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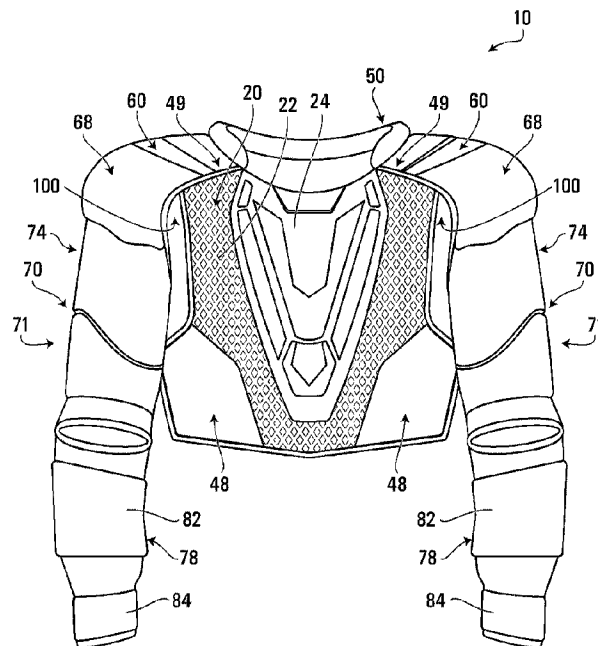
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(54) **Titre : EPAULIERES ET AUTRE EQUIPEMENT DE PROTECTION POUR LA PROTECTION DU HAUT DU CORPS**

(54) **Title: SHOULDER PADS AND OTHER PROTECTIVE GEAR FOR UPPER BODY PROTECTION**



(57) **Abrégé/Abstract:**

An article of protective gear (e.g., shoulder pads) for protecting an upper body of a wearer (e.g., a hockey, lacrosse, football, or other contact-sport player), in which the article of protective gear is configured to protect a thorax of the wearer and arms of the wearer against impacts (e.g., with other players, boards, pucks, balls, hockey sticks, lacrosse sticks, etc., which may be encountered during hockey, lacrosse, football or another contact sport), efficiently and conveniently, such as by integrating thorax (e.g., chest and shoulder) protection and arm protection into a unitary protective garment (e.g., which may be donned, doffed, and carried as a one-piece garment) while remaining lightweight and providing ventilation (e.g., for enhanced heat management, drying, etc.).

ABSTRACT

An article of protective gear (e.g., shoulder pads) for protecting an upper body of a wearer (e.g., a hockey, lacrosse, football, or other contact-sport player), in which the article of protective gear
5 is configured to protect a thorax of the wearer and arms of the wearer against impacts (e.g., with other players, boards, pucks, balls, hockey sticks, lacrosse sticks, etc., which may be encountered during hockey, lacrosse, football or another contact sport), efficiently and conveniently, such as by integrating thorax (e.g., chest and shoulder) protection and arm protection into a unitary protective garment (e.g., which may be donned, doffed, and carried as a one-piece garment) while
10 remaining lightweight and providing ventilation (e.g., for enhanced heat management, drying, etc.).

SHOULDER PADS AND OTHER PROTECTIVE GEAR FOR UPPER BODY PROTECTION

FIELD

5 This disclosure generally relates to protective athletic equipment and, more particularly, to shoulder pads and other protective gear for upper body protection of players playing contact sports such as hockey, lacrosse and football and other users.

BACKGROUND

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Shoulder pads are worn by players of contact sports, such as hockey, lacrosse and football, for upper body protection. Typically, shoulder pads comprise front and back members for respectively protecting front and back regions of a player's thorax and left and right shoulder protectors for respectively protecting the player's left and right shoulders.

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However, existing shoulder pads typically leave players' arms mostly unprotected. To remedy this, some players may wear a padded undergarment including arm padding (e.g., elbow pads). However, this system is relatively heavy, uncomfortable, heat retaining, and complexifies donning, doffing and carrying processes.

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For these and other reasons, improvements in shoulder pads and other articles of protective gear for upper body protection would be welcomed.

SUMMARY

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In accordance with various aspects of this disclosure, there is provided an article of protective gear (e.g., shoulder pads) for protecting an upper body of a wearer (e.g., a hockey, lacrosse, football, or other contact-sport player), in which the article of protective gear is configured to protect a thorax of the wearer and arms of the wearer against impacts (e.g., with other players, boards, pucks, balls, hockey sticks, lacrosse sticks, etc., which may be encountered during hockey, lacrosse, football or another contact sport), efficiently and conveniently, such as by integrating thorax (e.g., chest and shoulder) protection and arm protection into a unitary protective garment (e.g., which may be donned, doffed, and carried as a one-piece garment) while remaining lightweight and providing ventilation (e.g., for enhanced heat management, drying, etc.).

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For example, in accordance with an aspect of this disclosure, there is provided an article of protective gear for protecting an upper body of a wearer against impacts. The article of protective gear comprises: a front member configured to protect a front side of a thorax of the wearer; a back member configured to protect a back side of the thorax of the wearer; shoulder protectors configured to protect shoulders of the wearer; sleeves connected to the shoulder protectors, configured to receive arms of the wearer, and comprising a plurality of arm protectors configured to protect the arms of the wearer; and openings configured to leave at least part of a left side of the thorax of the wearer and at least part of a right side of the thorax of the wearer uncovered by the article of protective gear.

In accordance with another aspect of this disclosure, there is provided an article of protective gear for protecting an upper body of a wearer against impacts. The article of protective gear comprises: a front member configured to protect a front side of a thorax of the wearer; a back member configured to protect a back side of the thorax of the wearer; shoulder protectors configured to protect shoulders of the wearer; and sleeves connected to the shoulder protectors, configured to receive arms of the wearer, and comprising a plurality of arm protectors configured to protect the arms of the wearer. The front member, the back member, the shoulder protectors and the sleeves are donnable and doffable all at once.

In accordance with another aspect of this disclosure, there is provided a unitary article of protective gear for a wearer. The article comprises: a front member for protecting a front side of a thorax of the wearer; a back member for protecting a back side of the thorax of the wearer; a collar for protecting a sternal angle region of the wearer, the collar being affixed to the front member and to the back member; arch and shoulder protectors for protecting left and right trapezius regions and left and right shoulders of the wearer; and left and right sleeves for receiving left and right arms of the wearer, the sleeves comprising a plurality of arm protectors for protecting regions of the left and right arms of the wearer. The sleeves connected to the arch and shoulder protectors, and are separate and spaced from the front member and from the back member.

In accordance with another aspect of this disclosure, there is provided a unitary article of protective gear for a wearer. The article comprises: a front member for protecting a front side of a thorax of the wearer; a back member for protecting a back side of the thorax of the wearer; a collar for protecting a sternal angle region of the wearer, the collar being affixed to the front

member and to the back member; arch and shoulder protectors for protecting left and right trapezius regions and left and right shoulders of the wearer; and left and right sleeves for receiving left and right arms of the wearer, the sleeves comprising a plurality of arm protectors for protecting regions of the left and right arms of the wearer. The sleeves and arch and shoulder protectors
5 define openings configured to uncover left and right armpit regions of the wearer.

In accordance with another aspect of this disclosure, there is provided a unitary article of protective gear for a wearer. The article comprises: a front member for protecting a front side of a thorax of the wearer; a back member for protecting a back side of the thorax of the wearer; a
10 collar for protecting a sternal angle region of the wearer, the collar being affixed to the front member and to the back member; arch and shoulder protectors for protecting left and right trapezius regions and left and right shoulders of the wearer; and left and right sleeves for receiving left and right arms of the wearer. The sleeves comprise a plurality of arm protectors for protecting regions of the left and right arms of the wearer. The sleeves comprise a base which supports the
15 arm protectors. The arm protectors comprise elbow caps for protecting left and right elbows of the wearer. The elbow caps are affixed to the base of the sleeves.

These and other aspects of this disclosure will now become apparent to those of ordinary skill in the art upon review of a description of embodiments that follows in conjunction with accompanying
20 drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

A detailed description embodiments is provided below, by way of example only, with reference to
25 drawings annexed hereto, in which:

Figures 1 and 2 are respective front and back views of an example of an article of protective gear for a wearer, the article being shoulder pads and the wearer being a player in accordance with an embodiment of the disclosure;

30 Figure 3 is a front view of a front panel of a front member of the shoulder pads;

Figure 4 is a cross-sectional view of the front panel of the front member of the shoulder pads;

Figure 5 is a cross-sectional view of a foam body of the front panel;

Figure 6 is a front view of a front shield of the front member of the shoulder pads;

5 Figure 7 is a cross-sectional view of the front shield;

Figure 8 is a cross-sectional view of the front shield assembled with the front panel;

10 Figure 9 shows a back panel of a back member of the shoulder pads and portions of rib protectors affixed to the back panel;

Figure 10 is a cross-sectional view of the back panel of the back member of the shoulder pads;

15 Figure 11 is a cross-sectional view of a foam body of the back panel;

Figure 12 shows a back shield of the back member of the shoulder pads;

Figure 13 is a cross-sectional view of the back shield;

20 Figure 14 is a cross-sectional view of the back shield assembled with the back panel;

Figure 15 shows a cross-sectional view of a main body of the rib protector;

25 Figure 16 shows a cross-sectional view of a collar of the shoulder pads;

Figure 17 shows a cross-sectional view of an arch and shoulder protector of the shoulder pads;

Figure 18 shows an elevation view of shoulder caps of the arch and shoulder protector;

30 Figure 19 is a cross-sectional view of an arm padding of the shoulder pads;

Figure 20 shows a connection between the arch and shoulder protector of the shoulder pads and a sleeve of the shoulder pads;

Figure 21 shows an opening at an underside of the sleeve and a floating pocket affixed to a base of the sleeve;

5 Figures 22 and 23 are cross-sectional views of the sleeve showing the floating pocket affixed to the base of the sleeve without and with the arm protector inside the floating pocket;

Figure 24 is a schematic view of another pocket affixed to the base of the sleeve;

10 Figure 25 is a cross-sectional view of the sleeve showing the pocket of Figure 24 affixed to the base of the sleeve with the arm protector inside the pocket;

Figure 26 is a cross sectional view of an elbow cap of the sleeve;

15 Figures 27 and 28 are elevation views of a padding insert of a forearm protector of the sleeve;

Figure 29 is a cross-sectional view of the sleeve showing another pocket affixed to the base of the sleeve with the padding insert inside the pocket;

20 Figure 30 is a cross-sectional view of a cover of the forearm protector;

Figures 31 and 32 show an embodiment of the shoulder pads wherein the rib protectors are detachably attachable to the back member;

25 Figures 33 to 36 show embodiments of the shoulder pads wherein the sleeves are detachably attachable to the arch and shoulder protectors;

Figure 37 shows an embodiment of the shoulder pads wherein each sleeve comprises an upper portion and a lower portion that is detachably attachable to the upper portion of the sleeve;

30 Figure 38 shows a fabric comprising a synthetic yarn and a metallic or metallic-coated yarn; and

Figures 39 and 40 are respective front and back views of regions of an upper body of the player.

The description and drawings are only for purposes of illustrating certain embodiments and are an aid for understanding. They are not intended to be limiting.

DETAILED DESCRIPTION

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Figures 1 and 2 show an example of an article of protective gear 10 for protecting an upper body of a wearer in accordance with an embodiment. In this embodiment, the article of protective gear 10 is shoulder pads and the wearer is a player playing a contact sport (e.g., hockey, lacrosse, football, etc.). In this example, the player is a hockey player playing hockey (e.g., ice hockey) and thus the shoulder pads 10 are hockey shoulder pads.

In this embodiment, the shoulder pads 10 protect a thorax 12 of the player and arms LA, RA of the player against impacts (e.g., with other players, boards, pucks, hockey sticks, etc.) during hockey, efficiently and conveniently, such as by integrating thorax (e.g., chest and shoulder) protection and arm protection into a unitary protective garment (e.g., which may be donned, doffed, and carried as a one-piece article) while remaining lightweight and providing ventilation (e.g., for enhanced heat management, drying, etc.).

The shoulder pads 10 protect various regions of an upper body of the player. As shown in Figures 39 and 40, the thorax 12 of the player has a front side FS, a back side BS, a left side LS and a right side RS. The front side FS of the thorax 12, which can also be referred to as a “chest” or “ventral” side, comprises left and right pectoral regions LPR, RPR overlying left and right pectoral muscles of the player, a sternum region SR overlying a sternum of the player, a manubrium region MBR located at the top of the sternum region SR, and left and right front lower rib regions LFL, RFL overlying the sixth to tenth ribs of the player. The back side BS of the thorax 12, which can also be referred to as a “dorsal” side, comprises a thoracic spinal region TSR overlying thoracic vertebrae of the player, a sternal angle region SAR overlaying a sternal angle of the spine of the player, left and right trapezius regions LTR, RTR overlying left and right trapezius muscles of the player, left and right latissimus dorsi regions LDR, RDR overlying left and right latissimus dorsi muscles of the player and left and right back lower rib regions LBL, RBL overlying the sixth to twelfth ribs of the player.

The thorax 12 of the player further has a lateral direction and a medial direction representing directions extending farther and closer from the midline of the thorax 12 of the player, respectively.

The left and right sides LS, RS of the thorax 12 respectively comprise left and right lateral rib regions LLR, RLR overlying the lateral sides of the ribs of the player. The thorax 12 additionally comprises left and right shoulders LSS, RSS of the player which join the left and right arms LA, RA of the player to the thorax 12. Each of the left and right shoulders LSS, RSS has a clavicle region CR, a scapular region BR, an acromioclavicular joint region ACR, and a deltoid region DR respectively overlying a clavicle, a scapula, an acromioclavicular joint, and a deltoid muscle of that shoulder.

The thorax 12 of the player has a front-back (i.e., a dorso-ventral) axis FBA (which is perpendicular to the front and back views shown in Figure 4A), a left-right (i.e., dextro-sinistral) axis LRA, and a vertical (i.e., cephalo-caudal) axis VA. A front-back direction, a left-right direction, and a top-bottom direction of the shoulder pads 10 are respectively parallel to the front-back axis FBA, the left-right axis LRA, and the vertical axis VA of the thorax 12 of the player. Similarly, a lateral direction and a medial direction of the shoulder pads 10 are respectively parallel to the lateral direction and the medial direction of the thorax 12 of the player.

As shown in Figures 3 to 8, in this embodiment, the shoulder pads 10 comprise a front member 20 for protecting the front side FS of the thorax. The front member 20 is configured to substantially overlie the front side FS of the thorax when the shoulder pads 10 are worn by the player. The front member 20 may have any suitable shape. For instance, in this example, the front member 20 comprises a panel 22 to cover the front side FS of the thorax and a front shield 24 disposed over the panel 22 to cover the sternum region SR of the thorax.

