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(71) Applicant: SPERRY PRODUCT INNOVATION, INC.

[US/US]; 12 Deangelo Dr, Bedford, MA 01730 (US).

(72) Inventor: SPERRY, Laurence, B.; 12 Deangelo Dr, Bedford, MA 01730 (US).

(74) Agent: DETWEILER, Sean, D.; Morse, Barnes-Brown & Pendleton, P.C., CityPoint, 230 Third Avenue, 4th Floor, Waltham, MA 02451 (US).

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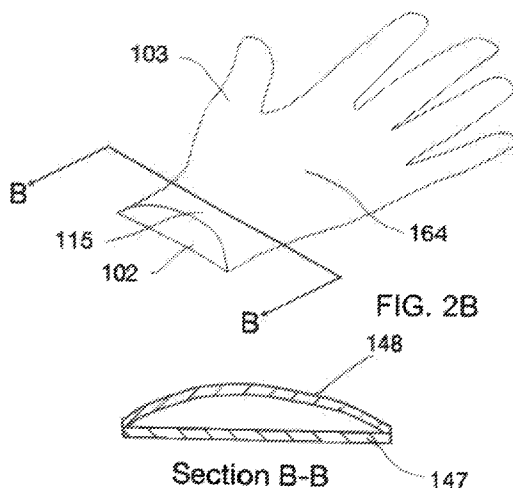
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(54) Title: QUICK DONNING DISPOSABLE GLOVES

(57) Abstract: A disposable glove and system are provided that has features and characteristic that enable a cuff opening of the glove to more easily open, thereby assisting in donning the glove. The disposable glove system includes stacked glove configurations for mounting and storage. The disposable glove system also includes features that make the disposable gloves easier to dispense from a dispenser with minimal user contact with the outer surface of the disposable gloves.



QUICK DONNING DISPOSABLE GLOVES

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims priority to, and the benefit of, co-pending United States Provisional Application 62/689,670 filed June 25, 2018 for all subject matter common to both applications. The disclosure of said provisional application is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to disposable gloves for the service industry. In particular, the present invention relates to disposable gloves having features that make them easier to don by a user.

BACKGROUND

[0003] The service industry, such as food service or cleaning service, often requires workers to wear gloves to prevent cross-contamination. Gloves are often one-time use disposable gloves where the risk of cross-contamination is reduced with frequent glove changes. For example, a food service worker will don fresh gloves for each customer to prevent cross-contamination of foods or after handling money or other non-food items.

[0004] Conventional elastomeric (nitrile or similar) gloves are generally manufactured using a dipping process over a form of a hand. These gloves are designed to be close in size to a user's hand and stretch when donned to conform tightly to the hand. Although the conformed fit is beneficial to the usability, elastomeric gloves are generally costly and

overcoming the elastomeric nature of the material makes for a difficult and time consuming donning process.

[0005] A conventional and cost-effective solution is to use two layers of substantially non-elastic plastic material (polyethylene or similar) sealed together to form the anterior (palm side of the hand) and posterior (back side of the hand) portions of the glove. The gloves have the general profiled shape of a hand but because the flat profiled shape of these gloves needs to fit the three-dimensional shape of a user's hand, the gloves require excess material for the geometric transformation. Two-layer gloves are also resistant to transitioning to the three-dimensional donned shape, preferring to hold to their flattened shape. Flattened two-layer gloves are prone to bending and kinking, making them further resistant to donning and the internal surfaces of plastic gloves generally stick to wet surfaces such that sweaty or wet hands even further complicate the donning process. Two-layer gloves are difficult and slow to don, they do not provide for a good fit, and they are generally uncomfortable to wear.

[0006] Some quick don glove solutions exist, which feature stacks of gloves with relatively easy access to the glove opening for inserting a hand and separating a glove from the stack with the action of donning. Quick don glove products can be advantageous over other glove products available but existing options suffer from a number of shortcomings. Existing solutions either consist of overly involved equipment or overly simplistic approaches that impede the path of donning with remnant glove stack material or glove mounts that reside directly in the path of donning.

[0007] The difficult donning process for both elastomeric gloves and non-elastic gloves is also further complicated since the user should not contact the exterior surfaces of the glove to limit the spread of contamination.

[0008] Escalating public awareness and understanding of the environmental impact of disposable plastic products provides another deterrent for the usage of disposable gloves in general. Conventional two layer gloves are often contaminated with food and unable to be properly recycled where food products inhibit the recyclability of plastic, consequently, gloves are usually thrown out and not recycled.

