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(71) Applicant(s):
Myovolt Limited
5th Floor, St Georges Building,
2 Ice House St Central, Hong Kong

(72) Inventor(s):
Steven Leftly
Dianne Jones

(74) Agent and/or Address for Service:
Haseltine Lake LLP
5th Floor Lincoln House, 300 High Holborn, LONDON,
WC1V 7JH, United Kingdom

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(56) Documents Cited:
GB 2515010 A **WO 2016/051414 A1**
WO 2013/122870 A1 **US 5902256 A**
US 20120259255 A1 **US 20120253236 A1**
US 20090076421 A1

(58) Field of Search:
INT CL **A61H**
Other: **EPODOC, WPI**

(54) Title of the Invention: **Wearable vibration device**
Abstract Title: **Wearable Vibration Device**

(57) A wearable vibration device for delivering vibration to the muscles and soft tissues of a wearer comprises an upper soft fabric foam covered case 1 encompassing at least a vibration motor 2, a lithium ion battery 4, a control PCB 5, a control switch with LED display 6 and a lower fabric covered case 3. The upper and lower cases 1,3 are fixed together by gluing or stitching. The control PCB drives vibration motor to set frequencies for vibration motor activations. Vibrations for the device are tuned at frequencies in the range of 30-50Hz. The device is held in place and lined up with the holes (10, Fig 2) of a stretchable strap (8), which is then wrapped around the target muscle or limb area.