The panel 22 may comprises a liner 25 and a foam body 26 covering at least part of (i.e., part of, a majority of, or an entirety of) the liner 25. In this example, the liner 25 may comprise a fabric, such as a synthetic fabric, such as LYCRA™, polyester, nylon, polyamide, elastane, etc., and any combination thereof. The foam body 26 may comprise one or more layers of foam. For instance, in this embodiment, the foam body 26 may comprise a plurality of layers 28 of foam laminated onto one another. More specifically, in this embodiment, the foam body comprises three layers 28 of foam laminated onto one another. In some embodiments, also, the foam body 26 may comprise layers of non-foam material. For example, in some embodiments, the foam body 26 may comprise one or more layers 28 of foam, an inner layer 27 of non-expanded polymeric material (such as a polymeric sheet) laminated on an inner side of the one or more layers 28 of foam, and an outer layer 29 of non-expanded polymeric material (such as a polymeric sheet)

laminated on an outer side of the one or more layers 28 of foam. In this embodiment, the panel 22 may further comprise an outer cover 52 covering the foam body 26 on an outer side and defining an outermost surface of the panel 22. The outer cover may comprise any suitable material. In this embodiment, the outer cover 52 may comprise mesh and/or fabric. More specifically, in this embodiment, the outer cover 52 may comprise VELCRO™ loops configured to allow attachment of VELCRO™ hooks. In this embodiment, the outer cover 52 may span over at least part of the foam body 26. More specifically, in this embodiment, the outer cover 52 may span over at least a majority of the foam body 26. More specifically, in this embodiment, the outer cover 52 may span over an entirety of the foam body 26.

The front shield 24 may be configured to substantially cover the sternum region SR of the player when the player wears the shoulder pads 10. For instance, in some embodiments, the front shield 24 may span an area of at least 500 cm², in some embodiments of at least 700 cm², in some embodiments of at least 900 cm², and in some embodiments of even more (e.g., of at least 1000 cm²). The front shield 24 may have any suitable shape. For instance, in this embodiment, the front shield 24 may have an overall diamond shape. The front shield 24 may also have a variable thickness T_{FS}. For instance, in front shield 24 may comprise a first set of portions 92 having a reduced thickness of no more than 10 mm, a second set of portions 93 having a thickness of at least 12 mm, and a third set of portions 94 having a thickness of at least 15 mm. In this embodiment, the second set of portions 92 may span a majority of a surface of the front shield, in some embodiments at least 60% of the surface area of the front shield, in some embodiments at least 70% of the surface area of the front shield, and in some embodiments even more.

The front shield 24 may be affixed to the panel 22 on an outer side of the panel 22 in any suitable way. More specifically, in this embodiment, the front shield 24 may be stitched to the panel 22. In some embodiments, the front shield 24 may be glued, fused or otherwise fastened to the panel 22.

The front shield 24 may comprise one or more layers of expanded and non-expanded polymers (e.g., TPU, PE, TPE, etc.). For instance, in this embodiment, the front shield 24 may comprise at least two, three or four layers 54 of foam, and at least one layer 55 of non-expanded polymeric material. The non-expanded polymeric material may be any suitable polymeric material, such as thermoplastic polyurethane (TPU), polyethylene (PE), thermoplastic polyethylene (TPE), etc. The front shield 24 may be manufactured in any suitable way. For instance, in this embodiment, at

least part of (i.e., part of, a majority of, or all of) the front shield 24 may be molded into shape in a mold.

As shown in Figures 9 to 14, in this embodiment, the shoulder pads 10 comprise a back member 30 for protecting the back side BS of the thorax. The back member 30 is configured to substantially overly the back side BS of the thorax when the shoulder pads 10 are worn by the player. The back member 30 may have any suitable shape. For instance, in this example, the back member 30 comprises a panel 32 to cover the back side BS and a back shield 34 disposed over the panel 32 to cover the thoracic spinal region TSR of the thorax.

The panel 32 may comprises a liner 35 and a foam body 36 covering at least part of (i.e., part of, a majority of, or an entirety of) the liner 35. In this example, the liner 35 may comprise a fabric, such as a synthetic fabric, such as LYCRA™, polyester, nylon, polyamide, elastane, etc., and any combination thereof. The foam body 36 may comprise one or more layers of foam. For instance, in this embodiment, the foam body 36 may comprise a plurality of layers 38 of foam laminated onto one another. More specifically, in this embodiment, the foam body comprises three layers 38 of foam laminated onto one another. In some embodiments, also, the foam body 36 may comprise layers of non-foam material. For example, in some embodiments, the foam body 36 may comprise one or more layers 38 of foam, an inner layer 37 of non-expanded polymeric material (such as a polymeric sheet) laminated on an inner side of the one or more layers 38 of foam, and an outer layer 39 of non-expanded polymeric material (such as a polymeric sheet) laminated on an outer side of the one or more layers 38 of foam. In this embodiment, the panel 32 may further comprise an outer cover 56 covering the foam body 36 on an outer side and defining an outermost surface of the panel 22. The outer cover may comprise any suitable material. In this embodiment, the outer cover 56 may comprise mesh and/or fabric. More specifically, in this embodiment, the outer cover 56 may comprise VELCRO™ loops configured to allow attachment of VELCRO™ hooks. In this embodiment, the outer cover 56 may span over at least part of the foam body 36. More specifically, in this embodiment, the outer cover 56 may span over at least a majority of the foam body 36. More specifically, in this embodiment, the outer cover 56 may span over an entirety of the foam body 36.

The back shield 34 may be configured to substantially cover the thoracic spinal region TSR of the thorax of the player when the player wears the shoulder pads 10. For instance, in some embodiments, the back shield 34 may span an area of at least 1000 cm², in some embodiments

of at least 1200 cm², in some embodiments of at least 1400 cm², and in some embodiments of even more (e.g., of at least 1500 cm²). The back shield 34 may be larger than the front shield 24. For instance, in some embodiments, a ratio of a total surface area of the back shield 34 over a total surface area of the front shield 24 may be at least 1.1, in some embodiments at least 1.3, in some embodiments at least 1.5, and in some embodiments even more (e.g., at least 1.7). The back shield 34 may have any suitable shape. For instance, in this embodiment, the back shield 34 may have an overall diamond shape. The back shield 34 may also have a variable thickness T_{FS}. For instance, in back shield 34 may comprise a first set of portions 96 having a reduced thickness of no more than 10 mm, a second set of portions 97 having a thickness of at least 12 mm, and a third set of portions 98 having a thickness of at least 15 mm. In this embodiment, the second set of portions 97 may span a majority of a surface of the back shield, in some embodiments at least 60% of the surface area of the back shield, in some embodiments at least 70% of the surface area of the back shield, and in some embodiments even more.

The back shield 34 may be affixed to the panel 32 on an outer side of the panel 32 in any suitable way. More specifically, in this embodiment, the back shield 34 may be stitched to the panel 32. In some embodiments, the back shield 34 may be glued, fused or otherwise fastened to the panel 32.

The back shield 34 may comprise one or more layers of expanded and non-expanded polymers (e.g., TPU, PE, TPE, etc.). For instance, in this embodiment, the back shield 34 may comprise at least two, three or four layers 58 of foam, and at least one layer 59 of non-expanded polymeric material. The non-expanded polymeric material may be any suitable polymeric material, such as thermoplastic polyurethane (TPU), polyethylene (PE), thermoplastic polyethylene (TPE), etc. The back shield 34 may be manufactured in any suitable way. For instance, in this embodiment, at least part of (i.e., part of, a majority of, or all of) the back shield 34 may be molded into shape in a mold.

In this example, the panels 22, 32 are continuous and integral with one another. In particular, the panels 22, 32 are connected to one another over the left and right trapezius regions LTR, RTR of the player. In some embodiment, the panels 22, 32 may be distinct and separate from one another and may be connected to one another directly or indirectly over the left and right trapezius regions LTR, RTR of the player.

In this embodiment, the shoulder pads 10 may comprise rib protectors 40 for protecting front lower rib regions, back lower rib regions and lateral rib regions of the player. The rib protectors 40 comprise left and right rib protectors which are configured to substantially overly the front lower rib regions LFL, RFL, the back lower rib regions LTR, RTR and the lateral rib regions LLR, RLR of the player when the shoulder pads 10 are worn by the player.

The rib protectors 40 may further connect the panels 22, 32 to one another. In particular, the rib protectors 40 may be affixed to bottom portions 57 of the back panel 32 and back shield 34, e.g., by being disposed between or over the back panel 32 and the back shield 34 and stitched to the back panel 32 and the back shield 34.

As shown in Figure 15 and with additional reference to Figures 2 and 9, each rib protector 40 may comprise a main body 41 configured to substantially overly respective ones of the front lower rib regions LFL, RFL, the back lower rib regions LTR, RTR and the lateral rib regions LLR, RLR of the player when the shoulder pads 10 are worn by the player. The main body 41 may comprise a padding 42. The padding 42 may be configured to absorb and dissipate at least a majority of (i.e., a majority of or an entirety of) impacts on the main body 41. That is, the padding 42 may be configured to absorb and dissipate more energy than the other components of the main body 41. The padding 42 may comprise one or more layers of molded foam material. For instance, in this embodiment, the padding 42 may comprise at least two layers 43 of molded foam. The rib protectors 40 may also comprise one or more layers 44 of fabric affixed to the padding 42 to support the padding 42. For instance, the layers 44 of fabric may be stitched to one another and may form an envelope encasing the padding 42.

Each rib protector 40 may comprise a chest strap 46 affixed to the main body 51 (e.g., by being stitched, glued, fused or otherwise fastened) and detachably attachable to the front member 20. In this embodiment, the chest straps 46 are flexible and elastic. The chest straps 46 may be detachably attachable via any suitable connection, such as hook-and-loop connections. More specifically, each flexible chest strap 46 may comprise a connector portion 47 which, in this example, may include VELCRO™ hooks, and the front member 20 may comprise a corresponding connector portion 48 which, in this example, may include VELCRO™ loops.

In this embodiment, the shoulder pads 10 comprise a collar 50 for protecting the sternal angle region SAR of the player. The collar 50 is configured to substantially overly the sternal angle

region SAR of the player when the shoulder pads 10 are worn by the player. As shown in Figure 16, the collar 50 may comprise a foam core 52. The foam core 52 may comprise at least one layer 53 of foam. For instance, in this embodiment, the foam core 52 may comprise at least two layers 53 of polyurethane (PU) foam.

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The collar 50 may optionally comprise a liner 54 defining an external surface of the collar 50. More specifically, in this embodiment, the liner 54 may comprise fabric material and may be a fabric liner. More specifically, in this embodiment, the fabric material may be a synthetic fabric such as LYCRA™, polyester, elastane, polyamide, etc., and any combination thereof. The collar 50 may be affixed to the front member 20, to the back member 30 and to arch and shoulder protectors 60 of the shoulder pads 10, in any suitable way (e.g., by being stitched, glued, fused or otherwise fastened).

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In this embodiment, the shoulder pads 10 may comprise arch and shoulder protectors 60 for protecting the left and right trapezius regions LTR, RTR and the left and right shoulders LSS, RSS of the player. The arch and shoulder protectors 60 comprise left and right arch and shoulder protectors 60 which are configured to substantially overly the left and right trapezius regions LTR, RTR and the left and right shoulders LSS, RSS of the player when the shoulder pads 10 are worn by the player. The arch and shoulder protectors 60 (hereinafter referred-to as “protectors” for conciseness) may be disposed over upper portions 49 of the front and back members 20, 30 and may be affixed to at least one of the front and back members 20, 30 and the collar 50 by any suitable way (e.g., by being stitched, glued, fused or otherwise fastened). In particular, in this example, the protectors 60 may be stitched to the collar 50.

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As shown in Figures 17 and 18, the protectors 60 may comprise an inner liner 64, an outer cover 66 and a padding 62 disposed between the liner 64 and the cover 66. The padding 62 may be configured to absorb and dissipate at least a majority of (i.e., a majority of or an entirety of) impacts on the protectors 60. That is, the padding 62 may be configured to absorb and dissipate more energy than the other components (such as the inner liner 64 and the outer cover 66) of the protectors 60. In this case, each of the inner liner 64 and the outer cover 64, 66 may comprise fabric. More specifically, in this embodiment, the fabric of the inner liner 64 and the outer cover 66 may be a synthetic fabric such as LYCRA™, polyester, elastane, polyamide, etc., and any combination thereof. In some embodiments, however, the inner liner 64 and/or the outer cover

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66 may be free of fabric and may comprise a different material such as a sheet of polymeric material.

In this embodiment, the padding 62 of the protectors 60 may comprise shoulder caps 68 for protecting the left and right shoulders LSS, RSS of the player. The shoulder caps 68 may comprise left and right shoulder caps configured to substantially overly the left and right shoulders LSS, RSS of the player when the shoulder pads 10 are worn by the player. The shoulder caps 68 may comprise one or more layers of expanded and non-expanded polymers (e.g., TPU, PE, TPE, etc.). For instance, in some embodiments, the shoulder caps 68 may comprise EXPANCELTM foam. In some embodiments, the shoulder caps 68 may also comprise a film of non-expanded polymeric material such as TPU, PE, TPE, etc., covering the foam material.

The shoulder caps 68 may be manufactured in any suitable way. In this embodiment, the shoulder caps 68 may be molded into shape in a mold and the foam is a molded foam.

As shown in Figures 20 to 30, in this embodiment, the shoulder pads 10 may comprise sleeves 70 for receiving the left and right arms of the player. The sleeves 70 may comprise left and right sleeves 70 configured to receive the left and right arms LA, RA of the player when the shoulder pads 10 are worn by the player. In this embodiment, the sleeves 70 are long sleeves, i.e., are configured to extend below the elbows LE, RE of the player. For instance, in some embodiments, each sleeve 70 may be configured to enclose at least a majority, in some embodiments at least three-quarters, and in some embodiments even more (e.g., at least 90% or 100%) of a surface area of a respective one of the arms of the wearer. In some embodiments, each sleeve 70 may be configured to enclose a respective one of the arms of the wearer along at least a majority, in some embodiments at least three-quarters, and in some embodiments even more (e.g., at least 90% or 100%) of a length of the respective one of the arms of the wearer. More specifically, in this embodiment, the sleeves 70 are "full" or "enclosing" sleeves, i.e., are configured to extend to the wrists LW, RW of the player, to enclose substantially an entirety of the surface area of the respective one of the arms of the wearer, and to enclose the respective one of the arms of the wearer along substantially an entirety of the length of the respective one of the arms of the wearer.