SUMMARY

[0009] There is a need for a disposable glove that is fast and simple to don and is low cost, comfortable to wear, and of an appropriate size and fit for conducting manual operations. The present invention is directed toward further solutions to address this need, in addition to having other desirable characteristics. Specifically, the disposable glove has features that allow the cuff of the glove to more easily open assisting in donning the glove. The disposable gloves are stackable for mounting and storage. The disposable gloves also include features that make the glove easier to dispense from a dispenser with minimal user contact with the outer surface of the glove.

[0010] In accordance with example embodiments of the present invention, a disposable glove is provided. The disposable glove includes a first layer of thermoplastic material and a second layer of thermoplastic material. The first layer of thermoplastic material has a first perimeter border generally in the shape of a human hand and includes a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand. The second layer of thermoplastic material has a second perimeter border generally in the shape of a human hand and includes a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand. The first layer and the second layer are coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the disposable glove. The disposable glove has a biased open cuff opening configured to receive a user's left hand or a user's right hand therethrough, wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening to maintain a steady-state open state facilitating donning of the disposable glove.

[0011] In accordance with an aspect of the present invention, at least one of the first layer and second layer comprises a starch based thermoplastic.

[0012] In accordance with an aspect of the present invention, the thermoplastic material of at least one of the first layer and second layer has a thickness between 0.5 mils and 3 mils.

[0013] In accordance with an aspect of the present invention, at least one of the first layer and second layer comprises formed geometry. In certain instances, the formed geometry comprises a three-dimensional form generally shaped to fit a human hand. The geometry may be formed by extruding the thermoplastic material to a depth between about 0.1 inches to about 2.5 inches. In certain instances, the formed geometry comprises features for facilitating compression and elastic deformation of the disposable glove for storage. In other instances, when in a compressed state, the extra material of the formed geometry provides structural rigidity to disposable glove.

[0014] In accordance with an aspect, at least one of the first layer or second layer has extra cuff length so to extend beyond the cuff of the other layer resulting in an offset cuff feature.

[0015] In accordance with an aspect, the disposable glove further includes one or more mounting features for mounting the disposable glove. In certain instances, the one or more mounting features are configured to separate from the disposable glove when disposable glove is unmounted and donned by a user. In other instances, the one or more mounting features are configured to release with disposable glove when disposable glove is unmounted and donned by a user. In some instances, the one or more mounting features are attached to one of the first layer and second layer. In other instances, the one or more mounting features are asymmetrical for facilitating correct orientation when mounting. In still other instances, the one or more mounting features are configured to facilitating the stacking of one or more disposable gloves in an elastically deformed and compressed closed state. In certain instances the one or more mounting features are spaced such that the one or more mounting features are located within the width of the cuff of the disposable glove in its elastically deformed and compressed state and located outside the width of the cuff of the disposable glove in an open state.

[0016] In accordance with an aspect of the present invention, the disposable glove is configured to be interchangeably right-handed or left-handed.

[0017] In accordance with an aspect of the present invention, the disposable glove further includes a tab extending from the biased open cuff of the disposable glove on at least one of the first layer and second layer.

[0018] In accordance with an aspect of the present invention, the disposable glove is disposed within a stack of a plurality of disposable gloves underneath the plurality of disposable gloves, the biased open cuff is held in a closed state by the stack of the plurality of disposable gloves and returns to the open state when the disposable glove is disposed in a top most position on top of the stack of the plurality of disposable gloves. In some instances, the stack of plurality of disposable gloves are all the either right-handed or left-handed gloves. In certain instances, the disposable glove is treated to adhere to other to disposable gloves in the stack.

[0019] In accordance with an example embodiment of the present invention, a stack of disposable gloves is provided. The stack consists of one or more disposable gloves having a first layer of thermoplastic material and a second layer of thermoplastic material. The first layer of thermoplastic material has a first perimeter border generally in the shape of a human hand and includes a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand. The second layer of thermoplastic material has a second perimeter border generally in the shape of a human hand and includes a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand. The first layer and second layer are coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves. The disposable glove has a cuff opening configured to receive a user's left hand or a user's right hand therethrough. The disposable glove also has one or more mounting features extending from the at least one of first or second layers at the cuff of the disposable glove for connecting the disposable glove to the stack of disposable gloves and one or more opening reliefs where the one or more mounting features extend from the at least one of first or second layers at the cuff of the disposable glove. The one or more opening reliefs provide slack in the cuff facilitating donning of the disposable glove while the mounting features are connecting the disposable glove to the stack.

