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- (73) Patenthaver: **Olariu, Monica Rodica, Residing in Comuna Floresti , Tautului Street No. 21 G. , Ap. 1, Jud. Cluj, Rumænien**
- (72) Opfinder: **Olariu, Monica Rodica, Residing in Comuna Floresti , Tautului Street No. 21 G. , Ap. 1, Jud. Cluj, Rumænien**
- (74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**
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DESCRIPTION

Field of the invention

[0001] The submitted invention, makes reference to babywearing systems comprised of multi-adjustable mechanisms, and in particular child carriers comprised of multi-adjustable mechanisms, which allow the adjustment of both the length of the supportive back panel and the shoulder strap to which it binds, attached to the body of the wearer (either by a hip, front or back carry with crossed or parallel straps) as well as the child's sitting position, with the main purpose of providing the proper ergonomic position of a child.

Current state of the invention

[0002] The benefits of an adjustable baby carrier are not questioned since recently technology development tends to adapt to the medical reasoning throughout the natural growth of the child worn. In the present days, many different carriers have been presented to the consumers, all of them trying to bring up solutions for the quick changes that overcome to a child's body in his first years of life, for example the baby carriers of US 8 172 116 B1, US 2011/011902 A1, and DE 20 2016 103901 U1.

[0003] In consequence, the market has developed, and a wide range of baby carrier can be nowadays found. Thus, most of the solutions presented nowadays are unsatisfying due to either a lack of simplicity in the carrier's use, or due to a lack of proper adjustability mechanisms.

[0004] This novel solution complements the current technique in this specific field, which has yet to offer a complex system with multi-adjustable functions. Several partially-adjustable solutions are already known, but no prior solutions have provided adjustable systems for different physical aspects of a child's body configuration (height, weight, age), all together, as well as for the wearer's body type and built, while respecting the well-established medical principles and ergonomic rules.

[0005] There are several child-carrying systems in the patent literature. The solutions presented until now show carriers with different adjusting systems, either complicated to use or only partially adjustable.

[0006] As far as the adjustability of the carrier's seat goes, the technical details are limited, thus there is no proper support for the anatomical position of a child, for a longer period. Some of the solutions presented include, for the adjustment of the seat of the baby, a separate item, also known as a "baby insert", that might be attached to create a smaller sitting for the carried baby or child. In this version, the seat adjustment system is, in fact, an additional element of

the wearing system and not an inseparable functionality. Practically, with an "insert system", the carrier's body is not reduced, but inside it, there is inserted an element that allows the child to be placed in a new "receiving body" attached to the supportive back panel. Therefore, the adjustment is staged and can only be made at the child's sitting position in two points, namely: by using the adjustable element, the reception will be optimal for a small baby; in addition, depending on its constitution, this element may or may not be appropriate from a certain age. In the second possibility, the "insert" adjustment element will be elevated, with the baby carrier's receiving body, the supportive back panel, being the standard size, allowing the child to be placed in an "ideal" constitution, but this only in abstract, without allowing it to adapt the size of the seat or depending on its real dimension (and thus without allowing ergonomic support from one knee to another).

[0007] Therefore, in the proposed enquiry, disclosed in the patent EP 2 148 594, in which an additional piece is required, named by inventors as an "insert" to suit smaller children, the adjustment is achieved only for two stages of a child's development, hence the child might be too big to be correctly positioned with an insertion system as well as too small to be ergonomically carried without it, preserving the initial foundation of the carrying system.

[0008] For other known systems, as in the case of the utility model DE202016103901, the seat adjustment is made by means of a circular tube surrounding the belt at the waist. This feature can slide on the belt, can be tightened, extended and attached through a Velcro system. This system, as presented, though, has several disadvantages. Without having a fixed point on the waist belt of a minimal size, the adjusting can be performed even by exceeding a minimum limit. Consequently, the ergonomics and the safety of the child might be affected, if the adjusting is not correctly performed. There might be a risk of the child falling from the system, when too much space is formed between the wearer's body and the child's lumbar support panel, due to a very narrow seat adjustment.

[0009] In this case, since the shoulder strap is connected to the waistband, the space between the support panel and the wearer's chest can be of such a size, so that it can increase the risk of the child falling.

[0010] Additionally, the fitting can only be made up to a maximum size equal to the width of the seat, which may result into a faulty ergonomics for older children.

[0011] Some recent carrying systems present an adjustable ribbed base with a tightening ring/tunnel system but without any fastening system. The tightening ring/ tunnel system has been known now for the last few years, The lack of a fastening system after adjusting the tunnel system, meaning the sitting base, in such carrying systems presents big disadvantages and security issues. Therefore, when the child is placed in, the adjustment will not resist. Since it does not have a fixing point, the material will be tightened under the pressure of the child's legs and will no longer be placed in the correct squat ergonomic position. This type of system was attempted by the undersigned inventor before creating the first adjustable carriers in March 2012. By multiple testing, we have concluded that an adjusting sitting that doesn't

include a fixing mechanism cannot ensure the ergonomic spread-squat position nor the entire safety of the child.

[0012] Some of the known solutions present folds to the receiving body for back and back support, consisting of a natural way of adjustment of the back-support material to the baby's back. The reason for these folds is not, however, an adjustment of the child's seat, but its reasoning is to create a "bag shaped" type of back support panel. Therefore, the folds do not influence in any way the adjustable seating/width of the receiving body / supportive back-panel. The folds are a fixed element, a stitch made from designing the system and cannot contribute to the real adjustability, meaning a manual transformation of the back-support panel.

[0013] Other baby carriers present a simple adjustment made on the system of "accordion". Thus, in this case, the adjustment is made over the entire length of the dorsal panel and not just by the base. Therefore, the widening is of the type of a "hammock", where the ends of the bearing remain the base with the waist belt and the end with the shoulder straps. As a result, in no way will the saddle be adjusted to respect the child's ergonomics and correct position, namely the spread squat position required in the case. Considering the anatomy of the child and the fact that the spread squat position requires that the baby should be placed with his knees higher than the bottom, the baby must be seated in a bag-shaped supportive back panel. A very small and fixed seat base will not allow an ergonomic carrying. Moreover, this sort of system doesn't usually include any fastening element. Consequently, even if the lateral folds might be extended, the base cannot be kept to a certain size ensuring the correct anatomical position of the baby being worn, as explained *supra*.

[0014] Some other known solutions have presented a system with seat-flaps that can be either removed completely to create a narrow seat or fixed in place to widen the seat, also in regular and prior-determined stages. This solution might be inadequate adaptive for every child's configuration and size.

[0015] When it comes to the length of the back-support panel, as shown down below, many of the proposed solutions that can be found on the market today are only partially sustainable and that is because of the limits they present. For instance, some of them include an extensive panel composed by a larger panel including a part of the material that can be folded and fixed in place by a zipper, an added material or a diagonal folding system. All these solutions might be inappropriate when it comes to using the same child carrier throughout a baby's growth until toddlerhood since they can only present partial adjustments hence they can't allow the adjustability to the exact dimensions of the child being worn.

[0016] One known system has incorporated a panel that is adjustable in height and permits the child's back support to be adjusted in two steps, solely by the presence of a zipper that opens or closes this panel. Therefore, the suitable size for a baby carrying system can only be found and permit to properly attain the curved C-spine position in two stages of a child's development: when the baby is small enough to fit the carrier having a closed panel, as well as when his bigger size due to growing allows to facilitate proper back support while extending the

back panel. The fact that there is no intermediate solution, proves that in certain situations, the back-support panel is not able to adjust to a suitable size for the carried child.

[0017] Additionally, the versions in which the adjustability is achieved by means of oblique clamping systems, forming a V at the back of the child, have the disadvantage of reducing the panel only on the sides, without really being adapted to the size of the carried child.

[0018] Other systems provide an adjustable mechanism that, such as the mechanisms for the sitting, don't come with a safety element consisting of a minimum size to which the carrier can be adjusted to. Therefore, if lack of attention or misunderstanding of strict instructions of use by the carrying person, the carrier might engage accidents such as back injury of the child due to minimum adjustments.

[0019] Regarding the adjustability of the strap, the current technique discloses a few acceptable adjusting systems, without providing a simple solution for its simultaneous adjustment with the back-support panel. Furthermore, none of the noted systems, display possibilities regarding the shoulder strap adjustability in three different points.

Problem solved by the invention

[0020] The objective of the proposed invention ought to provide a carrying system with a long-term functionality, which adapts to the progressive growth of the child, to carrying in different situations, as well as to any user / wearer regardless of size, height and weight.

SUMMARY OF THE INVENTION

[0021] The invention is defined by independent claim 1. Further embodiments are disclosed in the dependent claims.

[0022] A principal object of the invention is to provide a new and improved multi-adjustable child carrier device, capable of being used simply, with one-handed operations for adjusting its dimensions in order to welcome small babies and/or toddlers or pre-schoolers, with neat design and incorporating mechanisms 19, 20, 21, 4 for extending or narrowing the carrier's dimensions (Fig. 7, Fig. 8, Fig.9).

[0023] According to the invention, the child carrying system solves the technical problem and overcomes the disadvantages mentioned above, due to the carrier's back support panel with adjustable length and multiple strap adjustment systems, to which it binds, simultaneously or separately, as well as the multi-adjustable seat width, made of a by a might be lined belt and attached cylinders.

[0024] The above-mentioned belt comprises several elements, preferably four, which allow the adjustability of the seat width, in order to ensure the accurate ergonomic position of a child, as defined below.

[0025] The proposed solution, adjusting the width of the base on the belt and keeping the folds as fixed stitches above this, allows for the creation of a "seat" that can achieve the main function: receiving a child in an ergonomic position, where the knees are higher than the bellows, therefore the adjustable base should be narrower than the material that includes the knees of the baby from one knee to another, otherwise risking that ergonomics is not respected.

[0026] The strap adjustment is carried out in several directions, either by adjusting the lower side of it, fixed or detachable from the lumbar support panel (Fig.7, Fig. 10), as well as by adjusting the opposite side, through a belt webbing or any other similar system (Figure 11, Figure 12) in two different points, at both ends of the system.

[0027] To adjust the shoulder strap, the tightening can be performed in several ways, as follows: by gripping the upper end of the webbing and pulling it towards the front, during a front carry (Fig.4, Fig.12), as well as by gripping the lower end of the webbing and pulling it down by tightening both ends / straps, emerging from both sides of the buckle, located on the wing, if the buckle is double adjustable.

[0028] These natural movements are made possible, due to the presence of a construction element (e.g., a buckle, a pair of D rings etc., but not just limited to these), allowing the webbing to pass through one eye and to adjust its orientation towards the initial position, as opposed to the starting one. Thus, whatever the carrying technique (front, back or hip carry) or the position of the shoulder straps may be (parallel Figure 14.1, crossed Figure 14.2), the adjusting maneuver will always be for the wearer, a natural, convenient and intuitive one. He/She will be able to adjust the length, to tighten or pull the strap everywhere, without having to remove the entire carrier system or ask for help from a third person.

Advantages of the invention

[0029] By submitting the invention, we ensure a child carrier with the following benefits:

- allows correct ergonomics for both the child and the wearer throughout the carrying experience;
- due to its multi-adjustable elements, it adapts to both the progressive growth of the child, as well as to any users / wearers regardless of their size, height and weight.
- may be effective to different body shapes and types, to be adapted to babies, toddlers and preschoolers, or any other age range;
- may be adapted without the need of additional elements or accessories such as baby inserts or other;

- offers a system with a long-lasting functionality;
- facilitates the use and wearing of a baby carrying system;
- may be relevant to any carrying system, containing a central panel that can be resized by concurrent multiple adjustments;
- may be used for front-carry, back-carry or hip-carry, without the need of additional elements;
- is easy to manipulate, it doesn't include any rigid structures, nor additional parts so that its use remains simple and intuitive and its look neat and aesthetic;
- because of its simple adjusting mechanisms, the components can easily be replaced in case of malfunction.

