(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
2 May 2008 (02.05.2008)

PCT

(10) International Publication Number
WO 2008/051165 A1

(51) International Patent Classification:
A61H 9/00 (2006.01) *A43B 7/00* (2006.01) *A43B 13/00* (2006.01) *A43B 21/00* (2006.01) *A61H 23/04* (2006.01)

(21) International Application Number: PCT/SG2006/000316

(22) International Filing Date: 27 October 2006 (27.10.2006)

(25) Filing Language: English

(26) Publication Language: English

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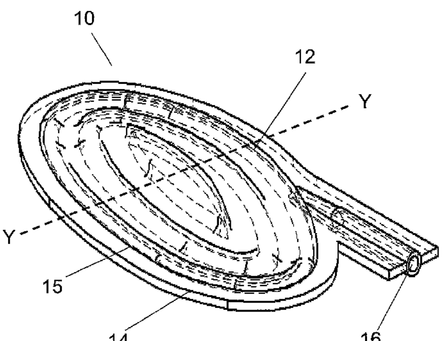
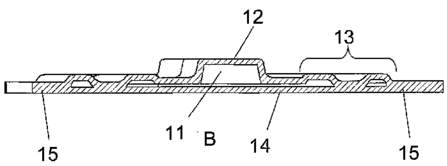
(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(54) Title: AN AIR BAG AND AN APPARATUS AND SYSTEM HAVING THE SAME





(57) Abstract: An air bag having a first monolithic layer and a second monolithic layer, said first and second monolithic layer being attached to each other along a closed line such that the surface area of the first monolithic layer within the closed line is larger than the surface area of the second monolithic layer within said closed line. The first monolithic layer and the second monolithic layer define a fluid chamber bounded by said closed line, wherein the first monolithic layer rests on the second monolithic layer, and is of an at least substantially corrugated shape when said fluid chamber is deflated. The air bag also includes at least one fluid port in fluid communication with the fluid chamber.

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AN AIR BAG AND AN APPARATUS AND SYSTEM HAVING THE SAME

DESCRIPTION

[0001]The present invention relates to the field of air bags, and more specifically, to an air bag for applying massage forces to a body.

[0002] Massage chairs and beds provide their respective users with a massage that alleviates certain medical conditions. Examples of some conditions that a massage can alleviate include improving blood circulation, relieving stress and relaxing tense muscles. In order to provide an effective massage, massage devices typically employ force applicators that apply forces to a body of a user. These force applicators knead, tap, roll or press against the body to generate the effect of a massage. Typically such force applicators are mechanical rollers. However, in order to allow a mechanical roller to perform the aforesaid motions, the control and actuation mechanisms required are complex and numerous and therefore, contribute substantially to the cost of the massage device using such mechanical force applicators. Furthermore, such mechanisms are also difficult to implement in smaller applications such as in footwear, for example.

[0003] In view of the limitations of the mechanical force applicators, several massage devices have turned to air bags as substitutes to the conventional roller force applicator. By doing so, the amount of control and actuation mechanisms required by the air bag-based massage chairs and beds have been reduced. Furthermore, the air bags and their corresponding mechanisms may be suitably scaled in size in order that said air bags may be used in applications such as in foot massaging devices.

[0004] An example of such a foot massaging device is described in United States patent application 2002/0133106 A1, which discloses a piece of footwear having at least three independently inflatable air bags that are distributed along the sole of the footwear. The air bags are formed of two planar layers attached along their respective peripheries thereby forming there between a fluid chamber. The air bags exert a massaging force on a foot of a user when inflated. However, the massaging force exerted by the air bags is limited in part to the elasticity of the material used to form said air bags. Furthermore, the planar nature of the layers that form the air bag also limits the height to which the air bags may be inflated to, thereby limiting the projection (and massage force) of the air bag into the foot of the user.

[0005] PCT application WO 2006/065225 A1 also discloses a similar planar air bag, wherein said air bag is formed by planar monolithic layers bonded at their peripheries. The extent of the massage force exerted by the air bags onto a foot (or body) of a user is again limited by the elasticity of the material used to form said air bags. Furthermore, the planar nature of the layers that form the air bag also limits the height to which the air bags may be inflated to. Although in one embodiment, the PCT application describes a stacking of two air bags in an overlapping relationship in order to increase the massage force applied to the foot (or body), such an arrangement raises implementation difficulties especially when the space within which the air bags are to be fitted is constrained.

[0006] Accordingly, there remains a need for an air bag that is compact, is of simple construction and is yet capable of expanding sufficiently enough in order to apply a sufficient massage force to the body of a user. In addition, such an air bag should be simple and cost effective to manufacture. In this respect, an air bag according to the present invention, and as defined in the appended claims, overcomes the aforesaid difficulties.

[0007] The air bag of the present invention includes a first monolithic layer and a second monolithic layer, wherein the first and second monolithic layers are attached to each other along a closed line. The surface area of the first monolithic layer within the closed line is larger than the surface area of the second monolithic layer within said closed line. By way of being attached to each other, the first monolithic layer and the second monolithic layer define there between a fluid chamber that is bounded by said closed line. The first monolithic layer rests on the second monolithic layer and is of an at least substantially corrugated shape when said fluid chamber is deflated. The air bag also includes at least one fluid port in fluid communication with the fluid chamber.

[0008]In one embodiment of the air bag, the first monolithic layer within the closed line, i.e. its surface area within said closed line, may be shaped into a plurality of ridges and grooves and/or a plurality of waveforms.

[0009]In another embodiment of the invention, the ridges and grooves and/or the waveforms may be at least substantially concentric. In other words, the surface area of the first monolithic layer within the closed line may be rippled and have a plurality of concentric waveforms originating from a point within the closed line, and extending outwards to the closed line.

[0010]In all the embodiments described herein, it is to be noted that the shape and form of the second monolithic layer is typically, though not necessarily, substantially planar while that of the first monolithic shape, as mentioned, is substantially corrugated and rests on the second monolithic layer when the fluid chamber is deflated. The corrugated shape of the first monolithic layer may be achieved by first manually folding said layer to have, as in the case of the above-mentioned embodiment, concentric waveforms for example. This is then followed by the attaching of the folded first monolithic layer to the substantially planar second monolithic layer along the closed line as mentioned above.

[0011]Alternatively, especially in the case of mass production, the first and second monolithic layers may be molded via molding processes such as press-fit molding, injection molding, blow molding, vacuum forming or thermoforming, for example. Generally, the first and second monolithic layers may be formed separately or simultaneously within a suitable mold and attached to each other along the closed line.

[0012]The attachment of the first monolithic layer to the second monolithic layer along the closed line, whether the air bag is fabricated by manual means or otherwise, may be carried out by any suitable method. Examples of such suitable methods include, but are not limited to, solvent bonding, ultra-violet (UV) bonding, ultra-sonic bonding, thermal bonding and/or adhesion bonding. These methods may also be employed to attach the first monolithic layer to the second monolithic layer along lines apart from the closed line, details of which follow later on.

[0013]In yet another embodiment, the first and second monolithic layers may be of a single layer. In this embodiment, the air bag may also be fabricated manually by having a first portion of the single layer folded over a remaining portion of the single layer. The periphery, or any other part, of the first portion is then attached to the remaining portion along a closed line, such that said first portion and remaining portion, along with the bounded closed line, define therebetween a fluid chamber.

[0014]In this embodiment, where the first and second monolithic layers are of a single layer, forming the airbag may also be carried out via a first molding step to form the single layer followed by a second molding step that gives the corrugated shape to the first portion (via thermoforming, for example). Subsequently, the attachment of the shaped first portion to the remaining portion along said closed line may be carried out by any of aforesaid attachment methods.

[0015]Where the first and second monolithic layer are of a single layer, the first portion of the single layer may be taken to be the first monolithic layer while the remaining portion which is folded under said first portion may be taken to be the second monolithic layer. Accordingly, prior to attaching (or folding) the first portion, said first portion should be suitably shaped, as mentioned above, in order to be at least substantially corrugated. As in the previous embodiments, either the first portion or the remaining portion may include a fluid port, as long as the fluid port is located (on either portion) in a position such that when the fluid chamber is defined as described above, said fluid port is in fluid communication with the fluid chamber, which is defined by the first portion and the remaining portion bounded by the closed line.