[0020] In accordance with an aspect of the present invention, the opening reliefs comprise separation lines, that when torn, provide slack in the cuff facilitating donning of the disposable glove while the mounting features still couple the disposable glove to the stack.

[0021] In accordance with an aspect of the present invention, at least one of the first layer or second layer has extra cuff length so to extend beyond the cuff of the other layer resulting in an offset cuff from which the mounting features extend.

[0022] In accordance with an aspect of the present invention, when the disposable glove is disposed within a stack of a plurality of disposable gloves underneath the plurality of disposable gloves, the cuff is held in a closed state by the stack of the plurality of disposable gloves and transitions to the open state when the disposable glove is disposed in a top most position on top of the stack of the plurality of disposable gloves enabling the opening reliefs to provide slack in the cuff.

[0023] In accordance with an aspect of the present invention, the one or more mounting features are asymmetrical for facilitating correct orientation when mounting the stack in a dispenser. In certain instances, the one or more mounting features are configured to separate from the disposable glove when the disposable glove is removed from the stack. In other instances, the one or more mounting features are configured to release with the disposable glove when the disposable glove is removed from the stack.

[0024] In accordance with an aspect of the present invention, the one or more disposable gloves are all the either right-handed or left-handed gloves.

[0025] In accordance with an aspect of the present invention, the one or more disposable gloves are treated to adhere to other disposable gloves in the stack. In certain instances the treatment is chemical. In other instances the treatment is electrostatic. In still other instances, the treatment is heat.

[0026] In accordance with an example embodiment of the present invention, a dispenser for disposable gloves is provided. The dispenser includes a base for supporting dispenser; a support frame extending from the base; a first mounting face attached to the support frame; a first set of mounts for holding a first stack of disposable gloves on the first mounting face; a second mounting face attached to the support frame opposite and adjacent to the first

mounting face; and a second set of mounts for holding a second stack of disposable gloves on the second mounting face.

[0027] In accordance with an aspect of the present invention, the dispenser further includes a first stack of disposable gloves mounted on the first mounting face and a second stack of gloves mounted on the second mounting face. In certain instances, the stack of gloves consists of one or more disposable gloves having a first layer of thermoplastic material and a second layer of thermoplastic material. The first layer of thermoplastic material has a first perimeter border generally in the shape of a human hand and includes a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand. The second layer of thermoplastic material has a second perimeter border generally in the shape of a human hand and includes a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand. The first layer and second layer are coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves. The disposable glove has a biased open cuff opening configured to receive a user's left hand or a user's right hand therethrough. The disposable glove also has one or more mounting features for mounting the one or more disposable gloves on the one or more mounts of at least one of the first or second mounting faces of the dispenser. The first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff of the one or more disposable gloves to have a steady-state open state facilitating donning of the one or more disposable gloves. The one or more disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff of the one or more disposable gloves is held in a closed state by the one or more other disposable gloves in the stack of disposable gloves and transitions to the open state when the one or more disposable gloves holding the biased open cuff in a closed state are removed. In other instances, the first and second stack consist of one or more disposable gloves having a first layer of thermoplastic material and a second layer of thermoplastic material. The first layer of thermoplastic material has a first perimeter border generally in the shape of a human hand and includes a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left

hand or right hand. The second layer of thermoplastic material has a second perimeter border generally in the shape of a human hand and includes a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand. The first layer and second layer are coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves. The disposable glove has a cuff opening configured to receive a user's left hand or a user's right hand therethrough. The disposable glove also has one or more mounting features extending from the at least one of first or second layers at the cuff of the disposable glove for connecting the disposable glove to the stack of disposable gloves and mounting on at least one of the first and second mounting faces. The disposable glove also has one or more opening reliefs where the one or more mounting features extend from the at least one of first or second layers at the cuff of the disposable glove; wherein the one or more opening reliefs provide slack in the cuff facilitating donning of the disposable glove while the mounting features are connecting the disposable glove to the stack.

[0028] In accordance with an aspect of the present invention, the second mounting face is not orientated parallel with the first mounting face.

[0029] In accordance with an aspect of the present invention, the orientation of the first mounting face and second mounting face are angularly splayed to each other.

[0030] In accordance with an aspect of the present invention, the orientation of the first mounting face and second mounting face are adjustable in relation to each other and the dispenser base.

