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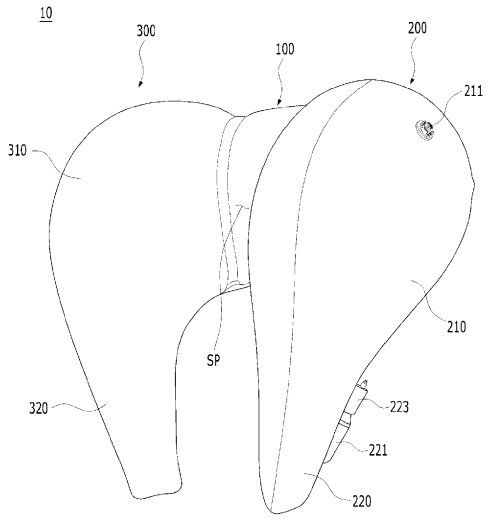
(54) **HEAD- AND CERVICAL SPINE-PROTECTIVE AIRBAG AND MANUFACTURING METHOD THEREFOR**

(57) The present disclosure relates to a head and cervical spine-protective airbag capable of protecting the head and the cervical spine of a user and a method of manufacturing the same, and more particularly, to a head and cervical spine-protective airbag capable of protecting the head and the cervical spine of a user by forming a central airbag, a left airbag, and a right airbag that have three-dimensional (3D) shapes to surround the head of the user from a left side, a rear side, and a right side, and a method of manufacturing the head and cervical spine-protective airbag.

FIG. 1



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Description

Technical Field

[0001] The present disclosure relates to a head and cervical spine-protective airbag for protecting the head and the cervical spine of a user and a method of manufacturing the same.

Background Art

[0002] The present disclosure relates to a head and cervical spine-protective airbag for protecting the head and the cervical spine of a user and a method of manufacturing the same. A hurt from a fall denotes a phenomenon of getting hurt from a fall off or a fall down or a hurt caused therefrom. A falling accident frequently occurs nearly as one of the most frequent cause of death of a human being. On an age basis, the risk of falling is exhibited to be highest for elderly people, and on a job basis, a construction worker, an electrical engineer, a miner, a painter, etc. are exhibited to have a high risk of falling.

[0003] In order to prevent injuries from falling, various types of airbags have been used. Generally, as an airbag for preventing an injury from falling for elderly people, an airbag worn on the wrist is used, and as an airbag protective against an injury from a falling accident of an industrial site worker or a motorcycle rider, an airbag worn on an upper body and/or a lower body is used.

[0004] An airbag may be easily worn by a user while at work, when the airbag is manufactured as an integral type or a detachable type with respect to a harness which may be worn by the user.

[0005] An airbag operates in a way in which a falling state is sensed by using an acceleration sensor and/or a deceleration sensor and, according to a sensing signal, a percussion device hits a gas cartridge to expand the airbag. Based on this operating way, studies have been continued to variously modify shapes and the number of airbags, etc. for the effective protection of various parts of a human body.

[0006] An airbag as described above is well known and is disclosed in Korean Patent Registration No. 1 0-1803319 (hereinafter, referred to as "Patent Document 1").

[0007] An airbag system of Patent Document 1 discloses a structure in which an upper airbag, a back airbag, and a wrist airbag are separate from one another and are separately coupled to a harness.

[0008] According to the airbag system of Patent Document 1, airbags may be inflated by compression gas of an inflator to protect a user from external shocks. However, the shape of the airbag system may be insufficient to protect both of the head and the cervical spine of the user.

Disclosure

Technical Problem

[0009] In order to solve the problem described above, the present disclosure provides a head and cervical spine-protective airbag capable of protecting the head and the cervical spine of a user by forming a central airbag, a left airbag, and a right airbag in three-dimensional (3D) shapes to surround the head of the user from a left side, a rear side, and a right side, and a method of manufacturing the head and cervical spine-protective airbag.

Technical Solution

[0010] According to an aspect of the present disclosure, there is provided a head and cervical spine-protective airbag including: a central airbag; a left airbag provided at a left side of the central airbag; and a right airbag provided at a right side of the central airbag, wherein the left airbag includes: a first left airbag connected to the left side of the central airbag, the first left airbag being formed to be convex in a front direction of the central airbag such that a front surface of the left airbag protrudes further forward than a front surface of the central airbag; and a second left airbag formed below the first left airbag to extend in a lower direction, the second left airbag having a rear surface located to be more forward than the front surface of the central airbag, and the right airbag includes: a first right airbag connected to the right side of the central airbag, the first right airbag being formed to be convex in the front direction of the central airbag such that a front surface of the right airbag protrudes further forward than the front surface of the central airbag; and a second right airbag formed below the first right airbag to extend in the lower direction, the second right airbag having a rear surface located to be more forward than the front surface of the central airbag.

[0011] Also, a space may be formed at a front side of the central airbag, wherein the space may be located at a right side of the first left airbag and at a left side of the second right airbag and may be surrounded by the central airbag, the first left airbag, and the first right airbag.

[0012] Also, a lengthwise central line of the first left airbag may be formed to be downwardly inclined toward a front side of the first left airbag, and a lengthwise central line of the first right airbag may be formed to be downwardly inclined toward a front side of the first right airbag.

[0013] Also, a lengthwise central line of the second left airbag may be formed to be inclined in a right direction toward a lower side of the second left airbag, and a lengthwise central line of the second right airbag may be formed to be inclined in a left direction toward a lower side of the second right airbag.

[0014] Also, the head and cervical spine-protective airbag may further include: a left gas cartridge provided at a rear surface of the second left airbag; a left inflator provided at the rear surface of the second left airbag and

configured to, when shock is applied to the left inflator, inject gas of the left gas cartridge into the left airbag to inflate the left airbag; a right gas cartridge provided at a rear surface of the second right airbag; and a right inflator provided at the rear surface of the second right airbag and configured to, when shock is applied to the right inflator, inject gas of the right gas cartridge into the right airbag to inflate the right airbag.

[0015] Also, the head and cervical spine-protective airbag may further include: a left vent hole provided at a left surface of the first left airbag and configured to, when shock is applied to the first left airbag while the first left airbag is being inflated by gas, discharge the gas to an outside of the first left airbag; and a right vent hole provided at a right surface of the first right airbag and configured to, when shock is applied to the first right airbag while the first right airbag is being inflated by gas, discharge the gas to an outside of the first right airbag.

[0016] Also, the head and cervical spine-protective airbag may further include: a left zipper provided at a left surface of the second left airbag; and a right zipper provided at a left surface of the second right airbag.

[0017] Also, the first left airbag and the first right airbag may be mirror symmetrical with each other with respect to a central line of the central airbag, the second left airbag and the second right airbag may be mirror symmetrical with each other with respect to the central line of the central airbag, and sizes of maximum cross-sectional areas of the central airbag, the first left airbag and the first right airbag, and the second left airbag and the second right airbag may satisfy a relationship that the maximum cross-sectional area of the first left airbag and the first right airbag > the maximum cross-sectional area of the central airbag > the maximum cross-sectional area of the second left airbag and the second right airbag.

[0018] According to another aspect of the present disclosure, there is provided a head and cervical spine-protective airbag for protecting a head and a cervical spine of a user, the head and cervical spine-protective airbag including: a central airbag, a front surface of which is located at a rear side of the head of the user; a first left airbag provided to forwardly protrude at a left side of the central airbag such that a right surface of the first left airbag is located at a left side of the head and a lower surface of the first left airbag is located above a left shoulder of the user; a second left airbag formed to extend from the first left airbag in a lower direction such that a rear surface of the second left airbag is located at a front side of a left breast of the user; a first right airbag provided to forwardly protrude at a right side of the central airbag such that a left surface of the first right airbag is located at a right side of the head and a lower surface of the first right airbag is located above a right shoulder of the user; and a second right airbag formed to extend from the first right airbag in the lower direction such that a rear surface of the second right airbag is located at a front side of a right breast of the user.

[0019] Also, an uppermost portion of the central airbag may be located to be higher than an uppermost portion of the head of the user.

[0020] According to another aspect of the present disclosure, there is provided a method of manufacturing a head and cervical spine-protective airbag, the method including: a member preparation operation in which front members and rear members are prepared, the front members including a first central portion, a first left portion formed at a left side of the first central portion and providing a first left protrusion portion protruding from the first central portion in a lower direction, a first right portion formed at a right side of the first central portion and providing a first right protrusion portion protruding from the first central portion in the lower direction, a left hole formed at a left side with respect to a central line of the first central portion, a right hole formed at a right side with respect to the central line of the first central portion, a first left groove formed above the left hole, and a first right groove formed above the right hole, and the rear members including a second central portion, a second left portion, and a second right portion respectively having same shapes as the first central portion, the first left portion, and the first right portion; a coupling operation in which the front members and the rear member are coupled to each other in front and rear directions; and an airbag formation operation in which, after the first left portion is folded in a direction toward the first central portion with respect to a left reference line crossing central points of the first left groove and the left hole, a first left arc and a second left arc of the left hole are coupled to each other to form a left airbag at a left side of the first central portion, after the first right portion is folded in the direction toward the first central portion with respect to a right reference line crossing central points of the first right groove and the right hole, a first right arc and a second right arc of the right hole are coupled to each other to form a right airbag at a right side of the first central portion, and a central airbag formed of the first central portion is formed between the left airbag and the right airbag.

[0021] Also, the method may further include, before the coupling operation, a ring coupling operation in which a left ring is coupled to a rear side of the left hole such that a central point of the left ring corresponds to the central point of the left hole and a right ring is coupled to a rear side of the right hole such that a central point of the right ring corresponds to the central point of the right hole.

[0022] Also, in the airbag formation operation, when the first left portion is folded in the direction toward the first central portion, a left region of the left ring may be folded to be piled up at a front side of a right region of the left ring, and when the first right portion is folded in the direction toward the first central portion, a right region of the right ring may be folded to be piled up at a front side of a left region of the right ring.

Advantageous Effects

[0023] According to a head and cervical spine-protective airbag and a method of manufacturing the same, as described above, according to the present disclosure, the following effects are obtained.

[0024] A central airbag, a left airbag, and a right airbag may surround the head and the cervical spine of a user, and thus, when the user falls, the head and the cervical spine of the user may be protected.

[0025] The left airbag and the right airbag may be inflated to be convex so as to sufficiently absorb shocks applied to a user.

[0026] A second left airbag and a second right airbag may protect the upper body of a user.

[0027] An uppermost portion of the central airbag may be located to be higher than an uppermost portion of the head of a user, and thus, the head of the user may be sufficiently protected.

[0028] Through first and second left grooves and first and second right grooves, first and second left portions and first and second right portions may be easily folded in directions toward first and second central portions, and thus, a three-dimensional (3D) shape of the head and cervical spine-protective airbag may be easily manufactured.

[0029] Through left and right rings, the first and second left portions and the first and second right portions may be easily folded in the directions toward the first and second central portions and the first and second left portions, and the first and second right portions may be easily coupled to the first and second central portions.

Description of Drawings

[0030]

FIG. 1 is a perspective view of a head and cervical spine-protective airbag according to the present disclosure.

FIG. 2 is a view illustrating a rear side of FIG. 1.

FIG. 3 is a view illustrating a front side of FIG. 1.

FIG. 4 is a comparison view of cross-sectional areas of a central airbag, a first left airbag, and a second left airbag of a head and cervical spine-protective airbag according to the present disclosure.

FIG. 5 is a view illustrating locations of left and right inflators of a head and cervical spine-protective airbag according to the present disclosure.

FIG. 6 is a view illustrating a left side of FIG. 1.

FIG. 7 is a view illustrating a right side of FIG. 1.

FIGS. 8 and 9 are views illustrating a state in which a head and cervical spine-protective airbag surrounds the head and the cervical spine of a user, according to the present disclosure.

FIG. 10 is a view of a human body protection device providing a head and a cervical spine-protective airbag according to the present disclosure.

FIG. 11 is a view illustrating a state in which the head and cervical spine-protective airbag of FIG. 10 is inflated.

FIG. 12 is a schematic view of a method of manufacturing a head and cervical spine-protective airbag, according to the present disclosure.

FIG. 13 is a view illustrating front members.

FIG. 14 is a view illustrating rear members.

FIG. 15 is a view of a left ring and a right ring.

FIG. 16 is a view illustrating a state in which a left ring and a right ring are respectively coupled to inner portions of a left hole and a right hole of the front member of FIG. 13.

Mode for Invention

[0031] The aspects below merely illustrate the principles of the present disclosure. Thus, although not clearly described nor illustrated in this specification, one of ordinary skill in the art may realize the principles of the present disclosure and invent various devices included in the concept and the scope of the present disclosure. Also, all of the conditions and the embodiments listed in this specification are basically apparently intended solely for the purpose of helping understand the concept of the present disclosure, and it should be understood that the present disclosure is not limited to these particularly listed embodiments and conditions.