In this embodiment, the sleeves 70 may comprise arm protectors 71 for protecting regions of the left and right arms LA, RA of the player. The arm protectors 71 may be configured to overly these regions of the left and right arms LA, RA of the player when the player wears the shoulder pads

10. Each of the arm protectors 71 may be configured to absorb and dissipate at least a majority of (i.e., a majority of or an entirety of) impacts received thereon. That is, when subject to an impact, each arm protector 71 may be configured to absorb and dissipate more energy than the other components of the sleeves 70 that are also subject to said impact.

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In this embodiment, the sleeves 70, including the arm protectors 71, may be integrated with the remainder of the shoulder pads 10, including the front member 20, the back member 30, the collar 50, the protectors 60, etc., such that the front member 20, the back member 30, the rib protectors 40, the collar 50, the protectors 60, and the sleeves 70 are donnable and doffable all at once. That is, the front member 20, the back member 30, the rib protectors 40, the collar 50, the protectors 60, and the sleeves 70 may be assembled into a unitary article of protective gear that can be donned and doffed by the player all at once, by passing his/her head into an opening of the collar 50, e.g., by inserting his/her arms into the sleeves 70 and positioning the arm protectors 71 on his/her arms LA, RA.

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In this embodiment, the sleeves 70 may be strapless. That is, the sleeves 70 may be free of any strap that would be required for attaching the sleeves 70 to a remainder of the shoulder pads 10, to secure the shoulder pads 10 to arms of the player in a tight/comfortable fashion, and/or to secure padding components to the sleeves 70.

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For instance, in this embodiment, the sleeves 70 may comprise a base 72. The base 72 may comprise a fabric and may be configured to face and/or contact the skin of the left and right arms LA, RA of the player when the player wears the shoulder pads 10.

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The base 72 of the sleeves 70 may connect the sleeves 70 to a remainder of the shoulder pads 10. In particular, the base 72 of the sleeves 72 may be connected to the protectors 60 of the shoulder pads 10. More specifically, the base 72 of the sleeves 70 may be continuous with the inner liner 64 and the outer cover 66 of the protectors 60. In particular, the fabric of the inner liner 64 and the fabric of the outer cover 66 may be continuous with the fabric of the base 72 of the sleeves 70, e.g., such that the fabric of the inner liner 64 and of the outer cover 66 extends beyond the protectors 60 and forms the base 72 of the sleeves 70. As such, in this embodiment, the sleeves 70 may be only connected to the protectors 60 and may be free of a connection to a remainder of the shoulder pads 10.

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In this embodiment, the base 72 of the sleeves 70 may support the arm protectors 71.

For instance, the sleeves 70 may comprise pockets to accommodate at least some of (i.e., some of, a majority of, or an all of) the arm protectors 71. In particular, each pocket may be configured to removably or permanently receive the arm pads 74 and may be connected to the base 72 of the sleeves 70. To facilitate insertion and removal of the arm protectors 74, the pockets may be light, flexible, and elastic. For example, some of the pockets may be located in portions configured to substantially overly biceps, triceps and/or forearms of the player. The base 72 of the sleeves 70 may be affixed or attached to at least some of the arm protectors 71, e.g., by stitching, gluing, fusing or otherwise fastening.

In particular, in this embodiment, the arm protectors 71 comprise arm pads 74 for protecting upper arms of the player. The arm pads 74 may comprise left and right arm pads 74 configured to substantially overly the left and right triceps and/or the left and right biceps of the player when the player wears the shoulder pads 10. More specifically, some of the arm pads 74 may be biceps arm pads configured to substantially overly the left and right biceps of the player when the player wears the shoulder pads 10, and some of the arm pads 74 may be triceps arm pads configured to substantially overly the left and right triceps of the player when the player wears the shoulder pads 10.

In this example, as shown in Figure 19, each arm pad 74 may comprise one or more layers of expanded and/or non-expanded polymers (e.g., TPU, PE, TPE, etc.). For instance, in this embodiment, the arm pads 74 may comprise a molded layer 86 of non-expanded polyethylene and two layers 87 of foam laminated on each side of the layer 86 of polyethylene.

As shown in Figures 22 and 23, the pockets of the sleeves 70 may comprise left and right bicep pockets 88 configured to receive the biceps arm pads. In this embodiment, each bicep pocket 88 may be a floating pocket (also referred-to as “slinky” pocket). The bicep pocket 88 may be open at one end to allow insertion and removal of a respective arm pad 74. In this example, the bicep pocket 88 may comprise mesh or fabric forming the bicep pocket 88, which may be light, flexible and elastic to facilitate manipulation of the bicep pocket 88. The bicep pocket 88 may be connected to the base 72 of the sleeve 70 at one end of the pocket 88, e.g., by being stitched, glued, fused or otherwise fastened to the base 72 of the sleeve 70.

During use, respective ones of the arm pads 74 may be inserted in the bicep pockets 88 for protecting the biceps of the player during play. The floating construction of the bicep pockets 88 may allow the user to move the bicep pockets 88 and the arm pads 74 encased therein when the player wears the shoulder pads 10 in order to have a more comfortable fit.

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As shown in Figures 24 and 25, the pockets of the sleeves 70 may also comprise left and right triceps pockets 89 configured to receive the triceps arm pads. Each triceps pocket 89 may be open at one end to allow insertion and removal of a respective arm pad 74. In this example, the triceps pocket 89 may comprise mesh or fabric forming the triceps pocket 89, which may be light, flexible and elastic to facilitate manipulation of the triceps pocket 89. The base 72 of the sleeves 70 may also form part of the triceps pocket 89 such that the triceps pocket 89 may not be a floating pocket in this example. Specifically, in this embodiment, the base 72 of the sleeves 70 may form a wall of the triceps pocket 89. The mesh or fabric of the triceps pocket 89 may be connected to the base 72 of the sleeve 70 across a majority of a periphery of the triceps pocket 89, e.g., by being stitched, glued, fused or otherwise fastened to the base 72 of the sleeve 70.

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During use, respective ones of the arm pads 74 may be inserted in the triceps pockets 89 for protecting the triceps of the player during play.

As shown in Figure 26, the arm protectors 71 may further comprise elbow caps 76 for protecting the left and right elbows LE, RE of the player. The elbow caps 76 may comprise left and right elbow caps configured to substantially overly the left and right elbows LE, RE of the player when the player wears the shoulder pads 10. The elbow caps 76 may comprise one or more layers of expanded and non-expanded polymers (e.g., TPU, PE, TPE, etc.). The elbow caps 76 may comprise any suitable material. For instance, in some embodiments, the elbow caps 76 may comprise a liner 102 comprising irradiation cross-linked polyethylene (IXPE) foam, a layer 104 of non-expanded polymeric material (e.g., TPU, PE, TPE, etc.) disposed over the liner 102, and a laminate comprising a first layer 106 of IXPE foam and a second layer 108 of PU foam laminated over the layer 106. In some embodiments, the elbow caps 76 may also comprise a film of non-expanded polymeric material such as TPU, PE, TPE, etc., covering the foam material.

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The elbow caps 76 may be manufactured in any suitable way. In this embodiment, at least part of the elbow caps 76 may be molded into shape in a mold. For instance, the layer 104 may be injection molded. In some embodiments, every layer of the elbow caps 76 may be placed in a

mold to form the elbow caps 76. The elbow caps 76 may be affixed to the base 72 of the sleeves 70 by any suitable way (e.g., by being stitched, glued, fused or otherwise fastened).

As shown in Figures 27 to 30, the arm protectors 71 may further comprise forearm protectors 78 for protecting the left and right forearms LFA, LRA of the player. The forearm protectors 78 may comprise left and right forearm protectors 78 which are configured to substantially overly the left and right forearms LFA, LRA of the player when the player wears the shoulder pads 10. The forearm protectors 78 may comprise padding inserts 80 positionable into forearm pockets 110. The padding inserts 80 of the forearm protectors 78 may comprise one or more layers of expanded and non-expanded polymers (e.g., TPU, PE, TPE, etc.). For instance, in some embodiments, the padding inserts 80 may comprise a layer 112 comprising IXPE foam and a layer 114 of non-expanded polymeric material (e.g., TPU, PE, TPE, etc.) disposed over the layer 112. The layers 112, 114 of the padding inserts 80 may be encased by layers of fabric (e.g., tricot).

In this embodiment, the forearm protectors 78 may be configured to cover a majority of a circumference of the player's forearms. More specifically, the forearm protectors 78 are configured to cover an entirety of the circumference of the player's forearms.

The pockets of the sleeves 70 may comprise left and right forearm pockets 110 configured to receive the padding inserts 80 of the forearm protectors 78. Each forearm pocket 110 may be open at one end to allow insertion and removal of a respective padding inserts 80. In this example, the forearm pocket 110 may comprise mesh or fabric forming the forearm pocket 110. In some embodiments, the forearm pockets 110 may be similar in construction as the triceps pockets 89.

In some embodiments, the sleeves 70 may comprise forearm protection covers 82 to cover the inserts 80 once they are in place in their respective pocket, and comprising one or more layers of expanded and non-expanded polymers (e.g., TPU, PE, TPE, etc.). For instance, in some embodiments, the forearm protection covers 82 may comprise a layer 107 of non-expanded polymeric material sandwiched between two layers 109 of foam material. The forearm protection cover 82 may be affixed to the base 72 of the sleeve 70 (e.g., by being stitched, glued, fused or otherwise fastened) to form the forearm pocket 110. The forearm protection covers 82 may be manufactured in any suitable way. In this embodiment, at least part of the forearm protection covers 82 may be molded into shape in a mold. In some embodiments, every layer of the forearm

protection covers 82 may be placed in a mold to form the forearm protection covers 82 and the forearm pocket 110.

The base 72 of the sleeves 70 may also form part of the forearm pocket 110 such that the forearm pocket 110 may not be a floating pocket in this example. Specifically, in this embodiment, the base 72 of the sleeves 70 may form a wall of the forearm pocket 110. The forearm protection covers 82 may be affixed to the base 72 of the sleeves 70 by any suitable way (e.g., by being stitched, glued, fused or otherwise fastened).

During use, the padding inserts 80 of the forearm protectors 78 may be inserted in the forearm pockets 110 for protecting the left and right forearms LFA, LRA of the player.

The sleeves 70 may further comprise wrist guards 84 for protecting left and right wrists LW, RW of the player. The wrist guards 84 may comprise left and right wrist guards configured to overly left and right wrists LW, RW of the player when the player wears the shoulder pads. The wrist guards 84 may be affixed to the base 72 at distal ends 75 of the sleeves 70. This may be achieved in any suitable fashion, such as by stitching, gluing, fusing or otherwise fastening the wrist guards 84 may be affixed to the base 72. The wrist guards 84 may be manufactured in any suitable way. For instance, in this embodiment, the wrist guards 84 may comprise one layer of non-expanded polymer (e.g., PU) and one layer of foam. More specifically, in this embodiment, the wrist guards 84 may comprise a liner of IXPE foam affixed to a molded layer of polyethylene (PE). The wrist guards 84 may also comprise a cover of synthetic material.

With additional reference to Figures 1, 2 and 20, 21, in this embodiment, the shoulder pads 10 may be configured to provide openings 100 that leave areas of the player's body uncovered (e.g., for ventilation) when the player wears the shoulder pads 10. For instance, the openings 100 may comprise left and right openings allowed by the connection between the sleeves 70 and the remainder of the shoulder pads 10 and configured to leave the player's upper left and right side/armpit areas uncovered. More specifically, in this embodiment, as the sleeves 70 may be only connected to the protectors 60 and may be separate and spaced from the front member 20, the back member 30 and the rib pads 40, the proximal ends 73 of the sleeves 70, the front member 20 and the back member 30 may define the left and right openings 100 for uncovering the player's upper left and right side/armpit areas.

Each opening 100 may have any suitable size which may be sufficient for cooling and/or providing comfort to the player during play. For instance, in some embodiments, the opening covers an area of at least 300 cm², in some embodiments of at least 350 cm², in some embodiments of at least 400 cm², and in some embodiments even more.

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The shoulder pads 10 may be implemented in various other ways in other embodiments.

For example, in some embodiments, as shown in Figures 31 to 32, the rib protectors 40 may be removably connectable to the front and back members 20, 30 of the shoulder pads 10 such that
10 the player may decide to remove the rib protectors 40 from the shoulder pads 10 and wear the shoulder pads 10 without any rib protector, and/or to change or replace the rib protectors 40 on the shoulder pads 10, e.g., to change sizing of rib protectors, to use lighter or bulkier rib protectors depending on the use, etc.

15 In this embodiment, the shoulder pads 10 may comprise an attachment mechanism 120 for connecting the removable rib protectors 40 to the back member 30. The attachment mechanism 120 may comprise a first set of connectors 122 provided on the back member 30 and a second set of connectors 124 provided on the main body 41 of the rib protectors 40. The first and second set of connectors 122, 124 may be configured to be removably attachable to one another. For
20 instance, in some embodiments, the first and second set of connectors 122, 124 may comprise hook-and-loop fasteners.

In some embodiments, the first and second set of connectors 122, 124 may only be attachable at pre-determined positions. For instance, in some embodiments, the first set of connectors 122
25 may comprise buttons 126 connectable to respective connectors of the second set of connectors 124, and the second set of connectors 124 may comprise slits 128 each configured to receive a respective connector of the first set of connectors 122. In other embodiments, the first set of connectors 122 may comprise the slits buttons 128 and the second set of connectors 124 may comprise the buttons 126.

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As another example, in some embodiments, as shown in Figures 33 to 36, the sleeves 70 may be detachable from the shoulder pads 10, e.g., to facilitate cleaning them, to allow sleeve replacement and/or to allow the player to wear the shoulder pads 10 without sleeves. For instance, in some embodiments, the shoulder pads 10 may comprise attachment mechanisms

130 for connecting each sleeve 70 to the protectors 60. The attachment mechanism 130 may comprise a first connector 132 provided on a distal portion of the protectors 60 and a second connector 134 provided on a proximal portion of the sleeves 70 and configured to be detachably attachable to the first connector 132. For instance, in some embodiments, the first and second set of connectors 132, 134 may comprise hook-and-loop fasteners; in some embodiments, the attachment mechanism 130 may comprise a zipper (also known as “zip”, “fly”, “zip fastener”, or “clasp locker”) and each of the first and second set of connectors 132, 134 may comprise a corresponding set of teeth; in some embodiments, the first and second set of connectors 132, 134 may comprise clips configured to engage one another; in some embodiments, the first connector 132 may comprise a button (similar to the buttons 126) connectable to the second connector 134, and the second connector 134 may comprise a slit (similar to the slits 138) configured to receive the first connector 132.

