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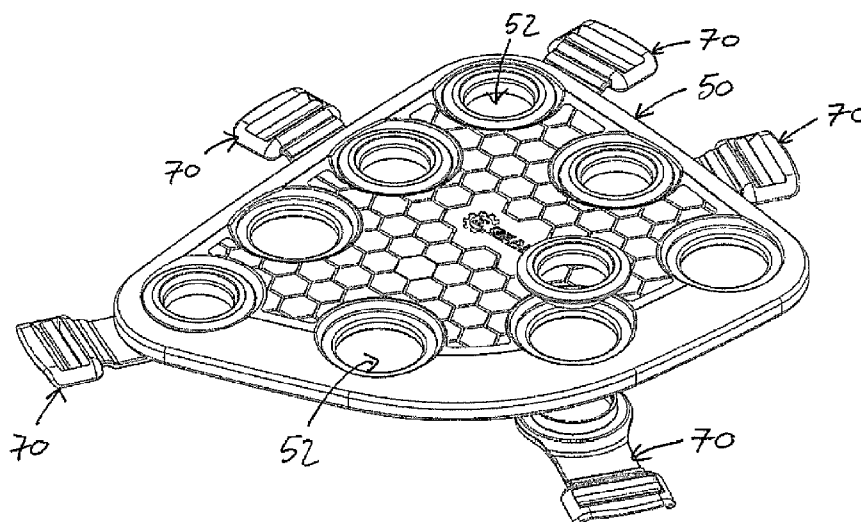


Fig. 14

(57) Abstract: A body weight element for a body weight system having a plurality of components is disclosed. The body weight element comprises flexible support material of a first density defining a solid supporting structure, particulate material of a second density greater than the first density and held by the support material such that the support material holding the particulate material is flexible, and a plurality of first connection portions arranged to facilitate connection of the body weight element to a second connection portion of a separate component of the body weight system. Each first connection portion includes a connection aperture and the connection apertures are disposed relative to the body weight element so as to provide multiple different connection locations for the second connection portion and multiple distributed ventilation locations during use.



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A BODY WEIGHT SYSTEMField of the Invention

- 5 The present invention relates to a body weight system and to a weight element for use in a body weight system.

Background of the Invention

- 10 It is known to provide a body weight system in the form of a suit provided with pockets for receiving weights. Such body weight suits are used to load a person with additional weight at defined locations relative to the person's body, for example for training, exercise, rehabilitation, muscle building, weight loss and/or strength enhancing purposes.

- 15 However, such suits are bulky, cumbersome to use, and inflexible in that it is difficult to modify the suit so that the suit is customized for the person or the desired objective. Such suits are also uncomfortable to wear and can only practically be worn for relatively short periods of time because of compression effects and heat.

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Summary of the Invention

- In accordance with a first aspect of the present invention, there is provided a body weight element for a body weight system having a plurality of components, the body weight element comprising:

- 25 flexible support material of a first density, the support material defining a solid supporting structure;

- particulate material of a second density greater than the first density, the particulate material held by the support material such that the support material holding the particulate material is flexible; and

- 30 a plurality of first connection portions arranged to facilitate connection of the body weight element to a second connection component of a separate component of the body weight system;

- wherein each first connection portion includes a connection aperture and the connection apertures are disposed relative to the body weight element so as to provide multiple different connection locations for the second connection portion and multiple distributed ventilation locations during use.

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In an embodiment, the support material is settable material and the particulate material is distributed through the settable material.

- 5 In an embodiment, the support material includes a first settable material having a first density and a second settable material disposed over the first settable material, the second settable material having a density less than the first settable material.

10 In an embodiment, the support material comprises polymer material that may include urethane material.

In an embodiment, the particulate material comprises powder material.

15 In an embodiment, the particulate material comprises particles of diameter between about 4mm and about 20mm. The particulate material may be of generally spherical shape.

In an embodiment, the particulate material comprises lead, iron, tungsten and/or alloys of lead, iron and/or tungsten.

20

Each connection aperture may be provided with an aperture reinforcing device, such as a cylindrical reinforcing member.

25 In an embodiment, at least one first connection portion includes a ledge portion arranged to facilitate engagement with a second connection portion. the ledge portion may be annular.

In an embodiment, at least one first connection portion includes a first connection component disposable on a first side of the connection aperture and a second
30 connection component disposable on a second opposite side of the connection aperture, the second connection component engageable with the first connection component so as to attach the first connection portion to the connection aperture;
wherein the attached first connection portion facilitates connection to the second connection portion.

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In an embodiment, at least one first connection portion includes at least one recess for receiving at least part of a second connection portion such that the at least part of the

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second connection portion is substantially flush with the body weight element when the second connection portion is attached to the first connection portion.

5 In an embodiment, the first connection portion is configured such that a second connection portion is able to rotate relative to the connection aperture when the second connection portion is connected to the first connection portion.

10 In an embodiment, at least one first connection portion comprises a first connector of a quick release clasp buckle, the first connection portion arranged to connect to a second connection portion of the quick release clasp buckle, the second connection portion part of a separate component of the body weight system.

15 In an embodiment, the body weight element comprises at least one reinforcing member that may include a reinforcing mesh, such as a fiberglass mesh, a carbon fibre mesh or a tungsten fibre mesh.

In an embodiment, the body weight element comprises a comfort layer arranged to provide comfortable contact with skin of a person during use.

20 In an embodiment, the body weight element comprises at least one perimeter reinforcing device, such as at least one perimeter reinforcing member disposed at a perimeter of the body weight element.

25 In an embodiment, the body weight element comprises at least one relatively raised portion and at least one relatively lowered portion that define a cavity adjacent a person when the body weight element is disposed adjacent the person during use.

In an embodiment, the body weight element has a thickness of about 6mm to 24mm.

30 In an embodiment, the body weight element comprises an amount of particulate material such that the weight of the body weight element is between about 0.1Kg and 8Kg.

35 In accordance with a second aspect of the present invention, there is provided a modular body weight system, the modular body weight system comprising:
at least one body weight element according to the first aspect of the present invention; and

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at least one connection device having a second connection portion arranged to connect to the first connection portion of a body weight element.

5 In an embodiment, at least one connection device includes an elongate member provided with a second connection portion at each elongate end of the elongate member.

In an embodiment, the elongate member is a strap.

10 In an embodiment, the elongate member is configured such that the length of the elongate member is adjustable.

In an embodiment, the second connection portion comprises a Velcro fixing device.

15 In an embodiment, the Velcro fixing device includes a first Velcro component at a longitudinal end of the elongate member and a second Velcro component between longitudinal ends of the elongate member, wherein the length of the elongate member is selectable by selecting a location of the connection between the first and second Velcro components.

20

In an embodiment, the first connection portion comprises a first connector of a quick release clasp buckle and the second connection portion comprises a second connector of the quick release clasp buckle, the second connection portion being releasably connectible to the first connection portion.

25

In an embodiment, the second connection portion includes a first connection component disposable on a first side of the connection aperture and a second connection component disposable on a second opposite side of the connection aperture, the second connection component engageable with the first connection component so as to attach the second connection portion to the connection aperture.

30

In an embodiment, at least one of the first and second connection components is configured to connect to a strap of a connection device.

35 In an embodiment, the connection device includes a third connection component, at least one of the first and second connection components configured to releasably connect to the third connection component, and the third connection component

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configured to connect to a strap of the connection device.

In an embodiment, the length of at least one connection device is adjustable.

- 5 In an embodiment, at least one connection device has at least some resilience.

In an embodiment, at least one connection device includes a plurality of extension components that are releasably connectable to each other.

- 10 In an embodiment, the body weight system comprises a retaining device arranged to facilitate selective retention and removal of a body weight system to/from a person by enabling sections of the body weight system to be releasably connected together.

- 15 In an embodiment, the retaining device comprises a clasp including a first clasp portion and a second clasp portion, the first and second clasp portions being releasably connectable together, for example using respective complimentary first and second slots.

- 20 In an embodiment, the first and second clasp portions include respective fixing apertures arranged to facilitate connection to at least one connection device.

- In an embodiment, the body weight system comprises at least one connection hub, each connection hub including a plurality of engagement portions arranged to facilitate connection to a connection device.

- 25 In an embodiment, the connection hub includes a plurality of connection sockets, each connection socket arranged to facilitate connection to a connection device.

- 30 In an embodiment, the body weight system includes at least one blank body weight element that does not include particulate material.

- In an embodiment, the body weight system includes a sleeve portion connectable to at least one connection device, the sleeve portion including a sleeve member arranged to receive and hold at least one body weight element.

- 35 In an embodiment, the sleeve member comprises at least one pocket for receiving a body weight element.

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In this embodiment, at least one pocket includes a pocket aperture and at least one body weight element includes an element aperture, the pocket and element apertures substantially aligning when the body weight element is received in the pocket so as to
5 provide ventilation for a person during use.

In an embodiment, at least one sleeve portion includes a thumb loop or an elastic cuff for retaining the sleeve portion at a desired position relative to an arm of the person during use.
10

In an embodiment, the body weight system comprises a shoulder portion having at least one resilient epaulette, the epaulette including at least one epaulette connector arranged to connect to a connection device. The epaulette may include an internal reinforcing spine.
15

In an embodiment, the body weight system comprises a joint connector arranged to connect to first and second adjacent body weight elements, the joint connector including a swivel connector so as to facilitate rotation of the first body weight element relative to the second body weight element.
20

In an embodiment, the body weight system includes a joint support part, the joint support part including an integrated mechanical joint support.

In an embodiment, the body weight system comprises an electrical system arranged to
25 distribute electrical power through the body weight system.

In an embodiment, at least one body weight element and at least one connection device is configured so that electrical power is transferrable between the body weight element and the connection device when the connection device is connected to a
30 connection aperture of the body weight element.

In an embodiment, the connection aperture includes a first terminal on a first side of the body weight element and a second terminal on a second opposite side of the body weight element, the first and second terminals arranged to connect to respective
35 terminals on a connection device when the connection device connects to the connection aperture.

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In an embodiment, a plurality of connection apertures of a body weight element include first and second terminals, and wherein the body weight element includes first electrical connections between the first terminals and second electrical connections between the second terminals.

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Brief Description of the Drawings

The present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

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Figure 1 is a diagrammatic partially cut-away plan view of a body weight element according to an embodiment of the present invention;

Figure 2 is a diagrammatic side view of the body weight element shown in Figure 1;

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Figure 3 is a cross sectional view of the body weight element shown in Figures 1 and 2 taken along the line III-III of Figure 1 in the direction of the arrows;

Figure 4 is a cross sectional view of a body weight element according to an alternative embodiment of the present invention;

Figure 5 is a diagrammatic plan view of an example connection device of a body weight system according to an embodiment of the present invention;

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Figure 6 is a diagrammatic front perspective view of a body weight element according to an alternative embodiment of the present invention;

Figure 7 is a diagrammatic rear plan view of the body weight element shown in Figure 6;

25

Figure 8 is a cross sectional view of the body weight element shown in Figures 6 and 7 taken along the line VIII - VIII;

Figure 9 is a diagrammatic front perspective view of a body weight element according to an alternative embodiment of the present invention;

Figure 10 is a diagrammatic rear perspective view of the body weight element shown in Figure 9;

30

Figure 11 is a diagrammatic perspective view of a connector engageable with an aperture of the body weight element shown in Figure 6 to 10;

Figure 12 is a perspective view of the connector shown in Figure 11 with first and second connector portions of the connector disconnected from each other;

Figure 13 is a diagrammatic cross-sectional view of the connector shown in Figure 11;

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Figure 14 is a diagrammatic perspective view of a body weight element including several attached connectors;

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Figure 15 is a diagrammatic side view of the body weight element shown in Figure 14;

Figure 16 is a diagrammatic perspective view of an alternate connector engageable with an aperture of the body weight element shown in Figure 6 to 10;

5 Figure 17 is a perspective view of the connector shown in Figure 16 with first and second connector portions of the connector disconnected from each other;

Figure 18 is a diagrammatic perspective view of a further alternate connector engageable with an aperture of the body weight element shown in Figure 6 to 10;

10 Figure 19 is a perspective view of the connector shown in Figure 18 with first and second connector portions of the connector disconnected from each other;

Figure 20 is a diagrammatic side view of the connector shown in Figure 18;

Figure 21 is a diagrammatic cross-sectional view of the connector shown in Figure 18;

15 Figure 22 is a diagrammatic perspective view of a mounting clip of the connector shown in Figures 18 to 21;

Figure 23 is a diagrammatic perspective view of a connection hub of a body weight system according to an embodiment of the present invention, the connection hub shown connected to several mounting clips;

20 Figure 24 is a diagrammatic perspective view of an alternate connection hub of a body weight system according to an embodiment of the present invention, the connection hub shown connected to several mounting clips;

Figure 25 is a diagrammatic perspective view of a further alternate connection hub of a body weight system according to an embodiment of the present invention, the connection hub shown connected to several mounting clips;

25 Figure 26 is a diagrammatic perspective view of an alternate connection device of a body weight system according to an embodiment of the present invention;

Figure 27 is a diagrammatic perspective view of the alternate connection device shown in Figure 26, with the connection device shown in a disconnected configuration;

30 Figure 28 is a diagrammatic front perspective view of a clasp of a body weight system according to an embodiment of the present invention;

Figure 29 is a diagrammatic rear perspective view of the clasp shown in Figure 28;

Figure 30 is a diagrammatic plan view of a first clasp portion of the clasp shown in Figures 28 and 29;

35 Figure 31 is a diagrammatic plan view of a second clasp portion of the clasp shown in Figures 28 and 29;

Figure 32 is a diagrammatic front perspective view of an alternate clasp of a

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body weight system according to an embodiment of the present invention;

Figure 33 is a diagrammatic rear perspective view of the clasp shown in Figure 32;

5 Figure 34 is a diagrammatic plan view of a first clasp portion of the clasp shown in Figures 32 and 33;

Figure 35 is a diagrammatic plan view of a second clasp portion of the clasp shown in Figures 32 and 33;

Figure 36 is a diagrammatic perspective view of a further alternate connection hub of a body weight system according to an embodiment of the present invention;

10 Figure 37 is a diagrammatic perspective view of a further alternate connection hub of a body weight system according to an embodiment of the present invention;

Figure 38 is a diagrammatic perspective view of the connection hub shown in Figure 37, the connection hub shown connected to several connectors;

15 Figure 39 is a diagrammatic representation of an upper front torso part of a body weight system according to an embodiment of the present invention;

Figure 40 is a diagrammatic representation of an upper rear torso part of the body weight system shown in Figure 39;

Figure 41 is a diagrammatic representation of a shoulder portion of the body weight system shown in Figures 39 and 40;

20 Figure 42 is a diagrammatic representation of an epaulette of the shoulder portion shown in Figure 41;

Figure 43 is a diagrammatic representation of an example arm weight system of a body weight system according to an embodiment of the present invention;

25 Figure 44 is a diagrammatic representation of an elbow swivel connection of the arm weight system shown in Figure 43;

Figure 45 is a diagrammatic representation of an example arm sleeve arrangement of a body weight system according to an embodiment of the present invention;

30 Figure 46 is a diagrammatic representation of an example weight element for use with the arm sleeve arrangement shown in Figure 45;

Figure 47 is a diagrammatic representation of an example integrated knee support arrangement of a body weight system according to an embodiment of the present invention;

35 Figure 48 is a diagrammatic representation of a female upper front torso part of a body weight system according to an embodiment of the present invention;

Figure 49 is a diagrammatic representation of a front part of a body weight system according to an embodiment of the present invention, the body weight system

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shown during use on a person;

Figure 50 is a diagrammatic representation of a back part of the body weight system shown in Figure 49;

Figure 51 is a diagrammatic representation of a sleeve portion of a body weight system according to an embodiment of the present invention;

Figure 52 is a diagrammatic representation of a pocket of a sleeve portion of a body weight system according to an embodiment of the present invention;

Figure 53 is a diagrammatic representation of a weight element arranged to be disposed in the pocket shown in Figure 52;

Figure 54 is a diagrammatic representation of a front part of a body weight system according to an alternate configuration of the body weight system;

Figure 55 is a diagrammatic representation of a back part of a body weight system according to an alternate configuration of the body weight system;

Figure 56 is a diagrammatic representation of a front part of a body weight system according to an alternate configuration of the body weight system;

Figure 57 is a diagrammatic representation of a back part of the body weight system shown in Figure 56;

Figure 58 is a diagrammatic rear perspective view of an alternate body weight element a body weight system according to an embodiment of the present invention;

Figure 59 is a diagrammatic front perspective view of the alternate body weight element shown in Figure 58;

Figure 60 is a diagrammatic perspective view of a connector for use with the body weight element shown in Figures 58 and 59; and

Figure 61 is a diagrammatic cross-sectional view of a portion of the connector shown in Figure 60.

Description of an Embodiment of the Invention

Referring to Figures 1 to 3 of the drawings, there is shown a body weight element according to an embodiment of the present invention.

The body weight element 10 in this example is in the form of a panel, wherein the thickness t of the body weight element 10 is significantly less than the width w and length l of the body weight element 10. In addition, the thickness t of the body weight element 10 is sufficiently small that the body weight element 10 can be practically worn underneath clothing. In this example, the thickness t of the body weight element 10 is of the order of 6-22mm, for example 12mm or 14mm, the length l of the body weight

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element 10 is 120mm to 190mm and the width w of the body weight element 10 is 100mm to 150mm although it will be understood that any suitable dimensions for the body weight element 10 are envisaged.

- 5 In this example, the body weight element 10 comprises settable material 12 of a first density and particulate material 14 of a second density higher than the first density. The settable material 12 is flexible when set and the particulate material 14 is distributed around the settable material 12 such that when set the body weight element 10 is flexible at least to the extent that the body weight element 10 is able to at least
10 partially conform to the contours of a person's body when the body weight element 10 is disposed under a garment adjacent the user's body.

In this example, the settable material 12 comprises a polymer material, such as a urethane material that may include fast setting polyurethane elastomer, rubber and/or
15 silicone rubber material. Preferably, the polymer material is dermatologically safe and non-reactive, and may have antibacterial, antimicrobial and UV stabilized properties. An example settable material has a hardness rating of 50 duro.

