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(54) **SAFETY CLOTHES**

(57) Safety clothes includes a fabric structure having a liner fabric and a cover fabric attached to each other, and a plurality of gas-containing capsules contained in

compartments, which are defined between the liner fabric and the cover fabric. Gas is sealed inside the gas-containing capsules. The reliability and the freedom of motion of safety clothes are improved.

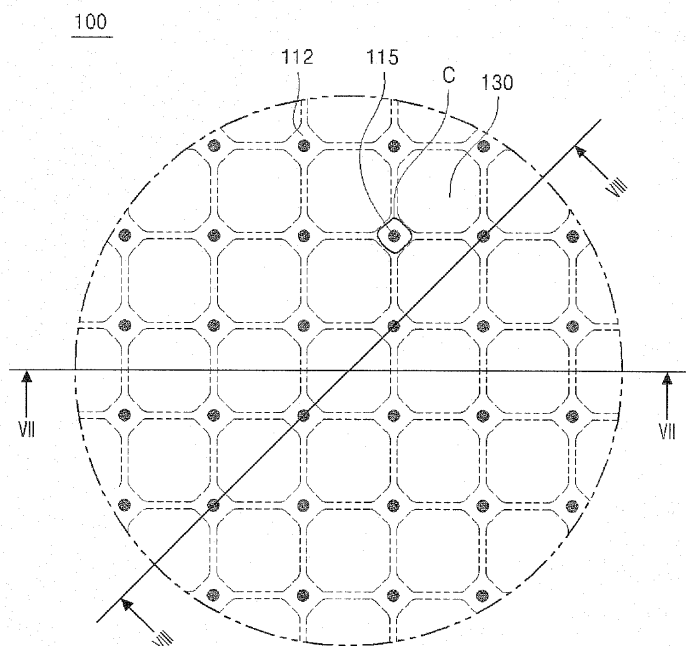


FIG. 6

Description

[Technical Field]

[0001] The present invention relates to safety clothes, and more particularly, to a structure for improving the reliability and the freedom of motion of safety clothes.

[Background Art]

[0002] In general, safety clothes is used as a floating device, in which a buoyant material is fitted between a liner fabric and a cover fabric to keep a wearer afloat in the water; a shock-absorbing device, in which a shock-absorbing material is fitted between the liner fabric and the cover fabric to protect the wearer's body from external impact when he/she is exercising or walking on the ground; or the like. In particular, the safety clothes used as the floating device (e.g., a life jacket) is required to be worn for the purpose of safety in the case of water sports, fishing, and sea cruising.

[0003] FIG. 1 is a perspective view showing an example of a conventional life jacket.

[0004] Referring to FIG. 1, the life jacket 10 of the related art is provided in the form of a vest that a person can wear, in which a buoyant material 40 is fitted between a liner fabric 20 and a cover fabric 30. The buoyant material 40 is typically made of foamed resin, such as polyethylene foam, which has a predetermined thickness. The buoyant material 40 is provided in the form of a plate in order to facilitate manufacture, and is contained inside the life jacket 10 by sealing the liner fabric 20 and the cover fabric 30.

[0005] However, the life jacket 10 of the related art has a problem in that, when the wearer remains in the water for a long time, the buoyant material 40, which is made of foamed resin such as polyethylene foam, absorbs water, thereby endangering the safety of the wearer, even if the liner fabric 20 and the cover fabric 30 are made of a waterproof or water-resistant material.

[0006] In addition, the life jacket 10 of the related art has a problem in that the buoyant material 40 is not easily brought into close contact with the body of the wearer and has little pliability, since it is provided in the form of a plate, which is made of foamed resin, such as polyethylene foam.

[Disclosure]

[Technical Problem]

[0007] An object of the present invention is to provide safety clothes that can improve reliability and freedom of motion, which are required for the same.

[Advantageous Effects]

[0008] The invention uses gas-containing capsules, in

which gas is sealed, as a buoyant material so that no water can permeate into the buoyant material even if a wearer remains in the water for a long time, thereby improving the reliability of a life jacket.

[0009] The invention also uses the gas-containing capsules, in which gas is sealed, as a buoyant material so that the buoyant material can exhibit external impact-absorbing performance that is better than that of the shock-absorbing material of the related art in which no gas is contained, thereby more thoroughly protecting the body of the wearer.

[0010] Furthermore, the invention provides an attachment structure having a dotted pattern to liner and cover fabrics, which form multiple compartments in which the multiple gas-containing capsules are contained, so that the gas-containing capsules, which are contained in the compartments, can move within a predetermined range. This, as a result, can increase the pliability of the life jacket, improve the wearing sensation, and increase the freedom of motion of a wearer.

[Description of Drawings]

[0011]

FIG. 1 is a perspective view showing an example of a life jacket of the related art.

FIG. 2 is a perspective view showing a life jacket according to an exemplary embodiment of the invention.

FIG. 3 is a perspective view of the gas-containing capsule shown in FIG. 2.

FIG. 4 is a cross-sectional view of the gas-containing capsule shown in FIG. 3.