[0030] The novelty and the usefulness of the presented solution are to be described in detail herein. The solution presented herein includes one or more adjustment systems which adapt to allow the welcoming of a new-born as well as for a pre-schooler, using the same carrying system, and without the need of extra material or additional accessories.

[0031] Further benefits and advantages of the present invention will become apparent after reading the detailed description with appropriate reference to the accompanying drawings.

[0032] We acknowledge any conventional system by using the phrase "any system", for children and not only, that are not limited to baby carriers, onbu, onbuhimo, mei-tai, half buckle carrier and/or any other combination of the above-mentioned systems.

[0033] According to the invention, further prototypes are provided, although not limited to the stated model, with regard to the attached drawings. In the drawings:

BRIEF DESCRIPTION OF THE DRAWINGS

[0034]

Fig. 1 represents the carrying system where:

Fig. 1.1 represents the carrying system, one of the prototypes, as viewed from the front, stretched on a flat surface, where the outward cylinders are not attached to the support panel

Fig.1.2 represents the carrying system, one of the prototypes, as viewed from the front, stretched on a flat surface and where the outward cylinders are attached to the support panel via a hook and a loop

Fig. 2 shows the spatial representation of the carrying system, where:

Fig. 2.1 shows the carrying system, as in in Fig.1.1, but seen as a spatial representation

Fig. 2.2 shows the carrying system, as in Fig.1.2, but seen as a spatial representation

Fig.3 variations of the carrying system, like onbu, not limited though to onbu, or to any other similar systems where:

Fig. 3.1 shows the carrying system according to the invention, front-facing view, stretched on a flat surface.

Fig. 3.2 shows the carrying system, front-facing, stretched on a flat surface with the buckles fastened.

Fig. 4 variations of the carrying system, onbu style, but not only limited to onbu

Fig. 5 presents variations of the half buckle carrier system, not limited to it though, or to any other similar system, viewed from a frontal position, when stretched on a flat surface, where:

Fig. 5.1 are variations of the half buckle carrier system, but not limited to it, front-facing on a flat surface with the adjusting panel system

Fig. 5.2 are variations of the half buckle carrier system, not limited to it, facing forward, when stretched on a flat surface and without an adjusting panel system Fig. 6 variations of the half buckle carrier system, not limited to it, or to any other similar system, representation during carrying where:

Fig. 6.1 variations of the half buckle carrier system, not limited to it, or to any similar system, representation during carrying, with the adjustable panel system

Fig. 6.2 variations of the half buckle carrier system, not limited to it, or to any other similar system, representation during carrying, without the adjustable panel

Fig. 7 - uses of a multi-adjustable panel system, without being limited to it, where Fig. 7.1 - double adjuster adjustment

Fig. 7.2 - string adjustment

Fig. 7.3 - double buckle adjustment

Fig. 7.4 - two simple adjusters adjustment

Fig. 7.5 - D-ring adjustment

Fig. 7.6 - Velcro adjustment

Fig. 7.7 - Creased string adjustment

Fig. 7.8 - adjustment through combined ways - creasing string and simple adjustment

Fig. 8 - variations, not limited to, the adjustable seat, consisting of three cylinders where:

Fig. 8.1 - Two of the three cylinders are completely detachable and not attachable to the panel

Fig. 8.2 - None of the three cylinders are detachable

Fig. 8.3 - Two of the three cylinders are completely detachable and attachable to the support panel via a hook and loop system

Fig. 9 - ways to adjust the seat size, where:

Fig. 9.1 - seat adjustment is performed by tightening the center ring around the seat belt.

Fig. 9.2 - extending the seat by stretching the center ring around the seat belt

Fig. 9.3 - additional extended adjustment by attaching detachable outer cylinders that are completely detachable and not attachable to the support panel

Fig. 10- rendering simultaneous adjustments of the panel's height and the strap during breastfeeding where:

Fig. 10.1 - closed breastfeeding strap, closed panel

Fig.10.2 - open breastfeeding strap, closed panel

Fig. 10.3 - open breastfeeding strap, extended panel

Fig. 11 -rendering of the double adjustable strap comprised of webbing

Fig. 12 - mechanism for strap adjustment from webbing, through natural ergonomic movements

Fig. 13 - quick attach buckle

Fig. 14 - ways of positioning the straps, not limited to them, where:

Fig. 14.1 - positioning with parallel straps (H), front or back

Fig. 14.2 - positioning with cross straps (X), back

Fig. 15 - ways of positioning and carrying the child, where:

Fig. 15.1 - hip position, front view

Fig. 15.2 - hip position, back view

Fig. 16 - correct dorsal support of the child's neck, when he does not have well- developed neck muscles; source: google

Fig. 17 - correct anatomical position of the child's back, C curved, source: School of Babywearing UK manual course

Fig. 18 - the correct anatomical position of the child's sitting and knees, position M; source: <http://hipdysplasia.org>

Fig. 19 - Outward cylinders attaching system where:

Fig. 19.1 - hook

Fig. 19.2 - loop

Fig. 19.3 - hook and loop attached

Fig. 20 - hiding pocket for the hook

Detailed description of the invention

[0035] According to the invention, as shown in Figure 1.1, Fig. 1.2, the carrier system shows an object consisting of several elements, fixed or detachable, having two or even one shoulder strap 1 which can be attached to the wearer, to provide the carrying of a child or of something else, between the supportive back panel of the system 2 and the wearer's body.

[0036] The system has a minimum wearable height of the back-support panel 2, determined by the positioning of the double adjuster 19 and the length of the anti-tearing webbing 9, calculated such as to permit its adjustability so that the child is to be worn in complete safety.

[0037] In one embodiment, the system can include multiple or single adjustment mechanisms that allow the back-support panel 2, the sitting 21, as well as the straps 1 to be reduced or extended, according to the child's real body configuration and dimensions.

[0038] The back-support panel's height 2 might be adjusted using a two-ways adjuster 19 able of reducing the length by its mechanism consisting in one anti-tearing webbing 9 firmly and permanently attached to the back support panel 2, upper middle part, on both sides of the back support panel 2. The webbing 9 is then passed through the adjusting mechanism 19 which allows the user to tighten/lower the panel 2 by folding it once the adjusting mechanism 19 is pulled. Because the webbing's strategical fixed position on the back-support panel 2 in two different points, the back support panel 2 itself will tighten by the folding movement. This mechanism might be realized using other systems than a webbing, such as string adjustment Fig. 7.2, double buckle adjustment Fig. 7.3, two simple adjusters' adjustment Fig. 7.4, D-ring adjustment using webbings Fig. 7.5, Velcro adjustment Fig. 7.6, Creased string adjustment Fig. 7.7, adjustment through combined ways - creasing string and simple adjustment Fig. 7.8, or any other similar system using the same principle.

[0039] The multi-adjustor 19 allows the extension or narrowing of the shoulder straps 1 by repeating the same move and system used to narrow and extend the height of the supporting back panel 2. One anti-tearing webbing 9 is fixed in one upper part of the strap 1 and passed through the adjusting mechanism 19 such as to allow the folding of the strap 1 once the

adjuster 19 is activated. By pulling up the adjuster 19, the webbing will action over the strap 1 and therefore tear it to allow its folding. By detensioning/easing the adjuster 19, the webbing 9 will be released and the strap 1 unfolded, therefore extended.

[0040] The double adjusting system's importance 19 is figured by the wearer's need to adapt the carrying system for the child being worn, as well as for the wearer itself. Ruled by principles of ergonomics, if lack of such an adapting system 19 allowing the adjustability of the height of the back support panel 2 and in the same time of the breastfeeding strap 1, ergonomics of the child being worn might not be respected. For example, if a carrier would present only adjustability of the height of the back support panel 2, while wearing a small child by a small wearer, if the strap 1 is impossible to be adjusted, adjusting only the height of the panel 2 will cause the lowering of the supportive back panel on the child's back which will result in a lack of ergonomic back support for the child's back, to its neck level (Fig. 16).

[0041] In the herein inventive solution, when adjusting the height of the back support panel 2 and the length of the breastfeeding strap 1, the wearer will generally manipulate a one-handed operation by pulling the webbing 9 upwards. This one-hand operation is possible by using a multi-adjusting mechanism 19 which's manipulation remains ergonomic and natural. On the other hand, by incorporating this device 19, the adjusting of the baby carrier's dimensions will remain ergonomic as well as aesthetic since the adjusting mechanism 19 doesn't imply multiple elements nor multiple webbings positioned one above another, but one single mechanism 19 with multifunctional utilities. The used multi-adjustable mechanism 19, such as presented herein, can be easily replaced in the event of a malfunction, without engaging complex manoeuvres.

[0042] The plurality of sitting adjustments 21 allows, at all stages, the ergonomically correct spread squat position, no matter the dimensions of the child being worn. All configurations adapt to support a child.

[0043] The herein mentioned sitting adjustments 21 consider the use of a plurality of elements 4, described herein as cylinders 4.1, 4.2 which, folded around the waist belt 3 and presenting a fixing mechanism such as, for example, a Velcro, allow the sitting's 21 width to be enlarged or narrowed. If a Velcro is used, this will be fixed after rippling the cylinder 4 around the waist belt 3 horizontally (Fig. 9.1). The rippling may be regulated as much as needed and the Velcro fixed at the needed point (Fig. 9), one part of the Velcro being fixed on the inner side of the waist belt 3 and the other one on the inner side of the cylinders 4.1, 4.2.

[0044] To extend the sitting 21 for pre-schoolers, outer cylinders 4.2 might be attached to the back support panel 2 by a hook 25 and loop 26 (Fig.1.2) system in a third layer forming an inside pocket 27 of the back support panel 2, and fixed on the waist belt 3 by a Velcro system, such as described supra for the main cylinder 4.1. The outer cylinders 4.2 allow the textile to be extended or they might be also rippled by the fixing method of the Velcro (Fig. 9.3) in order to create a narrower sitting 21.

[0045] Outer cylinders 4.2 in the herein invention are predisposed to be completely removed and attached via a hook 25 and loop 26 system when needed (Fig. 1.2). The complete removal of the outer cylinders 4.2 is very important and it's demanded for wearing small babies otherwise the sitting textile 21 would be bulky and its thickness would determine a non-ergonomic positioning of the wearing child and his discomfort. Each element of the herein invention has been tested and calculated such to ensure all specific elements' safety and the rules of ergonomics. Therefore, the fixing spot of the hook 25 on the supportive back panel 2 is realized in a specific place, exactly where the strap's webbing 9 is fixed in the back panel 2. This is argued by the gravity point and the traction forces actioned over the supportive back panel 2 under the child's weight. Therefore, since the webbing 9 can only be fully tensioned in the middle part of the back support panel's height 2, that is the only spot where the outer cylinders 4.2 could be attached with the hook 25 and loop 26 system (Fig. 1.2) so as to still be rippled if needed, as well as to be held in place in such a way to allow the spread squat position of the wearing child.

[0046] None of the solutions currently known is designed in such an easy manipulation manner. Many are sophisticated to use, multi-handed operation which is cumbersome and undesirable, especially for a child carrying system intended to facilitate a mother's daily life.

[0047] Embodiments described in the solution that we're bringing upwards provide satisfying advantages over prior baby carrier so as disclosed by the actual development. Hence, the solutions proposed are ergonomic and ensure the correct spread-squat position of a baby since the seat 21 has the capacity to gradually adjust to a growing baby from new-born to toddlerhood and even pre-schooler, while it ensures a correct back support, allowing it to maintain the natural C curve of the spine, despite the growing process, due to the double adjustments mechanism 19 of the back-support panel.

[0048] All variations of the presented solution provide an adjustable seat 2 1 which does not require any additional structure, therefore they can accommodate newborns and toddlers at the same time. All solutions allow an ergonomic support of the child's bottom, pelvis, and thighs.

[0049] The novelty of this carrier does not stop at its adjustments, but it also follows a simple-to-use and light construction. The carrying system doesn't include any rigid structures, nor additional parts so that its use remains simple and intuitive.

[0050] Furthermore, the carrying system contains a body support panel 2, which can be square, rectangular, trapezoidal, oval or any other alternative to these forms, serving to support the child's body when in close proximity of the wearer's body. The back-support panel 2 includes a bottom edge that is securely fixed into the upper edge of the waist belt 7.