In this example, the particulate material 14 comprises high density material such as
20 lead, iron, tungsten, alloys of lead, iron and/or tungsten, or any suitable high density material, for example of density greater than $8,000\text{Kg/m}^3$ and preferably greater than $18,000\text{Kg/m}^3$. The particulate material may for example comprise powder or larger particles of the order of 2mm to 20mm diameter, and the particulate matter may be shaped to suit the shape of the body weight element 10.

25 In this example, the settable material is urethane material and the particulate material comprises tungsten spheres of 6mm diameter. In an embodiment, 2 or more types of settable material may be used, an inner portion formed of relatively higher density urethane material and a surrounding outer portion formed of relatively lower density
30 urethane material, so that sufficient rigidity is maintained whilst providing improved comfort to a wearer.

Typically, a body weight element 10 may weigh about 1-3Kg, although it will be understood that any suitable weight is envisaged.

35 The body weight element 10 also includes at least one first connection portion 16 arranged to facilitate connection of the body weight element 10 to another component

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of a body weight system, such as an adjacent body weight element 10 of the body weight system.

In this example, the body weight element 10 includes several first connection portions, each first connection portion in the form of an aperture 16 that facilitates connection of the body weight element 10 to another component of the body weight system by engaging a second connection portion with the aperture 16. An example second connection portion that forms part of a connection device 40 is shown in Figure 5 and described below.

In this embodiment, each aperture 16 has a diameter between 15mm and 50mm, although it will be understood that any suitable size for the apertures 16 is envisaged.

As shown more particularly in the cross-sectional view in Figure 3, the apertures 16 include beveled edges 18, and the body weight element 10 includes rounded edges 24.

As shown more particularly in Figure 3, in this example the body weight element 10 includes at least one reinforcing member 20 arranged to provide the body weight element 10 with improved structural integrity, for example so as to reduce warping and/or stretching of the body weight element 10 during use. In this example, the reinforcing member 20 comprises a fiberglass mesh, although it will be understood that other types of reinforcement are envisaged, such as carbon fibre mesh or tungsten fibre mesh.

In this embodiment, since the body weight element 10 is intended to be disposed in use directly adjacent the skin of a person during use, the body weight element 10 also includes a comfort layer 22 formed of a material that provides comfortable contact for a user. In this example, the comfort layer 22 is formed of a material that also serves to wick sweat away from the body and that reduces slippage between the body weight element 10 and the user's skin, such as a cotton elastane, bamboo elastane or merino wool material.

It will be understood that in addition to facilitating connection of the body weight element 10 to other components of the body weight system, the apertures 16 also provide ventilation for a person's skin when the body weight element 10 is disposed in contact with the person's skin.

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A cross-sectional view of an alternative body weight element 30 is shown in Figure 4. The alternative body weight element 30 is similar to the body weight element 10 shown in Figures 1 to 3, except that the alternative body weight element 30 further includes
5 aperture reinforcements, in this example in the form of cylindrical reinforcing members 32. The alternative body weight element 30 also includes perimeter reinforcements, in this example in the form of at least one perimeter reinforcing member 34. Such aperture reinforcing members 32 and/or perimeter reinforcing member 34 would typically be included in the body weight element when the weight of the body weight
10 element is relatively high. In this example, the aperture reinforcing members 32 and/or perimeter reinforcing member 34 are formed of ethylene vinyl acetate (flexible EVA), although any other suitable flexible, non-elastic hard wearing reinforcement may be used, such as a wire reinforcement loop.

15 It will be understood that several body weight elements 10, 30 may be provided of different shapes and sizes, with the shape of at least some of the body weight elements 10, 30 selected so as to conform to one or more particular parts of the body.

Figure 5 shows a connection device 40 usable to facilitate connection of a body weight
20 element 10, 30 to other components of the body weight system. The connection device 40 in this example is a strap device that includes second connection portions 41 at longitudinal ends of the strap. Each of the second connection portions 41 constitutes a connector arranged to releasably connect to a first connection portion of body weight element 10, 30, in this example an aperture 16 of the body weight element
25 10, 30.

In this embodiment, each second connection portion 41 includes a hook/loop type fastener, such as a Velcro fastener, wherein an end portion 42 of the connection device 40 comprises a first Velcro component and a central portion 44 of the strap
30 comprises a second Velcro component. However, it will be understood that the connection device 40 may include any suitable connection arrangements capable of releasably connecting to the first connection portion 16 provided on the body weight element 10, 30.

35 For example, the first connection portion provided on the body weight element 10, 30 may comprise a first connector of a quick release clasp buckle and the second connection portion provided on the connection device 40 may comprise a second

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connector of the quick release clasp buckle that is connectible to the first connector.

In this example, at least some of the connection devices 40 of a body weight system include elastic material to enable the connection device to stretch a relatively small
5 amount and provide improved comfort for a wearer of the body weight system.

It will be understood that the connection device 40 is effectively adjustable in length during use by selection of the connection location for the first and second Velcro components of the second connection portion 41. Other arrangements are envisaged
10 for enabling a person to select the length during use between adjacent components of the body weight system. For example, a connection device that includes a strap arrangement and strap buckle for adjusting the length of the strap may be used.

An alternative body weight element 50 is shown in Figures 6 to 8. Like and similar features are indicated with like reference numerals. In Figure 8, the particulate material 14 is omitted for clarity.
15

A further alternative body weight element 60 is shown in Figures 9 and 10. Like and similar features are indicated with like reference numerals.
20

The body weight element 50, 60 is similar to the body weight element 10, 30 shown in Figures 1 to 4 in that each body weight element 50, 60 includes first connection portions in the form of apertures 52 and 62 respectively. However, each first connection portion of the alternate body weight elements 50, 60 also includes an
25 annular ledge portion 54, 64 that facilitates engagement with a second connection portion of an alternate connection device. Each annular ledge portion 54, 64 defines a front annular recess 55, 65 and a rear annular recess 57, 67.

As shown more particularly in Figures 7, 8 and 10, a rear surface of each of the body weight elements 50, 60 includes relatively raised portions 56, 66 and relatively lowered portions 58, 68. The relatively lowered portions 58, 68 provide a thin cavity that creates a pocket of air when the rear surface of the body weight element 50, 60 is disposed during use adjacent a person, thereby improving comfort for the wearer.
30

An example second connection portion 70 for use with the body weight element 50, 60 is shown in Figures 11 to 13. The second connection portion 70 constitutes a connector arranged to engage with an aperture 52, 62 of a body weight element 50,
35

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60. The connector 70 forms part of an alternate connection device (not shown) that includes a flexible or inflexible strap connected to the connector 70, for example using a double loop connector arrangement 72.

- 5 The connector 70 includes a first connection component 76 having a first cylindrical portion 78 and a shoulder portion 80, and a second connection component 82 having a second cylindrical portion 84 configured to be receivable in the first cylindrical portion 78, and a lip portion 86. When the second cylindrical portion 84 is received in the first cylindrical portion 78, the first and second connection components 76, 82 connect
10 together using a snap-fit connection arrangement 88, as shown in Figure 13.

The outer diameter of the first cylindrical portion 78 is slightly smaller than the diameter of the aperture 52, 62 defined by an annular ledge portion 54, 64 so that the first cylindrical portion 78 is receivable through the aperture 52, 62 when the connector 70
15 engages with the aperture 52, 62.

In this example, the diameter of the shoulder portion 80 is less than the diameter of the rear annular recess 57, 67 so that the shoulder portion 80 sits at least partially in the rear annular recess 57, 67 when the first and second connection components 76, 82
20 are connected together around an annular ledge portion 54, 64. Similarly, the diameter of the lip portion 86 is less than the diameter of the front annular recess 55, 65 so that the lip portion 86 sits at least partially in the front annular recess 55, 65 when the first and second connection components 76, 82 are connected together around an annular ledge portion 54, 64. In this way, the first and second connection components 76, 82
25 sit substantially flush with the a body weight element 50, 60 when the first and second connection components 76, 82 are connected to the body weight element 50, 60.

It will be appreciated that the configuration of the apertures 52, 62 and the connectors 70 enables the connectors 70 to freely swivel relative to the apertures 52, 62 when
30 engaged with the apertures 52, 54, which provides a degree of flexibility at connection locations of the body weight system and thereby an improved fit to a person's body

An example body weight element 50 including several engaged connectors 70 is shown in Figures 14 and 15.

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A further example connector 90 for use with the body weight element 50, 60 is shown in Figure 16. Like and similar features are indicated with like reference numerals.

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The connector 90 is similar to the connector 70 except that instead of a double loop connection arrangement 72, the connector 90 includes an elongate split ring 92 that for example receives a strap (not shown) of the type having a locking end plate. During use, the strap is received in the split ring 92 through a gap 94 in the split ring 92, and the end plate locates against the split ring 92 to lock the strap relative to the split ring 92 during use.

A further example connector 100 for use with the body weight element 50, 60 is shown in Figure 17. Like and similar features are indicated with like reference numerals.

The connector 100 is similar to the connector 90 shown in Figure 16 except that instead of an elongate split ring 92, the connector 100 includes a single loop connection arrangement 102.

A further example connector 110 for use with the body weight element 50, 60 is shown in Figures 18 to 21. Like and similar features are indicated with like reference numerals.

The connector 110 includes first and second connection components 112, 114 of annular configuration that connect to each other through an aperture 52, 62 in a snap-fit manner using a first snap-fit connection 120 in a similar way to the first and second connection components 76, 82.

The connector 110 also includes a mounting clip 116 that is arranged to releasably engage with the connected first and second connection components 112, 114, in this example in a snap-fit manner using a second snap fit connection 122. The mounting clip 116 includes a button portion 119 usable to cause disconnection of the second snap fit connection 122 when pressed. The mounting clip 116 is also configured so as to allow air to flow to/from a wearers skin when the mounting clip 116 is engaged with the connected first and second components.

The connector 110 enables a connection device that has at least one mounting clip 116 to be easily connected to and disconnected from a body weight element 50, 60.

An alternative mounting clip 124 that includes a double loop connection arrangement 126 is shown in Figure 22.

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A connection device is also able to connect to other components of the body weight system in addition to or instead of the body weight elements 10, 30, 50, 60. For example, a connection device may connect to a connection hub 130 as shown in
5 Figure 23. The connection hub 130 in this example includes 4 sockets 132 for receiving and engaging 4 respective mounting clips 116, 126. In this example, each socket 132 is arranged to releasably engage a mounting clip 116, 126 in a snap fit manner.

10 An alternative connection hub 140 is shown in Figure 24. Like and similar feature are indicated with like reference numerals. The connection hub 140 is similar to the connection hub 130 shown in Figure 23, except that 6 sockets 132 are provided for receiving 6 respective mounting clips 116, 126.

15 An alternative connection hub 150 is shown in Figure 25. Like and similar feature are indicated with like reference numerals. The connection hub 150 is similar to the connection hubs 130, 140 shown in Figures 23 and 24, except that 8 sockets 132 are provided for receiving 6 respective mounting clips 116, 126.

20 An alternative connection device 160 for connecting together components of the body weight system is shown in Figures 26 and 27. The connection device 160 in this example includes a mounting clip 116 disposed at each longitudinal end of the connection device 160, at least one male extension component 162 having 2 connection projections 163, and at least one female extension component 164 having
25 2 connection apertures 166. A connection aperture 168 of the mounting clip 116 is engageable with a connection projection 163 of a male extension component 162, and each connection aperture 166 of a female extension component 164 is engageable with a connection projection 163 of a male extension component 162. The length of the connection device 160 is adjustable by connecting together a required number of
30 male and female extension components 162, 163. Each connection projection 163 may engage with a connection aperture 166 in a snap-fit manner.

A further example of a component to which a connection device may connect to is shown in Figures 28 to 31, which show a retaining device that in this example is in the
35 form of a releasable clasp 170.

The clasp 170 is usable to facilitate simple engagement and disengagement of

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portions of the body weight system to/from each other, for example in order to fit or remove the body weight system to/from a person. The clasp 170 in this example includes a first clasp portion 172 and a second clasp portion 174 that are able to releasably connect together using respective first and second slots 176, 178 and snap fit connections 180, 182 that engage with respective apertures 184, 186. In this example, the first and second clasp portions 172, 174 also include respective elongate split rings 92 that are each arranged to receive a suitable connection device.

An alternative clasp 190 is shown in Figures 32 to 35. Like and similar features are indicated with like reference numerals.

The clasp 190 is similar to the clasp 170 shown in Figures 28 to 31 in that the clasp 190 includes first and second clasp portions 192, 194 that are able to releasably connect together using respective first and second slots 176, 178 and snap fit connections 180, 182 that engage with respective apertures 184, 186. However, instead of 4 elongate split rings 92 for receiving a connection device, the clasp 190 includes 2 elongate split rings 92.

A further example connection hub 200 is shown in Figure 36. In this example, the connection hub 200 includes a body portion 202 and several, in this example 4, elongate split rings 92 for respectively receiving a connection device. However, it will be understood that the connection hub may include any suitable connection arrangement for connecting to a connection device.

A further example connection hub 210 is shown in Figures 37 and 38. In this example, the connection hub 210 includes a first hub portion 212 and a second hub portion 214 that are connectable to each other, for example using a snap-fit connection, and readily separable from each other. When the first and second hub portions 212, 214 are connected together, 4 receiving slots 216 are defined for respectively receiving an alternative connection device 218. The connection device 218 includes a tongue portion 220 provided with at least one aperture 222, and a connector 224 of any suitable type disposed at an end of the connection device 220. In this example, each receiving slot 216 includes a retaining pin 226 that is received in an aperture 222 when a tongue 220 is received in a slot 216 and the first and second hub portions 212, 214 are connected together.

An example upper front torso part 230 of an example body weight system is shown in

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Figure 39. The front torso part 230 includes several body weight elements 50 connected together using connection devices 40 and connectors 70 that engage in a snap fit manner with apertures 52 in the body weight elements 50, and a connection hub or clasp 232, for example of the type shown in any of Figures 23 to 25 or 28 to 38. In this example, the front torso part 230 also includes an epaulette 234 of a shoulder portion described in more detail below.

An example upper rear torso part 240 of an example body weight system that also includes the front torso part 230 shown in Figure 39 is shown in Figure 40. The rear torso part 240 includes several body weight elements 50 connected together using connection devices 40 and connectors 70 that engage in a snap fit manner with apertures 52 in the body weight elements 50, and a connection hub or clasp 232, for example of the type shown in any of Figures 23 to 25 or 28 to 38.

A shoulder portion 250 of an example body weight system is shown in Figures 41 and 42. The shoulder portion 250 includes the epaulette 234 that includes epaulette connectors 252, for example arranged to connect to a strap connection device (not shown); a body portion 254, for example formed of resilient material configured to be comfortable to wear during use; a retaining strap 256 arranged to receive a strap-type connection device 40 between the retaining strap 256 and the epaulette 234; and a supporting spine 258 disposed internally of the epaulette 234, in this example formed of nylon material.

An arm portion 260 of an example body weight system is shown in Figures 43 and 44. The arm portion 260 includes an upper arm body weight element 262 and a forearm body weight element 264 connected together using connection devices 40 and connectors 70 that engage in a snap fit manner with apertures in the arm and forearm body weight elements 262, 264. The arm portion 260 also includes an elbow connector 266 that connects the arm and forearm body weight elements 262, 264 together whilst permitting the upper arm body weight element 262 to flex relative to the forearm body weight element 264 as the wearer flexes his/her arm. In this example, the elbow connector 266 includes 2 connectors 270, for example of similar configuration to the connectors shown in Figures 11 to 13, and a swivel connection 272 that connects the connectors 270 together whilst enabling the connectors 270 to rotate relative to each other.

An alternative arm portion 280 of an example body weight system is shown in Figure

- 20 -

45. The alternative arm portion 280 includes a sleeve member 282, in this example attached to the epaulette 234 using connection devices 40.

5 The sleeve member 282 in this example is formed of flexible material, such as cotton elastane or bamboo elastane, and is provided with pockets 284, for receiving an appropriately shaped weight element 286, as shown in Figure 46. In this example, the configuration of the weight element 286 is similar to the configuration of the body weight elements 10, 30, 50, 60 in that the weight element 286 includes settable material 90 of a first density and particulate material 92 of a second density higher than
10 the first density disposed in the settable material 90.

An alternative pocket arrangement for the sleeve member 282 is shown in Figures 53 and 54. In this embodiment, pockets 285 and the sleeve member 282 include apertures 287, and each weight element 288 includes an aperture 289 that aligns with
15 the apertures 287 in the pockets 285 and sleeve member 282 when the weight element 288 is received in a pocket 285 so as to provide ventilation for a person during use.

20 An alternative sleeve member 320 is shown in Figure 51. In this example, each sleeve member 320 also includes a thumb loop 322 that serves to retain the sleeve portion 320 at a desired position relative to an arm of a person.

A knee support part 290 of an example body weight system is shown in Figure 47. The knee support part 290 includes a thigh body weight element 292 and a shin body weight element 294 attached to a person's leg using connection devices 40 and
25 connectors 70 that engage in a snap fit manner with apertures in the thigh and shin body weight elements 292, 294. The knee support part 290 also includes a knee support device 296 arranged to provide mechanical support for the wearer's knee, for example by integrating a spring into the knee support device 296.

30 An upper front torso part 300 of an example body weight system for a female person is shown in Figure 48. The front torso part 300 includes several body weight elements 50 connected together using connections devices 40 and connectors 70 that engage in a snap fit manner with apertures 52 in the body weight elements 50, and connection
35 hubs or clasps 232, for example of the type shown in any of Figures 23 to 25 or 28 to 38. In this example, the front torso part 230 also includes an epaulette 234 of a shoulder portion.

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An example body weight system 310 is shown in Figures 49 and 50 during use on a person 312. Figure 49 shows a front view of the person 312 and Figure 50 shows a rear view of the person 312. The system 310 in this example includes several body weight elements 10, 30, 50, 60 connected together using connection devices 40, with the size and shape of the body weight element 10, 30, 50, 60, the length of the connection devices 40 and the connection locations of the body weight elements 10, 30, 50, 60 chosen so that body weight elements 10, 30, 50, 60 of desired weight are disposed at the desired locations relative to the person's body to achieve the desired objective. The body weight system 310 of the present example has a harness-like configuration, although it will be understood that other types of configuration are possible.