FIG. 5 is a perspective view showing variations of the gas-containing capsule of the invention.

FIG. 6 is a schematic plan view showing the enlargement of a part of the life jacket shown in FIG. 2.

FIG. 7 is a schematic cross-sectional view of the life jacket taken along line VII-VII in FIG. 6.

FIG. 8 is a schematic cross-sectional view of the life jacket taken along line VIII-VIII in FIG. 6.

FIG. 9 is a schematic plan view showing part of a life jacket according to another exemplary embodiment of the invention.

FIG. 10 is a schematic cross-sectional view of the life jacket taken along line X-X in FIG. 9.

[Best Mode]

[0012] According to the invention for realizing one or more of the foregoing objects, the safety clothes includes a fabric structure having a liner fabric and a cover fabric attached to each other; and a plurality of gas-containing capsules contained in compartments, which are defined between the liner fabric and the cover fabric, wherein gas is sealed inside the gas-containing capsules.

[0013] Each of the gas-containing capsules may be

made of a synthetic resin material, with an enclosed inner space formed therein. Gas is sealed in the inner space.

[0014] The gas-containing capsule may be manufactured by forming the synthetic resin material into a predetermined shape with the inner space therein through blow molding or injection molding, followed by injecting gas into the inner space, and sealing the inner space.

[0015] Examples of the synthetic resin material may include ethylene vinyl acetate.

[0016] The liner fabric and the cover fabric may be attached to each other intermittently at points adjacent to the gas-containing capsules in lateral and vertical directions in order to form the compartments.

[0017] The compartments may be formed between the liner fabric and the cover fabric, which are attached to each other in central areas. Each of the central areas is defined by 4 adjacent capsules of the gas-containing capsules.

[0018] The gas-containing capsules may have an octagonal cross-sectional shape. Each gas-containing capsule may have 8 sidewalls, in which 4 sidewalls have a shorter lateral length, 4 remaining sidewalls have a longer lateral length, and the 4 sidewalls having a shorter lateral length form corners of the gas-containing capsule.

[0019] The safety clothes may further include a plurality of through-holes penetrating the liner fabric and the cover fabric in central areas, each of which is defined by 4 adjacent capsules of the gas-containing capsules

[0020] The safety clothes can include a life jacket in which the gas-containing capsules act as a buoyant material.

[Mode for Invention]

[0021] The above and other advantages of the invention and of the operation of the invention and the above and other objects, which are realized by embodying the invention, will be more apparent from the following description taken in conjunction with the accompanying drawings, which show exemplary embodiments of the invention.

[0022] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments thereof are shown. In the following description of the present invention, however, detailed descriptions of known functions and components incorporated herein will be omitted when they may make the subject matter of the present invention unclear.

[0023] The life jacket of the invention can be applied in various forms, such as those of a vest, a jumper, pants, a guard, and the like. In terms of use, the life jacket can be applied as a floating device, which keeps a wearer afloat in the water, a shock-absorbing device, which protects the wearer's body from external impact when the wearer is exercising or walking on the ground, and the like. That is, in this disclosure, the term "safety clothes" is used as a concept that embraces various types of pro-

TECTIVE equipment, which are in the form of a piece of apparel that a person can wear on his/her body. However, in the following description, the safety clothes of the invention will be limited, for the purpose of illustration, to the life jacket, which is used as a buoyant device to prevent a water accident from occurring by keeping the wearer afloat in the water.

[0024] FIG. 2 is a perspective view showing a life jacket according to an exemplary embodiment of the invention, FIG. 3 is a perspective view of the gas-containing capsule shown in FIG. 2, FIG. 4 is a cross-sectional view of the gas-containing capsule shown in FIG. 3, and FIG. 5 is a perspective view showing variations of the gas-containing capsule of the invention.

[0025] In addition, FIG. 6 is a schematic plan view showing the enlargement of a part of the life jacket shown in FIG. 2, FIG. 7 is a schematic cross-sectional view of the life jacket taken along line VII-VII in FIG. 6, and FIG. 8 is a schematic cross-sectional view of the life jacket taken along line VIII-VIII in FIG. 6.

[0026] Referring to FIGS. 2 to 8, the life jacket 100 of this embodiment includes a plurality of gas-containing capsules 130, in which gas is sealed, and a fabric structure 110, which includes a liner fabric 111 and a cover fabric 112. The liner fabric 111 and the cover fabric 112 are attached to each other to form a plurality of compartments S in which the gas-containing capsules 130 are contained.

[0027] Referring to FIGS. 3 and 4, each gas-containing capsule 130 is configured to form an enclosed inner space, in which gas is sealed in order to produce a certain amount of buoyancy. Examples of the gas sealed inside the gas-containing capsules 130 may include air, nitrogen (N_2), and the like.