[0051] In the main embodiments of the carrying systems, the supportive back panel 2 is intentionally designed in a rectangular shape for security, ergonomics and technological reasons. Comparing to other baby carriers, the proposed solution considers the importance of

ergonomics. Therefore, if a supportive back panel 2 is, for instance, trapezoidal, with the narrow base attached to the waist belt 7, so as presented already in one known carrying system, the spread-squat position of the child will be difficultly attained, and that is because of the human body constitution. Consequently, in order for the spread-squat position (also known as the knee-to-knee position) to be attained, the sitting 21 support must be wide enough.

[0052] For the same reason, the main embodiments of the carrying system don't consider an adjusting mechanism of the width of the upper side of the supportive back-panel 2. One version of the systems could though present a width of the upper side supportive panel if this is designed so as to allow a minimum safety adjustment. This refers to that the child won't be exposed to a "hammock" type of carrier consisting in a narrow adjustment. in the upper part of the supportive back panel 2 and a narrow adjustment in the sitting 21 part of the supportive back panel. This kind of "hammock" adjustments not only won't ensure the safety of the child, but they won't be ergonomically either.

[0053] At the top of panel 2 there are some straps positioned, one, or more, preferably two straps 1. If two straps are present, they are placed at the top end of panel 2, one on the left side and the other on the right side, in a vertical position. These straps can be permanently attached to the back-support panel 2 at one single end 8 having the 2nd one free at the other end. As a different option, the straps 1 can be detached from the dorsal support panel at its extreme upper points.

[0054] In one of the prototypes, the straps 1 are permanently attached to the dorsal support panel2.

[0055] As a different alternative to the invention, the straps 1 and a part of webbing 9, although not limited to these, can be made of a lined fabric part. Some options, for example, in mei-tai onbu (Fig. 3, Fig. 5) onbuhimo, half buckle (Fig.5), and not only, can the straps only be made from fabric, which may even be partially lined.

[0056] Some other adaptations show that, the side permanently attached to the support panel 2 may be the fabric part 8. An entire anti-tearing webbing can be attached to the middle of the strap and fastened at tension points, without being sewn on its length on the right, left side.

[0057] The free end of the lined part may be attached to the part formed only by the webbing 9. Between these two elements there can be found a "linking" element 20, which allows the webbing size adjustment (Fig.11, Fig.12). The adjustment can be made by tightening and releasing. This is possible due to the presence of the linking element, designed so as to allow the webbing to pass through one eye and return to its initial position in order to continue the direction from which it actually started without returning in the opposite direction. Therefore, for gripping it is more than enough to pull the strap in the direction of its orientation, enabling the ergonomics of the wearer. Unlike the adjustable elements through which the webbing is turned in the opposite direction from which it starts, the gripping would require an uncomfortable maneuver, whereas in the presence of this element 20, the adjustment is very intuitive and

convenient.

[0058] At the free end part, formed only by the webbing 9 (opposite to that shown at the above point) there is a merging system 10, which may be in the form of a buckle, for example, but not only, which allows it to be attached to the shoulders/ back of the wearer (depending on the chosen grip position, on the front, back or on the hip), regardless of the straps position (parallel Fig. 14.1, crossed 14.2) and it also allows to merge either to the dorsal support panel 2, on the side (Fig. 12) or to the waist belt cylinders 4.2 (Figure 2.1).

[0059] In this particular case, gripping and releasing of the strap 9 is accomplished through two natural and intuitive maneuvers, due to the presence of the element 10 which allows the webbing to turn in the opposite direction as opposed to the one from which it has started.

[0060] The solution presented herein allows the accommodation of children despite their body configuration and size, from newborn to pre-schooler, in multiple carrying positions (front carry, back carry, hip carry) Fig. 14, Fig. 15 and always ensuring the ergonomics of the child, by using technical solutions such as a multi-adjustor 19 for enlarging (Fig. 10.3) or limiting (Fig. 10.1, Fig. 10.2) the back support panel 2, a multi-adjustor 19 for enlarging the strap 1 (Fig. 10.1), or narrowing it (Fig. 10.2, Fig. 10.3), cylinders 4 and outer cylinders 4.2 for widening and narrowing the sitting 21 of the carrier, fixed in place usually with a Velcro mechanism.

[0061] According to the invention, the carrying system enables children to be front carried, close to the wearer's chest, with the straps 1 positioned in a parallel configuration, backwards (Fig.14.1) or with the straps 1 positioned in a crossed configuration, forming an X on the back of the wearer (Fig. 14.2).

[0062] Moreover, both a back carry can be performed when the straps 1 are front-facing and in a parallel position, as well as a hip carry of the child, when one of the straps 1 surrounds the wearer's torso (Fig.15.1, Fig.15.2).

[0063] Also, other options show that the straps 1 can be directly wrapped around the waist of the wearer (Figure 6.1, Figure 6.2), can be crossed through one, two or more rings, the straps being positioned at the top, on the shoulders or on the bottom, on the waist, (for example, in the case of onbuhimo systems) or in any other combination. Two pieces of lined fabric 13, are permanently attached to one end of the support panel 2, forming two wings 13, in a trapezoidal, rectangular, square, oval shape, in a horizontal position. A system is attached (such as a buckle 10, but not only) on the wings 13 described above, which allows the shoulder strap to latch onto panel 2, as well as a safety elastic strap 17.

[0064] The elastic strap allows the buckle to remain attached to it, in case of an accidental opening (the opening of the buckle 10), thus being firmly sealed by the safety elastic strap. There is also a clamping belt at the bottom of the support panel 2 which is attached to the wearer's waist 3, 7. The waist belt 3 is designed so as to balance the weight of the child between the weight carried on the carrier's shoulders and the one felt at the waistline.

[0065] For it to be attached or detached around the waist, this belt 3, 7 is provided at its ends with fastening systems such as, buckle / buckles, string, cap, Velcro, knot or any other similar or different system, fit to perform this function.

[0066] The belt 3, 7 is permanently attached to the back-support panel 2 in at least one point 4.1.1 (as shown in Figure 8.1, Figure 8.2, Figure 8.3, Figure 9.1, Figure 9.2, Figure 9.3). The waist belt 3,7 as described above, may be comprised of a foam, wadding linen or any other similar filling, wrapped in fabric material, from a wide anti-tearing webbing 9 which crosses completely or partially the filled part and continues towards the left and right extremes, in a horizontal position, being constantly attached to it.

[0067] At the opposite ends, fastening systems are attached, so that the belt 3, 7 can surround the wearer's waist, while the ends merge. (Fig.8, Fig.9).

[0068] When the carrier is placed on a flat surface, with the exterior facing upwards, in regards to the waist belt 3,7 on the left side of the filling portion and after the wide anti-tearing webbing 9 with its gripping system, there is a detachable piece of material permanently attached, preferably a lined one. It can have different shapes, such as square, rectangular, trapezoidal, oval, circular etc., and is always attached on the left side of the belt, in horizontal position. Afterwards, it will form a tongue 15 which will enable the wearer to feel no discomfort around the waist, the fastening system being on the outside of the tongue 15.

[0069] In addition, a safety elastic strap 17 is positioned on this peculiar tongue/extension. The safety elastic strap 17 ensures that, in case of an accidental opening of the waist gripping, the buckles will not be able to unlatch from the wearer's waist, being held in place by the safety elastic.

[0070] According to the invention, the carrying system should preferably include a waistband with different components 3,7, as shown in the attached figures.

[0071] According to the invention, some other possible options may include a fabric belt, which can be lined (as in the case of mei-tei systems), with or without a clamping device, at the end. Thus, the belt may have two longer, wider or narrower tails that can be knotted. Another option would include the waist belt 3, as being a bit softer, with or without filling as well as with or without a gripping component.

[0072] Adjustability. According to the invention, the waist belt has three cylinders attached 7, 4.1, 4.2 (Figure 8.1, Figure 8.2, Fig. 8.3), which are ideally made of a lined rectangular piece (made of foam, padding or other filling) that surround the waist belt at its widest side. The side cylinders 4.1, 4.2 are merged by fastening and forming a cylinder / eye which surrounds the belt and can slide on it either to the left or to the right side. After the merge, they are followed by a piece of padded material lined as a wing 13. A shoulder strap gripping buckle in panel 10 and a safety elastic 17 can also be attached to this wing 13 (Fig. 8.1). The safety elastic

secures the strap, in case of an accidental opening of the merging strap from the wing. In an example not forming part of the invention, the outward cylinders might not be provided with any buckle, nor a safety elastic band (Fig. 8.3).

[0073] The outer cylinders 4.2, two, are identical and may include a belt fastening system around the waist. In this case, within the formed eye, a fastening system such as Velcro, buttons, eyelet, snaps, string may be found, without being limited to these, which allow the cylinders 4.2, completely detachable or not, to be properly secured onto the wearer's belt.

[0074] In some variations of the invention, the clamping system may be done through eyelets, string clamping systems, double webbing systems with adjustable clamping, double webbing systems with double buckle, elastic creasing systems and / or any other combination.

[0075] The main embodiments of the carrying system consider a fixing of the cylinders 4, once and for the adjustability, directly on the waist belt 3 and not on a parallel strap or other system which is not mended to be strongly attached to the waist belt 3. As it concludes, the reasoning for this mechanism consists in securing the carrier, ensuring at all times the spread squat position of the child being carried, as well as for creating a still adjustment. The adjusting systems which are to be made, for instance, with the use of a strap and staples or snaps and which are not to be firmly fixed on the waist belt might influence and determine an incorrect body positioning of the child due to the child's movements while being carried.

[0076] On the support panel 2, on the lower left side, bottom right side, there may be two lined cushions 14 constantly attached to three sides of this panel. The cushions' main aim is to protect and offer an increased comfort to the child, as they will be placed on the child's thigh, behind the knee.

[0077] Furthermore, a hood 16 of a rectangular shape or any other shape, can be added, that has two elastic bands running along its length, on the left and right side. On one side this hood is provided with an attachment system to the back-support panel 2, inward. This attachment system might be, but is not limited to eyelets, buttons, zippers, etc. Consequently, the attachment will be only temporary, for whenever the wearer deems it necessary. When he does not want to use it, he can detach it completely.

[0078] They will be able to attach to the shoulder straps by means of a clip / clip system, but without being limited to it, on the opposite side of the attachment, along the elastic sides described above. The clip can be slid on the shoulder strap, top or bottom, in order to be positioned where needed and when is necessary, generally on the webbing 9 which can extend over the entire length of strap 1.

[0079] The carrier may further include a gripping/connection strap 6, to hold the two shoulder straps together, when the carrying is done on the front / back with parallel straps. (Figure 14.1). The gripping strap 6 includes two attachable parts by means of a system such as, but not limited to, buckles. It can also be made of anti-tearing webbing 9. On one side, inwards, an

elastic could be attached, in a horizontal position. The elastic is of a shorter size than the webbing, thus it will create a loop. The wearer will not feel any discomfort on the skin, if tension between the two parts of webbing occurs.

[0080] At the opposite ends of both sides, they will be attached to the shoulder straps by a system of, but not limited to, a clip. This one will be able to slide down the shoulder strap 1 of the webbing 9, so that the wearer would find the optimum comfort point. The strap 6 has the purpose of holding the shoulder straps together, hence they will not be able to slip off the wearer's shoulder.

[0081] Embodiments of such carriers may also include a strap 18 that connects the side wing 13, when the strap closure is made at the cylinders 4.2 of the belt 7 (Figure 2) via the gripping system 10. The strap is made of an anti-tearing webbing 9, with an adjustable length at one end. The attachment is done by closing the buckle from the wing side 13 into one of the ends 10, 11 and attaching the webbing from the strap through eyelets, Velcro, clips, buckles, Hook, without being limited to these.

[0082] This additional piece provides increased safety, which does not permit the space between the support panel 2 and the carrier's body to be too long.