In the example shown in Figures 49 and 50, the body weight system 310 is configured such that a body weight element 10, 30, 50, 60 is disposed at chest portions, waist portions, thigh portions, calf portions and shoulder portions of the person's body, although it will be understood that any desired configuration and distribution of body weight elements 10, 30, 50, 60 is envisaged, depending on the desired objective.

In this embodiment, the body weight system 310 includes a clasp 170 disposed at a generally front central location, the clasp 170 serving to retain the body weight system relative to the person 312 and enable the person to remove the body weight system 310 by disengaging the first and second clasp portions 172, 174 from each other.

It will therefore be understood that the present body weight system 310 is modular and highly configurable since by appropriately connecting together the body weight elements 10, 30, 50, 60 using the connection devices 40 it is possible to dispose the body weight elements 10, 30, 50, 60 at any desired location. It is also possible to use different shapes and sizes of body weight elements 10, 30, 50, 60 at selected body locations in order to define the desired body weightings at the selected body locations.

Figures 54 to 57 show further alternate configurations of a body weight system 320, 322. Figures 54 and 55 show an example body weight system configuration that includes only shoulder body weight elements 10, 30, 50, 60, and Figures 56 and 57 show an example body weight system configuration that includes only sleeve portions 320.

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In an embodiment, the body weight system may include an electrical system arranged to distribute electrical power to desired locations of the system by configuring the body weight elements 10, 30, 50, 60 and the connection devices 40 so that electrical power is transferrable through the body weight elements 10, 30, 50, 60 and the connection devices 40, and configuring the body weight elements 10, 30, 50, 60 and the connection devices 40 so that electrical power is transferrable between a body weight element 10, 30, 50, 60 and a connection device 40 when the connection device is connected to an aperture of the body weight element 10, 30, 50, 60.

Referring to Figures 58 and 59, an example body weight element 330 that facilitates transfer of electrical power is shown. The body weight element 330 is similar to the body weight element 50 shown in Figures 6 to 8 in that the body weight element 330 includes apertures 332 having respective annular ledge portions 334 that facilitate mechanical connection of the body weight element 330 to a connection device provided with a connector of the type shown in Figures 11 to 13 and 16 to 22.

The body weight element 330 includes a first aperture electrical terminal 336, in this example of annular configuration formed on each annular ledge portion 334 on a front side of the body weight element 330, as shown in Figure 59. Similarly, the body weight element 330 includes a second aperture electrical terminal 338, in this example of annular configuration formed on each annular ledge portion 334 on a rear side of the body weight element 330, as shown in Figure 58.

The body weight element 330 also includes first electrical connections 340 disposed internally of the body weight element, each first electrical connection 340 electrically connecting together an adjacently disposed pair of first aperture electrical terminals 336. Similarly, the body weight element 330 also includes second electrical connections 342 disposed internally of the body weight element, each second electrical connection 342 electrically connecting together an adjacently disposed pair of second aperture electrical terminals 338. The first and second electrical connections 340, 342 may be configured so that as the body weight element 330 flexes during use, the first and second electrical connections 340, 342 do not break, for example by coiling the first and second electrical connections 340, 342.

An example connector 350 for use with the body weight element 330 is shown in Figures 60 and 61. The connector 350 has a similar configuration to the connector 70 shown in Figures 11 to 13 in that the connector 350 includes a first connection

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component 352 and a second connection component 354 engageable with the first connection component 352. Like and similar features are indicated with like reference numerals.

- 5 The connector 350 includes a first connector terminal 356 disposed on the lip portion 86 of the second connection component 354 such that the first connector terminal 356 electrically connects with a first aperture terminal 336 of an aperture 332 when the connector is mechanically engages with the aperture 332.
- 10 The first connector terminal 356 is electrically connected to a second connector terminal 358 through an electrical connector 360, the second connector terminal 358 connecting electrically with a third connector terminal 362 when the first and second connection components 352, 354 mechanically connect with each other. The third connector terminal 362 connects to a terminal adjacent a double loop connection arrangement 363 through an electrical connector 364.
- 15

- The first connection component 352 includes a fourth connector terminal 366 disposed on the first connection component 352 such that the fourth connector terminal 356 electrically connects with a second aperture terminal 338 of an aperture 332 when the connector is mechanically engaged with the aperture 332. The fourth connector terminal 366 connects to a terminal adjacent the double loop connection arrangement 363 through an electrical connector 368.
- 20

- The connector 350 connects at the double loop connection arrangement 363 to a suitable strap (not shown) that includes electrical connections and electrical terminals to facilitate transfer of electrical power along the strap.
- 25

- It will be understood that by using body weight elements 330 of the type shown in Figures 58 and 59, connectors 350 of the type shown in Figures 60 and 61, and suitable power transferring straps, it is possible to facilitate transfer of power across the body weight system by connecting the body weight elements 330 together using the connectors 350 and suitable power transferring straps.
- 30

- For example, a power source may be connected to the body weight system using a connector 350 of the type shown in Figures 60 and 61, and devices requiring power, such as an electrical muscle stimulation system, connected to any of the apertures 332 of the body weight element 330.
- 35

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While the present example is described in relation to a modular body weight system that includes multiple body weight elements that are each provided with high density particulate material, it will be understood that other arrangements are envisaged. For example, a modular body weight system may be provided wherein some of the body weight elements are provided with high density particulate material, but some are 'blank' body weight elements that do not include high density material. Such 'blank' body weight elements may be used to apply only a relatively small weight to some parts of the body, for example in circumstances wherein it is desired to slowly introduce weights to parts of a person's body.

The body weight elements 10, 30 may be fabricated in any suitable way. An example fabrication process will now be described.

Firstly, a mould is made to define the shape of a body weight element according to the desired body location of the body weight element. If the plate is to be a heavy plate (for example, in excess of 1.5kg), aperture and/or perimeter reinforcements 32, 34 may be added to the mould. A small layer of settable material 12 is then evenly applied to the mould, to a depth of around 1mm, and a quantity of particulate material 14 added to the layer of settable material 12 according to the desired weight of the body weight element 10, 30, preferably so that the particulate material is generally evenly distributed. A reinforcing member, in this example a reinforcing mesh is placed over the weighted material, and further settable material is disposed over the reinforcing member until the weighted material and mesh are fully covered. The body weight element is then allowed to set in the mould, and after setting the body weight element is removed from the mould. Prior to using the settable material, it may be prepared and degassed if necessary in a vacuum chamber.

It will be understood that the by selecting appropriate colours of materials for the body weight element, or by adding a colour to the settable and/or particulate material, a desired colour for the body weight element can be achieved. If a bright metal finish is required (and metal powder has been added), the body weight element may be lightly polished and buffed with wax to provide a flexible plate that has the appearance of solid metal.

If the body weight element is for use in a harness-type body weight system of the type shown in Figures 7 to 16, the body weight element is provided with a high wicking

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fabric pad having a natural cotton layer, for example attached to the body weight element using a suitable glue. The pad is typically less than about 3mm thick.

It will be appreciated that the body weight system may be used for various applications, for example in the following fields:

Military

- to develop endurance, power and fitness in soldiers through all day wear of the body weight system outside of physical training times;
- to reduce injury from heavy loading for patrols and operations by allowing gap reduction;
- to increase warfare capability through significant gains in strength and endurance.

Civilian

- to lose weight, by carrying gradually increasing amounts of statically loaded weights on the body during normal daily activities;
- to gain muscle tone, strength and bulk through constantly increasing load worn over very long durations;
- to increase base metabolic rate by increasing muscle mass, permanently increasing ordinary energy consumption by the body.

Sports professional

- to significantly increase power, speed, reaction and stamina on match days, by having a body conditioned to carrying 1 – 20kgs more daily;
- to increase muscle mass, power and endurance through gradual conditioning;
- to increase the effectiveness of training activities by increasing carried load in a comfortable manner.

Medical

- to target rehabilitation of whole and part of body for improvement of muscle

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mass, strength and repair of atrophy (such as loading weight to a limb that has been in a cast for a long period of time, or where a muscle has been reduced, excised or re-tasked);

- to increase bone density for older people through light and comfortable additional weight carried on a regular basis;
- to provide support for people with autism (weighted suits have been demonstrated to calm and soothe people with autism).

Diving

10

- as a dive weight system for commercial and recreational use (since the components of the body weight system may be configured such that they are all waterproof and salt resistant).

15

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

20

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

25

Modifications and variations as would be apparent to a skilled addressee are deemed to be within the scope of the present invention.

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CLAIMS:

1. A body weight element for a body weight system having a plurality of components, the body weight element comprising:
 - 5 flexible support material of a first density, the support material defining a solid supporting structure;
particulate material of a second density greater than the first density, the particulate material held by the support material such that the support material holding the particulate material is flexible; and
 - 10 a plurality of first connection portions arranged to facilitate connection of the body weight element to a second connection portion of a separate component of the body weight system;
wherein each first connection portion includes a connection aperture and the connection apertures are disposed relative to the body weight element so as to provide
 - 15 multiple different connection locations for the second connection portion and multiple distributed ventilation locations during use.
2. A body weight element as claimed in claim 1, wherein the support material is settable material and the particulate material is distributed through the settable
- 20 material.
3. A body weight system as claimed in claim 2, wherein the support material includes a first settable material having a first density and a second settable material disposed over the first settable material, the second settable material having a density
- 25 less than the first settable material.
4. A body weight element as claimed in claim 2 or claim 3, wherein the support material comprises polymer material.
- 30 5. A body weight element as claimed in any one of the preceding claims, wherein the particulate material comprises powder material.
6. A body weight element as claimed in any one of the preceding claims, wherein the particulate material comprises particles of diameter between about 2mm and about
- 35 22mm.
7. A body weight element as claimed in claim 6, wherein the particulate material is

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of generally spherical shape.

8. A body weight element as claimed in any one of the preceding claims, wherein the particulate material comprises lead, iron, tungsten and/or alloys of lead, iron and/or tungsten.

9. A body weight element as claimed in claim 8, wherein at least one connection aperture is provided with an aperture reinforcing device.

10. A body weight element as claimed in any one of the preceding claims, wherein at least one first connection portion includes a ledge portion arranged to facilitate engagement with a second connection portion.

11. A body weight element as claimed in claim 10, wherein the ledge portion is annular.

12. A body weight element as claimed in any one of the preceding claims, wherein at least one first connection portion includes a first connection component disposable on a first side of the connection aperture and a second connection component disposable on a second opposite side of the connection aperture, the second connection component engageable with the first connection component so as to attach the first connection portion to the connection aperture; and wherein the attached first connection portion facilitates connection to the second connection portion.

13. A body weight element as claimed in any one of the preceding claims, wherein at least one first connection portion includes at least one recess for receiving at least part of a second connection portion such that the at least part of the second connection portion is substantially flush with the body weight element when the second connection portion is attached to the first connection portion.

14. A body weight element as claimed in any one of the preceding claims, wherein the first connection portion is configured such that a second connection portion is able to rotate relative to the connection aperture when the second connection portion is connected to the first connection portion.

15. A body weight element as claimed in any one of the preceding claims, wherein

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at least one first connection portion comprises a first connector of a quick release clasp buckle, the first connection portion arranged to connect to a second connection portion of the quick release clasp buckle, the second connection portion being part of a component of the body weight system.

5

16. A body weight element as claimed in any one of the preceding claims, wherein the body weight element comprises at least one reinforcing member.

10

17. A body weight element as claimed in claim 11, wherein at least one reinforcing member includes a reinforcing mesh.

18. A body weight element as claimed in claim 16, wherein the reinforcing mesh includes a fiberglass mesh, a carbon fibre mesh and/or a tungsten fibre mesh.

15

19. A body weight element as claimed in any one of the preceding claims, wherein the body weight element comprises a comfort layer arranged to provide comfortable contact with the skin of a person during use.

20

20. A body weight element as claimed in any one of the preceding claims, wherein the body weight element comprises of at least one perimeter reinforcing device.

25

21. A body weight element as claimed in any one of the preceding claims, comprising at least one relatively raised portion and at least one relatively lowered portion that define a cavity adjacent a person when the body weight element is disposed adjacent the person during use.

22. A body weight element as claimed in any one of the preceding claims, wherein the body weight element has a thickness of about 6mm to 24mm.

30

23. A modular body weight system, the modular body weight system comprising:
at least one body weight element according to any one of the preceding claims;
and

at least one connection device having a second connection portion arranged to connect to the first connection portion of a body weight element.

35

24. A body weight system as claimed in claim 23, wherein at least one connection device includes an elongate member provided with a second connection portion at

- 30 -

each elongate end of the elongate member.

25. A body weight system as claimed in claim 24, wherein the elongate member comprises a strap.

5

26. A body weight system as claimed in claim 24 or claim 25, wherein the elongate member is configured such that the length of the elongate member is adjustable.

10 27. A body weight system as claimed in any one of claims 24 to 26, wherein the second connection portion comprises a hook/loop type fixing device.

15 28. A body weight system as claimed in claim 27, wherein the hook/loop fixing device includes a first component at a longitudinal end of the elongate member and a second component between longitudinal ends of the elongate member, wherein the length of the elongate member is selectable by selecting a connection location between the first and second components.

20 29. A body weight system as claimed in claim 23, wherein the first connection portion comprises a first connector of a quick release clasp buckle and the second connection portion comprises a second connector of the quick release clasp buckle, the second connection portion being releasably connectible to the first connection portion.

25 30. A body weight system as claimed in claim 23, wherein the second connection portion includes a first connection component disposable on a first side of the connection aperture and a second connection component disposable on a second opposite side of the connection aperture, the second connection component engageable with the first connection component so as to attach the second connection portion to the connection aperture.

30

31. A body weight system as claimed in claim 30, wherein at least one of the first and second connection components is configured to connect to a strap of a connection device.

35 32. A body weight system as claimed in claim 30, wherein the connection device includes a third connection component, at least one of the first and second connection components configured to releasably connect to the third connection component, and

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the third connection component configured to connect to a strap of the connection device.

33. A body weight system as claimed in any one of claims 23 to 32, wherein the
5 length of at least one connection device is adjustable.

34. A body weight system as claimed in claim 33, wherein at least one connection device has at least some resilience.

10 35. A body weight system as claimed in claim 33, wherein at least one connection device includes a plurality of extension components that are releasably connectable to each other.

15 36. A body weight system as claimed in any one of claims 23 to 35, wherein the body weight system comprises a retaining device arranged to facilitate selective retention and removal of a body weight system to/from a person by enabling sections of the body weight system to be releasably connected together.

20 37. A body weight system as claimed in claim 36, wherein the retaining device comprises a clasp including a first clasp portion and a second clasp portion, the first and second clasp portions being releasably connectable together.

25 38. A body weight system as claimed in claim 37, wherein the first and second clasp portions include respective fixing apertures arranged to facilitate connection to at least one connection device.

30 39. A body weight system as claimed in any one of claims 23 to 38, comprising at least one connection hub, each connection hub including a plurality of engagement portions arranged to facilitate connection to a connection device.

40. A body weight system as claimed in claim 39, wherein the connection hub includes a plurality of connection sockets, each connection socket arranged to facilitate connection to a connection device.

35 41. A body weight system as claimed in any one of claims 23 to 40, wherein the body weight system includes at least one blank body weight element that does not include particulate material.

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42. A body weight system as claimed in any one of claims 23 to 41, wherein the body weight system includes a sleeve portion connectable to at least one connection device, the sleeve portion including a sleeve member arranged to receive and hold at least one body weight element.

43. A body weight system as claimed in claim 42, wherein the sleeve member comprises at least one pocket for receiving a body weight element.

44. A body weight system as claimed in claim 43, wherein at least one pocket includes a pocket aperture and at least one body weight element includes an element aperture, the pocket and element apertures substantially aligning when the body weight element is received in the pocket so as to provide ventilation for a person during use.

45. A body weight system as claimed in any one of claims 42 to 44, wherein at least one sleeve portion includes a thumb loop or an elastic cuff for retaining the sleeve portion at a desired position relative to an arm of the person during use.

46. A body weight system as claimed in any one of the preceding claims, comprising a shoulder portion having at least one resilient epaulette, the epaulette including at least one epaulette connector arranged to connect to a connection device.

47. A body weight system as claimed in claim 46, wherein the epaulette includes an internal reinforcing spine.

48. A body weight system as claimed in any one of claims 23 to 47, comprising a joint connector arranged to connect to first and second adjacent body weight elements, the joint connector including a swivel connector so as to facilitate rotation of the first body weight element relative to the second body weight element.

49. A body weight system as claimed in any one of claims 23 to 48, comprising a joint support part, the joint support part including an integrated mechanical joint support.

50. A body weight system as claimed in any one of claims 23 to 49, comprising an electrical system arranged to distribute electrical power through the body weight

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system.

51. A body weight system as claimed in claim 50, wherein at least one body weight element and at least one connection device is configured so that electrical power is
5 transferrable between the body weight element and the connection device when the connection device is connected to a connection aperture of the body weight element.

52. A body weight system as claimed in claim 51, wherein the connection aperture includes a first terminal on a first side of the body weight element and a second
10 terminal on a second opposite side of the body weight element, the first and second terminals arranged to connect to respective terminals on a connection device when the connection device connects to the connection aperture.

53. A body weight system as claimed in claim 51 or claim 52, wherein a plurality of
15 connection apertures of a body weight element include first and second terminals, and wherein the body weight element includes first electrical connections between the first terminals and second electrical connections between the second terminals.