[0031] In accordance with an aspect of the present invention, the first set of mounts and second set of mounts are independent of the first mounting face and second mounting face. In certain instances, at least one of the first mounting face and second mounting face are biased in relation to the first set of mounts and second set of mounts so as to provide a retention force for holding the first stack and second stack of disposable gloves on the mounts. In some such instances the bias is provided by a spring mechanism. In still other instances, at least one of the first mounting face and second mounting face are configured to deflect when a user inserts a hand into the cuff of the one or more disposable gloves to assist donning of

the one or more disposable gloves. In certain other instances, the first set of mount and second set of mounts are biased in relation to at least one of the first mounting face and second mounting face so as to provide a retention force for holding the first stack and second stack of disposable gloves on the mounts. In some such instances, the bias is provided by a spring mechanism.

[0032] In accordance with an aspect of the invention, the mounts are asymmetrical to facilitate mounting stacks of disposable gloves in the correct orientation.

[0033] In accordance with an aspect of the present invention, the first and second mounting faces are configured to provide support for the stack of disposable gloves while a user dons the topmost disposable glove in the stack. In some instances, at least one of the first mounting face and second mounting face further comprise depressions in their respective surfaces to enable a disposable glove mounted on the dispenser to open to assist in donning. In other instances, at least one of the first mounting face and second mounting face further comprise curved surfaces to enable a disposable glove mounted on the dispenser to open to assist donning.

[0034] In accordance with an aspect of the present invention, the dispenser further includes an air jet for providing a burst of air to assist in opening the biased open cuff of a disposable glove mounted on the dispenser for donning.

[0035] In accordance with an aspect of the present invention, the first mounting face is configured to hold a stack of left-handed gloves and the second mounting face is configured to hold a stack of right-handed gloves.

[0036] In accordance with an example embodiment of the present invention, a method of manufacturing a disposable glove is presented. The method involves providing a first layer of thermoplastic material, providing a second layer of thermoplastic material, forming at least one of the first layer and second layer into a three-dimensional shape generally conforming to a human hand including a middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand, coupling the first layer to the second layer such that a resulting middle section of the first layer and a resulting middle section of the second layer have different total areas from each other in such a way that when one of the resulting middle section of the first layer and

the resulting middle section of the second layer contain extra material and does not lay flat, causing a biased open cuff of the disposable glove to be in a steady-state open state facilitating donning of the disposable glove, and cutting the coupled first layer and second layer to have a perimeter border generally in the shape of a human hand.

[0037] In accordance with an aspect of the invention, forming at least one of the first layer or second layer of material consists of vacuum forming at least one of the first layer and second layer on a mold.

[0038] In accordance with an aspect of the invention, the coupling of the first layer and second layer is performed while at least one of the first layer and second layer is still on the mold.

[0039] In accordance with an aspect of the invention, the cutting of the coupled first layer and second layer is performed while at least one of the first layer and second layer is still on the mold.

[0040] In accordance with an aspect of the invention, at least one of the first layer and second layer comprises a starch based thermoplastic.

[0041] In accordance with an aspect of the invention, at least one of the first layer and second layer comprises sub layers.

[0042] In accordance with an aspect of the invention, the thermoplastic material of at least one of the first layer and second layer has a thickness between about 0.5 mils and about 3 mils.

[0043] In accordance with an aspect of the invention, the first layer and second layer are made of different thermoplastic materials.

[0044] In accordance with an aspect of the invention, at least one of the first layer and second layer comprises formed geometry. In some instances, the formed geometry comprises a three-dimensional form generally shaped to fit a human hand. In other instances, the formed geometry comprises extruded features.

[0045] In accordance with an aspect of the invention, at least one of the first layer and second layer further includes one or more mounting features.

[0046] In accordance with an example embodiment of the present invention, a disposable glove is provided. The disposable glove includes a first layer of thermoplastic material and a second layer of thermoplastic material. The first layer of thermoplastic material has a first perimeter border generally in the shape of a human hand and includes a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand. The second layer of thermoplastic material has a second perimeter border generally in the shape of a human hand and includes a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand. The first layer and the second layer are coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the disposable glove. The disposable glove has a biased open cuff opening configured to receive a user's left hand or a user's right hand therethrough, wherein at least one of the first or second sections have a formed geometry comprising a three-dimensional form generally shaped to fit a human hand and causing the biased open cuff of the disposable glove to be in a steady-state open state facilitating donning of the disposable glove.