[0083] According to the invention, the system consists of multi-adjustable systems as described below, which may or may not exist simultaneously or independently, to any of the child carrying systems available.

[0084] Thus, the child-carrying system brought forward could be a soft-structured carrier / carrier system for wearing children, mei-tai, onbu, onbuhimo, half buckle, without being limited to the aforementioned.

[0085] According to the invention the child carrying system may contain, in one alternative, a back support panel 2 made of fabric with a square, rectangular, trapezoidal, rounded shape, or a different form, to which two or one gripping system are attached, similar to a shoulder strap 1, at the top, ideally, on the left and right corners.

[0086] On the opposite side, a waist belt is placed 3, 7 which could be fixed, or which could slide sideways along the fabric, so that it can be adjusted (Figure 9).

[0087] In order to make the system adjustable, the sliding is achieved by detaching the provided system, and folding / tightening the fabric symmetrically, from left to inwards as well as from right to inwards 9.1.

[0088] Folding will be made according to the size of the child being worn, by means of a fabric, in order to maintain hip support from one knee to another. For enlargement the attached system will be detached and the fabric will be stretched Fig. 9.2, 9.3 as much as necessary, depending on the actual size of the child. Sliding is possible due to the cylinder 4.1 and / or the

cylinders 4.2 made from the same material surrounding the waist belt 3,7. In conclusion, this material will slide along the belt, either to be fastened or to be stretched / enlarged. For fixation after fastening, a Velcro system, webbing, double webbing and simple adjustment, double webbing and buckle, eyelets, webbing and eyelet, eyelets, buttons, cords or similar system can be employed.

[0089] In any of the above-mentioned forms, the material is designed to support the child's sitting and back when carried.

[0090] In one embodiment of the invention, especially in the case where the belt consists of three cylinders which are attached to each other, 4.1, 4.2 (Figure 8), a part of the material on the dorsal support panel 2, namely the part connecting the cylinders, can be made of a material such as a mesh, where the panel can be tightened by creating pleats 5, between which this type of material is found. When the pleats 5 are opened, the material can serve to fully support the child, as well as to ventilate the dorsal part during warmer temperature seasons. Another option could include a different type of material than the mesh, in regards to the pleats or they could be used without any material, remaining free.

[0091] In one of the alternatives, where the outer cylinders 4.2 are completely detachable (Fig. 8.3), they could be attached to the middle part of the dorsal support panel 2 by a hook 25 or a clamp system or any other attaching systems. In this case, the hook 25 is fixed between the inner layers of the dorsal support panel 2 that forms a hidden pocket 27. The hook 25 can be fixed on the sides of the support panel 2, on the left and right side, for example right close to the wings 13. The hook 25 is hidden between the inner layers that form a sort of a pocket 27 (Fig. 20) in order for it not to be visible while babywearing, as well as not to create discomfort for the wearer or for the child being worn. In order for the two outer cylinders 4.2 to be hanged on the clamp or hook 25, in the herein alternative, on each of the two outer side cylinders 4.2 there is a gripping loop 26 made of a strap, an elastic, a cord, a textile or of any other type of material. The loop 26 is firmly attached to the upper part of the outer cylinders 4.2.

[0092] When extending the seating in order to welcome a bigger child, by using the outwards cylinders 4.2 on the waist belt, such as explained above, the two cylinders 4.2 can be attached and secured to the top by gripping the loop 26 in the hook 25 (Fig. 19.3) secured in the pocket 27 (Fig.20). The gripping system might, as shown herein, be made of a metal hook 25 and a textile loop 26 (Fig. 19.3), but it may be replaced with any other system capable of providing its gripping functionality (such as, for example, the cap, buckles, knots, clamps, zippers, snaps etc.)

[0093] The present alternative may or may not include the strap 9 or the belt fastening as depicted below.

[0094] In case the outer cylinders 4.2 are attached to the dorsal support panel 2, the attachment will be made only at the top, thus the 4.2 will remain fully mobile on the waist belt 3, 7.

[0095] The correct ergonomic position for a child carried in such a system should be that in which, the back of the child is supported up to the armpit, in the case of older children, and up to the middle of the neck (Figure 16), in the case of young children who do not have well-developed neck muscles yet. Therefore, the gripping material must be adjustable, so that the back and neck of the child are properly supported, forming the C- shaped curve similar to the shape of their spine (Figure 17). This matter is especially examined in this documentation, to ensure that at any stage of a child's development, a healthy position will be enabled.

[0096] Additionally, the correct ergonomic position is also given by the hip abduction position, where the femur is covered more than 2/3 by the acetabulum of the coxal bone, and where the sitting should be lower than the knees, forming the M-position, Figure 18).

[0097] Due to the above mentioned, the child carrying system must allow the base of the material to adjust to the dorsal support / belt sitting, as much as necessary, to ensure an optimum sitting position while the material 14 covers / supports the legs up to the knee.

[0098] This is not possible with other child-carrying systems that have a fixed base and do not adapt to the size of the child being carried.

[0099] The submitted solution offers a carrying system that can adjust both the height / length of the support panel 2, the length of the straps 1 in multiple ways, and the width of the panel and sitting, without being limited to certain adjustable steps.

[0100] In other words, the adjustment, in all of these points, can be step less / no-stages (Figure 9), millimeter by millimeter, as much as needed. Additionally, the adjustment of the panel and shoulder strap can be done by using a single gripping element capable of functioning in such a way that the enlargement or tightening is carried out in an easy and intuitive manner for the wearer, will manage to remove the disadvantages presented in the prior models disclosed in Fig 7. Moreover, the feasibility of adjusting the child's sitting can be performed in detail, millimeter by millimeter, so that the correct ergonomic position of the child is maintained at all times, regardless of his/her stage of development, up to the maximum limit provided by this system.

[0101] The use of such adjustments is also provided by the fact that they can be adapted and employed for almost any child-carrying system such as, but not limited to, a soft structured carrier / baby carrier, mei-tai, half buckle, onbu, onbuhimo or any other alternative.

[0102] The waist belt 7 consists of three elements 4.1, 4.2, and they can be distinct and detachable (Figure 8.1), or just detached by a re-attachable system 5 (Figure 8.3), regardless of how it was reattached (Fig. zipper, eyelet, elastic, webbing, mesh, hook or any other system that can provide this purpose), confers the possibility of extending the period of use of the carrying system by adjusting it to both babies and large children.

[0103] The adjustability of the cylinder 4.1 and / or of the panel that glides on the belt, that surrounds the waist of the wearer and located at the bottom of the dorsal support panel 3, 7 (Figure 9) or by any other system that allows modification both for narrowing the base (Figure 9.1) as well as for enlarging it (Figure 9.2), the submitted documentation ought to cover the drawbacks of previous inventions in which the sitting could not be adapted to the child's actual size. Later on, fixing the narrowed cylinder 4 in the correct position, on the waist belt (ensuring the ergonomics of a carried child) can be achieved through various methods, but not limited to: Velcro, eyelets, buttons, string, adjusters and webbing, buckle and webbing etc.

[0104] This solution offers adjustability systems for perfect sizing, as much as needed, without having to establish adjustable steps.

[0105] The height / length adjustment of the dorsal support panel 2 is done through the medium of a construction element 19, such as a buckle, elastic, webbing etc. that is capable to stretch the panel 2 along its length, as well as to tighten the length of the shoulder strap 1.

[0106] Thus, in one of the options, on the dorsal support panel 2 there will be one, preferably two anti-tearing webbing 9, fixed on the top (but not on the end), left, upper right side of panel 2, and which will be followed by passing through the adjustment mechanism 19. This mechanism will be achieved by tightening the webbing 9 so that the back support panel material 2 folds.

[0107] As an alternative, instead of a webbing, an adjustable string with adjuster, eyelets, double Velcro or any other system capable of performing the folding function of the dorsal support material could be employed (Fig 7.1 - 7.8).

[0108] As a result, changing the length / height of the dorsal support panel 2 can be made in the same way as described above, by an easy handling of the webbing or of the available system (Figure 7, Figure 10). As a result of this manipulation (either upwards or downwards for release, by lowering the panel size, or by any other means depending on the components used to perform this function), the size of the dorsal support panel can be perfectly adapted to the back length of the child being carried (Figure 16) so that it is always supported in an exact manner, allowing the child's ergonomics and safety to be preserved. In this sense, the adjustability can be achieved gradually or suddenly, with the possibility of changing the length millimeter by millimeter (Fig. 7, Fig. 10).

[0109] In regards to the adjustability, at the moment of fastening and thus reducing the length of the dorsal support panel, this will create a small pleat at the top, as shown in Fig. 10.2, Fig. 10.3, ensuring an even stronger support. Minimizing the height of the panel for small babies will be beneficial, due to the fact that it forms a sort of cushion, doubling the material that provides support to baby's head, if the neck muscles are yet to be developed Figure 16. If the panel is at its maximum length, a strong support, even without the surplus of folded material, will be provided by creating tightening points.

[0110] The construction element 19 can be used for adjusting the height of the dorsal support panel, the simultaneous adjustment of shoulder strap 1 in one of the three adjustment points, which shows the second functionality.

[0111] Thus, by using the double-adjusting construction element 19, the shoulder strap 1 is adjusted by simply pulling up the webbing (Figure 10.1) or any other similar system to the webbing, as an intuitive ergonomic maneuver of the wearer. In order to be enlarged (Figure 10.2, Figure 10.3), this can be performed by a simple maneuver, releasing the buckle 19, if used, or depending on the situation, and nevertheless, the movement is an intuitive one.

[0112] The above mentioned easy handling, consists of two important functionalities, namely: it allows for a greater material surface coverage 8, if the wearer would like to maintain the strap in an extended position, for an added comfort, especially for taller people. The strap may be partially closed by reducing the initial length of the shoulder strap so as to perfectly fit different body types and build of wearers. As a second functionality, the strap may permit breastfeeding, having the function of a breastfeeding strap. Therefore, if the carrying system has to be released (Fig.10.2, Fig.10.3) around the area, so that the baby can easily descend towards the breast for breastfeeding, while maintaining its ergonomics, the simple release of the adjusting piece offers a convenient and discreet breastfeeding without the need for a total or even a partial removal of the carrying system.

[0113] Since breastfeeding is an important element during this period for which a carrying system is provided, this functionality ensures an easy handling and comfort for both the wearer's (mother) and the child, exempting her from an extra effort.

[0114] Additionally, one of the principles of ergonomics represents the upwards position of the baby, so that the wearer can easily give a kiss on the forehead. This is the ideal height at which the child's head should reach, and this is done by a precise adjustment of the shoulder strap length, according to the height and build of the wearer (Figure 11, Figure 12).

[0115] In another version, the shoulder straps 1 may be detachable from the top of panel 2, in which case a construction element 19 could also be employed, being capable of making a double length adjustment of the shoulder strap 1 as well as of the dorsal support panel 2, either in a simultaneous way or at different times.

[0116] The adjustment of the strap can be accomplished by two additional mechanisms, through this inventive solution. One of the innovative elements in the carrier system is the webbing 9 from the ongoing shoulder strap which ends in a buckle 20 or any other system or component able to achieve this aim (Figure 11). This webbing 9 is attached to the padded portion of the strap, allowing its length to be adjusted in two points (Figure 11). Thus, this system will help fastening the shoulder strap in a natural manner (Figure 12). If the carrying system is worn on the back (Fig.8.1, Fig.8.2, Fig. 8.3, regardless of the place where the shoulder strap is closed- be it in the middle height of the dorsal support panel, or at the waist belt), the webbing can be pulled or fastened forward to tighten the shoulder strap (Fig.12).

[0117] Moreover, due to the merging system of the padded strap and of the part formed by webbing through a buckle 20 or a double adjusting system, the length may be modified by pulling down the unobstructed portion of webbing from the buckle, located at the coupling between the padded side and webbing side, as well as by pulling the unobstructed webbing at the opposite end, at the coupling side between the waist belt and webbing (Fig. 12).

[0118] Additionally, a swift attachable / detachable buckle (Figure 13) may be employed or any other system designed 12 to achieve its functionality. This component will be able to switch from the support panel to the waist belt extension, on the outer rings, whether is detachable or not (Fig. 8.2).

