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(54) **CHILD-SUPPORTING HARNESS**

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(57) **ABSTRACT**

A child-supporting harness comprises a harness portion and a child-carrying portion. The harness portion comprises a dorsal member having an upper section and a lower section; a waist strap depending from the lower section of the dorsal member; a pair of shoulder straps depending from the upper section of the dorsal member; and a pair of torso straps selectively attached to the dorsal member between the upper section and the lower section thereof. The child-carrying pouch is releasably secured to the harness portion.

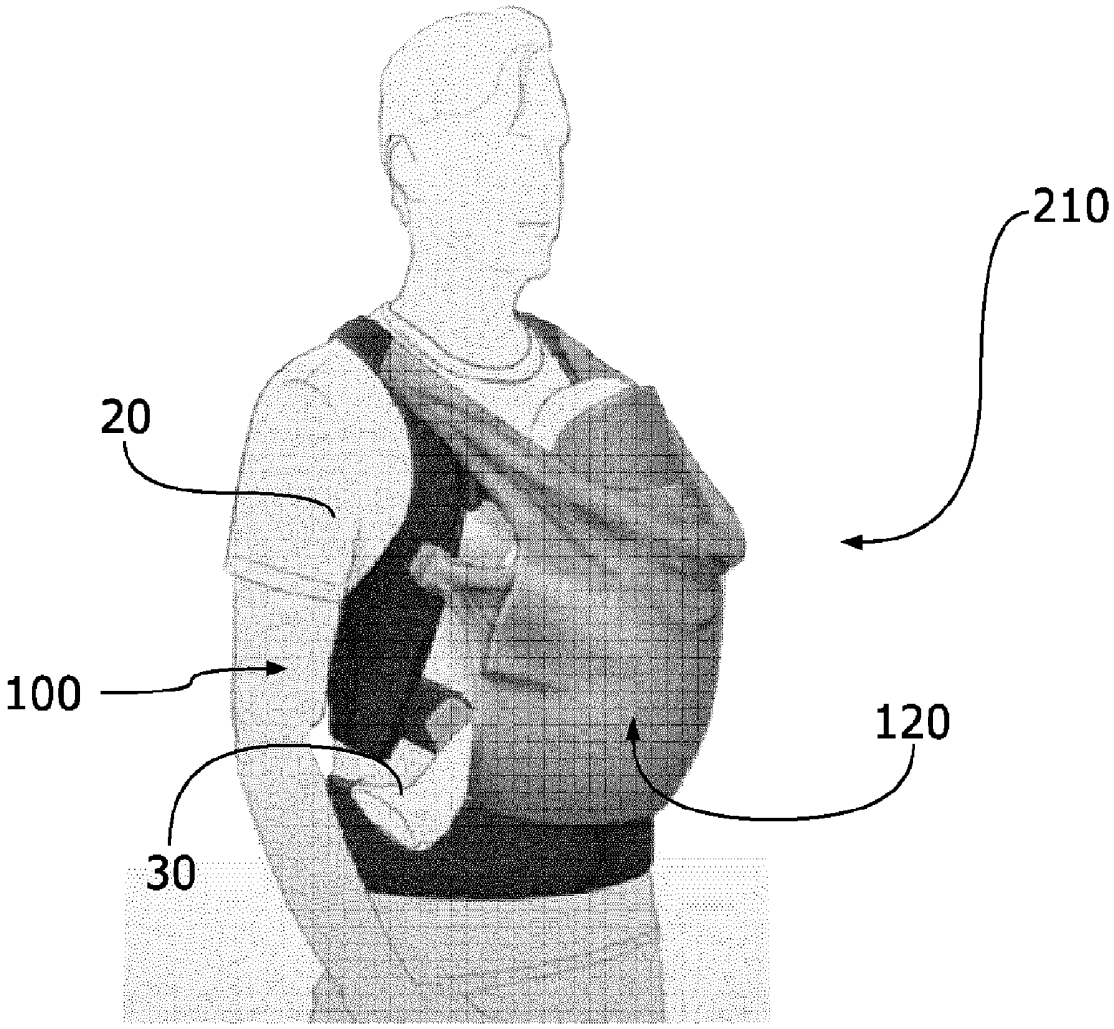
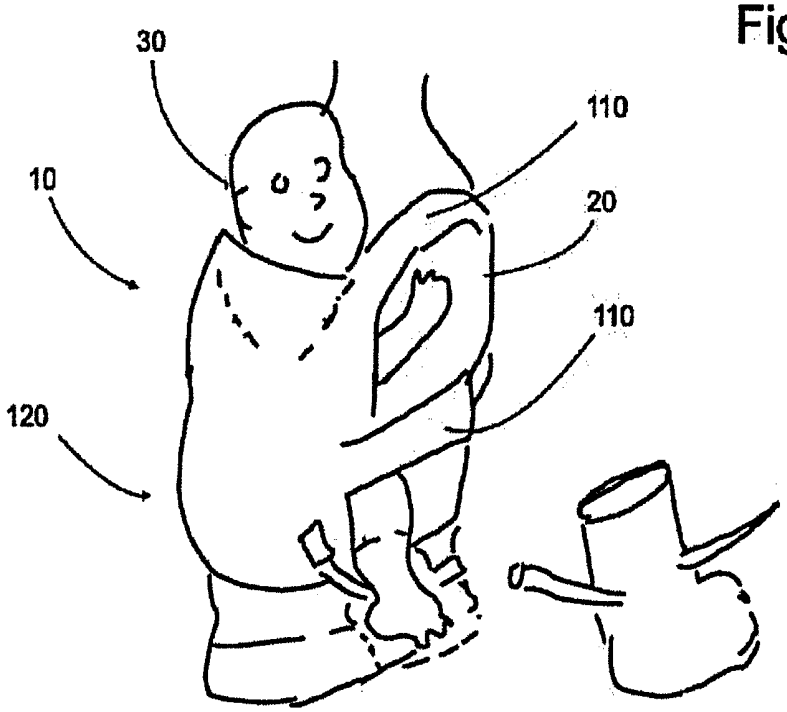
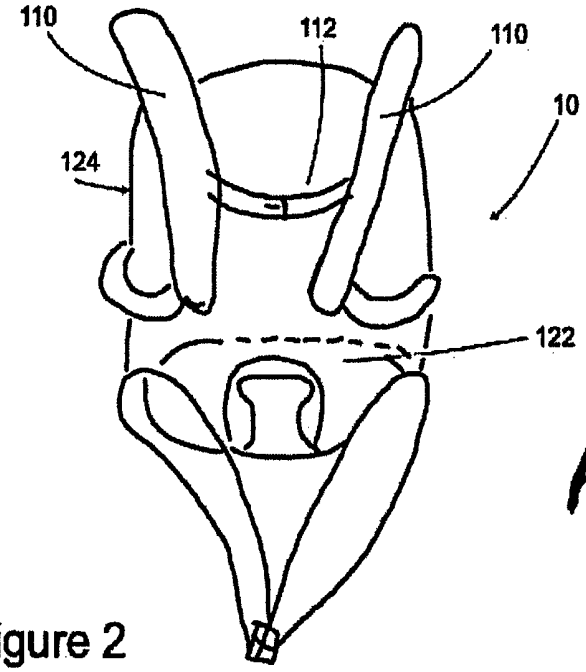


Figure 1





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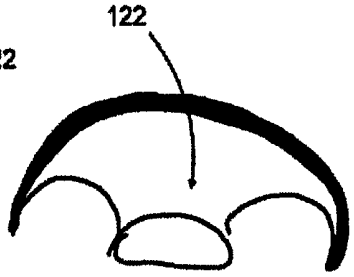

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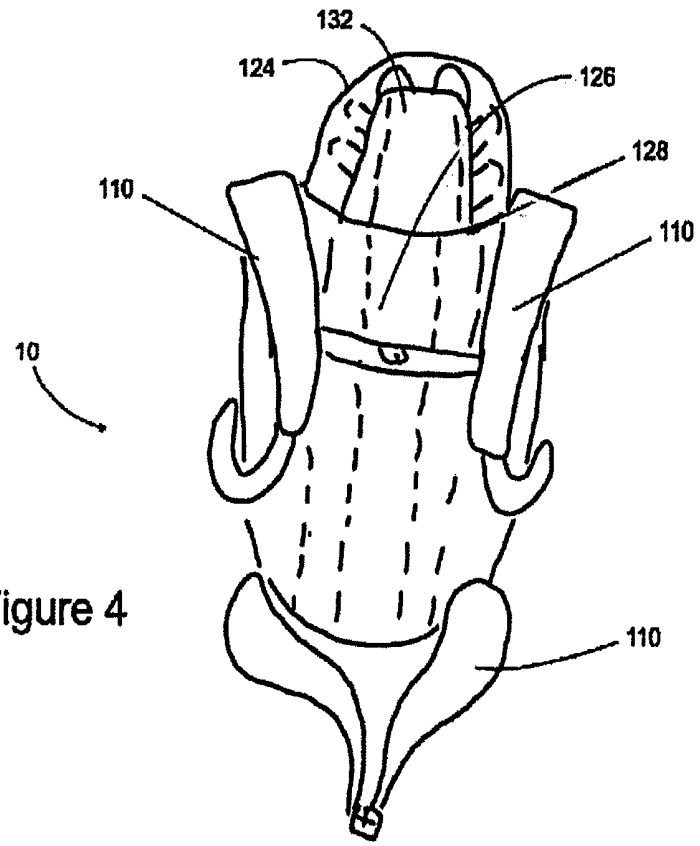

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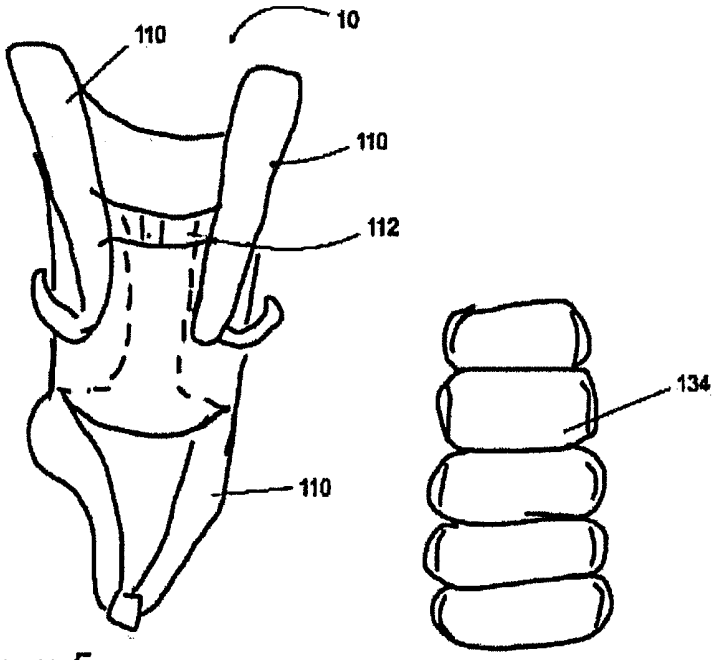