[0032] The purpose, the characteristics, and the advantage described above may become clear through the following detailed descriptions with reference to the accompanying drawings, and thus, one or ordinary skill in the art may easily execute the technical concept of the present disclosure.

[0033] The embodiments described in this specification will be described by referring to cross-sectional views and/or perspective views, which are desirable example views of the present disclosure. Thicknesses, etc. of layers and regions illustrated in the drawings may be exaggerated for effective descriptions of technical aspects. Due to a manufacturing technique and/or an allowable error, forms of the example views may be modified. Also, the number of metal molds illustrated in the drawings correspond to only part of the metal molds for example. Thus, the embodiments of the present disclosure are not limited to the illustrated particular forms and may include the modified forms generated according to a manufacturing process. The technical terms in this specification are merely used for describing a certain embodiment and are not intended to define the present disclosure. A singular expression may include a plural expression, unless an apparently different meaning is indicated in the context. In this specification, the term "including" or "having" is used to indicate a presence of a feature, a number, a step, an operation, an element, a component, or a combination thereof described herein, and the term does not exclude a presence of one or more other features, numbers, steps, operations, elements, components, or a

combination thereof or the possibility of an addition of the same.

[0034] Hereinafter, desirable embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. When describing various embodiments below, elements configured to perform the same functions as each other will be given the same name as each other and the same reference numeral as each other, for convenience, albeit according to different embodiments. Also, descriptions about the configurations and operations described already according to another embodiment will be omitted for convenience.

[0035] A head and cervical spine-protective airbag 10 according to the present disclosure

[0036] Hereinafter, referring to FIGS. 1 to 11, the head and cervical spine-protective airbag 10 according to the present disclosure is described.

[0037] FIG. 1 is a perspective view of a head and cervical spine-protective airbag according to the present disclosure. FIG. 2 is a view illustrating a rear side of FIG. 1. FIG. 3 is a view illustrating a front side of FIG. 1. FIG. 4 is a comparison view of cross-sectional areas of a central airbag, a first left airbag, and a second left airbag of the head and cervical spine-protective airbag according to the present disclosure. FIG. 5 is a view illustrating locations of a left inflator and a right inflator of the head and cervical spine-protective airbag according to the present disclosure. FIG. 6 is a view illustrating a left side of FIG. 1. FIG. 7 is a view illustrating a right side of FIG. 1. FIGS. 8 and 9 are views illustrating a state in which the head and cervical spine-protective airbag surrounds the head and the cervical spine of a user, according to the present disclosure. FIG. 10 is a view of a human body protection device providing the head and cervical spine-protective airbag according to the present disclosure. FIG. 11 is a view illustrating a state in which the head and cervical spine-protective airbag of FIG. 10 is inflated.

[0038] As illustrated in FIGS. 1 to 11, the head and cervical spine-protective airbag 10 according to the present disclosure may be provided to include a central airbag 100, a left airbag 200 provided at a left side of the central airbag 100, and a right airbag 300 provided at a right side of the central airbag 300.

[0039] The central airbag 100 may be provided between the left airbag 200 and the right airbag 300.

[0040] The central airbag 100 may connect the left airbag 200 with the right airbag 300.

[0041] At a front side of the central airbag 100, a head 910 of a user 900 is located. Thus, a rear side of the head 901 of the user 900 and a rear side of the cervical spine of the user 900 are located at a front surface of the central airbag 100. Thus, the central airbag 100 may protect the head 910 and the cervical spine of the user 900.

[0042] The left airbag 200 may be provided at the left side of the central airbag 100 and may be provided to include a first left airbag 210 and a second left airbag 220.

[0043] The first left airbag 210 may be connected to the left side of the central airbag 100, and may be formed to be convex in a front direction of the central airbag 100 such that a front surface of the first left airbag 210 protrudes further forward than the front surface of the central airbag 100.

[0044] The second left airbag 220 may be formed below the first left airbag 210 to extend in a lower direction, and a rear surface of the second left airbag 220 may be located to be more forward than the front surface of the central airbag 100.

[0045] As illustrated in FIGS. 8 and 9, a right surface of the first left airbag 210 may be located at a left side of the head 910 of the user 900. Thus, the first left airbag 210 may have a shape to surround the left side of the head 910 of the user 900.

[0046] A lengthwise central line of the first left airbag 210 may be downwardly inclined toward a front side of the first left airbag 210.

[0047] In this case, the lengthwise central line of the first left airbag 210 may be downwardly inclined toward the front side of the first left airbag 210 in a range of from more than 0° to 20° or less with respect to the user 900 in a front direction.

[0048] The lengthwise central line of the first left airbag 210 may be a virtual line extending in a lengthwise direction of the first left airbag 210 and crossing central points of a cross-section of the first left airbag 210.

[0049] Also, the lengthwise central line of the first left airbag 210 may have a shape to extend in a front direction and a lower direction up to a certain section and then to extend in the lower direction.

[0050] The first left airbag 210 may be provided to forwardly protrude at the left side of the central airbag 100 such that the right surface of the first left airbag 210 may be located at the left side of the head 910 of the user 900.

[0051] The first left airbag 210 may be provided such that a lower surface of the first left airbag 210 may be located above a left shoulder of the user 900.

[0052] When the first left airbag 210 is inflated, all of the front surface, a rear surface, a left surface, the right surface, and an upper surface of the first left airbag 210 may have a spiral-convex shape. Accordingly, the first left airbag 210 may wrap the left side of the head 910 of the user 900 from the outside so as to protect the head 910 of the user 900.

[0053] The second left airbag 220 may extend from a lower end of the first left airbag 210 in the lower direction.

[0054] A lengthwise central line of the second left airbag 220 may be inclined in a right direction toward a lower side of the second right airbag 320.

[0055] In this case, the lengthwise central line of the second left airbag 220 may be downwardly inclined toward the front side of the second left airbag 220 in a range of from more than 0° to 20° or less with respect to the user 900 in the front direction.

[0056] The lengthwise central line of the second left airbag 220 may be a virtual line extending in a lengthwise direction of the second left airbag 220 and crossing cen-

tral points of a cross-section of the second left airbag 220.

[0057] Also, the lengthwise central line of the second left airbag 220 may have a shape to extend in the front direction and the lower direction up to a certain section and then to extend in the lower direction.

[0058] When the second left airbag 220 is inflated, all of a front surface, the rear surface, a left surface, a right surface, and a lower surface of the second left airbag 220 may have a spiral-convex shape.

[0059] The second left airbag 220 may be formed to extend from the first left airbag 210 in the lower direction such that the rear surface of the second left airbag 220 may be located at a front side of the left breast of the user 900.

[0060] As described above, the rear surface of the second left airbag 200 may be located at the front side of the left breast of the user 900. Thus, the second left airbag 220 may have a shape to surround the left breast of the user 900.

[0061] Also, the lengthwise central line of the second left airbag 220 may be inclined in the right direction toward the lower side of the second right airbag 320, and thus, the second left airbag 220 may relatively more solidly surround the left breast of the user 900 so as to effectively protect the upper body of the user 900.

[0062] The right airbag 300 may be provided at the right side of the central airbag 100 and may be provided to include a first right airbag 310 and a second right airbag 320.

[0063] The first right airbag 310 may be connected to the right side of the central airbag, and may be formed to be convex in a front direction of the central airbag 100 such that a front surface of the first right airbag 310 protrudes further forward than the front surface of the central airbag 100.

[0064] The second right airbag 320 may be formed below the first right airbag 310 to extend in a lower direction, and a rear surface of the second right airbag 320 may be located to be more forward than the front surface of the central airbag 100.

[0065] As illustrated in FIGS. 8 and 9, a left surface of the first right airbag 210 may be located at a right side of the head 910 of the user 900. Thus, the first right airbag 310 may have a shape to surround a left side of the head 910 of the user 900.

[0066] A lengthwise central line of the first right airbag 310 may be downwardly inclined toward a front side of the first right airbag 310.

[0067] The lengthwise central line of the first right airbag 310 may be a virtual line extending in a lengthwise direction of the first right airbag 310 and crossing central points of a cross-section of the first right airbag 310.

[0068] Also, the lengthwise central line of the first right airbag 310 may have a shape to extend in a front direction and a lower direction up to a certain section and then to extend in the lower direction.

[0069] The first right airbag 310 may be provided to protrude in the front direction at the right side of the central airbag 100 such that the left surface of the first right airbag 310 may be located at the right side of the head 910 of the user 900.

[0070] The first right airbag 310 may be provided such that a lower surface of the first right airbag 310 may be located above the right shoulder of the user 900.

[0071] When the first right airbag 310 is inflated, all of the front surface, a rear surface, the left surface, a right surface, and an upper surface of the first right airbag 310 may have a spiral-convex shape. Accordingly, the first right airbag 310 may wrap the right side of the head 910 of the user 900 from the outside so as to protect the head 910 of the user 900.

[0072] The second right airbag 320 may extend from a lower end of the first right airbag 310 in the lower direction.

[0073] A lengthwise central line of the second right airbag 320 may be inclined in a left direction toward a lower side of the second right airbag 320.

[0074] The lengthwise central line of the second right airbag 320 may be a virtual line extending in a lengthwise direction of the second right airbag 320 and crossing central points of a cross-section of the second right airbag 320.

[0075] Also, the lengthwise central line of the second right airbag 320 may have a shape to extend in the front direction and the lower direction up to a certain section and then to extend in the lower direction.

[0076] When the second right airbag 320 is inflated, all of a front surface, the rear surface, a left surface, a right surface, and a lower surface of the second right airbag 320 may have a spiral-convex shape.

[0077] The second right airbag 320 may be formed to extend from the first right airbag 310 in the lower direction such that the rear surface of the second right airbag 320 may be located at a front side of the right breast of the user 900.

[0078] As described above, the rear surface of the second right airbag 320 may be located at the front side of the right breast of the user 900. Accordingly, the second right airbag 320 may have a shape to surround the right breast of the user 900.

[0079] Also, a lengthwise central line of the second right airbag 320 may be inclined in a left direction toward a lower side of the second right airbag 320, and thus, the second right airbag 320 may relatively more solidly surround the right breast of the user 900 so as to effectively protect the upper body of the user 900.

[0080] A central line of the central airbag 100 may be a line crossing a left central point and a right central point of the central airbag 100 in an upper direction and a lower direction. The central line of the central airbag 100 may be the same as a central line of the head and cervical spine-protective airbag 10.

[0081] The first left airbag 210 and the first right airbag 310 may be mirror-symmetrical with respect to each other with respect to the central line of the central airbag 100, and the second left airbag 220 and the second right air-

bag 320 may be mirror-symmetrical with respect to each other with respect to the central line of the central airbag 100.

[0082] Thus, the left airbag 200 and the right airbag 300 may be mirror-symmetrical with respect to each other, and the left side and the right side may symmetrically have the same shape as each other.

[0083] A cross-sectional area of the central airbag 100 may be constant.

[0084] Each of the first left airbag 210 and the first right airbag 310 may have an increased cross-sectional area and then a decreased cross-sectional area toward a lower side of each of the first left airbag 210 and the first right airbag 310.

[0085] Each of the second left airbag 220 and the second right airbag 320 may have a decreased cross-sectional area toward a lower side of each of the second left airbag 220 and the second right airbag 320.

[0086] Sizes of maximum cross-sectional areas of the central airbag 100, the first left airbag 210 and the first right airbag 310, and the second left airbag 220 and the second right airbag 320 may satisfy the relationship of "the maximum cross-sectional area S2 of the first left airbag 210 and the first right airbag 310 > the maximum cross-sectional area S1 of the central airbag 100 > the maximum cross-sectional area S3 of the second left airbag 220 and the second right airbag 320."

[0087] The size of the cross-sectional area of the left airbag 200 may gradually increase from a portion thereof connected to the central airbag 100, the portion having a cross-sectional area corresponding to S1, the maximum cross-sectional area of the central airbag 100, toward a lower end portion thereof, a peak portion having the largest cross-sectional area corresponding to S2, the maximum cross-sectional area of the first left airbag 210 and the first right airbag 310, and thereafter, the size of the cross-sectional area of the left airbag 200 may gradually decrease to include a cross-sectional area of a lowest end portion of the left airbag 200, corresponding to S3, the maximum cross-sectional area of the second left airbag 220 and the second right airbag 320, which is less than the maximum cross-sectional area S1 of the central airbag 100. In this case, left and right sides of the head 910 of the user 900 may be located at the cross-sectional area S2 of the peak portion corresponding to the maximum cross-sectional area S2 of the first left airbag 210 and the first right airbag 310, and thus, the head 910 of the user 900 may be completely protected.