[0119] In order to overcome the disadvantages of previous techniques, regarding the total or partial absence of an adjustable child sitting base, worn at the correct size, as discussed above, this solution addresses these disadvantages by providing a multi- adjustable system in one of its prototypes: a belt comprised of three cylinders 4, 7, connected entirely or partially (Figure 8.2), or detachable (Figure 8.1, Fig. 8.3) as shown.

[0120] The proposed solution offers the possibility of resizing the seat base of the support panel by building a tunnel / tube / cylinder, able to slide on the waist belt. Although the current status of the technique is aware of the existence of a similar system, it still exhibits the disadvantage of a limited maximum width at the dorsal support panel as well as the disadvantage of a reduced base, without a fixed element, hence the ergonomics is no longer respected. (Fig. 18). Although the narrowing of the base is achievable at a minimal ergonomic size, in the current technique, the width of the panel cannot be exceeded, risking that in case of older children, the material will not be able to cover the entire thigh of the child, from one knee to another, hence the ergonomics are not respected.

[0121] The proposed solution envisages a possible belt system comprised of three components 7 (Figure 8): a central cylinder 4.1 that surrounds the belt 3, making a tunnel, attached to the belt 4.1.1 and adjustable on the sides by sliding and gripping either through a Velcro system, eyelets, buttons, string, adjuster and webbing, buckle and webbing etc. or any other system, capable of performing this function; two outer side cylinders 4.2 are also able to extend the base width of the support panel (Figure 9.3).

[0122] In this version, the above mentioned cylinders 4.1, 4.2 form a tunnel on the waist belt that may or may not be attached to it using a Velcro, eyelets, zipper or any other system capable of achieving this functionality, being completely detachable. (Figure 8.1).

[0123] In the proposed documentation, Fig. 8.2, the cylinders 4.1, 4.2 also form a tunnel on the waist belt, whether or not attached to it via a Velcro system, eyelets, zipper or any other system capable of achieving this functionality, being completely detachable from it (Figure 8.1, Figure 8.3). In the submitted version, the letter M will be formed on the dorsal support panel, when the base is extended and where the two uncovered areas may or may not be covered

with an elastic material, mesh, mesh material, or even be left unfilled, without material, etc. The functionality is doubled by an additional aspect, namely, that of creating a ventilation zone for the child, so that in the warm seasons the skin can breathe with more ease and without sweating.

[0124] In both alternatives of the current inventive solution, the functionality is not a singular one, but rather a complex one. Thus, the outer cylinders 4.2, will ideally be detachable (Fig 8.1, Fig. 8.3), in order to place them anywhere along the waist belt 3, so that the child ergonomics could be respected. There is also the possibility of performing the closure of the shoulder straps 1 in the outer cylinders 4.2, allowing the wearer to choose the way he or she desires.

[0125] These 4.2 cylinders that surround the belt, can extend the base of the carrier, so that it can be used with bigger children, enabling an increased comfort, which will ensure the under the knee support along the length of the child's thigh (Fig. 9.3). In one prototype, these cylinders 4.2 might also offer the possibility of closing 10 the shoulder straps on the waist belt (Figure 2). This provides additional comfort for the wearer, especially during a back carry. (Fig.2).

[0126] In another adaptation of the invention, in which the straps may be made of fabric material only, without having a fastening element such as, but not limited to, half buckle, mei-thai, onbu, onbuhimo, or any other variation, the belt's adjustability element made of sliding cylinder 4.1 may be preserved, while the straps will be able to be tied or gripped in the typical manner of each system. (For example, in the case of onbuhimo, rings may be used either at the top or at the bottom, in the case of half buckle, the straps may be knotted etc.), thus, there is no need for a fastening system 10 on the outer rings 4.2.

[0127] In the case of the shoulder strap being closed on the waist belt 10 as shown in Fig. 2, a strap 18 or any other system achieving this functionality, according to Fig. 2, will allow the shoulder strap to be secured onto the panel, in which the closure took place (Fig. 13). The attachment strap 18 will have a buckle-gripping part 11 (or any other system that can perform this function) which will cross under the safety elastic strap 17 and will be attached to the fixed portion of the buckle 10 secured onto the lined wing, followed at the opposite end by a webbing fastening system 9 (either in the case where the webbing is fastened to the padded strap or when the free webbing is permanently attached and adjustable to the lined portion), such as a snap or an eyelet system that surrounds the webbing on the shoulder strap and fixes it against the ear on the panel, when the strap is latched to the belt. (Figure 11). In the current prototype, the connecting strap between the two components takes into account the safety of the child being carried, so that the space between the dorsal panel and the wearer's chest is not too wide for the child. This last detail will ensure a greater safety for the carried child, thus there is no risk of falling through the gap created between the panel and the body of the wearer, as shown in Fig. 2.

[0128] The sitting 21 adjustment of the carrier system includes, in one of the options, an

adjusting element conspicuous by the inventor as an additional system and prolonging the duration of product use as follows: three textile cylinders 4.1, 4.2 (Figure 8.1, Figure 8.2, Fig. 8.3), surrounding the waist belt 3, from which a central adjustable cylinder 4.1, as well as two outer cylinders 4.2 may or may not be permanently removed or attached (Fig. 19.3).

[0129] The adjustment is made at both the central cylinder 4.1 and the outer cylinder 4.2, in this version. For adjustment, the central cylinder 4.1 slides on the waist belt, tightening as much as necessary, up to the minimum limit 4.1.1.

[0130] To broaden the base of the seat 21, the material surrounding the belt 3 is extended to the maximum limit. To fix the cylinder 4.1 so that it maintains its shape, a Velcro or any other fixed system capable of performing such a function, such as, but not limited to: buttons, snaps, string, adjuster and webbing, buckle and webbing, etc. To achieve an adjustable system, sliding is done by detaching the attached system, as described below, and folding the material symmetrically from left to inward as well as from right to inward. Folding will be based on the size of the child being worn, so that the material supports its hips from one knee to another. For enlargement, the attached system will be able to detach, and the material will stretch as desired, depending on the actual size of the child. Sliding is possible due to the cylinder 4, made of textile, which surrounds the waist belt 3. In conclusion, this material will slide on the waist belt 3, either for being tightened or for being stretched out.

[0131] Therefore, the easily adjustable features present a tunnel that surrounds the waist belt 3 and represents the bottoms side of the back-support panel 2, equivalent to the seat of the wearing system 21, which reduces its size and can be narrowed by simply tightening it along the waist belt 3. This system could be compared to a twine system.

[0132] For instance, in the case of a pair of sports trousers with a cord and a tightening piece to adjust the waist size of the trousers, the user will proceed to tightening the twine and, as a result, the trousers' material, folding it on the string, up at the appropriate reduction. To extend the diameter of the waist, the cord will be widened and, consequently, the material will be stretched out on the cord. Adjustment of the base of the dorsal support panel in the case of the patent application is made using a similar system, but where the cord is represented by the waist belt, and the trouser material is represented by the back-support panel.

[0133] Therefore, the adjustment is made non-staged, just as much as needed, without the need for any other external, alternating element.

[0134] The system also comprises two adjustable elements 4.2, as described above, in the tunnel element, but of smaller dimensions along the waist belt 3 and surrounding the waist belt 3.

[0135] The additional element is composed of two cylinders 4.2. As explained *supra*, these cylinders 4 could be completely removed. On the other hand, when the child grows, and the basic width of the supportive back panel 2 is no longer sufficient to support from one knee to

the other, the cylinders 4.2 can be used for extending the width of the seat 21.

[0136] In the embodiments shown in Fig.8.1 and Fig. 8.3, the outer cylinders 4.2 could be attached when needed Fig. 19.3, allowing the carrier system to adjust to the proper size of the child.

[0137] In all prototypes, a part of the central cylinder 4.1 is permanently attached to the waist belt by a seam or any other permanent fixation method, of a model 4.1.1, as a reinforcement in X, whether in any other form, to a minimum pre-established size, calculated, so that the seat should not be reduced to a smaller size, respecting the child's ergonomics. Calculating the size of this fixed element 4.1.1 is performed by approximating the smallest possible size that can ensure the support of a very small baby from one knee to another (generally about 10-12 cm, but without being a limited measurement. Anyhow, the fixed element should not be less than 10 cm.)

[0138] Thus, when one of the elements is fixed 4.1.1, the safety of the carried child is increased, and there is no risk that the positioning will vary / move / shift during wearing. In addition, the child ergonomics will be respected due to two aspects: When there is a central fixed element, there is no risk of sliding on the waist belt 3 and thus, the child will always maintain the correct position and the adjustment will be fixed. The fixed element 4.1.1 is small enough to allow the base of a small child to be adjusted and large enough to reduce the sitting, down to a size, in order to respect the ergonomics, according to the attached picture, offered by the International Hip Dysplasia Institute (Figure 18).

[0139] Almost all child carrier systems may or may not include multiple adjustments as described in this documentation. Thus, the child carrier system is similar to a classic system of mei-tai, half-buckle, onbu, onbuhimo or any other variation; both the child's sitting and the length of the panel and / or of the strap, can display the described adjustable mechanisms. The main goal is, namely, to keep the ergonomics whenever the child is carried, regardless of the classical structure of the wearing system employed.

[0140] In addition to the aforementioned, the present invention also relates to basic details, which permit the maintenance and realization of both the wearer and the child ergonomics, in order to achieve a healthy and lightweight carry. Furthermore, in one alternative technique, the webbing of the shoulder strap may fit at the end of the strap, into a component that helps when the carrier system is used for a front carry of the child, as the shoulder strap can be tightened by pulling the webbing forward. This maneuver is easier and more natural, intuitive and easy as compared to other systems disclosed and known, so far (Figure 11, Figure 12).

[0141] In one alternative of the invention, the sitting adjustment system consists of a material shaped as a cylinder that surrounds the waist belt 4.1 (Figure 8). For adjustment, it slides along the waist belt, tightening as much as necessary up to the minimum limit. To enlarge the sitting base, the material surrounding the belt can be extended to the maximum limit. To fix the cylinder so that it maintains its form, a Velcro or any other fixation system suitable for such a

function can be used, such as, but not limited to, buttons, snaps, string, adjuster and webbing, buckle and webbing etc.

[0142] In addition to these basic innovative elements, this solution also includes supplementary elements that reinforce the ergonomics and comfort of both the wearer and the child being worn, ensuring the safety and the possibility of a prolonged wear without creating any discomfort.

[0143] Thus, a portion of the straps can be lined and may have a width of 8 cm, but not solely, in order to support and take over the weight of the worn child, carried in a uniform manner. To extend this portion to the shoulder straps, a part of the straps 8 that is not lined can follow, made of the same fabric as that of the lined part and at the same time can fold under the adjusting mode, according to Fig. 7 and Fig. 10. This is directly attached to the main support panel on the side corners, as shown in Fig. 1. Its role and functionality are outlined above.

[0144] The shoulder strap may continue on the opposite side with a strap portion, made of anti-tearing webbing 9 or any other system that can perform this function and which serves to connect the lined part, either on the dorsal support panel of the child or on the side rings of the webbing, as belt elements (explained above).

[0145] This segment, made of webbing or any other system capable of performing this function, is not detachable and is permanently attached to the lined strap by any fixed attachment such as, but not exclusively to, sewing. On the detachable end of the lined part there is a double adjusting buckle, male part 11 or any other gripping system which can perform the strap merging, either with the dorsal support panel or with the outer cylinder (Figure 2), so that the child carrier system can be attached to a person, and then adjusted to its size.

[0146] Segments of the straps are made of anti-tearing webbing or any other system that can perform this function and which serve to connect the strap part made of anti-tearing webbing or any other similar system according to Fig. 1, Fig. 3, Fig. 5.

[0147] Additionally, there may be two cushions / wings 13 lined sideways and permanently attached to the middle of the dorsal support panel, at the end of which there is a part 14 of the gripping system that serves both to protect the wearer and the child. Two padded side cushions 14 are fully attached to the lower part of the dorsal support panel, aiming to comfortably support the child's feet, without the material holding him/her to firmly under the knee, leaving red marks.