[0047] In accordance with an example embodiment of the present invention, a dispenser for disposable gloves is provided. The dispenser includes a housing with an internal chamber and stack of disposable gloves in the internal chamber. The stack of disposable gloves having one or more disposable gloves. The disposable glove includes a first layer of thermoplastic material and a second layer of thermoplastic material. The first layer of thermoplastic material has a first perimeter border generally in the shape of a human hand and includes a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand. The second layer of thermoplastic material has a second perimeter border generally in the shape of a human hand and includes a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand. The first layer and the second layer are coupled together at and along the first perimeter border and the second perimeter border in such a way

that results in the disposable glove. The disposable glove has a biased open cuff opening configured to receive a user's left hand or a user's right hand therethrough, wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening to maintain a steady-state open state facilitating donning of the disposable glove. The one or more disposable gloves of the stack are in an elastically deformed and compressed closed state wherein the biased open cuff of the one or more disposable gloves is held in a closed state by the one or more other disposable gloves in the stack of disposable gloves and transitions to the open state when the one or more disposable glove holding the biased open cuff in a closed state are removed. The housing has an opening from which protrudes at least the biased open cuff of an uppermost disposable glove of the stack such that when the uppermost disposable glove is removed from the housing, the biased open cuff of a next disposable glove in the stack transitions from a closed to state to an open state and protrudes from the opening.

[0048] In accordance with an aspect of the present invention, the one or more disposable gloves of the stack further comprise one or more mounting features. In certain instances, the dispenser includes one or more mountings corresponding to the one or more mounting features of the one or more disposable gloves for holding the one or more disposable gloves of the stack in the housing. In some instances, the one or more mounting features are configured to separate from the one or more disposable gloves when the glove is unmounted and donned. In some such instances, the one or more mounting features comprises excess material around at least a portion of the first perimeter and second perimeter of the one or more disposable gloves. In some instances, the one or more mounting features are attached to one of the first layer and second layers. In certain other instances, the one or more mounting features are configured to facilitate the stacking of one or more disposable gloves in an elastically deformed compressed closed state. In still other instances, the one or more mounting features of each of the one or more disposable gloves in the stack are connected to the mounting features of the next disposable glove in the stack.

[0049] In accordance with an aspect of the present invention, one or more disposable gloves of the stack further comprise a tab extending from the biased open cuff of the one or more disposable gloves on at least one of the first layer and second layer. In certain

instances, the biased open cuff of one layer of the one or more disposable gloves comprises a first tab extending from the biased open cuff and the biased open cuff of an other layer of the one or more disposable gloves comprises a second tab extending from the biased open cuff not opposite and not opposing the first tab.

[0050] In accordance with an aspect of the present invention, the opening of the dispenser is generally in the shape of a human hand.

BRIEF DESCRIPTION OF THE FIGURES

[0051] These and other characteristics of the present invention will be more fully understood by reference to the following detailed description in conjunction with the attached drawings, in which:

[0052] **FIG. 1A** and **FIG. 1B** are perspective views with corresponding cross-sectional views of a two layer glove in a flat and open state for donning;

[0053] **FIG. 2A**, **FIG. 2B**, and **FIG. 2C** are perspective views with corresponding cross-sectional views of a two layer glove having a biased open cuff in different states of opening for donning in accordance with an embodiment;

[0054] **FIG. 3A** and **FIG. 3B** are perspective views with corresponding cross-sectional views of a glove having formed geometry and a biased open cuff in a flat state and an open state in accordance with an embodiment;

[0055] **FIG. 4A**, **FIG. 4B**, and **FIG. 4C** are cross-sectional views of how the excess material in one of the layers of a two layer formed glove is in different flat configurations accordance with embodiments;

[0056] **FIG. 5A** and **FIG. 5B** are perspective views with corresponding cross-sectional views of a another glove having formed geometry in a flat state and an open state in accordance with an embodiment;

[0057] **FIG. 6** depicts a glove having reduced width in accordance with an embodiment;

[0058] **FIG. 7** is a perspective view of a glove with formed geometry having a widened cuff in accordance with an embodiment;

[0059] **FIG. 8** is a perspective view of a glove with formed geometry having a additional formed features accordance in with an embodiment;

[0060] **FIG. 9** is a perspective view of another glove with alternate formed geometry having a additional formed features accordance with an embodiment;

[0061] **FIG. 10** is a perspective view of a box dispenser for gloves in accordance with an embodiment;

