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DESCRIPTION

[0001] The invention relates to an orthotic device and a method of making an orthotic device. The device may be particularly suitable for use in the treatment of scoliosis.

Background to the invention

[0002] Scoliosis is a condition involving a lateral curvature of the spine, often coupled with vertebral rotation. Untreated scoliosis can cause problems with respiratory and cardiac functions, as well as pain, and restricted mobility and limb functions. The treatment of scoliosis varies depending on the severity of the spinal curvature, and may involve physiotherapy, bracing or, in severe cases, surgery.

[0003] A typical non-surgical treatment of scoliosis involves the use of a rigid thoraco-lumbar brace to hold the spine in a preferential position, thereby enabling a wearer to experience improved posture and limb functionality. An example of such a rigid thoracic brace is the Boston brace developed in 1976. Typically, rigid brace treatment involves the wearing of a brace for up to 23 hours in a day. Studies have shown that such treatment may have a positive effect when the brace is worn for the prescribed periods of time. However, compliance with the prescribed treatment regimen may often be poor due to the inconvenience of wearing a rigid brace for long periods of time. Studies have shown that in some cases a brace was only worn 20% of the prescribed time, resulting in the treatment having little effect on prognosis of the scoliosis (Howton et al. 1987 orthopaedic transactions 11: 125-126).

[0004] Other methods of bracing have been used in the treatment of scoliosis. For example, the SpineCor brace is a dynamic brace that relies on elastic bands to apply a dynamic corrective force to a patient's trunk to correct spinal curvature. There may be patient comfort issues such as abrasion involved in use of the SpineCor brace, but overall patient compliance appears to be increased compared with a rigid brace system.

[0005] Matthews and Crawford (Prosthetics and Orthotics International August 2006; 30(2): 174-181) describe the use of a dynamic elastomeric fabric orthosis consisting of a Lycra® body-suit with the addition of elastomeric panels that act to counter thoracic spine rotation and lateral curvature. Patient compliance and comfort were improved with respect to a rigid brace, and the orthosis did not have the same abrasion issues as the SpineCor dynamic brace. The suit also appeared to provide beneficial proprioceptive effects and the visual appearance of the suit was improved compared with previously known braces. The orthosis described by Matthews and Crawford may be limited in the force that can be provided by the elastomeric panels, however, which may limit the situations in which the suit is applicable.

[0006] WO 95/17142 discloses a series of orthoses for the treatment of scoliotic deformities. One orthosis comprises a plastic polymer semi-rigid shell and a set of semi-elastic derotational straps which can be tensioned to provide required dynamic correcting forces on thoracic and lumbar deformities.

Summary of invention

[0007] The invention provides an orthotic device and a method of making an orthotic device according to the appended independent claims to which reference should now be made. Preferred and/or advantageous features of the invention are set out in various dependent sub-claims.

[0008] Thus, the invention may provide an orthotic device comprising a torso section fabricated from a material for conforming to at least a portion of a wearer's torso and a reinforcement for applying a force to the wearer's torso to urge a portion of the wearer's spine in a substantially lateral direction. The reinforcement comprises resilient material attached to the torso section, preferably in the form of a strip or panel, that extends diagonally across a front portion, and/or a rear portion, of the torso section between a first attachment point at a first side of the torso section and a second attachment point at a second side of the torso section. The first attachment point is locally indented into the first side of the torso section, and/or the second attachment point is locally indented into the second side of the torso section, such that the resilient material attached to the torso section is stretched when the orthotic device is donned by the wearer, thereby applying the force to the wearer's torso.

[0009] A resilient material is a material that can elastically deform under load and return to its original shape when the load is

removed, for example rubber materials or elastomeric fabric materials.

[0010] The material forming the torso section of the device, which may be termed an underlying material, is preferably a resilient or elastomeric material that is capable of conforming to the wearer's body without generating substantial directional forces, or giving rise to lines of tension or compression in any specific direction. Suitable materials are readily available, for example elastomeric materials comprising a polyurethane-polyurea copolymer such as Dorlastan®, Spandex®, or Lycra®. A particularly suitable material may be a polyamide-cotton-Dorlastan® material, for example a material comprising 51% polyamide, 17% cotton and 32% Dorlastan®.

[0011] The reinforcement that is attached to the torso section to form the device includes one or more sections of resilient material. The purpose of the resilient material in the reinforcement is to apply a force acting in one or more predetermined directions to assist and/or restrict movement of the wearer's torso. Particularly preferably, the resilient material is in the form of one or more strips or panels of resilient or elastic material that are attached to the torso section to produce a lateral force that acts on the wearer's spine.