[0148] The waist belt 3 may have a lateral extension/tongue 15 on the left side of the carrier's belt (when the system is stretched on a flat surface with the logo facing outwards and the dorsal support panel positioned in such a way, that the part which is normally designed to support the child, lies inwards, stuck to the flat surface on which it was previously positioned; the viewer looks at the carrier system from the front). This cushion / wing is fitted at the end

with a safety elastic 17, a safe-catch, aiming to catch the buckle in case of accidental opening.

[0149] Besides the safety feature, this lined cushion / wing protects the wearer's skin at the closure system around the waist so that it does not inconvenience, nor put pressure on the wearer's waist, consequently, it will enhance the wearing comfort, allowing a prolonged carry.

[0150] The wearing system may also be provided with a fully removable hood 16 and may be attached or detached, as required by any fastening system such as, but not exclusively to eyelets, snaps, buttons, Velcro, string or any other similar system capable of performing this function. The hood may have elastic edges, so that it can perfectly adjust to the size of the child when attached. Its role is not that of a winter hood that covers the child's head like a semicircle. The functionality of this fully removable accessory encompasses two purposes: protection against cold, wind, dust and other external factors. In addition, this hood holds the head of a child who has fallen asleep, while also shading against the light, for a peaceful sleep. Moreover, this particular hood represents an extension of the carrier's panel, providing head support, especially for small children who do not have well-developed neck muscles.

[0151] Additionally, a strap 6 or a similar support system for the two shoulder straps can be used, so that they do not move or pull away from the shoulder of the wearer (Figure 14.1).

[0152] Some security elastics 17 are sewn prior to any gripping system, as well as attached to a part of the gripping system, in order to ensure a fixed position in case of an accidental opening.

[0153] All these additional elements, that may or may not be found in the child carrier system support the proposed solution together with the establishment and preservation of ergonomics throughout the wearing period and over time, throughout the child's development, as described in the above paragraphs, performed with multi-adjustable elements.

Reference list

[0154]

1. 1. shoulder strap
2. 2. support panel
3. 3. waist belt
4. 4. 3 cylinders
 - 4.1 central cylinder
 - 4.2 outward cylinders
5. 5. pleats
6. 6. connection strap/ the gripping strap with the shoulder straps

7. 7. waist belt containing 3 elements
8. 8. breastfeeding straps/ unlined straps
9. 9. anti-tearing webbing
10. 10. gripping buckle on the strap or wing(female part)
11. 11. buckle (male part)
12. 12. quick attachment buckle
13. 13. wings
14. 14. padded side cushions
15. 15. side tongue/protection or extension
16. 16. hood
17. 17. safety elastic straps
18. 18. strap linking the shoulder strap to the side wing 13 when closing of the strap is made at the belt cylinders
19. 19. double adjuster/double tensionlock with double purpose: panel and strap adjustment
20. 20. adjuster/tensionlock for an ergonomic adjusting of the strap length
21. 21. adjusting system for the seating and of the width of the back panel
22. 22. loop from the strap placed between shoulder straps and elastic strap
23. 23. clasp, clips, clamps for the hood
24. 24. clamps or clips for gripping and sliding of the connection strap between shoulder straps
25. 25. hook for attaching the outward cylinders
26. 26. loop for attaching the outward cylinders on the hook
27. 27. hiding pocket

REFERENCES CITED IN THE DESCRIPTION

Cited references

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Patent documents cited in the description

- [US8172116B1 \[0002\]](#)
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- DE202016103901U1 [0002]
- EP2148594A [0007]
- DE202016103901 [0008]


P a t e n t k r a v


1. Barnebærersystem, omfattende:

- 5 - mindst én skulderrem (1), der er konfigureret til placering på en brugers skulder;
- et dorsalt støttepanel (2), der er konfigureret til at optage et barn;
- et taljebælte (3), der er konfigureret til at rumme en brugers talje;
- fastgørelsessystemer ved enderne af taljebæltet (3) til fastgørelse eller af-
- 10 - montering af det omkring brugerens talje;
- fastgørelsessystemer til den mindst én skulderrem (1) med det dorsale støt-
- tepanel (2), der er placeret ved den ene ende af den mindst én skulderrem (1);
- multijusterbare mekanismer (19, 20, 4, 4.1, 4.1.1, 4.2, 21), der er konfigureret
- til at gøre det muligt, at et barn altid bæres i den korrekte ergonomiske position,
- mens barnet er placeret i barnebærersystemet,
- 15 hvor de multijusterbare mekanismer (19, 20, 4, 4.1, 4.1.1, 4.2, 21) omfatter et
- justerbart breddesystem (21) af det dorsale støttepanel (2), hvor det justerbare
- breddesystem (21) omfatter tre cirkulære cylindre (4), der successivt er mon-
- teret omkring taljebæltet (3) på barnebærersystemet og er konfigureret til at
- 20 tillade en bred bærejusterbarhed af barnebærersystemet, så barnet kan pla-
- ceres i den korrekte ergonomiske position med støtte op ad bagsiden af bar-
- nets knæ:
-
- to udvendige aftagelige cylindre (4.2) af de cirkulære cylindre (4) er aftagelige
- eller delvist aftagelige til taljebæltet (3) ved hjælp af et første forbindelsesele-
- 25 ment, såsom sømme, øjer, velcro, spænder, bånd, knapper, netmateriale eller
- ethvert andet lignende system;
-
- den midterste (4.1) af de cirkulære cylindre (4) omfatter et permanent fastgjort
- element (4.1.1) til taljebæltet (3);

hvor barnebærersystemet yderligere omfatter skulderremgrebssystemer med den centrale del af det dorsale støttepanel (2), som omfatter:

5  gribeelementer (11), der er anbragt i den anden ende af den mindst én skulderrem (1),

 mindst én vinge (13), der er anbragt på hver laterale side af det dorsale støttepanel (2),

10  mindst ét spænde (10), der er anbragt på den mindst én vinge (13), som også er konfigureret til at fastgøre gribeelementerne (11), og

kendetegnet ved, at barnebærersystemet yderligere omfatter skulderrem- og taljebæltefastgørelsessystemer til fastgørelse af den mindst én skulderrem (1) med taljebæltet (3), som omfatter yderligere spænder (10), der er anbragt på
15 de udvendige aftagelige cylindre (4.2), der er konfigureret til at fastgøres med gribeelementerne (11) og at sikre beskyttelsen af barnets fødder og den korrekte ergonomiske position, med støtte op til knæets bagside.

2. Barnebærersystem ifølge krav 1, hvor de multi-justerbare mekanismer (19, 20, 4,4.1, 4.1.1, 4.2, 21) yderligere omfatter et justerbart system (19) til justering af længden af det dorsale støttepanel (2).
20

3. Barnebærersystem ifølge krav 1 og 2, hvor de multijusterbare mekanismer (19, 20, 4, 4.1, 4.1.1, 4.2, 21) yderligere omfatter justerbare længdemekanismer (19, 20) til justering af længden af den mindst én skulderrem (1).
25

4. Barnebærersystem ifølge krav 3, hvor en af de justerbare længdemekanismer (19, 20) på den mindst én skulderrem (1) omfatter et justeringselement (19), som tillader samtidige eller separate længdejusteringer af det dorsale

støttepanel (2) og/eller på den mindst én skulderrem (1).

5 **5.** Barnebærersystem ifølge krav 3 eller 4, hvor de justerbare længdemekanismer (19, 20) omfatter et justerbart element (20), der er konfigureret til at tillade et bånd (9), der kan låses på den mindst én skulderrem (1), at passere igennem det, så det nævnte bånd (9) kan drejes i samme retning, som det blev rettet i, før det passerede gennem det justerbare element (20), og derved tillade en justering gennem en naturlig ergonomisk manøvre ved at trække i båndet (9).

10

6. Barnebærersystem ifølge krav 5, hvor det justerbare element (20) er et spænde.

15

7. Barnebærersystem ifølge et hvilket som helst af de foregående krav, hvor gribeelementerne (11) er konfigureret til at blive fastgjort enten på taljebæltet (3) og / eller på den centrale del af det dorsale støttepanel (2).

20

8. Barnebærersystem ifølge krav 5, hvor det justerbare element (20) er konfigureret på en sådan måde, at det muliggør justering af den mindst én skulderrem (1) ved at opretholde princippet om at trække mod forsiden, på en naturlig måde, samtidig med at brugerens ergonomi respekteres, uanset placeringen af barnebærersystemet på brugeren.

25

9. Barnebærersystem ifølge et hvilket som helst af de foregående krav, hvor de udvendige aftagelige cylindre (4.2) er fastgjort til det dorsale støttepanel (2) ved hjælp af andre forbindelseselementer såsom syninger, øjer, velcro, spænder, stropper, knapper, maske, krog (25) og sløjfe (26) eller et hvilket som helst lignende element, således at den samme funktionalitet og glidekapacitet på taljebæltet (3, 7) opretholdes.

30

5 **10.** Barnebærersystem ifølge et hvilket som helst af de foregående krav, hvor det permanent fastgjorte element (4.1.1) er placeret i den midterste del af den midterste cirkulære cylinder (4.1) og er dimensioneret således, at det gør det muligt at indsnævre sædet jævnt for meget små børn for at dække afstanden mellem et barns knæ og understøtte barnets lår i den korrekte ergonomiske position.

10 **11.** Barnebærersystem ifølge et hvilket som helst af de foregående krav, hvor den mindst én skulderrem (1) omfatter en flerhed af låsesystemer, der er placeret enten på siden af det dorsale støttepanel (2) eller på de udvendige cylindre (4.2) på taljebæltet (3).

15 **12.** Barnebærersystem ifølge et hvilket som helst af de foregående krav, hvor skulderstroppegrebssystemerne med den centrale del af det dorsale støttepanel (2) omfatter et ekstra stykke, såsom en ekstra rem (18), der er konfigureret til at forbinde den mindst én skulderrem (1) til den mindst én vinge (13).

20 **13.** Barnebærersystem ifølge krav 12, hvor den ekstra rem (18) omfatter et konstruktionselement, der er konfigureret til at gøre det muligt at justere længden af den ekstra rem (18), og

25 mindst to yderligere fastgørelsessystemer, hvor mindst ét er konfigureret til at gribe spændet (10) fra den mindst én vinge (13), mindst ét er konfigureret til at tage fat i den mindst én skulderrem (1) eller båndet (9) i overensstemmelse med krav 5.

14. Barnebærersystem ifølge et hvilket som helst af de foregående krav, hvor barnebærersystemet omfatter to skulderstropper (1), hvor det yderligere om-

fatter en anden ekstra rem (6), der er konfigureret til at forbinde de to skulderstropper (1) mellem hinanden i en parallel position.

- 5 **15.** Barnebærersystem ifølge krav 14, hvor den anden ekstra rem (6) omfatter en sikkerhedselastik for at give komfort under transporten.