20

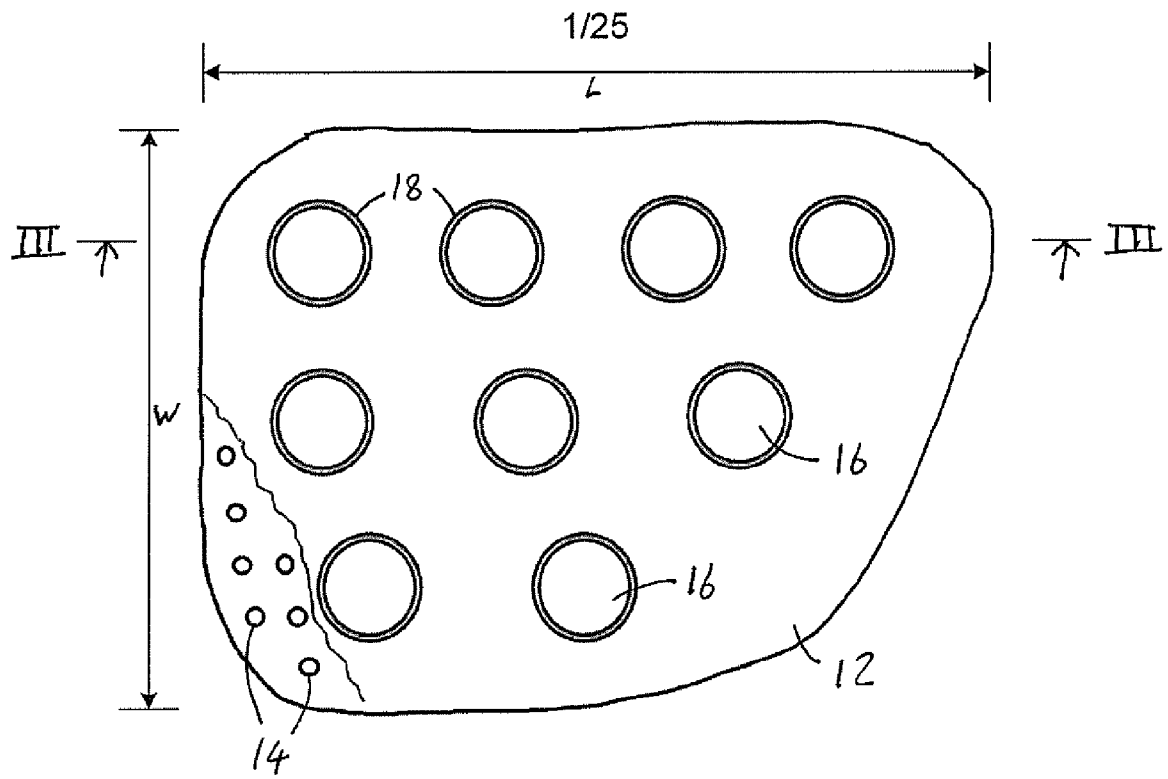


Fig. 1



Fig. 2

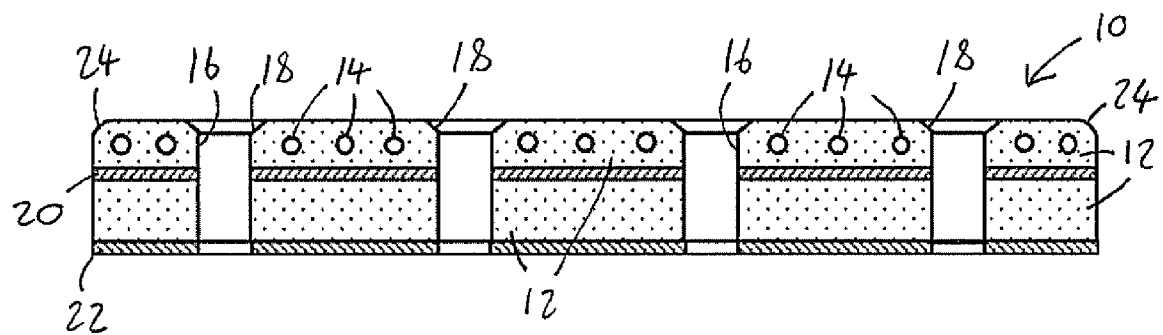


Fig. 3

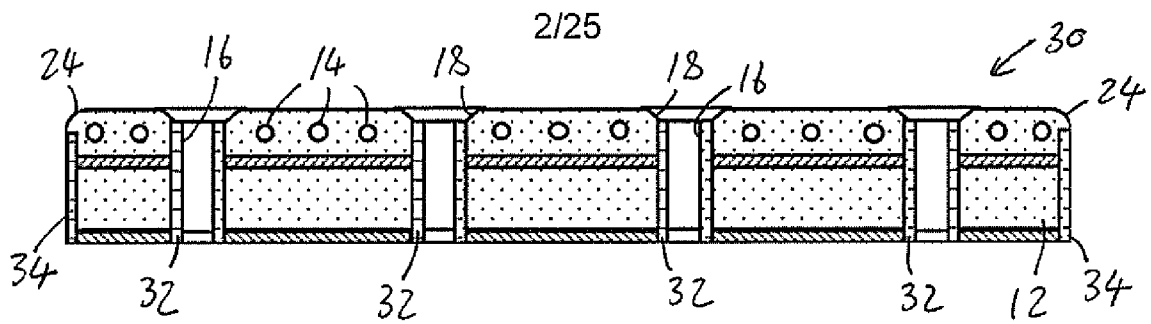


Fig. 4

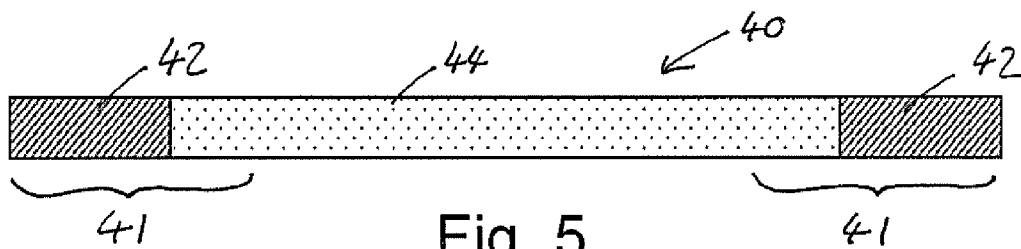


Fig. 5

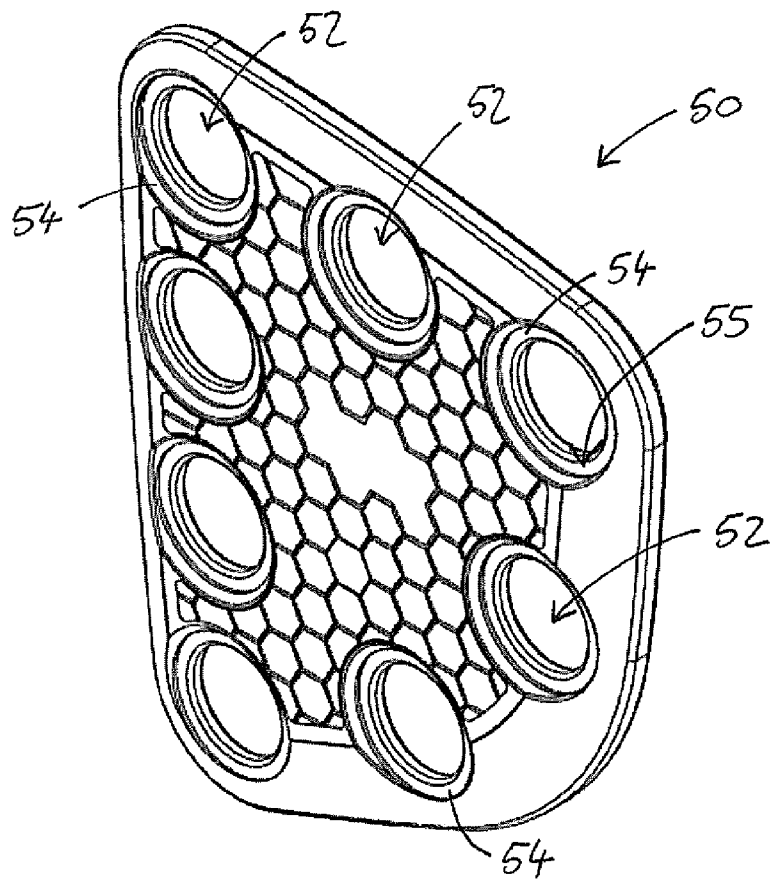
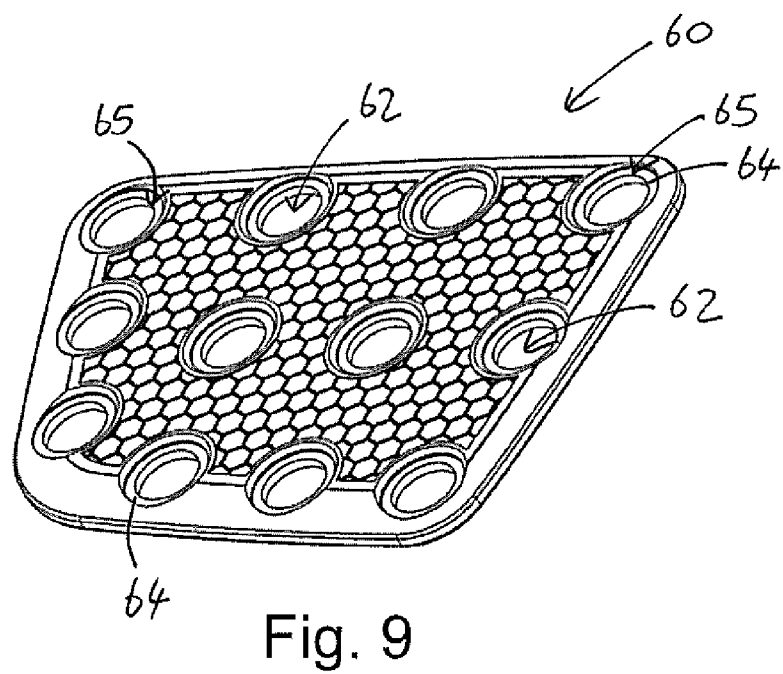
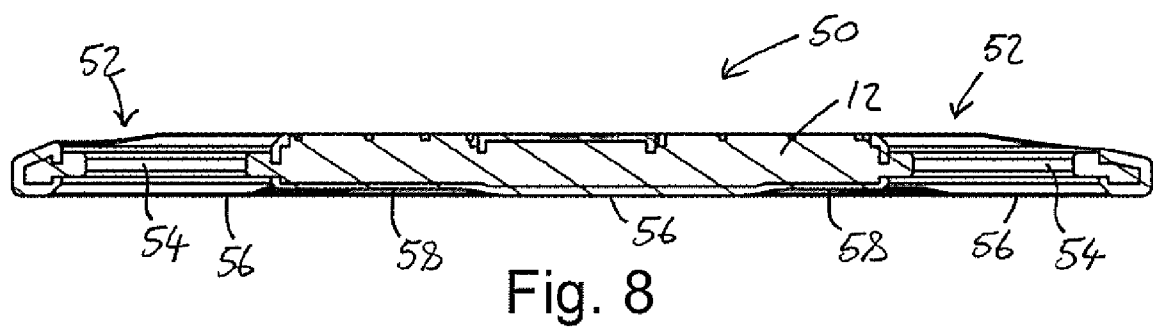
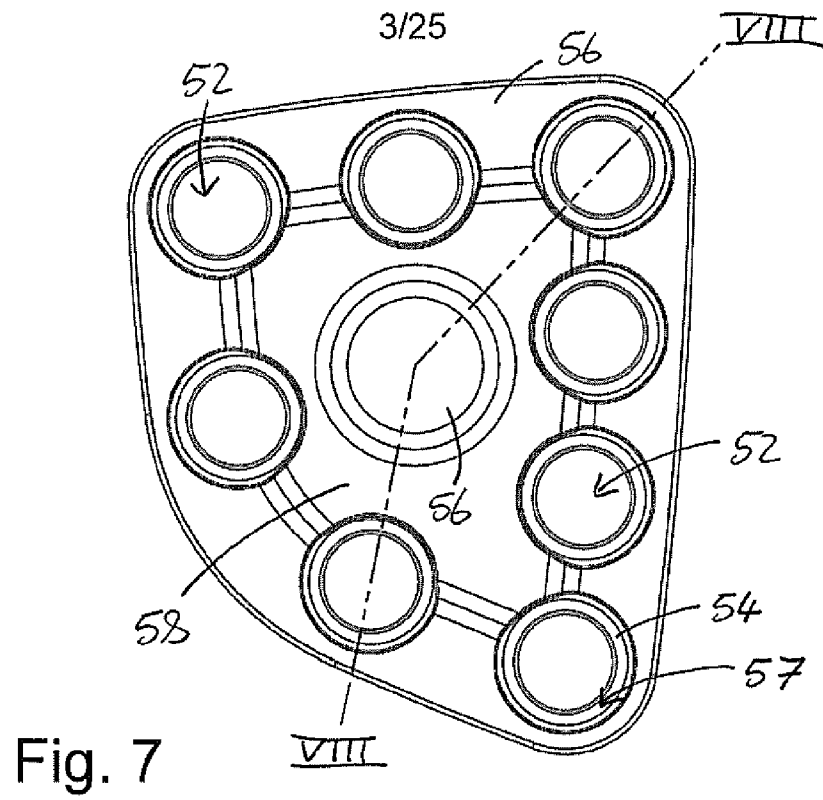
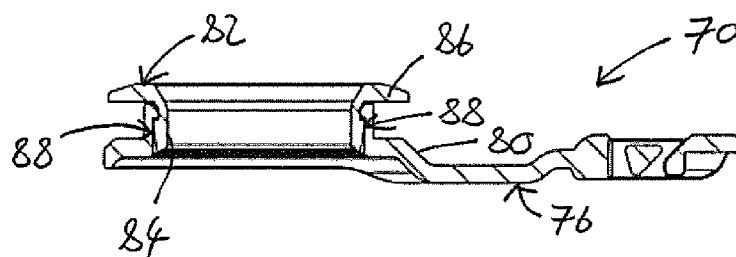
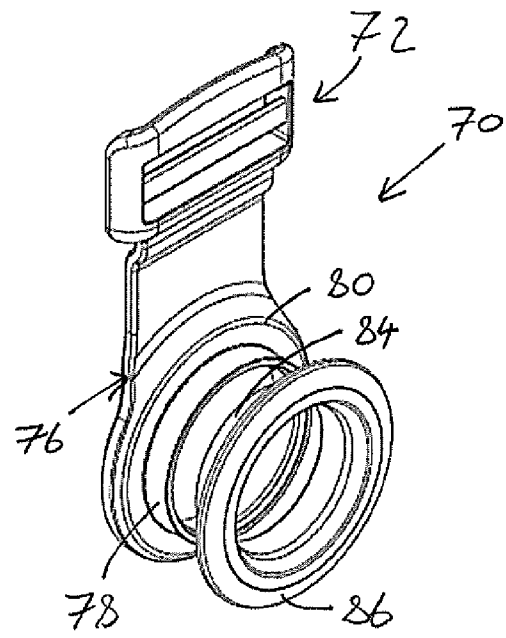
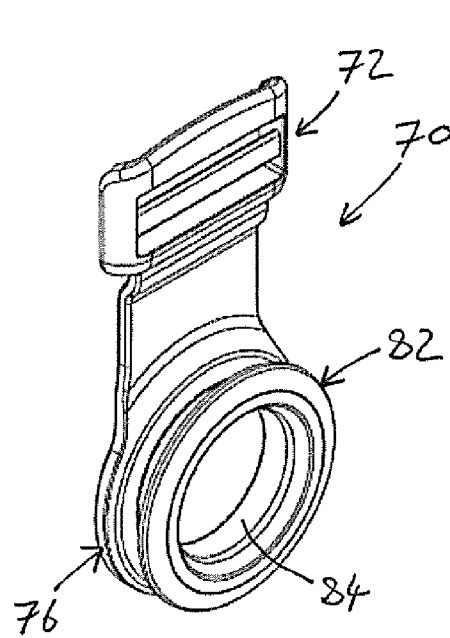
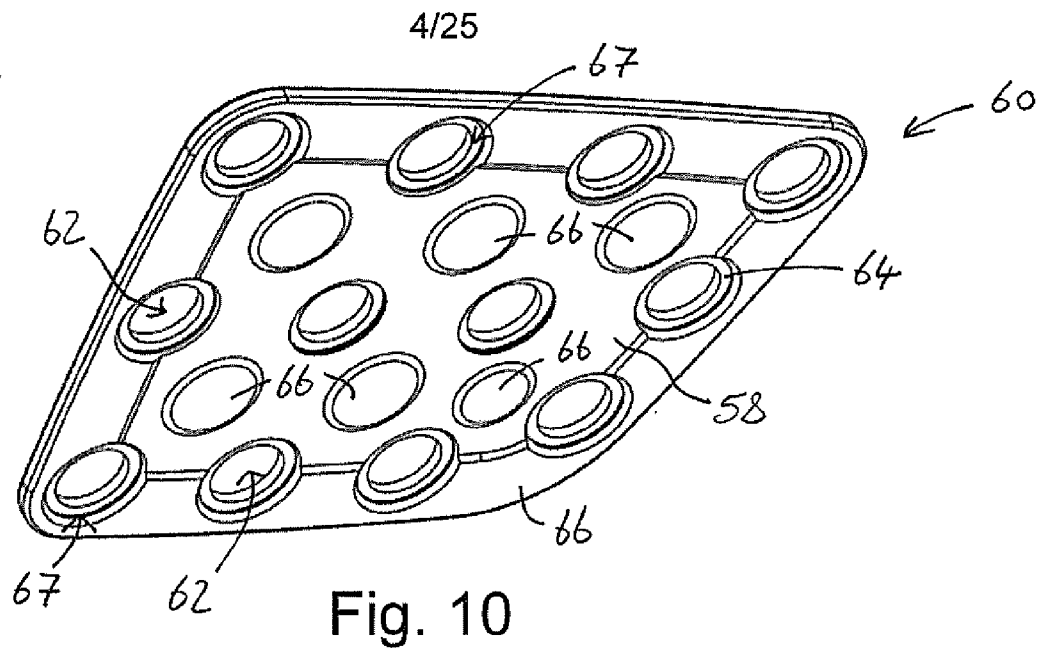
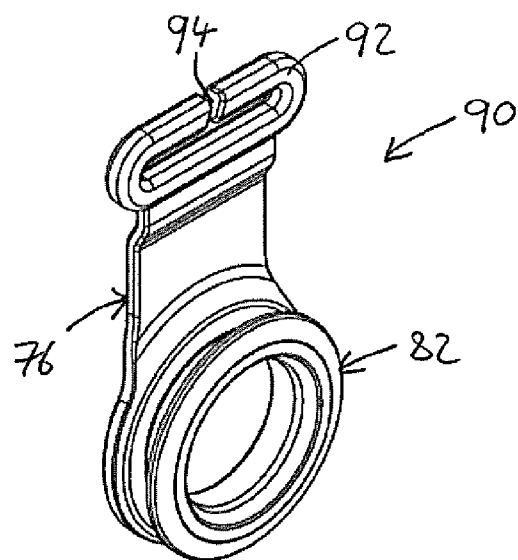
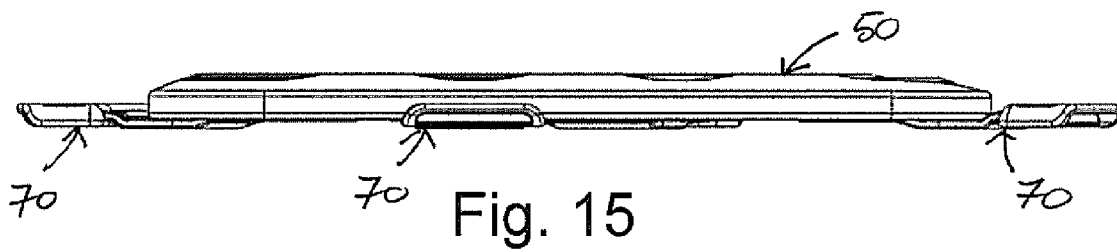
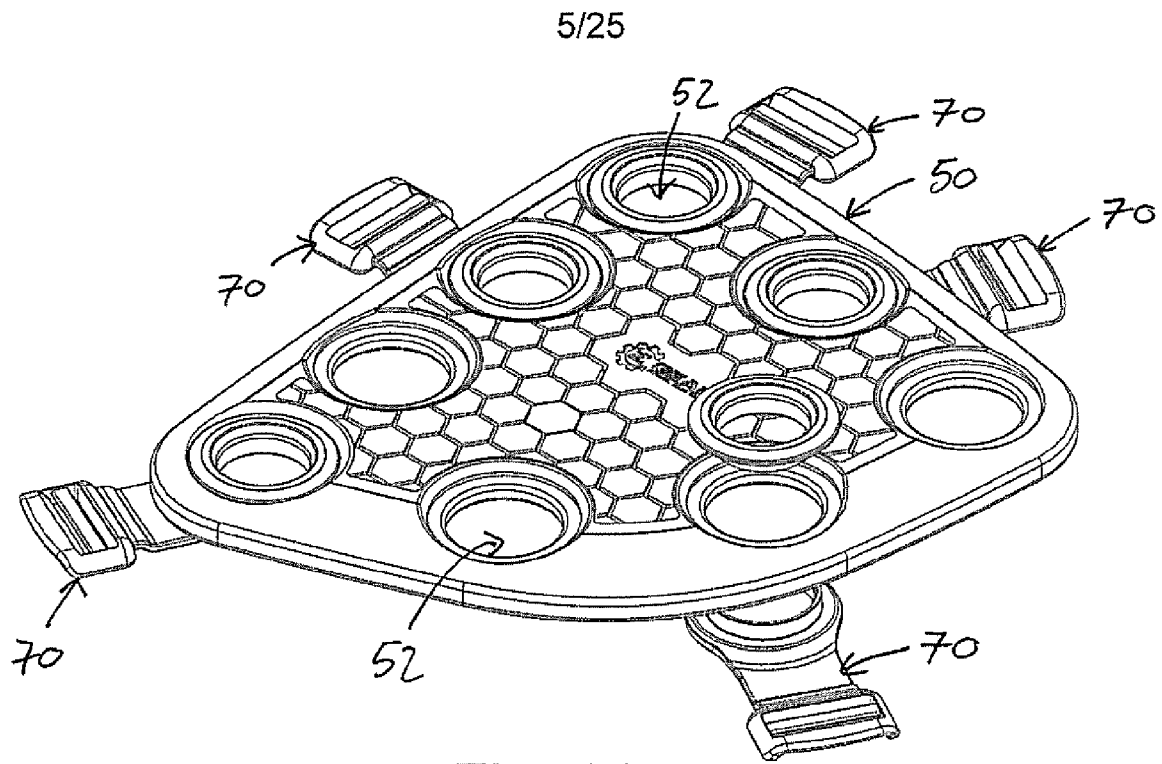