As another example, in some embodiments, as shown in Figure 37, the sleeves 70 may comprise upper portions 142 configured to overly the upper arms of the player when the player wears the shoulder pads 10, and lower portions configured to overly the forearms and wrists of the player when the player wears the shoulder pads 10, and the lower portions 144 may be removable attachable to the upper portions 142 such that the player may decide to wear the lower portions 144 when wearing the shoulder pads 10. More specifically, in this example, the first connector of the attachment mechanism 130 may be provided on a distal end of the upper portion 142 of the sleeve 70, and the second connector of the attachment mechanism 130 may be provided on a proximal portion of the bottom portion 144 of the sleeve 70.

As another example, in some embodiments, the sleeves 70 may be compression sleeves configured to compress the left and right arms LA, RA of the player when the player wears the shoulder pads 10, which may increase power capabilities of the left and right arms LA, RA of the player, increase endurance of the left and right arms LA, RA of the player, and/or reduce recovery times for the muscles of the left and right arms LA, RA of the player. The compression sleeves 70 may also improve body tissues (e.g., blood) circulation through compression. For instance, in this embodiment, the base 72 of the sleeves 70 may comprise a synthetic fabric, such as nylon, polyester, polyamide, elastane, etc., or any mix thereof. In some embodiments, the base 72 of the sleeves 70 may be configured to provide a compression level of at least 10 mmHg, in some embodiments of at least 20 mmHg, in some embodiments of at least 30 mmHg, and in some embodiments even more (e.g., at least 35 mmHg). In some embodiments, the base 72 of the

sleeves 70 may be configured to provide a compression that decreases from wrist to upper arm to facilitate body tissues circulation improve blood body tissues circulation.

5 In some embodiments, as shown in Figure 38, the fabric of the base 72 of the sleeves 70 may comprise polymeric yarns 152 and metallic yarns 154 such as silver-coated yarns and aluminum-coated yarns to increase thermal conductivity of the sleeves 70, which may advantageously cool the player's left and right arms LA, RA during play, and/or to provide antibacterial capabilities to the fabric of the base 72 of the sleeves 70.

10 In some embodiments, any feature of any embodiment described herein may be used in combination with any feature of any other embodiment described herein.

Certain additional elements that may be needed for operation of certain embodiments have not been described or illustrated as they are assumed to be within the purview of those of ordinary
15 skill in the art. Moreover, certain embodiments may be free of, may lack and/or may function without any element that is not specifically disclosed herein.

In describing embodiments, specific terminology has been resorted to for the sake of description but this is not intended to be limited to the specific terms so selected, and it is understood that
20 each specific term comprises all equivalents.

In case of any discrepancy, inconsistency, or other difference between terms used herein and terms used in any document incorporated by reference herein, meanings of the terms used herein are to prevail and be used.

25 Although various embodiments have been illustrated, this was purposes of describing, but should not be limiting. Various modifications will become apparent to those ordinarily skilled.

CLAIMS

1. An article of protective gear for protecting an upper body of a wearer against impacts, the article of protective gear comprising:
 - 5 - a front member configured to protect a front side of a thorax of the wearer;
 - a back member configured to protect a back side of the thorax of the wearer;
 - shoulder protectors configured to protect shoulders of the wearer;
 - sleeves connected to the shoulder protectors, configured to receive arms of the wearer, and comprising a plurality of arm protectors configured to protect the arms of the wearer;
 - 10 and
 - openings configured to leave at least part of a left side of the thorax of the wearer and at least part of a right side of the thorax of the wearer uncovered by the article of protective gear.
- 15 2. The article of protective gear of claim 1, wherein the front member, the back member, the shoulder protectors and the sleeves are donnable and doffable all at once.
3. The article of protective gear of claim 1, wherein the sleeves are separate and spaced from the front member and the back member.
- 20 4. The article of protective gear of claim 1, wherein the openings are configured to leave armpit regions of the wearer uncovered by the article of protective gear.
5. The article of protective gear of claim 1, wherein each opening covers an area of at least
25 300 cm².
6. The article of protective gear of claim 1, wherein: the at least part of the left side of the thorax of the wearer comprises an upper region of the left side of the thorax of the wearer; the at least part of the right side of the thorax of the wearer comprises an upper region of
30 the right side of the thorax of the wearer; the article of protective gear comprises lower rib protectors configured to cover a lower region of the left side of the thorax of the wearer and a lower region of the right side of the thorax of the wearer; and the openings extends between the front member, the back member, the sleeves, and the lower rib protectors.

7. The article of protective gear of claim 1, wherein the front member comprises a front panel configured to cover at least part of the front side of the thorax of the wearer, and a front shield disposed over the front panel to cover a sternum region of the thorax of the wearer.
- 5 8. The article of protective gear of claim 7, wherein the front panel comprises a fabric liner and a foam body covering at least part of the fabric liner.
9. The article of protective gear of claim 8, wherein the foam body covers a majority of the fabric liner.
- 10 10. The article of protective gear of claim 8, wherein the foam body covers an entirety of the fabric liner.
11. The article of protective gear of claim 8, wherein the foam body comprises a layer of foam.
- 15 12. The article of protective gear of claim 7, wherein the front shield is molded into shape.
13. The article of protective gear of claim 7, wherein the front shield comprises a layer of polymer.
- 20 14. The article of protective gear of claim 13, wherein the polymer comprises at least one of a non-expanded polymer and an expanded polymer.
- 25 15. The article of protective gear of claim 1, wherein the back member comprises a back panel configured to cover at least part the back side of the thorax of the wearer, and a back shield disposed over the back panel to cover a thoracic spinal region of the thorax of the wearer.
16. The article of protective gear of claim 15, wherein the back panel comprises a fabric liner and a foam body covering at least part of the fabric liner.
- 30 17. The article of protective gear of claim 16, wherein the foam body covers a majority of the fabric liner.

18. The article of protective gear of claim 16, wherein the foam body covers an entirety of the fabric liner.
19. The article of protective gear of claim 16, wherein the foam body comprise a layer of foam.
20. The article of protective gear of claim 15, wherein the back shield is molded into shape
21. The article of protective gear of claim 15, wherein the back shield comprises a layer of polymer.
22. The article of protective gear of claim 21, wherein the polymer comprises at least one of a non-expanded polymer and an expanded polymer.
23. The article of protective gear of claim 1, wherein: the front member comprises a front panel for covering the front side of the thorax of the wearer, and a front shield disposed over the front panel to cover a sternum region of the thorax of the wearer; and the back member comprises a back panel to cover the back side of the thorax of the wearer, and a back shield disposed over the back panel to cover a thoracic spinal region of the thorax of the wearer.
24. The article of protective gear of claim 23, wherein the front panel and the back panel are continuous and integral with one another.
25. The article of protective gear of claim 23, wherein the front panel and the back panel are connected to one another over left and right trapezius portions of the article for covering left and right trapezius regions of the wearer.
26. The article of protective gear of claim 1, wherein the article comprises a collar configured to protect a sternal angle region of the wearer, the collar being affixed to the front member and to the back member.
27. The article of protective gear of claim 26, wherein the collar comprises a foam core and a fabric liner.
28. The article of protective gear of claim 27, wherein the collar is affixed to the front member, to the back member and to the shoulder protectors of the article.

29. The article of protective gear of claim 28, wherein the collar is stitched to the front member, to the back member and to the shoulder protectors of the article.
- 5 30. The article of protective gear of claim 1, wherein the shoulder protectors are disposed over upper portions of the front and back members and are stitched to the collar.
31. The article of protective gear of claim 1, wherein the shoulder protectors comprise an inner liner, an outer cover, and a padding disposed between the liner and the cover.
- 10 32. The article of protective gear of claim 31, wherein the padding of the shoulder protectors comprises a layer of polymer.
33. The article of protective gear of claim 32, wherein the polymer comprises at least one of a non-expanded polymer and an expanded polymer.
- 15 34. The article of protective gear of claim 31, wherein the padding of the shoulder protectors comprises a shoulder cap which for protecting the left and right shoulders of the wearer.
- 20 35. The article of protective gear of claim 34, wherein the shoulder cap comprises a molded polymer.
36. The article of protective gear of claim 1, wherein the arm protectors comprise elbow caps for protecting elbows of the wearer.
- 25 37. The article of protective gear of claim 1, wherein the sleeves are integrated with at least one of the front member, the back member and the shoulder protectors.
38. The article of protective gear of claim 37, wherein: the shoulder protectors comprise an inner liner comprising a fabric, an outer cover comprising a fabric, and a padding disposed between the liner and the cover; and the fabric of the inner liner and the fabric of the outer cover extend beyond the shoulder protectors and form a base of the sleeves.
- 30 39. The article of protective gear of claim 1, wherein each sleeve is configured to enclose at least a majority of a surface area of a respective one of the arms of the wearer.
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40. The article of protective gear of claim 1, wherein the sleeve is configured to enclose at least three-quarters of the surface area of the respective one of the arms of the wearer.
- 5 41. The article of protective gear of claim 1, wherein each sleeve is configured to enclose a respective one of the arms of the wearer along at least a majority of a length of the respective one of the arms of the wearer.
- 10 42. The article of protective gear of claim 1, wherein the sleeve is configured to enclose the respective one of the arms of the wearer along at least three-quarters of the length of the respective one of the arms of the wearer.
- 15 43. The article of protective gear of claim 1, wherein the sleeves are suspended from the shoulder protectors.
44. The article of protective gear of claim 1, wherein the sleeves include stretchable material.
- 20 45. The article of protective gear of claim 44, wherein the stretchable material comprises at least one of Lycra and Spandex.
46. The article of protective gear of claim 1, wherein the sleeves are strapless.
- 25 47. The article of protective gear of claim 1, wherein the sleeves comprise a base which supports the arm protectors.
48. The article of protective gear of claim 47, wherein the base defines at least one pocket to accommodate at least one of the arm protectors.
- 30 49. The article of protective gear of claim 48, wherein the arm protectors comprise a layer of polymer.
50. The article of protective gear of claim 49, wherein the polymer comprises at least one of a non-expanded polymer and an expanded polymer.

51. The article of protective gear of claim 47, wherein the arm protectors comprise elbow caps for protecting elbows of the wearer.
52. The article of protective gear of claim 51, wherein the elbow caps are molded into shape.
- 5 53. The article of protective gear of claim 51, wherein the elbow caps are affixed to the base of the sleeves.
54. The article of protective gear of claim 53, wherein the elbow caps are stitched to the base of
10 the sleeves.
55. The article of protective gear of claim 51, wherein the elbow caps comprise a layer of polymer.
- 15 56. The article of protective gear of claim 55, wherein the polymer comprises at least one of a non-expanded polymer and an expanded polymer.
57. The article of protective gear of claim 47, wherein the arm protectors comprise forearm protectors for protecting left and right forearms of the wearer.
- 20 58. The article of protective gear of claim 57, wherein: the base of the sleeves defines a pocket; and the forearm protectors comprise a padding insert which can be positioned into the pocket.
- 25 59. The article of protective gear of claim 58 wherein the padding insert comprises a layer of polymer.
60. The article of protective gear of claim 59, wherein the polymer comprises at least one of a non-expanded polymer and an expanded polymer.
- 30 61. The article of protective gear of claim 60, wherein: the sleeves comprise a forearm protection cover configured to cover the insert when the insert is positioned in the pocket; and the forearm protection cover comprises a layer of polymer.
- 35 62. The article of protective gear of claim 47, wherein the sleeves comprise wrist guards for protecting left and right wrists of the wearer.

63. The article of protective gear of claim 62, wherein the wrist guards are affixed to the base at distal ends of the sleeves.
- 5 64. The article of protective gear of claim 63, wherein the wrist guards are stitched to the base.
65. The article of protective gear of claim 62, wherein the wrist guards comprise a layer of polymer.
- 10 66. The article of protective gear of claim 65, wherein the polymer comprises at least one of a non-expanded polymer and an expanded polymer.
67. The article of protective gear of claim 62, wherein the wrist guards comprise a first layer of expanded polymer and a second layer of non-expanded polymer.
- 15 68. The article of protective gear of claim 47, wherein the base includes stretchable material.
69. The article of claim 68, wherein the stretchable material comprises at least one of Lycra and Spandex.
- 20 70. The article of protective gear of claim 1, further comprising lower rib protectors configured to cover a lower region of the left side of the thorax of the wearer and a lower region of the right side of the thorax of the wearer.
- 25 71. The article of protective gear of claim 70, wherein each of the rib protectors connects the front panel to the back panel.
72. The article of protective gear of claim 70, wherein each of the rib protectors is affixed to the back member.
- 30 73. The article of protective gear of claim 72, wherein each of the rib protectors is stitched to the back member.
74. The article of protective gear of claim 70, wherein the rib protectors comprise chest straps detachably affixable to the front member.
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75. The article of protective gear of claim 74, wherein the chest straps are flexible.

76. The article of protective gear of claim 75, wherein the ribs pads comprise foam material and a layer of fabric material.

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77. An article of protective gear for protecting an upper body of a wearer against impacts, the article of protective gear comprising:

- a front member configured to protect a front side of a thorax of the wearer;
 - a back member configured to protect a back side of the thorax of the wearer;
 - 10 - shoulder protectors configured to protect shoulders of the wearer; and
 - sleeves connected to the shoulder protectors, configured to receive arms of the wearer, and comprising a plurality of arm protectors configured to protect the arms of the wearer;
- wherein the front member, the back member, the shoulder protectors and the sleeves are donnable and doffable all at once.

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78. An article of protective gear for protecting an upper body of a wearer against impacts, the article of protective gear comprising:

- a front member configured to protect a front side of a thorax of the wearer;
- a back member configured to protect a back side of the thorax of the wearer;
- 20 - shoulder protectors configured to protect shoulders of the wearer;
- sleeves connected to the shoulder protectors, configured to receive arms of the wearer, and comprising a plurality of arm protectors configured to protect the arms of the wearer; and
- openings configured to leave at least part of a left side of the thorax of the wearer and at
- 25 least part of a right side of the thorax of the wearer uncovered by the article of protective gear;

wherein the sleeves are separate and spaced from the front member and the back member.

79. An article of protective gear for protecting an upper body of a wearer against impacts, the article of protective gear comprising:

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- a front member configured to protect a front side of a thorax of the wearer;
- a back member configured to protect a back side of the thorax of the wearer;
- shoulder protectors configured to protect shoulders of the wearer;

- sleeves connected to the shoulder protectors, configured to receive arms of the wearer, and comprising a plurality of arm protectors configured to protect the arms of the wearer; and
- openings configured to leave left and right armpit regions of the wearer uncovered by the article of protective gear.