[0088] As described above, each of the first left airbag 210 and the first right airbag 310 may have the cross-sectional area increasing and then decreasing toward a lower side of each of the first left airbag 210 and the first right airbag 310, and thus, a right surface of the first left airbag 210 and a left surface of the first right airbag 310 may be located to be adjacent to the left and right sides of the head 910, respectively, and the inflation of the first left airbag 210 and the first right airbag 310 may be maintained at a level of an increased height. Thus, the shock absorption through the first left airbag 210 and the first right airbag 310 may become effective, and it is possible to effectively prevent the shock absorption by the head 910 of the user 900.

[0089] A space SP may be formed at the front side of the central airbag 100, the right side of the left airbag 200 (or the first left airbag 210), and the left side of the right airbag 300 (or the first right airbag 310).

[0090] That is, the space SP may be located at the right side of the first left airbag 210 and the left side of the second right airbag 320 and surrounded by the central airbag 100, the first left airbag 210, and the first right airbag 310.

[0091] The head 910 of the user 900 may be located in this space SP, and accordingly, the head 910 may be surrounded by the central airbag 100, the left airbag 200 (or the right side of the first left airbag 210), and the right airbag 300 (or the first right airbag 310).

[0092] The head and cervical spine-protective airbag 10 may be provided to further include a left inflator 223, a right inflator 323, a left gas cartridge 221, a right gas cartridge 321, a left vent hole 211, and a right vent hole 311.

[0093] The left inflator 223 may be provided at the rear surface of the second left airbag 220.

[0094] The left gas cartridge 221 may be connected to the left inflator 223 and may be provided at the rear surface of the second left airbag 220.

[0095] When shock is applied to the head and cervical spine-protective airbag 10 or the left inflator 223, or the user 900 falls and a sensor (not shown) configured to sense falling senses the falling of the user 900, while the user 900 is wearing the head and cervical spine-protective airbag 10, the left inflator 223 may inject gas of the left gas cartridge 221 to the left airbag 200 to inflate the left airbag 200.

[0096] For example, the sensor may be provided at the left inflator 223. In this case, the sensor may sense that shock is applied to the left inflator 223 or that the left inflator 223 falls.

[0097] The right inflator 323 may be provided at the rear surface of the second right airbag 320.

[0098] The right gas cartridge 321 may be connected to the right inflator 323 and may be provided at the rear surface of the second right airbag 320.

[0099] When shock is applied to the head and cervical spine-protective airbag 10 or the right inflator 323, or the user 900 falls and a sensor (not shown) configured to sense falling senses the falling of the user 900, while the user 900 is wearing the head and cervical spine-protective airbag 10, the right inflator 323 may inject gas of the right gas cartridge 321 to the left airbag 200 to inflate the right airbag 300.

[0100] The sensor may be provided at the right inflator 323. In this case, the sensor may sense that shock is applied to the right inflator 323 or that the right inflator 323 falls.

[0101] The left vent hole 211 may be provided at the

left surface of the first left airbag 210.

[0102] The left vent hole 211 may discharge the gas to the outside of the first left airbag 210, when shock is applied to the first left airbag 210 while the first left airbag 210 is being inflated by the gas.

[0103] When the gas of the first left airbag 210 is discharged to the outside, the gas of the second left airbag 220 may also be discharged to the outside together with the gas of the first left airbag 210. That is, the left vent hole 211 may discharge the gas of the left airbag 200 to the outside.

[0104] The right vent hole 311 may be provided at the right surface of the first right airbag 310.

[0105] The right vent hole 311 may discharge the gas to the outside of the first right airbag 310, when shock is applied to the first right airbag 310 while the first right airbag 310 is being inflated by the gas.

[0106] When the gas of the first right airbag 310 is discharged to the outside, the gas of the second right airbag 320 may also be discharged to the outside together with the gas of the first right airbag 310. That is, the right vent hole 311 may discharge the gas of the right airbag 300 to the outside.

[0107] When the user 900 falls or shock is applied to the head and cervical spine-protective airbag 10, the head and cervical spine-protective airbag 10 may sense the fall of the user 900 or the shock by using the sensor. When the sensor senses the fall of the user 900 or senses the shock as described above, compression gas may be supplied into the left airbag 200 (that is, the first left airbag 210 and the second left airbag 220) and the right airbag 300 (that is, the first right airbag 310 and the second right airbag 320) by the left inflator 223 and the right inflator 323.

[0108] As the gas is supplied into the left airbag 200 and the right airbag 300, all of the left airbag 200, the right airbag 300, and the central airbag 100 connected through the left airbag 200 and the right airbag 300 may be inflated.

[0109] Thereafter, when the user 900 falls and the head and cervical spine-protective airbag 10 crashes on the ground, external shocks may be delivered to the head and cervical spine-protective airbag 10, and the gas supplied into the central airbag 100, the left airbag 200, and the right airbag 300 may be discharged to the outside through the left vent hole 211 and the right vent hole 311. Thus, shocks may be absorbed by the central airbag 100, the left airbag 200, and the right airbag 300, and thus, the user may avoid getting injured.

[0110] As described, when the head and cervical spine-protective airbag 10 crashes on the ground, the left vent hole 211 may be provided at the left surface of the first left airbag 210 of the left airbag 200 and the right vent hole 311 may be provided at the right surface of the first right airbag 310 of the right airbag 300 to have the following advantages.

[0111] When the user 900 crashes on the ground, the first left airbag 210 and the first right airbag 310 may be located between the ground and the user 900, and thus, the left surface of the first left airbag 210 and the right surface of the first right airbag 310 may not crash on the ground. Thus, the left vent hole 211 and the right vent hole 311 may not be in direct contact with the ground, and thus, discharging of the gas in the central airbag 100, the left airbag 200, and the right airbag 300 may be smoothly performed.

[0112] Thus, the left vent hole 211 and the right vent hole 311 may not be in direct contact with the body of the user 900, and thus, discharging of the gas in the central airbag 100, the left airbag 200, and the right airbag 300 may be smoothly performed.

[0113] Also, when the user 900 crashes on the ground, shocks due to the crash on the ground may be vertically delivered to the user 900. However, the gas in the central airbag 100, the left airbag 200, and the right airbag 300 may be discharged to the outside through the left surface of the first left airbag 210 and the right surface of the first right airbag 310, and thus, shocks may be horizontally delivered to the outside. Therefore, the user 900 may receive minimized shocks.

[0114] It is desirable that a height of the central airbag 100 be greater than a height of the head 910 of the user 900. This is because only when the height of the central airbag 100 is greater than the height of the head 910 of the user 900, the head 910 of the user 900 may not stick out above the central airbag 100 to be effectively protected.

[0115] As described above, it is desirable that an uppermost portion of the central airbag 100 be located to be higher than the head 910 of the user 900 or an uppermost portion of the head. That is, it is desirable that the uppermost portion of the head 910 of the user 900 be located to be lower than the uppermost portion of the central airbag 100.

[0116] The central airbag 100, the left airbag 200, and the right airbag 300 may have one inner space connected therethrough and may be inflated by gas supplied into the connected inner space.

[0117] The head and cervical spine-protective airbag 10 may be provided to further include a left zipper 225 and a right zipper 325.

[0118] The left zipper 225 may be provided at the left surface of the second left airbag 220.

[0119] The right zipper 325 may be provided at the right surface of the second right airbag 320.

[0120] The left zipper 225 and the right zipper 325 may be opened so that an inflation member (not shown) may be easily accommodated in the head and cervical spine-protective airbag 10.

[0121] The inflation member may be inflated when compression gas is supplied thereto by the left inflator 223 and the right inflator 323. As the inflation member is inflated, the central airbag 100, the left airbag 200, and the right airbag 300 may be inflated.

[0122] The inflation member may include a material, such as thermoplastic polyurethane (TPU), etc.

[0123] The inflation member as described above may be an element necessary for the head and cervical spine-protective airbag 10 in which the central airbag 100, the left airbag 200, and the right airbag 300 function as outer skins.

[0124] That is, when the central airbag 100, the left airbag 200, and the right airbag 300 of the head and cervical spine-protective airbag 10 are directly inflated, an additional inflation member and the left zipper 225 and the right zipper 325 may not be needed, while when the central airbag 100, the left airbag 200, and the right airbag 300 are inflated by inflating the inflation member, the additional inflation member and the left zipper 225 and the right zipper 325 may be necessary.

[0125] As illustrated in FIG. 10, the head and cervical spine-protective airbag 10 may be realized to be provided in a housing 800 like a vest, etc. detachable from a harness 810.

[0126] The head and cervical spine-protective airbag 10 provided in the housing 800 may be inflated as illustrated in FIG. 11 by compression gas supplied by the left inflator 223 and the right inflator 323.

[0127] For the smooth inflation of the head and cervical spine-protective airbag 10, the housing 800 in which the head and cervical spine-protective airbag 10 is accommodated may be formed to include an airbag discharge portion 820, such as a zipper configured to be easily detached by the inflation of the head and cervical spine-protective airbag 10.

[0128] As described above, when the head and cervical spine-protective airbag 10 is provided in clothing, such as the housing 800, the housing 800 may be formed to be detachable from the harness 810, and thus, the head and cervical spine-protective airbag 10 may be easily worn by the user 900.

[0129] The head and cervical spine-protective airbag 10 may be realized as safety equipment coupled to and provided in other clothing, a bag, etc. worn by the user 900, in addition to the housing 800 described above.

[0130] The sensor may be mounted in the housing 800 and may be located at the back side, for example, directly below the neck of the user 900.

[0131] A method of manufacturing the head and cervical spine-protective airbag 10 according to the present disclosure

[0132] Hereinafter, the method of manufacturing the head and cervical spine-protective airbag 10, according to the present disclosure, will be described by referring to FIGS. 12 to 16.

[0133] FIG. 12 is a schematic view of the method of manufacturing the head and cervical spine-protective airbag according to the present disclosure. FIG. 13 is a view illustrating front members. FIG. 14 is a view illustrating rear members. FIG. 15 is a view illustrating a left ring and a right ring. FIG. 16 is a view illustrating a state in which the left and right rings are respectively coupled to left and right holes of the front members of FIG. 13.

[0134] In the descriptions below, the molding of the head and cervical spine-protective airbag 10 is described with respect to front members 500. However, first and second left portions 520 and 620 and first and second right portions 530 and 630 may be folded in directions toward first and second central portions 510 and 610. That is, although structures of rear members 600 corresponding to the front members 500 may be omitted in the descriptions, it may be understood that structures of the front members 500 and the structures of the rear members 600 may be molded together.

[0135] As illustrated in FIG. 12, the method of manufacturing the head and cervical spine-protective airbag 10 according to the present disclosure may include a member preparation operation S10 in which the front members 500 including the first central portion 510, the first left portion 520, and the first right portion 530 and the rear members 600 including the second central portion 610, the second left portion 620, and the second right portion 630 respectively having the same shapes as the first central portion 510, the first left portion 520, and the first right portion 530 are prepared, a ring coupling operation S20 in which a left ring 710 may be coupled to a rear side of a left hole 540 and a right ring 720 may be coupled to a rear side of a right hole 550, a member coupling operation S30 in which the front members 500 and the rear members 600 may be coupled to each other in front and rear directions, an airbag formation operation S40 in which after each of the first left portion 520 and the first right portion 530 is folded in the direction toward the first central portion 510 and is coupled to the first central portion 510, the left airbag 200 and the right airbag 300 may be formed, an inflation member insertion operation S50 in which an inflation member may be inserted into the central airbag 100, the left airbag 200, and the right airbag 300 through the left zipper 225 or the right zipper 325, and an inflator connection operation S60 in which the left inflator 223 to which the left gas cartridge 221 may be coupled may be connected to a left inflator hole 623 and the right inflator 323 to which the right gas cartridge 321 may be coupled may be connected to a right inflator hole 633.

[0136] As illustrated in FIGS. 13 and 14, in the member preparation operation S10, the front members 500 including the first central portion 510, the first left portion 520, and the first right portion 530 and the rear members 600 including the second central portion 610, the second left portion 620, and the second right portion 630 respectively having the same shapes as the first central portion 510, the first left portion 520, and the first right portion 530 may be prepared.

[0137] The front members 500 may include the first central portion 510, the first left portion 520 formed at a left side of the first central portion 510 and providing a first left protrusion portion 521 protruding from the first central portion 510 in a lower direction, the first right portion 530 formed at a right side of the first central portion 510 and providing a first right protrusion portion 531 protruding from the first central portion 510 in the lower di-

rection, the left hole 540 formed at a left side with respect to a central line C1 of the first central portion 510, the right hole 550 formed at a right side with respect to the central line C1 of the first central portion 510, a first left groove 561 formed above the left hole 540, and a first right groove 571 formed above the right hole 550.