Fig. 6







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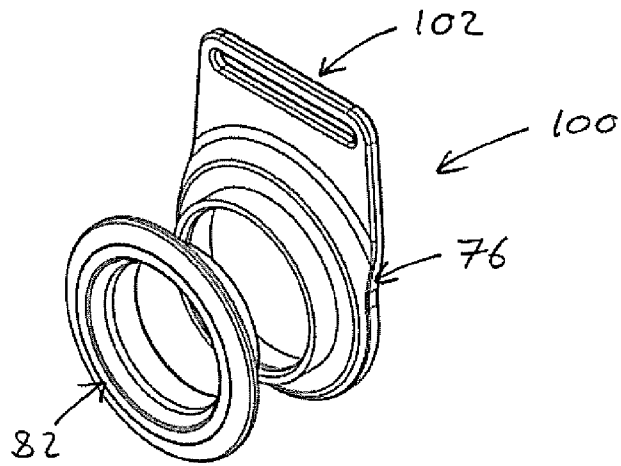


Fig. 17

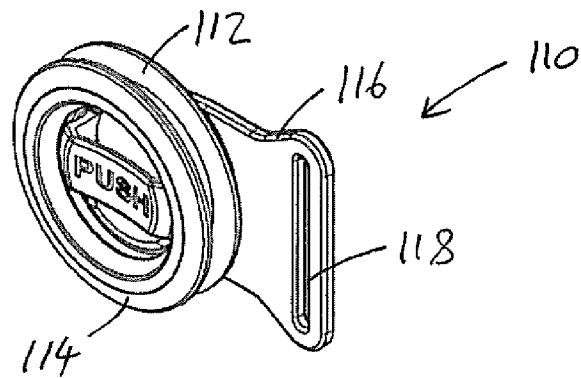


Fig. 18

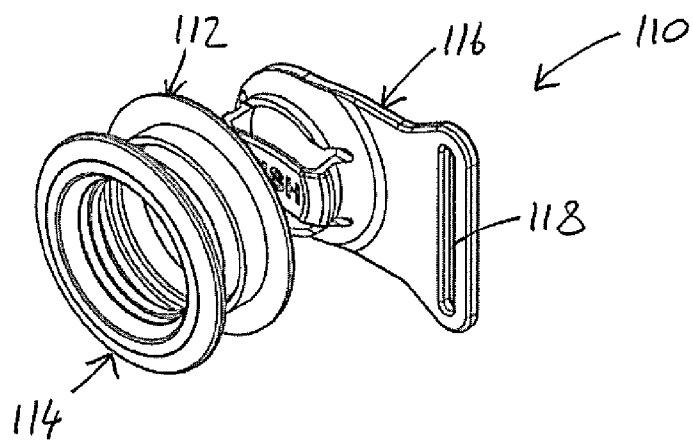


Fig. 19

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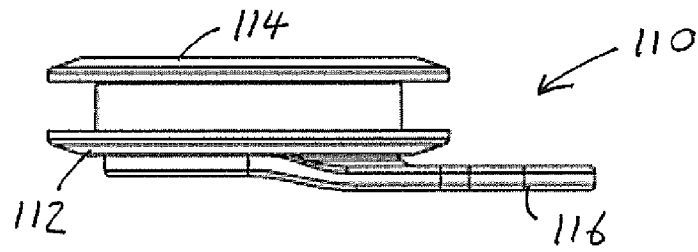


Fig. 20

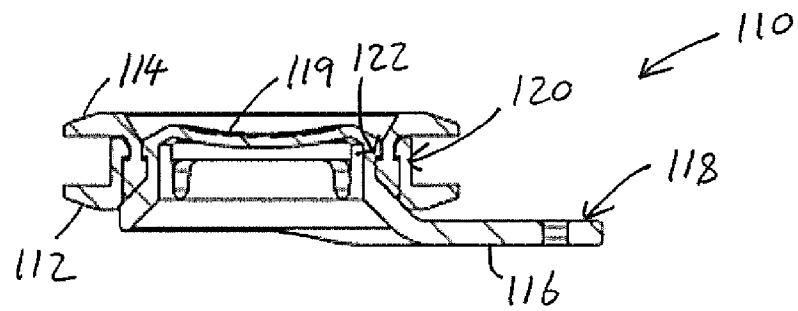


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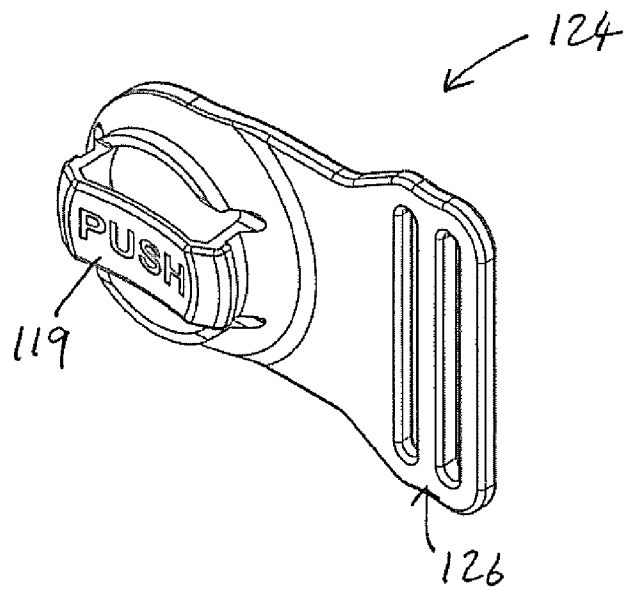


Fig. 22

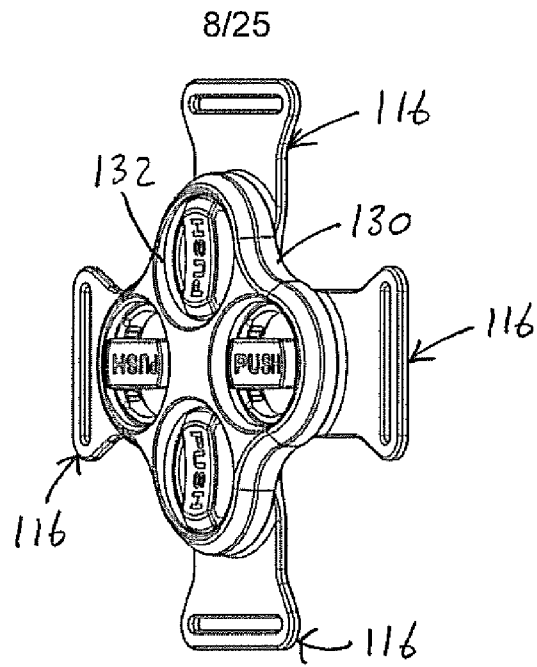


Fig. 23

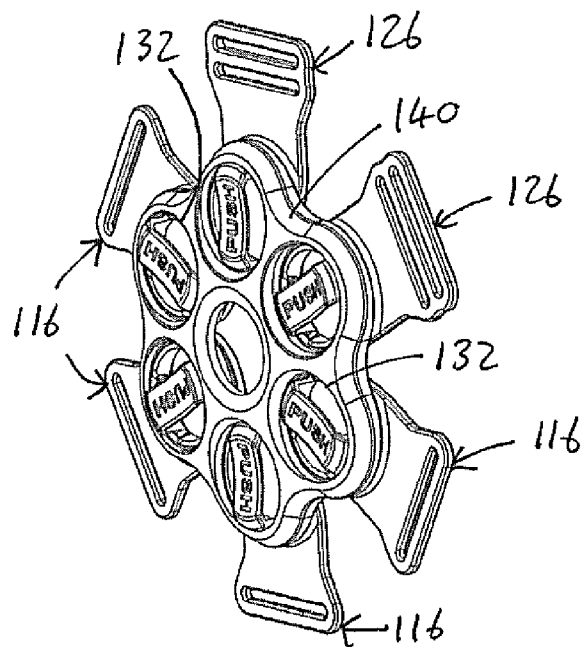


Fig. 24

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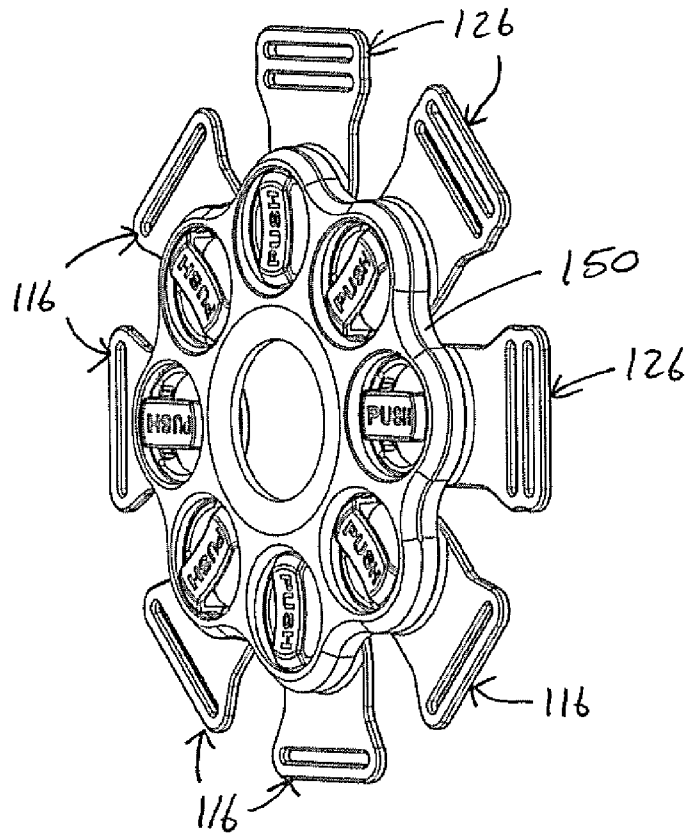


Fig. 25

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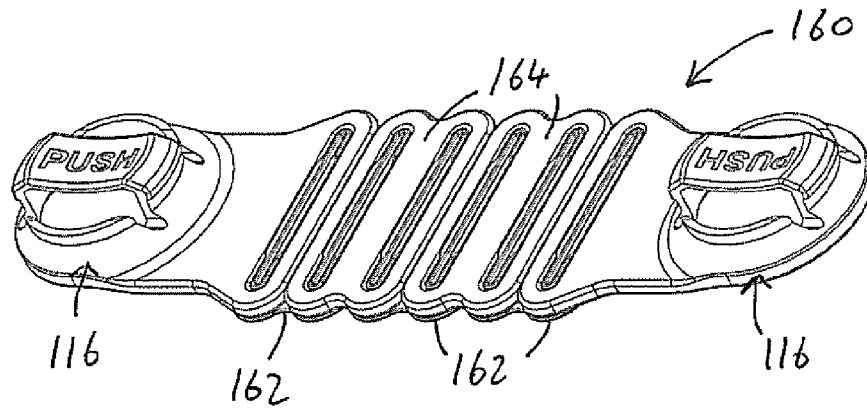


Fig. 26

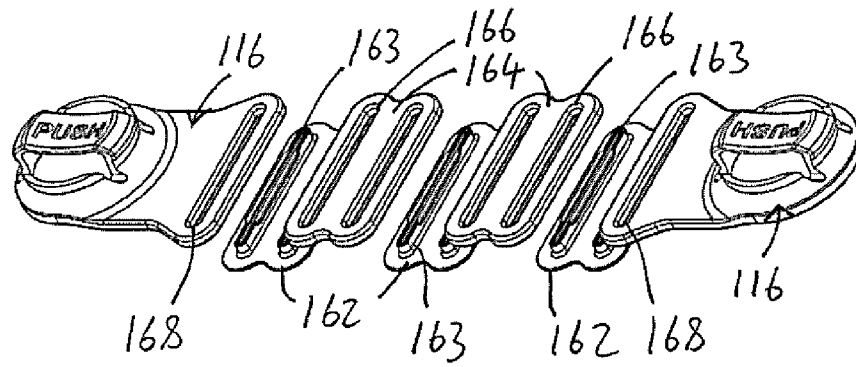


Fig. 27

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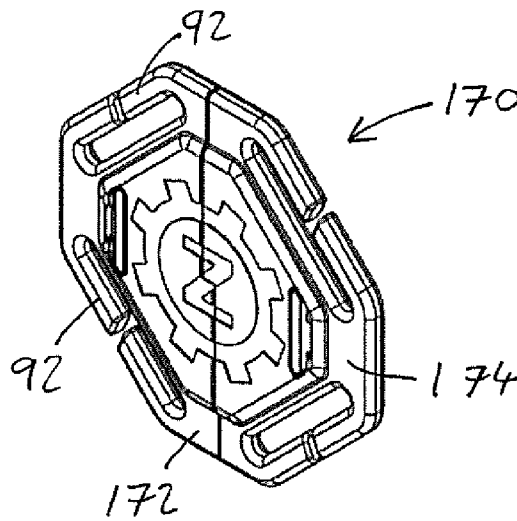