[0016]In a further embodiment of the invention, the first monolithic layer may include at least one node located on its outer surface and within the closed line. The node is typically a hardened part that is situated such that it is driven into a body of a user when the fluid chamber is inflated. As such, the node itself may have a pointed tip, or a parabolic tip or any other suitably shaped tip for it to apply or enhance the massage force to a body when the fluid chamber is inflated.

[0017]In one embodiment of the invention, the first and second monolithic layers are further attached to each other along at least one attachment line. The attachment line is within the closed line and thus, sub-divides the fluid chamber into at least two sub-chambers. In one exemplary embodiment, the attachment line may be another closed line that defines one of the sub-chambers. As it is a closed line, no fluid communication between the sub-chambers is possible. Accordingly, the fluid chamber defined by the closed attachment line includes at least one fluid port in fluid communication therewith. It follows that in a further exemplary embodiment, where a plurality of closed attachment lines are present, each sub-chamber defined by said closed attachment lines includes its own fluid port in fluid communication on therewith.

[0018]In another exemplary embodiment where the first and second monolithic layers are further attached to each other along at least one attachment line, the attachment line may not be a closed line. Accordingly, in this exemplary embodiment, the sub-chambers are in fluid communication with each other. In a further exemplary embodiment, where two or more attachment lines are present, the attachment lines may be located such that they define a plurality (two or more) sub-chambers, each in fluid communication with each other.

[0019]In all the embodiments of the invention described herein, the first and second monolithic layers may be polymeric materials suited for molding. Examples of such polymeric materials suited for molding include, but are not limited to, thermoplastic polyurethane (TPU), polyvinyl chloride (PVC), polypropylene, Nylon cloth grade 420d, Nylon cloth grade 210d and/or polyethylene (PE).

[0020]It should be noted that the fluid intended to inflate the fluid chamber and/or sub-chambers may be any suitable fluid such as a liquid or a gas. Examples of fluids that may be used include, but are not limited to, water, or gases such as nitrogen (N_2), air and noble gases such as argon (Ar), Helium (He) or Neon (Ne).

[0021]The air bag of the present invention may be of any suitable shape. In this respect, the overall shape of the inflatable portion of the air bag, i.e. the fluid chamber, is primarily governed by the shape of the closed line. Examples of shapes that the closed line may be formed of include but are not limited to, shapes that are at least substantially rectangular, polygonal, circular and/or elliptical.

[0022]Another aspect of the present invention relates to an air bag apparatus. The air bag apparatus includes an air bag as described in any of the aforesaid embodiments and a fluid pump system that is connectable (possibly in a removable manner via a docking mechanism) to the fluid port of the air bag.

[0023]The fluid pump system of the air bag apparatus includes a fluid pump. The connection of the fluid pump to the air bag may be through intermediate fluid flow tubes, for example. The fluid pump system may also include a controller, wherein said controller regulates the fluid pump, and a valve for controlling the inflation and deflation of the air bag of the apparatus. The fluid pump system may also include a pressure regulatory sensor in connection with the fluid pump and/or air bag. The fluid pump, controller, valve and pressure regulatory sensor may each be electrically coupled to either a single power source or to independent power sources.

[0024] As mentioned, the fluid pump system also includes a docking mechanism to allow for the fluid pump system to be connected to the air bag. The docking mechanism comprises two parts with one part located on the fluid pump system and the other part located on the air bag. The docking mechanism of the fluid pump system is essentially complementary to the docking mechanism found on the air bag, i.e. such as in a plug and socket, for example.

[0025]In one illustrative embodiment, the docking mechanism of the fluid pump system includes a housing. The housing includes at least one fluid flow tube. One end of the fluid flow tube is in fluid connection with the valve and therefore, with the fluid pump system while the other end is adapted, along with the housing to be connectable to the complementary docking mechanism found on the air bag. The docking mechanism on the air bag also includes a housing having at least one fluid flow tube therein, wherein one end of the tube is adapted to be connectable to the docking mechanism of the fluid pump system and the other end of the tube is connected to the air bag(s).

[0026]In the above illustrative embodiment of the docking mechanism, the fluid flow tube of the air bag may be also coupled to a flow valve that is capable of varying the rate of fluid flow (in the form of a radial dial, for example) from the fluid pump system to the docked air bag.

[0027]Another aspect of the present invention relates to a massage shoe system. The massage shoe system includes a pair of shoes, each having at least four air bags arranged therein. Each air bag includes a first monolithic layer and a second monolithic layer, wherein said first and second monolithic layers are attached to each other along a closed line. The surface area of the first monolithic layer within the closed line is larger than the surface area of the second monolithic layer within said closed line such that the first monolithic layer and the second monolithic layer define a fluid chamber bounded by said closed line. The first monolithic layer rests on the second monolithic layer and is of an at least substantially corrugated shape when said fluid chamber is deflated. In addition, the air bag includes at least one fluid port in fluid communication with the fluid chamber.

[0028]Essentially, any of the embodiments of the air bag as described above may be used in connection with the massage shoe system. In the implementation of any of the embodiments of the air bag into the shoe, space constraints are typically taken into consideration. In this respect, one embodiment of the massage shoe system includes a shoe having at least one recessed cup located on the sole of the shoe. The recessed cup is adapted such that it is capable of housing at least one air bag. For optimal comfort to a user of the shoe, the recess should be of a sufficient depth such that when the air bag is accommodated therein, the surface of the sole surrounding the recess, and the surface of the air bag at the opening of the recess should be at least substantially congruous.

[0029]In one exemplary embodiment of the shoe having the recess, said recess may be located in the heel region. Alternatively, in another exemplary embodiment, the recess may be located in the mid-sole region of the shoe.

[0030]In one specific exemplary embodiment of the massage shoe system where each shoe has four air bags therein, two of the four air bags are arranged on or in the sole of the shoe to provide a massage force to the heel region and/or sole region of a foot and the remaining two air bags are arranged along the lateral walls of the shoe to provide a massage force to the vamp region, plantar arch region and/or lateral region of the foot. The arrangement of the air bags is not limited to those regions mentioned above, and may also include other areas of the foot such as the calcaneal tubercle region, sides of the calcaneus, the tarsal region, the dorsal region and the digital region, for example.

[0031]In another exemplary embodiment, the massage shoe system includes boots instead of shoes. The boots may be hi-cut or low-cut, meaning that said boots may extend from the foot to the ankle or further up to the calf region. In this exemplary embodiment, the arrangement of air bags within the boot may be such that the lateral crural region, tarsal region and sural region are provided with a massaging means.

[0032]In another embodiment of the massage shoe system, each of the four air bags may be arranged beneath a layer of elastic material. This is done in order to provide for a more congruous surface over the sole of the shoe for the comfort of the user. In this embodiment, as the foot of a user only directly contacts the elastic material, the foot experiences massage forces, from the inflation of the air bags, via said elastic material, which stretches to accommodate the expanding air bag.

[0033]Although any suitable elastic material may be used, in one specific exemplary embodiment, the elastic material used is neoprene. The use of neoprene prevents the accumulation of heat within the shoe during any massage sequence thereby reducing the formation of sweat and unpleasant odors, Apart from neoprene, Nylex or any other suitable elastic material that serves the same purpose may also be used.

[0034] In a further embodiment of the massage shoe system, the heel region and/or the sole region of the shoe may include a docking mechanism. The docking mechanism is typically adapted to dock with an independent power supply and/or an air bag apparatus as described above.

[0035] The various aspects of the present invention will now be described with reference to the following illustrated exemplary embodiments of the present invention in which:

[0036] **Figure 1A** shows an embodiment of an air bag according to the present invention in a deflated state;

[0037] **Figure 1B** shows a cross-sectional view about a line **Y-Y** of the embodiment of **Figure 1A**;

[0038] **Figure 2A** shows the embodiment of **Figure 1A** in an inflated state;

[0039] **Figure 2B** shows a cross-sectional view about the line **Y-Y** of the embodiment of **Figure 2A**;

[0040] **Figure 3A** shows another embodiment of an air bag according to the present invention in a deflated state;

[0041] **Figure 3B** shows a cross-sectional view about a line **X-X** of the embodiment of **Figure 3A**;

[0042] **Figure 4A** shows the embodiment of **Figure 3A** in an inflated state;

[0043] **Figure 4B** shows a cross-sectional view about the line **X-X** of the embodiment of **Figure 4A**;

[0044] **Figure 5** shows an exploded view of a docking mechanism that forms part of a shoe massage system;

[0045] **Figure 6** shows an exploded view of a sole of a shoe massage system;

[0046] **Figure 7** shows an exploded view of another embodiment of a sole of the shoe massage system of **Figure 6**; and

[0047] **Figure 8** shows an exploded view of a shoe of a shoe massage system.