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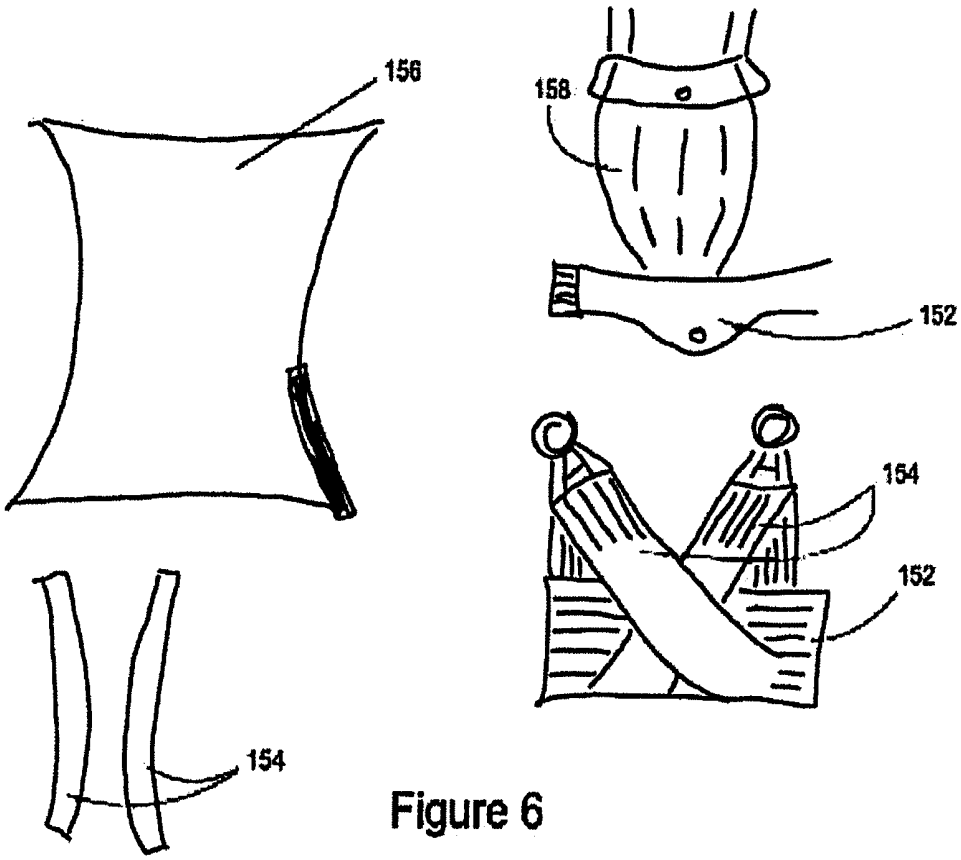

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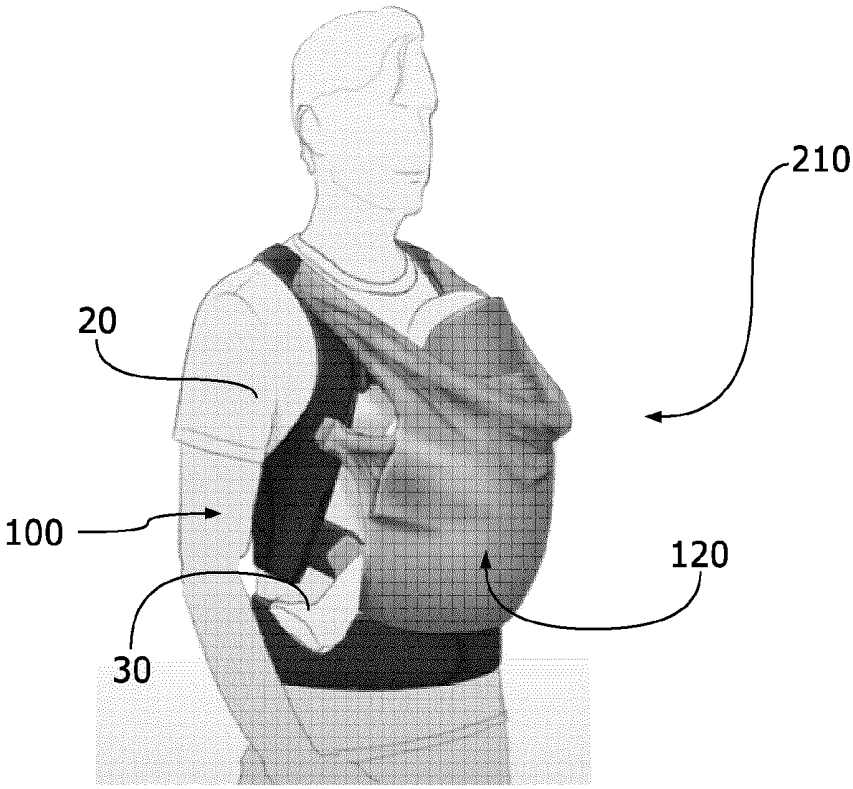

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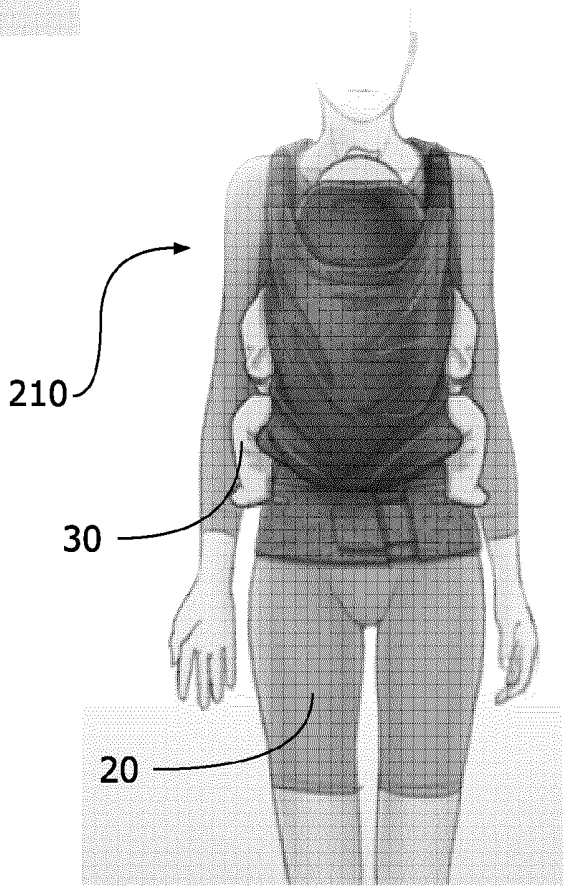

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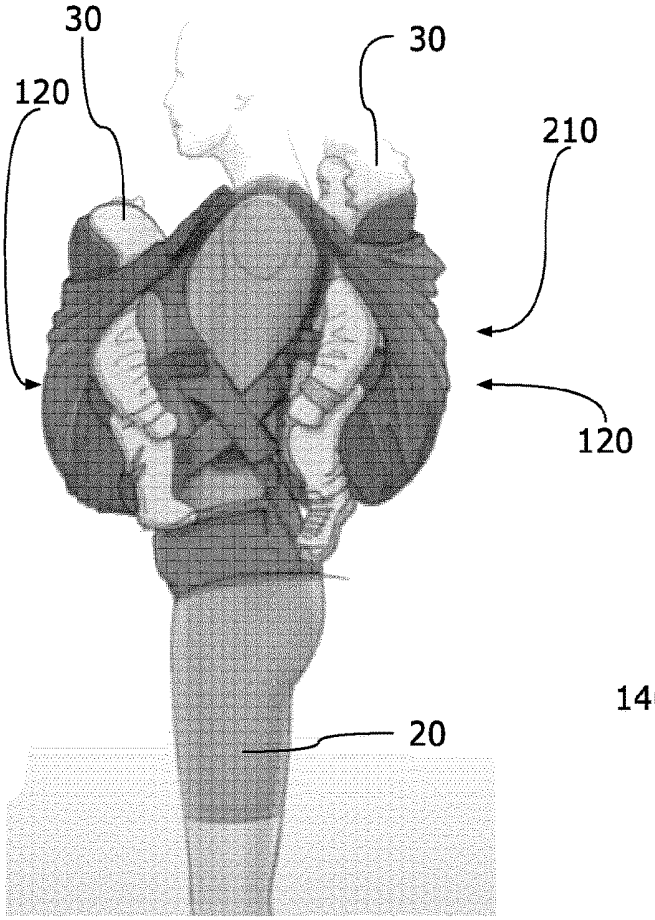

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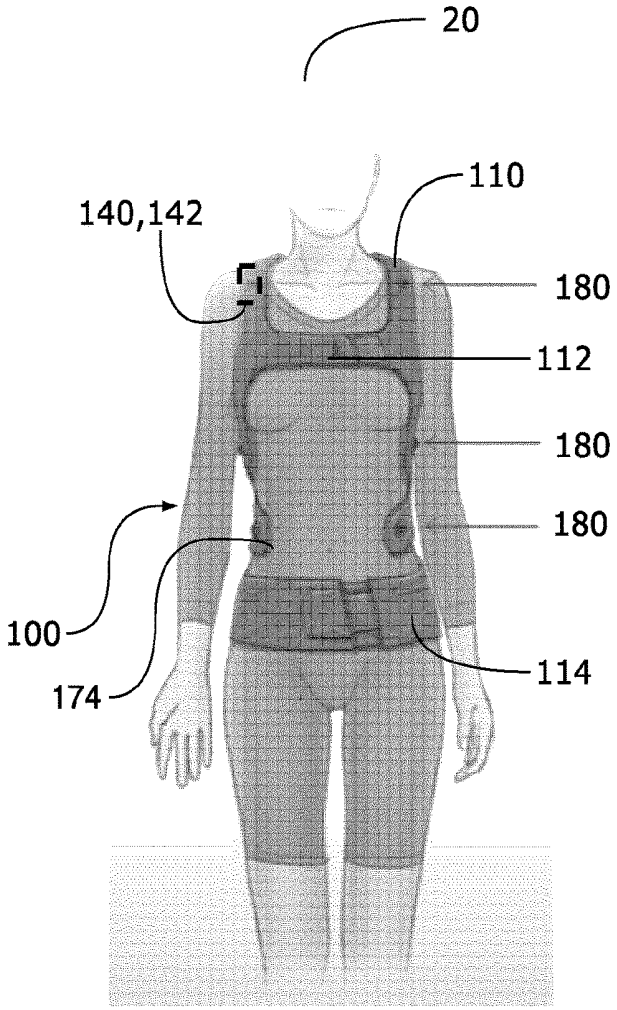

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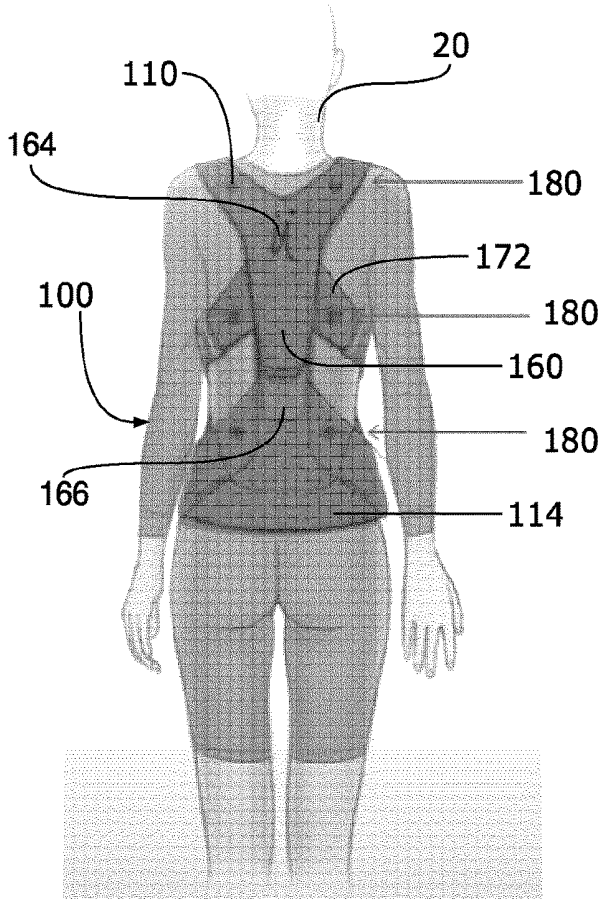

