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(56) Documents Cited:
GB 2140429 A
EP 0401883 A1
WO 2008/041215 A1
US 5652053 A
US 20080262400 A1
EP 1685953 A1
WO 2010/103186 A2
WO 2000/057821 A1
US 4240415 A
US 20080086068 A1

(58) Field of Search:
INT CL **A61F**
Other: **EPODOC, WPI**

(54) Title of the Invention: **Orthopaedic cast replacement**
Abstract Title: **Reusable thermopolymer orthopaedic cast**

(57) A replacement for a plaster of paris orthopaedic cast which can be re-used many times by virtue of a thermally reversible active compound that is a fluid at around 60 degrees Centigrade and a solid at body temperature, which is contained in a pack or belt that can be formed around an affected limb in the fluid phase and cooled to a solid to provide support and protection. The compound may be a mixture of thermoplastic polymers and synthetic waxes, and may be heatable in a pre-application oven or by means of 3-dimensionally printed heating circuits. Sensors may be affixed to the cast to monitor temperature or pressure, and vibrations may be used to promote healing. The skin contact surfaces may be anti-microbial.

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Title; **Orthopaedic Cast Replacement**

Description.

Background;

Orthopaedic casts are mostly made using Plaster of Paris bandage, which is dipped in water and wrapped around the affected limb. Removal of the cast is carried out by sawing through the cast which is then discarded.

This invention is a replacement for plaster bandaging that uses a blend of thermoplastic polymers and synthetic waxes which is solid at body temperature but becomes a flexible fluid at a temperature just below 60 degrees centigrade.

This allows the cast to be re-used many times.

Statement of Invention;

This invention is a replacement for an orthopaedic plaster cast that makes use of a blend of thermoplastic polymers and synthetic waxes that is solid at body temperature and semi-molten just under 60 degrees. The blend is contained in a laminated polymer film pouched pack that has 3-dimensionally printed heating circuits strategically placed to enable key areas of the cast to be softened to facilitate easy removal from the limb of the patient without the need for damaging the pack. The pack has a woven textile cover which has a set of tightening straps for applying pressure on the pack contents to mould to the shape of the limb.

The blend is solid at body temperature (circa 40 degrees centigrade) and a flexible fluid at a temperature just below 60 degrees centigrade. When heated to just under 60 degrees centigrade, using a thermostatically controlled pre-application oven, the blend becomes putty-like allowing the orthopaedic pack to be moulded around the affected limb. Cooling at room temperature or by application of cold packs then solidifies the pack around the limb providing both immobilisation and protection whilst the limb recovers.

The design of the pack allows the cast to be re-used on the same patient many times. It can also be fully cleaned and sterilised for use with multiple patients.

Advantages of the invention are;

1. Can be sterilised and re-used.
2. Good impact damping when limb is accidentally knocked against an object.
3. Unaffected by moisture; can be used in a swimming pool, warm shower or out in the rain.

4. Since the pack is re-usable many times, unless damaged in use, it can be fitted with sensors to provide data on aspects related to limb health such as;

a. Temperature sensors—to alert the patient or patient's carer to possible infection.

b. Pressure sensors—to alert for swelling that could cut off or reduce circulation.

5. The sensors can be linked to a mobile phone or hospital/clinic monitor via an RF app.

6. The pack can be fitted with a vibrator unit to promote healing by stimulating blood supply close to the injury site(s).

7. Skin contact surfaces can have anti-microbial treatment for reducing infection risks.

Claims;

Title; Reusable Orthopaedic Cast

Claim 1.

An orthopaedic cast that comprises a composite textile wrap around pack or belt containing a polymeric pouched layer within which said pouches are filled with a compound mixture of low melting point polymers and synthetic waxes, that change from a solid to a fluid and back again within the temperature range of 40 to 62 degrees Centigrade, overlaid with 3-D printed heating circuits positioned to allow the pack to be removed when the compound mixture is heated to the fluid phase at the heater sites.

Claim 2.

An orthopaedic cast according to Claim 1, in which the compound mixture additionally includes any of a range of fibres and/or fillers to modify the physical properties of the solid and fluid phases of the mixture.

Claim 3.

An orthopaedic cast according to Claim 1, in which the pack or belt can be moulded around a human or animal limb when the compound mixture is in the fluid phase and then cooled by air or by the application of cool-packs to the solid phase thus providing a rigid support for the limb.

Claim 4.

An orthopaedic cast according to Claim 1, which can be cleaned and sterilised and which can be re-used many times.

Claim 5.

An orthopaedic cast according to Claim 1, in which the textile pack or belt incorporates a moulded plastics or rubber sole so that the cast can be used for protection of a lower limb giving the patient the capability to walk/weight bear on the cast.

Claim 6.

An orthopaedic cast according to Claim 1, which can be placed in a thermostatically controlled oven set at 60 degrees Centigrade so as to change the compound mix to the fluid phase in preparation for use.

Claim 7.

An orthopaedic cast according to Claim 1, which can be produced in a range of different sizes to suit the specific limb requiring protection.

Claim 8.

An orthopaedic cast according to Claim 1, in which can be incorporated pressure sensors to alert the user or the user's clinician to potential loss of circulation through swelling.

Claim 9.

An orthopaedic cast according to Claim 1, in which can be incorporated heat sensors to detect temperature rises and alert the user or the user's clinician to potential infection.

Claim 10.

An orthopaedic cast according to Claim 1, in which can be incorporated vibration devices to stimulate blood supply to specific areas to promote healing.

Claim 11.

An orthopaedic cast according to Claim 1, which has straps or webbing with buckles that can be used to tension the pack or belt around the user's limb when the compound mixture is in the fluid phase, but which cannot be used to undo the pack or belt when the compound mixture is in the solid phase.

Claim 12.

An orthopaedic cast according to Claim 1, in which can be incorporated a chip device to wirelessly transmit data from any embedded sensors to a mobile phone or laptop, PC or monitoring station.

Claim 13.

An orthopaedic cast according to Claim 1, which has embedded connector sockets to provide access for DC power supply for heater circuits and any vibration devices.

Claim 14.

An orthopaedic cast according to Claim 1, in which the textile cover can have an anti-microbial finish where the pack or belt makes skin contact.

Intellectual Property Office

Application No:	GB1222878.9	**Examiner:**	Dr Joanna Manning
Claims searched:	1-14	**Date of search:**	27 August 2014

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-14	WO 2010/103186 A2 (ONBONE OY) Whole document relevant
X	1-14	US 2008/262400 A1 (PROSTHOTICS FUNCTIONAL SYSTEMS LLC) Whole document relevant
X	1-14	US 2008/086068 A1 (KARL OTTO BRAUN GMBH & CO KG) Whole document relevant
X	1-14	WO 2008/041215 A1 (FASTFORM RES LTD) Whole document relevant
X	1-14	EP 1685953 A1 (RUNLITE S A) Whole document relevant
X	1-14	WO 00/57821 A1 (CHANG) Whole document relevant
X	1-14	EP 0401883 A1 (LUXILON IND & CO N V) Whole document relevant
X	1-14	GB 2140429 A (WFR AQUAPLAST CORP) Whole document relevant
X	1-14	US 4240415 A (WFR AQUAPLAST CORP) Whole document relevant
X	1-14	US 5652053 A (LIEGEOIS) Whole document relevant

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of	P	Document published on or after the declared priority date but before the filing date of this invention.

Intellectual Property Office

	same category.		
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

Worldwide search of patent documents classified in the following areas of the IPC

A61F

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
A61F	0005/01	01/01/2006
A61F	0013/04	01/01/2006
A61L	0015/12	01/01/2006