[0048] **Figure 1A** shows an embodiment of an air bag **10** according to the present invention in a deflated state. The air bag includes a first monolithic layer **12** and a second monolithic layer **14**. The first and second monolithic layer **12** and **14** are attached to each other along a closed line **15** that runs all around in a substantially elliptical shape. The first and second monolithic layers **12** and **14**, along with the closed line **15**, define a fluid chamber (not shown). The air bag **10** includes a fluid port **16** that is in fluid communication with the fluid chamber.

[0049] The first monolithic layer **12**, within the closed line **15**, is at least substantially corrugated in shape while the second monolithic layer within the closed line **15** (though not shown) is substantially planar. The corrugation of the first monolithic layer **12** is made up of ridges and grooves or waveforms. As illustrated, said corrugations are concentric, extending from a plateau in the central region of the closed line **15**, towards the closed line **15**. As such, the total corrugated surface area of the first monolithic layer **12** within the closed line **15** is larger than that of the second monolithic layer **14**.

Figure 1B shows a cross-sectional view about the line **Y-Y** of the embodiment of **Figure 1A**. In **Figure 1B** the first monolithic layer **12** and the second monolithic layer **14** are attached to each other along the closed line **15**. Within the closed line **15**, the first and second monolithic layers have overlapping surfaces wherein the surface area of the first monolithic layer **12** is larger than that of the second monolithic layer **14**. The larger surface area of the first monolithic layer **12** is maintained within the closed line **15** by having said surface of the first monolithic layer **12** to be corrugated, i.e. it is shaped from a plurality of ridges and grooves (or waveforms) **13**. The corrugated first monolithic layer **12** and the second monolithic layer **14**, along with the closed line **15**, define the above-mentioned fluid chamber **11**. When the fluid chamber **11** is in its deflated state, the first monolithic layer **12** rests on the second monolithic layer **14** as shown.

[0050] **Figure 2A** shows the embodiment of **Figure 1A** in an inflated state. In the inflated state, the first monolithic layer **12** no longer appears corrugated as fluid (air) fills the fluid chamber **11** thereby forcing the expansion of the corrugated surface of the first monolithic layer **12** into a substantially parabolic shape with the plateau. The inflated state of the air bag is better illustrated in **Figure 2B** which shows a cross-sectional view about the line **Y-Y** of the embodiment of **Figure 2A**. In this embodiment, although the first monolithic layer **12** is substantially parabolic, the second monolithic layer **14** is essentially planar thereby giving rise to a substantially dome-shaped structure.

[0051] Alternatively, the second monolithic layer **14** may be adapted such that it adopts a parabolic shape as well when the air bag **10** is inflated thereby giving rise to a more circular structure (not shown) when viewed from its cross-sectional area about the line **Y-Y**. In addition, although in the illustrated embodiment, the first monolithic layer **12** is shown not to extend outside the closed line **15**, it is to be noted that the area of the monolithic layers **12** and **14** outside of the closed line **15** may vary. However, the relationship within the closed line between the monolithic layers **12** and **14** remains the same in that the surface area of the first monolithic layer **12** always exceeds that of the second monolithic layer **14**, with the excess being maintained within the closed line **15** by way of the first monolithic layer **12** being corrugated in shape, when the air bag is deflated.

[0052] **Figure 3A** shows another embodiment of an air bag **20** according to the present invention in a deflated state. The embodiment of **Figure 3A** is similar to that of **Figure 1A** with the exception being that the air bag of **Figure 3A** is arranged within a recess or cup **18** (as shown in **Figure 3B**). Accordingly, as in **Figure 1A**, the first monolithic layer **12** and the second monolithic layer **14** are attached to each other along a closed line **15** that runs all around in a substantially elliptical shape. The first and second monolithic layers **12** and **14**, along with the closed line **15** define the fluid chamber **11** (shown in **Figure 3B**) and said fluid chamber is in fluid communication with the fluid port **16**.

[0053] As the air bag **20** illustrated in **Figure 3A** is arranged within the recess **18**, the second monolithic layer **14** tends to adopt the shape of the recess **18**. Alternatively, the second monolithic layer **14** may be pre-formed to the shape of the recess to facilitate the assembly of the air bag **20** within the recess **18**. In any case, as in the embodiment of **Figure 1A**, the surface area of the first monolithic area **12** within the closed line **15** exceeds that of the second monolithic layer **14**. Accordingly, the larger surface area of the first monolithic layer **12** is maintained within the closed line **15** by having said surface area shaped into a plurality of waveforms **13**, as shown in **Figure 3B**, which is a cross-sectional view about the line **X-X** of the embodiment of **Figure 3A**. The waveforms **13** rest on the second monolithic layer **14** when the air bag **20** is in its deflated state and expand outwards, or unfold when air is pumped into the fluid chamber **11**.

[0054] **Figure 4A** shows the embodiment of **Figure 3A** in an inflated state. As in **Figure 2A** and **Figure 2B**, the first monolithic layer **12** no longer retains its waveform as fluid (air) fills the fluid chamber **11** thereby forcing the expansion of the waveform of the first monolithic layer **12** into a substantially parabolic shape with the plateau. The inflated state of the air bag is better illustrated in **Figure 4B** which shows a cross-sectional view about the line **X-X** of the embodiment of **Figure 4A**. In this embodiment, although the first monolithic layer **12** is substantially parabolic, the second monolithic layer **14** is essentially planar thereby giving rise to a dome-shaped structure.

[0055] Unlike the embodiment of **Figure 2B**, due to the placement of the air bag **20,** specifically, the second monolithic layer **14**, within the recess **18**, the air bag **20** is constrained by the size and shape of the rigid recess **18** and thus, forms a dome-shape where the second monolithic layer **14** is at least substantially planar while the first monolithic layer **12** is substantially parabolic with the plateau.

[0056] **Figure 5** shows an exploded view of part of a massage shoe system. This part of the massage shoe system illustrates the docking mechanism **712** of a shoe (not shown). The shoe typically includes at least one air bag located within said shoe. The shoe itself has a recess in the sole **718** that accommodates the docking mechanism **712**. The docking mechanism **712** is secured in place within the recess by way of a cover **720**. As shown, the docking mechanism is located in the heel region of the sole **718**, however, it may also be located further forward such as in the mid-sole region, for example.

[0057]The docking mechanism **712** is complementary to a docking mechanism of a power source or fluid pump system. When not in use, the docking may be covered with a cover **714** to prevent dirt from clogging the fluid channels of the docking mechanism **712**. The docking mechanism **712** is connected to the air bag within the shoe via fluid flow tubes **716**.

[0058]Figure 6 shows an exploded view of the sole **718** of a shoe massage system. The sole **718** is generally hollow to accommodate, generally in the heel and mid-sole region, docking mechanism **712** and fluid flow tubes **716**, as described above. The fluid flow tubes **716** are connected to a valve body **101**, which, in combination with an actuating mechanism **111**, forms a valve mechanism. An in-sole cover **1002** covers the hollow sole **718**. The in-sole cover **1002** includes at least one air bag **1004**. The air bag **1004** may be situated either directly on the lateral surface of the in-sole cover **1002** or beneath another layer of material, such as neoprene for example.

[0059]Figure 7 shows another embodiment of an exploded view of a sole of a shoe massage system of **Figure 6**. This embodiment is very similar to that of **Figure 6** with the exception being that the air bag **1004** is provided with a recess **1008** within the in-sole which the said air bag **1004** is located. The recess **1008** is situated in midway on the in-sole cover **1002**.

[0060] Figure 8 shows an exploded view of a shoe **110** of a shoe massage system. The shoe **110** has a sole **102**. The sole, as described above, includes at least one air bag **104** arranged in a hollow portion of the sole. The air bags **104** are covered by a layer of material **106**, such as neoprene or nylex for example, although any other suitable material may be used. The covering layer **106** provides a relatively uniform surface to the sole within the shoe **110**. In addition, said layer **106**, in the case of neoprene, helps to dissipate any build-up of heat within the shoe thus reducing the tendency for the foot to sweat and the development of foul odors.

