US 20140283277A1

(19) **United States**

(12) **Patent Application Publication**

WILHELM

(10) **Pub. No.: US 2014/0283277 A1**

(43) **Pub. Date: Sep. 25, 2014**

(54) **MEDICAL WRAP FOR NEONATAL KANGAROO CARE**

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(21) Appl. No.: **13/849,149**

(22) Filed: **Mar. 22, 2013**

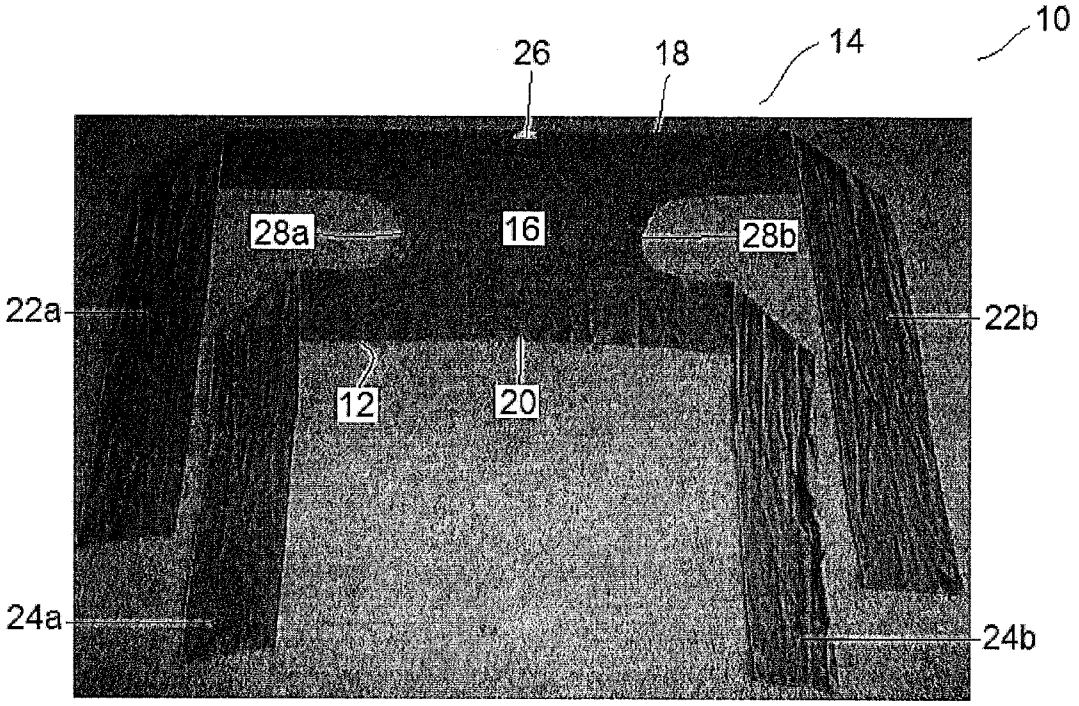
Publication Classification

(51) **Int. Cl.**
A41B 13/00 (2006.01)

(52) **U.S. Cl.**
CPC ***A41B 13/00*** (2013.01)
USPC **2/69.5**

(57) **ABSTRACT**

The invention is directed to a medical wrap for maintaining skin-to-skin contact between a wearer and a baby during kangaroo care and allowing passage of medical lines therethrough. The wrap is a single integral structure formed of a fabric and including a central portion having a top edge and a bottom edge; upper left and right members extending outwardly from the top edge of the central portion; and lower left and right members extending outwardly from the bottom edge of the central portion; wherein each of the upper members has a greater length compared to the length of each of the lower members.