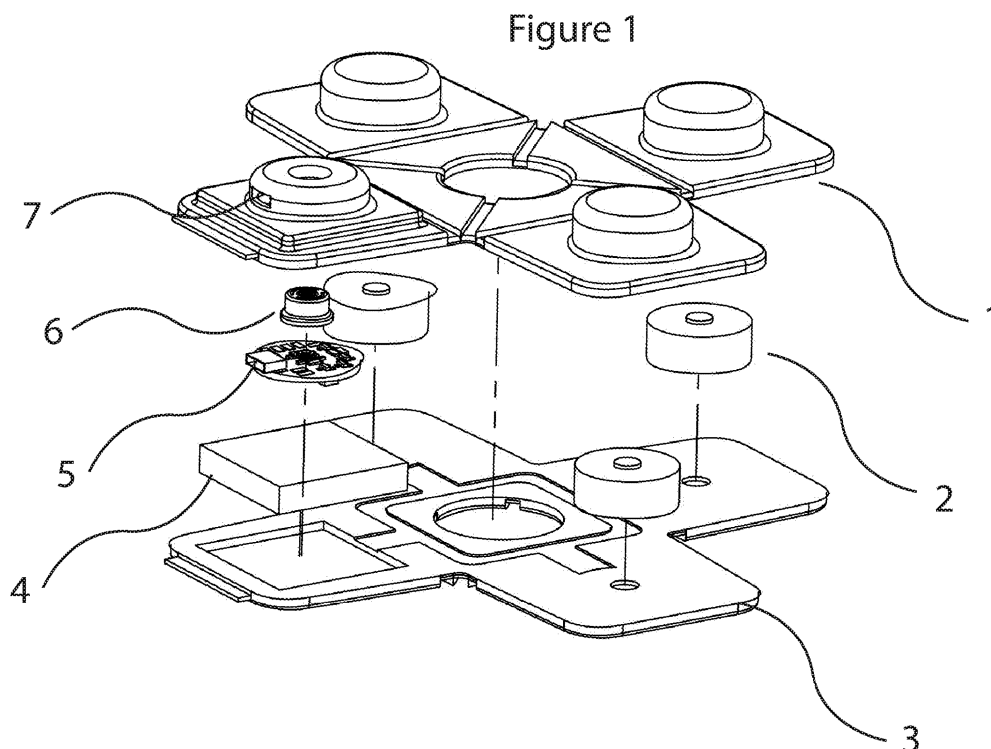


Figure 1