[0012] It is preferable that the resilient material forming the reinforcement is a different material from the underlying material forming the torso section. For example, the reinforcement may comprise one or more elongated strips or panels of a resilient material such as a nylon/cotton material or a nylon/ Lycra® material, for example a material comprising 81 % polyamide and 19% Lycra®.

[0013] When the device is worn, the reinforcement may provide a constant force to the wearer's torso that urges the wearer's spine in a specific direction. The reinforcement may also provide a force that resists movement of the wearer's torso and spine when the wearer moves their torso in a specific direction.

[0014] The torso section is indented at the first attachment point, the second attachment point, or both first and second attachment points. The circumference of the torso section at the indent or the indents is reduced. Thus, when the device is worn, the material at the indents needs to stretch more than the rest of the material in order to conform to the wearer's torso. By stretching when the device is worn, the resilient material is placed under tension. This tension applies a compressive force to the user. The depth of the indent or indents controls the tension that the resilient material is placed under and, thereby, the power of the device.

[0015] By attaching the reinforcement to the torso section at one or more indents, the reinforcement material (i.e. the resilient material) may be attached to the first portion in a non-tensioned condition, only becoming tensioned when the device is worn. Thus, the strips or panels of resilient material forming the reinforcement need not have a force applied to them when they are attached to the underlying resilient material of the torso section. It is not easy to pre-tension a resilient material and then attach it to an underlying orthotic device, for example by stitching. It also becomes more difficult to pre-tension a resilient material as the force the material is required to produce increases. By attaching the reinforcement at an indent, these problems may be overcome.

[0016] An indent may locally reduce the circumference of the torso section by greater than 2%. Preferably the circumference is reduced by between 3% and 30%, preferably between 5% and 25%, preferably between 7.5 % and 20%. The circumference may be reduced by about 10% or about 15%.

[0017] The indents cause the reinforcement material to stretch when the device is worn. The reinforcement material preferably stretches by between 2% and 25% of its length, for example between 5% and 20%, or between 10% and 15%. The more the reinforcement stretches, the greater the force exerted by the reinforcement.

[0018] It is preferred that one of the first or second attachment points is located level with a patient's hip on one side of the torso section and that the other of the first or second attachment points is located between the hip and the armpit on the other side of the torso section. The reinforcement extends diagonally between the first and second attachment points. For the avoidance of doubt, the assignment of the terms first attachment point, second attachment point, and, where needed, third attachment point, has no bearing on the function of the device. For the purposes of the following discussion, an attachment point that is level with the hip is referred to as the second attachment point and an attachment point located between the hip and the armpit on the opposing side of the torso section to the second attachment point is referred to as the first attachment point. An attachment point located between the hip and the armpit on the same side of the torso section as the second attachment point is referred to as a third attachment point.

[0019] While either or both of the first and second attachment points may be locally indented, it is preferred that an attachment point located at the hip, i.e. the second attachment point in the convention adopted for the purposes of this description, is not indented, or is only indented to a small degree compared with the first attachment point. There may be some wearer discomfort if a hip attachment point is locally indented to a great degree.

[0020] In preferred embodiments of the orthotic device, the second attachment point is located level with a patient's hip, or at the lowest point on one side of the torso section, and is not locally indented, whereas the first attachment point is located between the hip and armpit on the opposite side of the torso section and is locally indented.

[0021] Advantageously, the reinforcement may comprise a further section of resilient material extending laterally or diagonally across a front portion, and/or a rear portion, of the torso section between the first attachment point and a third attachment point that is vertically spaced from the second attachment point on the second side of the torso section. The third attachment point may be locally indented relative to the torso section. The reinforcement applies a compressive force that urges a wearer's torso in a lateral direction towards the second side of the torso section.

[0022] Where the reinforcement comprises sections of resilient material that attach to a first attachment point on one side of the torso section, and second and third attachment points on a second side of the torso section, the reinforcement may be described as being "V-shaped", although the "V" is on its side when the device is worn. The first attachment point forms the apex of the "V", and the second and third attachment points are at the end of each of the legs of the "V".