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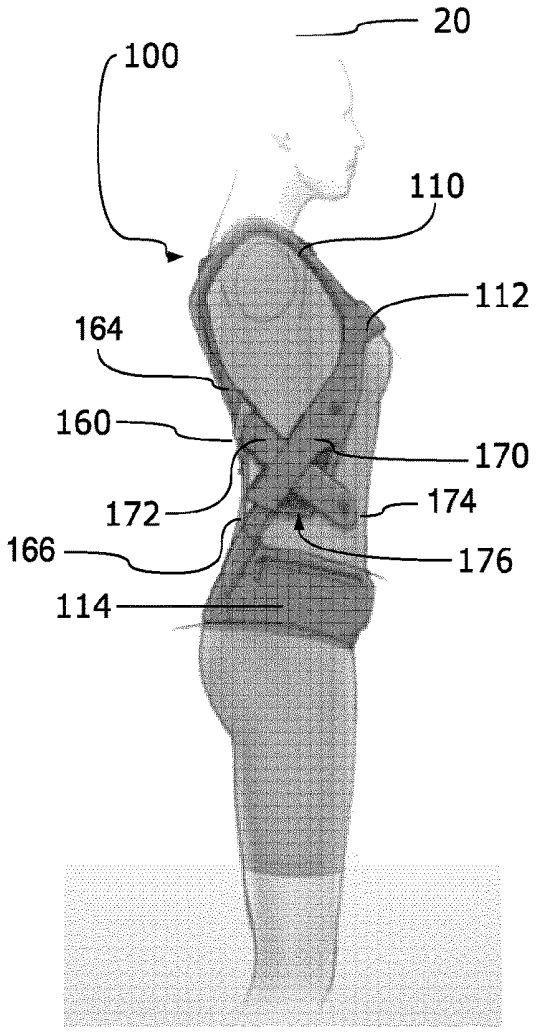

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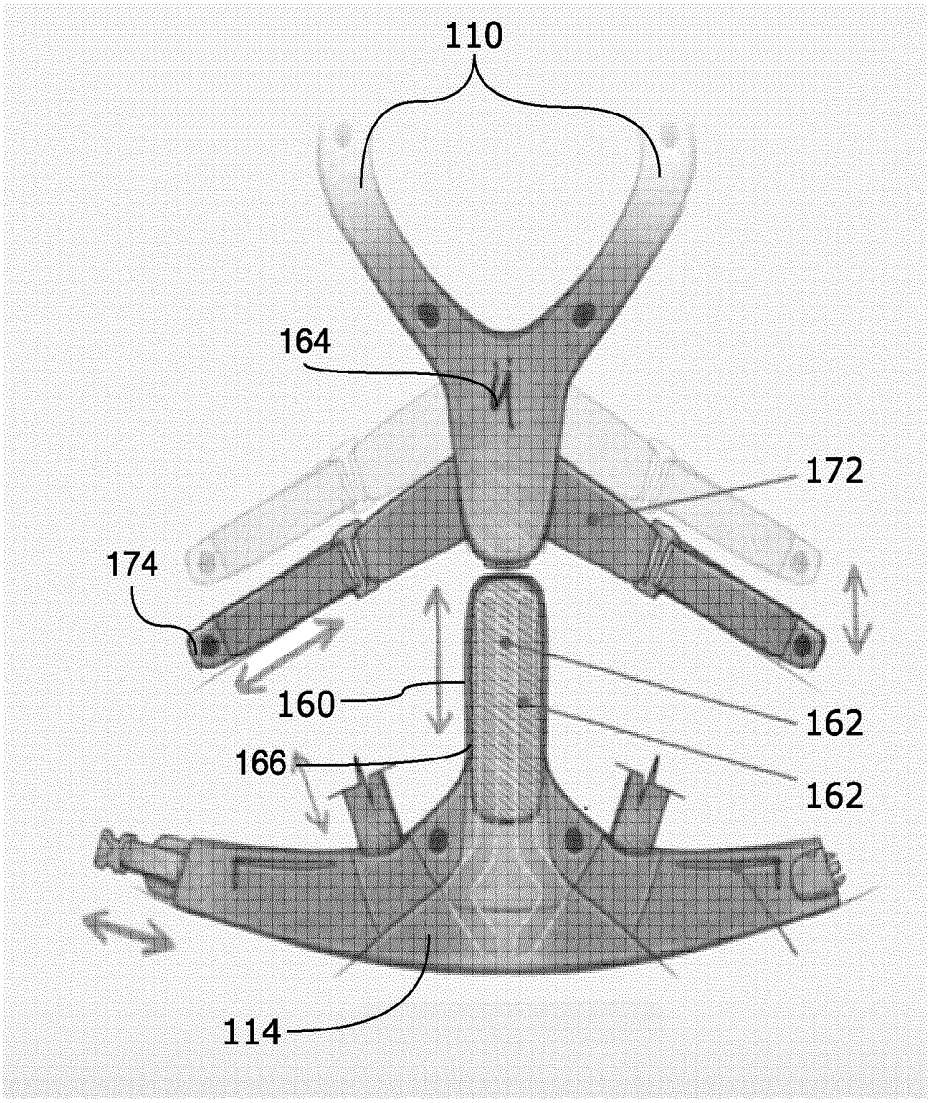

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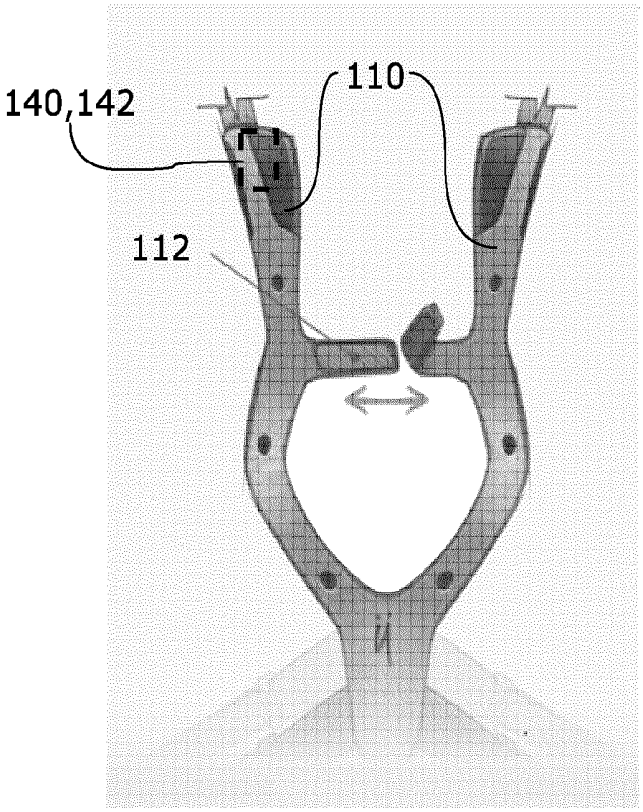

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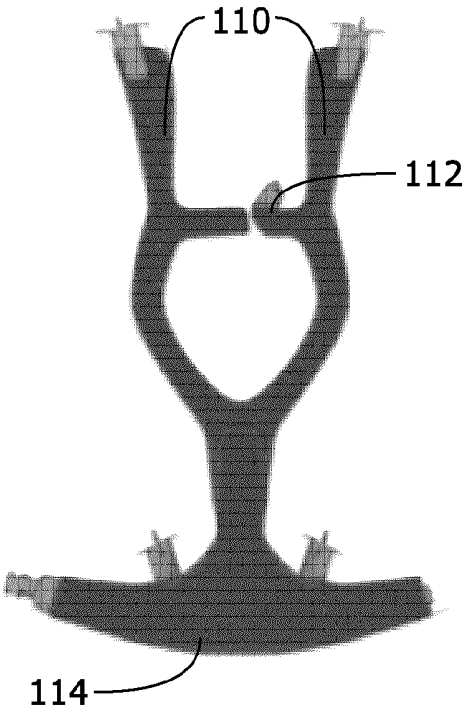

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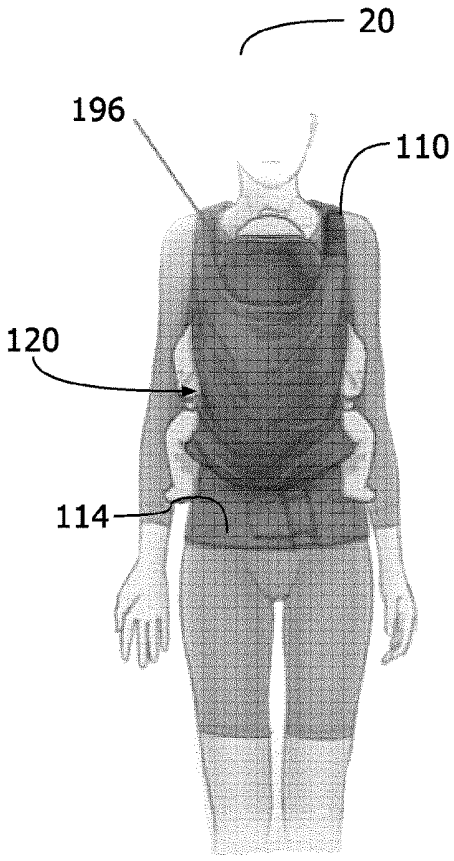

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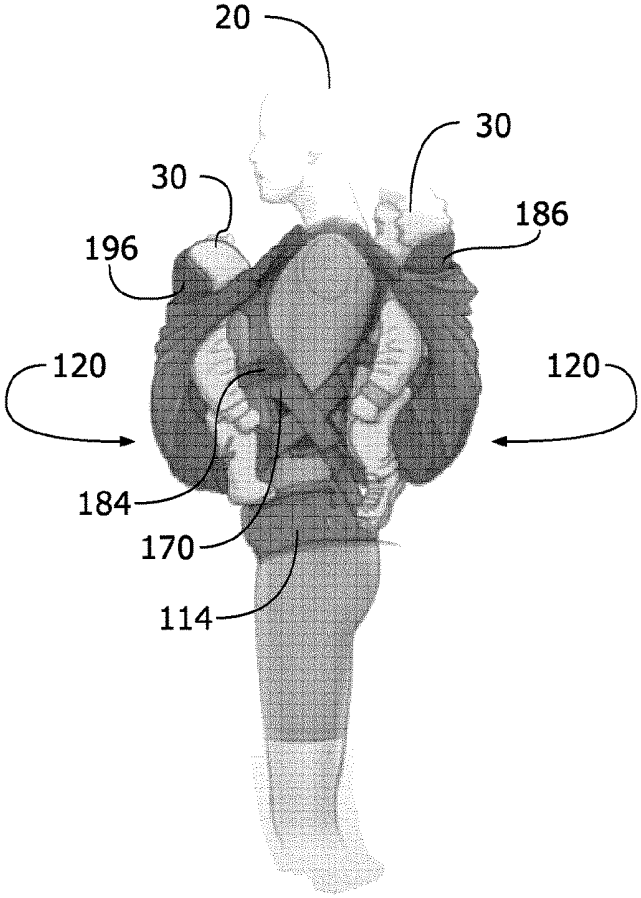

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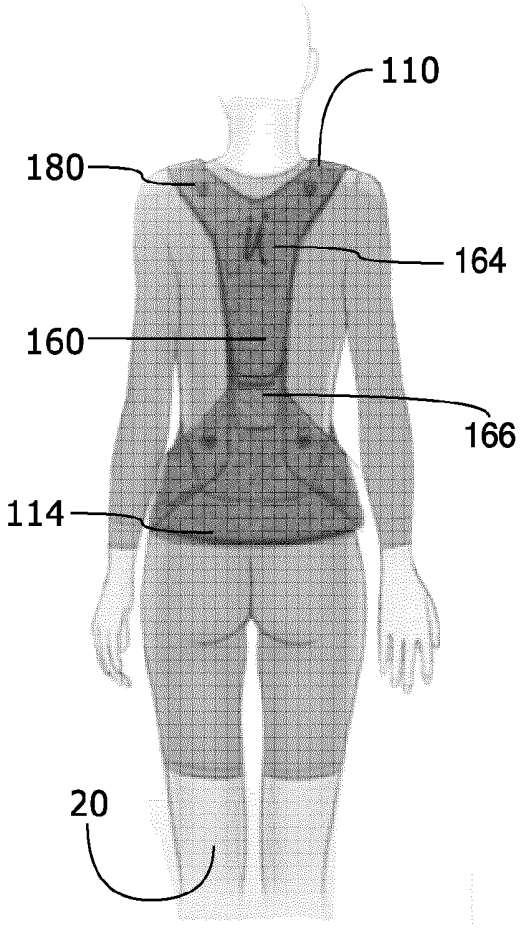