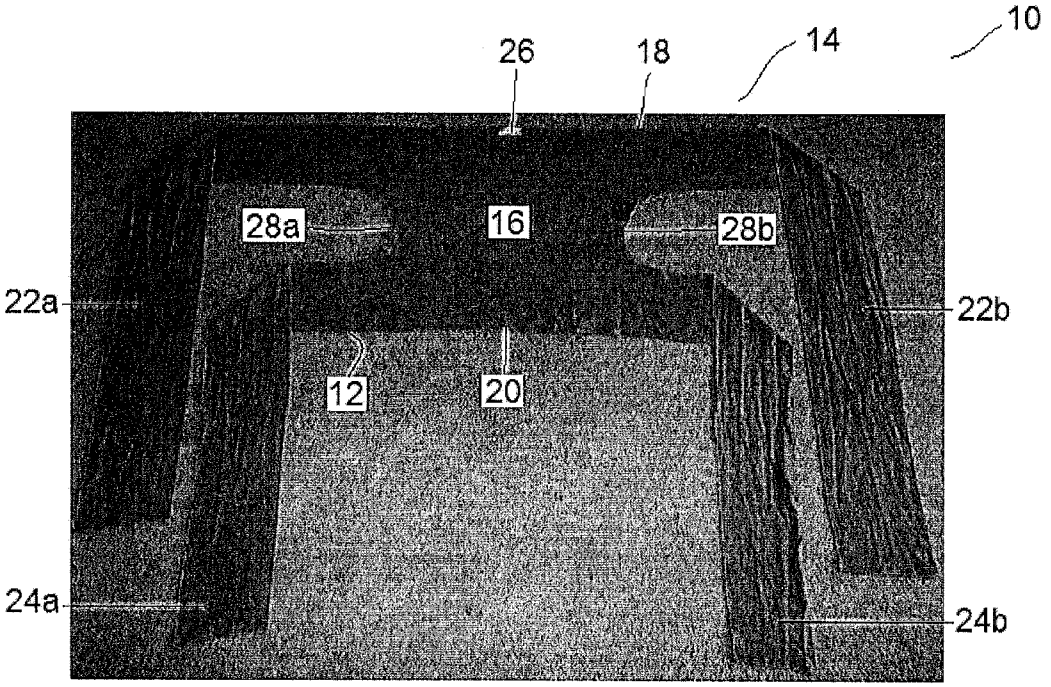


FIG. 1A

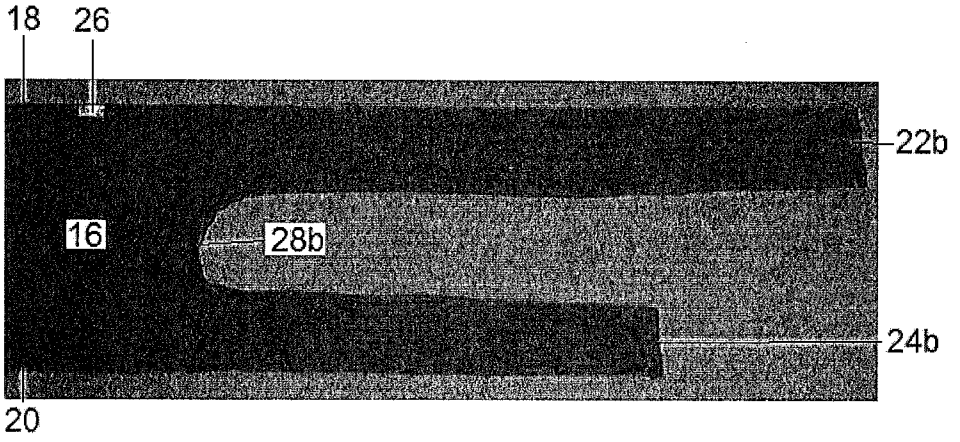


FIG. 1B

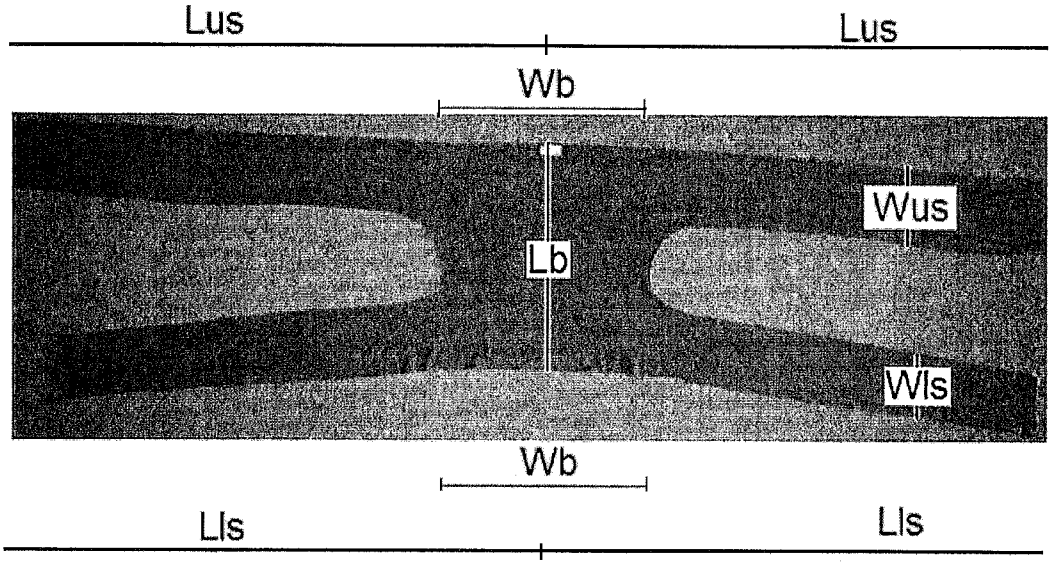


FIG. 1C

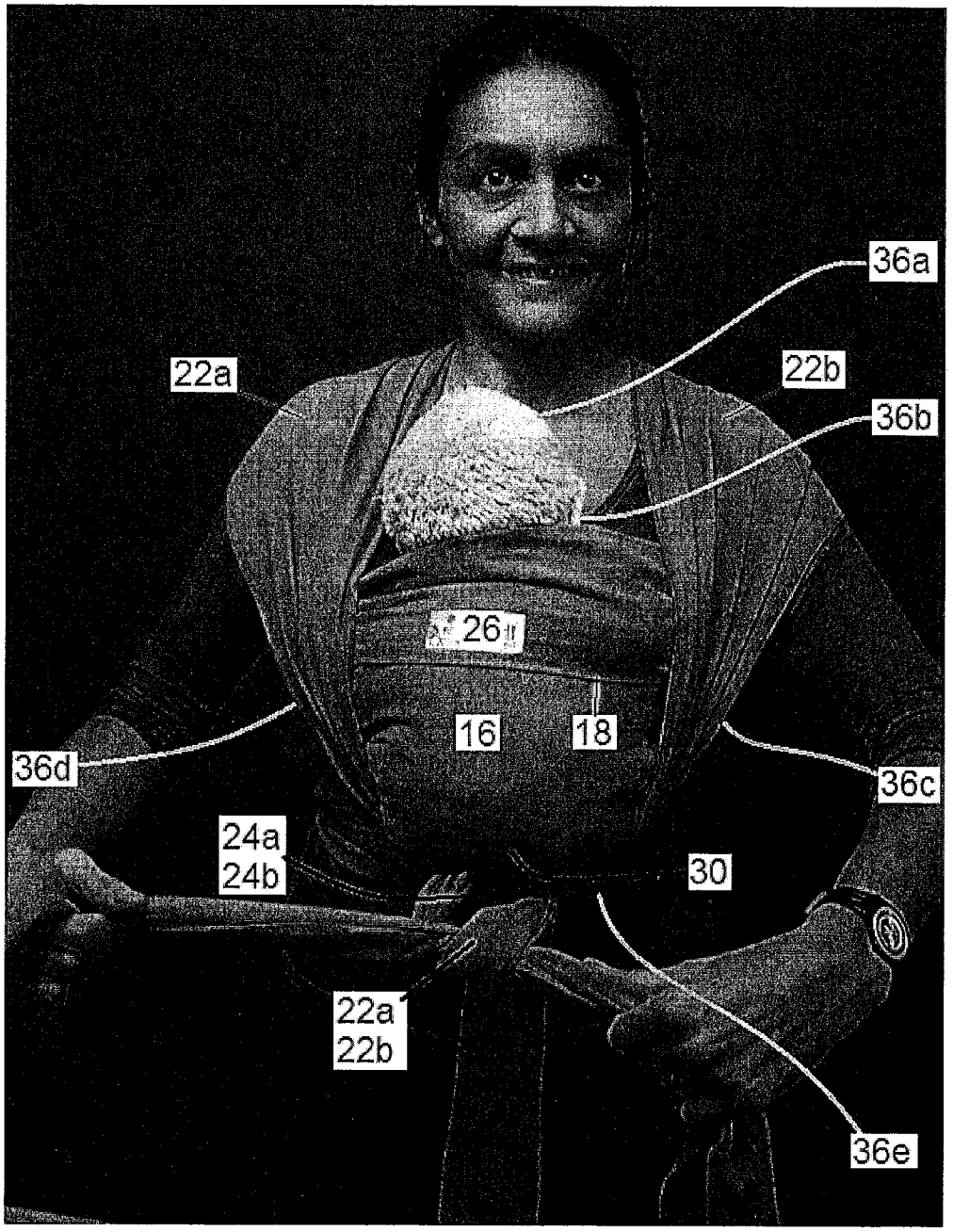


FIG. 1D

FIG. 2A

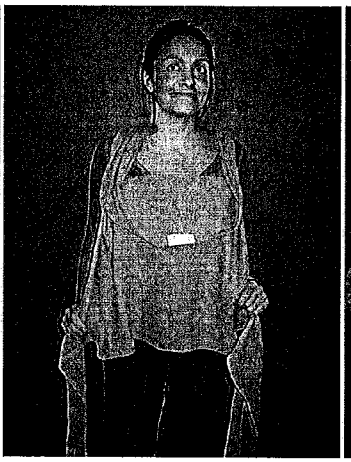


FIG. 2B

FIG. 2C

FIG. 2D

FIG. 2E

FIG. 2F

FIG. 2G

FIG. 2H

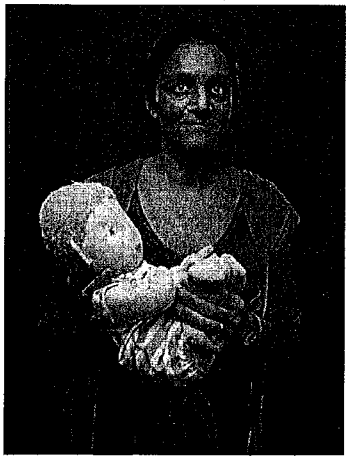


FIG. 2I

FIG. 2J

FIG. 2K

FIG. 2L

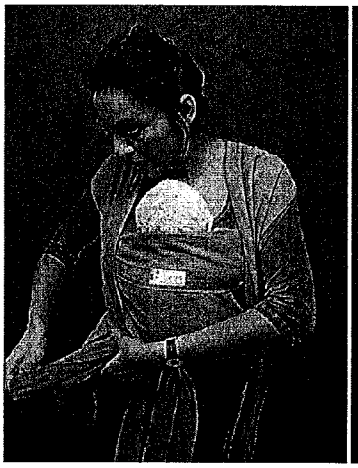


FIG. 2M

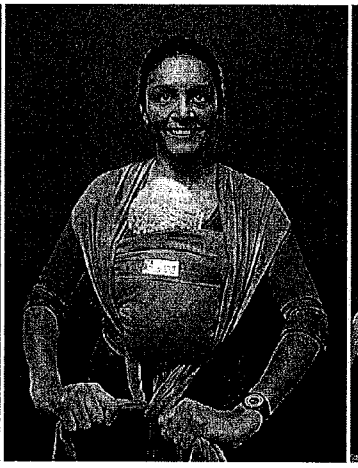


FIG. 2N

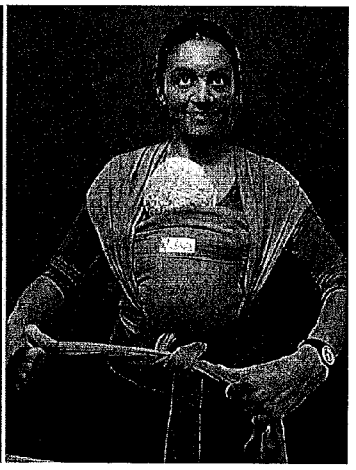


FIG. 2O

FIG. 3A

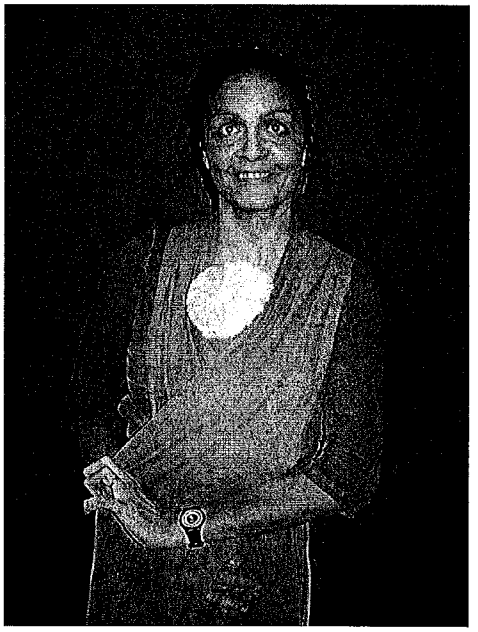


FIG. 3B