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80. An article of protective gear for protecting an upper body of a wearer against impacts, the article of protective gear comprising:

- a front member configured to protect a front side of a thorax of the wearer;
- a back member configured to protect a back side of the thorax of the wearer;
- shoulder protectors configured to protect shoulders of the wearer;
- sleeves connected to the shoulder protectors, configured to receive arms of the wearer, comprising a plurality of arm protectors configured to protect the arms of the wearer, the sleeves comprising a base for supporting the arm protectors, the arm protectors comprising elbow caps configured to protect left and right elbows of the wearer, the elbow caps being affixed to the base of the sleeves.

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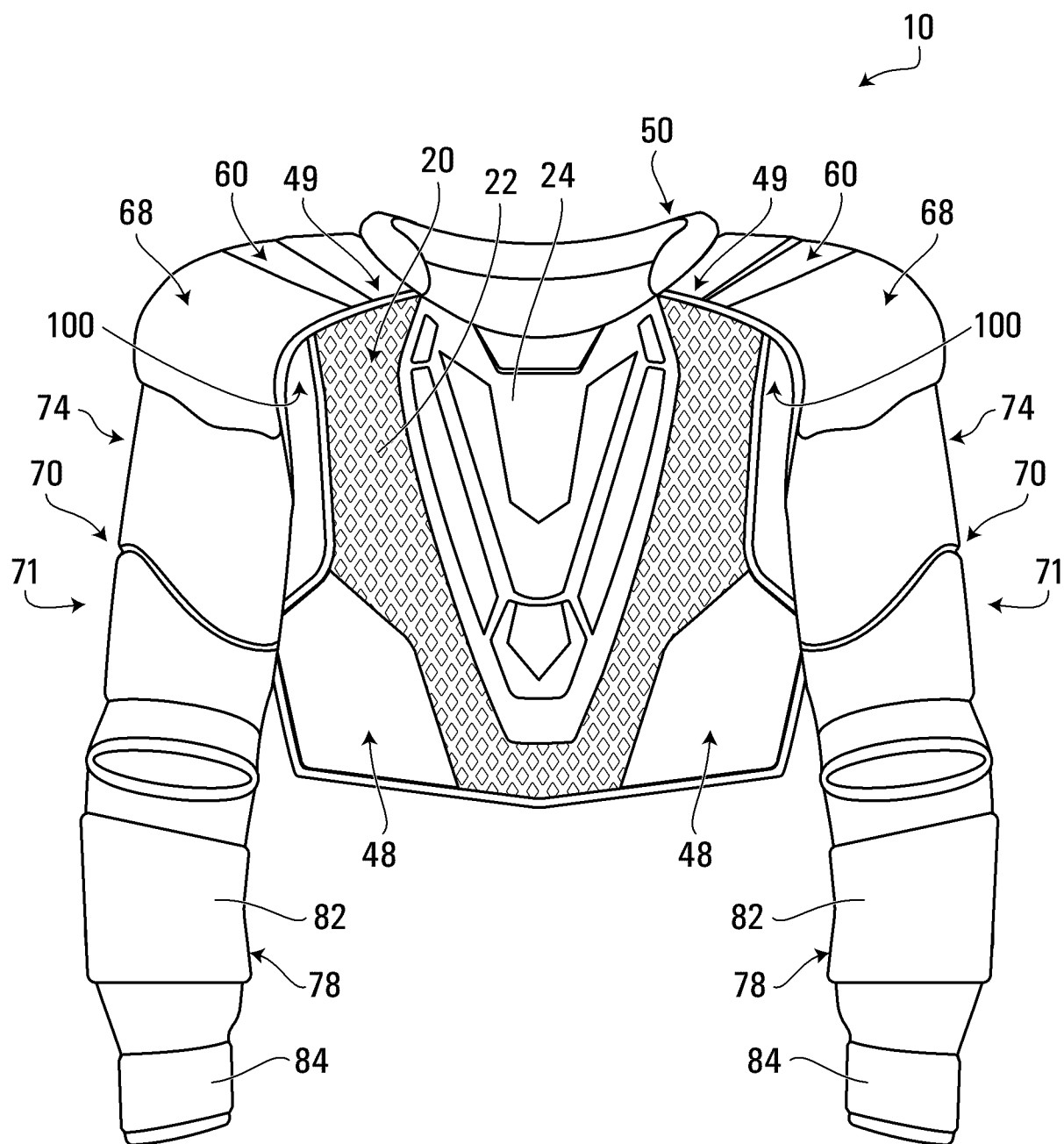