[0028] As shown in FIGS. 3 and 4, the gas-containing capsule 130 has a contour generally in the form of an octagonal column with an octagonal cross section. Thus, the octagonal structure of the gas-containing capsule 130 forms 8 sidewalls 131 and 133, of which 4 shorter sidewalls 131 have a shorter lateral length L_1 , and the other 4 sidewalls 133 have a longer lateral length L_2 . The 4 sidewalls 131 having the shorter lateral length L_2 form 4 corners of the gas-containing capsule 130. Accordingly, as shown in FIG. 6, it is possible to set the central areas C, which are defined by 4 adjacent gas-containing capsules 130, to have a sufficient space while decreasing the distance between the multiple gas-containing capsules 130, thereby providing attaching areas in which the liner fabric 111 and the cover fabric 112 are easily attached in a dotted pattern. However, the shape of the gas-containing capsule 130 is not limited to this embodiment. As shown in FIG. 6, the gas-containing capsule 130 can have a variety of shapes, such as those of a flat ellipse, a rectangular column, a hexagonal column, and the like. In addition, the size of the gas-containing capsule 130 can vary depending on the design of the life jacket 100 that is used. The advantage is that the smaller the gas-containing capsule 130 is, the better the wearing

sensation becomes. Although not shown in the figures, it is preferred that the corners of the gas-containing capsule 130 be rounded.

[0029] The gas-containing capsule 130 can be made of one material selected from among thermoplastic synthetic resins, such as Ethylene Vinyl Acetate (EVA), Poly Ethylene (PE), Poly Ethylene Terephthalate (PET), Poly Vinyl Chloride (PVC), and the like. In particular, considering that the life jacket 100 is a piece of apparel that a person wears, it is preferred that the gas-containing capsule 130 be made of EVA, which is a material that is inexpensive but has excellent pliability (softness), shock-absorbing ability, and heat retention. The gas-containing capsule 130 can be manufactured by forming a thermoplastic synthetic resin material into a specific shape having an enclosed inner space through blow molding, injection molding, or the like, injecting gas into the inner space, and sealing the inner space. Here, it is more preferable that blow molding, in which the gas-containing capsule 130 is manufactured by blowing air into it, be used rather than injection molding, in consideration that the gas-containing capsule 130 is shaped such that it has an enclosed inner space.

[0030] As described above, the gas-containing capsule 130 can serve as an excellent buoyant material in the life jacket 100, since it is made of a synthetic resin material and gas is sealed inside it. In addition, unlike foamed resin such as polyethylene foam, the gas-containing capsule 130 does not lose buoyancy even if it is left in the water for a long time, since no water permeates into it. Thereby, the gas-containing capsule 130 can improve the reliability of the life jacket 100. In addition, the gas-containing capsule 130 has an advantage in that it can produce buoyancy that is greater than that of the foamed resin of the related art when they have the same volume.

[0031] Referring to FIGS. 2, and 6 to 8, the fabric structure 110, including the liner fabric 111 and the cover fabric 112, is generally prepared in the form of a vest that a person can wear. The liner fabric 111 and the cover fabric 112 can be made of natural or synthetic fiber, preferably, waterproof or water-resistant fiber considering that the life jacket 100 is used in the water. The multiple gas-containing capsules 130 are arranged such that they are spaced apart from each other between the liner fabric 111 and the cover fabric 112. The liner fabric 111 and the cover fabric 112 are attached to each other to form multiple compartments S, in which the multiple gas-containing capsules 130 are contained. Specifically, each gas-containing capsule 130 is contained in a corresponding compartment S, which is defined between the liner fabric 111 and the cover fabric 112, in order to prevent the gas-containing capsule 130, which is arranged between the liner fabric 111 and the cover fabric 112, from being dislodged from its position, so that the multiple gas-containing capsules 130 are uniformly distributed throughout the life jacket 100.

[0032] Here, the multiple compartments S, in which

the multiple gas-containing capsules 130 are contained, are formed between the liner fabric 111 and the cover fabric 112, which are attached to each other at the central areas C, which are defined by 4 gas-containing capsules 130. Specifically, the liner fabric 111 and the cover fabric 112 are attached to each other at 4 points, which are adjacent to four corners of the gas-containing capsules 130, such that the multiple compartments S are formed therebetween. Here, the liner fabric 111 and the cover fabric 112 are sewn to each other. Specifically, the liner fabric 111 and the cover fabric 112 are securely attached to each other by sewing one point of the central area C, which is defined by the 4 adjacent gas-containing capsules 130, several times.

[0033] As above, in the life jacket 100 of this embodiment, the multiple compartments S, in which the multiple gas-containing capsules 130 are contained, are formed by attaching the liner fabric 111 and the cover fabric 112 to each other, such that the liner fabric 111 and the cover fabric 112 are attached to each other intermittently at points adjacent to the gas-containing capsules 130 in the lateral and vertical directions. That is, the attachment structure having a dotted pattern is applied to the attachment between the liner fabric 111 and the cover fabric 112, which forms the multiple compartments S. Accordingly, the life jacket 100 of this embodiment can improve the wearing sensation and increase the freedom of motion of a wearer thanks to increased pliability, since the gas-containing capsules 130, which are contained in the compartments S, can move within a predetermined range. Here, as described above, since the gas-containing capsules 130 have an octagonal cross-sectional shape, it is possible to set the central areas C, which are defined by 4 adjacent gas-containing capsules 130, to have a sufficient space while decreasing the distance between the multiple gas-containing capsules 130, thereby providing attaching areas in which the liner fabric 111 and the cover fabric 112 are easily attached in a dotted pattern. Unlike this embodiment, the attachment between the liner fabric 111 and the cover fabric 112, which forms the multiple compartments S, can be continuously made by an attachment structure having attaching lines, which include, for example, lateral and vertical attaching lines surrounding the gas-containing capsules 130.