[0062] **FIG. 11** is a perspective view of another box dispenser for gloves in accordance with an embodiment;

[0063] **FIG. 12A** and **FIG. 12B** are perspective views and corresponding cross-sectional views of a gloved having formed geometry including features for aiding in the compressing of the glove in accordance with an embodiment;

[0064] **FIG. 13** is a perspective view and corresponding cross-section of another glove with alternate formed geometry having an additional formed features accordance with an embodiment;

[0065] **FIG. 14A** and **FIG. 14B** are perspective views of a glove having tabs extending from the cuff in accordance with an embodiment;

[0066] **FIG. 15A** and **FIG. 15B** are perspective views of a glove having a non-overlapping cuff in accordance with an embodiment;

[0067] **FIG. 16** is a perspective view and corresponding cross-sectional view of a glove having formed geometry and a non-overlapping cuff in accordance with an embodiment;

[0068] **FIG. 17** is a perspective view of a glove dispenser for gloves having a tab extending from the cuff in accordance with an embodiment;

[0069] **FIG. 18A, FIG. 18B, and FIG. 18C** are perspective views of a stack of gloves with mounting features and opening reliefs in accordance with an embodiment;

[0070] **FIG. 19A-19D** depict gloves with alternate opening reliefs in accordance with an embodiment;

[0071] **FIG. 20A** and **20B** are perspective views and corresponding cross-sectional views of a glove stack bent to assist in opening and donning in accordance with an embodiment;

[0072] **FIG. 21A, FIG. 21B,** and **FIG. 21C** depict gloves with alternate mounting features and opening reliefs in use in accordance with an embodiment;

[0073] **FIG. 22A, FIG. 22B,** and **FIG. 22C** depict gloves with alternate mounting features and opening reliefs in use in accordance with an embodiment;

[0074] **FIG. 23A** and **FIG. 23B** are perspective views and a corresponding cross-sectional view of gloves with alternate mounting features and opening reliefs in use in accordance with an embodiment;

[0075] **FIG. 24A** and **FIG. 24B** are perspective views and a corresponding cross-sectional view of gloves with alternate widths for mounting holes on mounting features of gloves in relation to cuff opening in accordance with an embodiment;

[0076] **FIG. 25** is a perspective view of another alternate stack of gloves having formed geometry and mounting features in use on a dispenser in accordance with an embodiment;

[0077] **FIG. 26** is a perspective view of another alternate stack of gloves having formed geometry and mounting features in use on a dispenser in accordance with an embodiment;

[0078] **FIG. 27A, FIG. 27B,** and **FIG. 27C** are perspective views of a stack of gloves having formed geometry in use in accordance with an embodiment;

[0079] **FIG. 28A, FIG. 28B,** and **Fig. 28C** are perspective views of a stack of gloves having formed geometry in use on a dispenser in accordance with an embodiment;

[0080] **FIG. 29** is a perspective view of an alternate stack of gloves having formed geometry and mounting features in use on a dispenser in accordance with an embodiment;

[0081] **FIG. 30** is a perspective view of another alternate stack of gloves having formed geometry and mounting features on a dispenser in accordance with an embodiment;

[0082] **FIG. 31** is a perspective view of another alternate stack of gloves having formed geometry and mounting features on a dispenser in accordance with an embodiment;

[0083] **FIG. 32A** and **32B** are perspective views of stacks of gloves having formed geometry and mounting features in use on a double sided dispenser in accordance with an embodiment;

[0084] **FIG. 33A** and **33B** are perspective views of stacks of gloves having opening reliefs and mounting features in use on a double sided dispenser in accordance with an embodiment;

[0085] **FIG. 34A** and **FIG. 34B** depicts mounting feature configurations for disposable gloves in accordance with an embodiment;

[0086] **FIG. 35** is a perspective view of one or more disposable gloves mounted on an adjustable dispenser in accordance with an embodiment;

[0087] **FIGs. 36A-36D** are perspective views showing a disposable glove being mounted on both side of an adjustable dispenser in accordance with an embodiment;

[0088] **FIG. 37A** and **FIG. 37B** are perspective views of an adjustable dispenser for disposable gloves in accordance with an embodiment;

[0089] **FIG. 38A, FIG. 38B, and FIG 38C** depict donning and support angles for the adjustable dispenser for disposable gloves in accordance with an embodiment;

[0090] **FIG. 39A** and **FIG. 39B** depict alternate donning and support angles for the adjustable dispenser for disposable gloves in accordance with an embodiment;