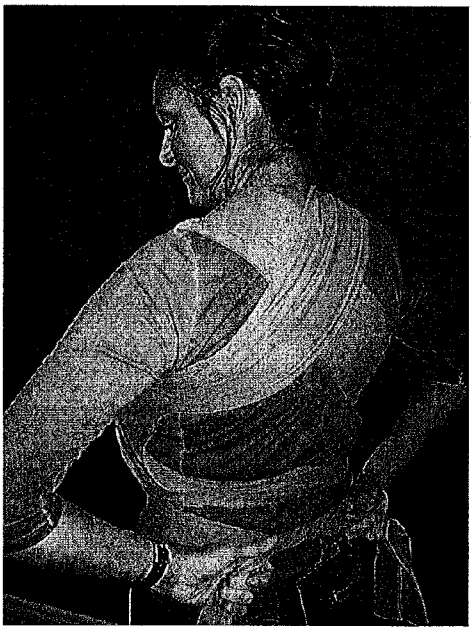


FIG. 3C

FIG. 4A

FIG. 4B

FIG. 4C

FIG. 4D

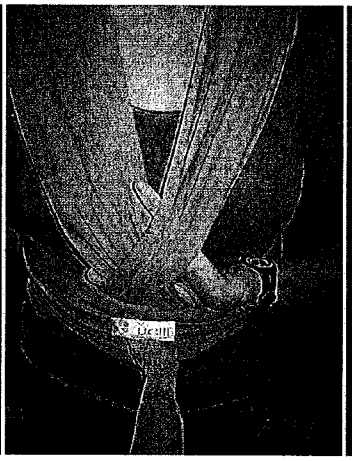


FIG. 4E

FIG. 4F

FIG. 4G

FIG. 4H

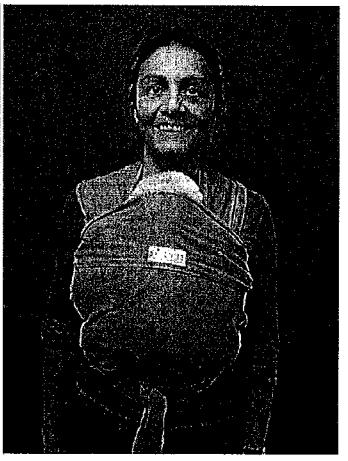


FIG. 4I

FIG. 5A

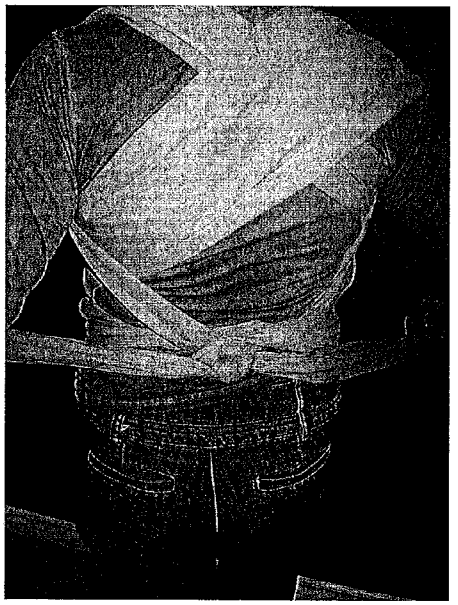
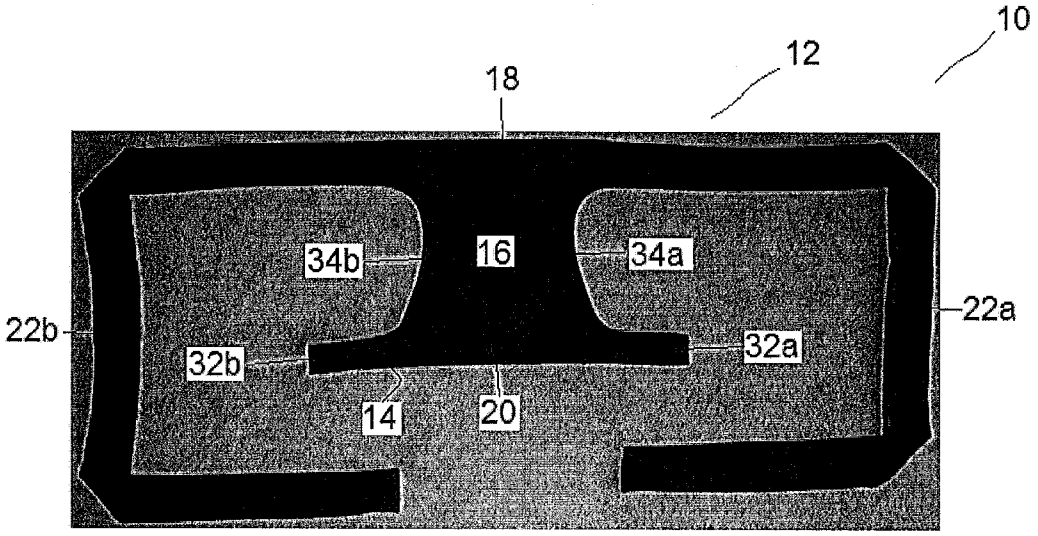


FIG. 5B

FIG. 5C


10
12
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34b
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22a
32b
32a
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20

FIG. 6A

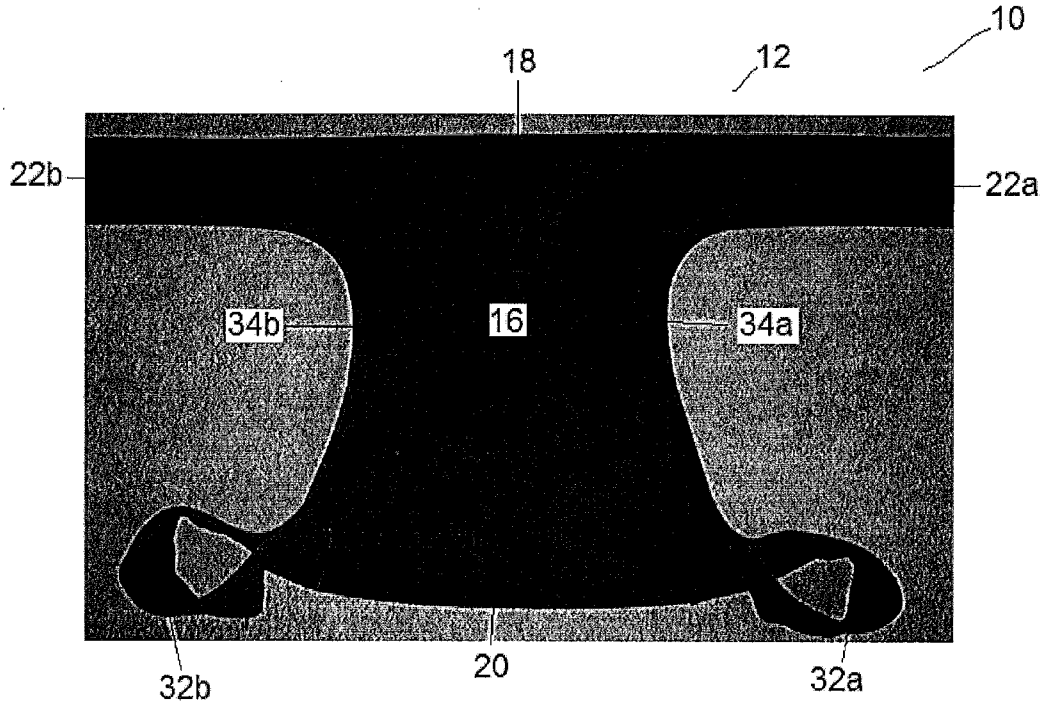
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FIG. 6B

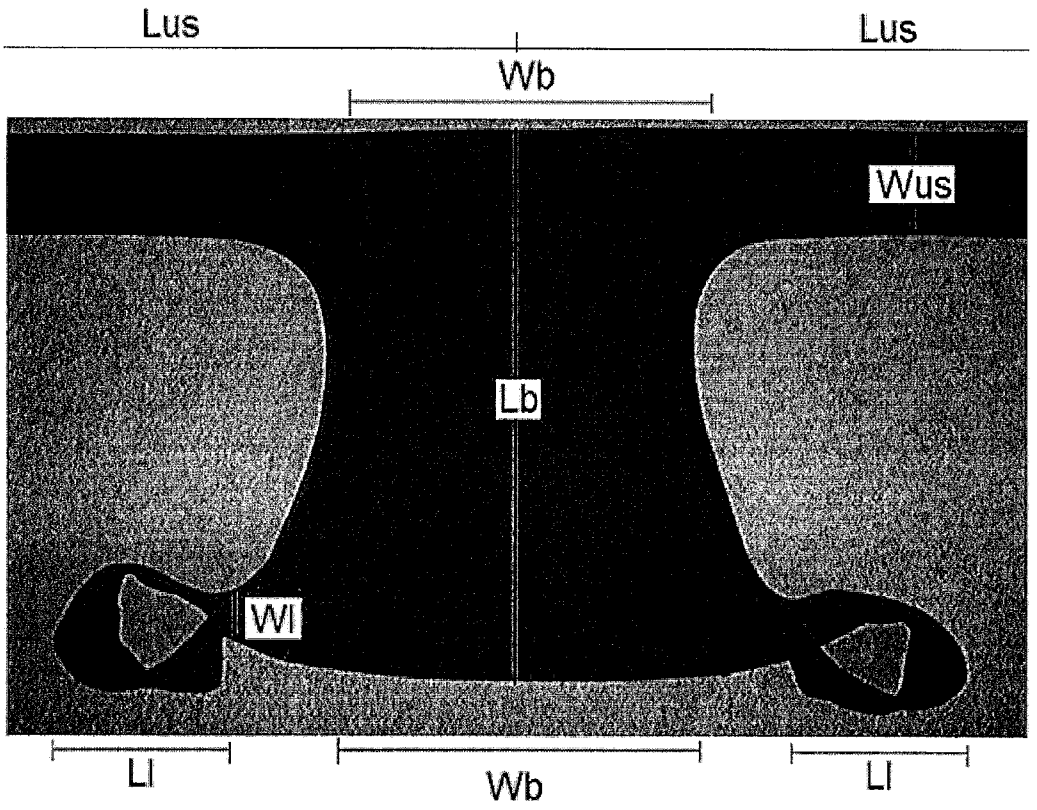

FIG. 6C

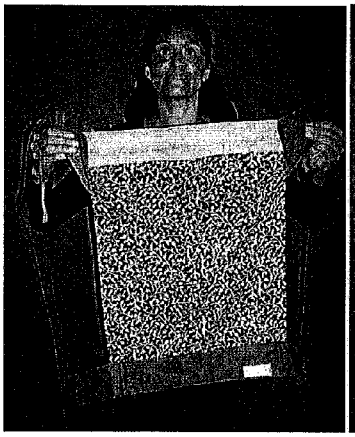

FIG. 7A

FIG. 7B

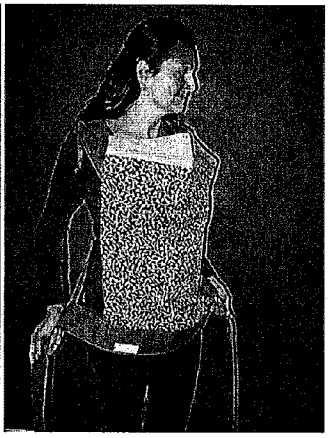

FIG. 7C

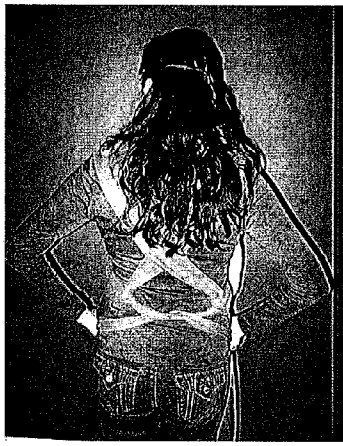

FIG. 7D

FIG. 7E

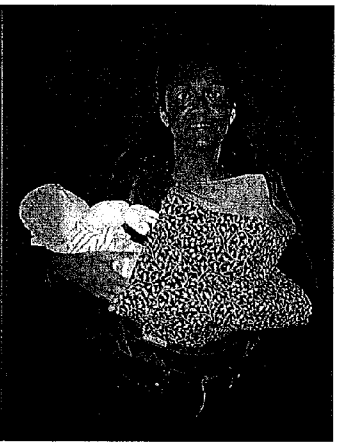

FIG. 7F

FIG. 7G

FIG. 7H

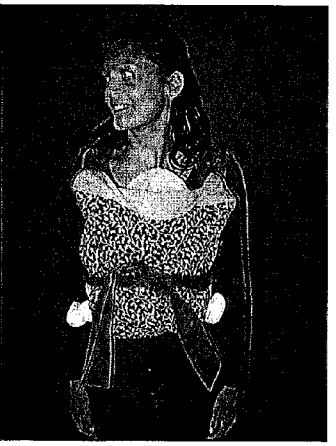

FIG. 7I

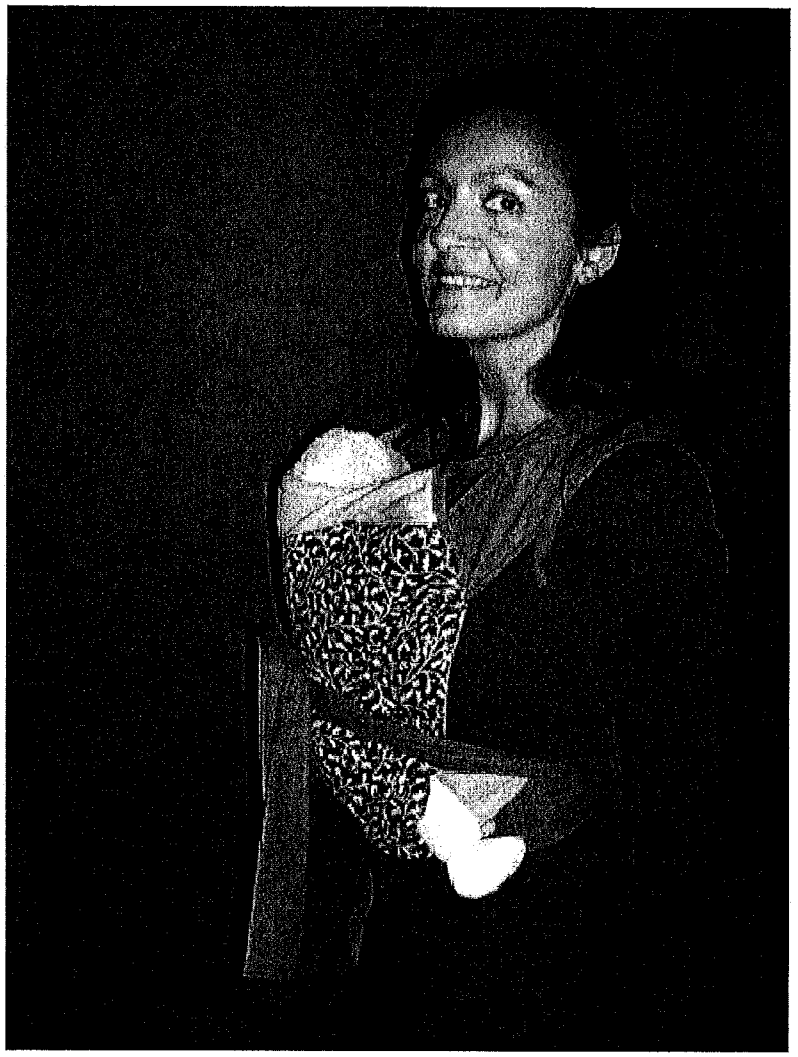

FIG. 7J

FIG. 8A

FIG. 8B

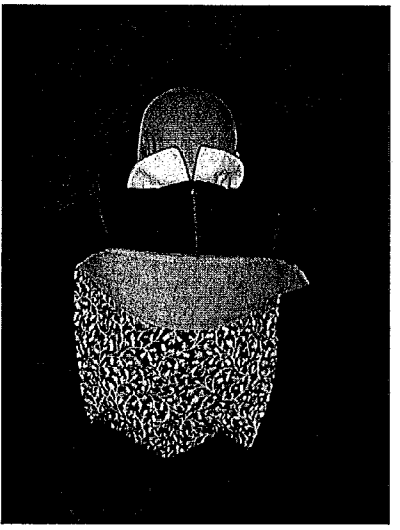

FIG. 8C

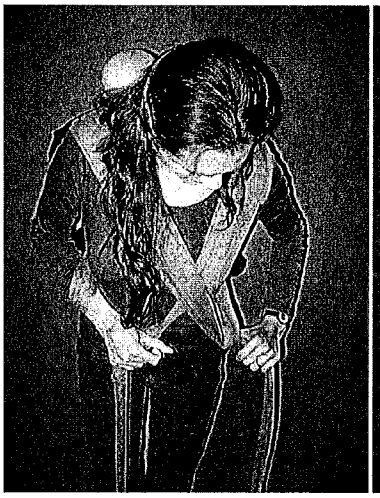

FIG. 8D

FIG. 8E

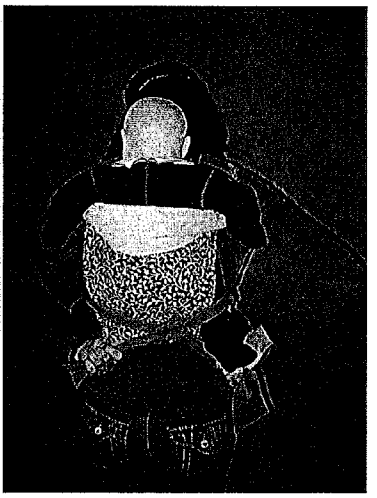

FIG. 8F

MEDICAL WRAP FOR NEONATAL KANGAROO CARE

FIELD OF THE INVENTION

[0001] The present invention relates generally to medical garments, particularly to a medical wrap for use in neonatal kangaroo care.

BACKGROUND OF THE INVENTION

[0002] Newborn premature (i.e., born before the thirty-seventh week of gestation) and low weight babies face increased risk of complications and mortality. Such babies require extensive specialized care in a neonatal intensive care unit equipped with monitoring machines to record the heart rate, respiratory rate, blood pressure, temperature, and the amount of oxygen in the blood (oximetry); alarm systems; various methods of respiratory assistance (for example, an endotracheal tube, ventilator or respirator, continuous positive airway pressure, oxygen hood); various methods of feeding (for example, intravenous lines, umbilical catheter, oral and nasal feeding, central line); protective, warming incubators; and Bili lights for treating jaundice. Multiple adhesive pads or cuffs are placed upon the chest, legs, arms, and other body parts of the premature baby, and are connected by electrical leads to the respective machines.

[0003] However, such care typically results in the separation of the parents and premature or low weight baby, thereby disrupting the bonding process. A lack of touch between the parent and baby causes release of high amounts of the toxic stress hormone cortisol which negatively impacts immune function and growth hormone. Further, in developing countries, access to medical technologies may be limited or unavailable, resulting in mortality of premature babies due to lack of proper medical care.

[0004] Kangaroo care is a method used to promote bonding between parents and their premature or low weight babies. Wearing only a hat and diaper, the baby is placed in an upright position on the parent's bare chest to be held in skin-to-skin contact with the parent. The baby's head is turned to position an ear above the parent's heart. Being held upright exposes the baby to combinations of sensory stimulation (kinesthetic, tactile, auditory, olfactory, visual and vestibular), and the flexed position of the baby more efficiently conserves heat as opposed to the baby lying on his back in an incubator.

[0005] Significant benefits of kangaroo care include enhancement of parent-baby bonding and improvement of the baby's prognosis, health and development. Kangaroo care stabilizes the baby's body temperature since the parent's body temperature will attain thermal synchrony with that of the baby. The temperature of the mother's breasts actually changes so that the baby can better maintain his own temperature. If the baby becomes too cold, the mother's body temperature will actually warm up to help warm the baby. If the baby becomes too hot, the mother's body temperature will decrease to cool the baby. Kangaroo care also stabilizes the baby's heart rate, and improves the baby's weight gain, sleep pattern, and cognitive development. The incidences of nosocomial infection, illness, lower respiratory tract disease, bradycardia, apnea, uneven breathing, high cortisol levels, pain responses, and discomfort are significantly reduced. Further, kangaroo care enables exclusive breastfeeding for a longer duration, with the skin-to-skin contact increasing milk supply and let-down. Additional benefits include reductions in the length of hospital stay, re-admissions to the hospital, and health care costs.

[0006] During kangaroo care, the baby is typically placed in position upon the parent's bare torso and covered by a light blanket or towel across the baby's back. However, the baby may easily shift from the proper position, and the parent may readily tire due to having to hold the baby continuously for at least one hour.

[0007] Various types of carriers, slings and wraps for infants have been developed but are inappropriate for kangaroo care. Structured carriers are typically formed of multiple components including a pouch, pocket, or seat for the baby, stitched seams, and fasteners such as, for example, belts, buckles, buttons, zippers, snaps, clasps, straps, ties, and VELCRO™. Such carriers are unsuitable for premature and low weight babies since the pouch or pocket may be too large to be snug enough to support the baby's body, and stitched seams and plastic/metal fasteners may damage the baby's sensitive skin. A pouch sling is a circle of cotton or cotton/lycra mix fabric having a curved seam, but must be custom fitted to the parent since a loose sling will not support the baby, while a tight sling will crush the baby. A ring sling is formed of a length of cotton fabric having two rings at one end, through which a free end threads through the rings to create a pouch which supports the baby; however, it is often difficult to achieve a close fit. Pouch and ring slings suffer from lack of security for the baby who can easily fall or slip out of the fabric.

[0008] A wrap is a short or long rectangular piece of fabric which is wrapped and tied around the parent and the baby to create a carrier. The wrap tends to be formed of stretchy fabric such as cotton/lycra mix or jersey knit. However, the wrap needs to be re-adjusted to remove as much slack as possible to hold the baby snugly. Further, as wrapping results in several overlapping layers, the baby can overheat but cannot be quickly removed from underneath these multiple layers. Stretchy fabrics will stretch further after prolonged use, necessitating a new wrap. Wrap-around shirts have been developed, but must be available in different sizes to fit the parent and include fasteners such as buttons which can press upon or damage the baby's skin.

[0009] As described above, prior art carriers, slings, and wraps are unsuitable for premature and low weight babies. Further, they do not easily accommodate medical lines connected to the baby, or enable breast pumping and breastfeeding. Accordingly, there is a need in the art for an improved wrap for kangaroo care which mitigates these problems.

SUMMARY OF THE INVENTION

[0010] The present invention relates to a medical wrap for neonatal kangaroo care.

[0011] In one aspect, the invention comprises a medical wrap for maintaining skin-to-skin contact between a wearer and a baby during kangaroo care and allowing passage of medical lines therethrough comprising:

[0012] a single integral structure formed of a fabric, the structure comprising a central portion having a top edge and a bottom edge; upper left and right members extending outwardly from the top edge of the central portion; and lower left and right members extending outwardly from the bottom edge of the central portion; wherein each of the upper members has a greater length compared to the length of each of the lower members.

[0013] In one embodiment, the upper members are spaced from the lower members by opposing U-shaped notches.

[0014] In one embodiment, the central portion is rectangular or square.

[0015] In one embodiment, the central portion has a width between about 10 inches to about 32 inches, and a length between about 15 inches to about 30 inches.

[0016] In one embodiment, each of the upper members has a length between about 60 inches to about 100 inches, and a width between about 4 inches to about 11 inches.

[0017] In one embodiment, each of the lower members has a length between about 44 inches to about 100 inches, and a width between about 4 inches to about 15 inches.

[0018] In one embodiment, the fabric comprises a linen and rayon blend.

[0019] In one embodiment, the lower members are modified to form lower left and right loops, the loops being sized to allow the upper members to extend therethrough.

[0020] In one embodiment, each of the upper members has a greater length compared to the length of each of the loops.

[0021] In one embodiment, the central portion has a width between about 10 inches to about 30 inches, and a length between about 15 inches to about 30 inches.

[0022] In one embodiment, each of the upper members has a length between about 60 inches to about 100 inches, and a width between about 2 inches to about 11 inches.

[0023] In one embodiment, each of the loops has a length between about 3 inches to about 10 inches, and a width between about 2 inches to about 7 inches.

[0024] In one embodiment, the central portion is configured to cover the wearer and define a pocket for holding the baby when the wrap is in use.

[0025] In one embodiment, the top edge is configured to form a supportive band for supporting the baby's head when the wrap is in use.

[0026] In one embodiment, the bottom edge is configured to form a base of the pocket for supporting the baby's bottom when the wrap is in use.

[0027] In one embodiment, the upper members are configured to pass over the wearer's shoulders, cross over the wearer's back, and to be tied at the front or the back of the wearer when the wrap is in use.

[0028] In one embodiment, the lower members are configured to encircle the wearer's waist when the wrap is in use.

[0029] In one aspect, the invention comprises a method for applying the above medical wrap to a wearer comprising the steps of:

[0030] a) folding over the top edge and the upper members to form a supportive band;

[0031] b) folding the bottom edge to create a pocket;

[0032] c) passing the lower members around the sides of the wearer's waist to converge at the wearer's back, running the lower members to the wearer's front, and tying the lower members;

[0033] d) passing the upper members underneath the armpits to converge at the wearer's back in a criss-cross pattern overlying the wearer's back; and

[0034] e) placing the baby within the pocket.

[0035] In one embodiment, after step (e), the upper members are passed over the wearer's shoulders to run underneath the lower members, and tied in a knot positioned underneath the pocket.

[0036] In one embodiment, after step (e), the upper members are passed over the wearer's shoulders to converge over the pocket in a criss-cross pattern, passed underneath the pocket and around to the wearer's back, and tied at the wearer's front or back.

[0037] In one embodiment, after step (d), the upper members are passed over the wearer's shoulders to converge over the wearer's chest in a criss-cross, run underneath the pocket and the lower members, and tied at the wearer's front or back, the criss-cross defining a seat for the baby.

[0038] In one embodiment, the method further comprises covering the baby with the upper members and pocket.

[0039] In one embodiment, after step (e), the upper members are passed over the wearer's shoulders and under the wearer's armpits to be tied at the wearer's back.

[0040] In one aspect, the invention comprises a method for applying the above medical wrap to a wearer comprising the steps of:

[0041] a) passing the upper members over the wearer's shoulders to converge at the wearer's back in a criss-cross pattern overlying the wearer's back;

[0042] b) passing the upper members through the loops, tying the upper members at the wearer's back, and running the upper members to the wearer's front;

[0043] c) placing the baby in the pocket; and

[0044] d) tying the upper members either at the baby's back or underneath the pocket.

[0045] In one aspect, the invention comprises a method for applying the above medical wrap to a wearer comprising the steps of:

[0046] a) placing the wrap over the baby and over the wearer's back;

[0047] b) tucking the bottom edge of the wrap underneath the baby's bottom to form the pocket;

[0048] c) passing the upper members over the wearer's shoulders to cross in front of the wearer's body, and passing the upper members through the loops; and

[0049] d) tying the upper members at the wearer's front or underneath the pocket.

[0050] Additional aspects and advantages of the present invention will be apparent in view of the description, which follows. It should be understood, however, that the detailed description and the specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0051] The invention will now be described by way of an exemplary embodiment with reference to the accompanying simplified, diagrammatic, not-to-scale drawings. In the drawings:

[0052] FIG. **1**A is a back view of one embodiment of the present invention, showing the upper left and right shoulder straps and lower left and right waist straps folded over.

[0053] FIG. **1**B is a partial view of the embodiment of FIG. **1**A, showing the upper right shoulder strap and lower right waist strap fully extended.

[0054] FIG. **1**C is a back view of the embodiment of FIG. **1**A, showing relative dimensions.

[0055] FIG. **1**D is a front view of a wearer shown wearing the embodiment of FIG. **1**A as it may be used with a baby.

[0056] FIGS. **2**A-O are views outlining steps in a method for placing the embodiment of FIG. **1**A on a wearer, according to one embodiment of the present invention.

[0057] FIGS. **3**A-C are views outlining steps in a method for placing the embodiment of FIG. **1**A on a wearer, according to one embodiment of the present invention.

[0058] FIGS. **4**A-I are views outlining steps in a method for placing the embodiment of FIG. **1**A on a wearer, according to one embodiment of the present invention.

[0059] FIGS. **5**A-C are views outlining steps in a method for placing the embodiment of FIG. **1**A on a wearer, according to one embodiment of the present invention.

[0060] FIG. **6**A is a front view of one embodiment of the present invention, showing the upper left and right shoulder straps folded over.

[0061] FIG. **6**B is an enlarged view of the embodiment of FIG. **6**A, showing the lower left and right waist loops.

[0062] FIG. **6**C is a front view of the embodiment of FIG. **6**A, showing relative dimensions.

[0063] FIGS. **7**A-J are views outlining steps in a method for placing the embodiment of FIG. **6**A on a wearer, according to one embodiment of the present invention.

[0064] FIGS. **8**A-F are views outlining steps in a method for placing the embodiment of FIG. **6**A on a wearer, according to one embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0065] Before the present invention is described in further detail, it is to be understood that the invention is not limited to the particular embodiments described, as such may, of course, vary. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting, since the scope of the present invention will be limited only by the appended claims.

[0066] Where a range of values is provided, it is understood that each intervening value, to the tenth of the unit of the lower limit unless the context clearly dictates otherwise, between the upper and lower limit of that range and any other stated or intervening value in that stated range is encompassed within the invention. The upper and lower limits of these smaller ranges may independently be included in the smaller ranges is also encompassed within the invention, subject to any specifically excluded limit in the stated range. Where the stated range includes one or both of the limits, ranges excluding either or both of those included limits are also included in the invention,

[0067] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although any methods and materials similar or equivalent to those described herein can also be used in the practice or testing of the present invention, a limited number of the exemplary methods and materials are described herein.

[0068] It must be noted that as used herein and in the appended claims, the singular forms "a", "an", and "the" include plural referents unless the context clearly dictates otherwise.

[0069] The present invention comprises a medical wrap for neonatal kangaroo care. The wrap is formed from a single section of fabric configured to be wrapped around a wearer for maintaining skin-to-skin contact between the wearer and a premature or low weight baby, and allowing passage of medical lines therethrough. As used herein, the term "wearer" means a female or male adult.

[0070] FIGS. **1**A-C generally show one embodiment of a medical wrap (**10**) of the present invention. The wrap (**10**) comprises a front side (**12**), a back side (**14**), a central portion (**16**), a top edge (**18**), a bottom edge (**20**), upper left and right members (**22***a*, **22***b*) extending outwardly from the central portion (**16**), and lower left and right members (**24***a*, **24***b*) extending outwardly from the central portion (**16**).

[0071] The front side (**12**) faces away from the wearer, while the back side (**14**) faces towards the wearer when the wrap (**10**) is in use. The central portion (**16**) or breast-covering section is of generally rectangular or square configuration, having sufficient width and length in consideration of the wearer's modesty. Since the wearer must expose her bare chest to hold the baby in skin-to-skin contact during kangaroo care, the breast-covering section (**16**) is sized to provide sufficient coverage, comfort, and warmth to the wearer. The breast-covering section (**16**) defines a pocket or pouch (**30**) within which the baby is held against the wearer in skin-to-skin contact when the wrap (**10**) is in use.

[0072] In one embodiment, the breast-covering section (**16**) has a width ("Wb") between about 10 inches to about 32 inches, and a length ("Lb") between about 15 inches to about 30 inches as measured from the top edge (**18**) to the bottom edge (**20**) (FIG. **1**C).

[0073] The breast-covering section (**16**) may be provided with an indicator (**26**) such as, for example, a label, on either the front side (**12**) or the back side (**14**) to enable centering of the breast-covering section (**16**) on the sternum of the wearer's body. Preferably, the indicator (**26**) is provided on the back side (**14**) so it does not contact the baby.

[0074] A newborn baby has little control in lifting and holding his head steady due to weak neck muscles. The top edge (**18**) forms a supportive band which supports the baby's head when the top edge (**18**) is folded downwards over itself and in a direction away from the wearer when the wrap (**10**) is in use.

[0075] The bottom edge (**20**) forms the base of a pocket or pouch (**30**) to seat and support the baby's bottom firmly when the bottom edge (**20**) is folded upwards upon itself and in a direction towards the wearer when the wrap (**10**) is in use. The bottom edge (**20**) acts as a "cummerbund" around the wearer's waist to prevent downward movement of the baby.

[0076] The upper left and right members (**22***a*, **22***b*) or shoulder straps extend outwardly from the breast-covering section (**16**) when the wrap (**10**) is laid out flat (FIGS. **1**A-C). The shoulder straps (**22***a*, **22***b*) are relatively wide and adapted to pass over the wearer's shoulders, cross over the wearer's back, and to be tied in a secure knot which is positioned either at the front or the back of the wearer. The back crossing of the shoulder straps (**22***a*, **22***b*) on the wearer and the extreme width of the shoulder straps (**22***a*, **22***b*) secure the wrap (**10**) to the wearer in a manner that improves comfort and minimizes the downward force or strain on the wearer's shoulders caused by the weight of the baby. In addition, the width of the shoulder straps (**22***a*, **22***b*) promotes safety, since narrower straps are likely to cut into the wearer's skin, or to rip or tear under the weight of the baby. The positioning of the knot in front of the wearer and underneath the pouch (**30**) provides additional support underneath the baby's bottom.

[0077] The lower left and right members (**24***a*, **24***b*) or waist straps extend outwardly from the breast-covering section (**16**)

when the wrap (**10**) is laid out flat (FIGS. **1**A-C). The waist straps (**24***a*, **24***b*) are relatively wide and adapted to encircle the wearer's waist to be tied in a secure knot which is positioned either at the front or the back of the wearer to secure the pouch (**30**) above the wearer's umbilicus. When positioned at the front of the wearer, the knot assists in preventing the baby from falling or slipping out of the wrap (**10**).

[0078] In one embodiment, each of the upper left and right shoulder straps (**22***a*, **22***b*) has a greater length compared to the length of each of the lower left and right waist straps (**24***a*, **24***b*) (FIGS. **1**B-C). In one embodiment, each of the upper left and right straps (**22***a*, **22***b*) has a length ("Lus") between about 60 inches to about 100 inches as measured from the indicator (**26**) positioned in the middle of the breast-covering section (**16**), and a width ("Wus") between about 4 inches to about 11 inches. In one embodiment, each of the lower left and right waist straps (**24***a*, **24***b*) has a length ("Lls") between about 44 inches to about 100 inches as measured from the middle of the breast-covering section (**16**), and a width ("Wls") between about 4 inches to about 15 inches.

[0079] The upper left and right shoulder straps (**22***a*, **22***b*) are spaced from the lower left and right waist straps (**24***a*, **24***b*) by substantially opposing U-shaped notches (**28***a*, **28***b*), rendering a substantially "butterfly-like" shape. The "butterfly-like" shape of the wrap (**10**) provides sufficient coverage for the wearer's chest and support for the baby. In addition, the notches (**28***a*, **28***b*) define side openings when the wrap (**10**) is in use to accommodate, route and allow access to medical lines (**36***a*, **36***b*, **36***c*, **36***d*, **36***e*; FIG. **1**D) connected to the baby, and to enable the mother to pump her breasts.

[0080] The wrap (**10**) is formed of a fabric having sufficient resilience and stretch to encircle the wearer's torso snugly, yet comfortably, and to impart sufficient compression to position and support the baby without applying constrictive pressure. The fabric is also soft, lightweight, natural, and breathable to ensure that the parent and baby do not overheat. Further, the fabric may also be machine washable and dryable at low heat to be appropriate for both hospital and home use. Suitable fabrics include, but are not limited to, natural, man-made, and any blend of natural and man-made fibers such as, for example, linen, rayon, linen/rayon blend, cotton, bamboo, polyester, ramie, silk, tencel, elasthane, and the like.

[0081] In one embodiment, the fabric comprises linen and rayon blend. A linen/rayon blend combines the toughness, durability, and air permeability of linen with the stretchiness and softness of rayon. In one embodiment, the fabric comprises between about 40% to about 60% linen, and between about 40% to about 60% rayon. In one embodiment, the fabric comprises 55% linen and 45% rayon blend. The fabric may also be water-resistant, non-allergenic, and non-irritating.

[0082] The wrap (**10**) is of one-piece construction and is formed by cutting the fabric on the bias at an angle of 45 degrees to its warp and weft threads in the configuration shown in FIG. **1**A. Since the fabric is cut along the diagonal, it imparts greater stretch to the wrap (**10**) than if it is cut along the grain. The wrap (**10**) may be serged on the edges with poly, wool/nylon, nylon, cotton or elasticized thread along all sides using an overlock stitch to prevent fraying. The wrap (**10**) is formed solely of fabric, with the exception of thread on the edges in the event that the wrap (**10**) is serged. The wrap (**10**) lacks any stitched seams or fasteners (for example, belts, buckles, buttons, zippers, snaps, clasps, and VELCRO™) which would damage the baby's sensitive skin and increase costs. Being formed of lightweight fabric, the wrap (**10**) is foldable and portable.

[0083] The wrap (**10**) is conveniently designed as "one size fits all" to accommodate a wide range of sizes of wearer (i.e, both women and men); thus, different sizes of wrap (**10**) are not required. Both the mother and father may thus share the same wrap (**10**) without having to purchase two separate sizes. Since the wrap (**10**) is constructed as one-piece and as "one size fits all" from readily available fabric, the wrap (**10**) is relatively inexpensive to manufacture and budget-friendly for the consumer.

[0084] Arrangements of the wrap (**10**) to achieve different configurations arc illustrated in FIGS. **2**A-O, FIGS. **3**A-**3**C, FIGS. **4**A-I and FIGS. **5**A-C which show embodiments of the wrap (**10**) in use. When the wrap (**10**) is wrapped and tied on the wearer, the baby is secured and supported in skin-to-skin contact with the wearer,

[0085] Referring to FIGS. **2**A-O, there is shown one embodiment of a step-by-step sequence for placing the wrap (**10**) on the wearer (a "basic" configuration). Initially, the wrap (**10**) is held by the upper left and right shoulder straps (**22***a*, **22***b*) with the indicator (**26**) centered at the sternum of the wearer. The top edge (**18**) and shoulder straps (**22***a*, **22***b*) are folded over (i.e., at about the width of the shoulder straps), with the indicator (**26**) facing away from the wearer (FIG. **2**A). The shoulder straps (**22***a*, **22***b*) are draped over the wearer's left and right shoulders, respectively (FIG. **2**B), to free the wearer's hands for folding the bottom edge (**20**) of the wrap (**10**) towards the wearer to create a pouch (**30**) for the baby (FIG. **2**C). The base of the pouch (**30**) rests above the wearer's umbilicus.

[0086] The lower left and right waist straps (**24***a*, **24***b*) are passed around the sides of the wearer's waist to converge at the wearer's back (FIG. **2**D), and then brought to the wearer's front to be connected together by tying a secure knot (FIG. **2**E). The shoulder straps (**22***a*, **22***b*) are passed underneath the armpits (FIG. **2**F) to converge at the wearer's back in a criss-cross pattern overlying the wearer's back (FIG. **2**G), and then draped over the wearer's shoulders to the front of the body (FIG. **2**H) in order to free the wearer's hands for placing the baby within the pouch (**30**) (FIG. **2**I).

[0087] The wearer supports the baby's head and legs as the baby is placed to sit upright in a frog position within the pouch (**30**) (FIG. **2**J). In the frog position, the baby's bottom is downward, the knees are bent outwards, the legs are raised to a 90° angle to the spine, and the arms are raised up to the sides or positioned at an oblique angle. The top of the wrap (**10**) is positioned at the baby's mid-ear level, with the baby's head turned to the side and in a neutral position. The baby's stomach is positioned in skin-to-skin contact with the wearer's chest. Alternatively, the baby may be positioned correctly upon the wearer's chest and the wrap (**10**) is then pulled over the baby.

[0088] The shoulder straps (**22***a*, **22***b*) are straightened to lie comfortably over the wearer's shoulders (FIG. **2**K) and are pulled downwardly to be tucked underneath the waist straps (**24***a*, **24***b*) at the waist (FIG. **2**L-M) and knotted together underneath the base of the pouch (**30**), thereby supporting the baby's bottom (FIG. **2**N-O). Alternately, the shoulder straps (**22***a*, **22***b*) may be crossed underneath the base of the pouch (**30**), thereby supporting the baby's bottom, and tied behind the wearer's back,

[0089] Referring to FIGS. **3**A-C, there is shown one embodiment of a step-by-step sequence for placing the wrap (**10**) on the wearer (a "cross-over" configuration). The cross-over configuration is suitable for newborn and older babies. After the baby has been placed into the pouch (**30**) as shown in FIG. **2**M, the upper left and right shoulder straps (**22***a*, **22***b*) are pulled downwardly over the wearer's shoulders to converge over the pouch (**30**) in a criss-cross pattern without covering the baby's head (FIG. **3**B). The shoulder straps (**22***a*, **22***b*) are passed underneath the base of the pouch (**30**) to support the baby's bottom, and around to the wearer's back (FIG. **3**C). The shoulder straps (**22***a*, **22***b*) may then be tied in a knot at the front or back of the wearer's waist, depending upon the waist size of the wearer. The shoulder straps (**22***a*, **22***b*) are then straightened over the wearer's shoulders to ensure a comfortable fit.