[0034] Although the attachment between the liner fabric 111 and the cover fabric 112 to form the multiple compartments S is realized by sewing, it can be realized by fusion, bonding, a method that uses a separate attaching tool (not shown) such as an eyelet, or the like. In addition, although one gas-containing capsule 130 is contained in one compartment S in this embodiment, two or more gas-containing capsules 130 can be contained in one compartment S.

[0035] As described above, since the gas-containing capsules 130, in which gas is sealed, are used as a buoyant material, the life jacket 100 of this embodiment exhibits excellent buoyancy. The reliability of the life jacket

can be improved, since no water can permeate into the buoyant material even if the wearer remains in the water for a long time.

[0036] In addition, the life jacket 100 of this embodiment employs an attachment structure having a dotted pattern on the liner fabric 111 and the cover fabric 112, which form multiple compartments S in which multiple gas-containing capsules 130 are contained, so that the gas-containing capsules 130, which are contained in the compartments S, can move within a predetermined range. This, as a result, can increase the pliability of the life jacket, improve the wearing sensation, and increase the freedom of motion of the wearer.

[0037] FIG. 9 is a schematic plan view showing part of a life jacket according to another exemplary embodiment of the invention, and FIG. 10 is a schematic cross-sectional view of the life jacket taken along line X-X in FIG. 9. Below, a description will be given of the life jacket according to another embodiment of the invention, focusing on the differences from the foregoing embodiment.

[0038] Referring to FIGS. 9 and 10, the life jacket 200 of this embodiment includes a plurality of gas-containing capsules 130, in which gas is sealed, and a fabric structure 110, which includes a liner fabric 111 and a cover fabric 112. The liner fabric 111 and the cover fabric 112 are attached to each other to form a plurality of compartments S in which the gas-containing capsules 130 are contained. In addition, a plurality of through-holes 217 is formed such that each through-hole 217 penetrates the liner fabric 111 and the cover fabric 112 in the central area C defined by 4 adjacent gas-containing capsules 130.

[0039] In other words, the life jacket 200 of this embodiment is configured to be substantially the same as the life jacket 100 of the foregoing embodiment, except that the fabric structure 110 has the multiple through-holes 217, each of which penetrates the liner fabric 111 and the cover fabric 112 in the central area C defined by 4 adjacent gas-containing capsules 130. Therefore, the components the same as or similar to those of the foregoing embodiments are given the same reference numerals, and detailed descriptions thereof will be omitted.

[0040] As above, the life jacket 200 of this embodiment further includes, in addition to the configuration of the foregoing embodiment, the multiple through-holes 217, each of which penetrates the liner fabric 111 and the cover fabric 112 in the central area C defined by 4 adjacent gas-containing capsules 130. Thus, it is possible not only to provide all the advantages of the foregoing embodiment, but also to further improve wearing sensation and reduce the unpleasant feeling of a wearer, since water is quickly evacuated from the life jacket 200 via the through-holes 217 and the life jacket 200 is quickly dried in the wind when the wearer comes out of the water.

[0041] Like the foregoing embodiment, this embodiment also applies the method of sewing the liner fabric 111 and the cover fabric 112 at the central areas C, each of which is defined by 4 adjacent gas-containing capsules

130, to the attachment between the liner fabric 111 and the cover fabric 112 in order to form the multiple compartments S in which the multiple gas-containing capsules 130 are contained. In consideration that the through-hole 217 is formed in the central area C defined by 4 adjacent gas-containing capsules 130, it is preferred that a string 215 be sewn around the through-hole 217 so that the liner fabric 111 and the cover fabric 112 can be securely attached to each other.

[0042] The safety clothes of the present invention has been described hereinbefore, by way of example, as being a life jacket. However, as mentioned above, the safety clothes of the invention can be applied in various forms, such as a jumper, pants, and a guard. Further, the use of the safety clothes is not limited to the floating device that keeps a wearer afloat in the water, but can be applied to a shock-absorbing device that protects the wearer's body from external impact when he/she is exercising or walking on the ground.

[0043] When the use of the safety clothes of the invention is applied to the shock-absorbing device, the gas-containing capsules act as a shock-absorbing material rather than the buoyant material. Since the gas-containing capsules are configured such that gas is sealed therein, they can exhibit external impact-absorbing performance that is better than that of the existing shock-absorbing material of the related art in which no gas is contained, thereby more thoroughly protecting the body of the wearer.

[0044] The present invention is not limited to the foregoing embodiments, but various modifications and alterations will be apparent to a person having ordinary skill in the art without departing from the spirit and scope of the invention. Therefore, it should be understood that all such modifications and alterations fall within the scope of the claims of the invention.