Fig. 28

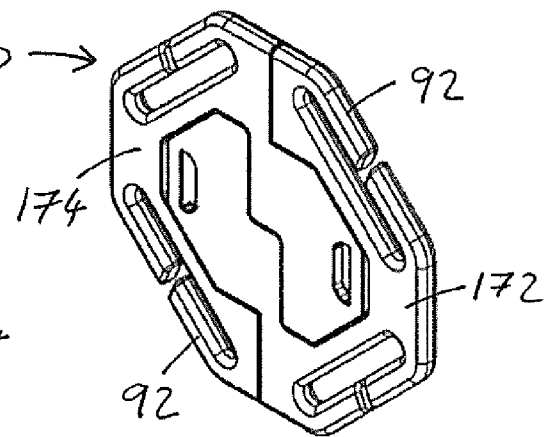


Fig. 29

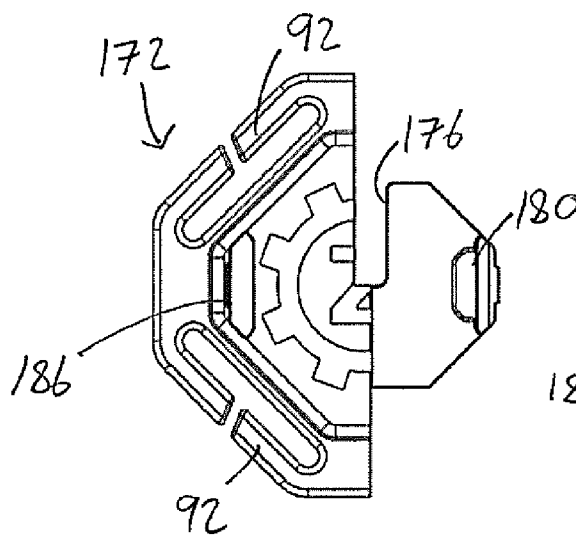


Fig. 30

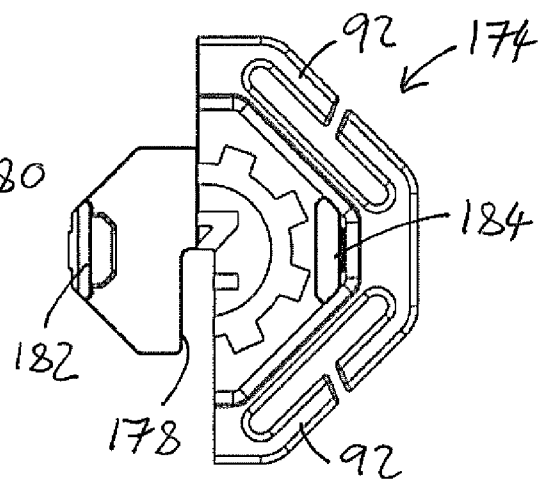


Fig. 31

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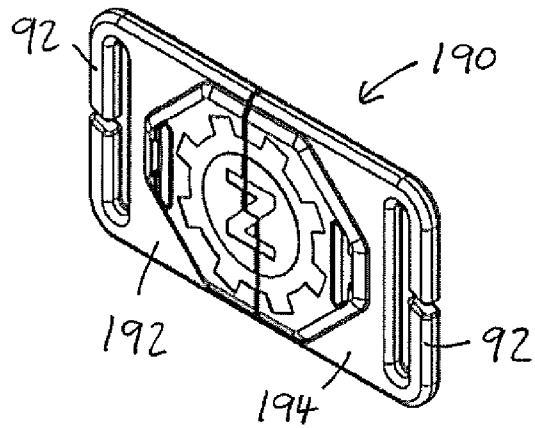


Fig. 32

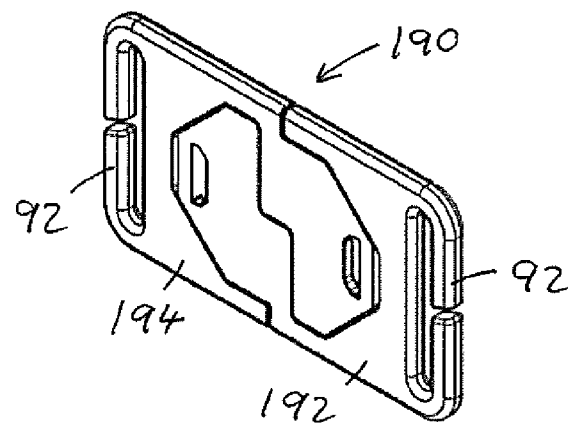


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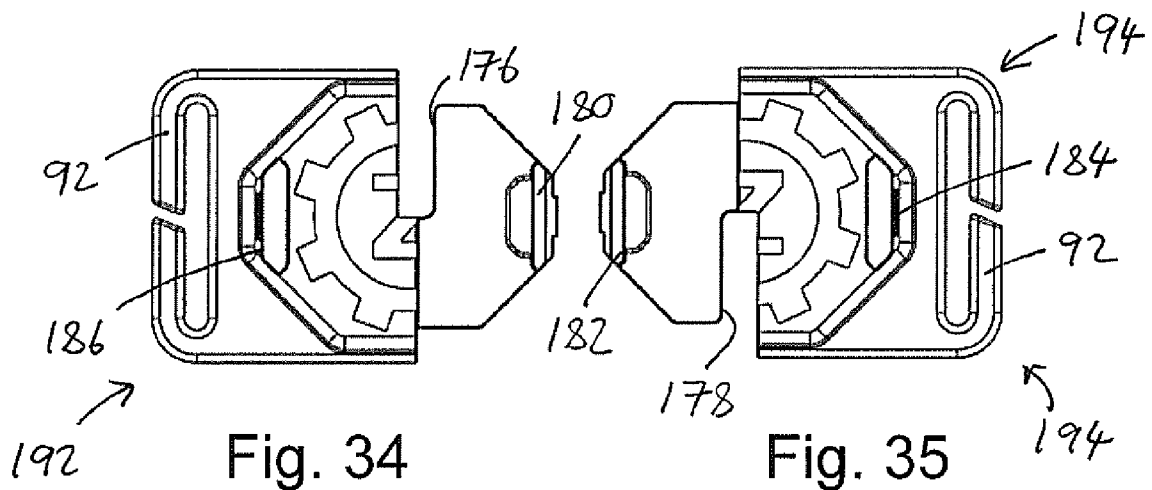


Fig. 34

Fig. 35

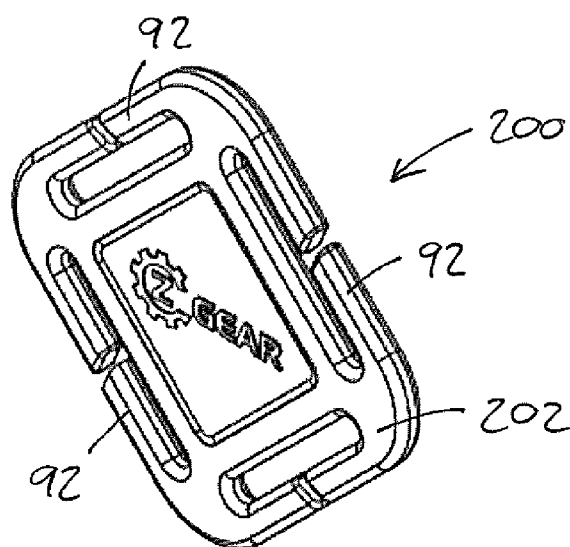


Fig. 36

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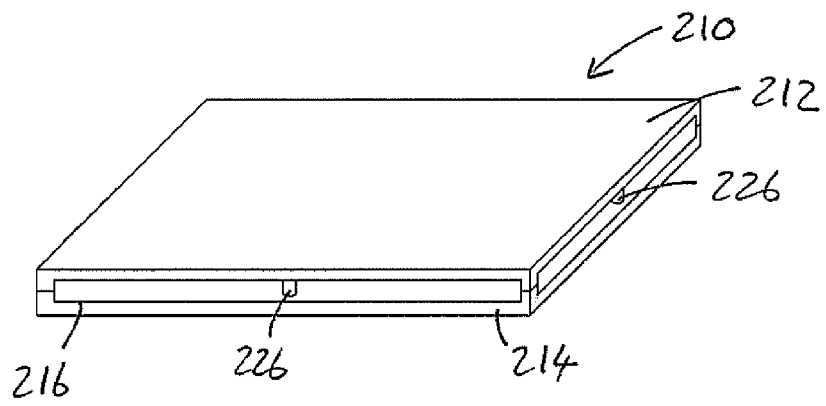


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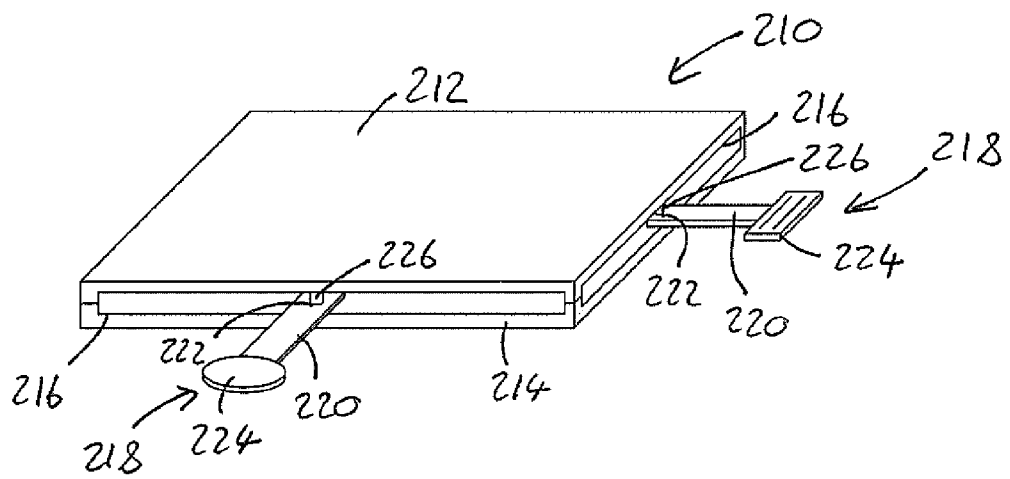


Fig. 38

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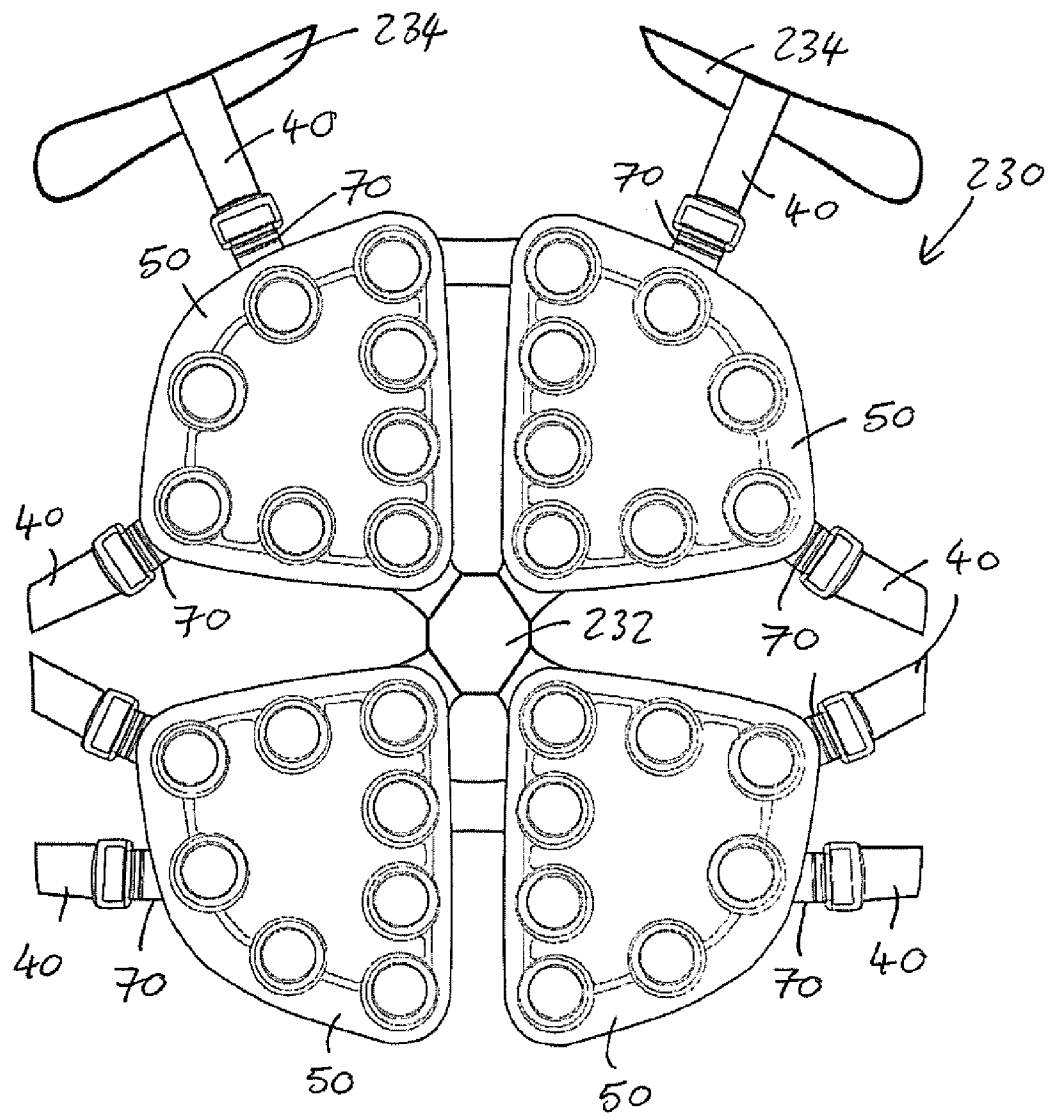


Fig. 39

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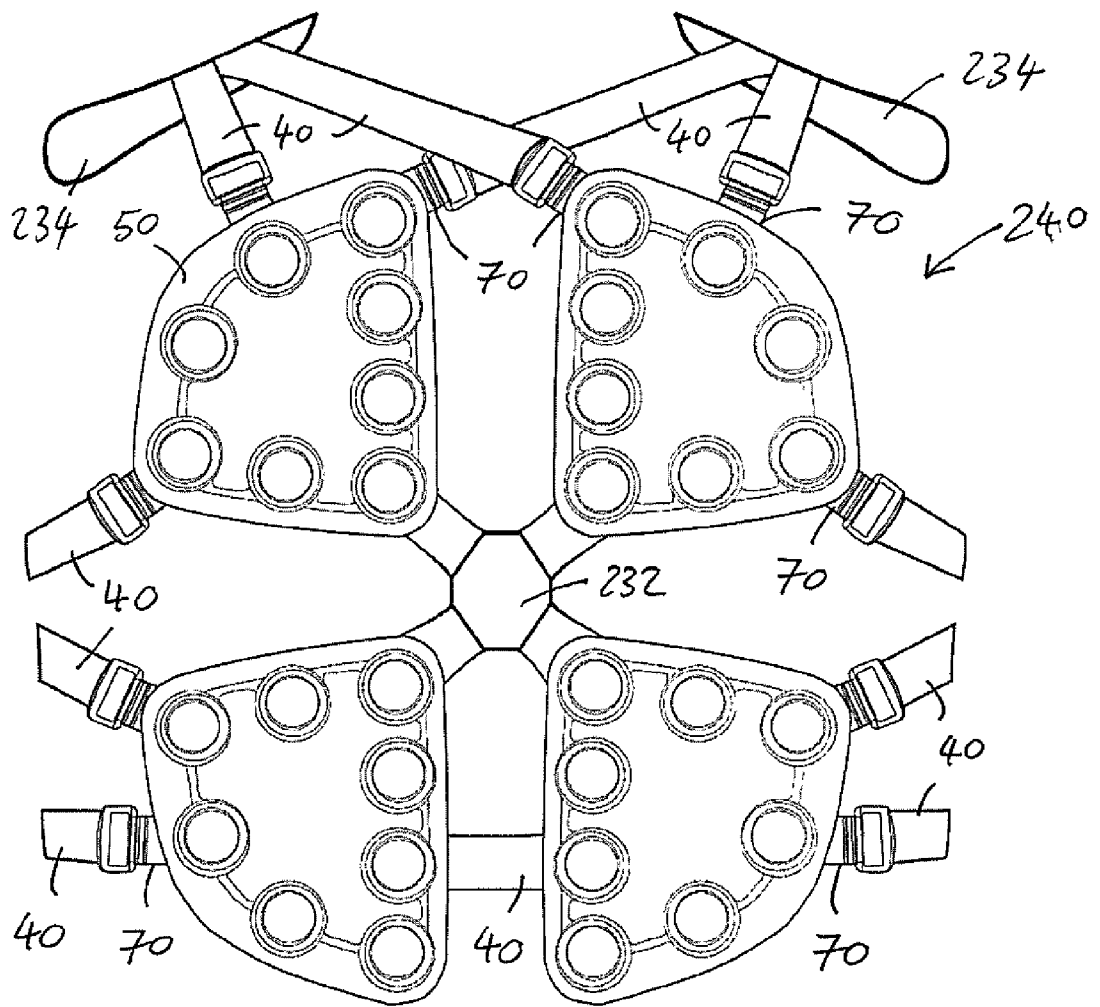


Fig. 40

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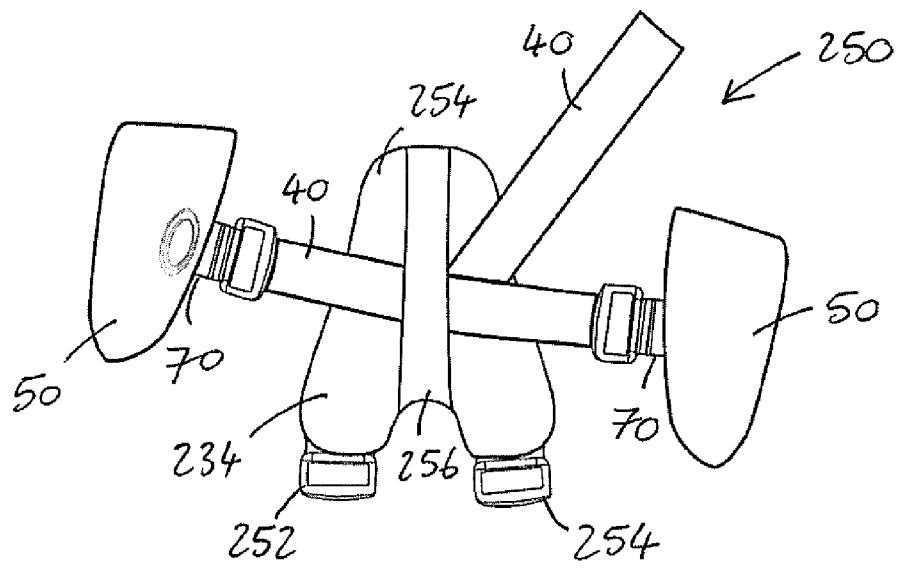