[0023] Where the reinforcement is "V-shaped" in the front view or rear view (or both) as described above, the first attachment point refers to the point on one side of the torso section that the reinforcement contacts, and the second and third attachment points refer to points on the opposite side of the torso section that the reinforcement contacts. When the resilient material forming the reinforcement is stretched, lines of tension are produced between the first attachment point and the second attachment point and between the first attachment point and the third attachment point.

[0024] It is preferable that the reinforcement extends across both front and rear portions of the torso section. Thus, in a preferred configuration the device may have reinforcement material attached at a first attachment point on, say, a left side of the torso section, and at second and third attachment points on a right side of the torso section. Sections of reinforcement material may extend across both the front and rear of the torso section between the first attachment point and the second attachment point and between the first attachment point and the third attachment point. It is preferred that the torso section is indented at the first attachment point, and there may be further indents at one or both of the second and third attachment points. The effect of the indents is to reduce the length of the sections of resilient material that form the reinforcement when the device in not worn. Thus, when the device is worn and the material at the indents is stretched (i.e. both the underlying resilient material and the reinforcement material) the reinforcement material causes a force to be applied to the wearer's torso.

[0025] Where the reinforcement is applied to the device in a "V-shape" to the front and/or rear of the torso section, a force is applied to the wearer's torso in a lateral direction from the first attachment point, or apex of the "V", toward the second side of the torso section. Thus, if the first attachment point is on the left side of the device, the lateral force acts in a left to right direction. If the first attachment point is on the right of the device, the lateral force acts in a right to left direction.

[0026] It is preferred that the second attachment point is fixed to be level with a patient's hip on either the left side or right side, as required. The first attachment point may be located at any point above the hip on the opposite side to the second attachment point, as determined by a medical practitioner. By moving the location of the first attachment point vertically up or down, the point at which the lateral force has maximum effect may be moved up or down. Scoliosis may result from curvature low in the spinal column or high in the spinal column. Typically the curvature will result in a "C-shape" to the spine when viewed from the rear. A double curvature may also cause an "S-shape" in the spine when viewed from the rear. By moving the first attachment point up or down, the device may be tailored to provide a corrective force at the appropriate point for a particular patient.

[0027] Preferably, the position of the first attachment point is determined by reference to an x-ray of the wearer's spine. Such an x-ray will show the position and extent of the scoliotic curve and allow the first attachment point to be chosen for most effective treatment. The process of preparing an orthotic device using x-ray information is known as x-ray blueprinting.

[0028] The height of the third attachment point may also be determined by x-ray blueprinting. Preferably the second attachment point, however, is determined by the position of the wearer's hip, i.e. without reference to the patient's condition.

[0029] Typically scoliosis patients have a lateral curvature of the spine of between 10 degrees and 60 degrees or more. A low

degree of scoliosis may not require a high applied force for treatment, whereas a more severe scoliosis may require treatment using an orthotic device that exerts a greater corrective force. The use of indents at attachment points for the reinforcement provides a simple means to tailor the corrective force provided by the device to a patient's needs. A shallow indent means that the reinforcement only needs to stretch a small amount in order for the device to conform to a patient's torso. Thus, the elastic force urging the reinforcement back towards its un-stretched state is low, and the corrective force transmitted to the patient is correspondingly low. By forming a device with an increased indent, the corrective force applied to the patient may be increased. In combination with the selection of different resilient materials having different degrees of elasticity to form the reinforcement, the corrective force transmitted to a patient may be carefully controlled to provide appropriate treatment.

[0030] An orthotic device according to embodiments of the invention may comprise additional reinforcement panels to exert forces in other directions to those described above. For example, the device may additionally comprise a reinforcement consisting of a section of a resilient material that extends from a central point on a front side of the torso section to a centre point on a rear side of the torso section. Such a reinforcement panel is preferably situated on the side of the wearer's body at which the spinal curve is convex and may provide a resistance to the curve via the wearer's thoracic cage.

[0031] In a further example of an optional reinforcement panel, embodiments of an orthotic device may comprise a section of reinforcement material that acts as a reinforcement to counter thoracic spine rotation. Such reinforcement may be termed spinal de-rotation reinforcement.

[0032] In a first configuration, a spinal de-rotation reinforcement may comprise a strip of resilient material that has a first end located on the torso section at an anterior portion of a shoulder. In most circumstances, the shoulder is the shoulder located on the same side of the torso section as the first attachment point described above. In some unusual circumstances, the shoulder may be on the opposite side of the torso section as the first attachment point. The strip of material extends over the shoulder and then downwards until clear of the axilla area. The strip then extends diagonally across the front of the chest and terminates at a second end located at a portion of the torso section near to the anterior superior iliac spine, i.e. near the hip. The second end is at approximately the same location as the second location point described above.