[Industrial Applicability]

[0045] The present invention is applicable to the field of safety clothes including a life jacket.

Claims

1. A safety clothes comprising:

a fabric structure having a liner fabric and a cover fabric attached to each other; and
a plurality of gas-containing capsules contained in compartments, which are defined between the liner fabric and the cover fabric, wherein gas is sealed inside the gas-containing capsules.

2. The safety clothes according to claim 1, wherein each of the gas-containing capsules is made of a synthetic resin material, with an enclosed inner space formed therein, wherein gas is sealed in the

inner space.

3. The safety clothes according to claim 2, wherein the gas-containing capsule is manufactured by forming the synthetic resin material into a predetermined shape that has the inner space through blow molding or injection molding, followed by injecting gas into the inner space, and sealing the inner space. 5
4. The safety clothes according to claim 2, wherein the synthetic resin material comprises ethylene vinyl acetate. 10
5. The safety clothes according to claim 1, wherein the liner fabric and the cover fabric are attached to each other intermittently at points adjacent to the gas-containing capsules in lateral and vertical directions in order to form the compartments. 15
6. The safety clothes according to claim 1 or 5, wherein the compartments are formed between the liner fabric and the cover fabric, which are attached to each other in central areas, wherein each of the central areas is defined by 4 adjacent capsules of the gas-containing capsules. 20 25
7. The safety clothes according to claim 1 or 5, wherein the gas-containing capsules have an octagonal cross-sectional shape. 30
8. The safety clothes according to claim 7, wherein each of the gas-containing capsules has 8 sidewalls, wherein 4 sidewalls have a shorter lateral length, and 4 remaining sidewalls have a longer lateral length, wherein the 4 sidewalls having a shorter lateral length form corners of the gas-containing capsule. 35
9. The safety clothes according to claim 1 or 5, further comprising a plurality of through-holes penetrating the liner fabric and the cover fabric in central areas, each of which is defined by 4 adjacent capsules of the gas-containing capsules. 40
10. The safety clothes according to claim 1, comprising a life jacket in which the gas-containing capsules act as a buoyant material. 45

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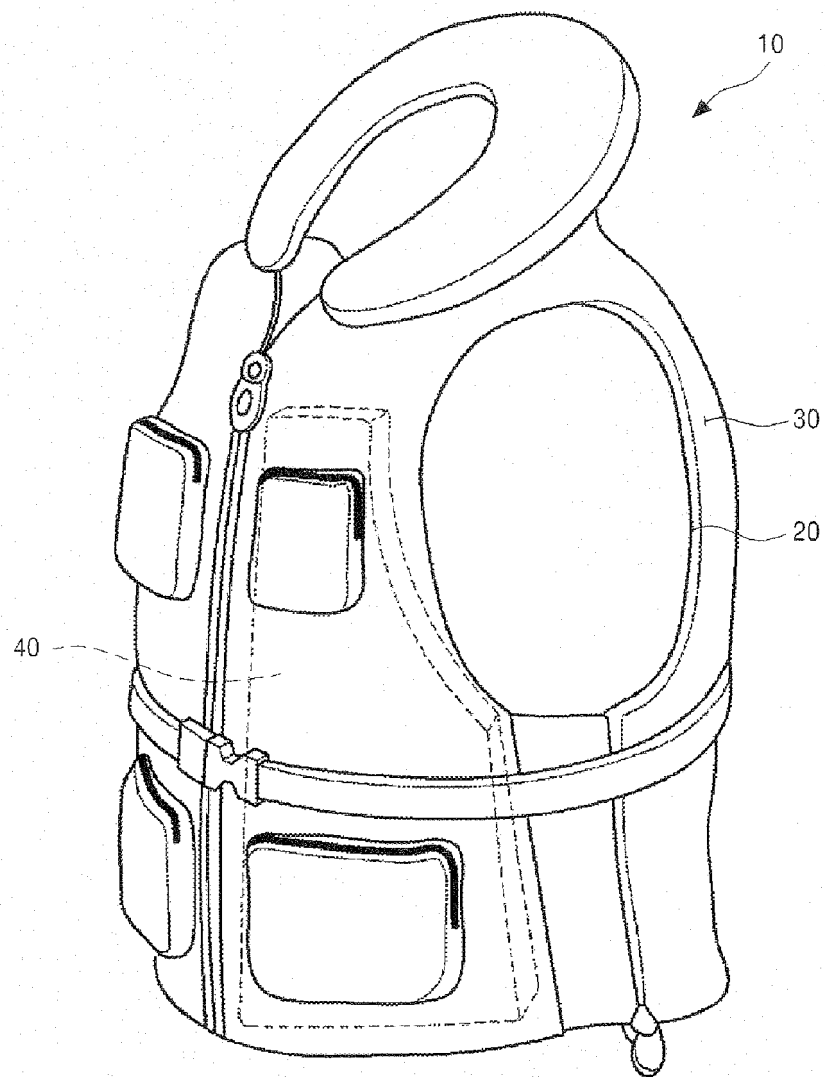