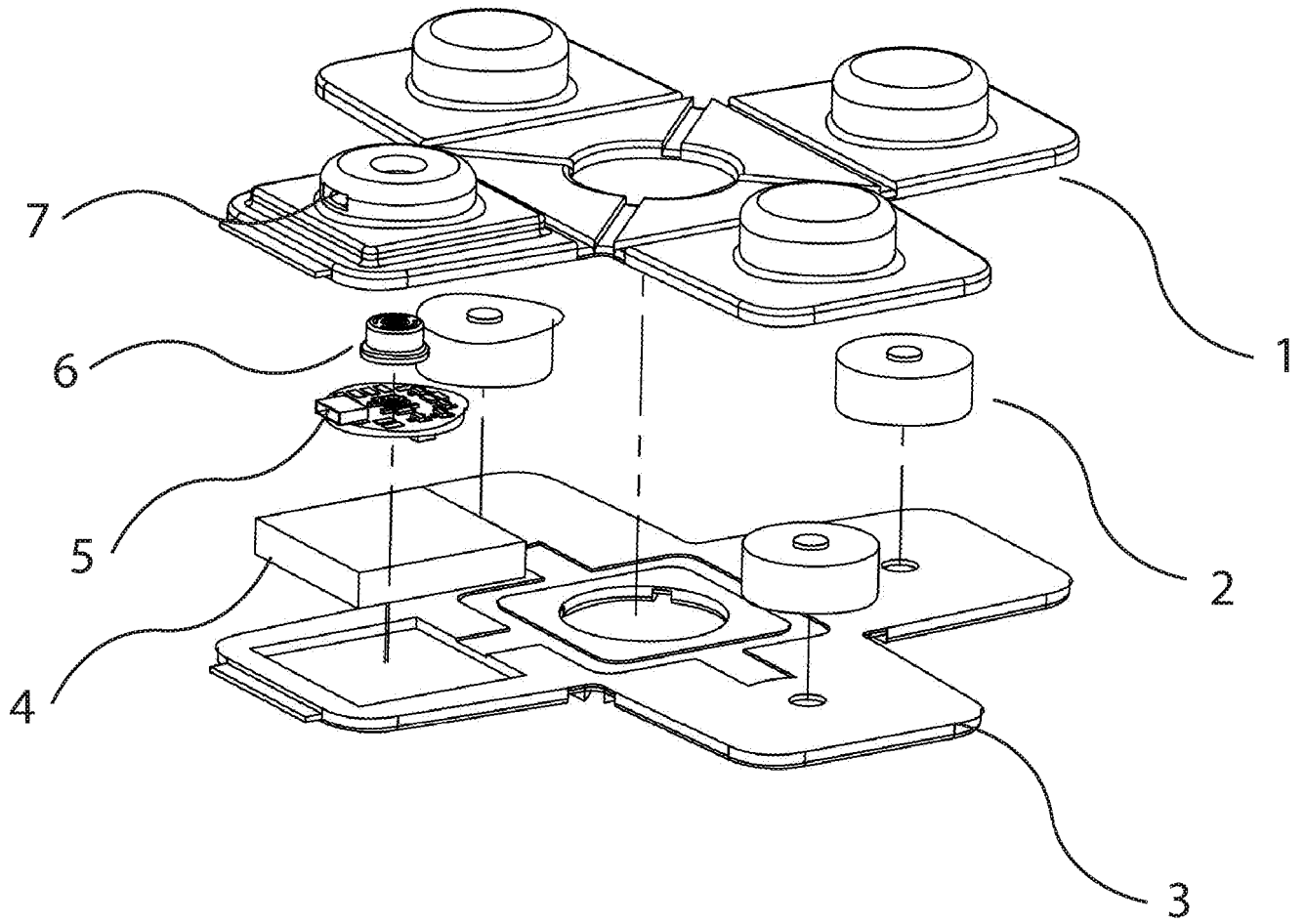
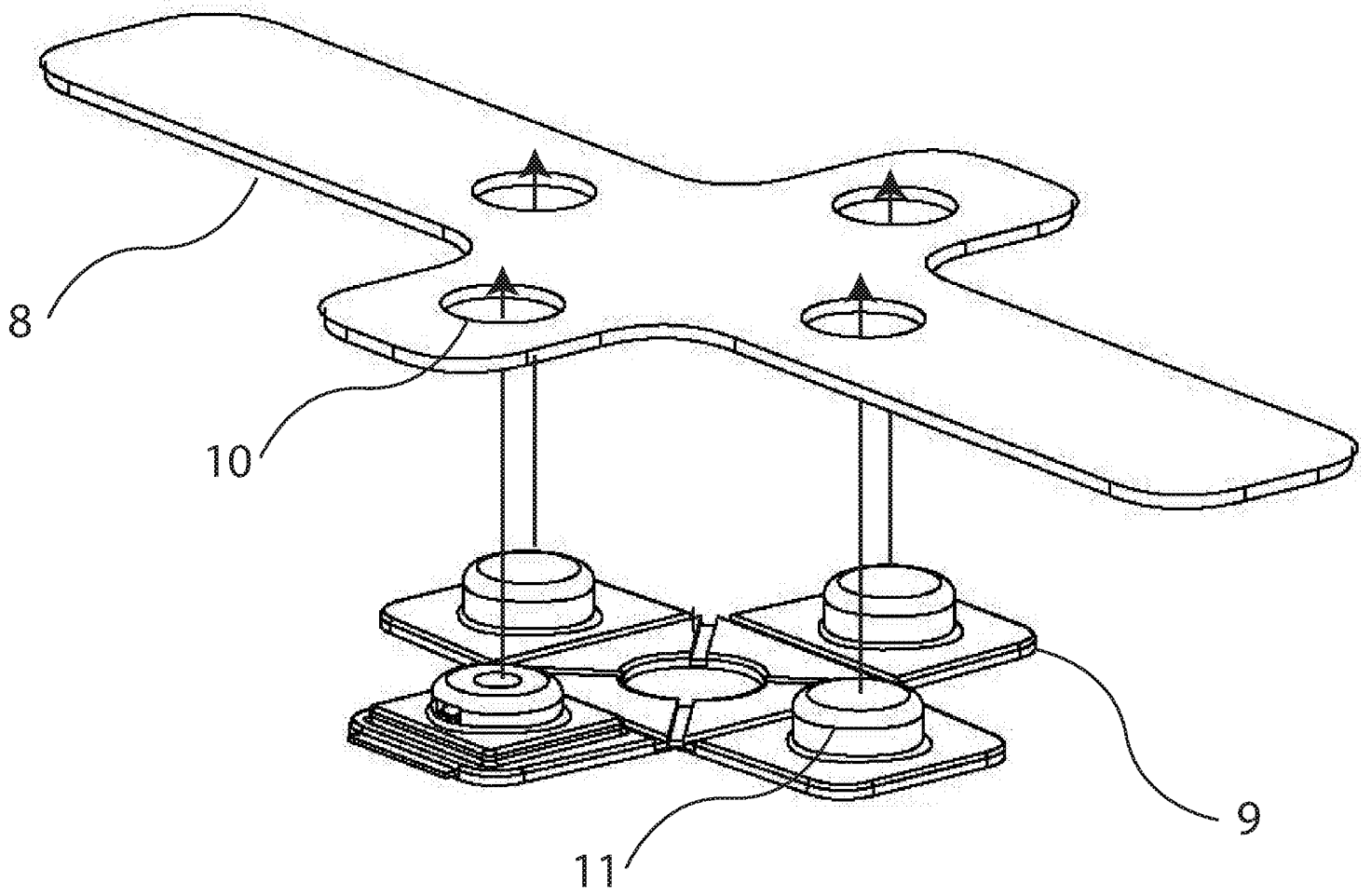