[0138] The first left portion 520 may be formed at the left side of the first central portion 510, and the first right portion 530 may be formed at the right side of the first central portion 510.

[0139] The first left protrusion portion 521 may be formed below the first left portion 520. The first left protrusion portion 521 may protrude from the first central portion 510 in the lower direction.

[0140] The first right protrusion portion 531 may be formed below the first right portion 530. The first right protrusion portion 531 may protrude from the first central portion 510 in the lower direction.

[0141] The first left portion 520 and the first right portion 530 may have a mirror symmetrical shape with each other with respect to the central line C1 of the first central portion 510.

[0142] The left hole 540 may be formed at the left side with respect to the central line C1 of the first central portion 510.

[0143] The left hole 540 may be formed throughout the first central portion 510 and the first left portion 520.

[0144] A left region of the left hole 540 may be formed at the first left portion 520, and a right region of the left hole 540 may be formed at the first central portion 510.

[0145] The first left groove 561 may be formed above the left hole 540. In detail, the first left groove 561 may be formed between the first central portion 510 and the first left portion 520. That is, the first left groove 561 may be a criterion to divide the first central portion 510 and the first left portion 520. Thus, the first left portion 520 may be located at a left side with respect to the first left groove 561, and the first central portion 510 may be located at a right side with respect to the first left groove 561.

[0146] The right hole 550 may be formed at the right side with respect to the central line C1 of the first central portion 510.

[0147] The right hole 550 may be formed throughout the first central portion 510 and the first right portion 530.

[0148] A right region of the right hole 550 may be formed at the first right portion 530, and a left region of the right hole 550 may be formed at the first central portion 510.

[0149] The first right groove 571 may be formed above the right hole 550. In detail, the first right groove 571 may be formed between the first central portion 510 and the first right portion 530. That is, the first right groove 571 may be a criterion to divide the first central portion 510 and the first right portion 530. Thus, the first right portion 530 may be located at a right side with respect to the first right groove 571, and the first central portion 510 may be located at a left side with respect to the first right groove 571.

[0150] The rear members 600 may be provided to include the second central portion 610 having the same shape as the first central portion 510, the second left portion 620 having the same shape as the first left portion 520, the second right portion 630 having the same shape as the first right portion 530, a second left groove 562 formed above a boundary between the second central portion 610 and the second left portion 620 to be located at a location to correspond to the first left groove 561, and a second right groove 572 formed above a boundary between the second central portion 610 and the second right portion 630 to be located at a location to correspond to the first right groove 571.

[0151] The front members 500 illustrated in FIG. 13 are front surfaces of the front members 500, and the rear members 600 illustrated in FIG. 14 are rear surfaces of the rear members 600. Thus, left and right directions of FIGS. 13 and 14 are illustrated as the opposite.

[0152] When the front members 500 and the rear members 600 are coupled to each other, the second central portion 610 may be located at a rear side of the first central portion 510.

[0153] When the front members 500 and the rear members 600 are coupled to each other, the second left portion 620 may be located at a rear side of the first left portion 520.

[0154] When the front members 500 and the rear members 600 are coupled to each other, the second right portion 630 may be located at a rear side of the first right portion 530.

[0155] A second left protrusion portion 621 having the same shape as the first left protrusion portion 521 may be provided at the second left portion 620.

[0156] A second right protrusion portion 631 having the same shape as the first right protrusion portion 531 may be provided at the second right portion 630.

[0157] The second left portion 620 may be formed at a left side of the second central portion 610, and the second right portion 630 may be formed at a right side of the second central portion 610.

[0158] The second left protrusion portion 621 may be formed below the second left portion 620. The second left protrusion portion 621 may protrude from the second central portion 610 in a lower direction.

[0159] The second right protrusion portion 631 may be formed below the second right portion 630. The second right protrusion portion 631 may protrude from the second central portion 610 in the lower direction.

[0160] The second left portion 620 and the second right portion 630 may have a mirror symmetrical shape with each other with respect to a central line C2 of the second central portion 610.

[0161] The second left groove 562 may be formed between the second central portion 610 and the second left portion 620. That is, the second left groove 562 may be a criterion to divide the second central portion 610 and the second left portion 620. Thus, the second left portion

620 may be located at a left side with respect to the second left groove 562, and the second central portion 610 may be located at a right side with respect to the second left groove 562. The second left groove 562 may be located at the location to correspond to the first left groove 561 of the front members 500. Thus, when the front members 500 and the rear members 600 are coupled to each other, the first left groove 561 and the second left groove 562 may form one groove.

[0162] The second right groove 572 may be formed between the second central portion 610 and the second right portion 630. That is, the second right groove 572 may be a criterion to divide the second central portion 610 and the second right portion 630. Thus, the second right portion 630 may be located at a right side with respect to the second right groove 572, and the second central portion 610 may be located at a left side with respect to the second right groove 572. The second right groove 572 may be located at the location to correspond to the first right groove 571 of the front members 500. Thus, when the front members 500 and the rear members 600 are coupled to each other, the first right groove 571 and the second right groove 572 may form one groove.

[0163] The rear members 600 may be provided to include the left inflator hole 623, the right inflator hole 633, the left vent hole 211, the right vent hole 311, the left zipper 225, and the right zipper 325.

[0164] The left inflator hole 623 may be a hole to which a gas injection portion of the left inflator 223 may be connected. Thus, the left inflator 223 may supply compression gas to the left airbag 200 through the left inflator hole 623.

[0165] The left inflator 223 may be directly fastened to the rear members 600 through the left inflator hole 623 without using a hose, etc.

[0166] The right inflator hole 633 may be a hole to which a gas injection portion of the right inflator 323 may be connected. Thus, the right inflator 323 may supply compression gas to the right airbag 300 through the right inflator hole 633.

[0167] The right inflator 323 be directly fastened to the rear members 600 through the right inflator hole 633 without using a hose, etc.

[0168] The left zipper 225 may be formed at the second left protrusion portion 621, and the right zipper 325 may be formed at the second right protrusion portion 631.

[0169] The left vent hole 211 may be formed above the second left portion 620, and the right vent hole 311 may be formed above the second right portion 630.

[0170] As described above, when the front members 500 and the rear members 600 are prepared, the member arrangement operation S10 may be completed.

[0171] After the member preparation operation S10 is completed, the ring coupling operation S20 may be performed.

[0172] In the ring coupling operation S20, as illustrated in FIGS. 15 and 16, the left ring 710 may be coupled to the rear side of the left hole 540 and the right ring 720 may be coupled to the rear side of the right hole 550.

[0173] In this case, the left ring 710 may be coupled to the rear side of the left hole 540 such that a central point of the left ring 710 may correspond to a central point of the left hole 540, and the right ring 720 may be coupled to the rear side of the right hole 550 such that a central point of the right ring 720 may correspond to a central point of the right hole 550.

[0174] In the airbag formation operation S40, the left ring 710 and the right ring 720 may support the first left portion 520, the first right portion 530, and the first central portion 510 to make easy the folding of the first left portion 520 and the first right portion 530.

[0175] The left ring 710 and the right ring 720 may be coupled to the rear sides of the left hole 540 and the right hole 550, respectively, through sewing, thermosetting, an adhesive, etc.

[0176] As described above, when the left ring 710 and the right ring 720 are coupled to the rear sides of the left hole 540 and the right hole 550, respectively, the ring coupling operation S20 may be completed.

[0177] After the ring coupling operation S20 is completed, the member coupling operation S30 may be performed.

[0178] In the member coupling operation S30, a process of coupling the front members 500 and the rear members 600 in the front and rear directions may be performed.

[0179] The front members 500 and the rear members 600 may be coupled to each other through sewing, thermosetting, an adhesive, etc.

[0180] The front members 500 and the rear members 600 may be coupled to each other such that the central line C1 of the first central portion 510 and the central line C2 of the second central portion 610 may correspond to each other.

[0181] The front members 500 and the rear members 600 may generally have the same shape as each other, and thus, a coupled body of the front members 500 and the rear members 600 may also generally have the same shape as the front members 500 and the rear members 600.

[0182] When the front members 500 and the rear members 600 are coupled to each other, the member coupling operation S30 may be completed.

[0183] After the member coupling operation S30 is completed, the airbag formation operation S40 may be performed.

[0184] In the airbag formation operation S40, after the member coupling operation S30 is performed, each of the first left portion 520 and the first right portion 530 may be folded in the direction toward the first central portion 510 and coupled to the first central portion 510 to form the central airbag 100, the left airbag 200, and the right airbag 300.

[0185] In detail, the process may be performed, in which, after the first left portion 520 is folded in the direction toward the first central portion 510 with respect to a

left reference line L1 crossing central points of the first left groove 561 and the left hole 540, a first left arc 541 and a second left arc 542 of the left hole 540 may be coupled to each other to form the left airbag 200 at the left side of the first central portion 510, and after the first right portion 530 is folded in the direction toward the first central portion 510 with respect to a right reference line L2 crossing central points of the first right groove 571 and the right hole 550, a first right arc 551 and a second right arc 552 of the right hole 550 may be coupled to each other to form the right airbag 300 at the right side of the first central portion 510, and the central airbag 100 including the first central portion 510 may be formed between the left airbag 200 and the right airbag 300.

[0186] In order to form the left airbag 200, the first left portion 520 may be folded in the direction toward the first central portion 510 with respect to the left reference line L1, in the state of FIG. 13. That is, the first left portion 520 may be folded in a right direction.

[0187] The left reference line L1 may be a virtual line crossing the central points of the first left grove 561 and the left hole 540 and may be a boundary line between the central airbag 100 and the left airbag 200.

[0188] Also, when the first left portion 520 is folded in the direction toward the first central portion 510, a left region of the left ring 710 may be folded to be piled up at a front side of a right region of the left ring 710. Thus, when the first left portion 520 is folded in the direction toward the first central portion 510, the left ring 710 may function as a structure to support the first left portion 520 and the first central portion 510 to make easy the folding of the first left portion 520.

[0189] When the first left portion 520 is folded in the direction toward the first central portion 510, the first left arc 541 and the second left arc 542 of the left hole 540 may be coupled to each other. The first left arc 541 and the second left arc 542 may be coupled to each other through sewing, thermosetting, an adhesive, etc.

[0190] The first left arc 541 may be an arc forming a left side of the left hole 540 with respect to the left reference line L1, and the second left arc 542 may be an arc forming a right side of the left hole 540 with respect to the left reference line L1. The first left arc 541 and the second left arc 542 may be mirror symmetrical with each other with respect to the left reference line L1 and may have semicircular shapes.

[0191] As described above, when the first left arc 541 and the second left arc 542 are coupled to each other, the left airbag 200 may be formed as illustrated in FIGS. 1 to 4.

[0192] The first left airbag 210 may have a form made by upper regions of the first left portion 520 and the first left portion 620, and the second left airbag 220 may have a form made by the first left protrusion portion 521 and the second left protrusion portion 621.

[0193] In order to form the right airbag 300, in the state of FIG. 13, the first right portion 530 may be folded in the direction toward the first central portion 510 with respect to the right reference line L2. That is, the first left portion 520 may be folded in a left direction.

[0194] The right reference line L2 may be a virtual line crossing central points of the first right groove 571 and the right hole 550 and may be a boundary line between the central airbag 100 and the right airbag 300.

[0195] Also, when the first right portion 530 is folded in the direction toward the first central portion 510, a right region of the right ring 720 may be folded to be piled up at a front side of a left region of the right ring 720. Thus, when the first right portion 530 is folded in the direction toward the first central portion 510, the right ring 720 may function as a structure to support the first right portion 530 and the first central portion 510 to make easy the folding of the first right portion 530.

[0196] When the first right portion 530 is folded in the direction toward the first central portion 510, the first right arc 551 and the second right arc 552 of the right hole 550 may be coupled to each other. The first right arc 551 and the second right arc 552 may be coupled to each other through sewing, thermosetting, an adhesive, etc.

[0197] The first right arc 551 may form a right side of the right hole 550 with respect to the right reference line L2, and the second right arc 552 may form a left side of the right hole 550 with respect to the right reference line L2. The first right arc 551 and the second right arc 552 may be mirror symmetrical with each other with respect to the right reference line L2 and may have semicircular shapes.

[0198] As described above, when the first right arc 551 and the second right arc 552 are coupled to each other, the right airbag 300 may be formed as illustrated in FIGS. 1 to 4.

[0199] The first right airbag 310 may have a form made by upper regions of the first right portion 530 and the second right portion 630, and the second right airbag 320 may have a form made by the first right protrusion portion 531 and the second right protrusion portion 631.

[0200] When the left airbag 200 and the right airbag 300 are formed, the central airbag 100 may be formed between the left airbag 200 and the right airbag 300.

[0201] The central airbag 100 may have a form made by the first central portion 510 and the second central portion 610.