Fig. 41

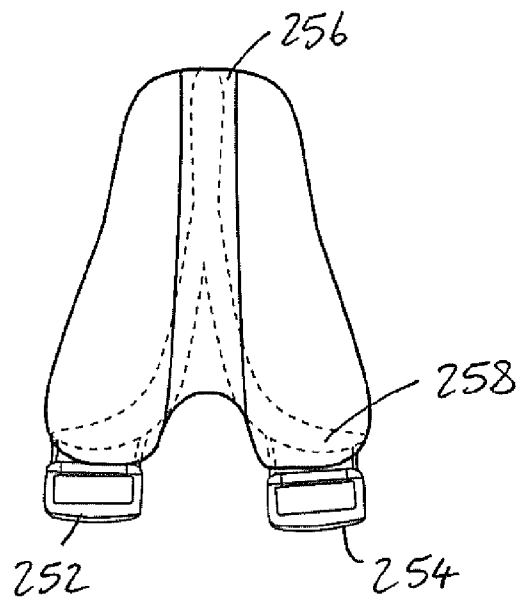


Fig. 42

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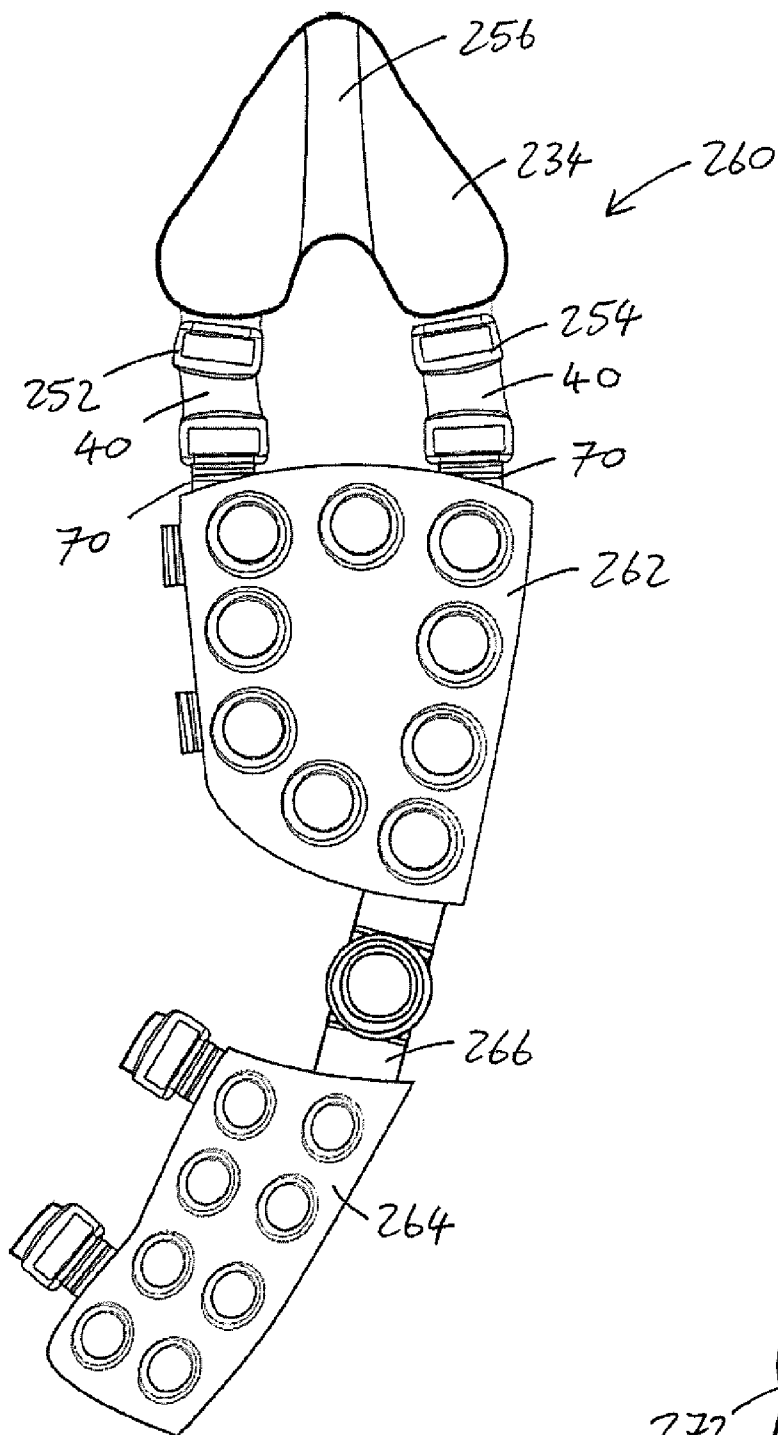


Fig. 43

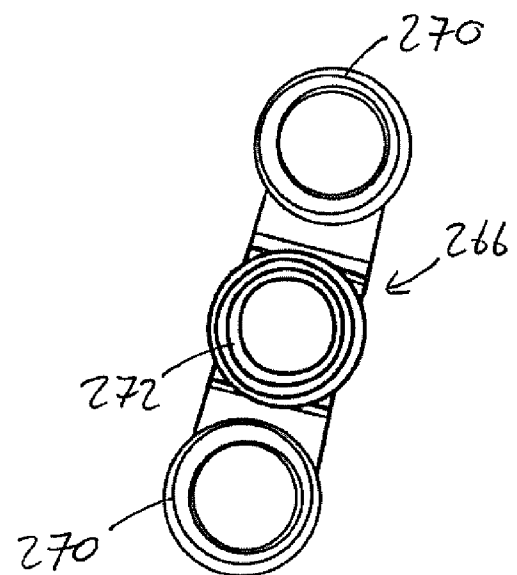


Fig. 44

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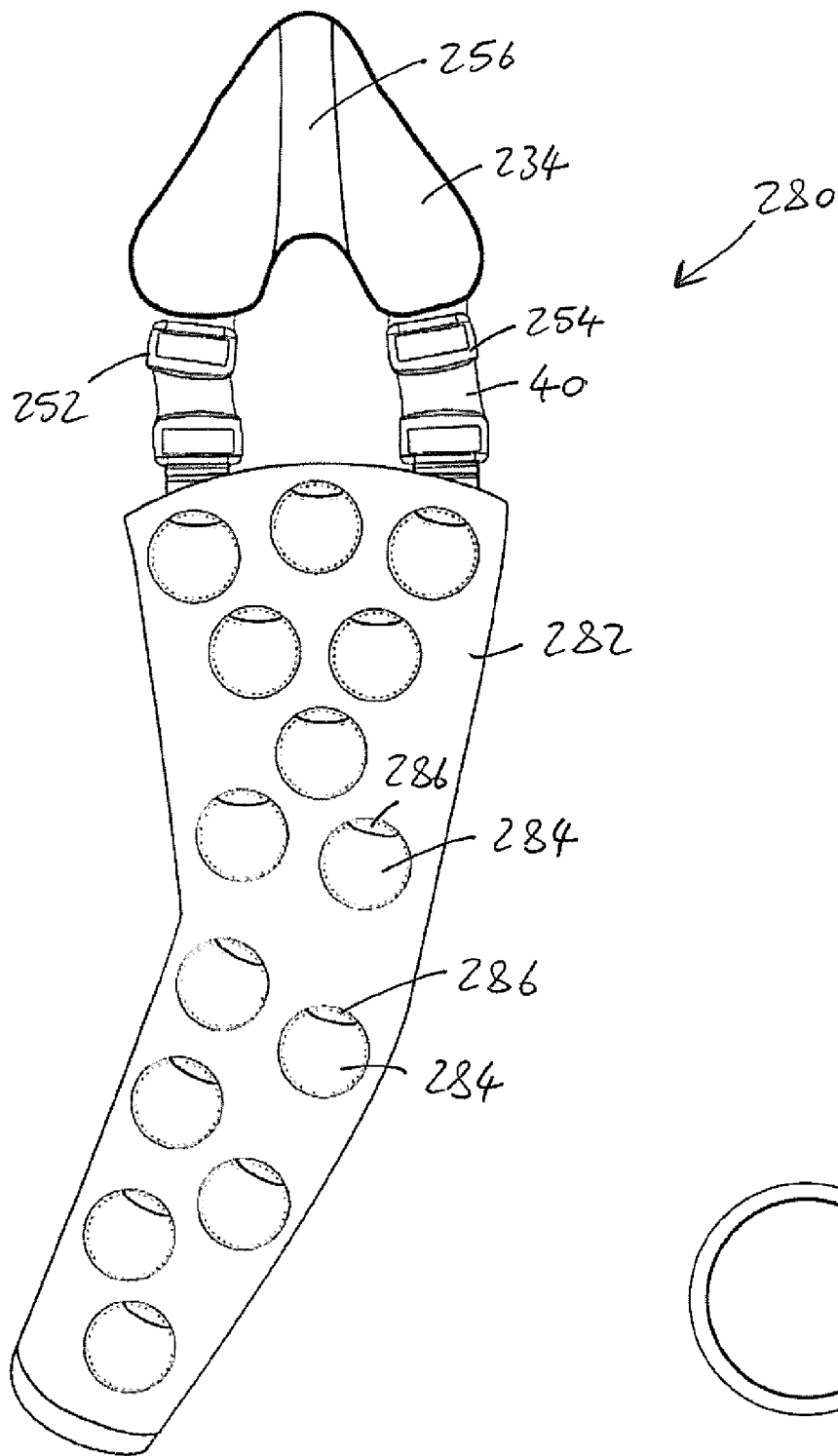


Fig. 45

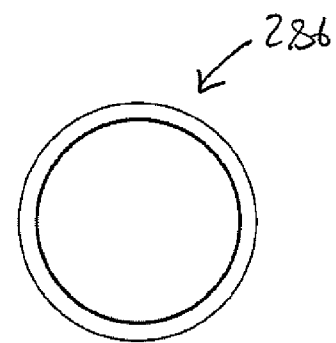


Fig. 46

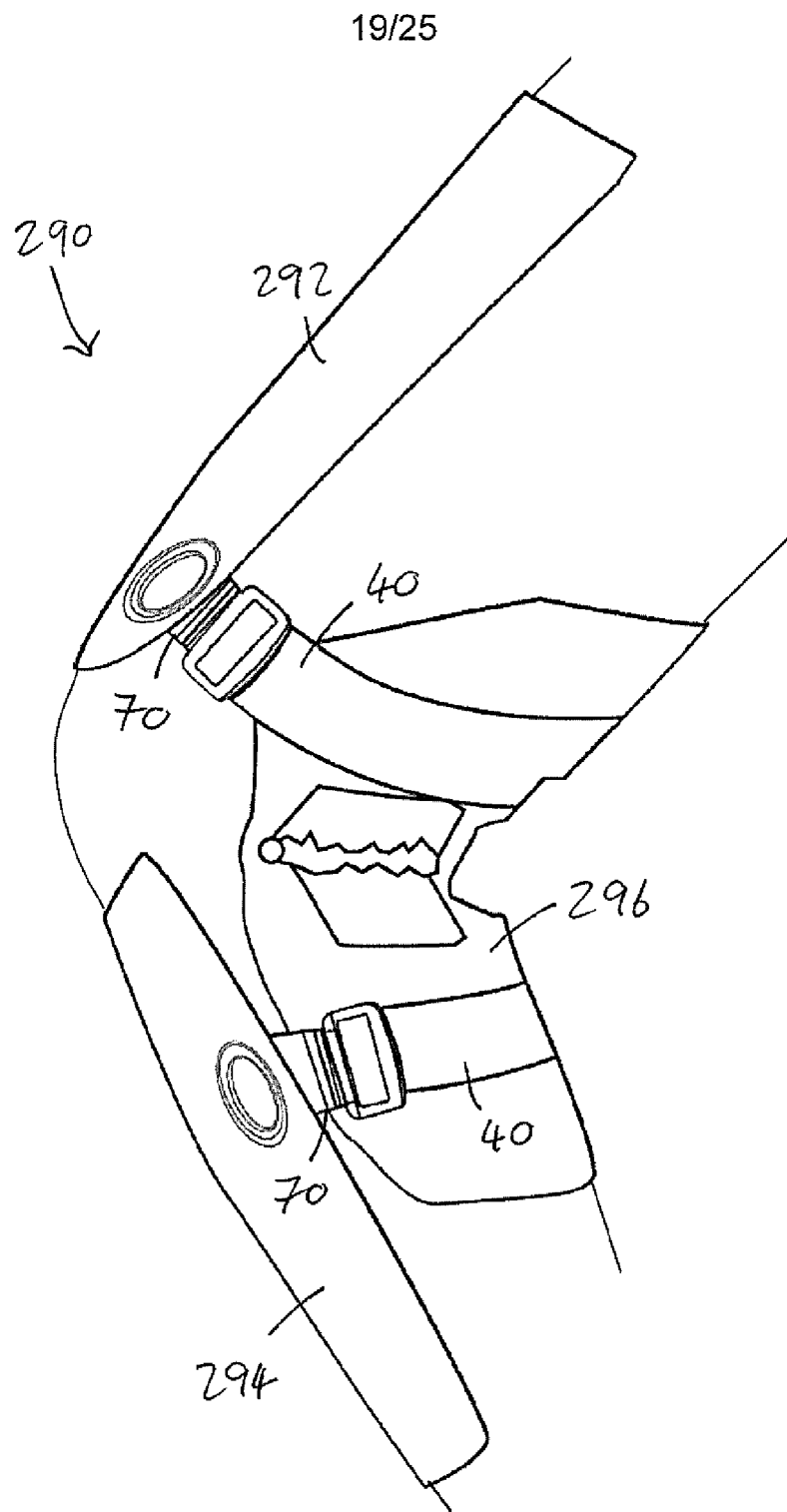


Fig. 47

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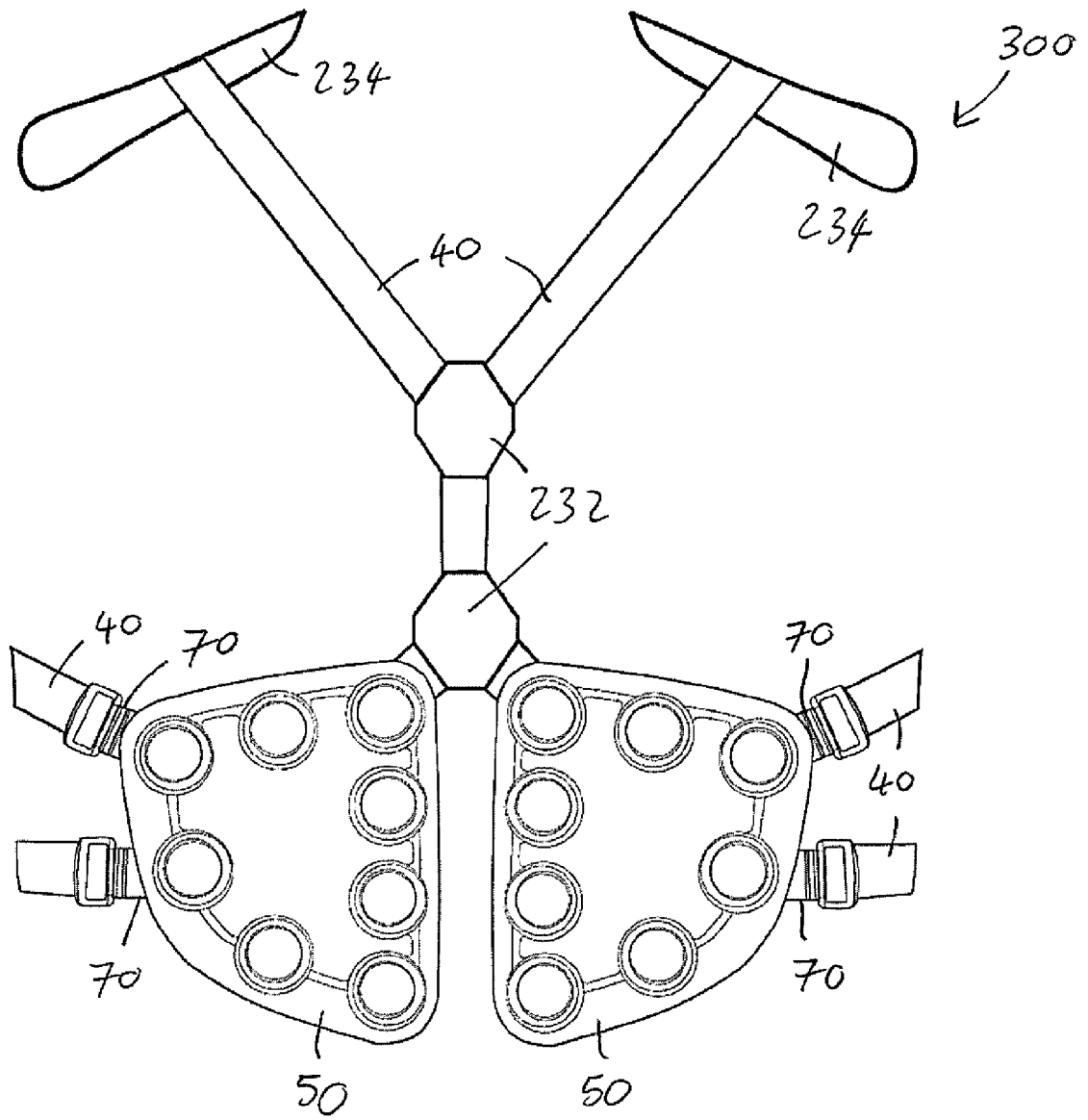