[0061] The shoe **110** also includes at least two more air bags **108** and **112**. The air bags **108** and **112** are situated along the lateral walls of the shoe such that the lateral surface and plantar arch regions of a foot of a user contact the air bags **108** and **112**, respectively.

[0062] It should be noted that the exemplary embodiments described above merely serve to aid in the understanding of the various aspects of the present invention. Accordingly, said various aspects of the present invention are not to be construed to as being limited to said exemplary embodiments, but rather, as defined by the claims that follow.

CLAIMS

What is claimed is:

1. An air bag for applying massage forces to a body comprising:

    a first monolithic layer;

    a second monolithic layer,

    said first and second monolithic layer being attached to each other along a closed line such that the surface area of the first monolithic layer within the closed line is larger than the surface area of the second monolithic layer within said closed line, the first monolithic layer and the second monolithic layer defining a fluid chamber bounded by said closed line, wherein the first monolithic layer rests on the second monolithic layer and is of an at least substantially corrugated shape when said fluid chamber is deflated; and

    at least one fluid port in fluid communication with the fluid chamber.

2. The air bag according to claim 1, wherein the first monolithic layer comprises, within said closed line, a plurality of ridges and grooves and/or a plurality of waveforms.

3. The air bag according to claim 2, wherein the ridges and grooves and/or the waveforms are at least substantially concentric.

4. The air bag according to any of the preceding claims, wherein the first and second monolithic layers are of a single layer.

5. The air bag according to any of the preceding claims, wherein the first monolithic layer comprises at least one node on its outer surface and within the closed line, said node being adapted to apply a massage force to a body when the fluid chamber is inflated.

6. The air bag according to any of the preceding claims, wherein the first and second monolithic layers are further attached to each other along at least one attachment line within the closed line thereby sub-dividing the fluid chamber into at least two sub-chambers.

7. The air bag according to claim 6, wherein the attachment line is another closed line that defines one of the sub-chambers and has at least one fluid port in fluid communication therewith.

8. The air bag according to claim 6, wherein the attachment line is defined so that the sub-chambers are in fluid communication with each other.

9. The air bag according to any of the preceding claims, wherein the first and second monolithic layers are formed of a polymeric material suited for molding or vacuum forming.

10. The air bag according to claim 9, wherein the polymeric material is thermoplastic polyurethane (TPU), polyvinyl chloride (PVC), polypropylene, Nylon and/or Polyethylene (PE).

11. The air bag according to any of the preceding claims, wherein the fluid that inflates the fluid chamber and/or sub-chambers is a gas.

12. The air bag according to any of the preceding claims, wherein the gas is nitrogen (N_2), air or a noble gas.

13. The air bag according to any of the preceding claims, wherein the closed line is at least substantially rectangular, polygonal, circular and/or elliptical.

14. An air bag apparatus comprising:

    an air bag as defined in any of claims 1 – 13; and

    a fluid pump system connected to the fluid port of the air bag.

15. The air bag apparatus according to claim 14, wherein the fluid pump system comprises:

a fluid pump adapted to connect to the fluid port of the air bag;

a valve connected to the fluid pump to control the directional flow of the fluid;

a controller, wherein said controller is adapted to regulate the fluid pump and valve thereby controlling the inflation and deflation of the air bag;

a pressure regulatory sensor in connection with the fluid pump and/or air bag; and

a power source electrically coupled to the fluid pump, valve controller and/or pressure regulatory sensor.

16. The air bag apparatus of claim 14 or claim 15, wherein the air bag and fluid pump system each comprise a docking mechanism complementary to each other, such that when the air bag is docked with the fluid pump system, the air bag is in fluid connection with the fluid pump system via said fluid port.

17. A massage shoe system comprising:

a pair of shoes or boots, each having at least four air bags, wherein each air bag comprises:

a first monolithic layer;

a second monolithic layer,

said first and second monolithic layer being attached to each other along a closed line such that the surface area of the first monolithic layer within the closed line is larger than the surface area of the second monolithic layer within said closed line, the first monolithic layer and the second monolithic layer defining a fluid chamber bounded by said closed line, wherein the first monolithic layer rests on the second monolithic layer and is of an at least substantially corrugated shape when said fluid chamber is deflated; and

at least one fluid port in fluid communication with the fluid chamber; and

a fluid pump system connected to the shoes via a docking mechanism.

18. The massage shoe system according to claim 17, wherein the first monolithic layer comprises, within said closed line, a plurality of ridges and grooves and/or a plurality of waveforms.

19. The massage shoe system according to claim 18, wherein the ridges and grooves and/or the waveforms are at least substantially concentric.

20. The massage shoe system according to any of claims 17 – 19, wherein the first monolithic layer comprises at least one node on its outer surface within the closed line, said node being adapted to apply a massage force to a body when the fluid chamber is inflated.

21. The massage shoe system according to any of claims 17 – 20, wherein the first and second monolithic layers are further attached to each other along at least one attachment line within the closed line thereby sub-dividing the fluid chamber into at least two sub-chambers.

22. The massage shoe system according to claim 21, wherein the attachment line is another closed line that defines one of the sub-chambers and has at least one fluid port in fluid communication therewith.

23. The massage shoe system according to claim 21, wherein the attachment line is defined so that the sub-chambers are in fluid communication with each other.

24. The massage shoe system according to any of the preceding claims 17 – 23, further comprising at least one recessed cup located on the sole of the shoe, said recessed cup being capable of housing at least one air bag.

25. The massage shoe system according to claim 24 wherein the recessed cup is located in the heel region and/or mid-sole region of the shoe.

26. The massage shoe system according to any of the preceding claims 17 – 25, wherein two air bags are arranged within each shoe to provide a massage force to the heel region and/or sole region of a foot, and the remaining two air bags are arranged within each shoe to provide a massage force to the vamp region, plantar arch region, lateral region, calcaneal tubercle region, sides of the calcaneus, tarsal region, dorsal region and digital region of the foot.

27. The massage shoe system according to any of the preceding claims 17 – 26, wherein each of the four air bags is arranged beneath a layer of elastic material.

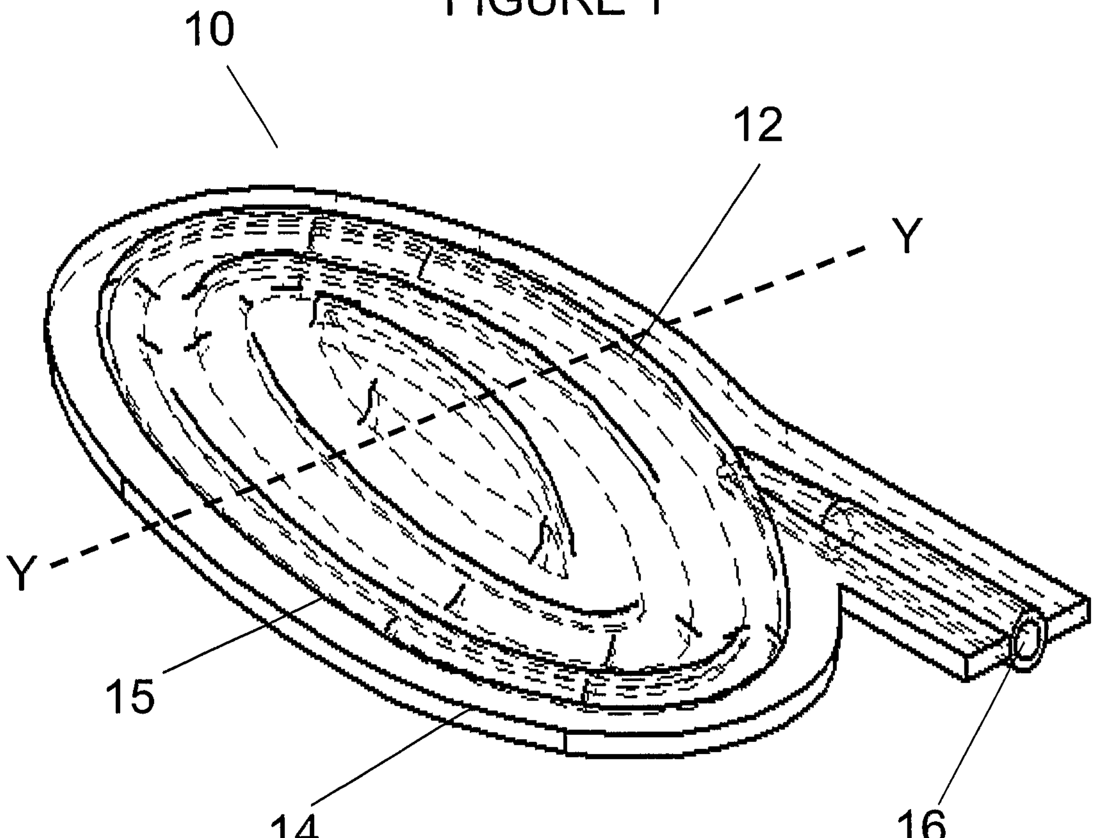
28. The massage shoe system of claim 27, wherein the layer of elastic material is neoprene or nylex.