FIG. 1
(Prior Art)

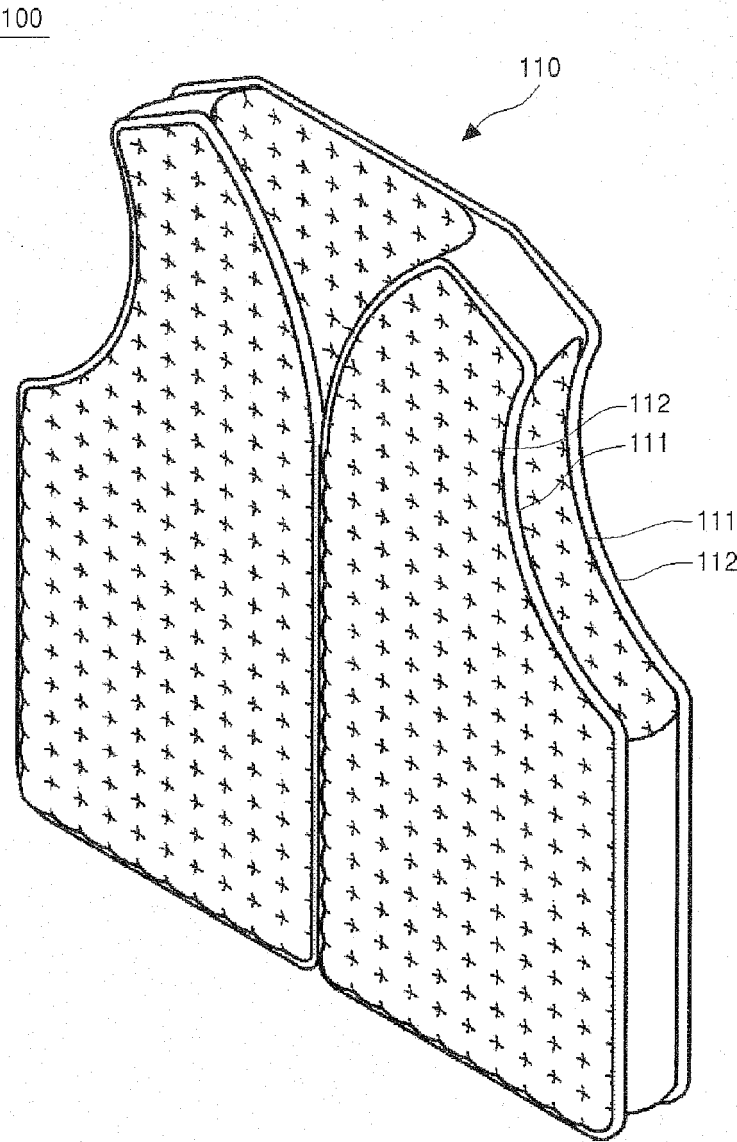


FIG. 2

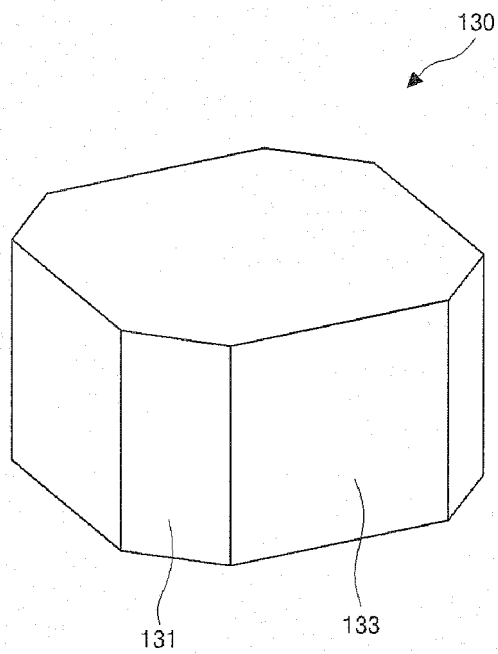


FIG. 3

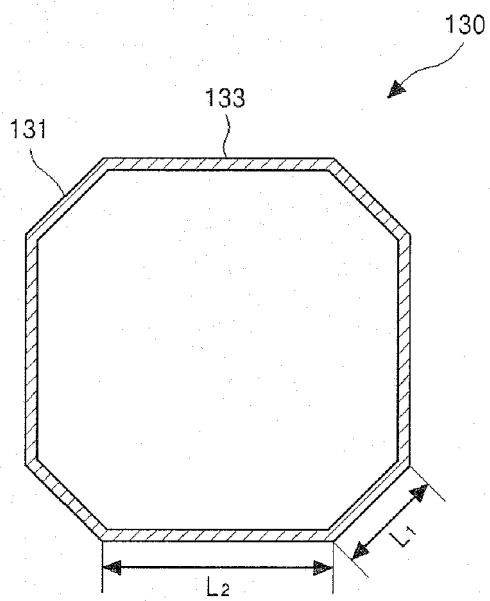
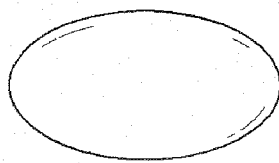
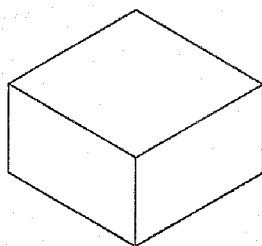