Figure 2



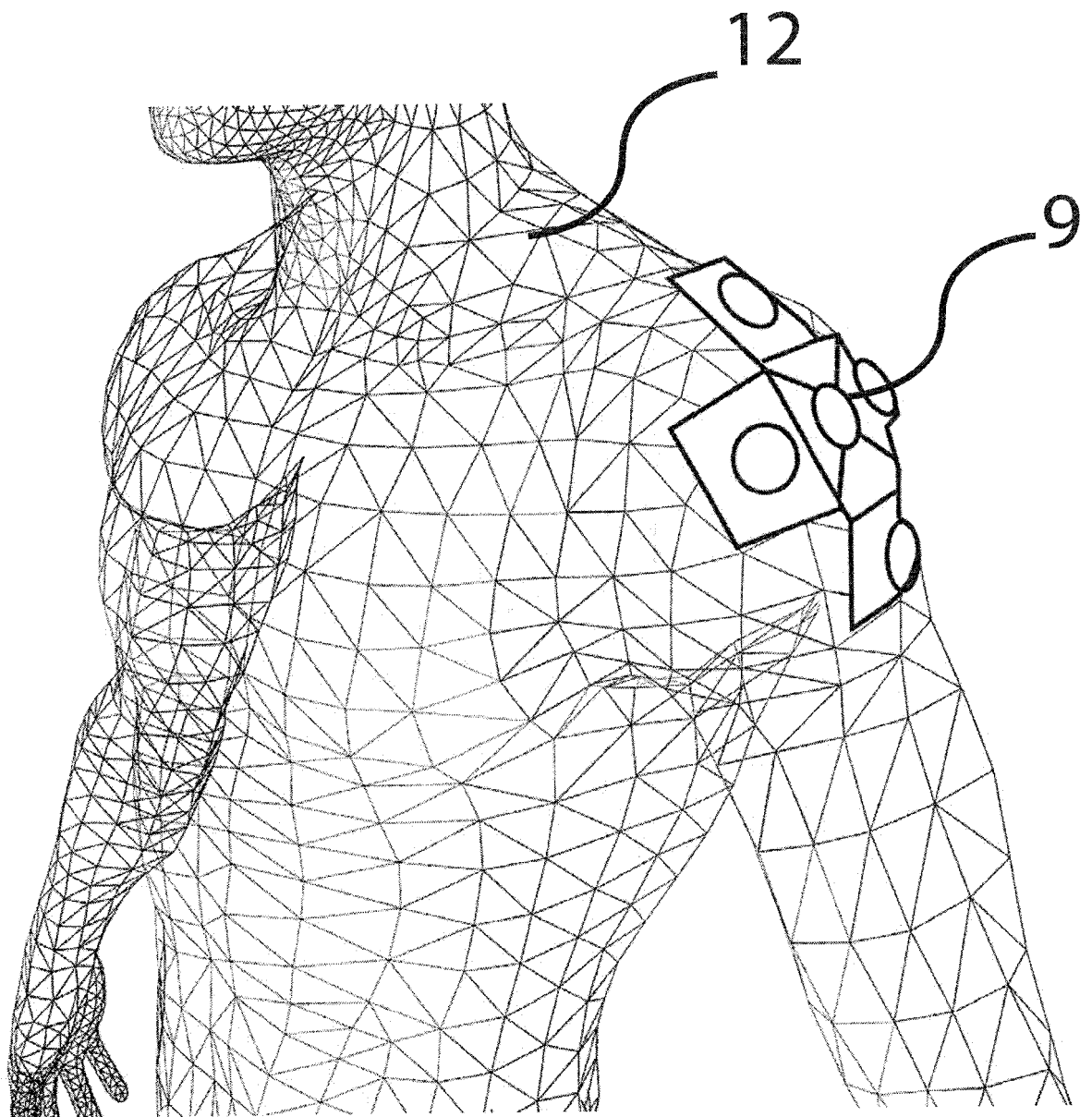


Figure 3



The following terms are registered trade marks and should be read as such wherever they occur in this document:

Velcro (page 2)

Wearable vibration device

This invention relates to an innovative design for a wearable vibration device. Using improvements on designs from prior patent GB1310058.1 this invention provides a complete wearable device design fit for purpose in the muscle treatment field.

This invention is a wearable technology that can benefit everyone, from elite athletes to anyone who cares about their fitness and want to improve how they perform and feel. In sport small incremental improvements and gains, every extra advantage is key and this invention can deliver those gains.

The invention is a soft wearable module that delivers high energy vibration deep into muscle and soft tissue. This can increase blood flow and circulation, as well as lengthening and stretching the muscles.