29. The massage shoe system according to any of the preceding claims 17 – 28, wherein the heel region and/or the sole region of the shoe comprises a docking mechanism that is adapted to dock with an independent power supply and/or fluid pump.

30. The massage shoe system of any of claims 17 – 29, wherein the docking mechanism is of two parts with one part located on the fluid pump system and the other located on the shoes, each part being complementary to the other, such that when the shoes are docked with

the fluid pump system, each of the air bags is in fluid connection with the fluid pump system via said fluid port.

FIGURE 1



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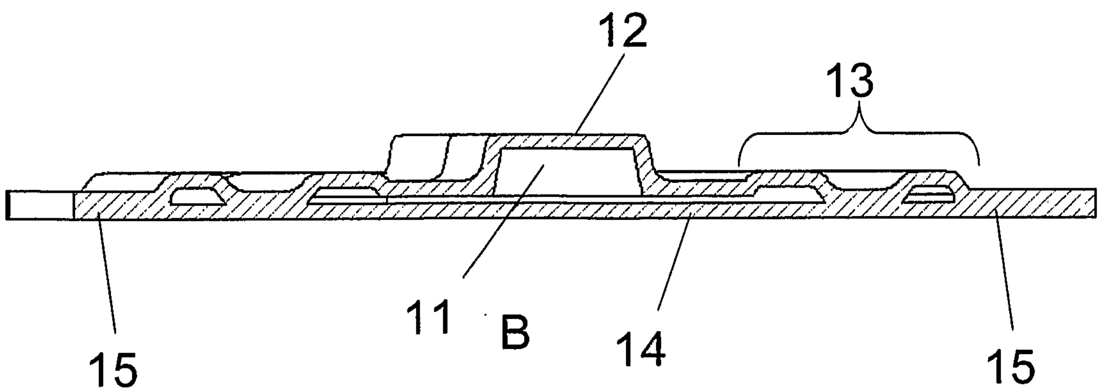

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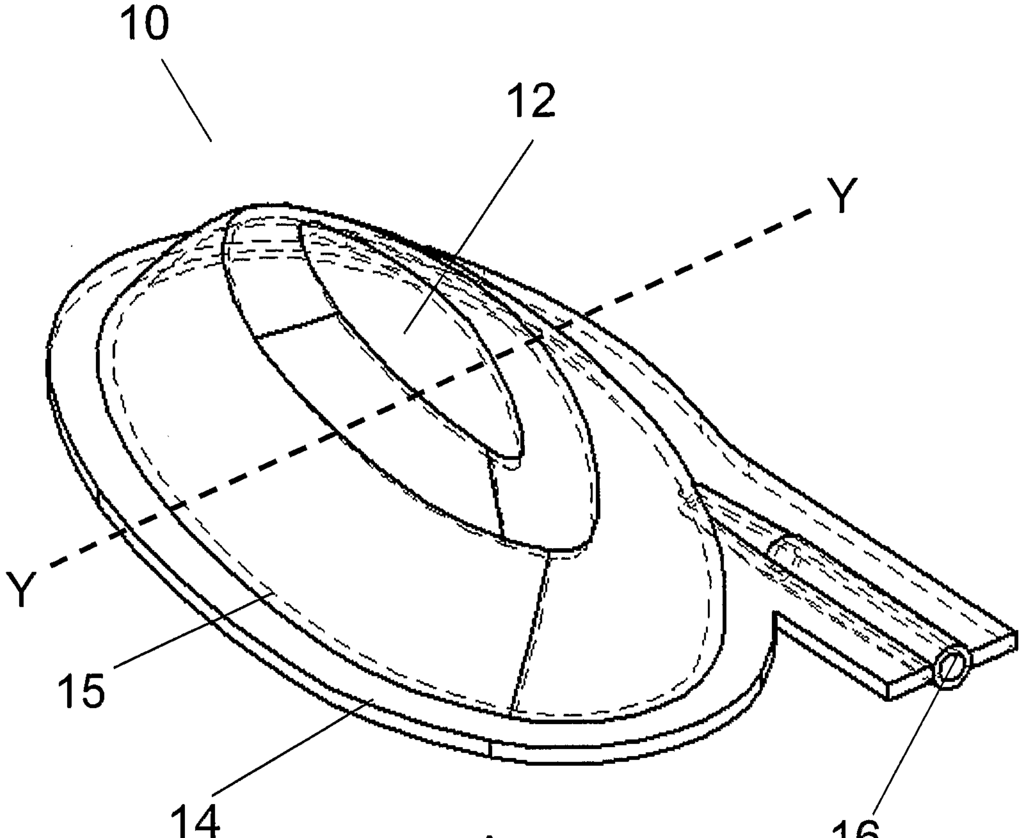
FIGURE 2



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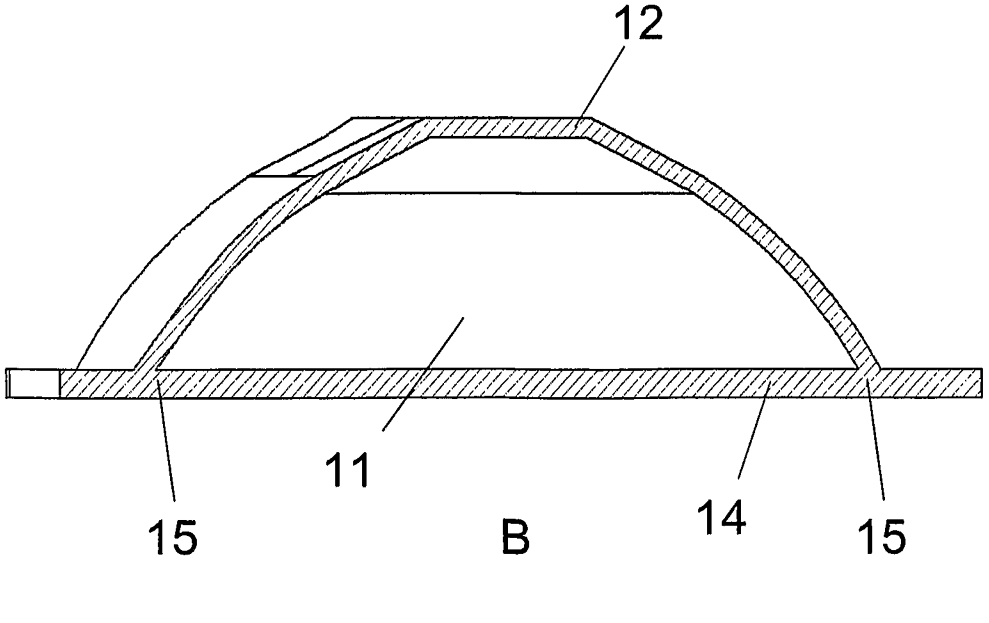