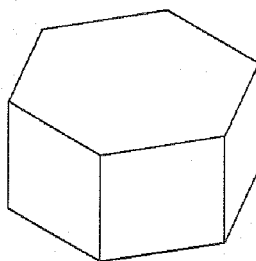
FIG. 4



(a)



(b)



(c)

FIG. 5

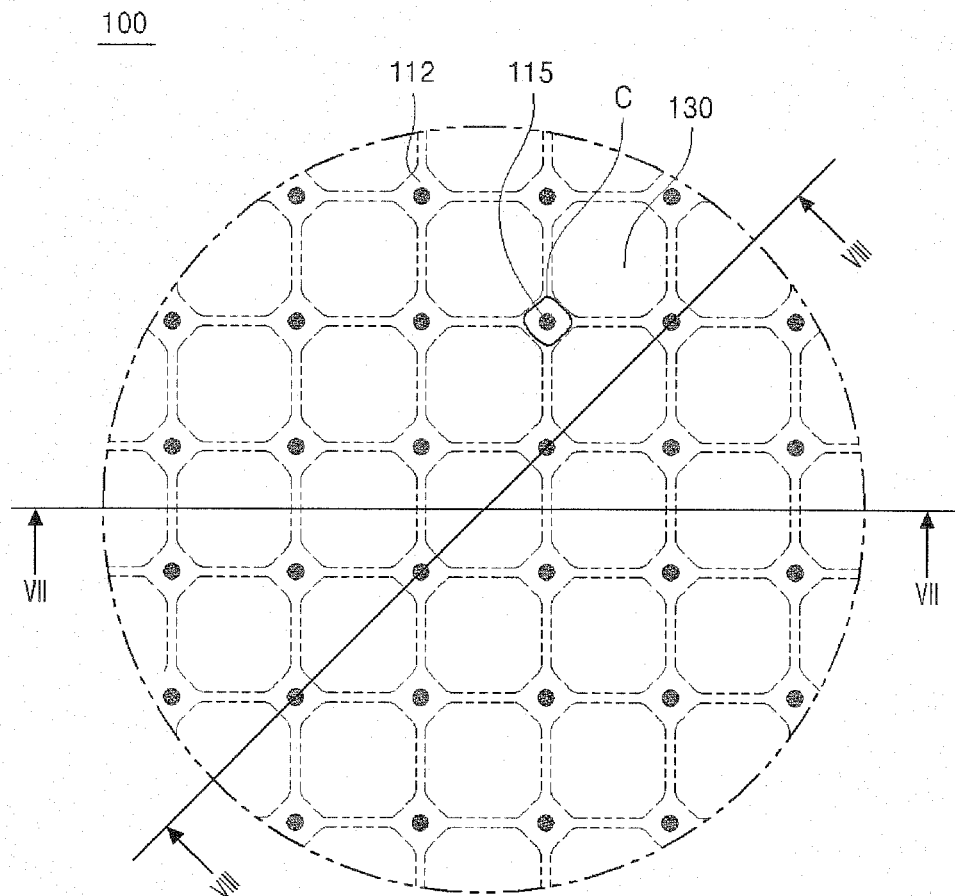


FIG. 6

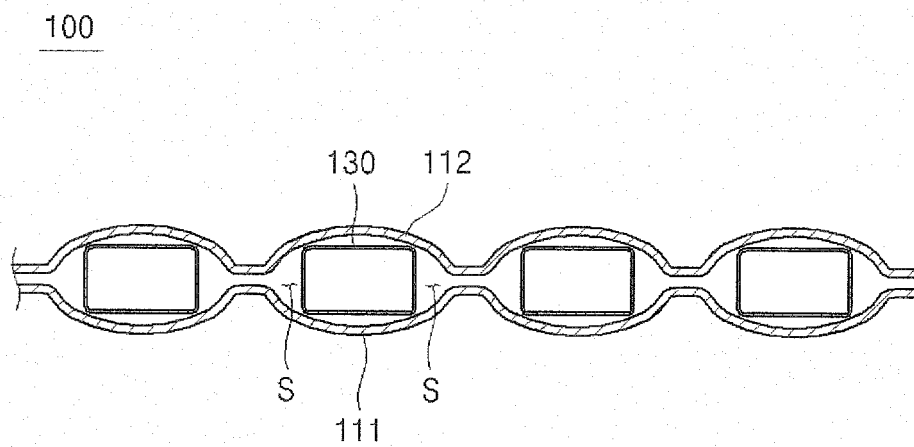