[0202] As described above, when after the first left portion 520 is folded in the right direction, the first left portion 520 is coupled to the first central portion 510, and when after the second right portion 630 is folded in the left direction, the second right portion 630 is coupled to the first central portion 510, the left airbag 200 and the right airbag 300 which may be bent from the central airbag 100 in a front direction may be formed to have a 3D shape.

[0203] As described above, after the airbag formation operation S40 is completed, the inflation member insertion operation S50 may be performed.

[0204] In the inflation member insertion operation S50, a process of inserting an inflation member into the central airbag 100, the left airbag 200, and the right airbag 300

through the left zipper 225 or the right zipper 325 may be performed.

[0205] The inflation member may be formed to have a general shape which is the same as the shape of the front members 500 or the rear members 600.

[0206] The inflation member may be easily inserted into the central airbag 100, the left airbag 200, and the right airbag 300 through the left zipper 225 or the right zipper 325.

[0207] As described above, when the inflation member is inserted into the central airbag 100, the left airbag 200, and the right airbag 300, the inflation member insertion operation S50 may be completed.

[0208] The inflation member insertion operation S50 may be performed when the central airbag 100, the left airbag 200, and the right airbag 300 of the head and cervical spine-protective airbag 10 function as outer skins, and when the central airbag 100, the left airbag 200, and the right airbag 300 of the head and cervical spine-protective airbag 10 are directly inflated, the inflation member insertion operation S50 may be omitted.

[0209] After the inflation member insertion operation S50 is completed, the inflator connection operation S60 may be performed.

[0210] In the inflator connection operation S60, the left inflator 223 to which the left gas cartridge 221 is coupled may be connected to the left inflator hole 623 and the right inflator 323 to which the right gas cartridge 321 is coupled may be connected to the right inflator hole 633.

[0211] The left inflator hole 623 may be located at a location to correspond to a left hole formed at a rear surface of the inflation member.

[0212] The gas injection portion of the left inflator 223 may be connected to the left inflator hole 623 and the left hole, and thus, the left inflator hole 623 and the left inflator 223 may be connected to each other.

[0213] When the central airbag 100, the left airbag 200, and the right airbag 300 of the head and cervical spine-protective airbag 10 do not function as outer skins and the central airbag 100, the left airbag 200, and the right airbag 300 of the head and cervical spine-protective airbag 10 are directly inflated, an additional inflation member may not be needed, and thus, the gas injection portion of the left inflator 223 may be directly connected to the left inflator hole 623.

[0214] As described above, when the left inflator hole 623 and the left inflator 223 are connected to each other, compression gas of the left gas cartridge 221 may be supplied (or injected) into the left airbag 200 through the left inflator hole 623 via the left inflator 223.

[0215] The right inflator hole 633 may be located at a location to correspond to a right hole formed at a rear surface of the inflation member.

[0216] The gas injection portion of the left inflator 223 may be connected to the right inflator hole 633 and the right hole, and thus, the right inflator hole 633 and the right inflator 323 may be connected to each other.

[0217] When the central airbag 100, the left airbag 200, and the right airbag 300 of the head and cervical spine-protective airbag 10 do not function as outer skins and the central airbag 100, the left airbag 200, and the right airbag 300 of the head and cervical spine-protective airbag 10 are directly inflated, an additional inflation member may not be needed, and thus, the gas injection portion of the right inflator 323 may be directly connected to the right inflator hole 633.

[0218] As described above, when the right inflator hole 633 and the right inflator 323 are connected to each other, compression gas of the right gas cartridge 321 may be supplied (or injected) into the right airbag 300 through the right inflator hole 633 via the right inflator 323.

[0219] According to the method of manufacturing the head and cervical spine-protective airbag 10 described above, the first left portion 520 and the second right portion 630 may be folded in the direction toward the first central portion 510 and then may be coupled to the first central portion 510, and thus, the 3D shape of the head and cervical spine-protective airbag 10 for protecting the head 910 and the cervical spine of the user 900 may be easily molded.

[0220] The first and second left portions 520 and 620 and the first and second right portions 530 and 630 may be easily folded in the directions toward the first and second central portions 510 and 610 through the first and second left grooves 561 and 562 and the first and second right grooves 571 and 572, and thus, the 3D shape of the head and cervical spine-protective airbag 10 may be easily manufactured.

[0221] When the first and second left portions 520 and 620 and the first and second right portions 530 and 630 are folded in the directions toward the first and second central portions 510 and 610 through the left ring 710 and the right ring 720, the first and second left portions 520 and 620 and the first and second right portions 530 and 630 may be easily folded and the first and second left portions 520 and 620 and the first and second right portions 530 and 630 may be easily coupled to the first and second central portions 510 and 610.

[0222] As described above, the disclosure is described with reference to desirable embodiments, but one of ordinary skill in the art may execute the disclosure by variously modifying or altering the disclosure in a range not deviating from the concept and the area of the disclosure described in the patent claims below.

Claims

1. A head and cervical spine-protective airbag comprising:

   a central airbag;
   a left airbag provided at a left side of the central airbag; and
   a right airbag provided at a right side of the central airbag,

wherein the left airbag comprises:

a first left airbag connected to the left side of the central airbag, the first left airbag being formed to be convex in a front direction of the central airbag such that a front surface of the left airbag protrudes further forward than a front surface of the central airbag; and
a second left airbag formed below the first left airbag to extend in a lower direction, the second left airbag having a rear surface located to be more forward than the front surface of the central airbag, and
the right airbag comprises:

a first right airbag connected to the right side of the central airbag, the first right airbag being formed to be convex in the front direction of the central airbag such that a front surface of the right airbag protrudes further forward than the front surface of the central airbag; and
a second right airbag formed below the first right airbag to extend in the lower direction, the second right airbag having a rear surface located to be more forward than the front surface of the central airbag.

2. The head and cervical spine-protective airbag of claim 1, wherein a space is formed at a front side of the central airbag, wherein the space is located at a right side of the first left airbag and at a left side of the second right airbag and is surrounded by the central airbag, the first left airbag, and the first right airbag.

3. The head and cervical spine-protective airbag of claim 1, wherein a lengthwise central line of the first left airbag is formed to be downwardly inclined toward a front side of the first left airbag, and a lengthwise central line of the first right airbag is i formed to be downwardly inclined toward a front side of the first right airbag.

4. The head and cervical spine-protective airbag of claim 1 or 3, wherein a lengthwise central line of the second left airbag is formed to be inclined in a right direction toward a lower side of the second left airbag, and a lengthwise central line of the second right airbag is formed to be inclined in a left direction toward a lower side of the second right airbag.

5. The head and cervical spine-protective airbag of claim 1, further comprising:

a left gas cartridge provided at a rear surface of the second left airbag;
a left inflator provided at the rear surface of the second left airbag and configured to, when shock is applied to the left inflator, inject gas of the left gas cartridge into the left airbag to inflate the left airbag; a right gas cartridge provided at a rear surface of the second right airbag; and
a right inflator provided at the rear surface of the second right airbag and configured to, when shock is applied to the right inflator, inject gas of the right gas cartridge into the right airbag to inflate the right airbag.

6. The head and cervical spine-protective airbag of claim 1, further comprising:

a left vent hole provided at a left surface of the first left airbag and configured to, when shock is applied to the first left airbag while the first left airbag is being inflated by gas, discharge the gas to an outside of the first left airbag; and
a right vent hole provided at a right surface of the first right airbag and configured to, when shock is applied to the first right airbag while the first right airbag is being inflated by gas, discharge the gas to an outside of the first right airbag.

7. The head and cervical spine-protective airbag of claim 1, further comprising:

a left zipper provided at a left surface of the second left airbag; and
a right zipper provided at a left surface of the second right airbag.

8. The head and cervical spine-protective airbag of claim 1, wherein the first left airbag and the first right airbag are mirror symmetrical with each other with respect to a central line of the central airbag, the second left airbag and the second right airbag are mirror symmetrical with each other with respect to the central line of the central airbag, and sizes of maximum cross-sectional areas of the central airbag, the first left airbag and the first right airbag, and the second left airbag and the second right airbag satisfy a relationship that the maximum cross-sectional area of the first left airbag and the first right airbag > the maximum cross-sectional area of the central airbag > the maximum cross-sectional area of the second left airbag and the second right airbag.

9. A head and cervical spine-protective airbag for protecting a head and a cervical spine of a user, the head and cervical spine-protective airbag comprising:

a central airbag, a front surface of which is lo-

cated at a rear side of the head of the user;
a first left airbag provided to forwardly protrude at a left side of the central airbag such that a right surface of the first left airbag is located at a left side of the head and a lower surface of the first left airbag is located above a left shoulder of the user;
a second left airbag formed to extend from the first left airbag in a lower direction such that a rear surface of the second left airbag is located at a front side of a left breast of the user;
a first right airbag provided to forwardly protrude at a right side of the central airbag such that a left surface of the first right airbag is located at a right side of the head and a lower surface of the first right airbag is located above a right shoulder of the user; and
a second right airbag formed to extend from the first right airbag in the lower direction such that a rear surface of the second right airbag is located at a front side of a right breast of the user.

10. The head and cervical spine-protective airbag of claim 9, wherein an uppermost portion of the central airbag is located to be higher than an uppermost portion of the head of the user.

11. A method of manufacturing a head and cervical spine-protective airbag, the method comprising:

a member preparation operation in which front members and rear members are prepared, the front members including a first central portion, a first left portion formed at a left side of the first central portion and providing a first left protrusion portion protruding from the first central portion in a lower direction, a first right portion formed at a right side of the first central portion and providing a first right protrusion portion protruding from the first central portion in the lower direction, a left hole formed at a left side with respect to a central line of the first central portion, a right hole formed at a right side with respect to the central line of the first central portion, a first left groove formed above the left hole, and a first right groove formed above the right hole, and the rear members including a second central portion, a second left portion, and a second right portion respectively having same shapes as the first central portion, the first left portion, and the first right portion;
a coupling operation in which the front members and the rear member are coupled to each other in front and rear directions; and
an airbag formation operation in which, after the first left portion is folded in a direction toward the first central portion with respect to a left reference line crossing central points of the first left groove and the left hole, a first left arc and a second left arc of the left hole are coupled to each other to form a left airbag at a left side of the first central portion, after the first right portion is folded in the direction toward the first central portion with respect to a right reference line crossing central points of the first right groove and the right hole, a first right arc and a second right arc of the right hole are coupled to each other to form a right airbag at a right side of the first central portion, and a central airbag formed of the first central portion is formed between the left airbag and the right airbag.

12. The method of claim 11, further comprising, before the coupling operation, a ring coupling operation in which a left ring is coupled to a rear side of the left hole such that a central point of the left ring corresponds to the central point of the left hole and a right ring is coupled to a rear side of the right hole such that a central point of the right ring corresponds to the central point of the right hole.

13. The method of claim 12, wherein in the airbag formation operation, when the first left portion is folded in the direction toward the first central portion, a left region of the left ring is folded to be piled up at a front side of a right region of the left ring, and when the first right portion is folded in the direction toward the first central portion, a right region of the right ring is folded to be piled up at a front side of a left region of the right ring.