[0033] In a second configuration, a spinal de-rotation reinforcement may comprise a strip of resilient material that has a first end located on the torso section at an posterior portion of a shoulder. The shoulder is the shoulder located on the same side of the torso section as the first attachment point described above. The strip of material extends over the shoulder and then downwards until clear of the axilla area. The strip then extends diagonally across the rear of the torso section and terminates at a second end located at a portion of the torso section near to the anterior superior iliac spine, i.e. near the hip. The second end is at approximately the same location as the second location point described above.

[0034] The strip of resilient material may be any suitable material, and may be multiple strips of material. The action of a spinal de-rotation reinforcement is to compress the convex side of the spinal curvature in a patient suffering from scoliosis, thus countering the natural progression of the scoliotic curve rotation, and to provide either a posterior or anterior acting force on the shoulder.

[0035] The orthotic device may take the form of a vest. The device may, however, be in the form of a body suit. In this case the device may have arm sections and leg sections in addition to the torso section. Leg sections may assist the anchoring of a lower portion of the device so that the attachment points do not stray from their intended position with respect to the wearer.

[0036] Fasteners such as zips may cut through reinforcement materials. The functionality of the reinforcement material, i.e. a strip or panel of a resilient material, should not be affected as long as a secure attachment is made on either side of the fastener. Forces generated by the reinforcement are transmitted through the fastener when it is closed. It is preferred that the fastener is a zip fastener.

[0037] The invention may also provide a method of making an orthotic device as described above comprising the steps of determining the vertical position of the first attachment point based on x-rays of the wearer's torso (blueprinting), producing a torso section for substantially-conforming to the wearer's body, the torso section being indented at the first attachment point, and attaching the reinforcement means to the torso section such that it is stretched when worn by the wearer. Advantageously, the reinforcement material is attached in an un-stretched condition. It is preferred that the location of the second attachment point is determined by the position of a patient's hip.

[0038] The method may involve a further step of determining the corrective force desired from the device and selecting the reinforcement material and/or the indent depth to achieve this force.

[0039] In one aspect the invention may provide an orthotic device comprising a torso section fabricated from a material for conforming to at least a portion of a wearer's torso and reinforcement for applying a force to a first shoulder of the wearer to provide a posterior or anterior acting force on the shoulder. The reinforcement comprises resilient material attached to the torso section, preferably in the form of a strip or panel. The resilient material extends upwardly from an anterior or posterior shoulder position on a first side of the torso section, upwardly over the first shoulder and then downward over the shoulder-blade until clear of the axilla. The resilient material then extends diagonally downwards across the front or rear of the torso section and is attached to the torso section at a position approximately at the anterior superior iliac spine or upper trochanter (i.e. at the hip) on a second side of the torso section opposite the first side of the torso section. The orthotic device comprises an arm section that encapsulates the first shoulder. The arm section may extend as required, and preferably covers at least an upper portion of the arm. There is no arm section on extending from the second side of the torso section. This orthotic device provides a spinal de-rotation effect, and pulls the first shoulder either backwards and down or forwards and down.

[0040] If used on a scoliosis patient, this device is preferably configured such that the first shoulder is the shoulder on the convex side of the patient's scoliosis curve.

[0041] The presence of the arm section on the same side as the first shoulder, but not on the side of the second shoulder, provides a counter-rotational force on the first shoulder.

[0042] Preferably, the orthotic device includes a pressure relief panel located at a second shoulder of the torso section. The pressure relief panel is a fastenable flap that can be opened to allow the wearer's second shoulder to be free of the orthotic device. The flap may be fastened once the wearer has donned the device.

[0043] An orthotic device comprising a spinal de-rotation reinforcement may comprise any other reinforcements described above in relation to other orthotic devices.

Specific embodiment of the invention

[0044] A specific embodiment of the invention will now be described with reference to the figures, in which;

Figure 1 illustrates a frontal view of an orthotic device according to an embodiment of the invention;

Figure 2 is a schematic illustration showing the indent in the embodiment as illustrated in figure 1;

Figure 3 illustrates front and rear views of a wearer of an orthotic device according to an embodiment of the invention and illustrates the position of translational reinforcement panels; and

Figure 4 illustrates front and rear views of a wearer of an orthotic device according to an embodiment of the invention and illustrates the position of spinal de-rotational reinforcement panels.