Fig. 48

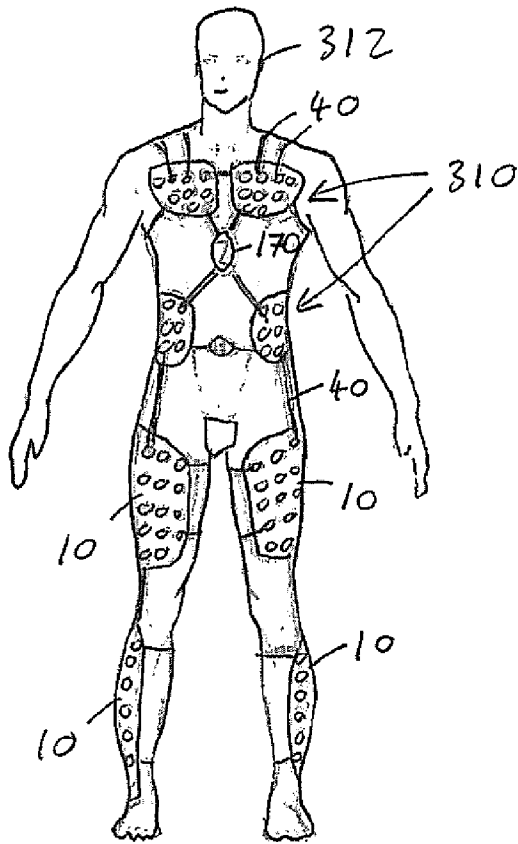


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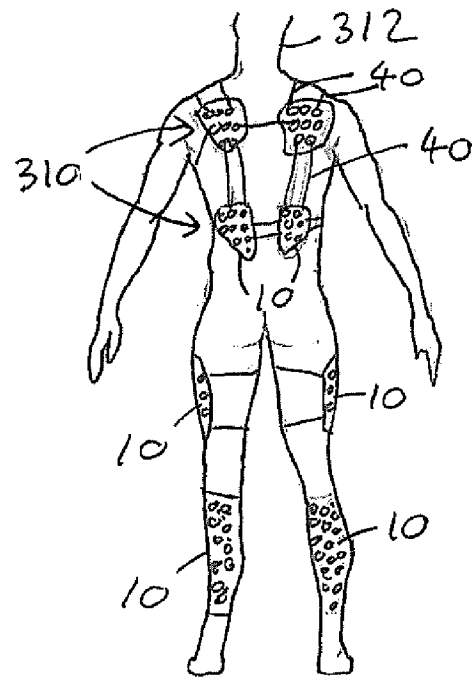


Fig. 50

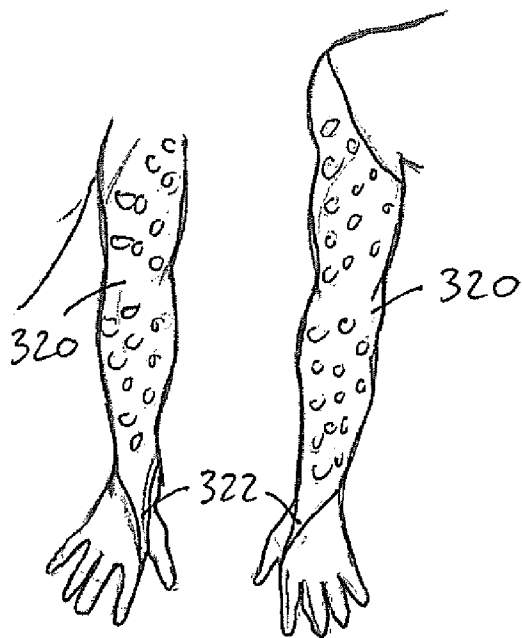


Fig. 51

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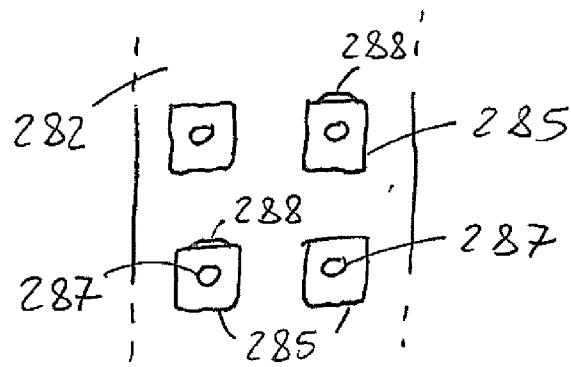


Fig. 52

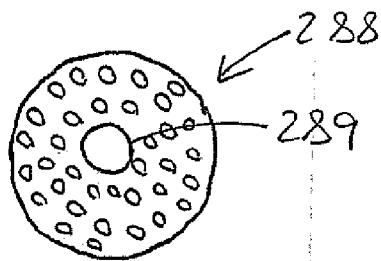


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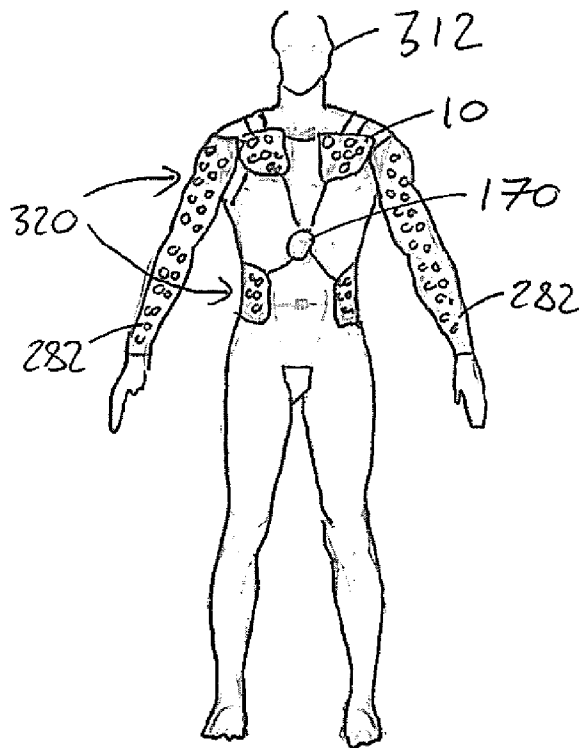


Fig. 54

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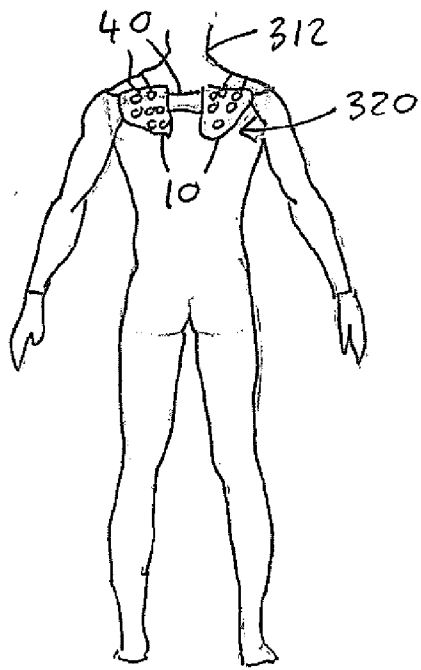


Fig. 55

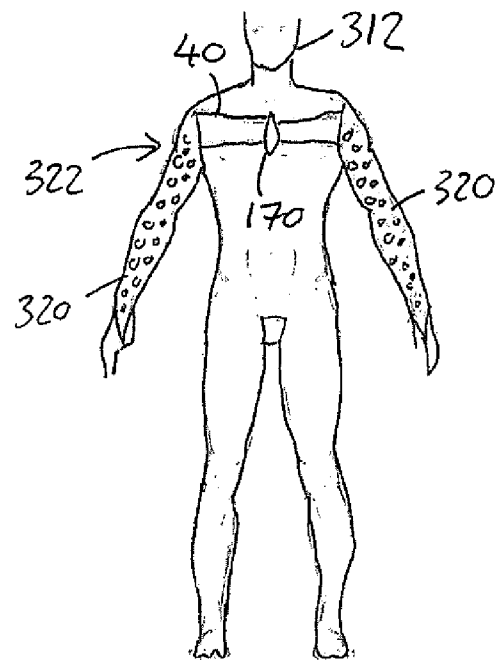


Fig. 56

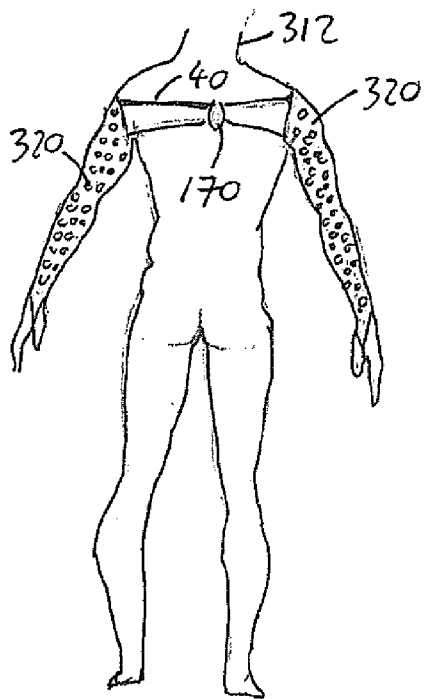
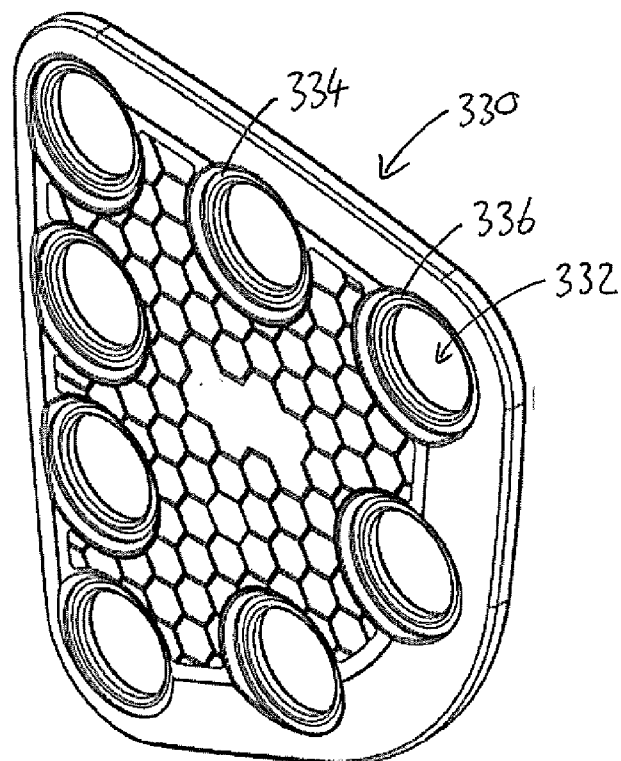
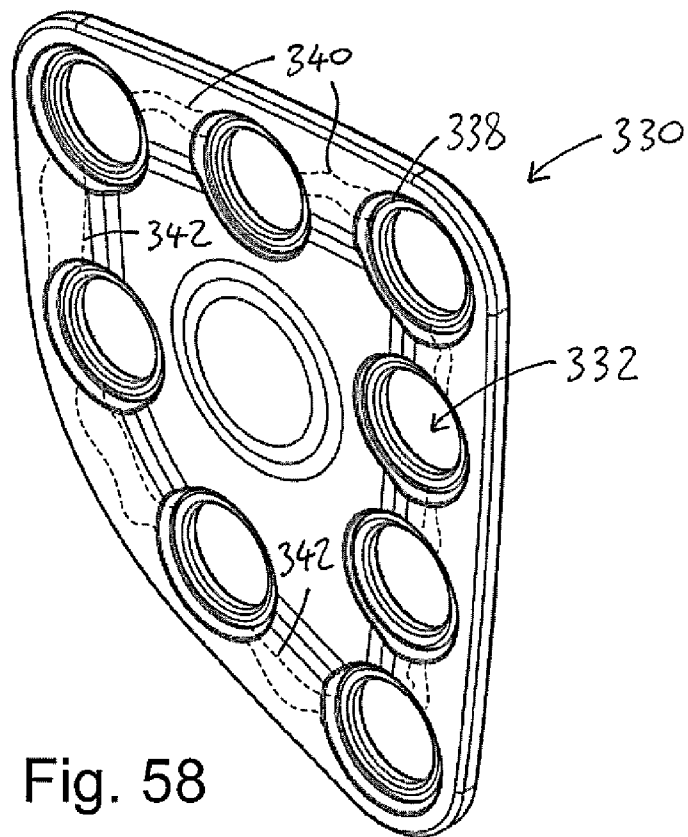


Fig. 57

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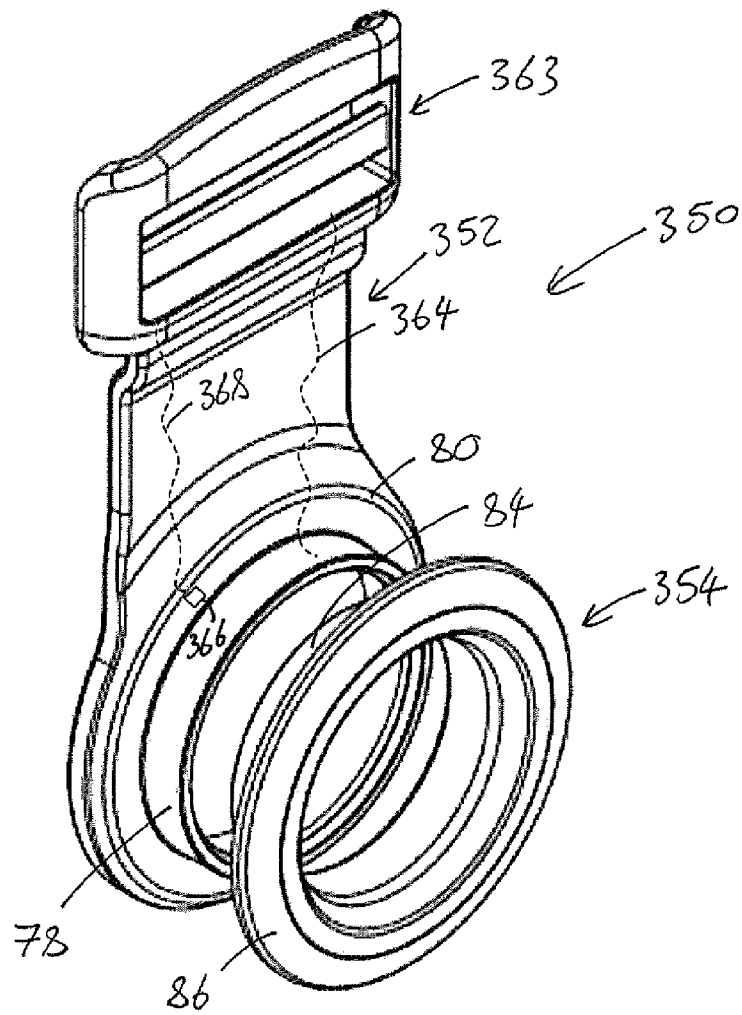


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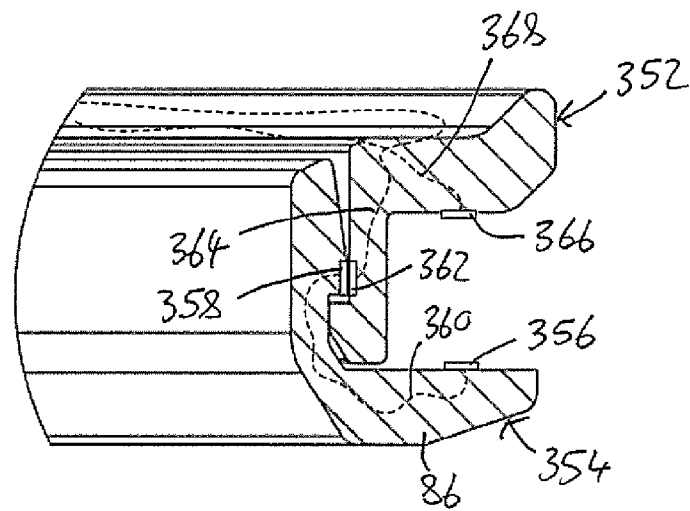


Fig. 61

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2020/050179

A. CLASSIFICATION OF SUBJECT MATTER

A63B 21/065 (2006.01) A41D 1/00 (2018.01) A41D 13/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PATENW: IPC/CPC marks: A63B21/065, A63B21/4025, B63C11/02, Y10S2/912 OR Y10S2/92; terms: second, separate, connect, fasten, attach, remove, engage, weight, vest, flexible, polymer, powder, particle, iron, aperture, ventilate, ledge, annular, electrical, power supply, internalnet, body area network, body sensor network, medical body area network, exercise, resistance and similar terms.

Google Patents: terms: electrical, muscle, stimulation, exercise, training, and similar terms. **Espacenet:** terms: garment, A61H39/08.

Applicant(s)/Inventor(s) name searched in Espacenet, Google and internal databases provided by IP Australia.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Further documents are listed in the continuation of Box C

☒ See patent family annex

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"D" document cited by the applicant in the international application	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
8 April 2020

Date of mailing of the international search report
08 April 2020

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Telephone No. +61262832166

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2020/050179
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2003/041524 A2 (REED, J.) 22 May 2003 whole document, in particular: abstract, p2 ln17-20, p6 ln1-2, 11-15, 25-30, p7 ln17-20, 25-28, p8 ln2-4, 7-16, p11 ln16-21, 27-31, p12 ln19-27, p13 ln1-2, 25-29, figures [1-6, 8A-E, 11A-D, 15A-B], claim [10]	1-26, 29-34, 39-45, 48-49
Y	whole document	27-28, 35-38, 46-47, 50-53
Y	US 2002/0152534 A1 (MORRISON) 24 October 2002 whole document, in particular: paragraphs [6, 30, 33, 38, 47, 57-58], figures [7, 9, 10]	27-28, 35-38, 46-47
Y	US 2013/0204169 A1 (ENDETEK, INC.) 08 August 2013 whole document, in particular: abstract, paragraphs [19-20, 22, 62, 82]	50-53
A	US 9,168,413 B2 (PETRAKIS et al.) 27 October 2015	
A	WO 2011/022717 A1 (MOTION THERAPEUTICS, INC.) 24 February 2011	
A	US 2010/0024089 A1 (TURNER) 04 February 2010	
A	US 8,133,824 B2 (HARBER) 13 March 2012	

INTERNATIONAL SEARCH REPORT		International application No.			
Information on patent family members		PCT/AU2020/050179			
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.					
Patent Document/s Cited in Search Report		Patent Family Member/s			
Publication Number	Publication Date	Publication Number	Publication Date		
WO 2003/041524 A2	22 May 2003	WO 03041524 A2	22 May 2003		
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EP 3573487 A1	04 Dec 2019				
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.					

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INTERNATIONAL SEARCH REPORT		International application No.	
Information on patent family members		PCT/AU2020/050179	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
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