FIG. 1

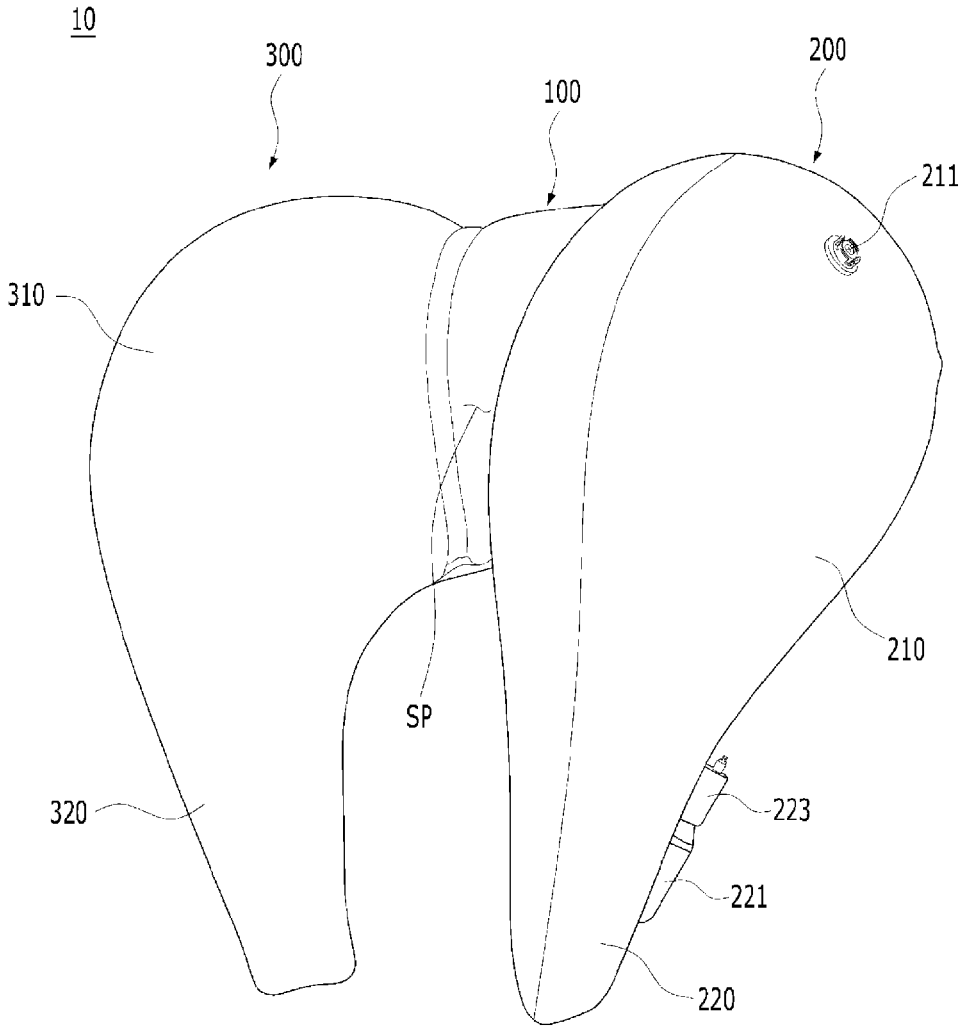

FIG. 2

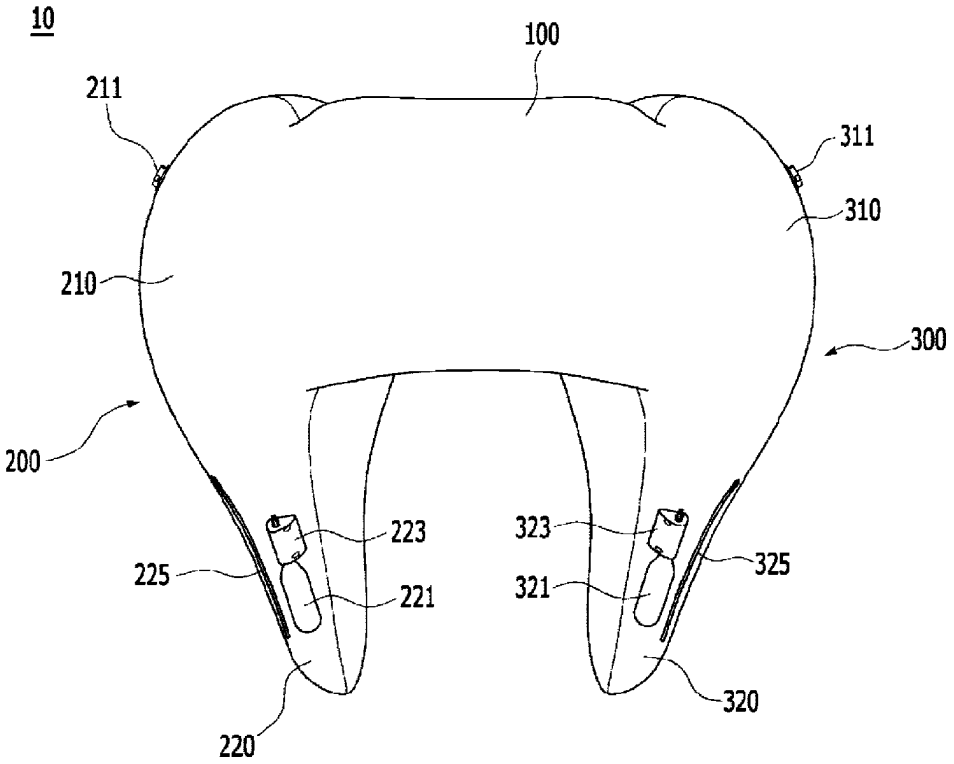
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FIG. 3

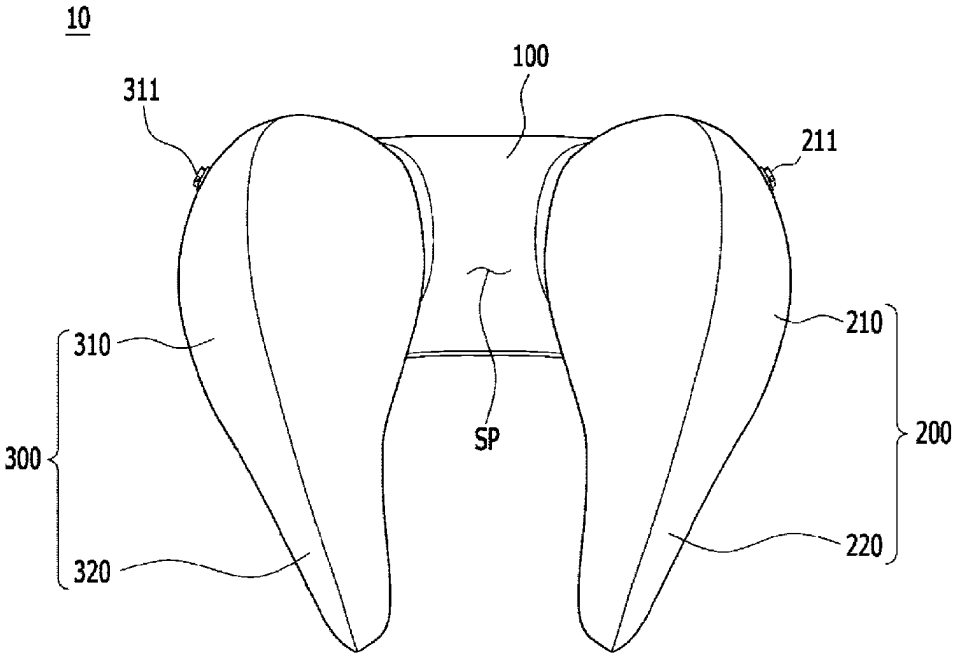
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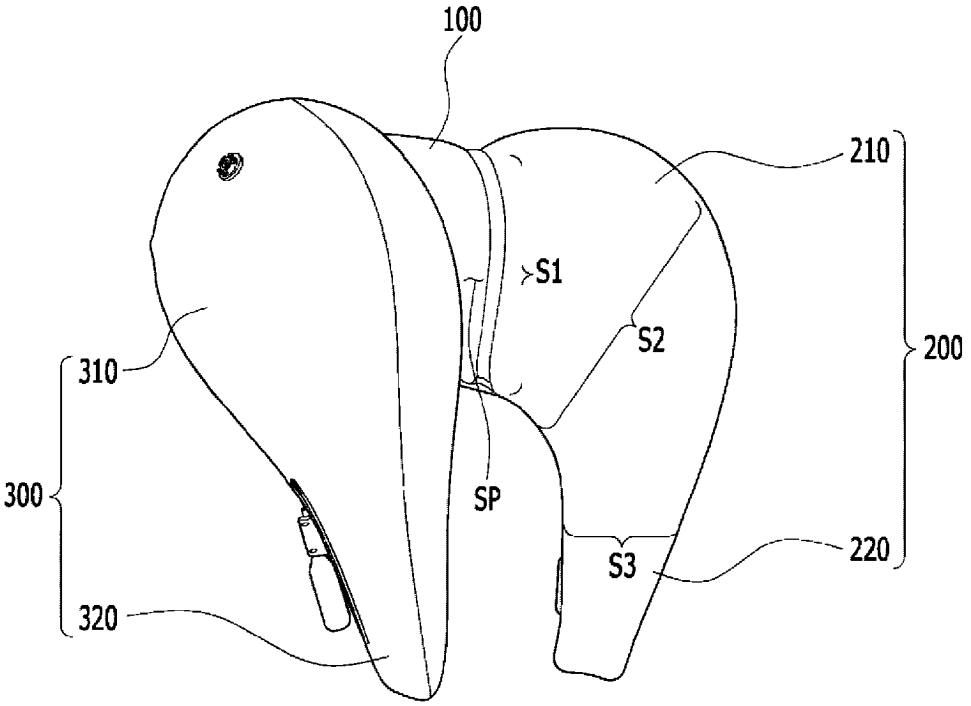
FIG. 4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S1
S2
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S3
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FIG. 5

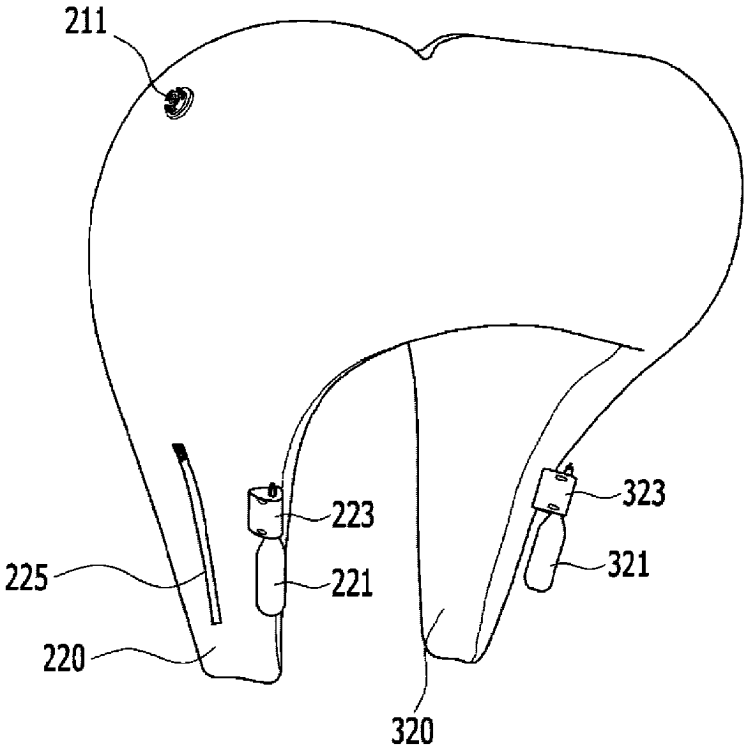
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FIG. 6