[0045] Figure 1 illustrates an orthotic body-suit 10 for the treatment of scoliosis. The frontal view of the suit is illustrated. The body-suit 10. is an orthotic device and comprises a torso section 20 for covering a wearer's torso and pelvis, and leg sections 31, 32 that extend down an upper portion of a wearer's right and left leg respectively. The torso section 20 and the leg sections 31, 32 are formed from an elastomeric material having a composition of 51% polyamide, 17% cotton and 32% Dorlastan®. This material is a lightweight, breathable, elastomeric fabric and is suitable for forming the underlying material of the body-suit 10. Other suitable fabrics are available, for example under the trade names Spandex® or Lycra®.

[0046] The body-suit 10 has a first reinforcement panel 40 that is v-shaped when viewed from the front. This reinforcement panel may also be termed a translatory panel, as it provides a translation force to the wearer's torso. This panel extends from a first attachment point 51 on a right side of the torso section 20, where the apex of the "V" 41 is attached, to second and third attachment points 52, 53 on a left side of the torso section, where lower and upper portions of the "V" 42, 43 are attached. The first reinforcement panel 40 extends around the rear of the suit in the same way as it extends across the front of the suit. Thus, in a rear view the reinforcement panel would also appear to be v-shaped.

[0047] Effectively, the first reinforcement panel provides two bands of reinforcement. A first band encircles the torso section and

extends diagonally upwards from the first attachment point 51 to the third attachment point 53, and a second band encircles the torso section and extends diagonally downwards from the first attachment point 51 to the second attachment point 52.

[0048] The first reinforcement panel 40 is formed from a resilient material having a composition of 81 % polyamide and 19% Lycra®, which is an elastomeric material that offers greater resistance to deformation than the underlying elastomeric material.

[0049] The first reinforcement panel 40 is attached to the underlying resilient material of the body-suit by means of stitching. This stitching follows the edges of the panel. Thus, the first reinforcement panel 40 is not only attached to the body-suit at the designated attachment points.

[0050] It is noted that the first reinforcement need not be a single v-shaped panel as illustrated in figure one. A plurality of strips of resilient material may be attached to the torso section in order to produce lines of tension between the first attachment point and the second attachment point and between the first attachment point and the third attachment point.

[0051] The first attachment point 51 is indented into the right side 21 of the torso section 20. This is more clearly illustrated by figure 2. In figure 2, a dotted line 100 shows the position the right side of the torso section would take if there was no indent. This is also the line that the right side of the torso section has when the device is worn, as the wearer's body stretches the fabric forming the device and eliminates the indents. The depth of the indent may be defined as the distance between the actual position of the material at a point of attachment and the position the material would be in if there was no indent. This is shown as the distance "d" in figure 2.

[0052] The position of the second attachment point is determined by reference to the position of a patient's hip. The positions of the first and third attachments points are determined by reference to the patient's condition. The strength of the correctional force applied by the orthotic device may depend in part on the resilience of the reinforcement panel 40, and in part on the depth of the indent at the first attachment point 51.

[0053] Figure 3 is a schematic diagram illustrating the position of the first reinforcement panel 40 on a wearer of the suit. The position of the first attachment point 51, the second attachment point 52, and the third attachment point 53, is shown in both front and rear views. While the second attachment point 52 is preferably fixed with respect to a wearer's hip, the first and third attachment points may vary depending on the wearer's condition.

[0054] The body suit of this specific embodiment also comprises a second spinal de-rotation reinforcement panel 90. This second reinforcement panel originates at a first end 97 located at an anterior portion of the torso section adjacent to the right shoulder. The panel then extends over the shoulder and downwards beneath the right armpit of the torso section. The panel 90 then extends diagonally downwards across the front of the body-suit, to a second end 92 located at a left hip portion of the torso section. The second reinforcement panel 90 lies beneath the first reinforcement panel 40 in this embodiment.

[0055] The second reinforcement panel 90 generates a strong compressive force to the right side of the wearer's torso. The suit incorporates a pressure relief panel 95 at a left shoulder of the torso section to compensate for this pressure. The pressure relief panel 95 is an adjustable Velcro® fastened flap. When donning the suit, the pressure relief panel is the final component to be fastened.