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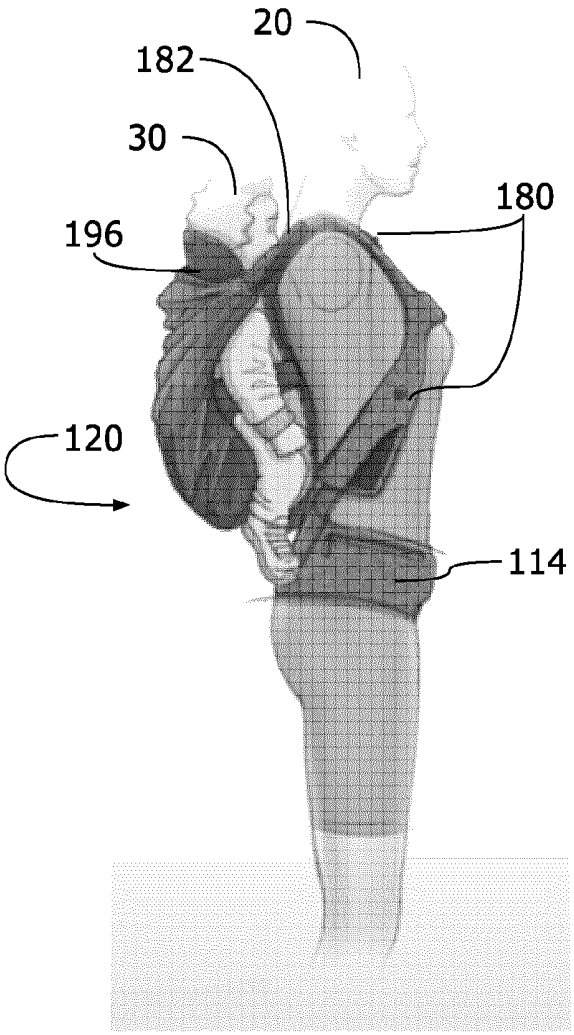

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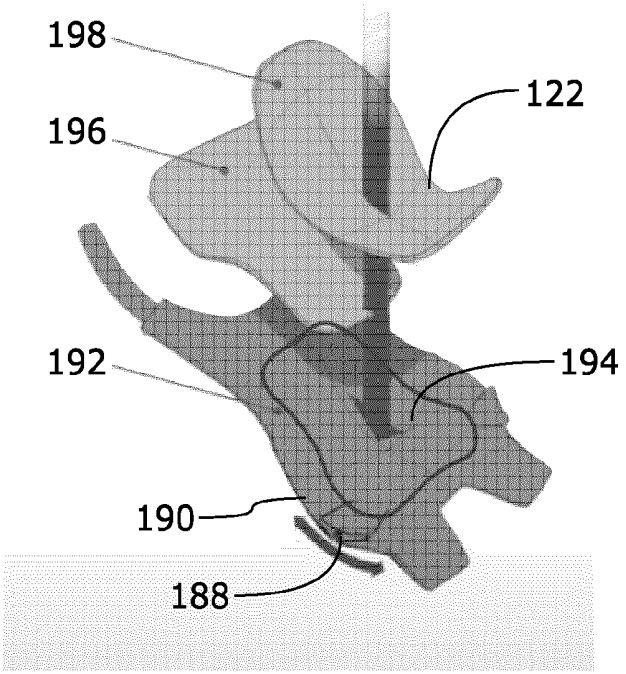

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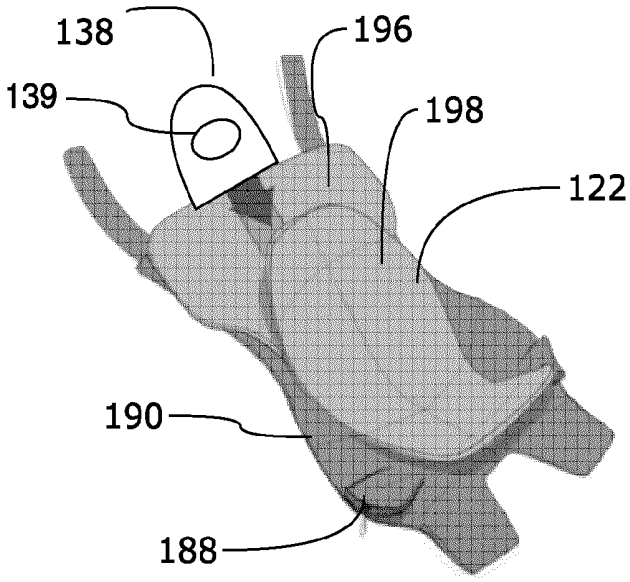

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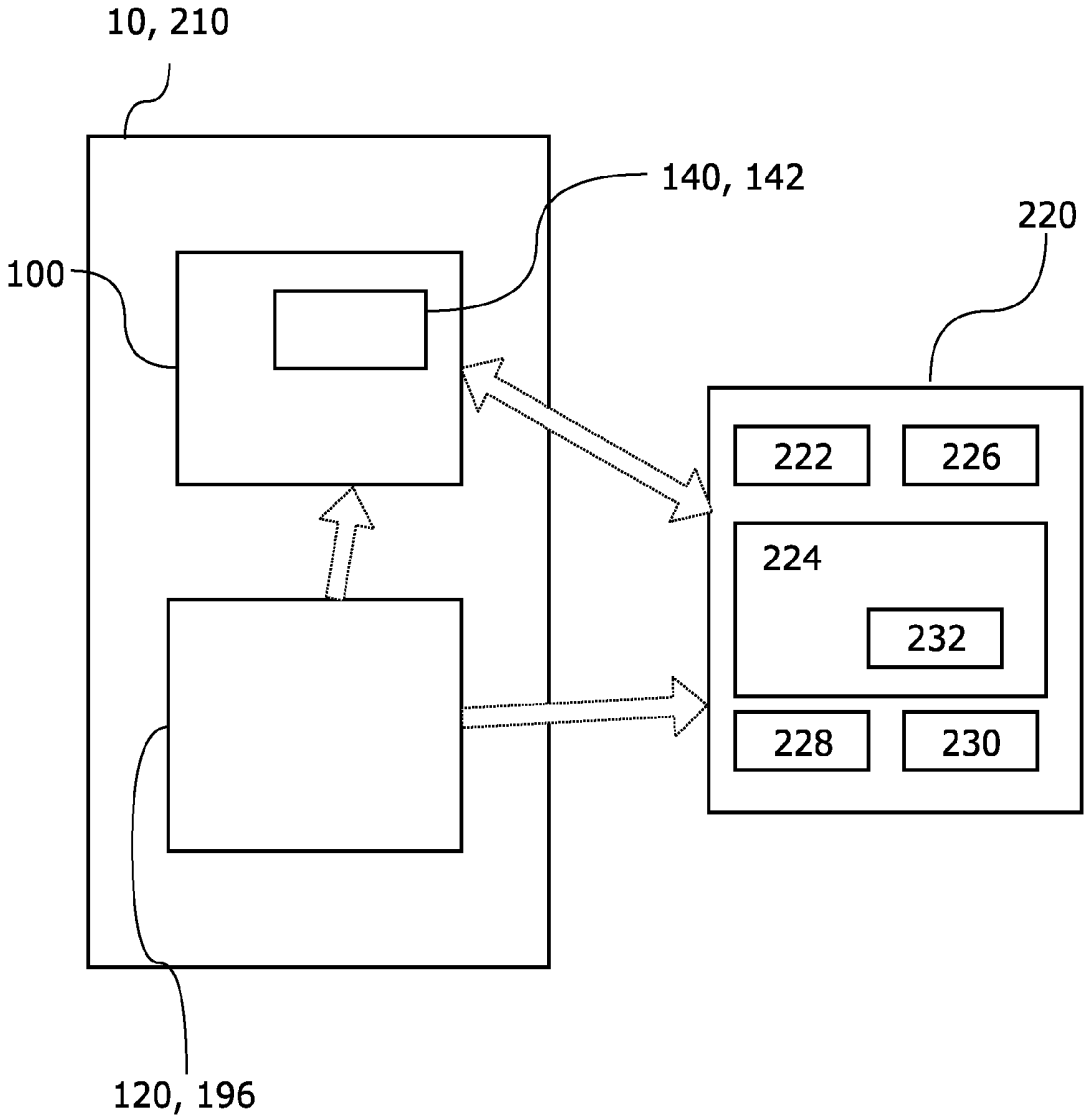

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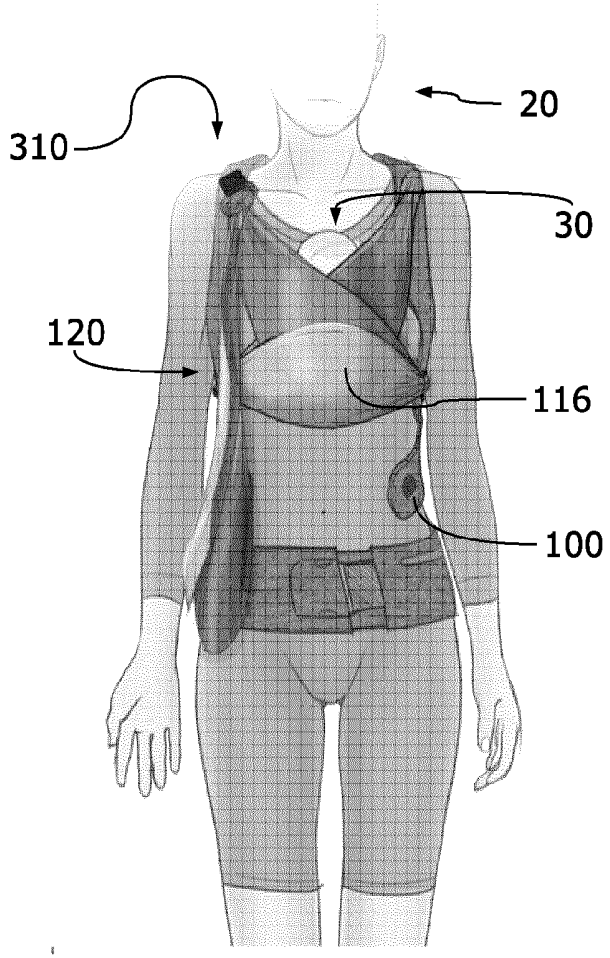