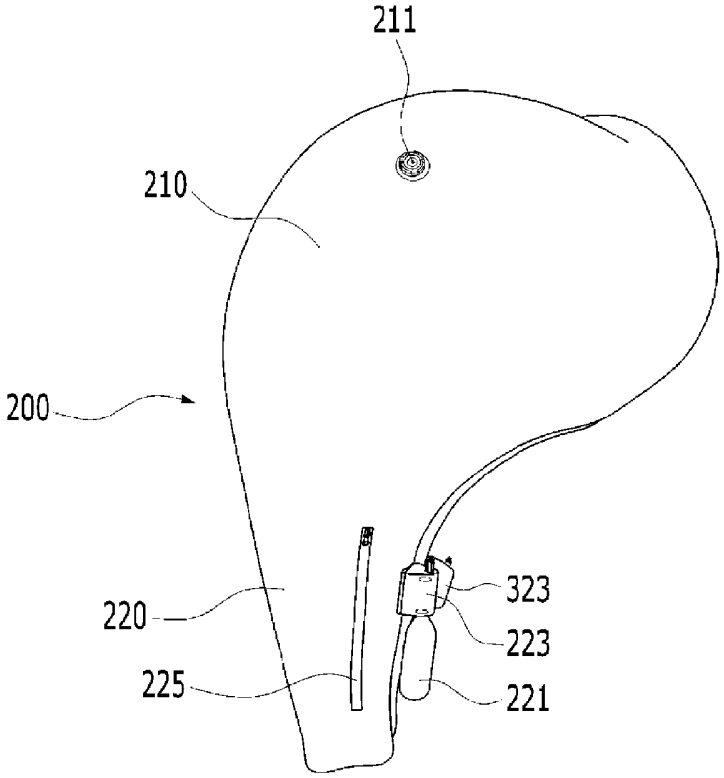


FIG. 7

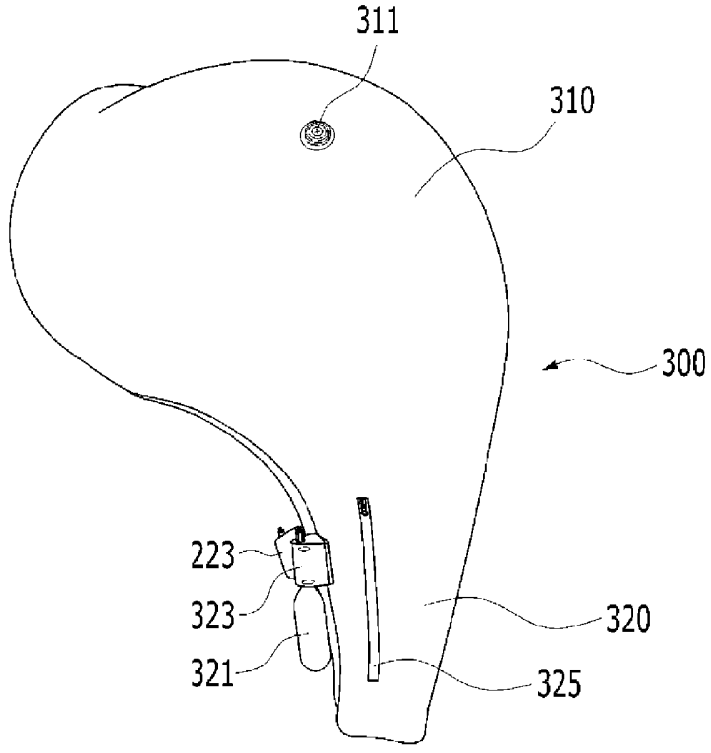


FIG. 8

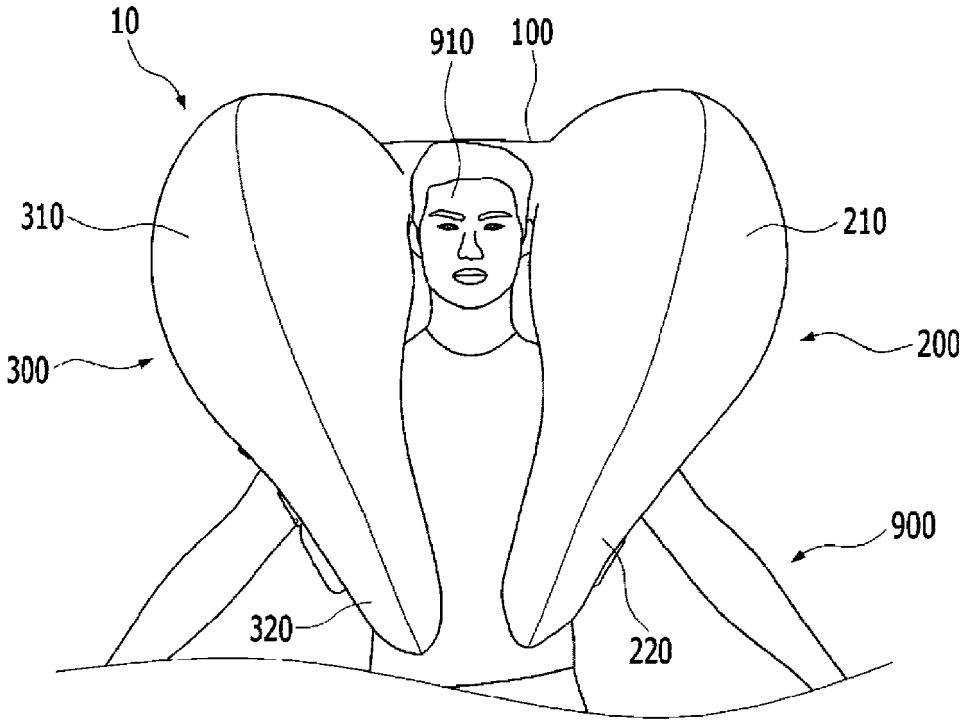


FIG. 9

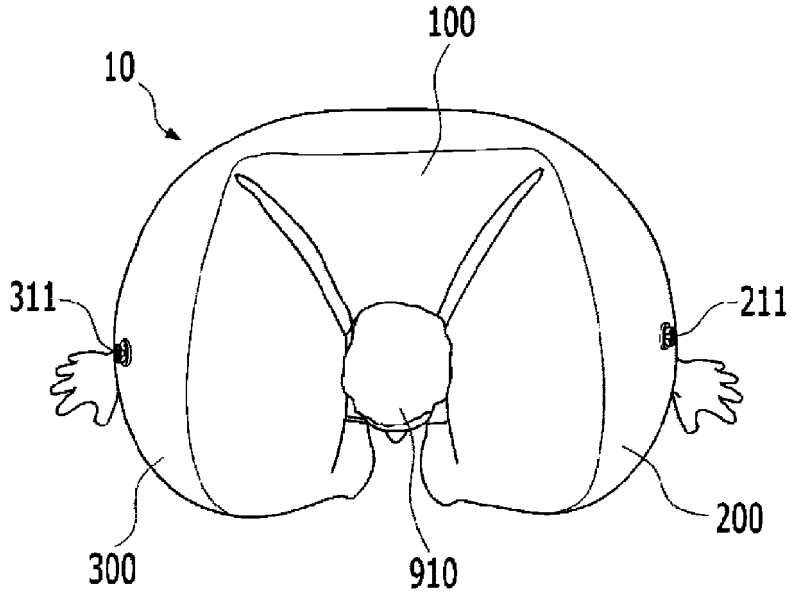


FIG. 10

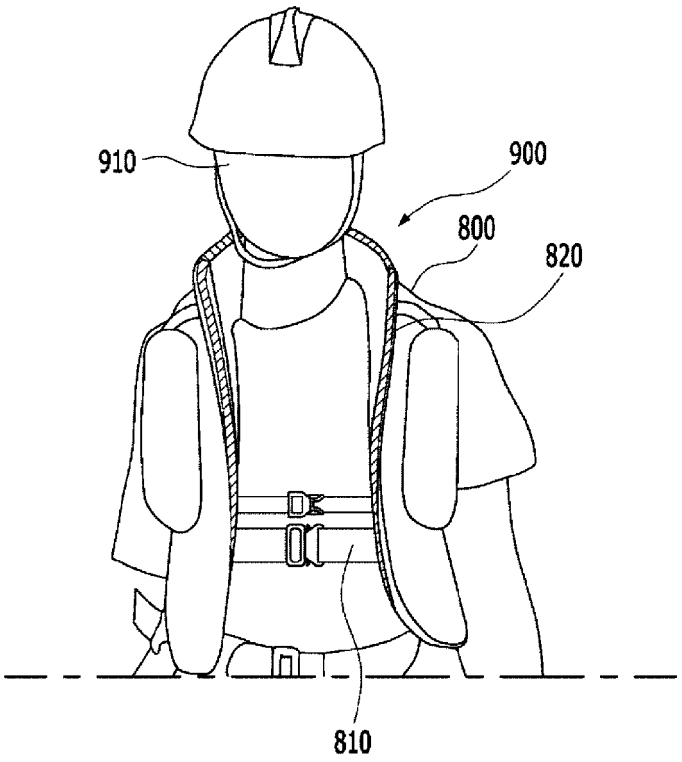


FIG. 11

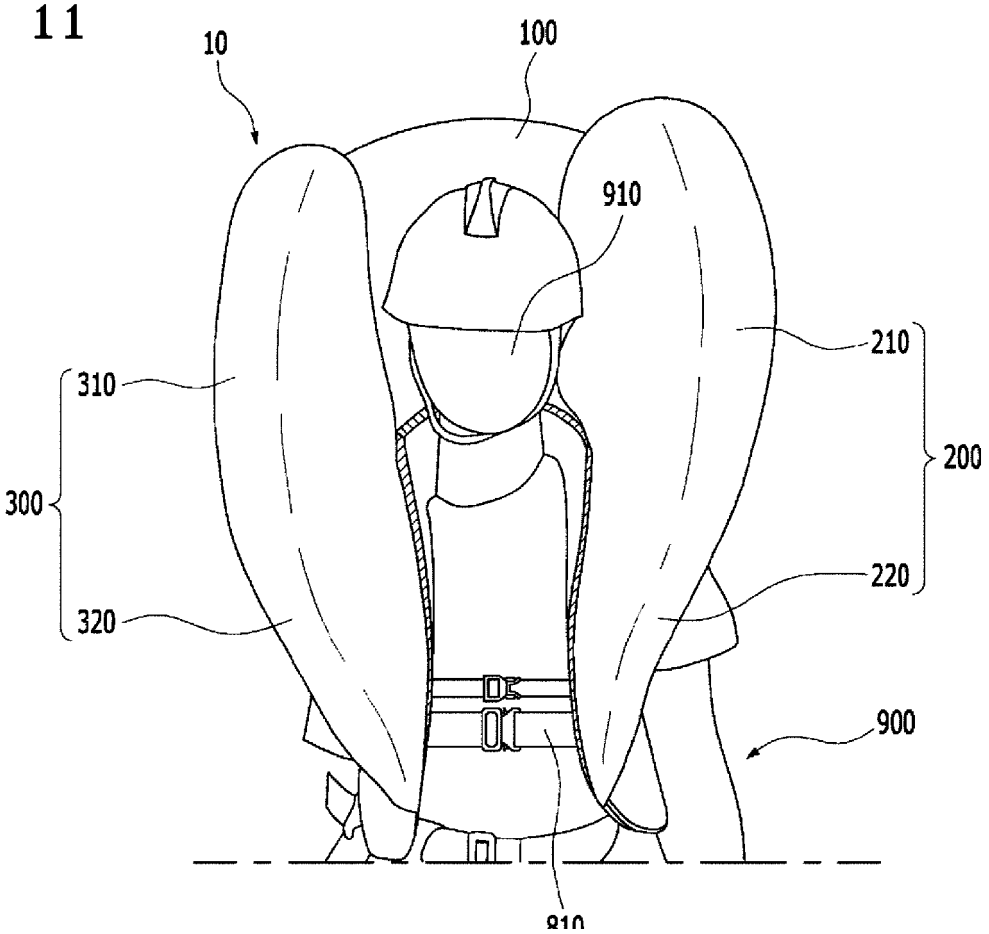


FIG. 12

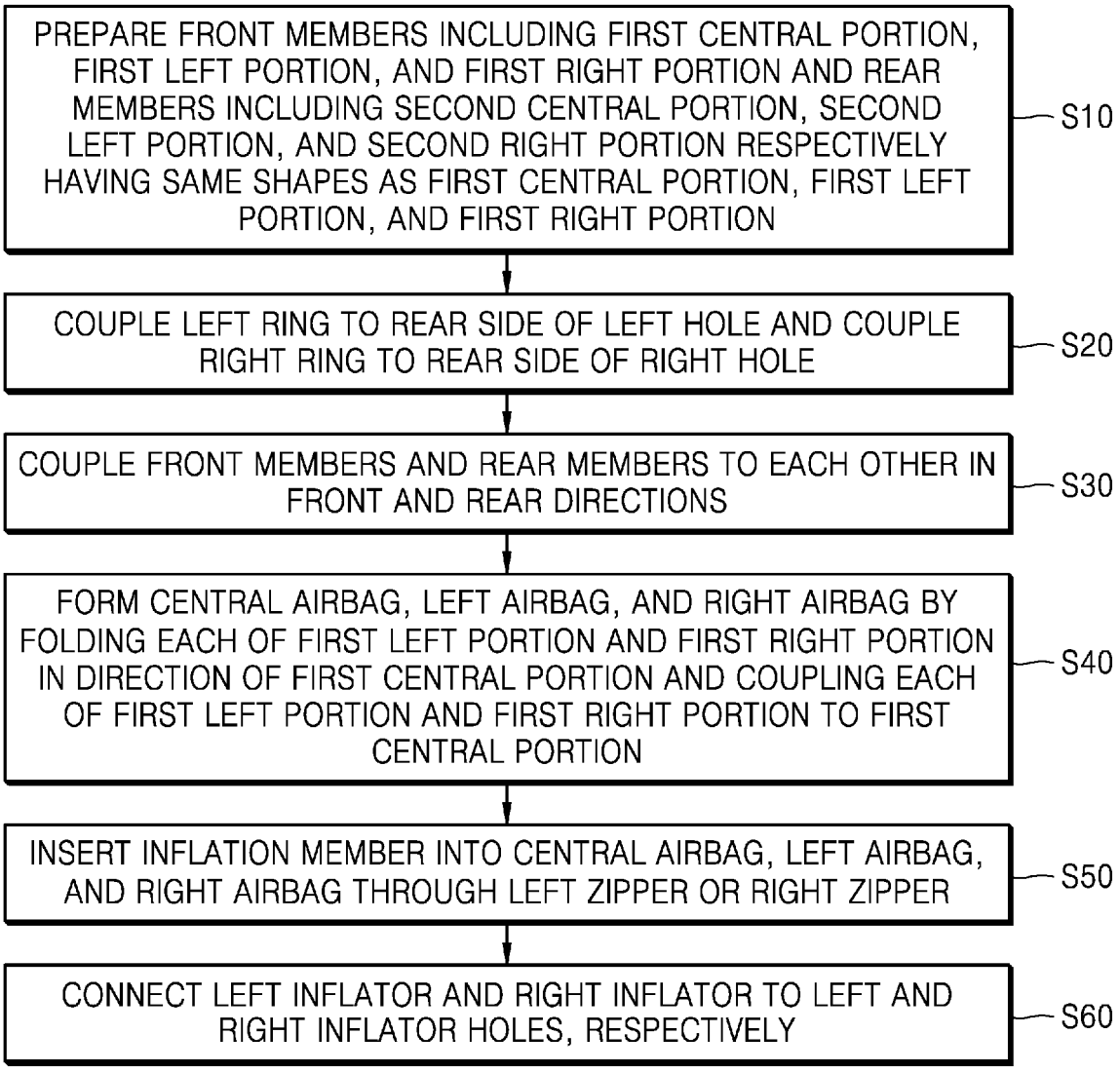
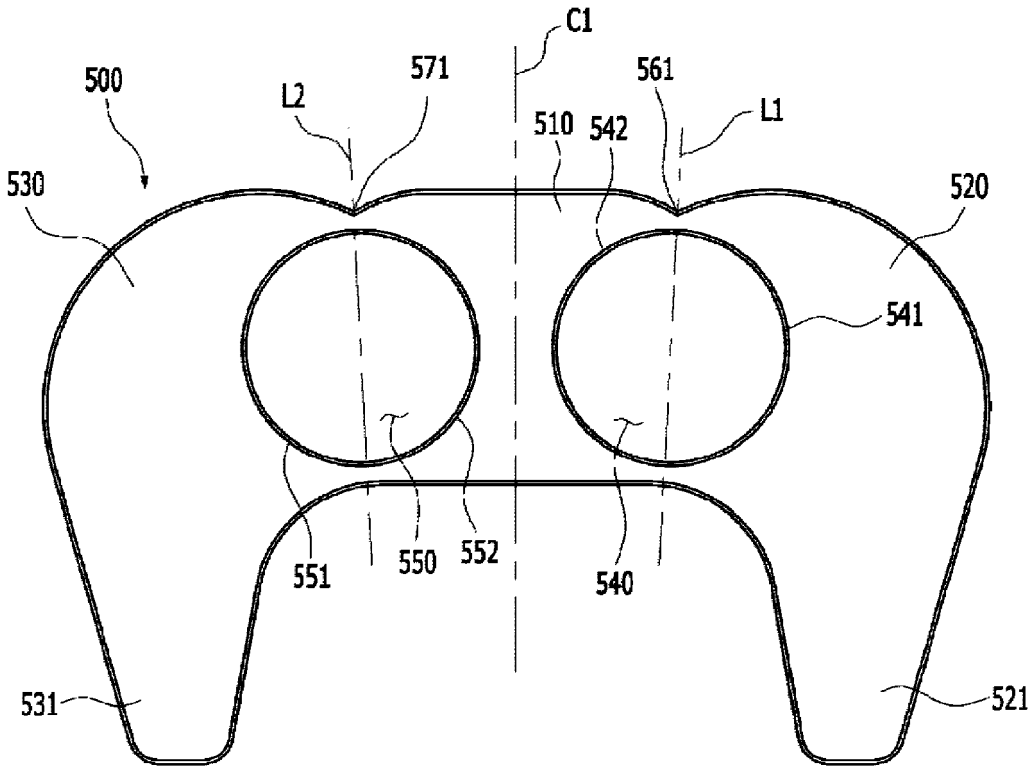

PREPARE FRONT MEMBERS INCLUDING FIRST CENTRAL PORTION, FIRST LEFT PORTION, AND FIRST RIGHT PORTION AND REAR MEMBERS INCLUDING SECOND CENTRAL PORTION, SECOND LEFT PORTION, AND SECOND RIGHT PORTION RESPECTIVELY HAVING SAME SHAPES AS FIRST CENTRAL PORTION, FIRST LEFT PORTION, AND FIRST RIGHT PORTION
S10
COUPLE LEFT RING TO REAR SIDE OF LEFT HOLE AND COUPLE RIGHT RING TO REAR SIDE OF RIGHT HOLE
S20
COUPLE FRONT MEMBERS AND REAR MEMBERS TO EACH OTHER IN FRONT AND REAR DIRECTIONS
S30
FORM CENTRAL AIRBAG, LEFT AIRBAG, AND RIGHT AIRBAG BY FOLDING EACH OF FIRST LEFT PORTION AND FIRST RIGHT PORTION IN DIRECTION OF FIRST CENTRAL PORTION AND COUPLING EACH OF FIRST LEFT PORTION AND FIRST RIGHT PORTION TO FIRST CENTRAL PORTION
S40
INSERT INFLATION MEMBER INTO CENTRAL AIRBAG, LEFT AIRBAG, AND RIGHT AIRBAG THROUGH LEFT ZIPPER OR RIGHT ZIPPER
S50
CONNECT LEFT INFLATOR AND RIGHT INFLATOR TO LEFT AND RIGHT INFLATOR HOLES, RESPECTIVELY
S60

FIG. 13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L2
L1
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FIG. 14

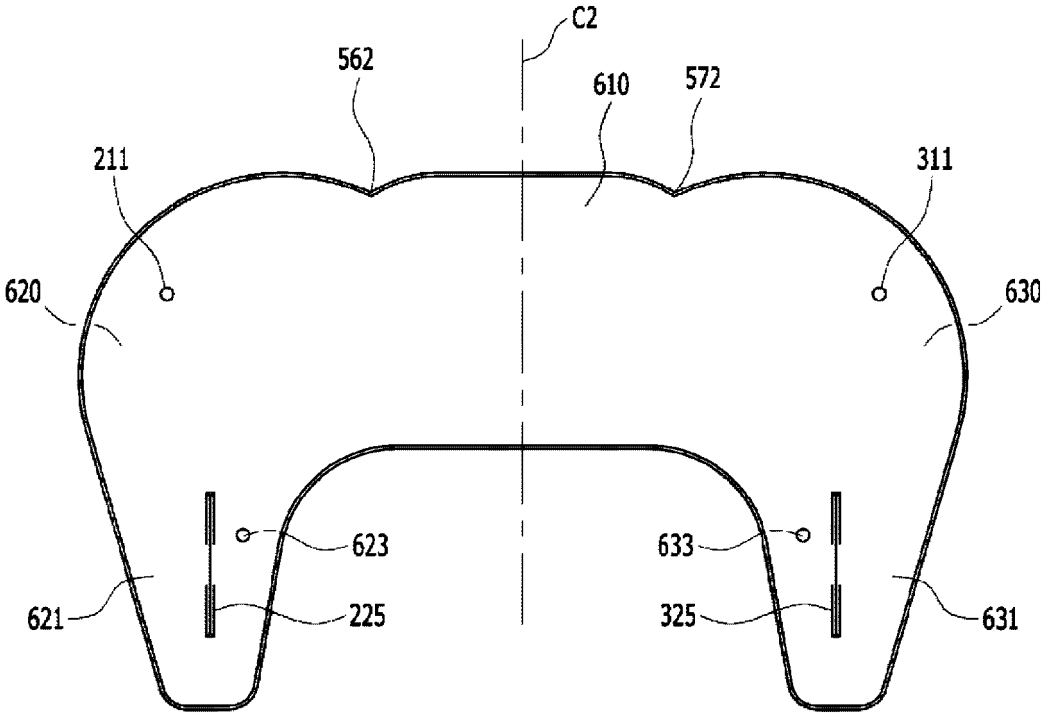
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FIG. 15

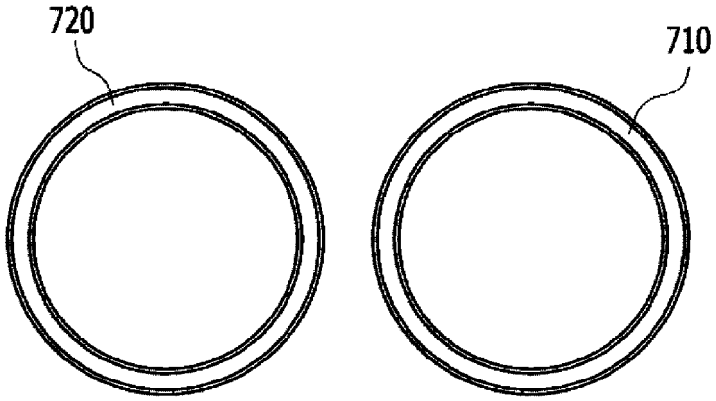
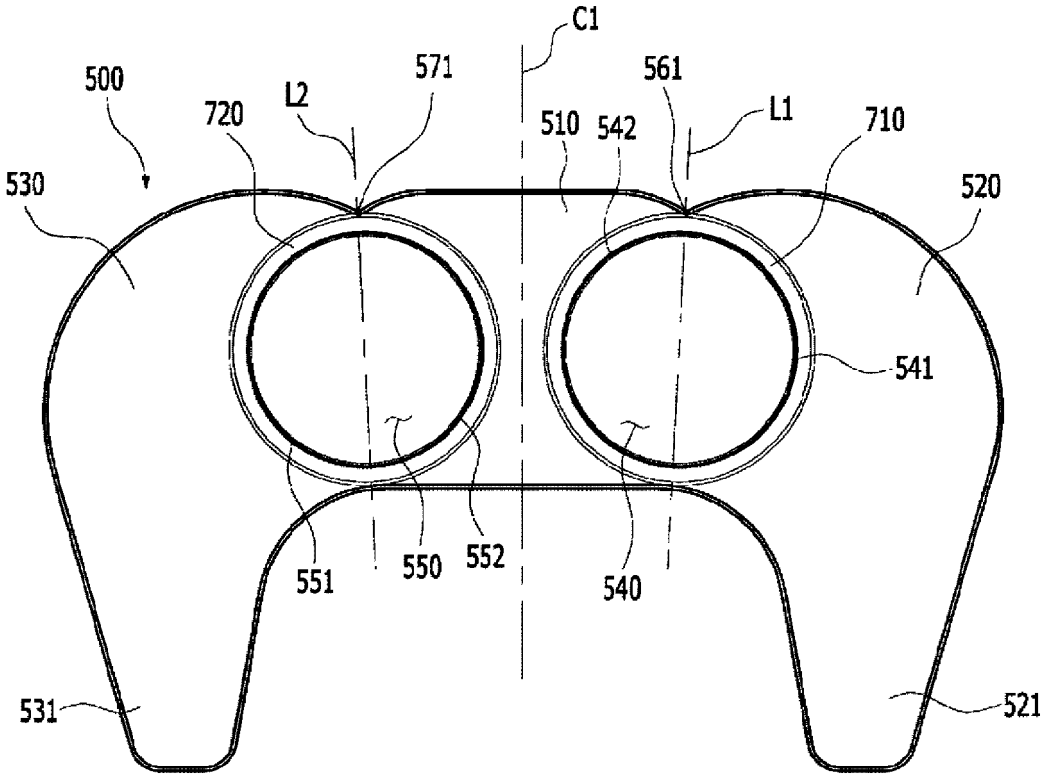

720
710

FIG. 16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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/018641