Extensive Medical research has shown that both targeted frequency and whole body vibration can increase muscle power, increase circulation, warm up muscles, relax muscles and ligaments and can reduce also pain. The key innovation of the innovation is that it is soft, wearable and the vibration focus is targeted at specific body locations. The invention applies the vibration energy directly to the target muscle or deep tissue area using three wearable actuators in soft module. The energy tuned at frequencies between 30-50Hz which have been shown to product the most performance increase for muscle power and other beneficial physiological effects.

The module is held in a neoprene alignment strap which enables the direction of the vibration energy to be focused at keys areas of the body and also limbs or joints. This means a user can apply the product directly to their chosen muscle group or area of focus. The module can be utilized for benefits in sports training for pre-match performance, post-match recovery and also injury therapy.

The module can be used in three basic modes:

Muscle Performance improvement

The module can improve muscle performance by:

- *Warming up muscles and ligaments providing more muscle power from startup
- *increasing localised circulation helping deliver more oxygen where it's needed
- * reduce risk of damage or injury by pre-warming muscles and joints.

Sports Recovery Tool

Accelerates Recovery enhances warm down by:

- *increasing circulation of targeted muscles for speeding up the removal of lactic acid
- * can reduce swelling faster when combined with cold treatment.
- *provide gentle warm down massage to tired and sore muscles.

Therapy Tool

The module can be used as a Therapeutic tool by:

- *Deep tissue vibration gently soothing any aches, strains without the power of heavy massage
- *reduce pain in muscles, ligaments and joints

The unique module design makes it very simple to use. The module is held in place and lined up with the holes of an alignment strap, which is then wrapped around the target muscle or limb area. After the Velcro is tensioned to hold the module firmly against the skin, the module can be switched on. By pressing the switch the wearer can choose one of selected programmes using software to determine a sequence of vibration motor s activations a frequencies.

Key features of the module are due to the materials used in its construction. The module is housed in a vibration transmissive foam with soft fabric covering. This allows the module to be bent in several planes to wrap around all body geometry parts easily. The module shape has been carefully designed and a convex polygon shape allows for multi-plane folding. This allows it to wrap easily around the body forms while keeping the flat surfaces required for vibration transmission.

Another feature of the invention is a series of fitted textile alignment straps to target all major muscle groups and joints so the wearer can target any and all areas. The straps are made of an elastic fabric, such as neoprene, with locating holes to position the module and lock I in position.

Further aspects of the invention are shown in the following drawings.

Figure 1

Figure 1 shows the improved wearable vibration module design and components breakdown. A soft fabric covered foam case upper (1) encases the internal components which comprise vibration motors (2), a control PCB (5), a control switch with LED display (6), a lithium ion battery (4). A lower fabric covered EVA case (3) encloses the module. The upper and lower fabric covered EVA cases are fix together by gluing or stitching.

Figure 2

For Figure 2 a finished wearable vibration module (9) is shown being inserted in a stretchable fabric strap (8). The wearable vibration module (9) locks into the fabric strap using aligning cut-out holes in the strap (10) which correspond with the motor cylinder shapes (11) on the module.

Figure 3

Figure 3 shows the wearable vibration module (9) placed in situ on a human shoulder location (12)

CLAIMS

1. A novel wearable sensor module system comprising:
 - a wearable electronic sensor module includes an electronic sensor and at least an magnet fixture;
 - a multi-layer conductive fabric includes an electrically conductive fabric member, a basic fabric and a semiconductor coated fabric;
 - at least a metallic fixture connected to said multi-layer conductive fabric;
 - wherein said multi-layer conductive fabric is in contact with the metallic fixtures for providing a stable and durable electronic signal communication with the electronic sensor.
 - wherein said magnetic fixture is self locating electronically contactable magnetic material to form a unique electronic contact between said multi-layer conductive fabric and said electronic sensor module and to transfer electrical signal from electronic sensor to the multi-layer conductive fabric through said metallic fixture.
2. The novel wearable sensor module of claim 1, wherein said magnetic fixture includes a magnet ring with an iron plate.
3. The novel wearable sensor module of claim 1, wherein said metallic fixture is made of ferrous material be coated with a durable nano particle coating to provide low resistance electrical contact.
4. The novel wearable sensor module of claim 1, wherein said metallic fixture is further coated to make the said metallic fixtures durable to domestic washing and dry-cleaning.