[0091] **FIG. 40A** and **FIG. 40B** depict additional alternate donning and support mounting angles for the adjustable dispenser for disposable gloves in accordance with an embodiment;

[0092] **FIG. 41** depicts an air jet feature for assisting in opening disposable gloves mounted on an adjustable dispenser in accordance with an embodiment;

[0093] **FIG. 42** is a perspective view of a belt style glove dispenser in accordance with an embodiment;

[0094] **FIG. 43** is a perspective view of an alternate belt style glove dispenser in accordance with an embodiment;

[0095] **FIG. 44** depicts a fabrication process for making disposable gloves in accordance with an embodiment;

[0096] **FIG. 45** depicts an alternate fabrication process for making disposable gloves in accordance with an embodiment;

[0097] **FIG. 46** depicts an alternate fabrication process for making disposable gloves in accordance with an embodiment;

[0098] **FIG. 47** depicts an alternate fabrication process for making disposable gloves in accordance with an embodiment;

[0099] **FIG. 48** depicts an alternate fabrication process for making disposable gloves in accordance with an embodiment;

DETAILED DESCRIPTION

[00100] An illustrative embodiment of the present invention relates to quick donning disposable gloves.

[00101] **FIGS. 1** through **FIG.48** wherein like parts are designated by like reference numerals throughout, illustrate an example embodiment or embodiments of easy donning disposable gloves and dispensers for the gloves, according to the present invention. Although the present invention will be described with reference to the example embodiment or embodiments illustrated in the figures, it should be understood that many alternative forms

can embody the present invention. One of skill in the art will additionally appreciate different ways to alter the parameters of the embodiment(s) disclosed, such as the size, shape, or type of elements or materials, in a manner still in keeping with the spirit and scope of the present invention.

[00102] An illustrative embodiment of the present invention relates to two-layer disposable gloves containing features and/or forming for faster and more sanitary donning. For example, one layer of film having a differential length across the cuff region than the opposing layer permits easy insertion of a hand by impeding the ability of the two film layers to lie flat together. Further ease of donning can be achieved by forming one or more layers of film to more closely resemble the three-dimensional shape of a hand, which also provides superior comfort, fit, and usability. Additionally, the packaging method and/or a quick don apparatus with glove mounting features further increases and/or improves the donning speed, usability, and sanitation of the presented configurations by permitting a hand to be easily inserted into the glove without contact, or limited contact, with the outer surface. The glove has additional configurations where glove opening reliefs for gloves constrained about a cuff region, such as having one or more binding regions or side mounting regions or glove mounting regions, provide a means for said glove to open for improved donning. Materials and methods of manufacturing said gloves are also described.

[00103] **FIG. 1A** shows a two-layer glove **101** that must reduce in size in the x and y-directions in order to increase in size in the z-direction to take on its donned shape shown in **FIG. 1B**. In **FIG. 1A**, the glove is in its naturally flattened state and in **FIG. 1B**, the glove is in an unnatural three-dimensional hand shape. The disposable glove **101** is formed of two layers of thermoplastic material. The first film layer **102** has a perimeter generally in the shape of a human hand including a middle section covering either the palmar aspect or the dorsal aspect of a user's hand. The second film layer **103** also has a perimeter generally in the shape of a human hand and includes a middle section to span the palmar or dorsal aspects of a user's hand. The first layer **102** and second layer **103** are coupled together along their perimeters resulting in the disposable glove having a cuff opening for receiving a user's hand therethrough.

[00104] The two-dimensional glove shape is typically intended to fit a left hand or a right hand, therefore film layer **102** and film layer **103** may be located on either the anterior side covering a palmar aspect of a hand or the posterior side covering the dorsal aspect of a user's hand. It should be noted that film layer thickness is exaggerated in some of the illustrations to convey the engagement of the two film layers. An individual film layer of two-layer disposable gloves is generally between 0.5 and 3 mils thick although thicker and thinner glove material layers are also practicable.