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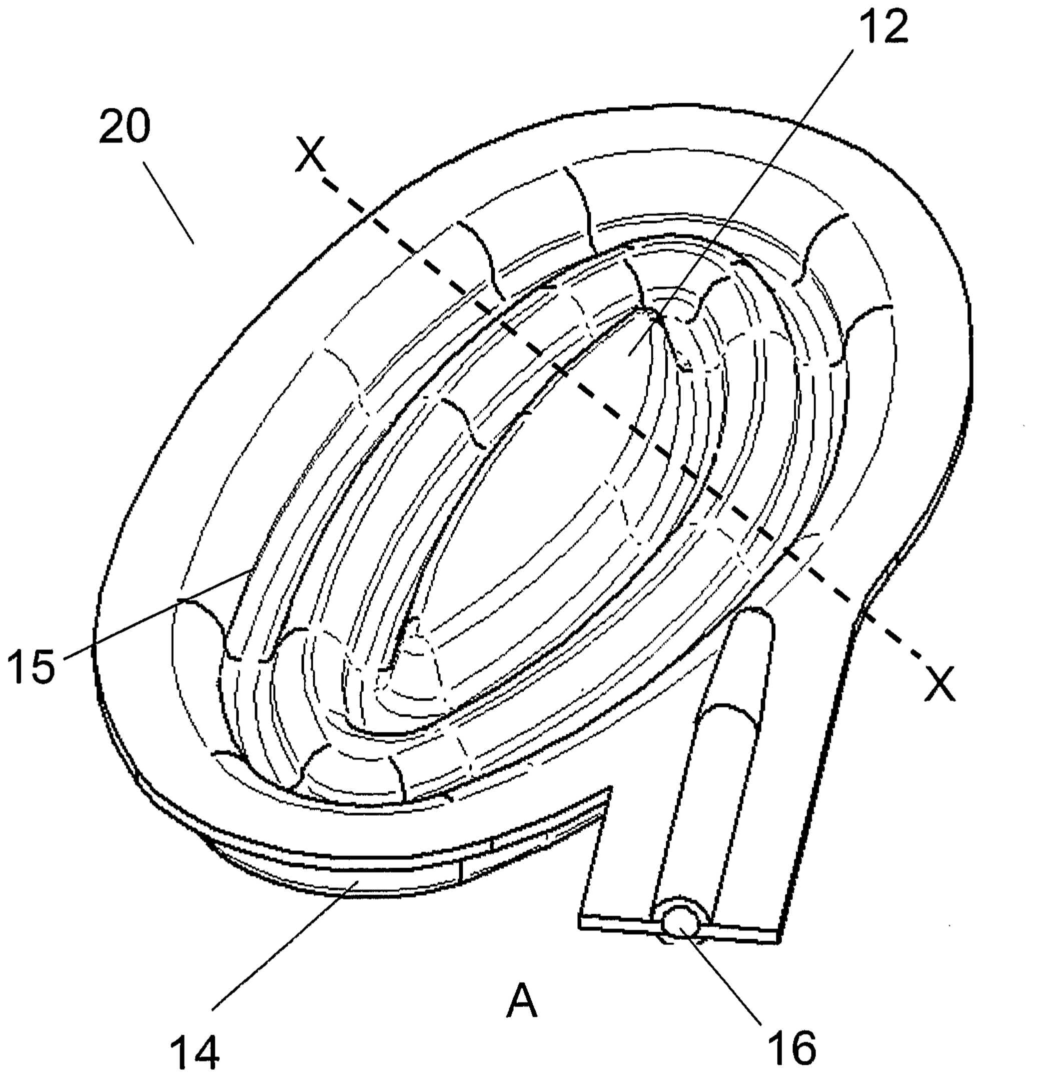
FIGURE 3



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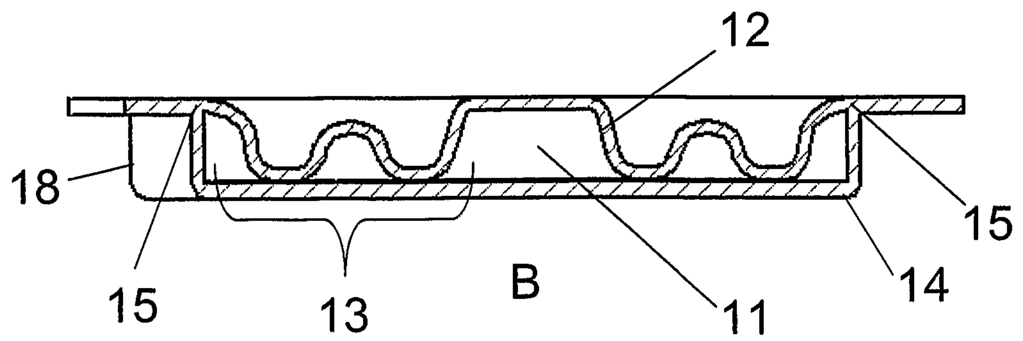