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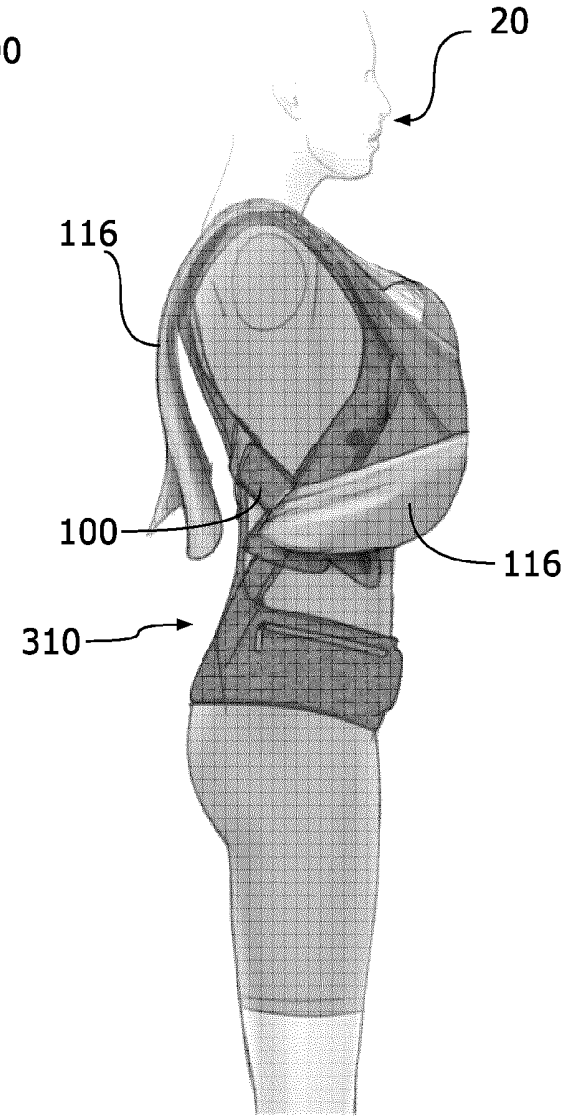

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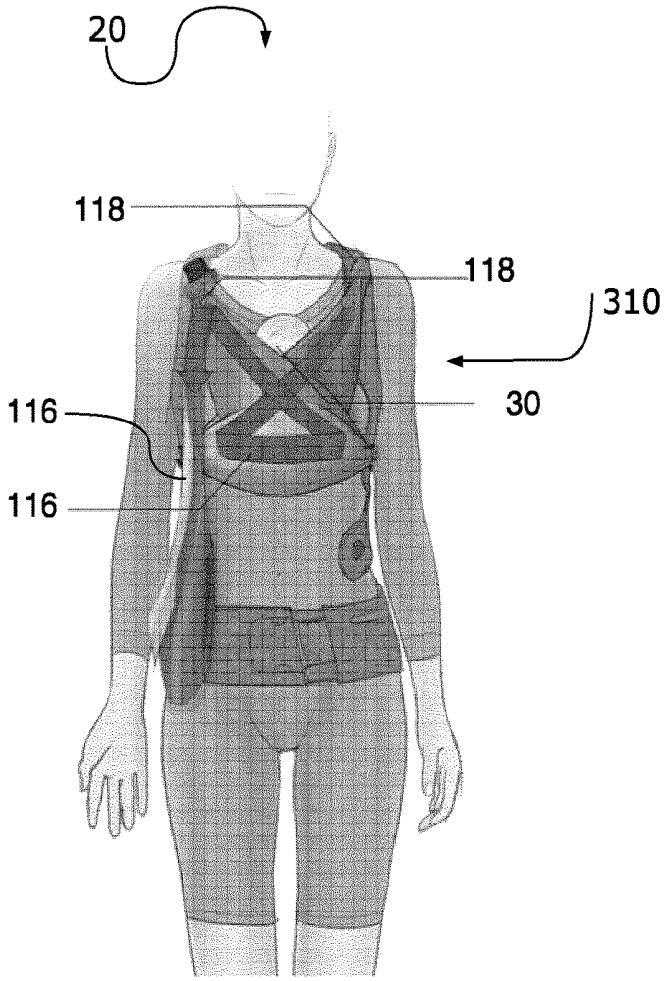

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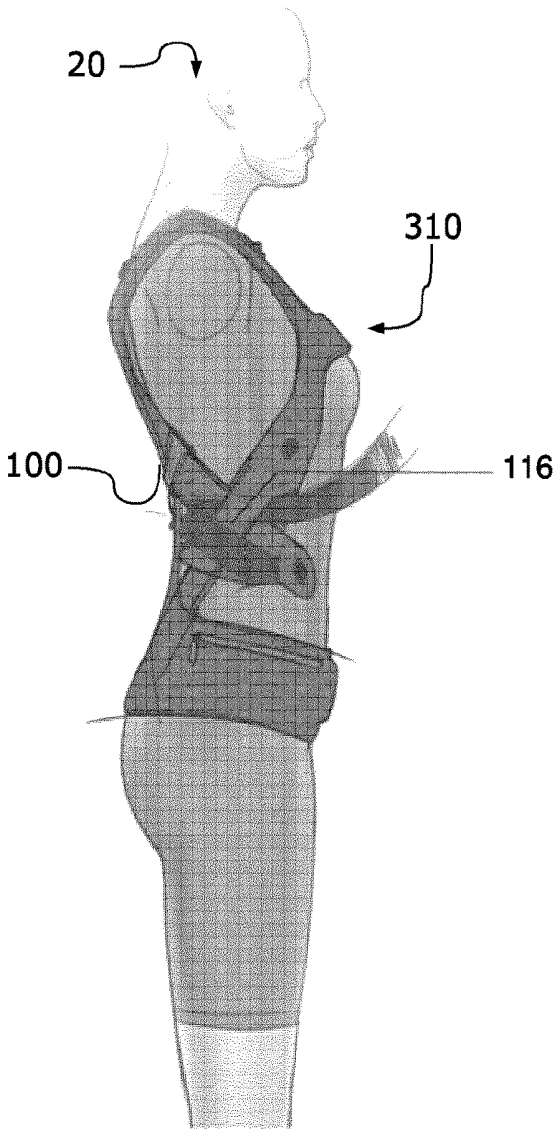

Figure 28

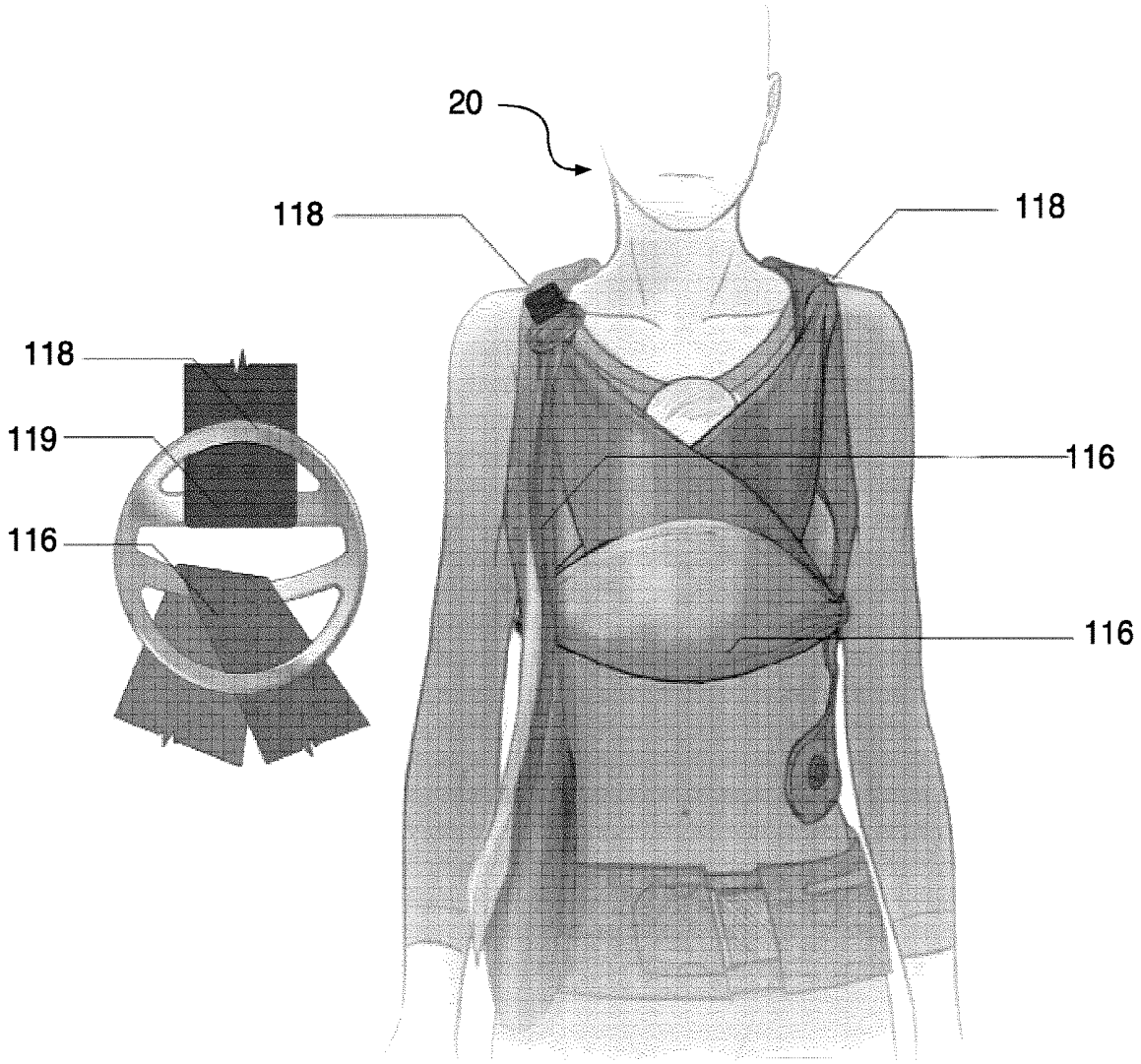

Figure 29

CHILD-SUPPORTING HARNESS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from U.S. patent provisional application 62/462,384 filed Feb. 23, 2017, the specification of which is hereby incorporated herein by reference in its entirety.

BACKGROUND

(a) Field

[0002] The invention relates to a harness and more specifically to child-supporting harness forming a child-carrying pocket or pouch for carrying a child.

(b) Related Prior Art

[0003] Child-supporting harnesses have long been known in the art and are available in many different configurations. Existing child-supporting harnesses are constructed to support the child on the chest-side of the user and the harness normally comprises a bag-like support and two or more looped harness straps, one for each shoulder on the rear side of the bag for the wearing of the child-supporting harness on the shoulders.

[0004] This kind of child-supporting harness is encumbered with limitations which the present child-supporting harness aims to overcome.

SUMMARY

[0005] According to an embodiment, there is disclosed a child-supporting harness comprising: a harness portion comprising: a dorsal member having an upper section and a lower section; a waist strap depending from the lower section of the dorsal member; a pair of shoulder straps depending from the upper section of the dorsal member; a pair of torso straps selectively attached to the dorsal member between the upper section and the lower section thereof; and a child-carrying pouch releasably secured to the harness portion.

[0006] According to an aspect, the pair of torso straps is selectively attached to the dorsal member at a position which is adjustable between the lower section and the upper section of the dorsal member.

[0007] According to an aspect, each torso strap of the pair of torso straps crosses a corresponding shoulder strap of the pair of shoulder straps.

[0008] According to an aspect, one of the shoulder straps and the torso straps comprise a slot, with the other of the shoulder straps and the torso straps passes through the slot when crossing each other.

[0009] According to an aspect, each torso strap of the pair of torso straps comprises a free end which is unattached to other part of the harness portion.

[0010] According to an aspect, the free end of each torso strap of the pair of torso straps comprises a base fixation used to releasable secure the child-carrying pouch.

[0011] According to an aspect, the child-carrying pouch comprises a seat support section and separate head support section.

[0012] According to an aspect, the seat support section is pre-molded to substantially match a shape of a child's buttocks area.

[0013] According to an aspect, the separate head support section is adjustable at least in height relative to the seat support section.

[0014] According to an aspect, the child-supporting harness further comprises sensors for sensing at least one of temperature, cardiac frequency and respiratory rate of a child in the child-carrying pouch.

[0015] According to an aspect, the sensors are further adapted to sense one or more of the child's weight, the child's oxygenation level, the time spent in the carrier by the child, as information on the position of the child in the child carrying pouch (e.g. using pressure sensors) and movements of child during the time spent in the child carrying pouch.