[0056] Figure 4 is a schematic illustration showing in front and rear views the position of the second reinforcement panel (spinal de-rotation panel) on a wearer when the suit is worn. The panel 90 can be seen to extend from a first end 97 on an anterior portion of the wearer's shoulder, downwardly over the wearer's right shoulder blade 98 and underneath the right armpit 99. The panel 90 then extends diagonally downwards across the wearer's chest and terminates at a second end 92 located at the anterior superior iliac spine.

[0057] When the body-suit 10 is worn, the suit conforms to the wearer's body. At the first attachment point 51 the suit needs to stretch in order to eliminate the indent and conform to the wearer's body. The first reinforcement panel 40 is, therefore, stretched and elastic forces are generated between the first attachment point and the second attachment point, and between the first attachment point and the third attachment point. These forces are illustrated in figure 1 as double-headed arrows extending along the upper and lower portions 43, 42 of the first reinforcement panel 40. The result of the forces generated in the upper and lower portions 43,42 of the first reinforcement panel 40 is that a force is generated that urges the wearer's torso from right to left as indicated by arrow 110 in figure 1. The second reinforcement panel 90 simultaneously acts to compress the spine and prevent thoracic spine rotation.

[0058] In alternative embodiments, the suit may have an arm section, for covering a wearer's arm, on the same side as the first end of the second reinforcement panel. For example, if an arm section were attached to the suit of figure 1 it would be a right arm section. An arm section may act to prevent the shoulder from coming forward.

[0059] To treat a scoliosis sufferer, the first attachment point would be provided on the convex side of the scoliotic curve, so that the force provided by the panel urges the spine towards a more normal curvature. The vertical position of the first attachment point and the vertical position of the second attachment point would be determined by reference to x-rays showing the abnormal curvature of the spine.

[0060] For example, the apex of the first reinforcement panel (the first attachment point) may be vertically positioned to apply a force to the rib below the vertebral angle lower "null" point of the scoliotic curve. The pressure from the reinforcement is thus applied, via the rib, to the vertebra at the lower "null" point of the scoliotic curve. The first attachment point should not be positioned higher than this, as pressure applied incorrectly may have detrimental results for the patient.

[0061] The vertical position of the third attachment point may likewise be determined from the patient's x-rays. The third attachment point may, for example, apply pressure to the rib below the vertebral angle upper "null" point of the scoliotic curve.

[0062] The magnitude of the corrective force may be tailored by altering the depth of the indent.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO9517142A [0006]

Non-patent literature cited in the description

- **HOWTON et al.**orthopaedic transactions, 1987, vol. 11, 125-126 [0003]
- **MATTHEWSCRAWFORD**Prosthetics and Orthotics International, 2006, vol. 30, 2174-181 [0005]

Patentkrav

1. Ortopædisk indretning (10) omfattende
en torsosektion, som er fremstillet af et første materiale til at tilpasse sig til i det mindste en del af en brugers torso, og
en forstærkning (40) til at påføre brugerens torso en kraft til at presse en del af brugerens rygsøjle i en sideretning, hvilken forstærkning (40) omfatter et elastisk materiale, som er fastgjort til torsosektionen og strækker sig diagonalt hen over en forreste del og/eller en bageste del af torsosektionen imellem et første fastgørelsespunkt (51) ved en første side af torsosektionen og et andet fastgørelsespunkt (52) ved en anden side af torsosektionen,
kendetegnet ved, at det første fastgørelsespunkt (51) er rykket lokalt ind i den første side af torsosektionen og/eller det andet fastgørelsespunkt (52) er rykket lokalt ind i den anden side af torsosektionen, således at det elastiske materiale, der er fastgjort til torsosektionen, strækkes, når den ortopædiske indretning er påført brugeren, hvorved kraften påføres brugerens torso.

2. Ortopædisk indretning ifølge krav 1, hvorved forstærkningen yderligere omfatter elastisk materiale, som strækker sig diagonalt hen over en forreste del og/eller en bageste del af torsosektionen imellem det første fastgørelsespunkt (51) og et tredje fastgørelsespunkt (53), som befinder sig adskilt fra det andet fastgørelsespunkt (52) i lodret retning på den anden side af torsosektionen, hvorved forstærkningen påfører en sideværts sammentrykningskraft, som tvinger en brugers torso i en sideretning imod den anden side af torsosektionen.

3. Ortopædisk indretning ifølge krav 2, hvorved det tredje punkt (53) er lokalt indrykket i den anden side af torsosektionen.