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FIGURE 4

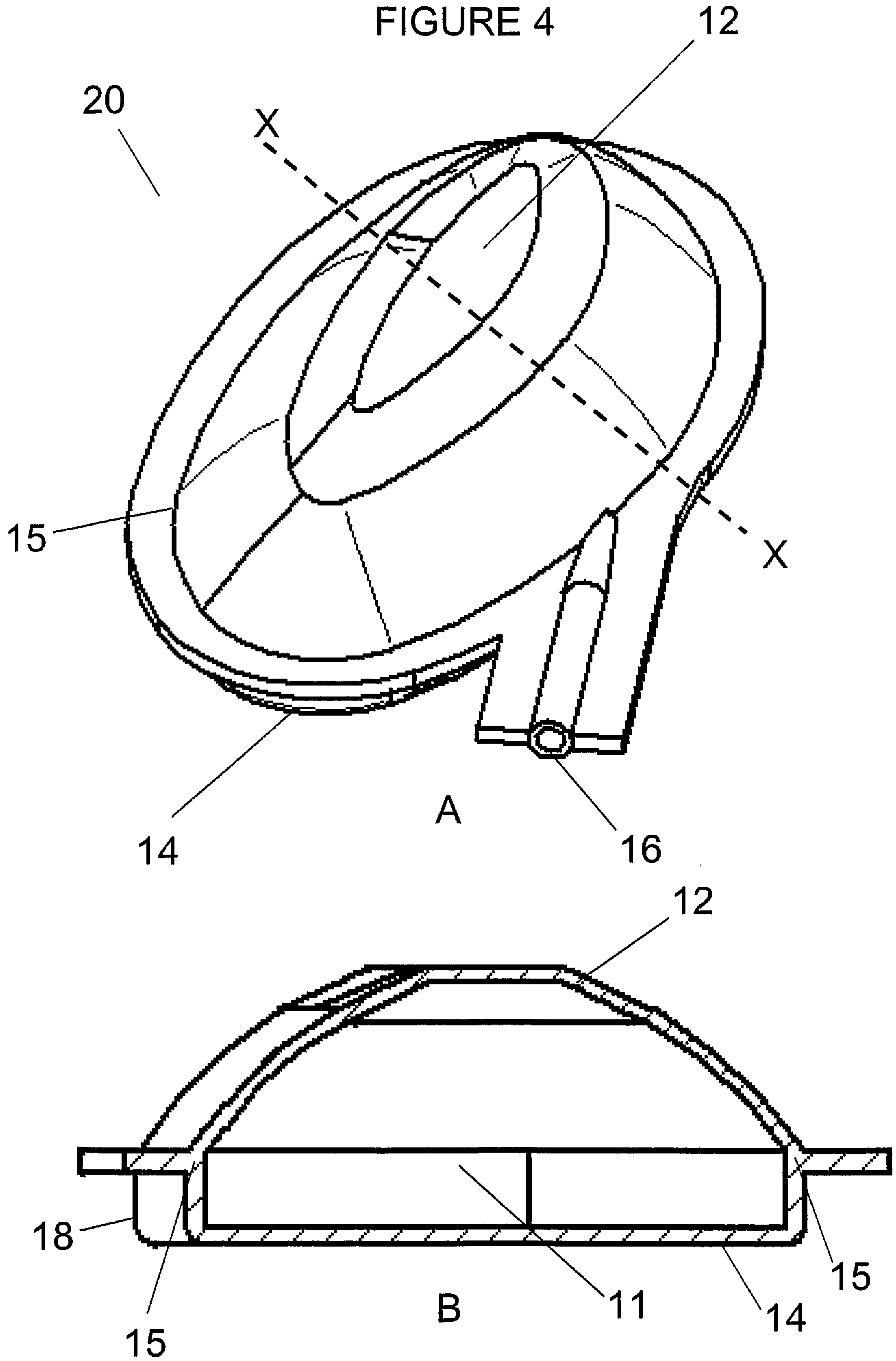


FIGURE 5

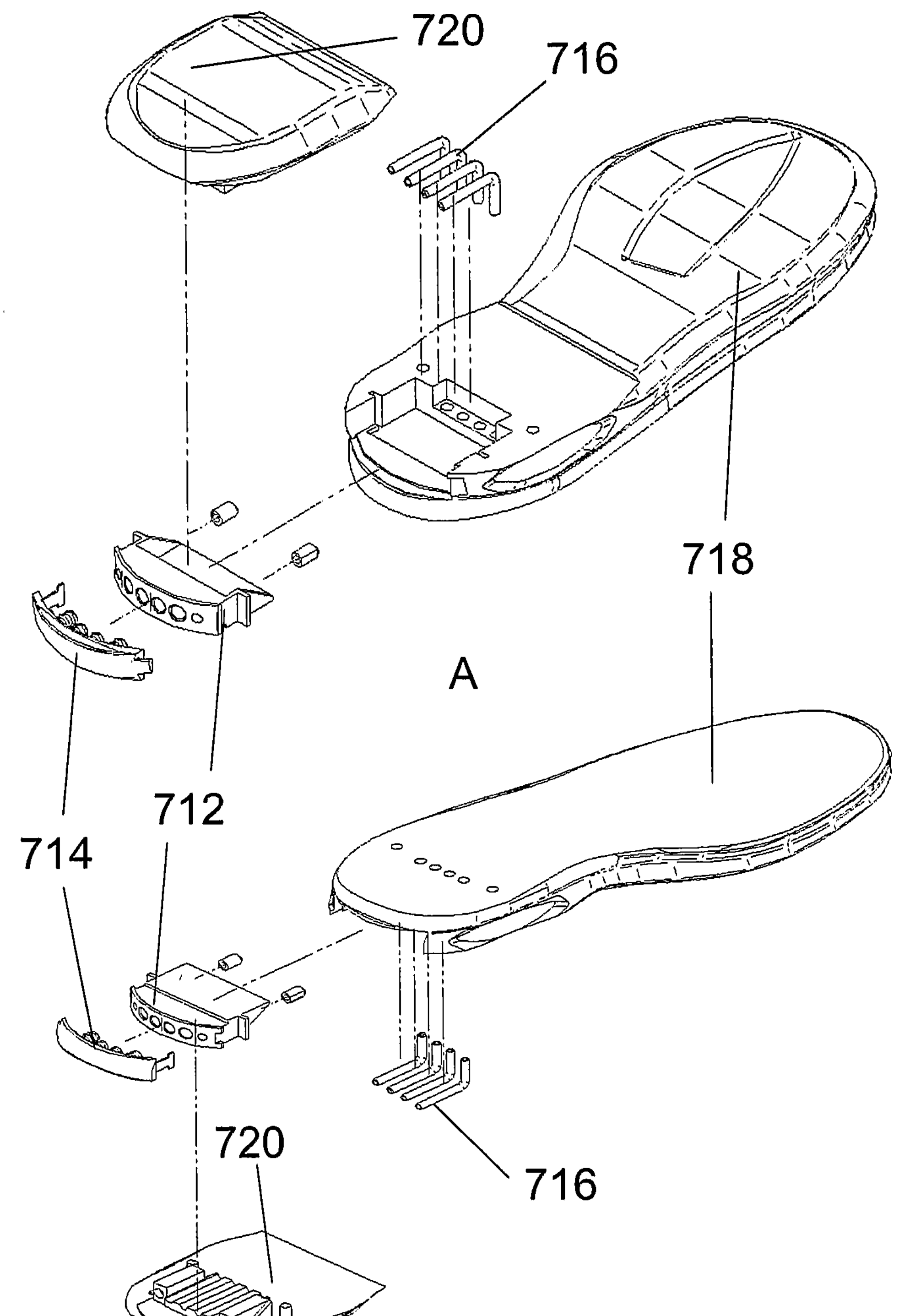


FIGURE 6

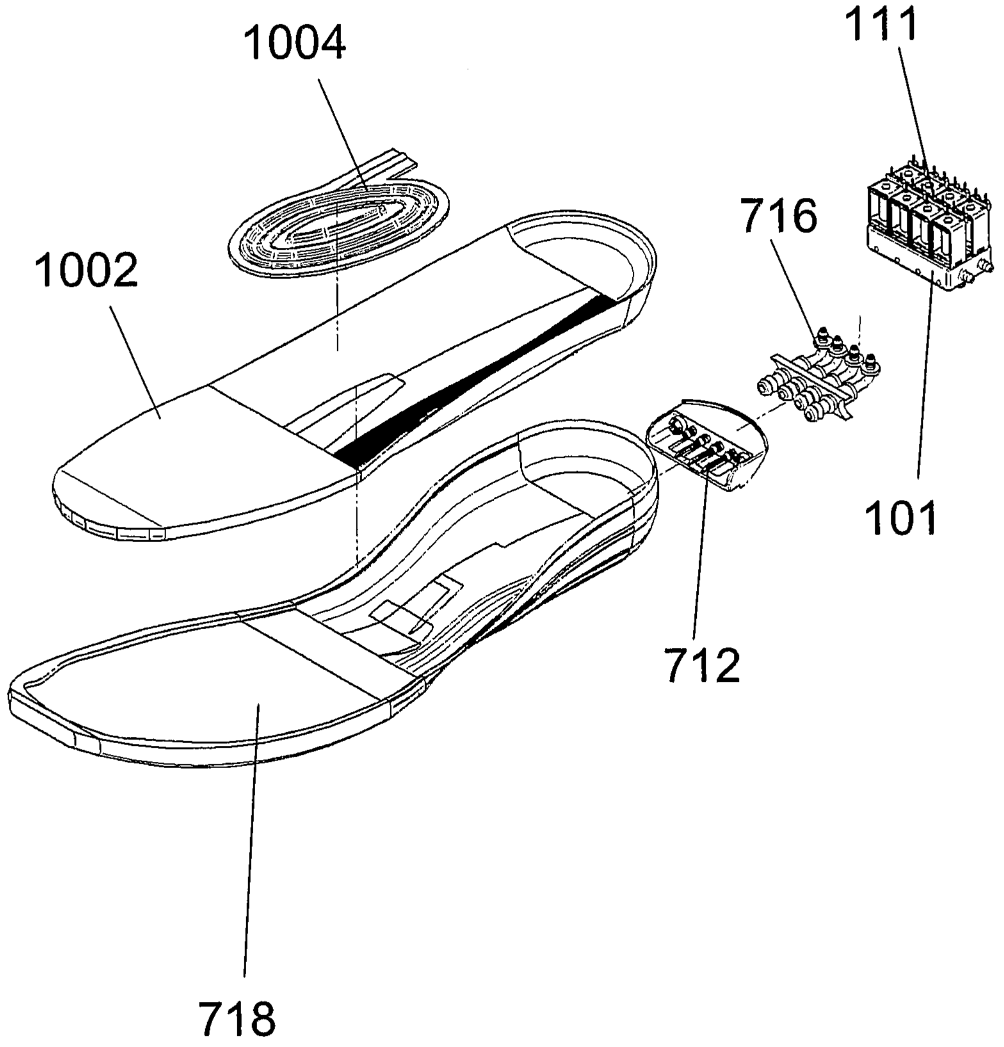


FIGURE 7

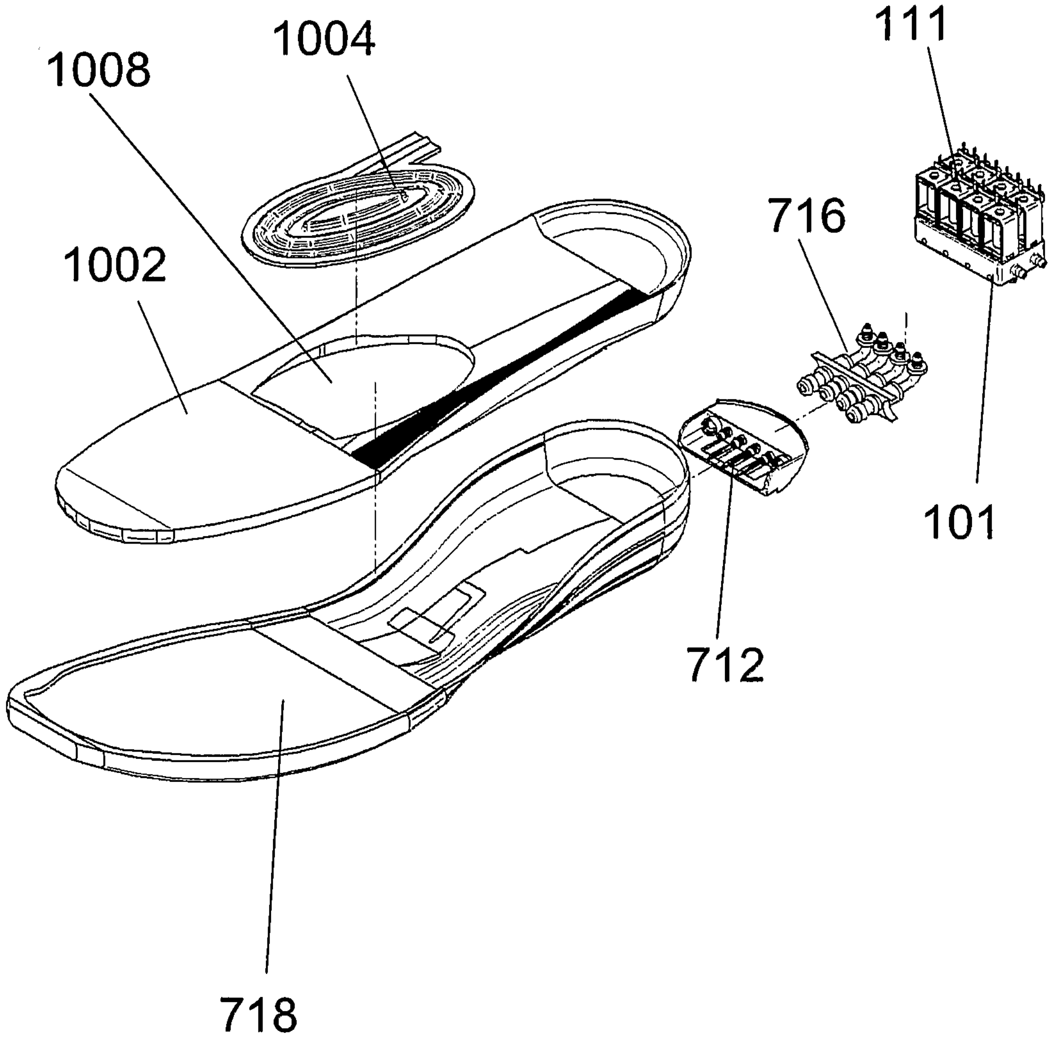
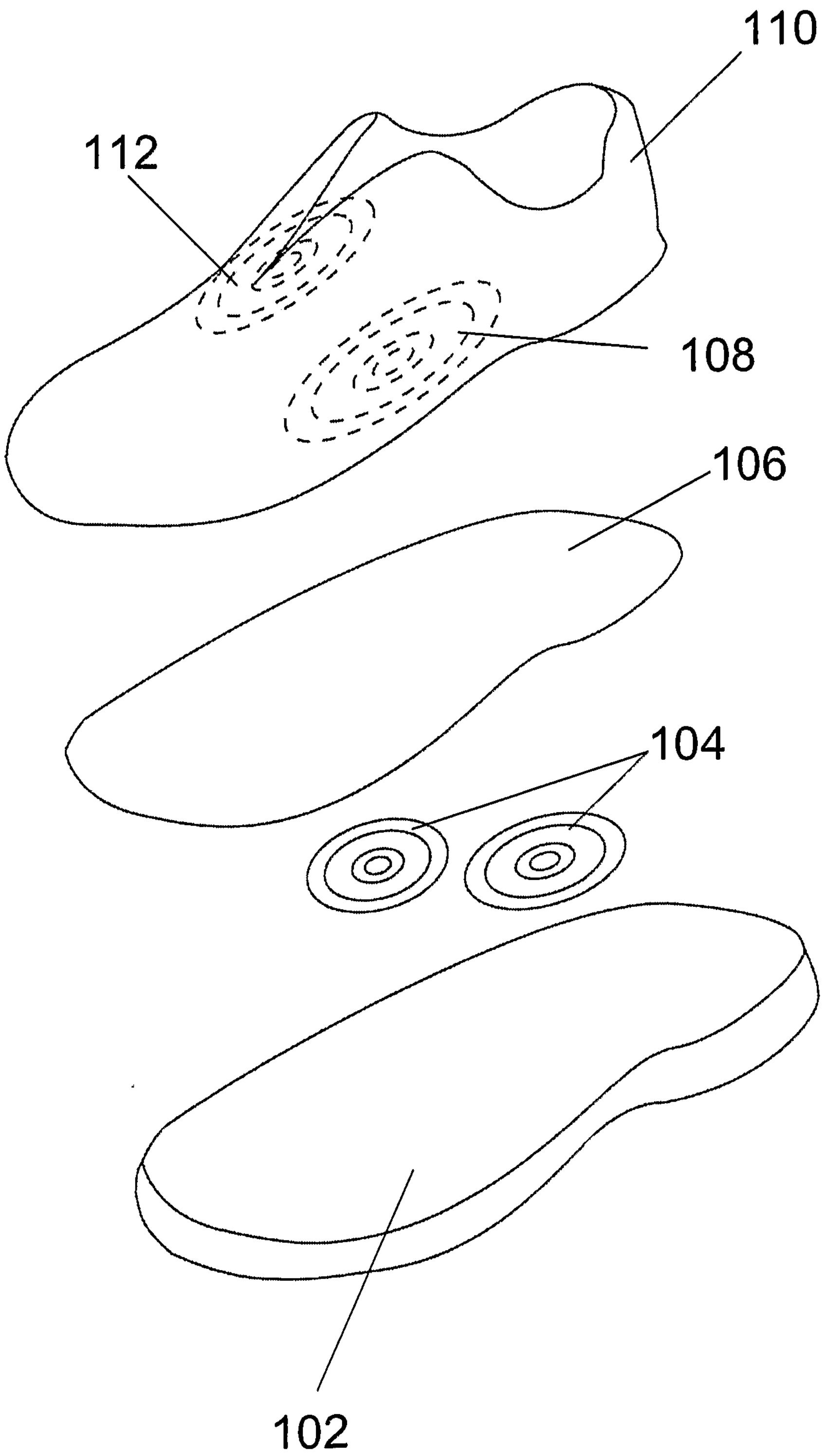


FIGURE 8



INTERNATIONAL SEARCH REPORT	International application No. **PCT**/SG2006/000316

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

A61H 9/00 (2006.01) *A43B 13/00* (2006.01) *A61H 23/04* (2006.01)
A43B 7/00 (2006.01) *A43B 21/00* (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)
Derwent file dwpi - IPC + keywords, bladder, bag, chamber, layer and like terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	DE 19957471 A (MATSUSHITA ELECTRIC WORKS Ltd) 31 May 2000.	1-16 17-30
X Y	DE 3530397 A (ANDRA) 5 March 1987. See figure 1.	1-16 17-30
X Y	US 6537639 B (HUANG) 25 March 2003. See figures, esp fig 17.	1-16 17-30
A	WO 2003/007855 A (HUNTLEIGH TECHNOLOGY PLC) 30 January 2003.	
A	WO 1998/025493 A (BOURDY) 18 June 1998.	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent but published on or after the international filing date	"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
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"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	Date of mailing of the international search report
04 December 2006	07 DEC 2006
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **DAVID LEE** Telephone No : (02) 6283 2107

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2006/000316

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6976321 B (LAKIC) 20 December 2005.	
A	EP 841018 A (JAPAN PIONICS Co. Ltd) 13 May 1998.	

This Annex lists the known "A" publication level 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 Cited in Search Report		Patent Family Member					
DE	19957471	JP	2000157374	US	6336907		
DE	3530397						
US	6537639						
WO	03007855	EP	1408893	GB	2379611	US	2005070828
WO	9825493	AU	54888/98	EP	0951221	FR	2757025
US	6976321						
EP	0841018	JP	10127680	JP	10151151	US	6127290

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX