



(12) **DEMANDE DE BREVET CANADIEN**
CANADIAN PATENT APPLICATION

(13) **A1**

(22) Date de dépôt/Filing Date: 2022/12/13

(41) Mise à la disp. pub./Open to Public Insp.: 2024/06/13

(51) Cl.Int./Int.Cl. *A61F 5/03* (2006.01),
A61F 5/37 (2006.01)

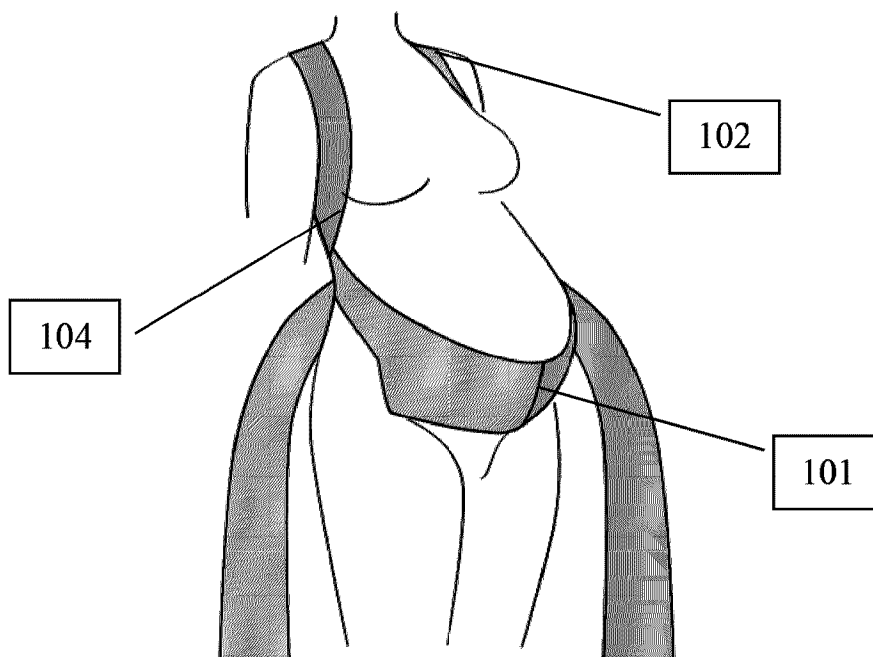
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(54) Titre : DISPOSITIF ET METHODE DE SUPPORT ET DE DISTRIBUTION DU POIDS DE L'ABDOMEN D'UNE PERSONNE

(54) Title: DEVICE AND METHOD FOR SUPPORTING AND DISTRIBUTING WEIGHT OF THE ABDOMEN OF A PERSON



(57) **Abrégé/Abstract:**

A maternity body support worn to support the weight of a growing fetus and redistribute the load onto the shoulders and trunk consisting of a continuous strap with built-in fastening points, reducing the pressure on organs within the lumbar and pelvic area.

ABSTRACT

A maternity body support worn to support the weight of a growing fetus and redistribute the load onto the shoulders and trunk consisting of a continuous strap with built-in fastening points, reducing the pressure on organs within the lumbar and pelvic area.

TITLE OF THE INVENTION

Device and method for supporting and distributing weight of the abdomen of a person

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] There are no cross-related applications.

5 FIELD OF THE INVENTION

[0002] The present invention generally relates to devices and methods for supporting and distributing weight of the abdomen of a person. More particularly, the present invention relates to methods and garments designed to support the abdomen of a pregnant woman and, more particularly to garments designed to alleviate pain and discomfort by
10 redistributing load onto the entire trunk, as well as reducing the pressure on organs within the lumbar and pelvic area.

BACKGROUND OF THE INVENTION

[0003] During and after pregnancy, joint laxity and swelling of the abdomen are associated with fetal growth, which changes the pelvic alignment of women. For example, softening
15 of the ligaments that join the pelvis occur because of pregnancy-related hormones such as relaxin which function is to make space for fetal growth. In addition, the pelvis widens as the abdomen enlarges with the advancing pregnancy and to facilitate the forthcoming labor and delivery. Although widening of the pelvis is necessary for fetal growth and childbirth, significant problems such as separation of the pubic symphysis can occur when pelvic
20 widening exceeds the limits of its range of motion and pelvic joint flexibility. Pelvic asymmetry alters the body's mechanics, placing strain on various body segments, which subsequently contributes to musculoskeletal pain.

[0004] Research also suggests that changes in pelvic alignment that occur in pregnancy might persist after pregnancy. As such, pelvic belts are popular among these women as a
25 tool to prevent changes in pelvic alignment in addition to reducing lumbopelvic pain. Devices that help to stabilize the pelvis such as pelvic belts are thought to be effective in relieving lumbar and pelvic pain.

[0005] It has been suggested that hip adduction forces in patients with pregnancy-related pelvic girdle pain is increased, the intensity of pelvic pain is reduced, and that daily activities are improved with pregnancy belt use. These effects are thought to occur because the belts, which compress the pelvis externally, are thought to augment pelvic stability via additional closure forces in lumbopelvic disorders where stability is compromised. This function of the pelvic belt might affect the width of the pelvis. Moreover, this pelvic compression function inhibits excessive movement of the pelvis joint and might also correct pelvic asymmetry.

[0006] However, the existing pregnancy belts on the market do not provide an optimal weight distribution, most often focusing only on the lumbar region, which significantly burdens the area already extremely vulnerable to pain during pregnancy. Furthermore, the lack of adjustability of these belts leads to discomfort for the expecting mother as well as quickly becomes inadequate as the baby grows and load increases. Moreover, users of existing pelvic belts and garments often complain of poor breathability of the fabric and lack of moisture wicking capability. Lastly, ergonomic considerations both for putting on and off and for adjustments are often lacking in these devices.

[0007] There is thus a need for a novel device for supporting and distributing weight during maternity and for a method for doing the same.

[0008] **SUMMARY OF THE INVENTION**

[0009] The shortcomings of the prior art are generally mitigated by an adjustable and easily wearable maternity belt which provides optimal weight distribution.

[0010] This maternity body support is worn to support the weight of a growing fetus and redistribute the load onto the shoulders and trunk of a women during maternity. The body support generally comprises a continuous sling with built-in fastening points. The body support may be manufactured through 3D knitting allowing variability in the sling's properties. The change in material properties allows for increased wearing comfort and improved performance. Moreover, fastening points allow both adjustment of the overall length and tension of the system, also allowing the user to rapidly and easily put it on and off.

[0011] Other and further aspects and advantages of the present invention will be obvious upon an understanding of the illustrative embodiments about to be described or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

5 **BRIEF DESCRIPTION OF THE DRAWINGS**

[0012] The above and other aspects, features and advantages of the invention will become more readily apparent from the following description, reference being made to the accompanying drawings in which:

10 [0013] FIG. 1 is an isometric view of an embodiment of a maternity body sling in accordance with the principles of the present invention, shown as it is being put on.

[0014] FIG. 2 is a back view of the maternity body sling of FIG. 1 showing criss-cross back pattern.

[0015] FIG. 3 is a side view of the maternity sling of FIG. 1.

[0016] FIG. 4 is a rear view of the maternity sling of FIG. 1.

15 [0017] FIG. 5 is a side view of an embodiment of a maternity body sling showing upper and lower adjustable attachment points.

[0018] FIG. 6 is a side view of an embodiment of a maternity body sling as it is being put on showing a single lower adjustable attachment point.

20 [0019] FIG. 7 is a side and rear view of an embodiment of a maternity body sling showing elastic and non-elastic regions of the body strap.

[0020] FIG. 8 comprises front and isometric views of the maternity body sling showing elastic and non-elastic regions of the body strap when being worn.

[0021] FIG. 9 is a front view of one embodiment of the fastener showing adjustability levels and quick connect feature.

25 [0022] FIG. 10 is a front view of a second embodiment of the fastener showing adjustability levels and quick connect feature

[0023] FIG. 11 is a side view showing mechanical forces on the body with and without the maternity body sling.

[0024] FIG. 12 is a body mapping image showing the yarn selection based on functionality.

[0025] FIG. 13 represents multiple views of an alternative embodiment of a maternity bodysuit with an underwear portion and integrated sling.

[0026] FIG. 14 represents multiple views of an alternative embodiment of a one-piece maternity sling.

[0027] FIG. 15 represents multiple views of an alternative embodiment of a maternity bodysuit with abdominal panel and integrated sling.

[0028] FIG. 16 represents multiple views of an alternative embodiment of a maternity bodysuit with bra portion and integrated sling.

[0029] FIG. 17 represents multiple views of an alternative embodiment of a maternity bodysuit camisole with integrated sling.

[0030] FIG. 18 represents multiple views of an alternative embodiment of a maternity bodysuit with a shorts portion and integrated sling.

DETAILED DESCRIPTION OF THE INVENTION

[0031] A novel device and method for supporting and distributing weight of the abdomen of a person will be described hereinafter. Although the invention is described in terms of specific illustrative embodiments, it is to be understood that the embodiments described herein are by way of example only and that the scope of the invention is not intended to be limited thereby.

[0032] While the present description refers to an exemplary embodiment of a sling and/or a garment for a pregnant woman, the present invention may be used to support any other type of weight or load of the abdomen of a wearer, such as but not limited to a person being overweight or a person having a disease which increases the weight of the said person. Understandably, the presently disclosed device may be used to adapt to variations of the load of the abdomen of a wearer.

[0033] Referring to FIGS. 1 and 2, a garment for supporting and distributing weight 100 embodied as a string is illustrated. The garment 100 is illustrated with left and right half color coded simply for the purpose of indicating the sequence of installation is shown. The string 100 comprises a wider and stiffer pelvic portion 101. The pelvic portion is 101 generally at the center or mid-point of the sling 100. The pelvic portion 101 is generally positioned at a first position in the suprapubic or hypogastric region supporting the weight of the belly of the pregnant wearer. The sling 100 symmetrically wraps over the iliac crest of the pregnant wearer and forms a first criss-cross 103 in the thoracic region before wrapping over the shoulders 102. Subsequently, as illustrated, the sling 100 is wrapped around the axillary region 104 of the pregnant wearer before making a second criss-cross pattern 105 in the upper lumbar/lower thoracic region. The second criss-cross pattern 105 is located below the first criss-cross 103. Each end of the sling returns to the iliac region where each end is fastened to one another or to another portion of the sling 100, not shown.

[0034] Referring now to FIGS. 3 and 4, another embodiment of the device is illustrated. The device further comprises an additional strap 201. The additional strap 201 is installed on the pregnant wearer to further support the weight of the belly. The additional strap 201 is wrapped from anterior to posterior.

[0035] The weight and thus the size of the growing abdomen fluctuates during pregnancy and change rapidly during the last months. In some cases, the shape and weight of the abdomen also change for some people experiencing swelling throughout the day. As such, there is a need for a personalized and easy-to-use fastening system.

[0036] Referring now to FIGS. 5 and 6, embodiments having different fastening points 106 are illustrated. In such embodiments, the device comprises two fastening points 106 for adjusting the sling 100 to fit and better stabilize the hip and pelvic girdle. The first fastening point 107 adjusts the sling in the upper portion of the torso. The second fastening point (108) allows for tightening of the lower part of the sling.

[0037] Referring now to FIGS. 7 and 8, a sling 100 made of material having different properties at different locations is illustrated. The sling 100 The sling 100 comprises flexible, stretchable panels combined with portions made of a more rigid and supportive material. As shown in FIGS. 7 and 8, the blue portions are made of rigid material 109 and

the yellow portions are made of elastic material. The rigid portions have particular use in supporting and stabilizing the pelvic girdle from below and upward. The elastic panels 110 are seamlessly inserted in the belly support sling 100 to allow the sling 100 to fit fully around the abdomen and better disperse or distribute weight by transferring the said weight to other parts of the body not involved in belly carrying. The elastic panels 110 may further provide a smoothing effect. The elasticity in the thoracic spine promotes better adjustment and comfort for the user, while the support provided by rigid material panels actively reduces kyphosis.

[0038] Referring now to FIGS. 9 and 10, an embodiment of a fastening system is illustrated. The illustrated fastening system is a male/female-type detachable buckle interconnecting the sling straps 100. The buckle comprises a first end 111 connectedly mating with a second end 114. The first end 111 ends in spatial tabs/hooks 112 that, when inserted, perfectly connect with holes 113 of the second part 114 of the buckle and lock the buckle in place. The fastening system may further comprise a marking system 115 visible on the straps to allow precise adjustment of the sling 100. The marking system 115 may further maintain desirable alignment and a quick release buckle for easy sling placement.

[0039] Referring now to FIG. 11, the forces created by the weight of the growing fetus on a pregnant woman are illustrated. Downward forces are generated on the pubic bone 501. The anterior positioning of the load leads to biomechanical changes including anterior pelvic tilt 502, thoracic kyphosis 503 and a forward head posture 504. Such changes in posture are often associated with pain and discomfort due to the increased stress on the spine. As shown on the right of FIG. 11, the biomechanical effects of the sling 100 lead to a decompression of the pelvic region and added support of the belly 505. The force vector 506 illustrates the transfer of the load onto the torso. This load transfer encourages a posterior pelvic tilt 507 decompressing the pelvic spine. The sling 100 also transfers the load onto the shoulders, leading to a neutral thoracic spine and shoulder position 508.

[0040] Referring now to FIG. 12, the different properties in the material of a supportive bodysuit in accordance with the principles of the present invention are shown. In such embodiment, the bodysuit is made using 3D knitting. The 3D knitting process and the different materials of the bodysuit generally creates four distinctive properties in the

bodysuit, such as supportive/compressive, heat transfer, moisture wicking and stretchy. The supportive and compressive fibers follow the path of the sling 100 as previously described to support the fetus and to distribute the load onto the shoulder and trunk of the pregnant wearer. The heat transfer properties are concentrated in the thoracic region, an
5 important source of heat generation in the human body. The majority of the bodysuit presents breathable fabric and moisture wicking capability. Lastly, the material located in the breast and abdominal region presents more flexible properties.

[0041] Referring now to FIGS. 13 to 18, different embodiments of a sling embedded in a bodysuit or garment are illustrated. In such embodiment, the device comprises a sling that
10 serves as the basis for the construction that is embedded into a garment or undergarment. The sling 100 generally stabilizes the core and pelvis, while actively dispersing and/or distributing the growing abdomen's weight over different parts of the body and reducing internal organ pressure with a fully customizable level of support. The outer portion generally acts as a shell, allowing for easier wearing and taking off of the garment. The
15 outer portion may further improve the silhouette of the pregnant wearer.

[0042] The use of 3D-knitting technology allows having a plurality of different material properties in one garment. The sling may be made of materials having different properties, such as compression/elastic material and semi-rigid materials in the lower portion of the garment. The materials having different properties generally stabilize the pelvis as the outer
20 portion of the material enhances the ability of the sling 100 to stabilize the pelvis. Based on the knowledge gathered from research on anatomy, thermoregulation, women's specific sweat and heat zones, as well as areas of greatest stress, the right knit fabric was selected having specific properties where they were most desired, while also providing optimal functionality for maximum comfort while wearing the garment, including but not limited
25 to moisture-wicking, heat transferring and loose stretchy zones. Understandably, any type of fabric known in the art having the above-mentioned properties may be used within the scope of the present invention.

[0043] Referring now to FIG. 13, an embodiment of one-piece bodysuit including an underwear portion and a built-in sling is illustrated. The bodysuit with a built-in sling 100
30 generally aims at easing putting on and taking off the sling. The embedded sling within the

bodysuit generally allows for an effective utilization of 3D knitting technology. In embodiments made with 3D knitting technology, a continuous piece of fabric may comprise a plurality of portions. Each portion may have specific elastic properties to create a desired effect in the sling. Some of the effects comprise overall support, pelvis stabilization and abdominal weight redistribution. As an example, the fabric of the support areas may have semi-rigid or semi-elastic properties while the fabric under the abdomen and the bust may have more compressive or elastic properties. Such variations in elastic properties of the fabric generally contribute to improve correction of the posture of a wearer by stabilizing joints and counteracting lordosis and kyphosis, particularly in wearers having large breasts and wide cleavage.

[0044] Referring now to FIG. 14, an embodiment of a one-piece sling assembly is illustrated. In such an embodiment, the sling 100 is pre-assembled into a wearable shape. This pre-assembled design facilitates the process of putting on the sling 100. Indeed, some researches indicate that a complex design of support garments may negatively influence the perceived safety of the garment by the users.

[0045] Referring to FIG. 15, another embodiment of a garment comprising a pre-assembled sling 100 is illustrated. In such an embodiment, the sling 100 is attached to additional panels located in the abdominal region of the pregnant wearer. The sling 100 is further attached to a built-in underwear component to further support the most vulnerable area affected by abdominal weight. The additional panels and/or underwear component generally aim at enhancing the perceived level of comfort while a user wears the garment. The additional panels and/or underwear component are preferably knitted to the sling. to the said panels and underwear component act as an extension of the sling 100 and may help counteract the lordotic effect by stabilizing the pelvis and coccyx bones. The garment generally comprises a variety of compression levels which may also support and transfer/distribute weight of the abdomen of the wearer more efficiently. Furthermore, by having the sling built into the underpants, putting on and taking off the sling is significantly easier and faster for the wearer.

[0046] Referring now to FIG. 16, a further embodiment of a garment comprising a pre-assembled sling 100 and a built-in bra is illustrated. Similar to the embodiment shown in

FIG. 15, the different levels of thickness and compression of the knitted fabrics present in the garment generally help transferring or distributing the weight more efficiently. Therefore, the built-in bra may provide additional support and may improve posture for people with larger breasts and cleavage areas who are prone to kyphosis. The garment may also be used as prophylactic wear of the sling by the wearer. As such, the garment may be used as a total support device without the need to wear additional underwear.

[0047] Referring now to FIG. 17, another embodiment of a one-piece camisole bodysuit including a built-in sling is illustrated. Such embodiment generally aims at increasing the perceived comfort of the user in putting on, wearing and taking off the device. As in the previous embodiments illustrated in FIGS. 13-16, positioning the sling in a knitted garment with variable elastic characteristics allows for a more effective posture correction.

[0048] Referring now to FIG. 18, an embodiment of a one-piece bodysuit comprising a built-in sling and built-in shorts is illustrated. As some qualitative research suggests, plus-size pregnant people might prefer shorts, pants or leggings to girdles as a type of support garment. To provide an embodiment that would answer the needs of such wearers, the sling is placed within a one-piece bodysuit with shorts. It might also be a preferred embodiment for users with excessive leg swelling counteracting rubbing and irritation of the thigh skin. The garment of the present embodiment generally uses the same technology and properties of the sling, but with an additional portion of 3D-knitted fabric, it might provide more satisfactory posture correction and holistic support within the lumbar and chest area.

While illustrative and presently preferred embodiments of the invention have been described in detail hereinabove, it is to be understood that the inventive concepts may be otherwise variously embodied and employed and that the appended claims are intended to be construed to include such variations except insofar as limited by the prior art.

CLAIMS

1. A continuous body sling for supporting and distributing the load of the abdomen of a wearer, the body sling comprising:
 - 5 a pelvic portion supporting the belly of the wearer and stabilizing the pelvis of the wearer;
 - a shoulder portion to transfer at least some of the load onto the shoulders and neck;
 - at least one crossing of the sling in the back of the wearer to distribute some of the load onto the trunk; and
 - 10 a fastening mechanism adapted to vary the length of the worn sling.
2. The body sling of claim 1, the worn sling forming two crossings in the back of the wearer.
3. The body sling of claim 1 being made of 3D knitted fabric.
4. The body sling of claim of claim 1 being made with moisture wicking and
15 breathable material.
5. The body sling of claim of claim 1 being made with heat transferring material.
6. The body sling of claim 1 being made with material alternating between material having different elastic properties.
7. The body sling of claim 1 being made with material alternating between elastic and
20 non-elastic material.
8. The body sling of claim 1 being made with material alternating between elastic and semi-rigid material.
9. The body sling of claim 6 where the material has higher rigidity in the pelvic portion.
- 25 10. The body sling of claim 6 where the material is of more supple in portions of the sling to be worn on the axillary region of the wearer than in other portions of the sling.

11. The body sling of claim 1, the fastening mechanism comprising a detachable buckle allowing adjustment of strap length to personal setting.
12. The body sling of claim 11, the detachable buckle multiple tension settings.
13. The body sling of claim 1 comprising multiple shoulder portions to improve load distribution.
14. The body sling of claim 1, the weight of the abdomen being increased by a growing foetus and the wearer being a pregnant woman.
15. A bodysuit with built-in body sling for supporting and distributing the load of the abdomen of a wearer throughout the body trunk of the said wearer, the bodysuit comprising:
- a pelvic portion supporting the belly of the wearer and stabilizing the pelvis of the wearer;
- a shoulder portion to transfer at least some of the load onto the shoulders and neck; and
- at least one crossing of the sling in the back of the wearer to distribute some of the load onto the trunk of the wearer.
16. The maternity bodysuit of claim 15 where the material is moisture wicking, heat transferring and breathable.
17. The bodysuit of claim 15 being 3D knitted.
18. The bodysuit of claim 15, the worn sling forming two crossings in the back of the wearer.
19. The bodysuit of claim 15 being a maternity bodysuit.
20. The bodysuit of claim 15, the weight of the abdomen being increased by a growing foetus and the wearer being a pregnant woman.
21. A method to support and distribute weight of the abdomen of a wearer throughout the body trunk of the said wearer, the method comprising:

supporting a pelvic portion of the belly of the wearer using a continuous sling;

wrap the continuous sling around the shoulder and the trunk of the wearer;

crossing the continuous sling in the back of wearer;

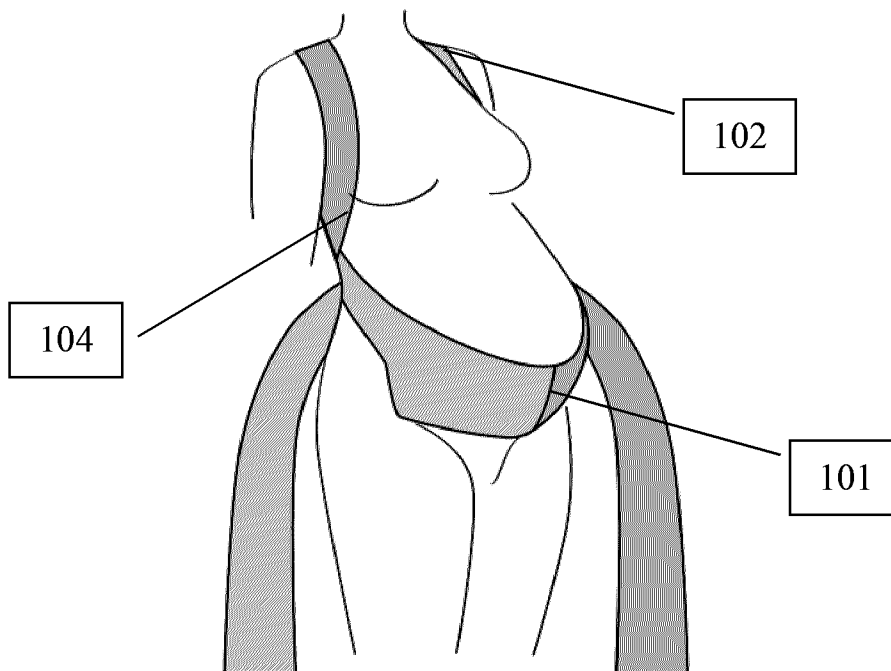
5 attaching a first end of the sling to a second end of the sling to provide a sufficient compression level on the wearer.

22. The method of claim 21 further comprising crossing the continuous sling a second time in the back of the wearer.

23. The body sling of claim 1, the weight of the abdomen being increased by a growing
10 foetus and the wearer being a pregnant woman.

DRAWINGS

FIG. 1



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FIG. 2

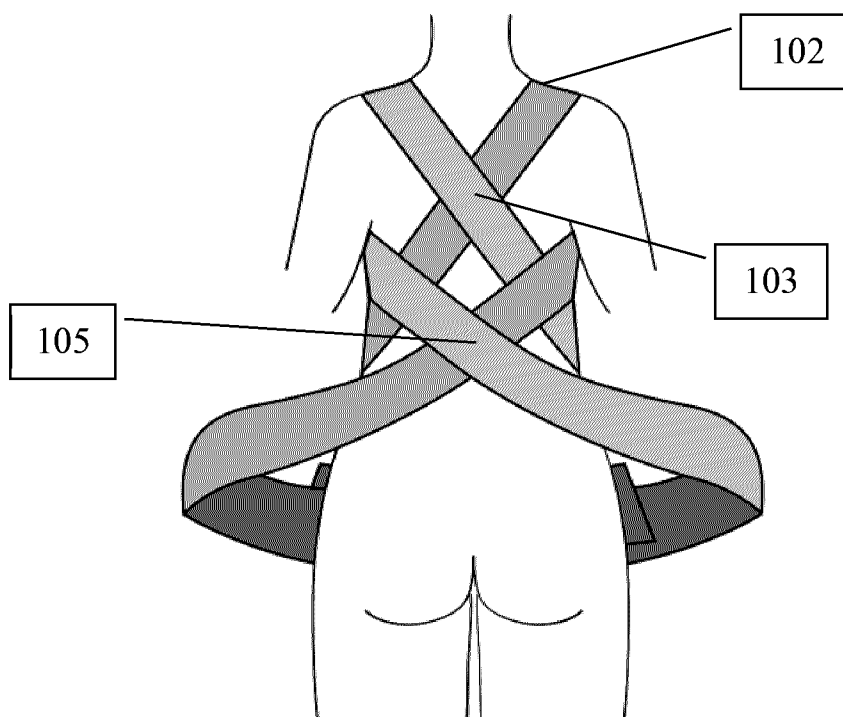
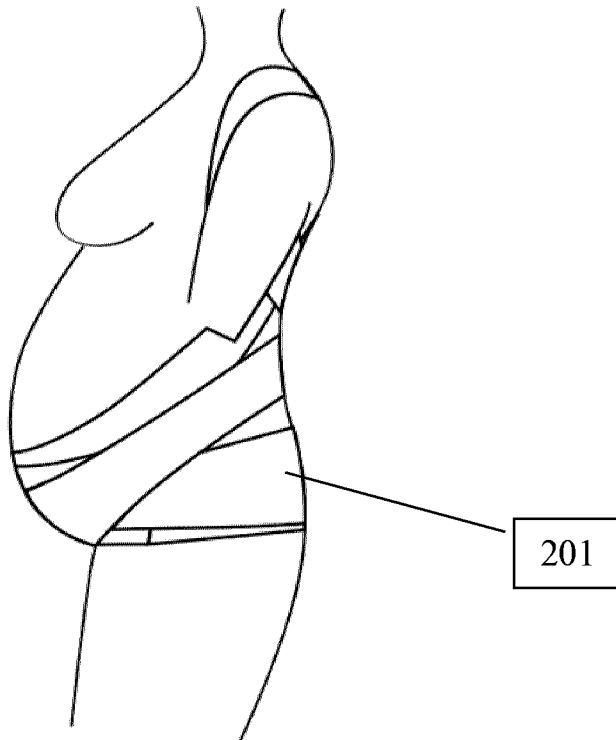


FIG. 3



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FIG. 4

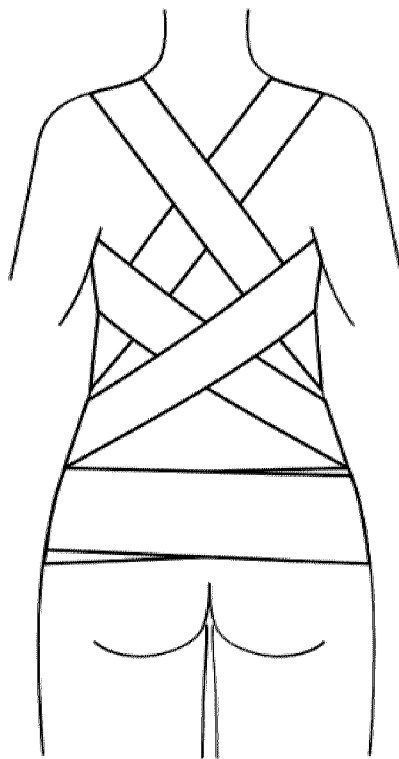
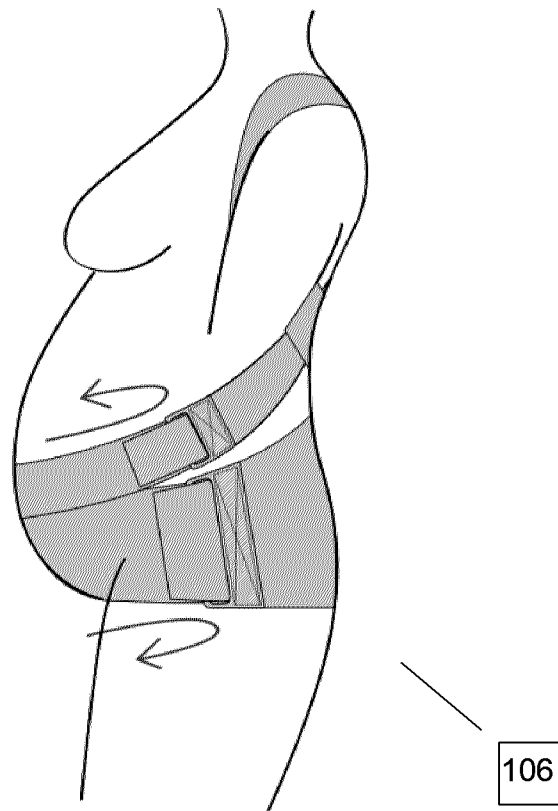


FIG. 5



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FIG. 6

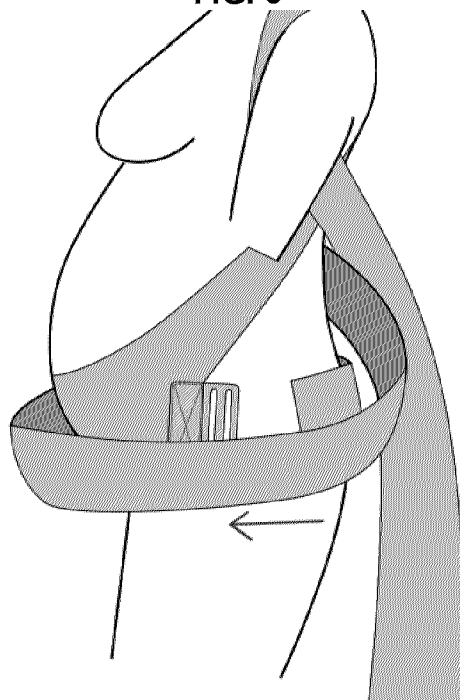
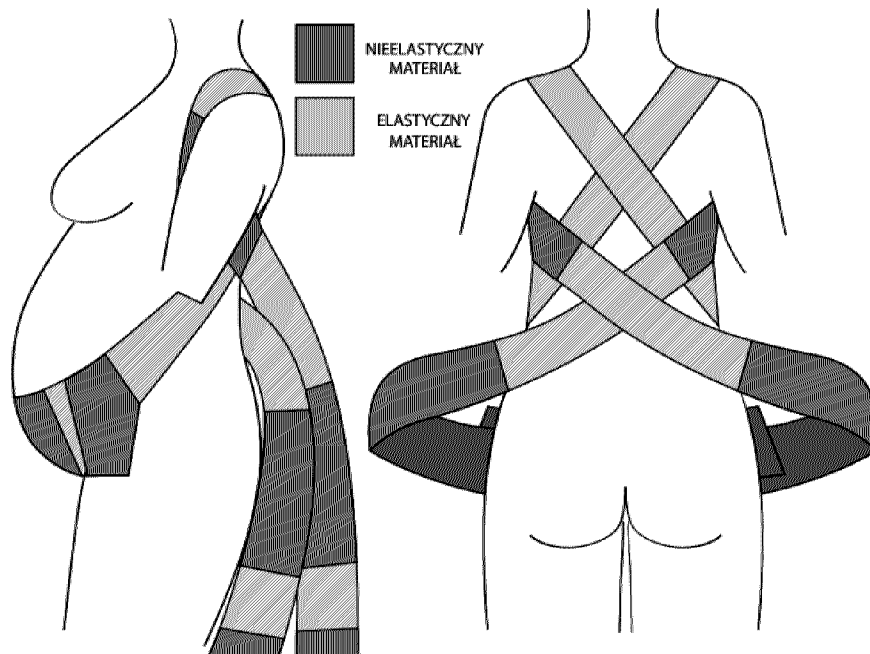


FIG. 7



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FIG. 8

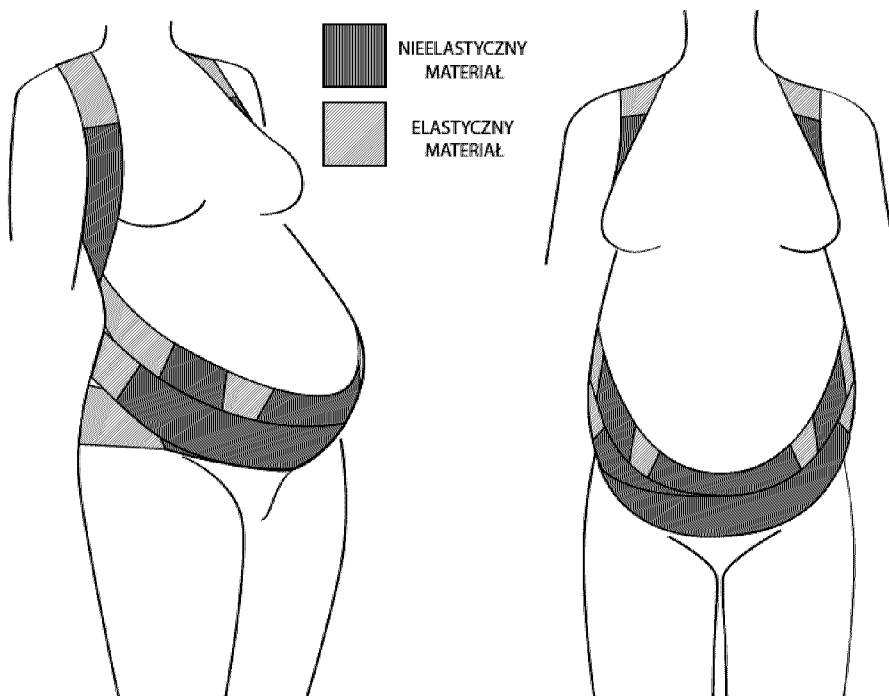


FIG. 9

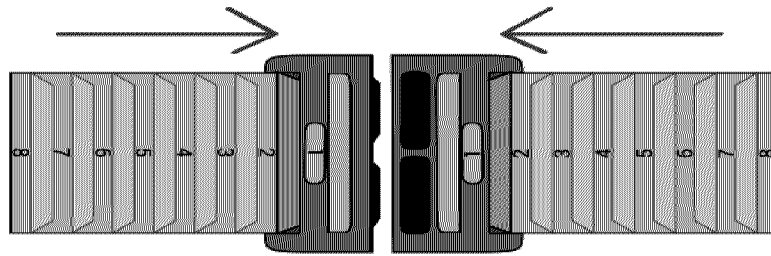


FIG. 10

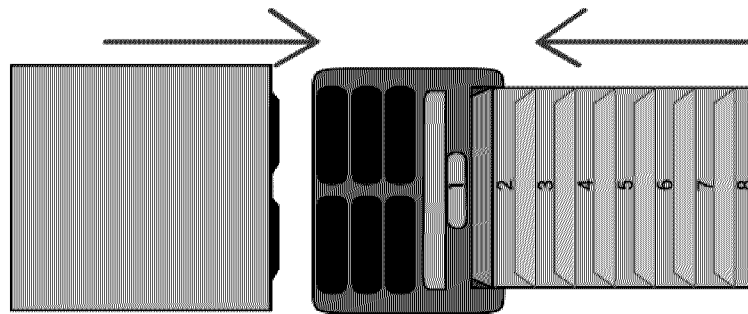


FIG. 11

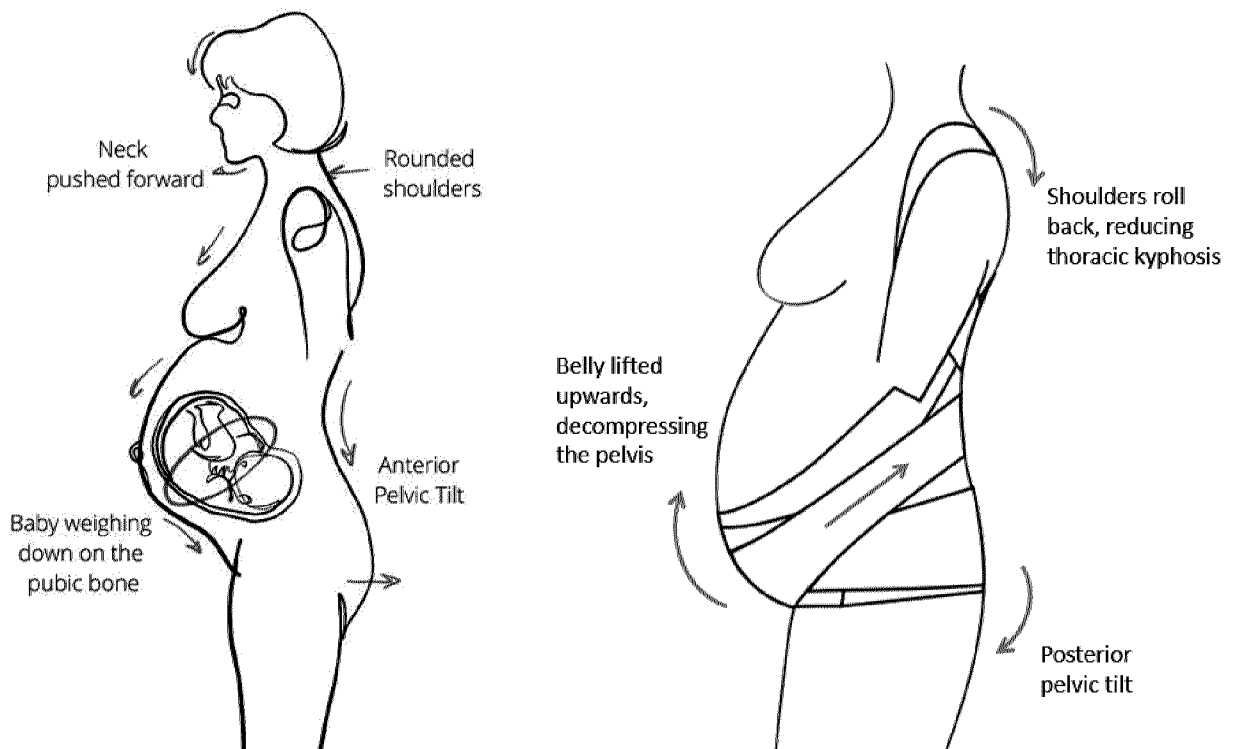


FIG. 12

BODYSUIT

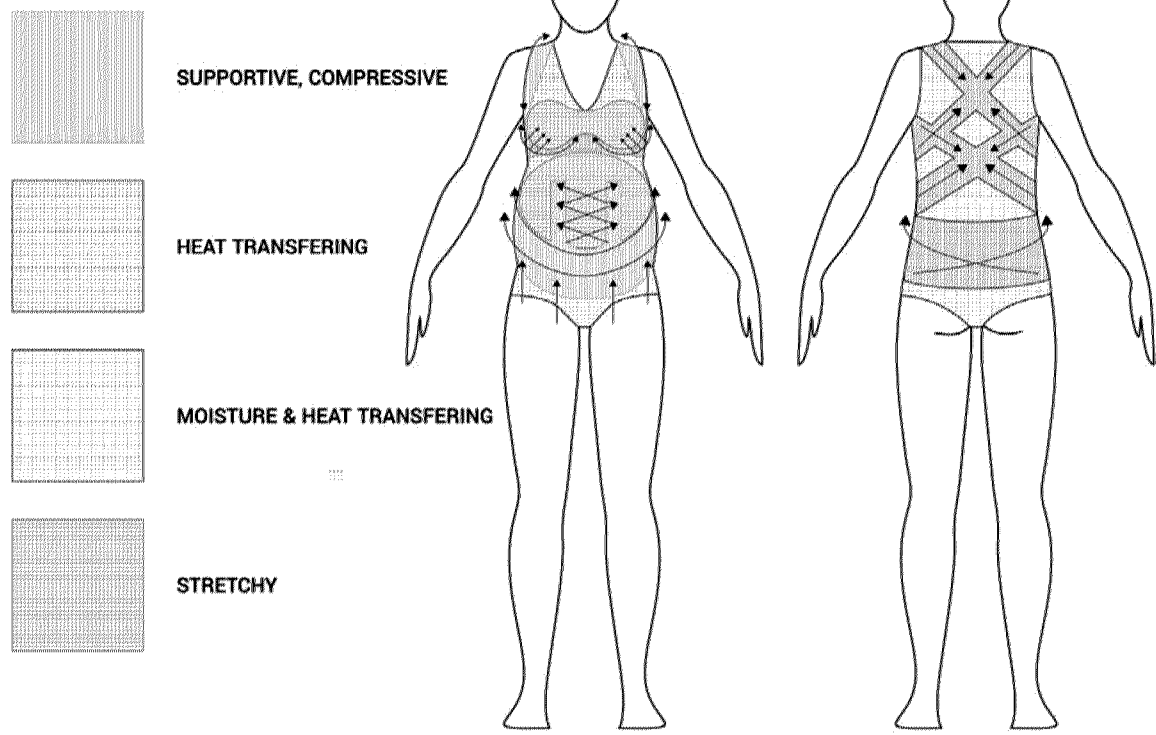


FIG. 13

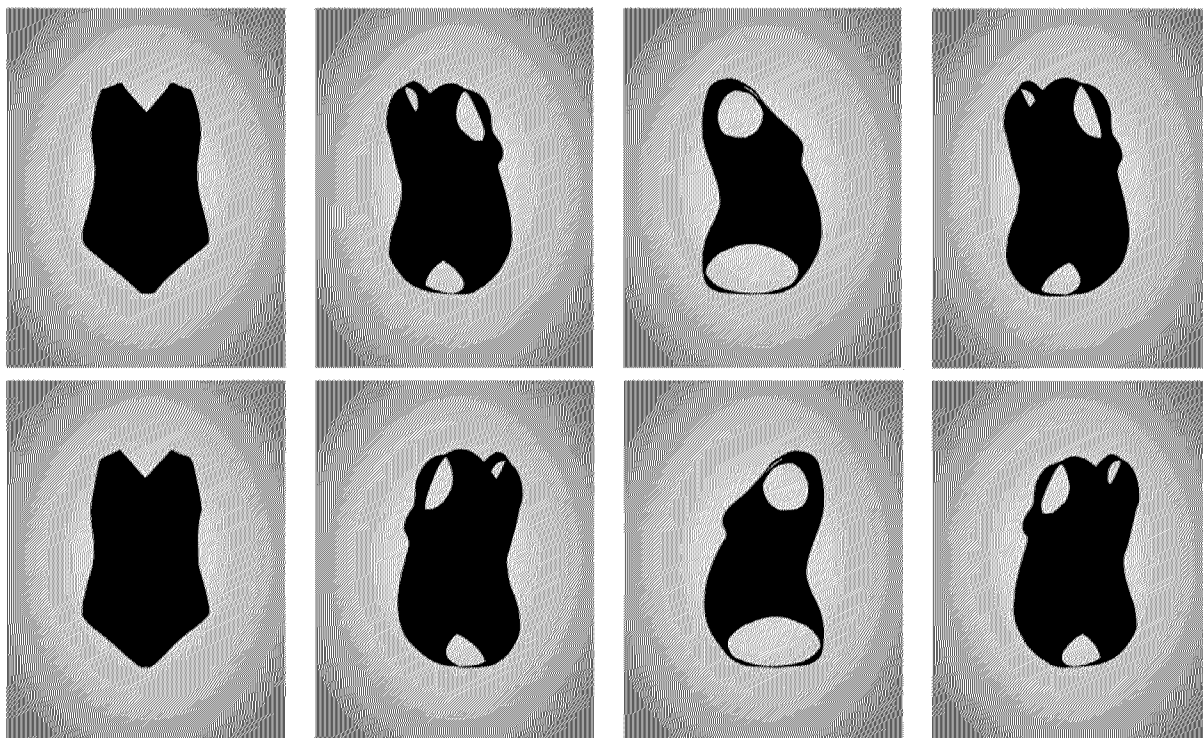


FIG. 14

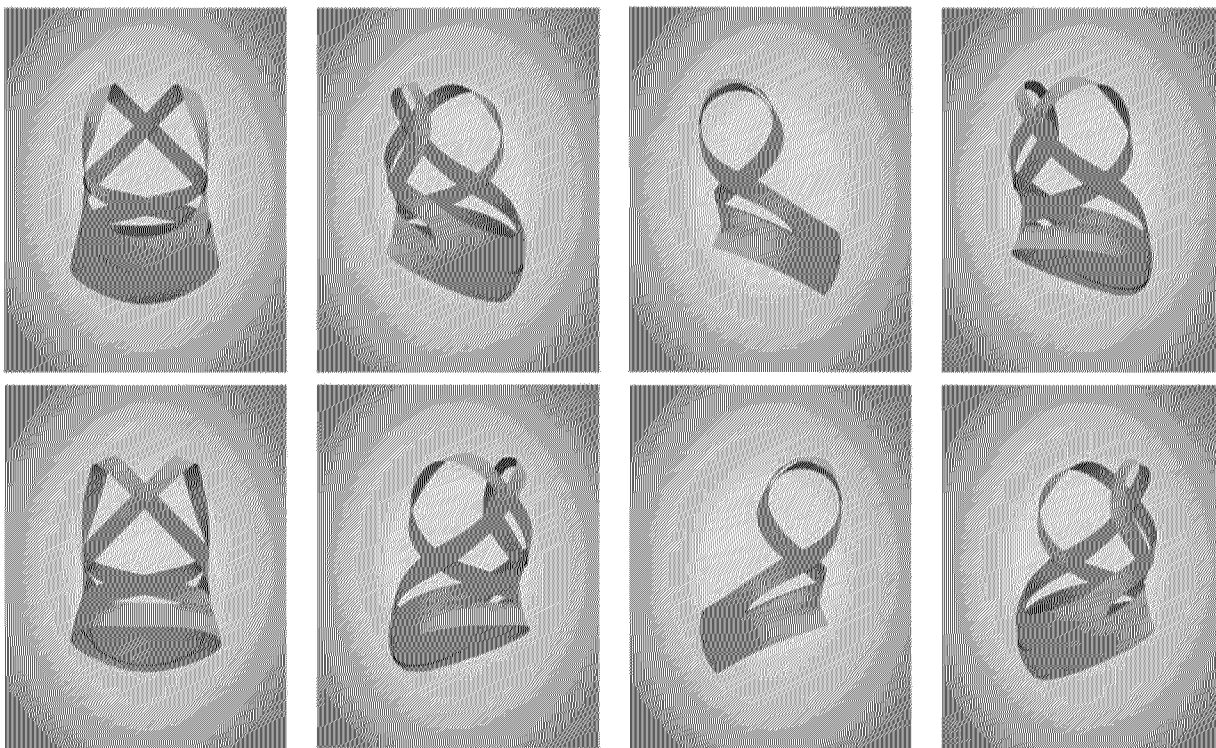


FIG. 15

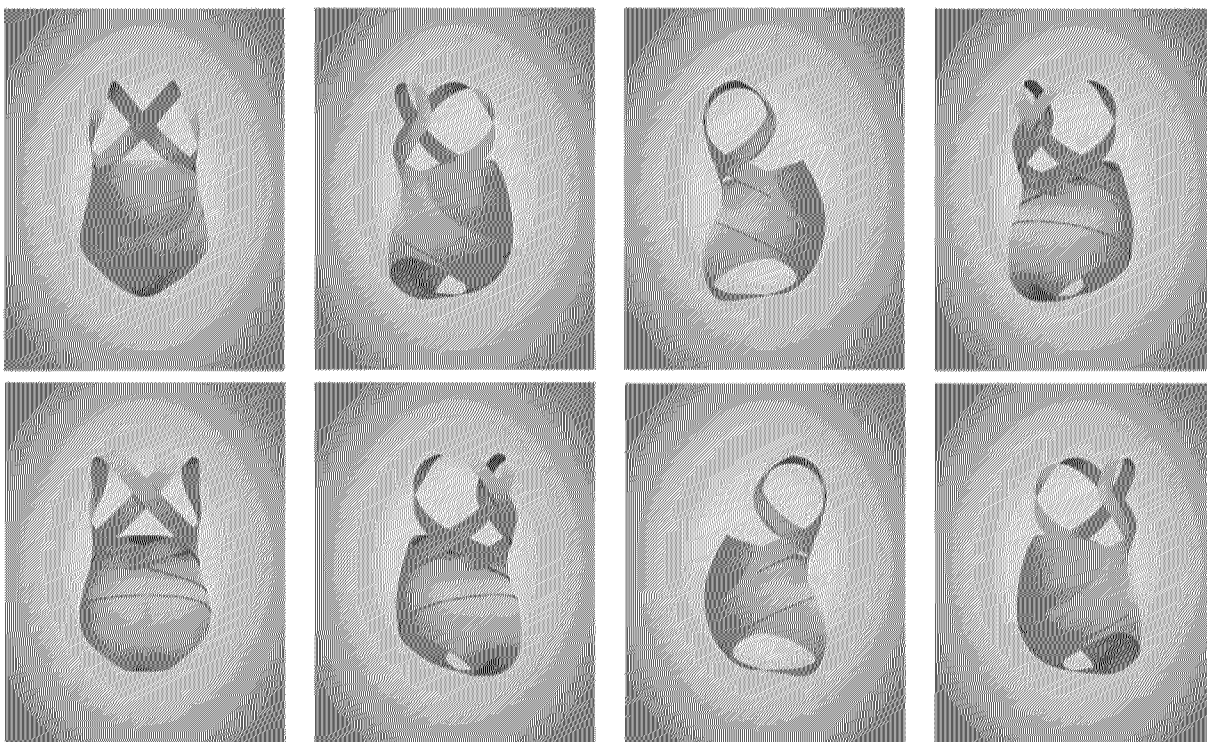


FIG. 16

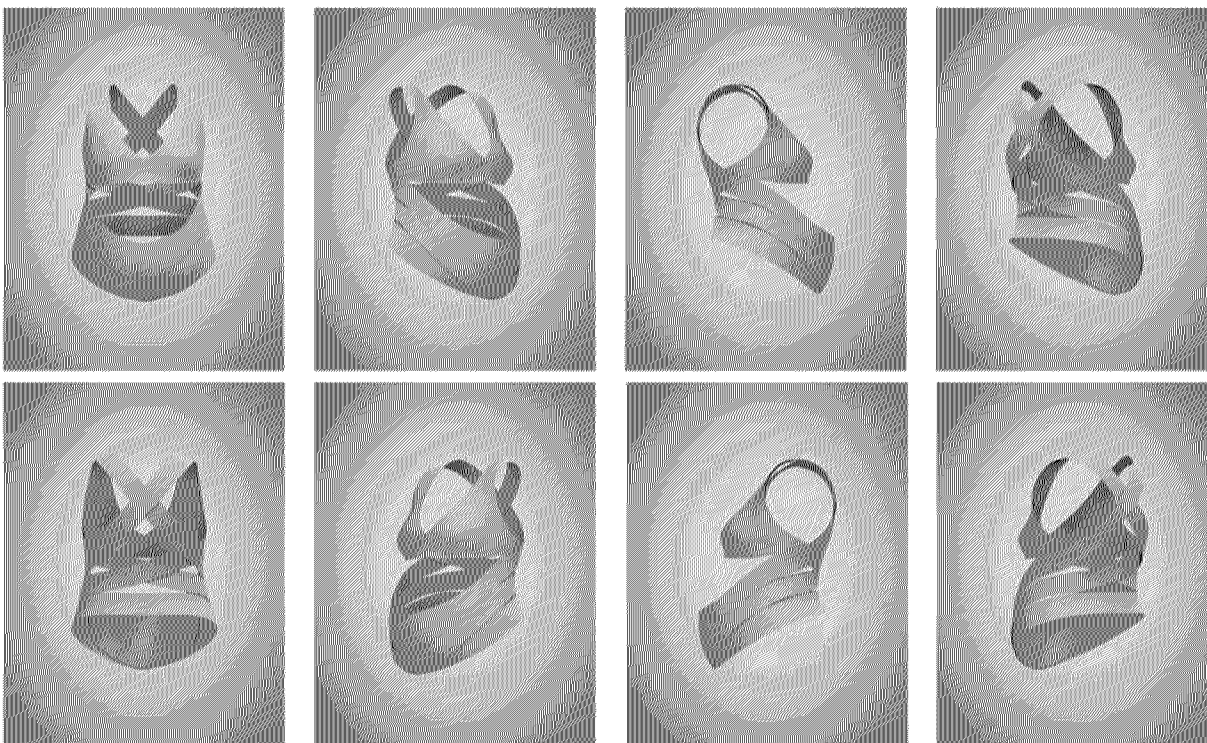


FIG. 17

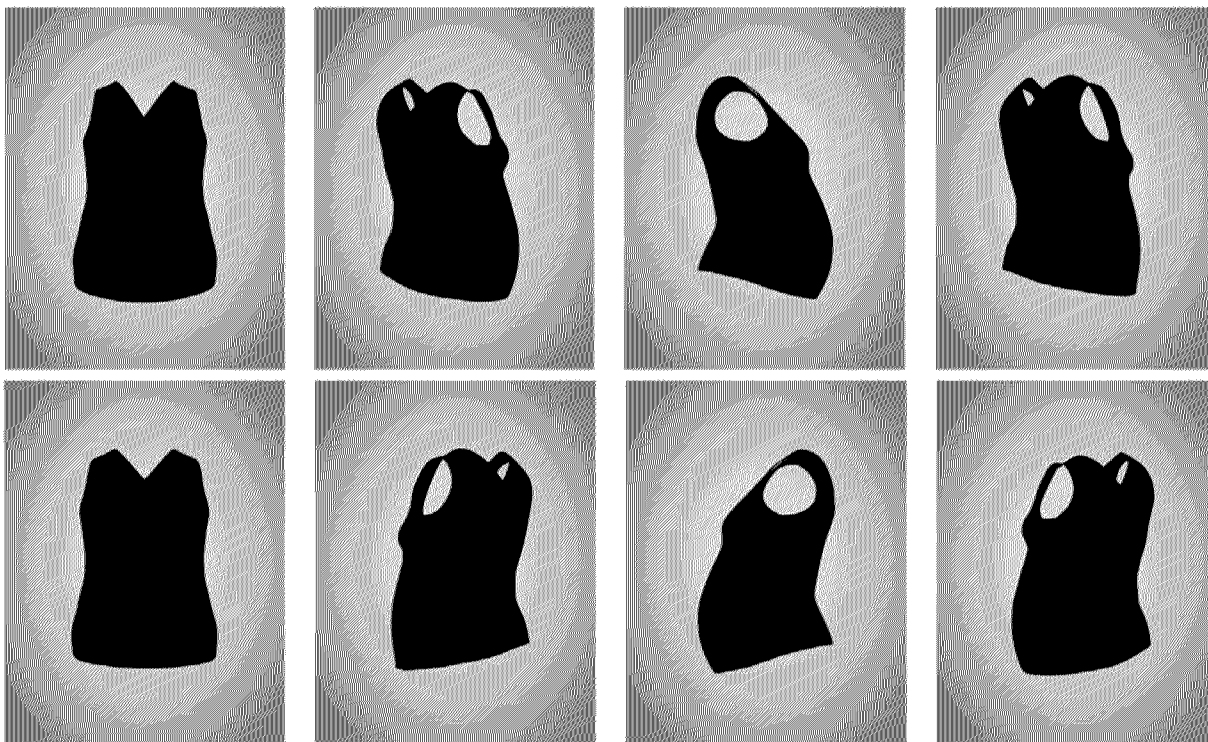


FIG. 18