[0090] Referring to FIGS. **4**A-I, there is shown one embodiment of a step-by-step sequence for placing the wrap (**10**) on the wearer (a "cross-under" configuration). This configuration allows the mother to pump her breasts without removing the baby, to use the wrap (**10**) with later term premature babies, and to carry the baby safely. After the step shown in FIG. **2**H, the upper left and right shoulder straps (**22***a*, **22***b*) are pulled downwardly over the wearer's shoulders to converge over the wearer's chest in a criss-cross pattern, and are then passed underneath the pouch (**30**) and the waist straps (**24***a*, **24***b*) which have been tied at the waist (FIGS. **4**B-C). The shoulder straps (**22***a*, **22***b*) may be tied in the front or back (FIG. **4**D) of the wearer's waist, depending upon the waist size of the wearer. The criss-cross defines a seat (FIG. **4**E) into which the baby is placed in a straddling position (FIG. **4**F-G). The shoulder straps (**22***a*, **22***b*) are then spread to cover the baby (FIG. **4**H) without covering the baby's head, and the pouch (**30**) is pulled upwardly to cover the criss-cross (FIG. **4**I). To enable pumping, the mother lowers the pouch (**30**), thereby allowing the mother to pump her breasts while simultaneously supporting the baby. The prolonged skin-to-skin contact between the mother and the baby increases milk supply and let-down.

[0091] Referring to FIGS. **5**A-C, there is shown one embodiment of a step-by-step sequence for placing the wrap (**10**) on the wearer (a "back tie" configuration). This configuration is suitable for a plus size parent. After the step shown in FIG. **2**M with the baby placed in the pouch (**30**), the upper left and right shoulder straps (**22***a*, **22***b*) are pulled downwardly over the shoulders, and are passed under the wearer's armpits to be tied at the wearer's back (FIGS. **5**B-C).

[0092] Premature and low weight babies usually require assistance to breathe and eat, and are often fully instrumented. It is thus frequently necessary, or at least desirable, to leave medical lines attached to the baby. As used herein, the term "medical line" means any tubing, wiring, and similar lines that are commonly connected to the baby including, but not limited to, lines for recording the heart rate, respiratory rate, blood pressure, temperature, and the amount of oxygen in the blood; for assisting in respiration (for example, an endotracheal tube, ventilator or respirator, continuous positive airway pressure, oxygen hood); for feeding (for example, intravenous lines, umbilical catheter, oral and nasal feeding, central line), and the like. Since babies have less skin surface area available for attachment of medical lines, each line is precisely positioned, and the position of such is fixed relative to the baby to prevent migration or dislodgment.

[0093] The embodiments of the wrap (**10**) are configured for passage of medical lines therethrough (**36***a*, **36***b*, **36***c*, **36***d*, **36***e*; FIG. **1**D). The configuration of the wrap (**10**) in a substantially "butterfly-like" shape is conducive to accommodating or routing the lines (**36***a*, **36***b*, **36***c*, **36***d*, **36***e*) and allowing access to the lines (**36***a*, **36***b*, **36***c*, **36***d*, **36***e*) connected to the baby from the top, bottom, and sides of the wrap (**10**), once the wrap (**10**) has been placed on the wearer and the baby is seated in the pouch (**30**). When using the wrap (**10**), the lines (**36***a*, **36***b*, **36***c*, **36***d*, **36***e*) do not have to be disconnected or removed from the baby, and can remain properly and comfortably attached to the baby during kangaroo care without migration, dislodgment, retraction, or advancement. Stabilization of the lines (**36***a*, **36***b*, **36***c*, **36***d*, **36***e*) is important since movement or awkward positioning of the lines (**36***a*, **36***b*, **36***c*, **36***d*, **36***e*) can irritate the baby's nostrils or skin. Further, retraction or advancement of the lines (**36***a*, **36***b*, **36***c*, **36***d*, **36***e*) (for example, feeding tubes) must be prevented.

[0094] The wrap (**10**) of the present invention is not limited to wraps having the configuration illustrated in FIGS. **1**A-C. In one embodiment shown in FIGS. **6**A-C, the wrap (**10**) comprises a front side (**12**), a back side (**14**), a breast-covering section (**16**), a top edge (**18**), a bottom edge (**20**), upper left and right shoulder straps (**22***a*, **22***b*), and lower left and right waist loops (**32***a*, **32***b*). The waist loops (**32***a*, **32***b*) are formed by shortening the lower left and right waist straps (**24***a*, **24***b*), doubling back the ends of the shortened waist straps (**24***a*, **24***b*), and attaching (e.g., sewing) the loops (**32***a*, **32***b*) to the bottom edge (**20**) so as to hold the loop formation. The shoulder straps (**22***a*, **22***b*) are spaced from the waist loops (**32***a*, **32***b*) by substantially opposing U-shaped notches (**34***a*, **34***b*), rendering a substantially "butterfly-like" shape. Each of the shoulder straps (**22***a*, **22***b*) has a greater length compared to the length of each of the waist loops (**32***a*, **32***b*). The waist loops (**32***a*, **32***b*) are sized to allow the shoulder straps (**22***a*, **22***b*) to extend therethrough.

[0095] In one embodiment, the breast-covering section (**16**) has a width ("Wb") between about 10 inches to about 30 inches. In one embodiment, the breast-covering section (**16**) has a length ("Lb") between about 15 inches to about 30 inches as measured from the top edge (**18**) to the bottom edge (**20**).

[0096] In one embodiment, each of the upper left and right shoulder straps (**22***a*, **22***b*) has a length ("Lus") between about 60 inches to about 100 inches as measured from the middle of the breast-covering section (**16**), and a width ("Wus") between about 2 inches to about 11 inches. In one embodiment, each of the lower left and right waist loops (**32***a*, **32***b*) has a length ("Ll") between about 3 inches to about 10 inches, and a width ("Wl") between about 2 inches to about 7 inches. The wrap (**10**) may be formed of suitable fabrics including, but are not limited to, natural, man-made, and any blend of natural and man-made fibers such as, for example, micro-suede, cotton, micro-suede/cotton blend, bamboo, ramie, silk, tencel, linen, line/silk blend, linen/cotton blend, polyester/cotton blend, rayon, nylon, polyester, polyester/nylon mesh, elasthane, and the like.

[0097] Referring to FIGS. **7**A-J, there is shown one embodiment of a step-by-step sequence for placing the wrap (**10**) having waist loops (**32***a*, **32***b*) on the wearer (a "front carry" configuration). Initially, the wrap (**10**) is held by the upper left and right shoulder straps (**22***a*, **22***b*) (FIG. **7**A). The shoulder straps (**22***a*, **22***b*) are passed over the wearer's shoulders to converge at the wearer's back in a criss-cross pattern

overlying the wearer's back (FIG. **7**B). The shoulder straps (**22***a*, **22***b*) are passed through the lower waist loops (**32***a*, **32***b*) (FIG. **7**C), and are then tied at the wearer's back (FIG. **7**D) before being run to the wearer's front where they are tucked into the pant pockets, gripped between the wearer's legs, or tied (FIG. **7**E). Ensuring that the bottom edge (**20**) of the wrap (**10**) is snug above the wearer's umbilicus to form a pouch (**30**) for the baby, the wearer inserts the baby into the pouch (**30**) from either the side (FIG. **7**F) or top (FIG. **7**G) of the wrap (**10**) to sit upright in a frog position, with the baby's feet facing outwardly over the waist loops (**32***a*, **32***b*) (FIG. **7**H). The top edge (**18**) of the wrap (**10**) is positioned at the baby's mid-ear level, with the baby's head turned to the side and in a neutral position. The shoulder straps (**22***a*, **22***b*) are then pulled tightly and are tied in a knot either at the baby's back (FIGS. **7**I-J) or underneath the base of the pouch (**30**), thereby supporting the baby's bottom.

[0098] Referring to FIGS. **8**A-F, there is shown one embodiment of a step-by-step sequence for placing the wrap (**10**) having waist loops (**32***a*, **32***b*) on the wearer (a "back carry" configuration). Initially, the wrap (**10**) is placed over the baby, with the shoulder straps (**22***a*, **22***b*) placed underneath the baby's armpits (FIG. **8**A). While leaning slightly forward, the wearer carefully positions the baby and wrap (**10**) over her back (FIG. **8**B). The bottom edge (**20**) of the wrap (**10**) is tucked underneath the baby's bottom to form the pouch (**30**), with the baby's feet facing outwardly over the waist loops (**32***a*, **32***b*) (FIG. **8**C). The shoulder straps (**22***a*, **22***b*) are passed over the wearer's shoulders, crossed in front of the wearer's body, and tucked into the pant pockets or gripped between the wearer's legs to allow grasping of the waist loops (**32***a*, **32***b*) (FIG. **8**D). While holding both the shoulder straps (**22***a*, **22***b*) and waist loops (**32***a*, **32***b*), the wearer passes the right shoulder strap (**22***b*) through the left waist loop (**32***a*), and the left shoulder strap (**22***a*) through the right waist loop (**32***b*) (FIG. **8**E). The shoulder straps (**22***a*, **22***b*) are then pulled tightly and tied in a knot either at the wearer's front or underneath the base of the pouch (**30**), thereby supporting the baby's bottom (FIG. **8**F).

[0099] The wrap (**10**) of the present invention may be used in a variety of situations and in various ways. Typically, the wrap (**10**) is used for neonatal kangaroo care. Since the wrap (**10**) is easy to use, the wearer can place the wrap (**10**) on her/his bare chest in the privacy of home prior to a hospital visit. Use of the wrap (**10**) is not limited to only premature and low weight babies. The wrap (**10**) may be useful for older babies. The wrap (**10**) may used as a baby carrier to support a baby.