A. CLASSIFICATION OF SUBJECT MATTER

A62B 35/00(2006.01)i; **A41D 13/015**(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A62B 35/00(2006.01); A41D 1/04(2006.01); A41D 13/00(2006.01); A41D 13/015(2006.01); A41D 13/018(2006.01); A62B 35/04(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 에어백(airbag), 두부(head), 경추(cervical spine), 가스 카트리지(gas cartridge), 인플레이터(inflator)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2004-162224 A (ACTIVE DEVICE K.K.) 10 June 2004 (2004-06-10) See paragraphs [0014]-[0017] and figure 1.	1-6,8-9
Y		7,10
A		11-13
Y	US 6270386 B1 (VISOCEKAS, Ariel Remy) 07 August 2001 (2001-08-07) See column 3, lines 38-54 and figure 4.	7
Y	JP 2006-081746 A (PROP K.K. et al.) 30 March 2006 (2006-03-30) See paragraph [0027] and figures 4-5 and 10.	10
A	JP 11-342217 A (KAGEYAMA, Takeshi et al.) 14 December 1999 (1999-12-14) See paragraphs [0015]-[0019] and figures 5-9.	1-13

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 February 2023	**24 February 2023**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/018641

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2012-0102434 A (RYU, Sil-Gun) 18 September 2012 (2012-09-18) See paragraphs [0017]-[0032] and figures 1-3a.	1-13

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/018641

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2004-162224 A	10 June 2004	JP 3730952 B2	05 January 2006
US 6270386 B1	07 August 2001	None	
JP 2006-081746 A	30 March 2006	JP 4621464 B2	26 January 2011
JP 11-342217 A	14 December 1999	None	
KR 10-2012-0102434 A	18 September 2012	KR 10-1230437 B1	06 February 2013

Form PCT/ISA/210 (patent family annex) (July 2022)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 101803319 **[0006]**