FIG. 7

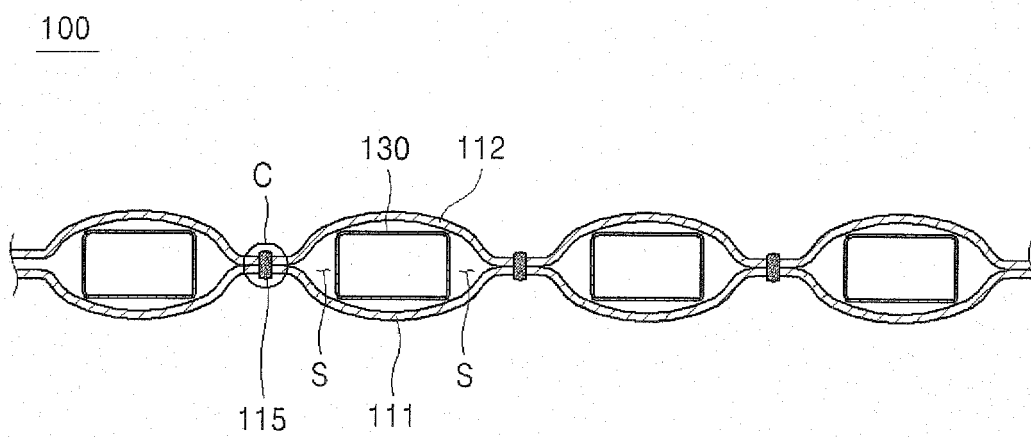


FIG. 8

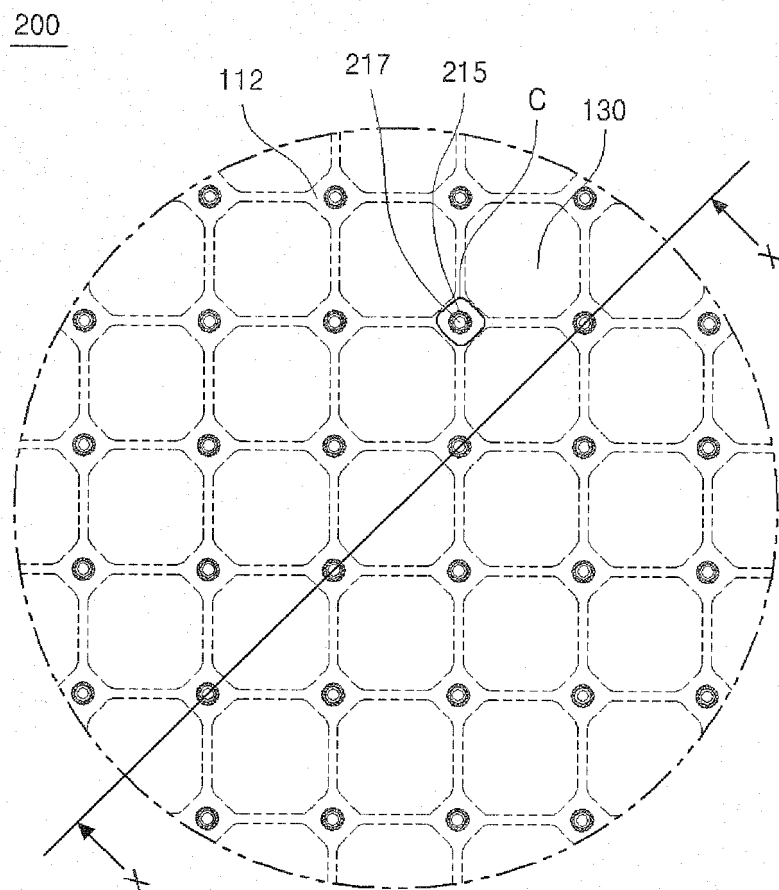


FIG. 9

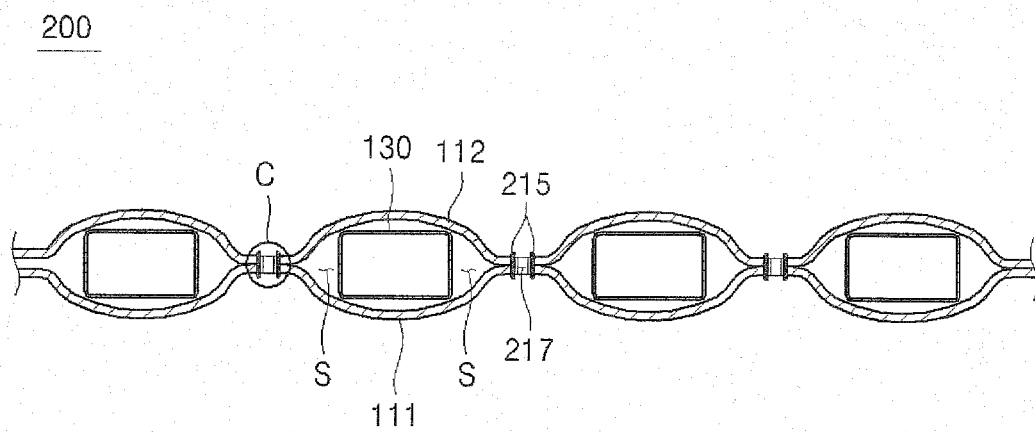


FIG. 10