[0016] According to an aspect, the child-supporting harness comprises a strip comprising the sensors for contacting the skin of the child when in the child-carrying pouch.

[0017] According to an aspect, the head supporting section comprises a main area and a strip, the strip extending from the main area and comprising the sensors, wherein the strip is for contacting the skin of the child when in the child-carrying pouch.

[0018] According to an aspect, the child-supporting harness further comprises a signalization device located in the harness portion and in communication with the sensors, the signalization device generating a signal when at least one of the temperature, the cardiac frequency and the respiratory rate meet an alarm criterion.

[0019] According to an aspect, the signalization device comprises one of a vibration device generating a vibration signal, a lighting device generating a light signal, and a speaker generating a sound signal

[0020] According to an aspect, the vibration device is located in at least one of the shoulder straps.

[0021] According to an aspect, the dorsal member comprises one of rigid material and semi-rigid material.

[0022] According to an aspect, the dorsal member comprises a first section and a second section, and a length, and wherein the first section is adjustable relative to the second section to adjust the length of the dorsal member.

[0023] According to an aspect, the harness portion comprises a front and a back which respectively correspond a front and a back of a user wherein the child-supporting harness further comprises additional the base fixations located on the front and on the back of the harness portion, thereby allowing the child-carrying pouch to be secured both to the back and to the front of the harness portion.

[0024] According to an aspect, the child-carrying pouch comprises another child-carrying pouch releasably secured to the harness portion, thereby resulting in having one child-carrying pouch releasably secured to front of the harness portion and the other child-carrying pouch releasably secured to back of the harness portion.

[0025] According to an aspect, the child-carrying pouch comprises a seat supporting section and a sitting-width about the seat-supporting section, wherein the child-carrying pouch comprises an adjusting means to adjust the sitting-width of the child-carrying pouch.

[0026] According to an aspect, the child-carrying pouch comprises a non-stretching area and a stretching area surrounded by the non-stretching area.

[0027] According to an embodiment, there is described a child-supporting harness comprising a child-carrying pouch comprising a layer of material having sensors for sensing a biometric parameter of a child in the child-carrying pouch.

[0028] According to an aspect, the biometric parameter comprises at least one of temperature, cardiac frequency, weight and respiratory rate.

[0029] According to an aspect, the layer of material of the child-carrying comprises a main area and a strip, the strip extending from the main area and comprising the sensors, wherein the strip is for contacting the skin of the child of the child when in the child-carrying pouch.

[0030] According to an aspect, the child-supporting harness further comprises a vibration device connected to the sensors, the vibration device vibrating when at least one of the temperature, the cardiac frequency and the respiratory rate meet an alarm criterion.

[0031] According to an aspect, the child-supporting harness further comprises shoulder straps wherein the vibration device is located in at least one of the shoulder straps.

[0032] According to an embodiment, there is disclosed a child-supporting harness comprising a child-carrying pouch comprising a seat support section which is pre-molded to substantially match a shape of a child's buttocks area.

[0033] According to an aspect, the child-carrying pouch comprises a head support section separate from the seat support section.

[0034] According to an aspect, the separate head support section is adjustable at least in height relative to the seat support section.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035] Further features and advantages of the present disclosure will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

[0036] FIG. **1** is a schematic of a child-supporting harness worn by a user for carrying a child in accordance with an embodiment;

[0037] FIG. **2** is a perspective view of the back of the child-supporting harness as worn by a user, with only the straps visible;

[0038] FIG. **3** is a schematic of a seat support section for installation in a child-supporting harness in accordance with an embodiment;

[0039] FIG. **4** is a perspective view of the back of the child-supporting harness as worn by a user, with the user invisible;

[0040] FIG. **5** is a perspective view of the back of the child-supporting harness as worn by a user, with the user and the near panel invisible;

[0041] FIG. **6** is a view of some unassembled pieces to be assembled to form the child-supporting harness, and a sub-assembly of pieces forming the straps in accordance with an embodiment;

[0042] FIGS. **7** and **8** are image showing images of various embodiments of child-supporting harnesses worn by a user;

[0043] FIG. **9** is an elevated perspective view of a child-supporting harness worn by a user to carry a child in front fashion according to an embodiment;

[0044] FIG. **10** is a front perspective view of the child-supporting harness shown on FIG. **9** as worn by another user;

[0045] FIG. **11** is a left-side perspective view of the child-supporting harness shown on FIGS. **9** and **10** with two children held, one in a front fashion and one in a back fashion;

[0046] FIG. **12** is a front perspective view of the harness of the child-supporting harness shown on FIGS. **9** to **11** as worn by a user without a child-carrying pouch;

[0047] FIG. **13** is a rear perspective view of the harness of FIG. **12**;

[0048] FIG. **14** is a right-side perspective view of the harness of FIGS. **12** and **13**;

[0049] FIG. **15** is a rear view of the rear portion of the harness shown on FIGS. **12-14** alone;

[0050] FIG. **16** is a front view of the front portion of the harness shown on FIGS. **12-14** alone;

[0051] FIG. **17** is a rear view of the front portion of the harness shown on FIG. **16**;

[0052] FIG. **18** is a front perspective view of the child-supporting harness of FIGS. **9-11** as worn by a user with a child-carry pouch worn in a front fashion;

[0053] FIG. **19** a left-side perspective view of the child-supporting harness of FIGS. **9-11** as worn by a user with a child-carrying pouch worn in a front fashion and a child-carrying pouch worn in a back fashion;

[0054] FIG. **20** is a rear view of the harness of FIGS. **12-14**;

[0055] FIG. **21** is a right-side perspective view of the child-supporting harness of FIGS. **9-11** as worn by a user with a child-carrying pouch worn in a back fashion;

[0056] FIG. **22** is an exploded perspective view of the child-carrying pouch according to an embodiment;

[0057] FIG. **23** is an assembled view of the child-carrying pouch of FIG. **22**;

[0058] FIG. **24** is a schematic view of a combination of the child-support harness of an embodiment and a monitoring device.

[0059] FIG. **25** is a front perspective view of a child-supporting harness according to another embodiment worn by another user;

[0060] FIG. **26** is a right-side perspective view of the child-supporting harness of FIG. **25** worn by a user with a child-carrying pouch worn in a front fashion;

[0061] FIG. **27** is a front perspective view of a child-supporting harness according of FIGS. **26-26** with illustration of the course of the shawl forming the pouch;

[0062] FIG. **28** is a right-side perspective view of the harness portion of the child-supporting harness of FIGS. **25-27** with illustration of the course of the shawl forming the pouch; and

[0063] FIG. **29** is a closer front perspective view of the child-supporting harness of FIGS. **25-28** and an exemplary fitting used to pass portion of the shawl through.

[0064] It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

DETAILED DESCRIPTION

[0065] Referring now to the drawings, and more particularly to FIG. **1**, the child-supporting harness **10** is worn by a user **20** to carry a child **30** in a pouch-like space or compartment wherein the child **30** is secure. The child-supporting harness **10**, as illustrated, comprises openings on both sides through which the arms and the legs of the child **30** may extend out of the child-supporting harness **10**.

[0066] The child-supporting harness **10** comprises two shoulder straps **110** intended to extend from the child-carrying pouch **120** of the child-supporting harness **10** over the shoulders of the user **20** down the back of the user **20** and

back to the front of the user **20** at the bottom of the child-carrying pouch **120** at the front of the user **20**.

[0067] The shoulder straps **110**, based on embodiments, are either crossing at the back of the user **20**, or not. The shoulder straps, according to an embodiment, are permanently secured to the front portion of the child-supporting harness **10**. According to an embodiment, the shoulder straps **110** are temporarily secured to the front of the child-supporting harness **10**. The shoulder straps may be temporarily secured to the front of the child-supporting harness **10** at the bottom, at the waist level, or at a higher level, for example at the location wherein the shoulder straps **110** join to the front portion of the child-supporting harness **10**. The shoulder straps **110** may be secured to the main portion of the child-supporting harness **10** using releasable means such as openable auto-locking devices, a belt buckle or the like, a system of hooks and eyes, rivets, buttons, releasable means such as Velcro®, and any combination thereof. The releasable means may for example be embodied as a combination of two complementary buckle components with at least one of the buckle components comprising biased parts to automatically lock together the buckle components when inserted one with the other and to release the lock when someone is pressing against a portion of at least one of the complementary buckle components to release them from each other.

[0068] According to embodiments, the shoulder straps **110** further comprises adjusting means to adjust the length of the shoulder straps **110** to maximize comfort of the user **20** and/or security of the child **30**. The adjustment means may further comprise means to move closer the shoulder straps **110** at some point.

[0069] One must note that even if the child **30** illustrated on FIG. **1** is facing towards the user **20**, the child-supporting harness **10** is adapted to carry a child **30** either facing toward the user **20** or facing in front in the same direction as the user **20**. The selection of the orientation of the child **30** depends on multiple factors, including the preferences of the user **20**, the preferences of the child **30**, and the age of the child **30** which set some limitation based in part on the capacity of the child **30** to sit upright.

[0070] It is also envisaged that the child-supporting harness **10** can be worn on the back of the user **20** instead of the front of the user **20**.

[0071] Still referring to FIG. **1**, it is shown that the child-supporting harness **10** allows the child **30** to wear additional clothes components (boots, mittens, etc.), with the child-supporting harness **10** comprising securing means adapted to temporarily secure the clothes components to the front portion of the child-supporting harness **10**. Similarly, the above-described securing means may be used to temporarily secure the clothes components to the child-supporting harness **10**, such as a securing strap having on at least one of its end one securing means and the other ends being temporarily or permanently secured to the front portion of the child-supporting harness **10**.

[0072] FIG. **2** shows a view of the child-supporting harness **10** from an observer located back to the user **20**, with the user **20** being transparent and only some parts of the child-supporting harness **10** visible. According to the illustrated embodiment, the shoulder straps **110** keep the back of the user **20** free, and are secured close to each other through an adjustable releasable tightening strap **112** allowing both to prevent the shoulder straps **110** from slipping away from each other and therefore from the shoulders of the user **20** and to adjust the distance between the shoulder straps **110**.

[0073] The child-supporting harness **10** further shows a removable seat support section **122** disposed on the floor of the child-carrying pouch **120** of the child-supporting harness **10**. The seat support section **122** helps the child **30** in sitting correctly in the child-carrying pouch **120** of the child-supporting harness **10**, and prevents the child **30** from slipping on one side or the other.

[0074] Additionally, referring to FIG. **3**, the seat support section **122** has a curved shape with upwardly curved edges at locations corresponding to the back and between the legs of the child **30**. This shape helps the child **30** to sit straight and to keep a good position in general. The seat support section **122** is removable and replaceable as the child **30** grows, to adjust to the different phases of the child development.

[0075] Now referring to FIG. **4**, the illustration shows the child-supporting harness **10** from the same perspective as FIG. **2**. The child-supporting harness **10** comprises to form its child-carrying pouch **120** a near panel **124**, close to the user **20**, and a far panel **126**, away from the user **20**. The near panel **124** and the far panel **126** are secured together at the bottom by a zipper or a similar attaching means able to support the weight of the child **30**. The near panel **124** and the far panel **126** are secured together on the sides with securing means (such as Velcro® or rivets) providing the openings for the legs and arms of the child **30**.

[0076] In addition to the shoulder straps **110** used to hold the child-supporting harness **10** close to the body of the user **20**, the child-supporting harness **10** further comprising waist straps **114**. The waist straps **114** are adjustable and attachable.

[0077] The near panel **124** comprises attaching means **128** at the top for securing a replaceable bib panel (not shown). The bib panel can be removed to be cleaned, and/or replaced with a new one.

[0078] The far panel **126** is adapted for receiving a head support **132** designed to help a child **30** to have its head straight. The head support **132** comprises semi-rigid ribs covered with padded fabric to support, protect and be comfortable to the child **30**.