FIG. 1

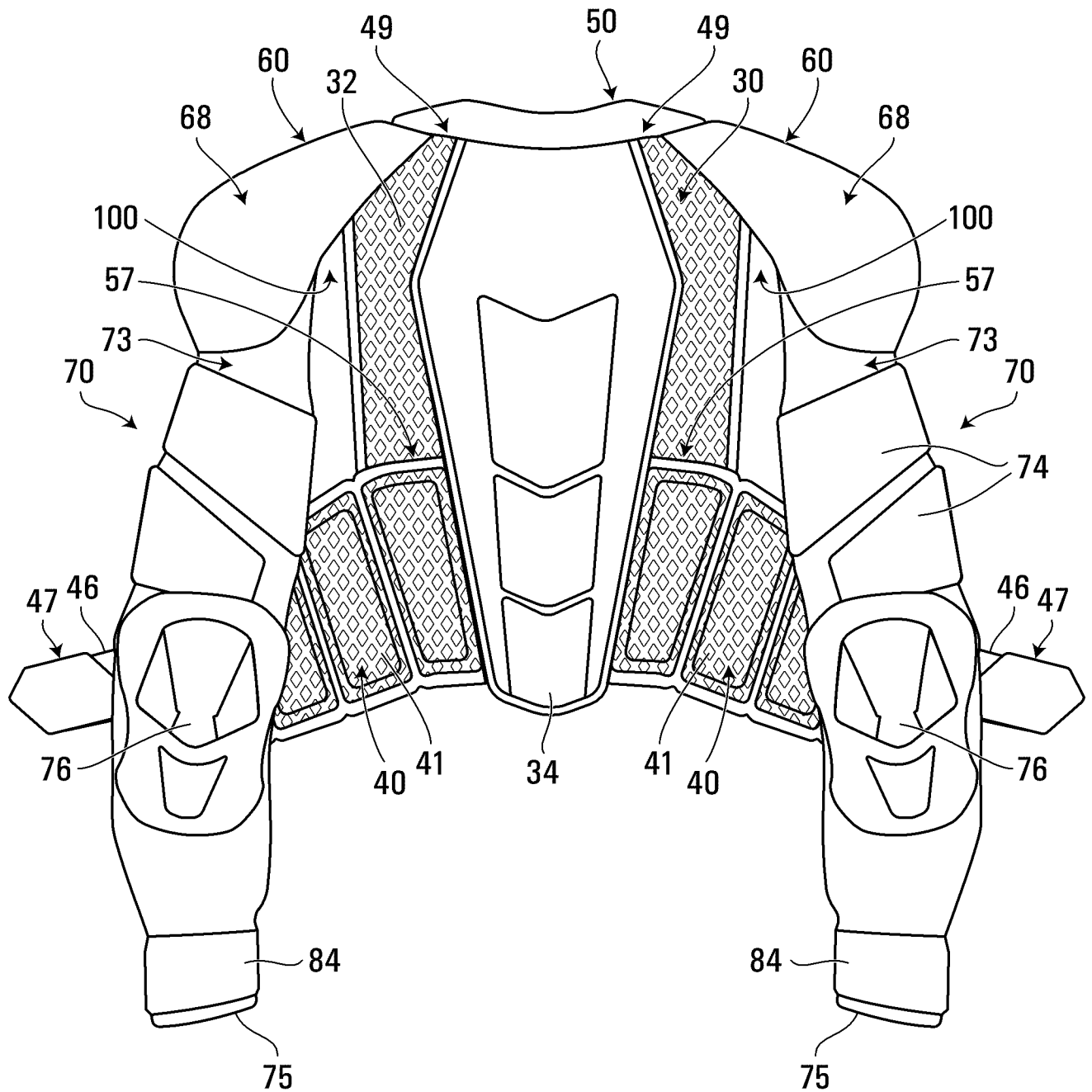


FIG. 2

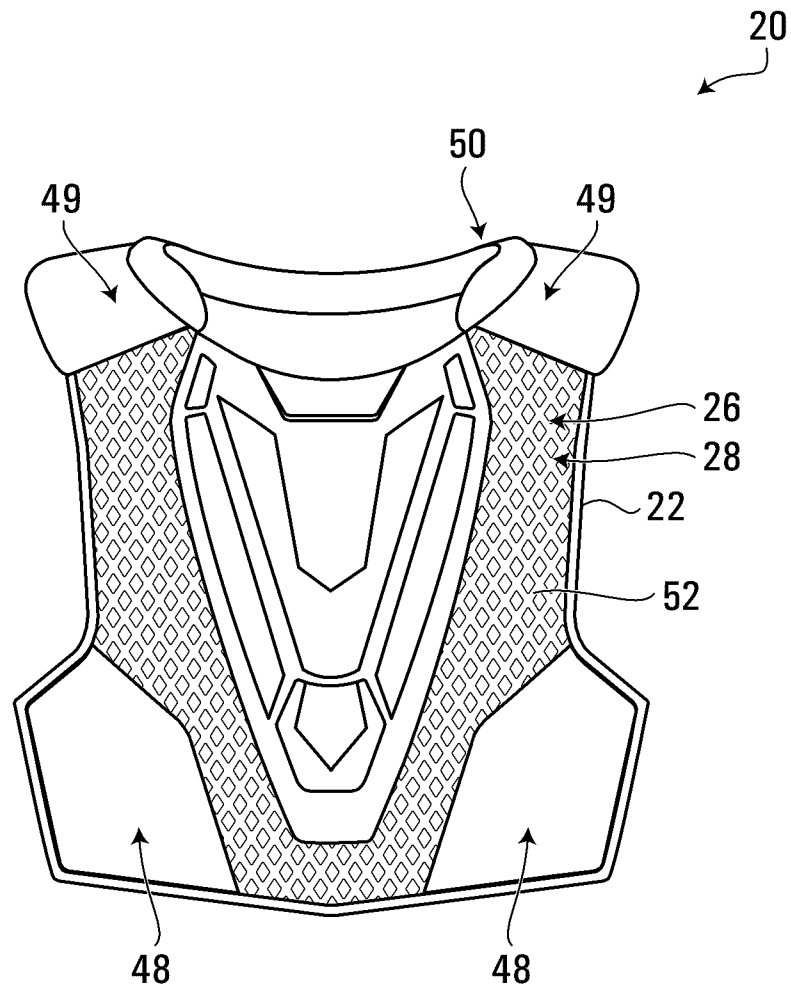


FIG. 3

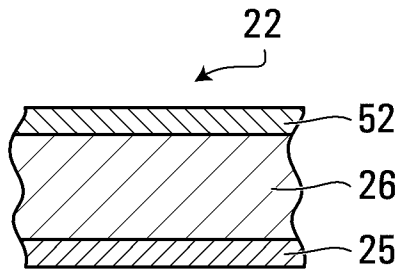


FIG. 4

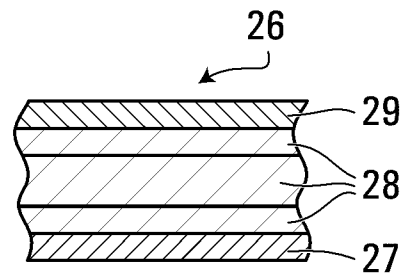


FIG. 5

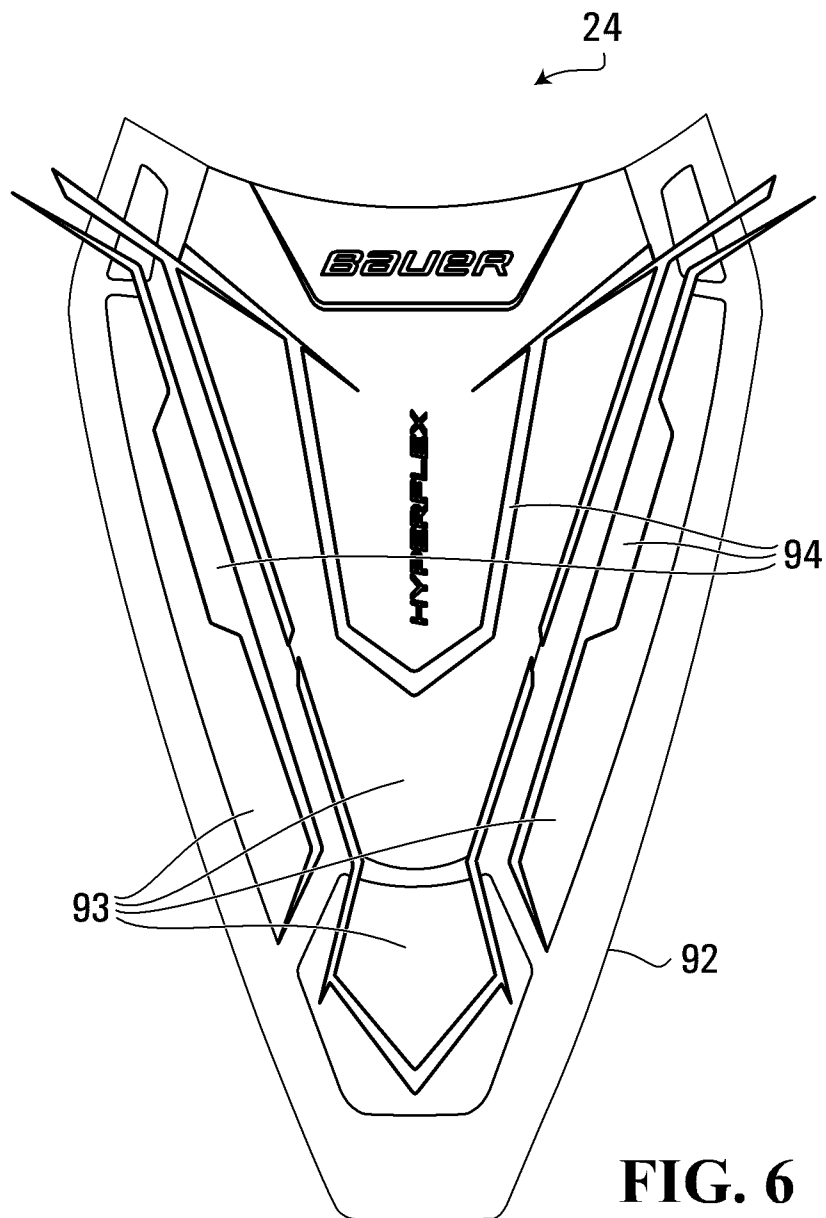


FIG. 6

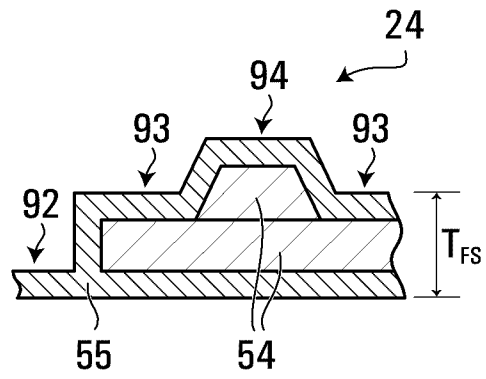


FIG. 7

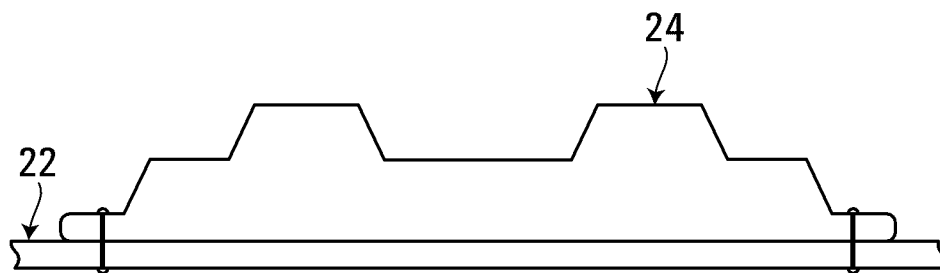


FIG. 8



Date Reçue/Date Received 2023-07-12

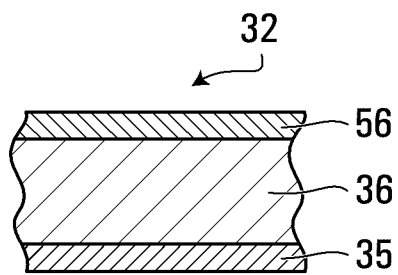


FIG. 10

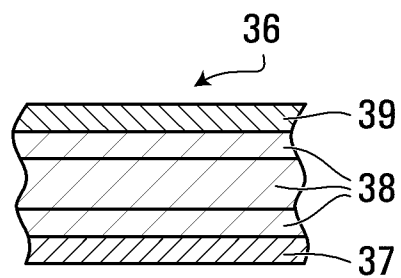


FIG. 11

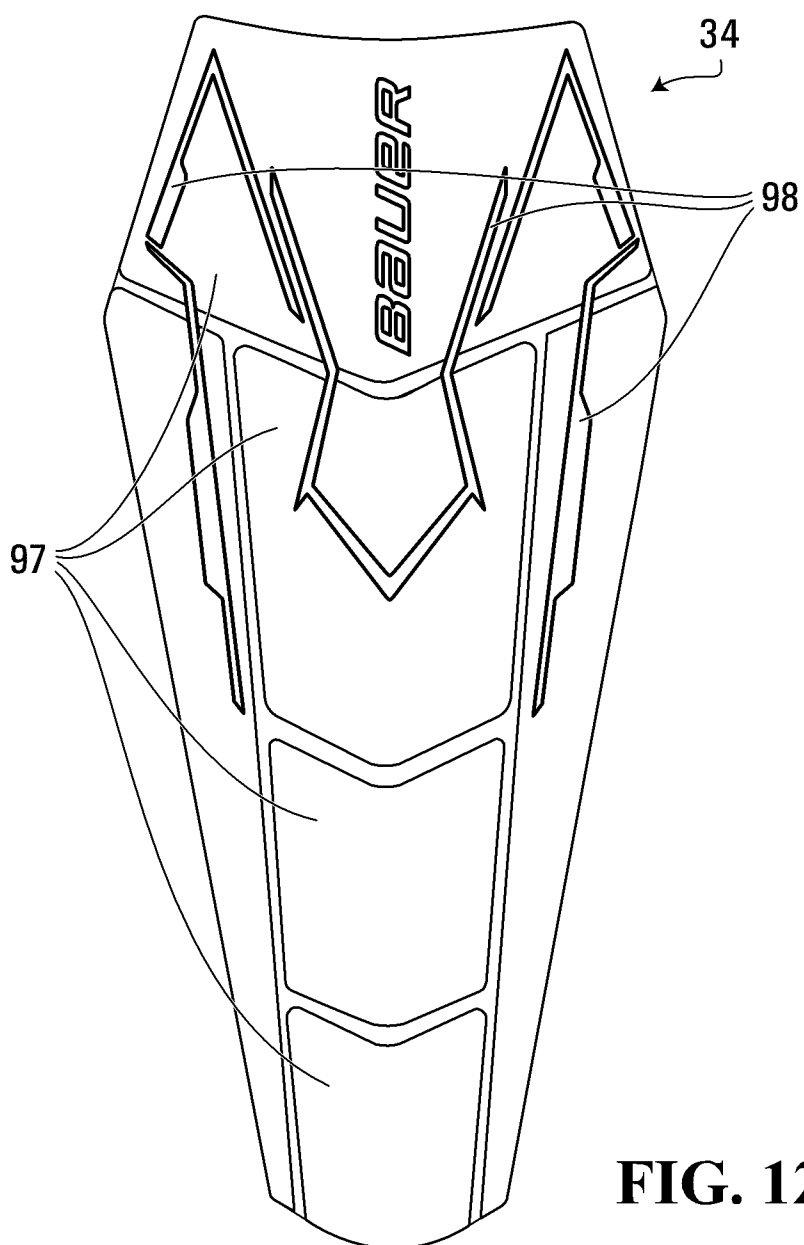


FIG. 12

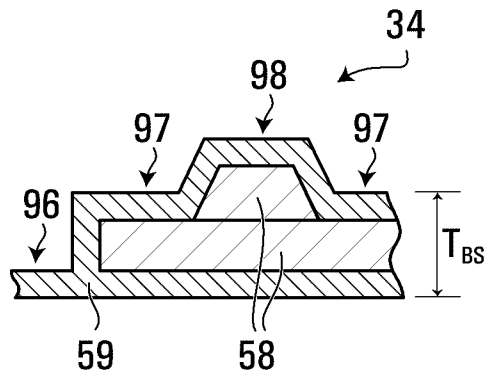


FIG. 13

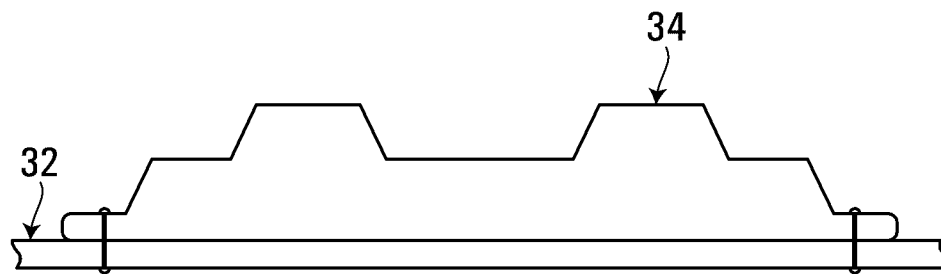


FIG. 14

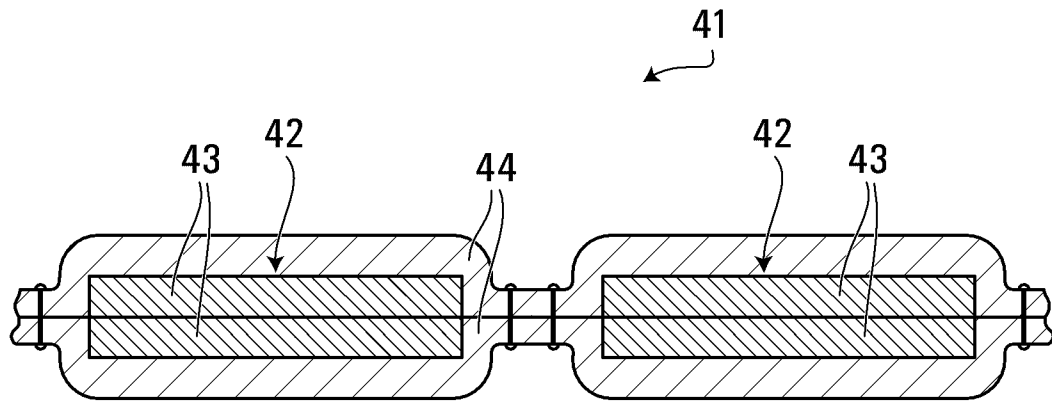


FIG. 15

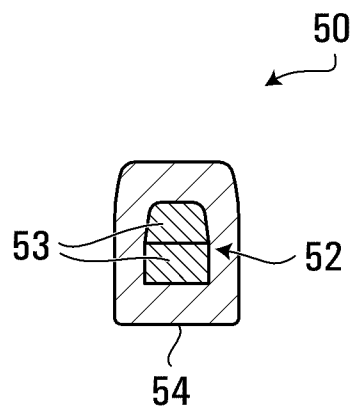


FIG. 16

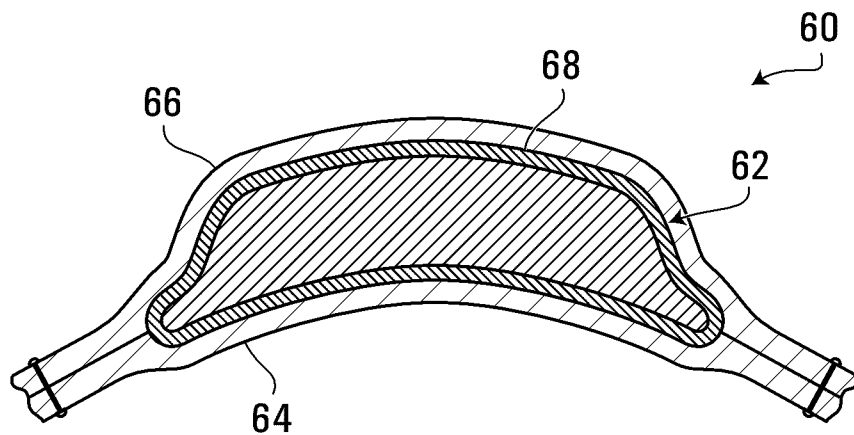


FIG. 17

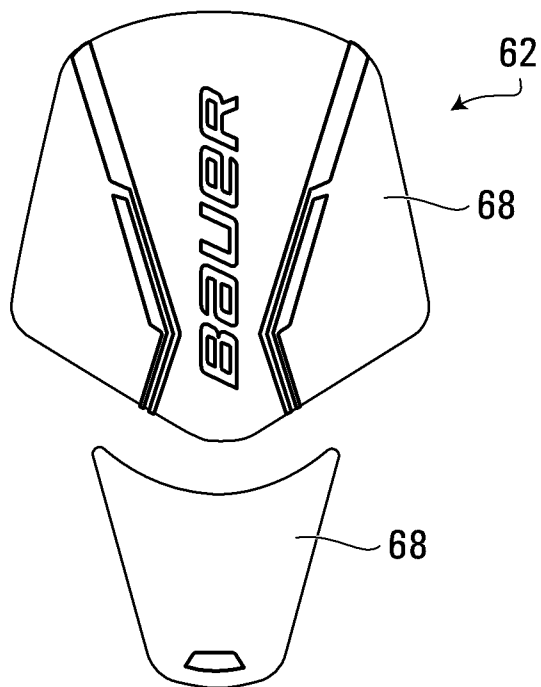


FIG. 18

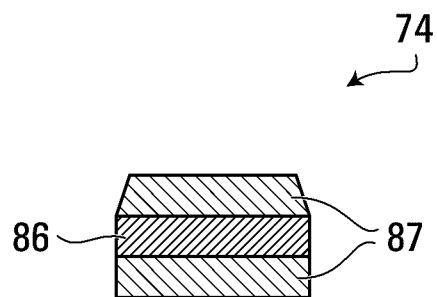


FIG. 19

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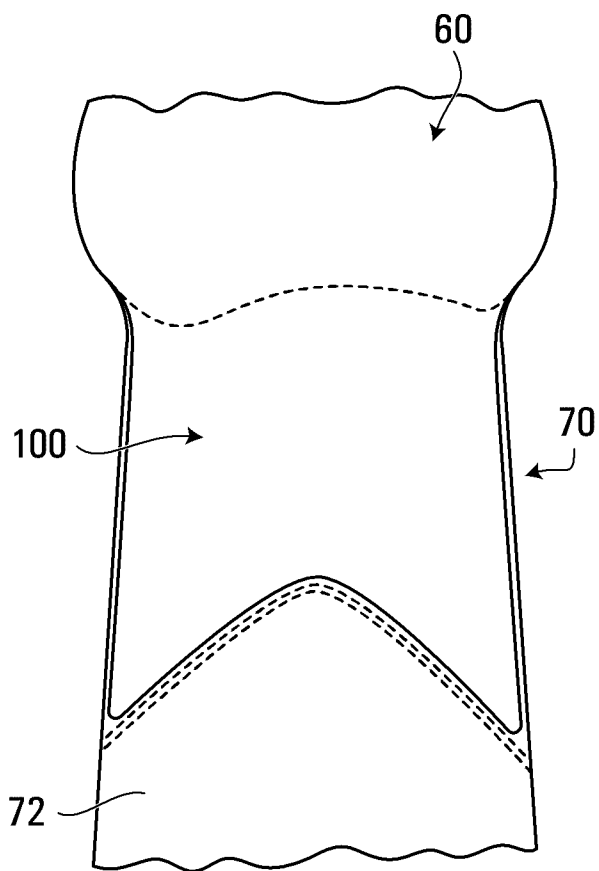


