - 9
Y	US5358503 Bertwell et al 25 October 1994 (25-10-1994) See the abstract, col. 3, lines 40 - 53 and col. 4, lines 30 - 68	1 - 9
A	US6290713 Russell 18 September, 2001 (18-09-2001) See the abstract, col. 3, line 38 - col. 4, line 7, col. 4, lines 52 - 67, col. 7, line 55 - col. 8, line 15, col. 8, lines 62 - 67, col. 9, lines 10 - 17, col. 9, line 54 - col. 10, line 8 and col. 13, lines 20 - 50	1 - 9
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US5634711 Kennedy et al 3 June 1997 (03-06-1997) See the abstract and col. 3, lines 30 - 37	1- 9
A	US6596016 Vreman et al (The Board of Trustees of the Leland Stanford Junior University) 22 July 2003 (22-07-2003) See the abstract and col. 9, line 48 - col. 10, line 14	1 - 9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CA2007/000606

Patent Document Cited in Search Report	Date	Publication Member(s)	Patent Family Date	Publication
US 6221095B1	24-04-2001	AU 739711B2		18-10-2001
		AU 4938897A		03-06-1998
		BR 9712948A		28-03-2000
		CA 2210450A1		13-05-1998
		CA 2210450C		14-11-2006
		EP 0951314A2		27-10-1999
		EP 1632267A2		08-03-2006
		EP 1632267A3		02-08-2006
		GB 9623627D0		08-01-1997
		US 2001008973A1		19-07-2001
		WO 9820937A2		22-05-1998
		WO 9820937A3		23-07-1998
US 6596016B1	22-07-2003	US 6350275B1		26-02-2002
US 6290713B1	18-09-2001	AU 774030B2		17-06-2004
		AU 6646800A		19-03-2001
		CA 2382753A1		01-03-2001
		CN 1250302C		12-04-2006
		CN 1382065A		27-11-2002
		EP 1212118A1		12-06-2002
		HK 1051151A1		24-11-2006
		JP 2003507144T		25-02-2003
		NZ 517898A		31-10-2003
		WO 0114012A1		01-03-2001
US 5358503A	25-10-1994	CA 2181467A1		27-07-1995
		CA 2181467C		06-07-1999
		DE 69526923D1		11-07-2002
		DE 69526923T2		19-12-2002
		DK 741594T3		15-07-2002
		EP 0741594A1		13-11-1996
		EP 0741594B1		05-06-2002
		ES 2174929T3		16-11-2002
US 5634711	03-06-1997	WO 9519812A1		27-07-1995
		AU 7737894A		03-04-1995
		CA 2149339A1		23-03-1995
		CA 2149339C		14-02-2006
		US 5420768A		30-05-1995
US 2005182460A1	18-08-2005	WO 9507731A1		23-03-1995
		CN 2704383Y		15-06-2005
		HK 1061169A2		27-08-2004
		TW 256751Y		11-02-2005
		US 7125416B2		24-10-2006