[0079] According to another embodiment, the child-supporting harness **10** comprises e-textile (a.k.a. smart textile, smart fabric, smart clothing or electronic textile) in contact with the child **30** and/or the child-carrying pouch **120**.

[0080] According to an embodiment, either one or both the near panel **124** and the far panel **126** comprises e-textile (aka electronic textile). E-textile as used herein is meant to include any fabric in which digital components, electrical components or electronics are embedded. According to an embodiment, the e-textile consists in fabric and/or garment components comprising electronic components acting as sensors or detectors and which are able to communicate with a memory **228**, processing component **226** and/or monitor (see FIG. **22**) to transmit data collected to a monitoring device **222**.

[0081] According to embodiments, the e-textile can monitor a biometric parameter. In an embodiment, the biometric parameter comprises at least one of temperature of the child **30**, the cardiac frequency of the child **30**, the respiratory rate of the child **30**, the humidity level of the child-carrying pouch **120**, sound-based data, etc.

[0082] According to an embodiment, the monitoring device **222** can be secured, temporarily or not, in one of the shoulder straps **110** with the e-textile and the monitoring device **222** connected together through wiring.

[0083] According to an embodiment, the e-textile is in communication with a generic monitoring device **222** owned by the user (e.g. a smart phone) through a wireless communication technology such as Bluetooth® or through Near Field Communication (NFC) technology.

[0084] According to an embodiment, the generic monitoring device **222** requires the installation of specific software (e.g. a specialized app for a iPhone™) to enter in communication with the e-textile and to collect data from the e-textile. According to an embodiment, the specific software is programmed to detect specific conditions (e.g. the respiratory rate of the child **30** decreasing under a specific rate) and to generate alerts when one such specific condition is detected.

[0085] According to an embodiment, components of the e-textile are removable from the housing component of the child-supporting harness **10**.

[0086] According to an embodiment, data collected by the monitoring device **222** (see FIG. **22**) of the child-supporting harness **10** transmits the collected data to a secured website over Internet and used to participate in a m-Health process. A health evaluation program is associated with the website and collects and transmits data from and to multiples sources to generate a health profile of the child **30**. According to an embodiment, the health profile allows to set custom alerts on the specialized program, for example when a heart malformation condition is associated with a child **30**. Similarly, a physician may access data and may be signaled when alerts occur for such a child **30**.

[0087] Now additionally referring to FIG. **5**, the child-supporting harness **10** comprises on the side of the child-carrying pouch **120**, on both sides of the far panel **126**, a cushion compartment comprising a series of inflatable cushions **134** that are more or less filled with air, based on need, to provide side support to the child **30**. The cushion compartments are located to not obstruct the openings for the arms and legs of the child **30**. The inflatable cushions **134** of the cushion compartment consist, according to an embodiment, in a series of substantially horizontally set cushions secured together in a single cushion assembly; one cushion assembly being installed on each side of the child-supporting harness **10**. According to an embodiment, the cushion assemblies are removable from the cushion compartments. According to an embodiment, the cushions of a cushion set are connected to each other, so that they are blown up together.

[0088] Referring to FIG. **6**, the child-supporting harness **10** comprises a belt part **152**, two shoulder strap parts **154** (forming the shoulder straps **110**), a base panel part **156** (forming the near panel **124**, and a carrying panel part **158** (forming the far panel **126**). Some of the parts **152**, **154**, **156**, **158** comprises a series of layers (ex. multi-layer shoulder straps, layers to form the cushion compartment, etc.). Some parts **152**, **154**, **156**, **158** also comprise additional components (e.g., a zipper portion on the belt part, attaching means, adjusting means, ribs, e-textile, compartments, etc.).

[0089] Referring now to FIGS. **9** to **21**, a child-supporting harness **210** comprises a harness portion **100** comprising shoulder straps **110** to be worn over the shoulders of the user **20**. The shoulder straps **110** are to be joined at the front of the user **20** (see FIGS. **12**, **16** and **17**) using the tightening strap **112**. The tightening strap **112** comprises a securing means, for instance Velcro™' at the end of releasable portions of the tightening strap **112** to attach one end to the other in an adjustable fashion.

[0090] The child-supporting harness **210** comprises a dorsal member **160** extending downward from the shoulder straps **110** on the back of the user **20**, thus the shoulder straps **110** depending from the upper section **164** of the dorsal member **160**. The dorsal member **160** has an upper section **164** and a lower section **166**. The dorsal member **160** comprises an integrated structure **162** made of rigid or semi-rigid material to provide structure to the child-supporting harness **210** as to be able to transfer efforts from one end of the dorsal member **160** to the other end of the dorsal member **160**. One end of the dorsal member **160** joins to the shoulder straps **110** where they join, defining a Y-shaped junction point where load is transferred in a balanced manner between the shoulder straps **110** and the dorsal member **160**.

[0091] The child-supporting harness **210** comprises pectoral sections **170** of the shoulder straps **110** extending downward and sideward from the upper section of the shoulder straps **110** at the front toward the side of the user **20**. According to an embodiment, the pectoral sections **170** are continuous from the main section of shoulder straps **110** and thereby are considered as sections of the shoulder straps **110**.

[0092] The child-supporting harness **210** comprises torso straps **172** selectively attached to the dorsal member **160** between the upper section **164** and the lower section **166** thereof and adjustable in height relative to the dorsal member **160** between the lower section **166** and the upper section **164**. The torso straps **172** are separate and distinct from the dorsal member **160**, the shoulder straps **110** and the waist strap **114**, and is selectively attached to the dorsal member **160** at a selected position. The torso straps **172** extend downward and sideward from the shoulder straps **110** at the back toward the side of the user **20**. The pectoral sections **170** and the torso straps **172** cross each other about the side of the user **20**. More precisely, each torso strap **172** of the pair of torso straps **172** crosses a corresponding pectoral strap **170** of the pair of pectoral sections **170**. The pectoral sections **170** comprises a slot **176** defining a passage for the torso straps **172** to pass through, providing adjustable support through the combination of the pectoral sections **170** and the torso straps **172**. According to an embodiment not shown, the torso straps **172** extend to join the waist strap **114**. According to embodiments, the slot **176** provides an aperture wherein the free end **174** of the torso straps **172** may be placed temporarily when not is used, or the slots **176** is designed to blocks the pectoral sections **170** to prevent the pectoral sections **170** to slide relative to the torso straps **172** when in use.

[0093] The torso straps **172**, according to an embodiment, are removable from the child-supporting harness **210**, being integrated only when appropriate, namely when the child-carrying pouch **120** is worn in a front fashion. The torso straps **172** are further adjustable in height, capable of being sled vertically relatively to the dorsal member **160**, to adjust to the height of the user **20**. According to an embodiment, each torso strap **172** of the pair of torso straps **172** comprises a free end **174** which is unattached to other part of the harness portion **100**. According to an embodiment, the torso

straps **172** come as a pair. The pair of torso straps **172** form a V-shape that is inversed when installed on the dorsal member **160**.

[0094] The child-supporting harness **210** comprises waist strap **114** depending from the lower section **164** of the dorsal member **160** on the back, to the pectoral sections **170** about one of the side and the back of the user **20**, and to the torso straps **172** about one of the side and the back of the user **20**. The waist strap **114** are to be joined in front of the user **20** to be worn by the user **20** around the waist. As with the tightening strap **112**, the waist strap **114** comprises adjustable securing means to secure the waist strap **114** around the waist of the user **20** while being adjustable to variable waist sizes.

[0095] The child-supporting harness **210** further comprises base fixations **180** located on at least one of the shoulder straps **110**, the dorsal member **160**, the waist strap **114**, the pectoral sections **170** and the torso straps **172**. According to an embodiment, the base fixations **180** are located at the front and at the back of the child-supporting harness **210**, allowing the user **20** to wear the child-carrying pouch **120** both in a front fashion, in a back fashion, or to have two child-carrying pouches **120** secured to the harness portion **100**. According to an embodiment, the base fixations **180** are located at three distinct heights of the harness portion **100**: at the base with the base fixations **180** being located on the waist strap **114**, the pectoral sections **170** or the torso straps **172**; about at the mid-height of the harness portion **100** with the base fixations **180** being located on the torso straps **172** or the pectoral sections **170**; and at the top of the harness portion **100** with the base fixations **180** being located on the shoulder straps **110**. The base fixations **180** may be embodied in different forms, for example anchoring means, tying means, Velcro™ and hook means, magnet-based fixtures and side release fixtures. The selection of the type of base fixations **180** being used is based on the desired weight the base fixations **180** must support, the easiness to secure and to unsecure them as the security of the fixation solution against accidental unmounting.

[0096] The child-supporting harness **210** further comprises a child-carrying pouch **120** for carrying a child **30**. The child-carrying pouch **120** defines a child-carrying pouch to hold the child **30** into, and complementary fixations **182** to be coupled to the base fixations **180** to releasably secure the child-carrying pouch **120** to the harness portion **100**.

[0097] According to an embodiment, the complementary fixations **182** comprises adjustable components **184** to adjust the position of the child-carrying pouch **120** relative to the harness portion **100**, thus adjusting the position of the child **30** relative to the user **20**.

[0098] According to an embodiment, the child-carrying pouch **120** has a sitting-width about where the child **30** held in the child-carrying pouch **120** would sit. The child-carrying pouch **120** comprises an adjusting means **188** to adjust the sitting-width of the child-carrying pouch **120**, thus providing additional control to the user **20** over the height, the closeness and other elative position characteristics of the child **30** relative to the user **20**, as the position of the child **30** in the child-carrying pouch **120**.

[0099] Referring now additionally to FIGS. **22** and **23**, the child-carrying pouch **120** of the child-supporting harness **210** comprises an external layer **190**, a head support section **196** and an inner layer **198**. The inner layer **198** consists in a removable pre-shaped molded layer comprising rigid or semi-rigid material that may be shaped specifically to fulfil the needs of the child **30** to be carried. According to an embodiment (not shown), the pre-shaped inner layer **198** is made of memory foam, a combination of memory foam and a cover, or a combination of a rigid or semi-rigid material shaped as needed, a soft material applied over the shaped material, and a cover. According to an embodiment, the cover is removable from the combination to be washed. According to an embodiment, the shape of the pre-shaped molded layer is obtained through the assembly of sub-sections of the layer which, when assembled together according to a predetermined pattern, result in some of the sub-sections being in non-planar configurations with each other.

[0100] The head support section **196** and the inner layer **198** are adjustable relative to each other and to the outer layer **190**, allowing to adjust their positions to improve the comfort of both the user **20** and the child **30**, as to adjust as the child **30** grows. Furthermore, the head support section **196** is adjustable relative to the body-supporting portion of the inner layer **198**. The relative positioning of the different layers **190**, **196**, **198** provides a large range of possible customization of the child-carrying pouch.

[0101] According to an embodiment, the head support section **196** and the inner layer **198** define a seat supporting section and separate head supporting section part of the child-carrying pouch **120**. Accordingly, the seat supporting section (shown as the inner layer **198**) is pre-molded to substantially match a shape of a child's buttocks area.

[0102] The child-carrying pouch **120** comprises a contour area **192** made of non-stretching material, and an inset area **194** inset to the contour area **192** that is made of stretchable material. The combination of non-stretching material for the contour area **192** and stretchable material for the inset area **194** fulfills the structural characteristics necessary to hold the child **30** in a secure manner, preventing openings between the harness portion **100** and the child-carrying pouch **120** to increase as the user **20** and the child **30** move, as fulfilling adjustment requirements for a growing child **30** as distinct shapes for the inner layer **198**.

[0103] The child-supporting harness **210** further comprises e-textile comprising sensors **139** adapted to sense one or more of temperature, cardiac frequency and respiratory rate of the child **30** held in the child-carrying pouch **120**. The sensors **139**, according to an embodiment, are further adapted to sense one or more of the child's weight, the child's oxygenation level, the time spent in the carrier by the child **30**, as information on the position of the child **30** in the child carrying pouch **120** (e.g. using pressure sensors) and movements of child **30** during the time spent in the child carrying pouch **120**.