FIG. 20

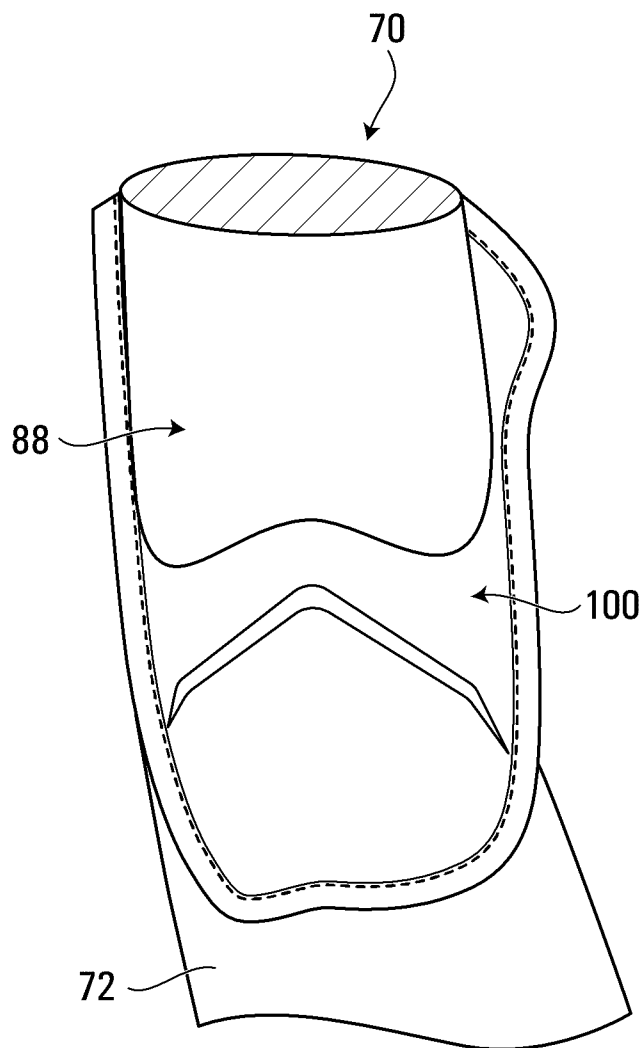


FIG. 21

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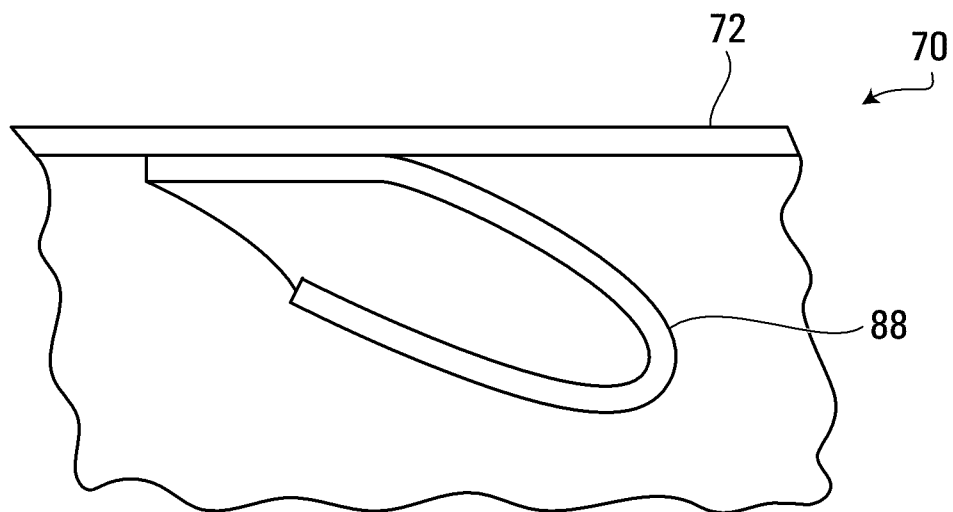


FIG. 22

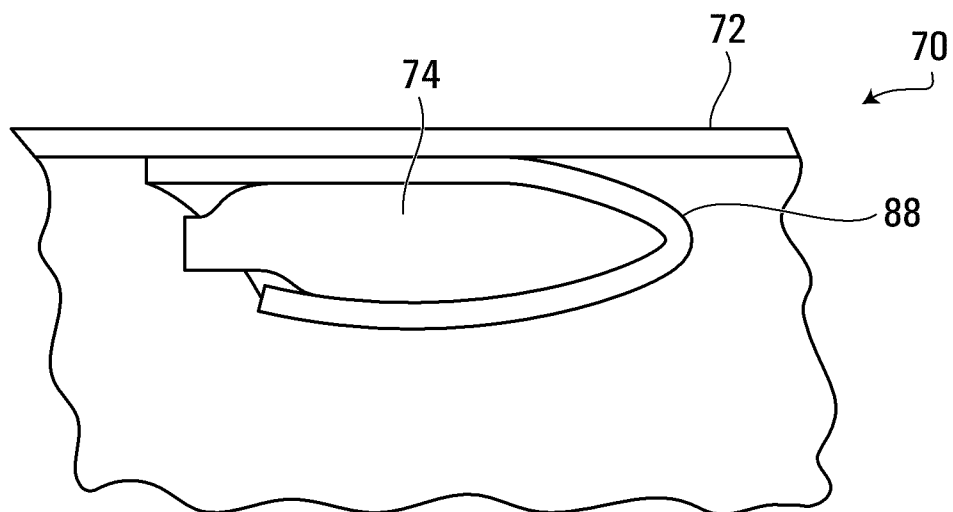


FIG. 23

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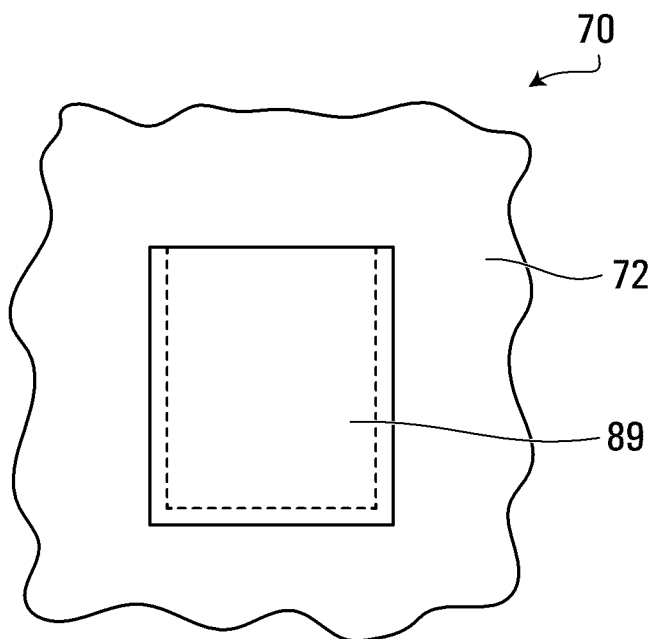


FIG. 24

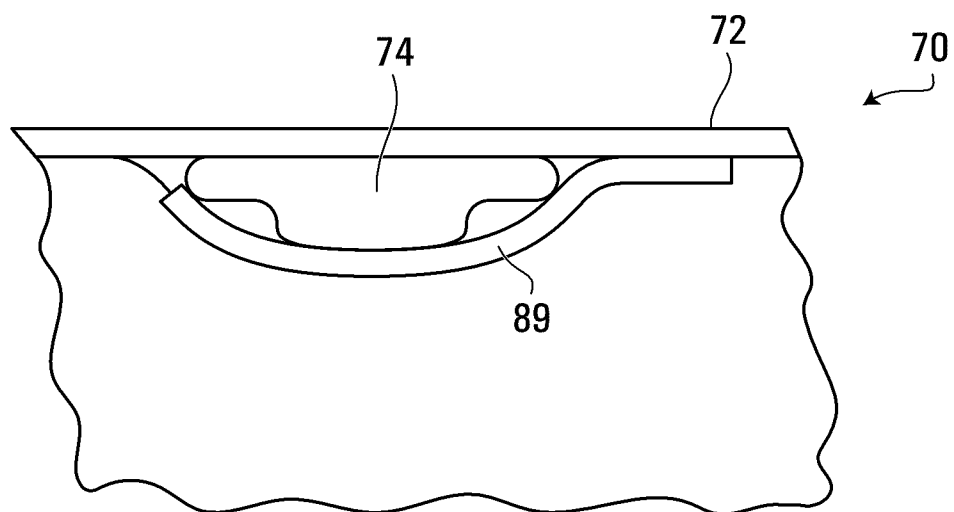


FIG. 25

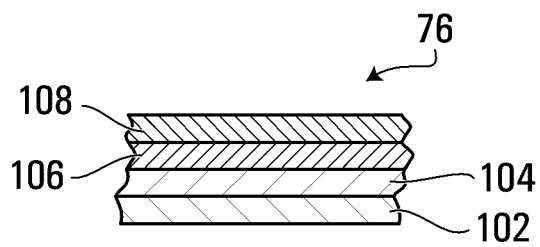


FIG. 26

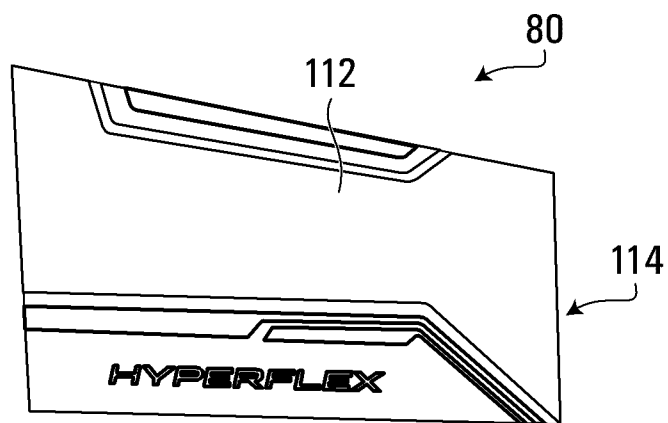


FIG. 27

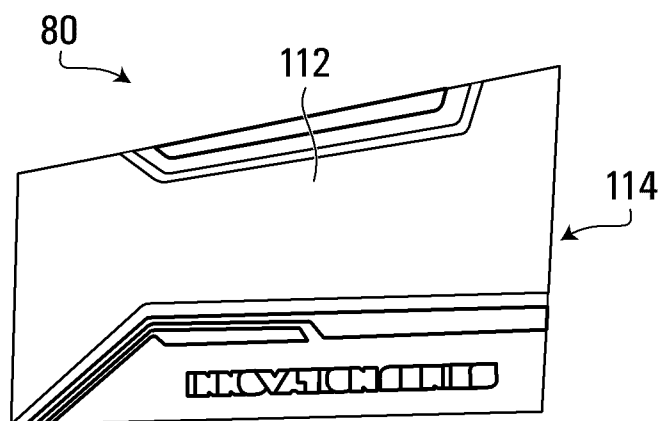


FIG. 28

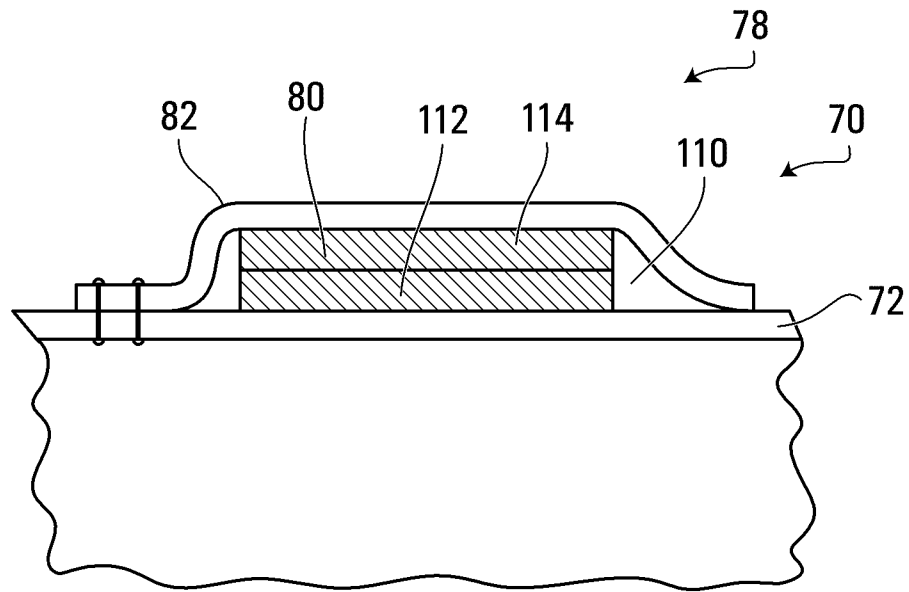


FIG. 29

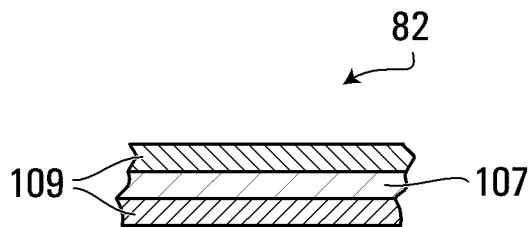


FIG. 30

FIG. 31

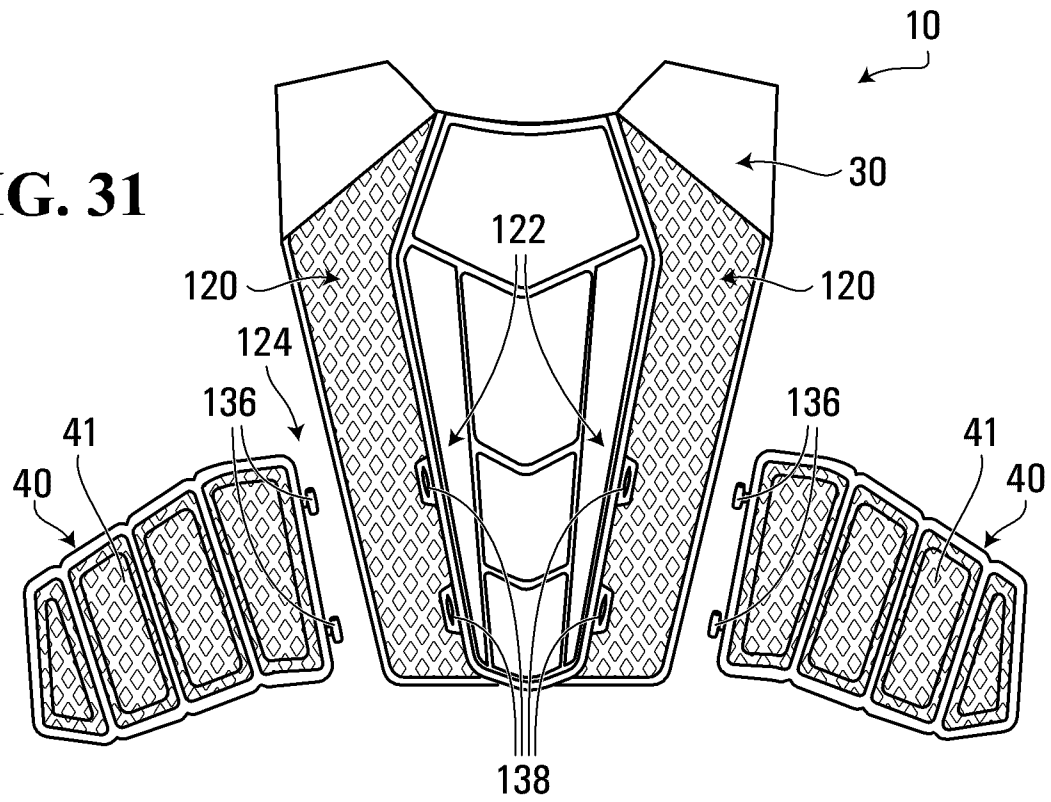
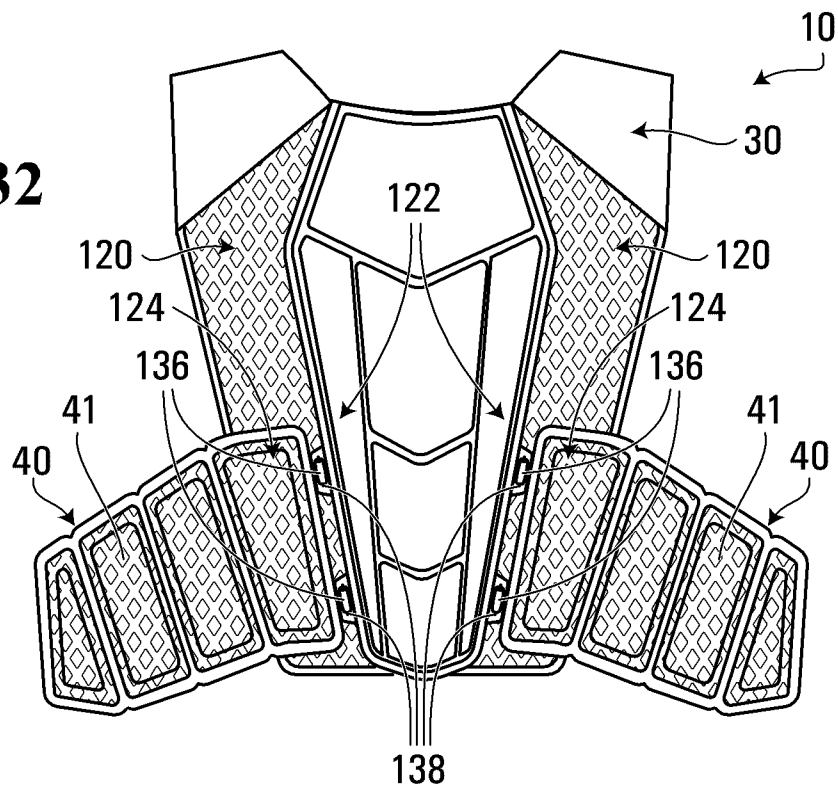