DRAWINGS

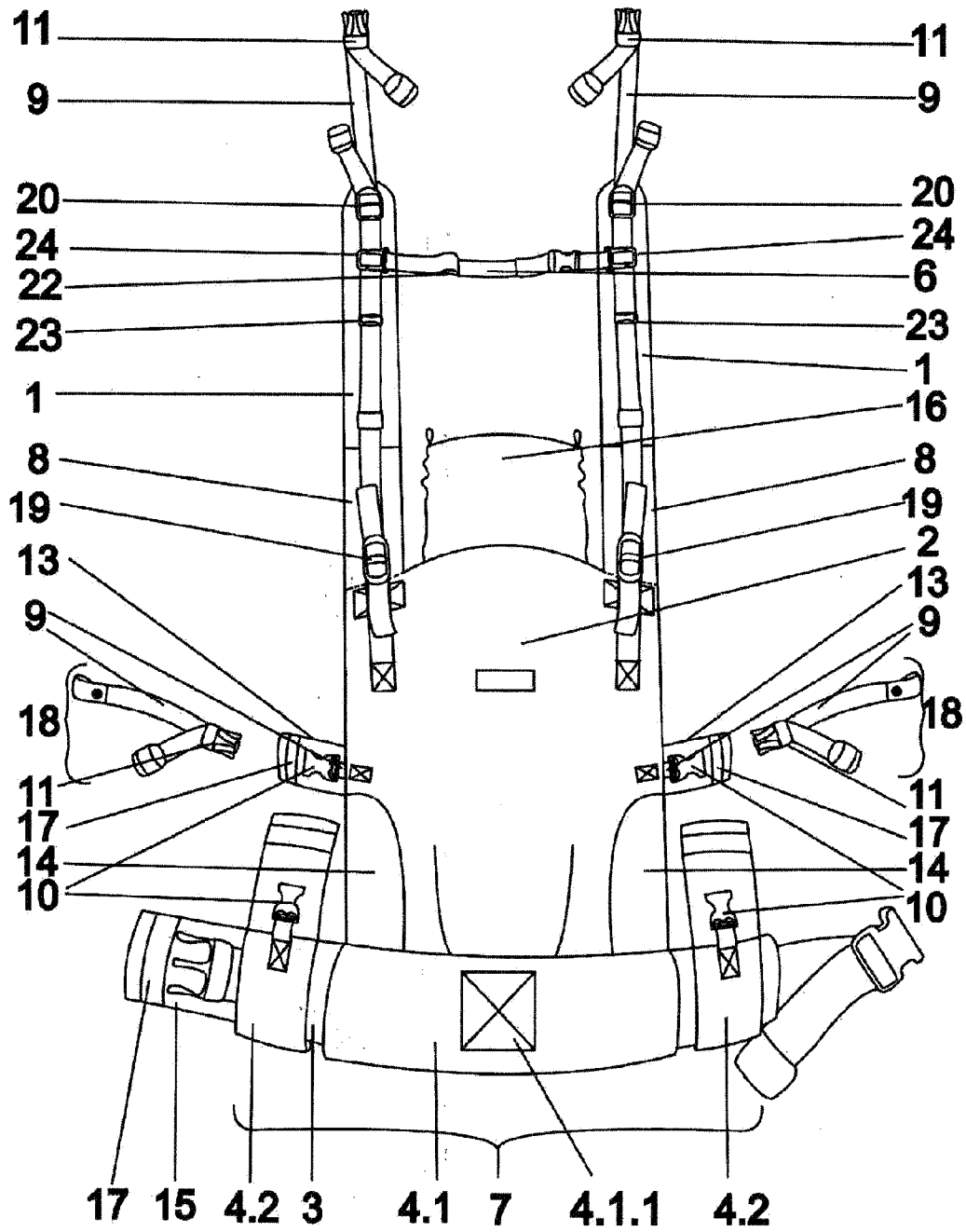


Fig. 1.1

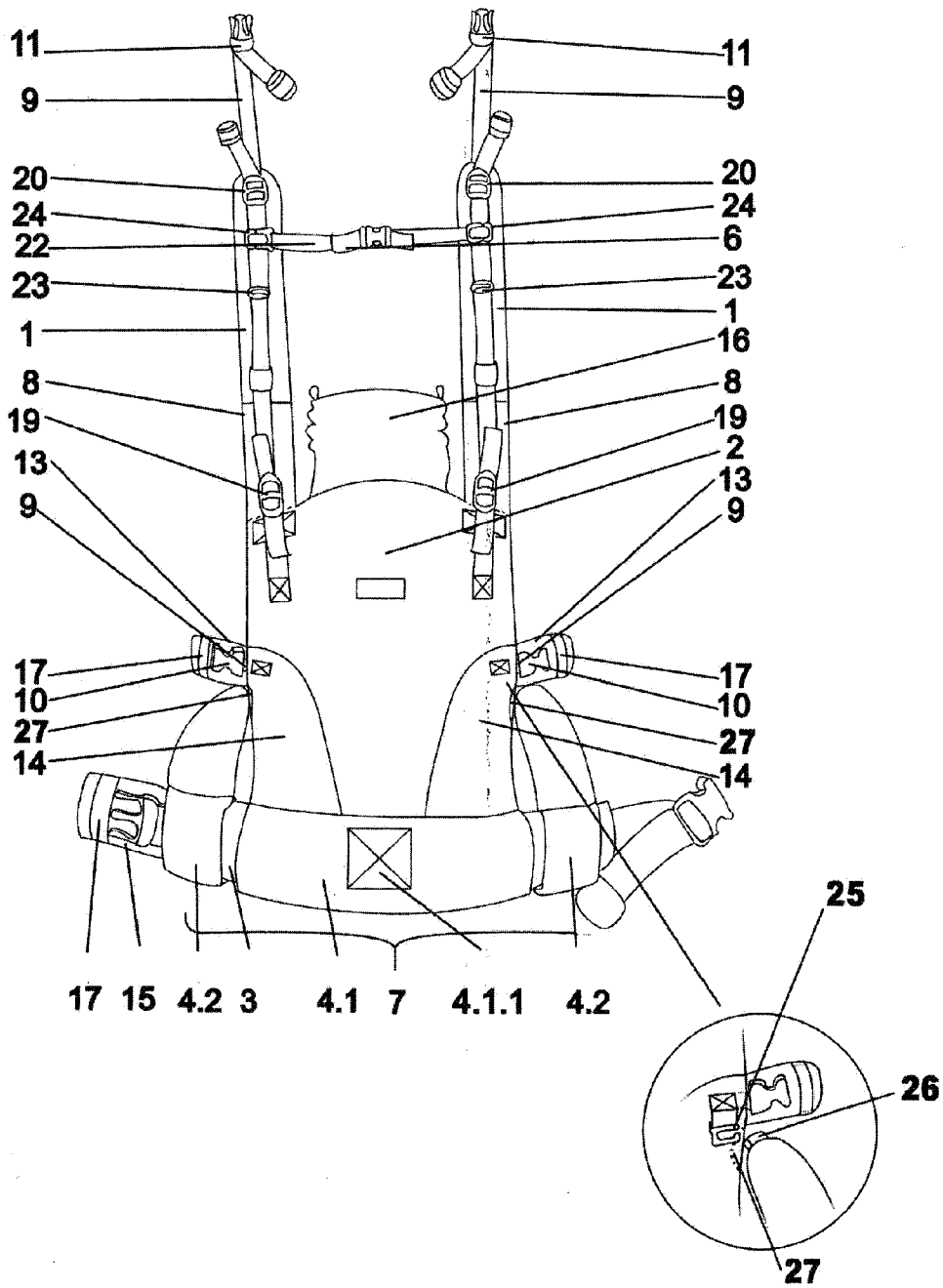


Fig.1.2

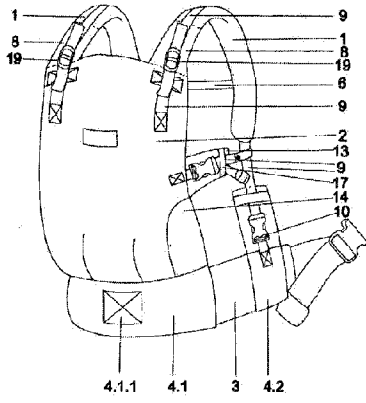


Fig. 2.1

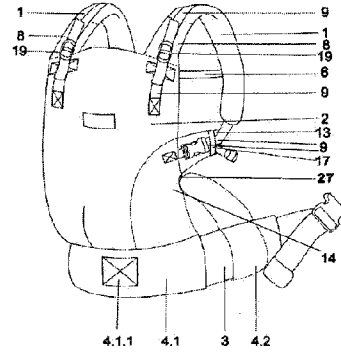


Fig. 2.2

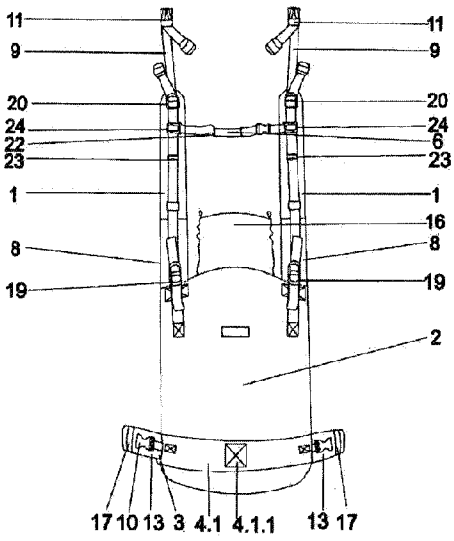


Fig. 3.1

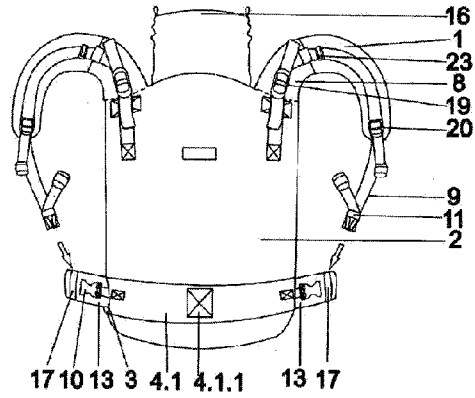
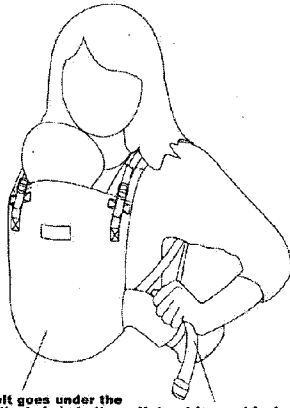


Fig. 3.2

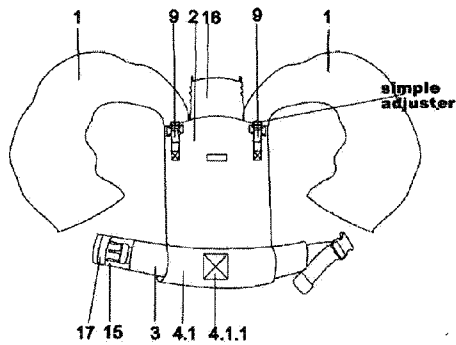
**WAIST BUCKLES ARE CLOSED.
WITH THE SHOULDER STRAP BUCKLE**



The belt goes under the under the baby's bottom creating a seat. Natural forward-facing strap pull

Fig 4

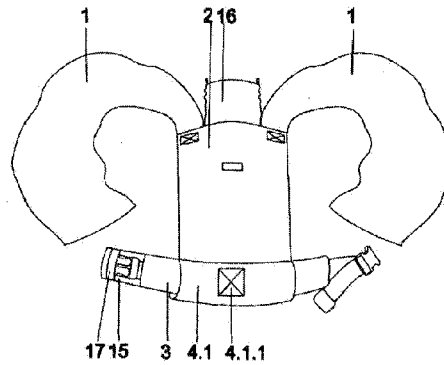
LONG STRAPS (1), LIKE A SCARF WHICH FORM AN X ON THE WEARER'S BACK, THEN PASS TO THE FRONT AND THEY WRAP IN AN X AROUND THE PANEL (1), WHILE AT THE END THEY WILL BE SECURED THROUGH A KNOT AROUND THE WEARERS' WAIST.