[0104] According to an embodiment, the e-textile, or more precisely the sensors **139**, are located in the head support section **196** which is adapted to be in contact with the skin of the child **30**. According to an embodiment, the sensors **139** are directly in contact with the skin of the child **30**. According to an embodiment, the layer comprising the e-textile comprises a strip **138** extending from the main area of the layer and adapted to be inserted in the clothes of the child **30** via an opening (e.g. the neck opening or the sleeve opening) with the clothes participating in maintaining the strip **138** comprising sensors **139** in contact with the skin of the child **30**.

[0105] One must note that even though the sensors **139** are illustrated localized in the strip **138**, other and/or alternative locations where the sensors **139** may be used to collect information from the child **30**. The illustrated location in the strip **138** (FIG. **23**) reflects a particular embodiment wherein the sensor-bearing component is moveable and furthermore possible to attach to ensure contact to the child **30**. Such an embodiment is exemplary and should not be construed as limiting the taught embodiments.

[0106] According to an embodiment, different sensors **139** are located at different locations of the child carrying pouch **120**, the different sensors **139** providing similar information and complementary information that combined together provide useful data (e.g. pressure data combined to provide weight and position data). The collected data, regardless their nature, can therefore be used to participate in a m-Health process.

[0107] According to an embodiment, sensors **139** are electronic components embedded in the textile of the child carrying pouch **120** and are connected to user-owned electronic devices, devices specific to the monitoring process, or other components. According to an embodiment (not shown), touch buttons are constructed completely in textile forms by using conducting textile weaves, which are then connected to devices that are mounted on woven conducting fiber networks to form, for example, displays.

[0108] According to an embodiment, sensors **139** printed in the textile for both physiological and environmental monitoring are integrated into the textile of the child carrying pouch **120**, for example cotton, polyester, nylon, Gore-Tex™, and neoprene. Therefore, accordingly, the sensors **139** are embedded in the yarns of at least some of the textiles composing the child carrying pouch **120**.

[0109] According to an embodiment, the e-textile comprises components adapted to transform vibrations resulting from movements of the user **20** into power to recharge the power source powering the sensors **139**.

[0110] According to an embodiment, the child-supporting harness **210** comprises, located according to one embodiment about one of the shoulder straps **110**, a signalization device, e.g. a haptic component **140** which is, according to one embodiment, a vibration device **142**. The haptic component **140** comprises components for communicating with one of the e-textile and a monitoring device **222** and to enter in an alarm mode when the sensors of the e-textile are monitoring conditions that meet an alarm criterion, or in other words are out of, above, or below, an acceptable range. For instance, the out-of-range data may comprise a respiratory rate out of acceptable range (too fast or too slow), a temperature out of acceptable range (too high or too low), and a cardiac frequency out of acceptable range (too fast or too slow). Further analysis may comprise combination of data out of acceptable range, or sudden changes in the monitored data, with the acceptable range limits being set accordingly.

[0111] According to another embodiment, the signalization device comprises, alone or in combination with the haptic component **140**, a lighting device generating a light signal, and a speaker generating a sound signal. Accordingly, the signalization device generates a signal detectable by the user **20** to be informed of an entry in the alarm mode.

[0112] According to one embodiment, a processing component **226**, for example a printed circuit board or PCB, is embedded with the sensors or the haptic component **140**. The processing component **226** comprises a power source **224** and a memory **228** to store and process monitored data, and to trigger an alarm condition based on the processing of the monitored data. Accordingly, upon trigger of an alarm condition, the haptic component **140** would operate to transmit a signal recognizable by the user **20**, for instance the vibration produced by the vibration device **142**.

[0113] According to one embodiment, the sensors and the haptic component **140** are connected through wires to be interconnected when coupling the fixations **180**, **182** or embedded in the fixations **180**, **182** themselves. According to an embodiment, the sensors and the haptic component **140** are communicating wirelessly.

[0114] Referring additionally to FIG. **24**, according to an embodiment the e-textile comprises communication components **230** enabling the e-textile to communicate monitored data to a monitoring device **222** (e.g. a smart phone) with a program **232** (e.g. an app) designed to receive the monitored data from the e-textile, store the data, and process the data. According to embodiments, the monitored data, or diagnostic data (processed monitored data) are available for the user **20** and health professionals to detect medical conditions of the child **30** and therefore be used to participate in a m-Health process. According to an embodiment, the haptic component **140** receives alarm condition signals from the monitoring device **222**.

[0115] Referring now to FIGS. **25-29**, another embodiment of a child-supporting harness **310** comprises a harness portion **100** and a shawl **116** shaped in a particular configuration to provides the functionalities of the child-carrying pouch **120**. The shawl **116** is secured to fittings **118** (see FIG. **29**) to be secured to the harness portion **100**. In order to shape the child-carrying pouch **120**, the user **20** attaches a first part of the shawl **116** to a first fitting **118** secured to the harness portion **100**, and afterwards attach subsequent parts of the shawl **116** to other fittings **118** as illustrated on FIGS. **27** and **28** (wherein the arrow is illustrating a normal course of the shawl **116** when attached to the harness portion **110**). The last section of the shawl **116** to be attached passes in the slot **176** on one side of the user **20**, about the crossing to the pectoral portion **170** of the shoulder strap **110** with the torso strap **172**. The last passage of the shawl **116** in the slot **176** blocks the final portion of the shawl **116** in place.

[0116] Referring particularly to FIG. **29**, the fittings **118** used with a shawl **116** differ from the complementary fixations **182** used in relation with the previous embodiment while, according to an embodiment, being compatible with the latter. In embodiments, the fittings **118** further vary depending on the shawl **116** being attached to them at the beginning if its course or further during the attaching process. For instance, the illustrated fitting **118** on FIG. **29** comprises a strap **119** comprising a complementary fixation **182** (see FIG. **19**) to be secured to a base fixation **182** (see FIG. **19**).

[0117] According to embodiments, the shawl **116** comprises a series of layers and/or sections specifically designed for specific requirements. According to embodiments, some sections of the shawl **116** are reinforced while other section are designed with removable layers.

[0118] According to embodiments, the harness portion **100** is adapted to be used with distinct embodiments of child-carrying pouch **120**, for example the one illustrated as part of the child-supporting harness **210** and the shawl **116** part of the child-supporting harness **310**. The harness portion

100 is designed to adapt to the different weights and sized of the child **30**, thus allowing a user **20** to select the best child-supporting compartment **120** as the child **30** grows older, the structure and fixations **180** of the support portion **100** being adapted for such a variety of conditions. It must be noted that components such as the power source **224**, the processing component **226**, the memory **228**, the communication component **230** and the program **232** are illustrated part of the monitoring device **222** on FIG. **24**, one must understand that, depending on embodiments, one or more of the above-identified components may be present in or in combination with the haptic component **140** and/or the e-textile, therefore providing a different level of autonomy to the component and allowing distinct communication channels as discussed herein before. Thus, locations of components as shown on FIG. **24** are a non-limiting example of combination and should not limit the scope the teaching of the present document.

[0119] It must be noted that, according to an embodiment, the textile selected to compose the child-supporting harness **10**/**210**/**310** are selected to be easy to clean, to be adapted for contact with the body of the user **20** and of the child **30** and therefore to be able to breath, to be in good part possible to dislodge from the fabric some parts less adapted to be cleaned (for example not adapted to be cleaned in a washing machine) with the other fabric able to be cleaned according to standard maintenances processes (such as in a washing machine). Some parts are able to be separated and to be secured together after a cleaning process to ease the cleaning process and/or the drying process.

[0120] While preferred embodiments have been described above and illustrated in the accompanying drawings, it will be evident to those skilled in the art that modifications may be made without departing from this disclosure. Such modifications are considered as possible variants comprised in the scope of the disclosure.

1. A child-supporting harness comprising:

a harness portion comprising:

a dorsal member having an upper section and a lower section;

a waist strap depending from the lower section of the dorsal member;

a pair of shoulder straps depending from the upper section of the dorsal member;

a pair of torso straps selectively attached to the dorsal member between the upper section and the lower section thereof; and

a child-carrying pouch releasably secured to the harness portion.

2. The child-supporting harness of claim **1**, wherein the pair of torso straps is selectively attached to the dorsal member at a position which is adjustable between the lower section and the upper section of the dorsal member.

3. The child-supporting harness of claim **1**, wherein each torso strap of the pair of torso straps crosses a corresponding shoulder strap of the pair of shoulder straps.

4. The child-supporting harness of claim **3**, wherein one of the shoulder straps and the torso straps comprise a slot, with the other of the shoulder straps and the torso straps passes through the slot when crossing each other.

5. The child-supporting harness of claim **1**, wherein each torso strap of the pair of torso straps comprises a free end which is unattached to other parts of the harness portion.

6. The child-supporting harness of claim **5**, where the free end of each torso strap of the pair of torso straps comprises a base fixation used to releasable secure the child-carrying pouch.

7. The child-supporting harness of claim **1**, wherein the child-carrying pouch comprises a seat support section and separate head support section.

8. The child-supporting harness of claim **7**, wherein the seat support section is pre-molded to substantially match a shape of a child's buttocks area.

9. The child-supporting harness of claim **7**, wherein the separate head support section is adjustable at least in height relative to the seat support section.

10. The child-supporting harness of claim **1**, further comprising sensors for sensing a biometric parameter of a child in the child-carrying pouch.

11. The child-supporting harness of claim **10**, further comprising a strip comprising the sensors for contacting the skin of the child when in the child-carrying pouch.

12. The child-supporting harness of claim **11**, wherein the head supporting section comprises a main area and the strip, the strip extending from the main area and comprising the sensors, wherein the strip is for contacting the skin of the child when in the child-carrying pouch.

13. The child-supporting harness of claim **10**, further comprising a signalization device located in the harness portion and in communication with the sensors, the signalization device generating a signal when at least one of the temperature, the cardiac frequency and the respiratory rate meets an alarm criterion.

14. The child-supporting harness of claim **13**, wherein the signalization device comprises one of a vibration device generating a vibration signal, a lighting device generating a light signal, and a speaker generating a sound signal.

15. The child-supporting harness of claim **14**, wherein the vibration device is located in at least one of the shoulder straps.

16. The child-supporting harness of claim **1**, wherein the dorsal member comprises one of rigid material and semi-rigid material.

17. The child-supporting harness of claim **1**, wherein the dorsal member comprises a first section and a second section, and a length, and wherein the first section is adjustable relative to the second section to adjust the length of the dorsal member.

18. The child-supporting harness of claim **1**, wherein the harness portion comprises a front and a back which respectively correspond a front and a back of a user wherein the child-supporting harness further comprises additional base fixations located on the front and on the back of the harness portion, thereby allowing the child-carrying pouch to be secured both to the back and to the front of the harness portion.

19. The child supporting harness of claim **18**, further comprising another child-carrying pouch releasably secured to the harness portion, thereby resulting in having one child-carrying pouch releasably secured to the front of the harness portion and the other child-carrying pouch releasably secured to the back of the harness portion.

20. The child-supporting harness of claim **1**, wherein the child-carrying pouch comprises a seat supporting section and a sitting-width about the seat-supporting section,

wherein the child-carrying pouch comprises an adjusting means to adjust the sitting-width of the child-carrying pouch.

21. (canceled)

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摘要(译)

儿童支撑安全带包括安全带部分和儿童携带部分。 线束部分包括背部件，该背部件具有上部和下部； 腰带从背部的下部伸出； 一对背带从背部件的上部悬垂； 一对躯干带，选择性地附接到其上部和下部之间的背侧构件。 携带儿童用的袋可释放地固定到背带部分。