5. The novel wearable sensor module of claim 1, wherein said electronic sensor module firmly attached to the multi-layer fabric sensor to provide a multi-channel electronic connection to the fabric.
6. The novel wearable sensor module of claim 1, wherein said magnetic fixture is recessed in to the electronic sensor so that the self locating magnetic fixture locks with the electronic sensor module.
7. The novel wearing sensor module of claim 1, wherein said novel wearable module attached to a garment for gathering physiological signals, or transmitting TENS signals or providing some other electronic function directly to the wearer's skin.
8. The novel wearing sensor module of claim 1, wherein said novel wearable module contains an electronic circuit and components to provide a variety of features includes of heart rate sensing, breathing sensing, temp sensing, movement sensor, motion sensing, posture sensing, tens application, wireless receiving and transmission of data, emotion sensing, and other environmental sensing.
9. An electronic sensor module and an apparel attachment fixture which in turn is attached to a fabric material, the electronic sensor module having recessed electronic connection ports on the underside which connect to mating crimped burrs attached to the fabric element using magnetic fixtures.
10. An electronic sensor module as claimed in claim 9, wherein the burrs are made of ferrous material.
11. An electronic sensor module as claimed in claim 9 or 10, wherein the burrs are arranged in groups to self- locate multiple electrical contacts to the garment.
12. An electronic sensor module as claimed in any of claims 9 to 11, wherein the burrs are coated with a nano particle coating.

13. An electronic sensor module as claimed in claim 12, wherein the nano particle coating forms an electrical connection between the fabric element and the electronic sensor module.
14. An electronic sensor module as claimed in any of claims 9 to 13, wherein the magnetic fixtures are recessed into the module case and the burrs protrude from the fabric element.
15. An electronic sensor module as claimed in any of claims 9 to 14, wherein the burrs comprise rivets.
16. An electronic sensor module substantially as described herein, with reference to and as shown in the accompanying drawings.

Amendments to the claims have been filed as follows:

Claims:

1. A novel wearable vibration device delivering high energy vibration deep in to the muscles and soft tissues for muscle treatment comprising:

an upper fabric foam covered case encompassing at least a vibration motor; a lithium ion battery; a control PCB; a control switch with LED display and a lower fabric covered case.
2. The device of claim 1, wherein said upper fabric foam covered case and said lower fabric covered case are fixed together by gluing or stitching.
3. The device of claim 1, wherein said high energy vibration is focused to target specific body locations and penetrates deep in to the muscle and to the soft tissues.
4. The device of claim 1, wherein said vibrations are tuned at frequencies in the range of 30-50Hz to increase muscle power and for other beneficial physiological effects.
5. The device of claim 1, wherein said device is held in a place lined up with the holes of an alignment strap.
6. The device of claim 1, wherein a Velcro is tensioned to hold the wearable module firmly against the skin.
7. The device of claim 1, wherein said control PCB module determines to set frequencies for a sequence of vibration motors activations.
8. The device of claim 1, wherein a user applies the device to the chosen muscle or to specific area of any parts of the body.

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9. The device of claim 8, wherein said device bent in several planes to wrap around all body geometry parts.
10. The device of claim 1, wherein said device improves muscle improvement performance and acts as a sports recovery tool and therapy tool.



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Examiner: Robert Crowshaw

Claims searched: 1

Date of search: 15 April 2016

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	WO2013/122870 A1 (SNOW BUDDY) See figure 9 and paragraph 48.
X	1	US2009/076421 A1 (GRANT) See paragraph 51.
X	1	GB2515010 A (SENTRIX) Whole document.
X	1	US5902256 A (BENARON) Whole document.
X	1	US2012/253236 A1 (SNOW BUDDY) Whole document.
X	1	US2012/259255 A1 (TOMLINSON) Whole document.
A	-	WO2016/051414 A1 (MYOVOLT)

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 same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	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

A61H

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

EPODOC, WPI



International Classification:

Subclass	Subgroup	Valid From
A61H	0023/02	01/01/2006