[0100] The embodiment shown in FIGS. **1**A-C may be used with a single baby having a weight up to about 10 kg (22 lbs), or even with two premature or low weight babies sharing the same wrap (**10**).

[0101] The embodiment shown in FIGS. **6**A-C may be used with a baby having a weight up to a maximum of about 11 kg (25 lbs) to about 16 kg (35 lbs) depending upon the fabric and intended use. Preferably, the baby is at least three months of age and has developed head control. The wrap (**10**) may be formed of polyester/nylon mesh for use in water (for example, a swimming pool). The wrap (**10**) can support a baby having a weight of up to 16 kg (35 lbs) in water, or a baby having a weight ranging from about 4 kg (10 lbs) to about 11-16 kg (25-35 lbs) outside of water. The wrap (**10**) may be formed of non-mesh, double-sided fabric (such as, for example, microsuede/cotton blend, linen/silk blend, linen/cotton blend).

[0102] In one embodiment, the wrap (**10**) of the embodiment shown in FIGS. **1**A-C has a wider body portion (**16**) than the body portion (**16**) of the embodiment shown in FIGS. **6**A-C in order to be supportive and safe for use with a premature or low weight baby who has little control in lifting and holding his head steady. In comparison, the narrower body portion (**16**) of the embodiment shown in FIGS. **6**A-C is suitable for an older baby who has developed head control. One skilled in the art would consider that a greater amount of fabric would be needed to support a larger baby compared to a smaller baby. However, the present invention indicates that a wider wrap (**10**) is required for a smaller baby, whereas a narrower wrap (**10**) is needed for a larger baby.

[0103] When worn, the wrap (**10**) does not interfere with body motions and does not restrict the usefulness or movement of the hands and arms such that the wearer may manipulate other articles without the inconvenience of having to maintain a constant grip or hold on the baby. The wrap (**10**) conveniently provides freedom for the hands and arms of the wearer to accomplish other activities (for example, reading, working, shopping, household chores, etc.) while the baby is supported securely within the wrap (**10**) against the wearer. The physical and emotional closeness between the wearer and baby are thus prolonged, enhancing the baby-parent relationship.

[0104] It should be apparent, however, to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the disclosure. Moreover, in interpreting the disclosure, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms "comprises" and "comprising" should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced.

References

[0105] All publications mentioned herein are incorporated herein by reference (where permitted) to disclose and describe the methods and/or materials in connection with which the publications are cited. The publications discussed herein are provided solely for their disclosure prior to the filing date of the present application. Nothing herein is to be construed as an admission that the present invention is not entitled to antedate such publication by virtue of prior invention. Further, the dates of publication provided may be different from the actual publication dates, which may need to be independently confirmed.

[0106] Carter, K. T. Infant carrier. U.S. Pat. Des. 247,199, issued Feb. 7, 1978.

[0107] Dardel, J. and Pavlik, S. Baby carrier. United States Patent Application Publication No. 2012/0286002 A1, published Nov. 15, 2012.

[0108] Heidt, E. S. Custom fitting, hands-free, baby wrap carrier article for infants and toddlers. United States Patent Application Publication No. 2005/0133551 A1, published Jun. 23, 2005.

[0109] Heine, N. Method for attaching textile baby carrying sheet to body, comprising loose ends left in front for adjustment. German Patent No. 10 2004 042 328 B3, issued Mar. 9, 2006.

[0110] Hiniduma-Lokuge, P. D. Infant carrier. United States Patent Application Publication No. 2008/0149674 A1, published Jun. 26, 2008.
[0111] Hiniduma-Lokuge, P. D. Infant carrier. United States Patent Application Publication No. 2012/0234877 A1, published Sep. 20, 2012.
[0112] Hoffman, E. Baby carrier. European Patent Application No. 0 792 605 A1, published Feb. 28, 1997.
[0113] Larch, D. Carrying device for a baby or a small child. United States Patent Application Publication No. 2010/0160885 A1, published Jun. 28, 2012.
[0114] Moftakhar, N. Baby carrier. United States Patent Application Publication No. 2010/0200626 A1, published Aug. 12, 2010.
[0115] Napolitano, N. A. Baby carrying device. U.S. Pat. No. 4,579,264, issued Apr. 1, 1986.
[0116] Parness, M. A.; Lighthall, S. and Ward, M. United States Patent Application Publication No. 2011/0240693 A1, published Oct. 6, 2011.
[0117] Powell, K. L. Baby sling. U.S. Pat. No. 5,950,887, issued Sep. 14, 1999.
[0118] Rahni, K. Wearable carrier. United States Patent Application Publication No. 2012/0248159 A1, published Oct. 4, 2012.
[0119] Reding, N. L. Child carrying harness. U.S. Pat. No. 4,544,088, issued Oct. 1, 1985.
[0120] Shatzkin, E. and Williams, M. Adult infant bonding garment. U.S. Pat. No. 5,946,725, issued Sep. 7, 1999.
[0121] Teetz, J. Baby-tragetuch mit schnalle. DE 20 2010 007 192 U1, issued Dec. 16, 2010.
[0122] Zack, E. Easy wrap carrier with lumbar support. International Publication No. WO 2012/109467 A1, published Aug. 16, 2012.

What is claimed is:

1. A medical wrap for maintaining skin-to-skin contact between a wearer and a baby during kangaroo care and allowing passage of medical lines therethrough comprising:

a single integral structure formed of a fabric, the structure comprising a central portion having a top edge and a bottom edge; upper left and right members extending outwardly from the top edge of the central portion; and lower left and right members extending outwardly from the bottom edge of the central portion; wherein each of the upper members has a greater length compared to the length of each of the lower members.

2. The wrap of claim **1**, wherein the upper members are spaced from the lower members by opposing U-shaped notches.

3. The wrap of claim **1**, wherein the central portion is rectangular or square.

4. The wrap of claim **3**, wherein the central portion has a width between about 10 inches to about 32 inches, and a length between about 15 inches to about 30 inches.

5. The wrap of claim **1**, wherein each of the upper members has a length between about 60 inches to about 100 inches, and a width between about 4 inches to about 11 inches.

6. The wrap of claim **1**, wherein each of the lower members has a length between about 44 inches to about 100 inches, and a width between about 4 inches to about 15 inches.

7. The wrap of claim **1**, wherein the fabric comprises a linen and rayon blend.

8. The wrap of claim **1**, wherein the lower members are modified to form lower left and right loops, the loops being sized to allow the upper members to extend therethrough.

9. The wrap of claim **8**, wherein each of the upper members has a greater length compared to the length of each of the loops.

10. The wrap of claim **8**, wherein the central portion has a width between about 10 inches to about 30 inches, and a length between about 15 inches to about 30 inches.

11. The wrap of claim **8**, wherein each of the upper members has a length between about 60 inches to about 100 inches, and a width between about 2 inches to about 11 inches.

12. The wrap of claim **8**, wherein each of the loops has a length between about 3 inches to about 10 inches, and a width between about 2 inches to about 7 inches.

13. The wrap of claim **1**, wherein the central portion is configured to cover the wearer and define a pocket for holding the baby when the wrap is in use.

14. The wrap of claim **13**, wherein the top edge is configured to form a supportive band for supporting the baby's head when the wrap is in use.

15. The wrap of claim **14**, wherein the bottom edge is configured to form a base of the pocket for supporting the baby's bottom when the wrap is in use.

16. The wrap of claim **15**, wherein the upper members are configured to pass over the wearer's shoulders, cross over the wearer's back, and to be tied at the front or the back of the wearer when the wrap is in use.

17. The wrap of claim **16**, wherein the lower members are configured to encircle the wearer's waist when the wrap is in use.

18. A method for applying the medical wrap of claim **1** to a wearer comprising the steps of:

a) folding over the top edge and the upper members to form a supportive band;
b) folding the bottom edge to create a pocket;
c) passing the lower members around the sides of the wearer's waist to converge at the wearer's back, running the lower members to the wearer's front, and tying the lower members;
d) passing the upper members underneath the armpits to converge at the wearer's back in a criss-cross pattern overlying the wearer's back; and
e) placing the baby within the pocket.

19. The method of claim **18**, wherein after step (e), the upper members are passed over the wearer's shoulders to run underneath the lower members, and tied in a knot positioned underneath the pocket.

20. The method of claim **18**, wherein after step (e), the upper members are passed over the wearer's shoulders to converge over the pocket in a criss-cross pattern, passed underneath the pocket and around to the wearer's back, and tied at the wearer's front or back.

21. The method of claim **18**, wherein after step (d), the upper members are passed over the wearer's shoulders to converge over the wearer's chest in a criss-cross, run underneath the pocket and the lower members, and tied at the wearer's front or back, the criss-cross defining a seat for the baby.

22. The method of claim **21**, further comprising covering the baby with the upper members and pocket.

23. The method of claim **18**, wherein after step (e), the upper members are passed over the wearer's shoulders and under the wearer's armpits to be tied at the wearer's back.

24. A method for applying the medical wrap of claim **8** to a wearer comprising the steps of:

a) passing the upper members over the wearer's shoulders to converge at the wearer's back in a criss-cross pattern overlying the wearer's back;
b) passing the upper members through the loops, tying the upper members at the wearer's back, and running the upper members to the wearer's front;
c) placing the baby in the pocket; and
d) tying the upper members either at the baby's back or underneath the pocket.

25. A method for applying the medical wrap of claim **8** to a wearer comprising the steps of:
a) placing the wrap over the baby and over the wearer's back;
b) tucking the bottom edge of the wrap underneath the baby's bottom to form the pocket;
c) passing the upper members over the wearer's shoulders to cross in front of the wearer's body, and passing the upper members through the loops; and
d) tying the upper members at the wearer's front or underneath the pocket.

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