4. Ortopædisk indretning ifølge krav 2 eller krav 3, hvorved det første fastgørelsespunkt (51) er placeret lodret højere end det andet fastgørelsespunkt (52) og lodret lavere end det tredje fastgørelsespunkt (53).

5. Ortopædisk indretning ifølge ethvert af de foregående krav, hvorved forstærkningen er en første forstærkning, som yderligere omfatter en anden forstærkning (90), idet den anden forstærkning omfatter elastisk materiale, som er således fastgjort til torsosektionen, at den påfører en omdrejningskraft, som virker i retning af at bringe en brugers torso til at rotere.

6. Ortopædisk indretning ifølge ethvert af de foregående krav, hvori det første materiale, som danner torsosektionen, er et elastisk letvægtsmateriale, som kan tilpasse sig til en brugers krop uden at give anledning til spændings- eller kompressionslinjer i nogen specifik retning, og fortrinsvis omfatter forstærkningen et andet elastisk materiale.

7. Ortopædisk indretning ifølge krav 6, hvorved forstærkningen omfatter sektioner af et elastisk materiale, der er i stand til at tilvejebringe en konstant kraft til at presse brugerens torso i en specifik retning, idet sektionerne af det elastiske materiale påføres torsosektionen i form af plader eller strimler af materiale.

8. Ortopædisk indretning ifølge ethvert af de foregående krav, hvorved størrelsen af kraften, som frembringes ved hjælp af forstærkningen, når indretningen bæres, er forbundet med den dybde, som fastgørelsespunktet eller hvert fastgørelsespunkt er indrykket i den første og/eller anden side af torsosektionen.

9. Ortopædisk indretning ifølge ethvert af de foregående krav, hvorved det andet fastgørelsespunkt (52) er placeret ved en brugers hofte på den anden side af torsosektionen, og det tredje fastgørelsespunkt (53) er placeret under en armåbning på den anden side af torsosektionen, idet det første fastgørelsespunkt (51) er placeret imellem hoften og armåbningen på den første side af torsosektionen.

10. Fremgangsmåde til fremstilling af en ortopædisk indretning ifølge ethvert af de foregående krav, omfattende følgende trin,
bestemmelse af den lodrette position af det første fastgørelsespunkt (51) baseret på røntgenfotografering af brugerens torso,

fremstilling af en torsosektion til i alt væsentligt at passe til brugerens krop, idet torsosektionen er indrykket ved det første fastgørelsespunkt (51), og fastgørelse af forstærkningen til torsosektionen, således at forstærkningen strækkes, når apparatet bæres.

11. Fremgangsmåde ifølge krav 10, hvorved det tredje fastgørelsespunkts (53) lodrette position bestemmes ud fra røntgenfotografering af brugerens torso.