FIG. 32



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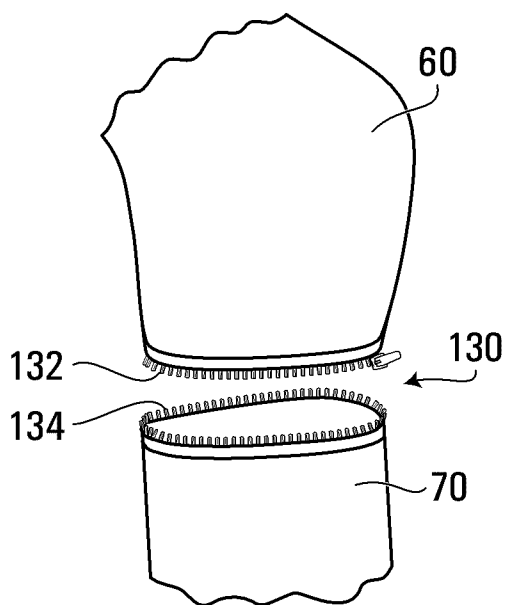


FIG. 33

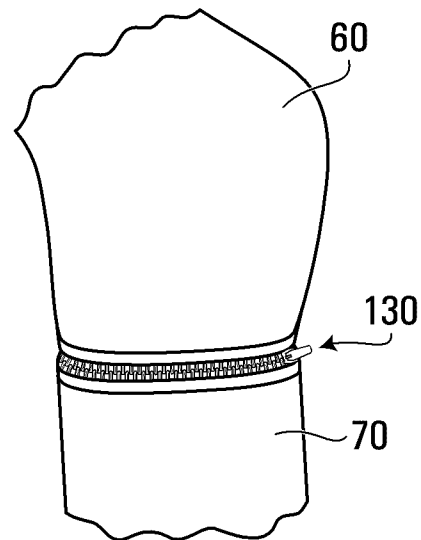


FIG. 34

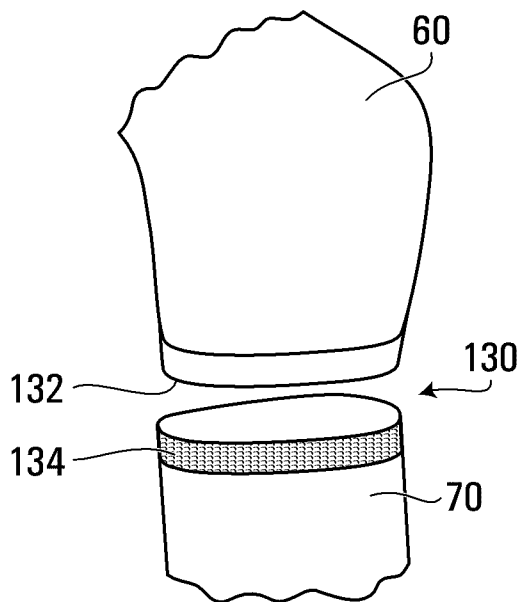


FIG. 35

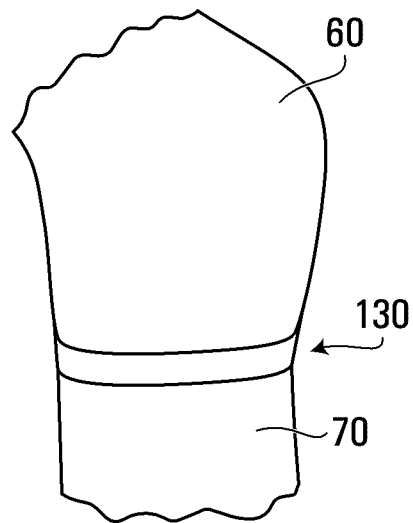


FIG. 36

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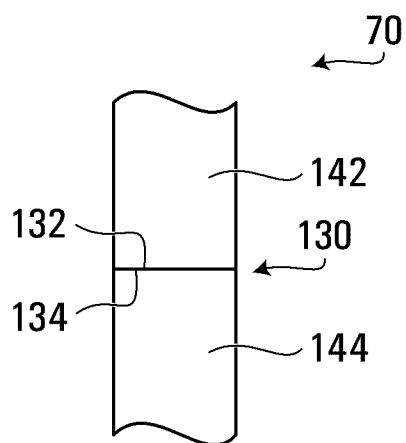


FIG. 37

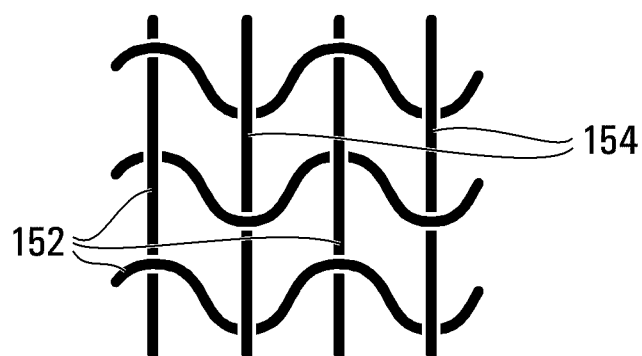


FIG. 38

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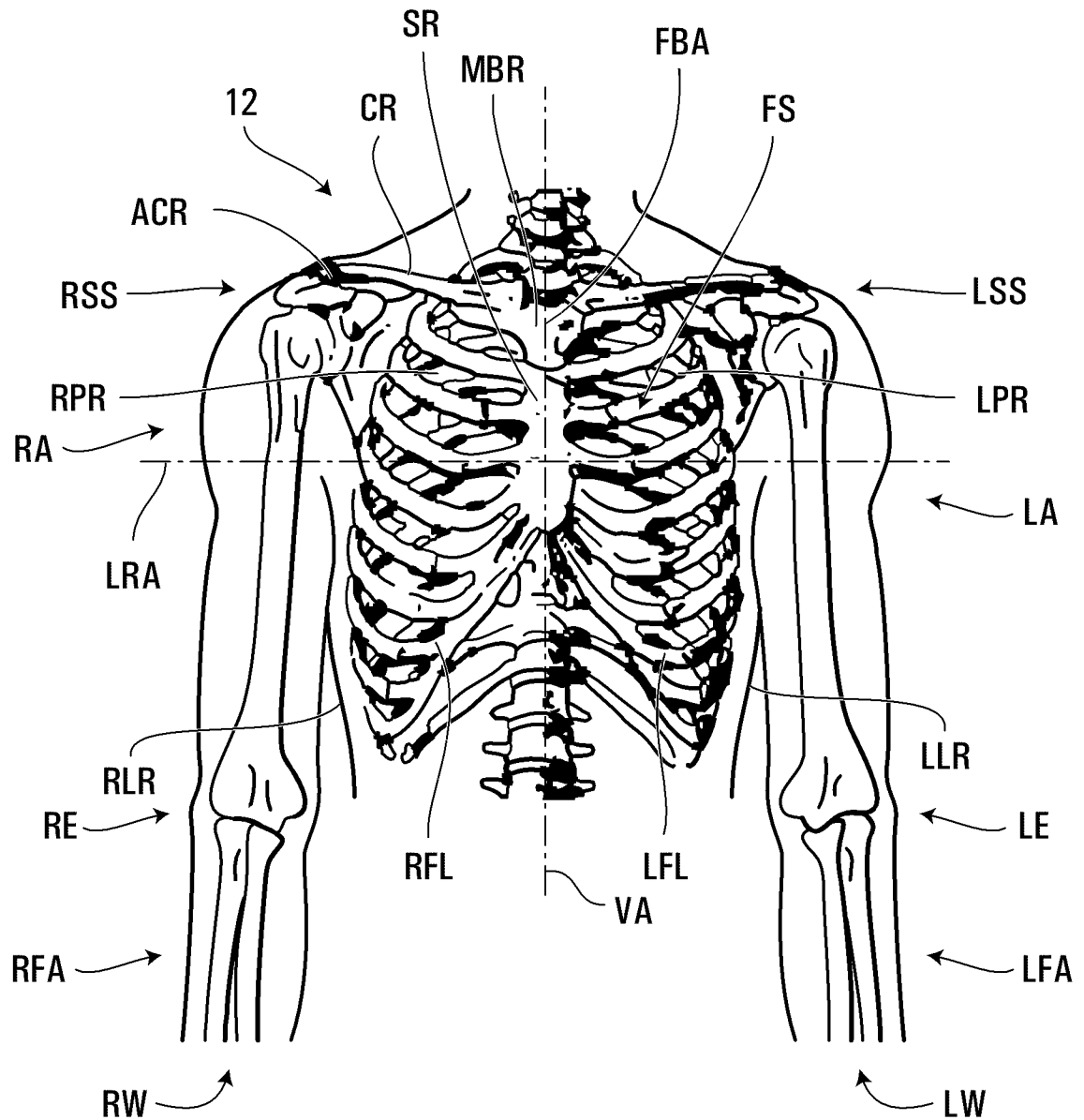


FIG. 39

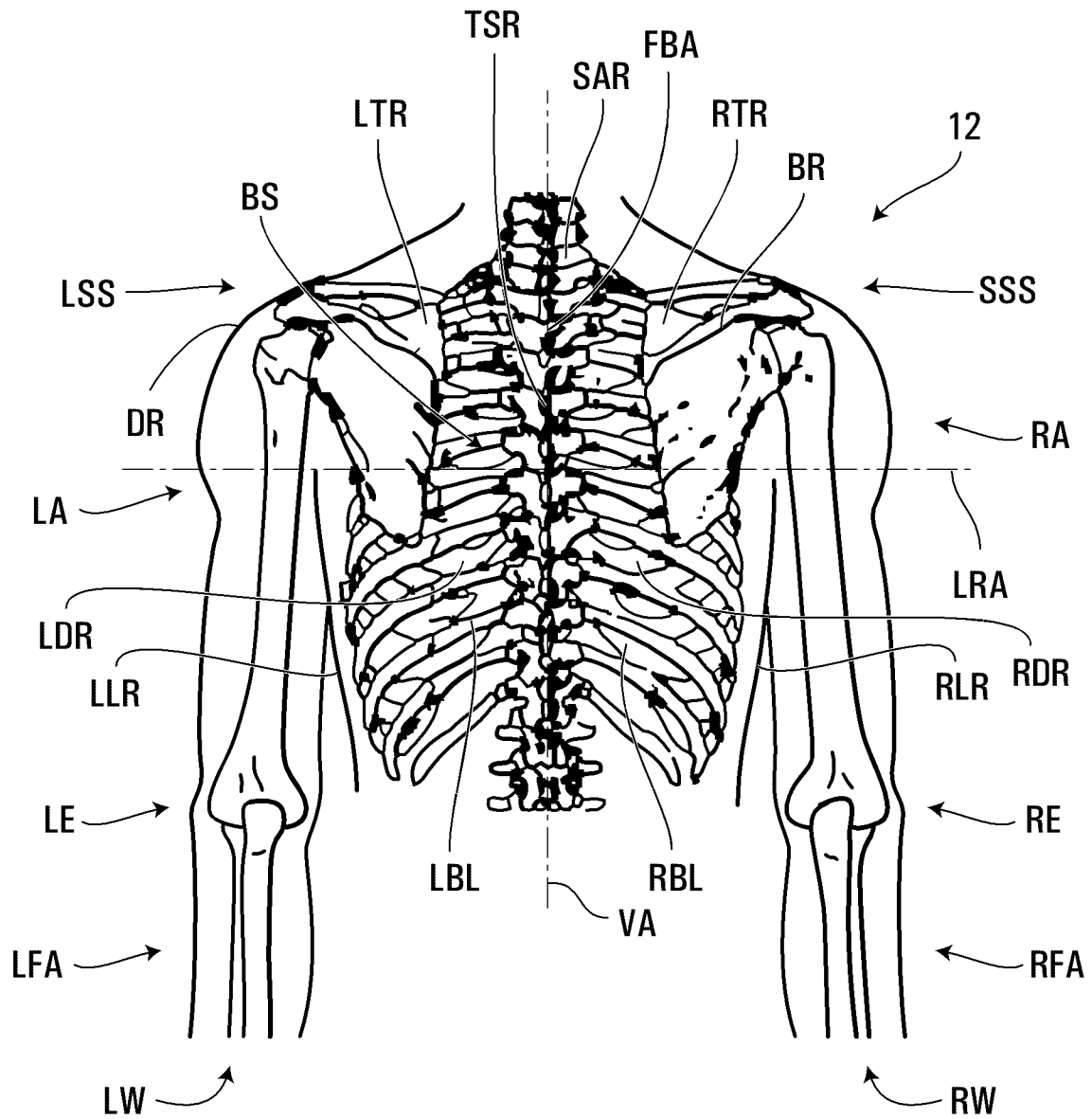


FIG. 40