OPTION 1: PANEL HEIGHT ADJUSTMENT

Fig 5.1

LONG STRAPS (1) LIKE A SCARF, WICH FORM AN X ON THE WEARER'S BACK, THEN MOVE TO THE FRONT AND THEY WRAP IN AN X AROUND THE PANEL (2) WHILE AT THE END THEY WILL BE SECURED THROUGH A KNOT AROUND THE WEARERS' WAIST



OPTION 2: WITHOUT PANEL HEIGHT ADJUSTMENT (2)

Fig 5.2

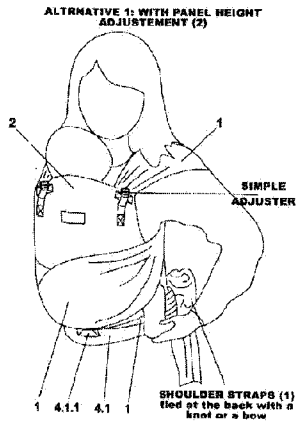


Fig. 6.1

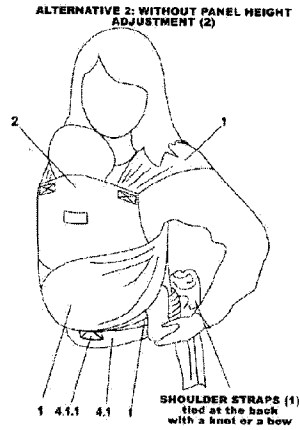


Fig. 6.2

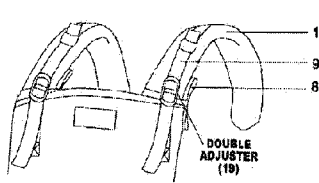


Fig. 7.1

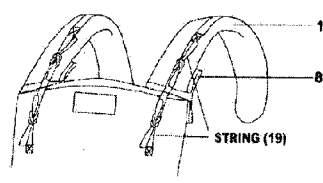


Fig. 7.2

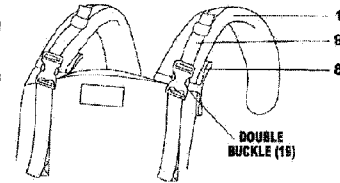


Fig. 7.3

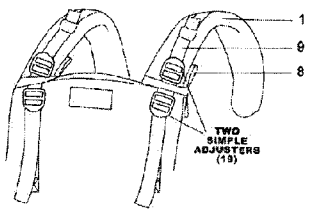


Fig. 7.4

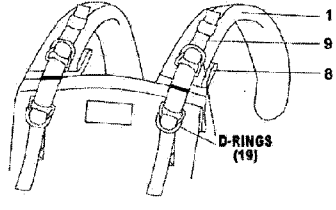


Fig. 7.5

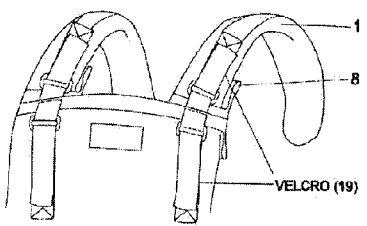


Fig. 7.6

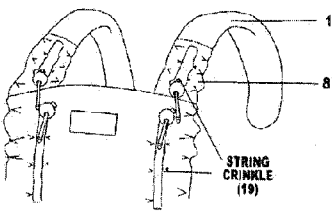


Fig. 7.7

ANY COMBINATION OF PREVIOUS PRESENTATIONS

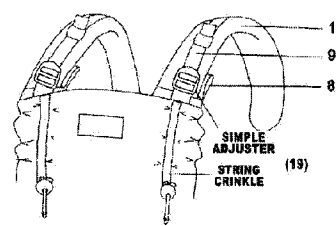


Fig. 7.8

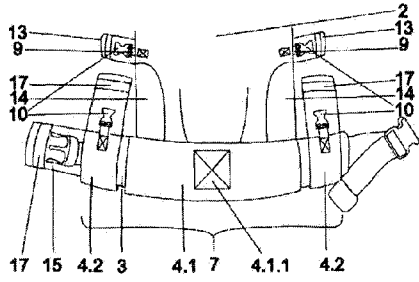


Fig. 8.1

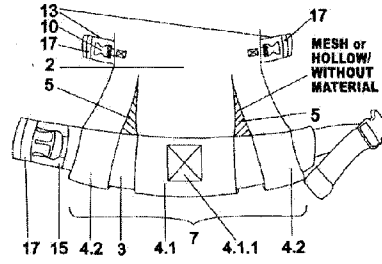


Fig. 8.2

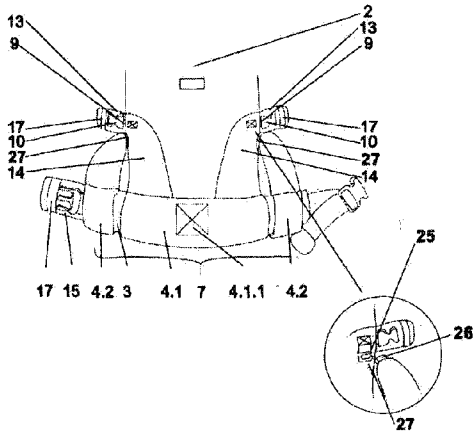


Fig. 8.3

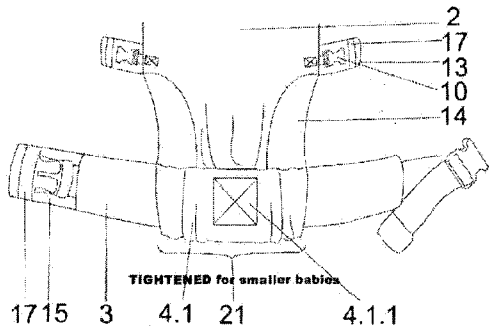


Fig. 9.1

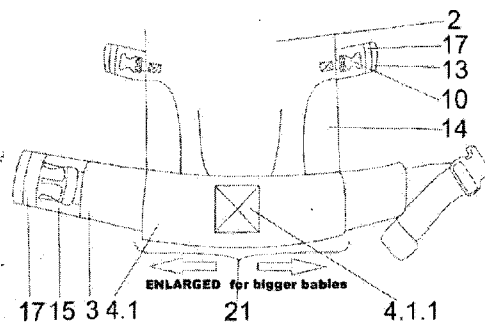


Fig. 9.2

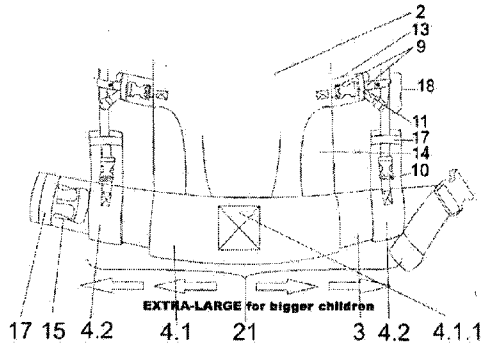


Fig. 9.3

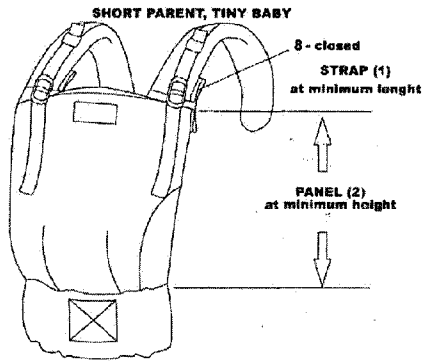


Fig. 10.1

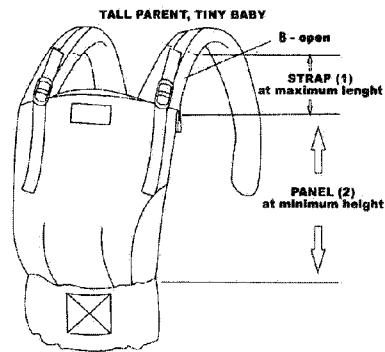


Fig. 10.2

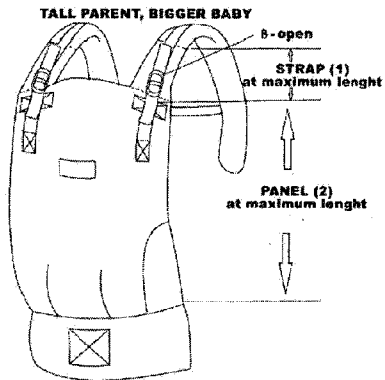


Fig. 10.3

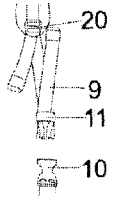


Fig. 11

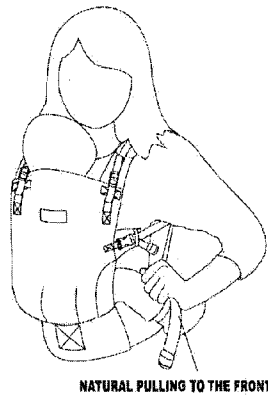


Fig. 12

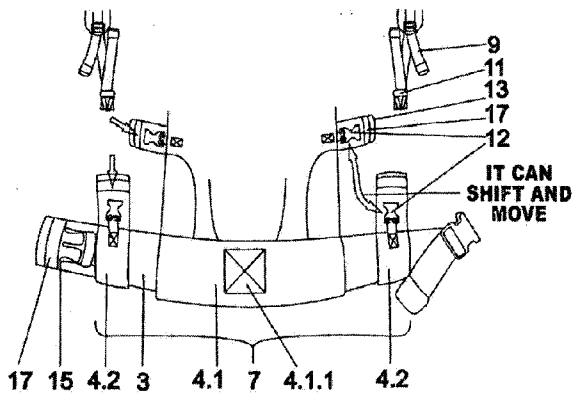


Fig. 13

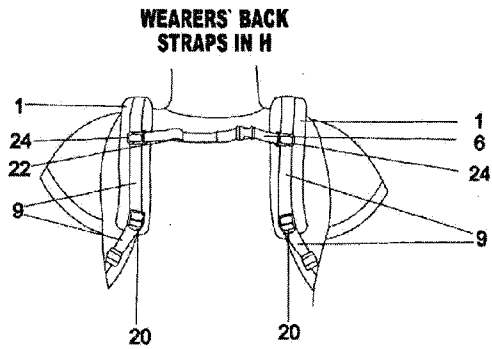


Fig. 14.1

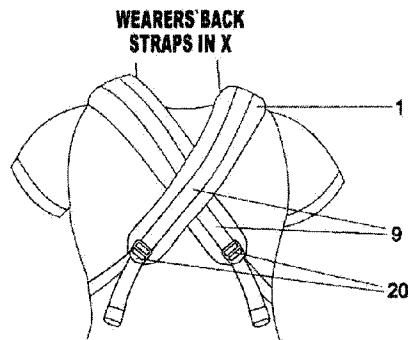


Fig. 14.2

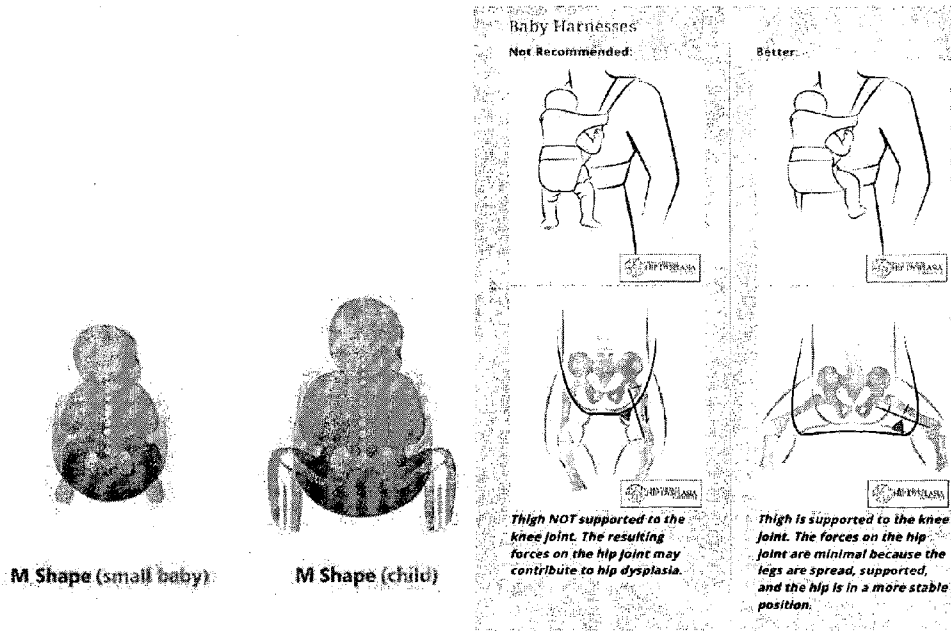


Fig. 18 - source: <http://hipdysplasia.org>