DRAWINGS

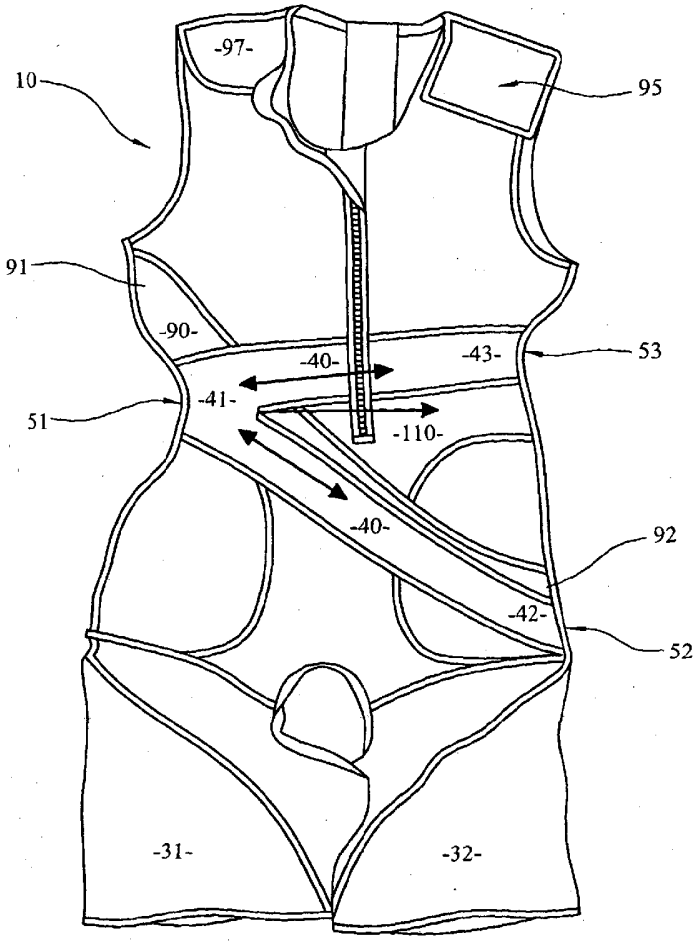

FIG. 1

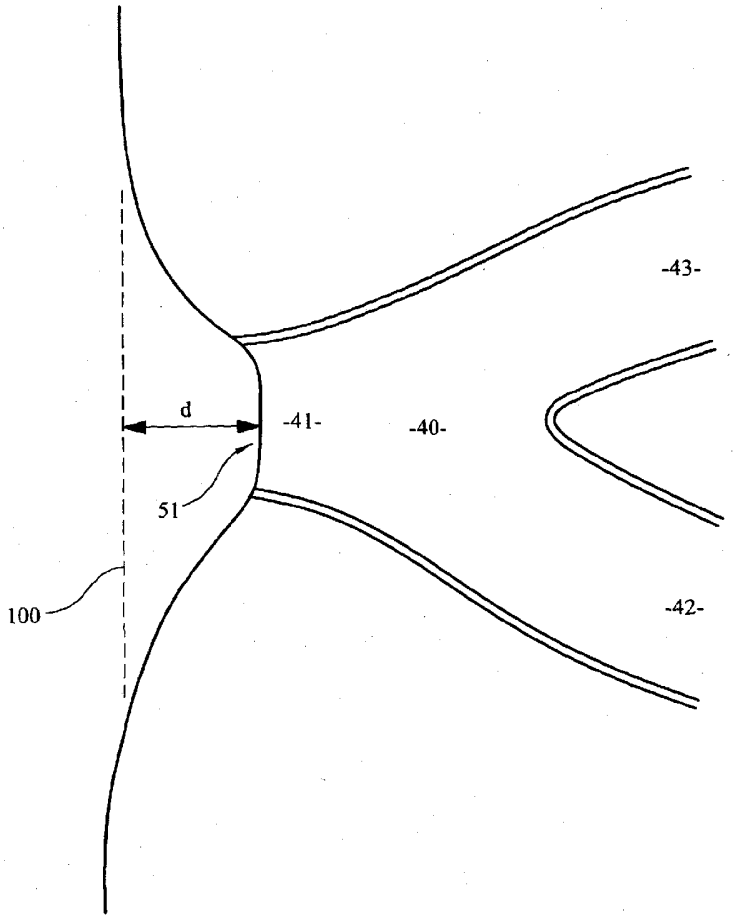

FIG. 2

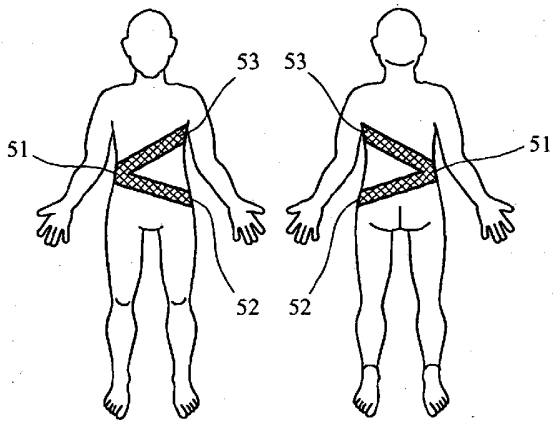
53
53
51
51
52
52
FRONT VIEW
BACK VIEW

FIG. 3

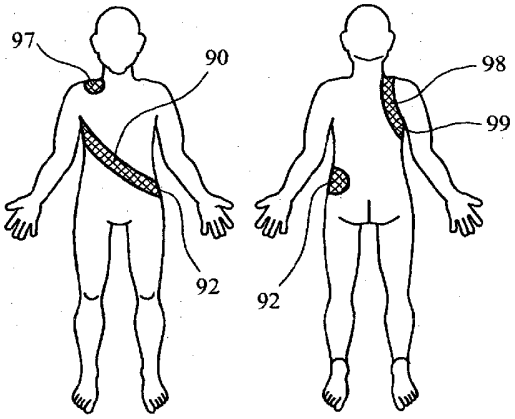
97
90
98
99
92
92
FRONT VIEW
BACK VIEW

FIG. 4