[00105] **FIGs. 2A – 2C** identify a differential layer sized glove **164** configuration in accordance with one embodiment of the present invention where **FIG. 2A** shows the glove in an unnatural flattened state, **FIG. 2B** shows the glove in its natural non-flattened state, and **FIG. 2C** shows the glove in an unnatural three-dimensional hand shape. The disposable glove **164** is formed of two layers of thermoplastic material. The first film layer **102** has a perimeter generally in the shape of a human hand including a middle section covering either the palmar aspect or the dorsal aspect of a user's hand. The second film layer **103** also has a perimeter generally in the shape of a human hand and includes a middle section to span the palmar or dorsal aspects of a user's hand. The first layer **102** and second layer are coupled together along their perimeters resulting in the disposable glove having a biased open cuff opening for receiving a user's hand therethrough. Here, the first middle section of the first layer **102** and the second middle section of the second layer **103** have different total areas from each other such that one of the middle sections contains extra material and does not lay flat. This causes the biased open cuff opening to maintain a steady-state open state facilitating donning of the disposable glove.

[00106] In this example the first film layer **102** defines the anterior of the glove covering the palmar aspect and is composed of less material surface area than the second film layer **103** defining the posterior of the glove covering the dorsal aspect of the user's hand. However, the functionality of the layers may be reverse or interchangeable. Additional material surface area residing in one film layer compared to the opposing film layer is achievable within the same fused perimeter of a glove such as by bowing, bunching, or folding the material during or prior to the glove fusing manufacturing operation. A film layer forming operation, such as vacuum forming or molding or by some other means, also is practicable to produce said glove. The cross-sectional views of **FIGs. 2A – 2C** illustrates an

example of a layer **103** that is bunched and folded relative to layer **102** such that layers **102** and **103** are unable to lie flush with one another when in a flattened state making the glove biased open. The natural non-flattened state in **FIG. 2B** serves as a transitional state, so that a glove requires less transformation for being in either a flattened state or a hand-shaped state. Producing the differential layer size in the cuff region creates a predisposition or bias for cuff **115** to be in an open state or a partially open state for easier donning and an improved fit compared to flat two-layer gloves. **FIG. 2B** also shows the resulting cross-sectional cuff length difference across the cuff region where a longer posterior cross-sectional cuff length **148** exists compared to the anterior cross-sectional cuff length **147**. Generating a differential cross-sectional cuff length where the longer cross-sectional cuff length side of the glove is between 0.1% and 10% longer than the shorter cross-sectional cuff length side provides a glove with an accessible glove opening for ease of donning although cross-sectional cuff length differences less than 0.1% or greater than 10% are also viable.

[00107] **FIG. 3A** and **FIG. 3B** depict a formed glove **165** configuration having formed geometry, in accordance with aspects of the present invention, where **FIG. 3A** shows the glove in its unnatural flattened state and **FIG. 3B** shows the glove in its natural three-dimensional formed state to fit a hand. The cross-sectional cuff length difference across the cuff region where a longer posterior side cross-sectional cuff length **148** exists compared to the anterior side cross-sectional cuff length **147** are also illustrated. The cross-sectional view of **FIG. 3A** also illustrates an example where layer **103** is unable to lie flush with layer **102** when in a flattened state making the glove biased open. **FIGs. 4A–4C** identify additional cross-sectional views of gloves that are biased open with differential cross-sectional cuff lengths that are not able to lie flush with one another where creasing, folding, and bending or the like is required in the longer cuff length layer. In accordance with other embodiments of the present invention, creasing, folding, bending or the like is also incorporated into the shorter cross-sectional cuff length layer. For the glove shown in **FIG. 3A** and **FIG. 3B**, the lengths of the cuff opening edges **140** and **143** of glove opening **121** correspond to the shorter and longer cross-sectional cuff lengths **147** and **148** respectively, where the glove opening **121** is perpendicular to film layer **102**. Producing a differential cross-sectional cuff length where the longer cross-sectional cuff length side of said formed glove is between 10% and 100% longer than the shorter cross-sectional cuff length side provides a glove with superior fit, comfort and donnability. Cuff length differences for formed gloves of less than 10% also

offer functional implementations. Formed cuff opening edge **143** formed at lengths over two times the length of cuff opening edge **140** where the seams are closer together on the anterior side of a formed glove **165** and the formed cuff opening edge **143** bulges at the sides to form glove opening **121** are also practicable. In accordance with an embodiment of the present invention, differential cross-sectional film layer lengths occur at other locations such as across a palm region or across a finger or thumb region. In accordance with another embodiment of the present invention, film layer **103** in a glove area is bunched or folded or the like prior to forming said film layer to reduce the amount of film stretch needed to create formed glove **165**.

[00108] For formed or differential layer sized gloves as depicted in **FIGs 2A – 2C** and **FIGs. 3A – 3B**, the formed or longer cross-sectional cuff length side of a glove defines the posterior side covering the dorsal aspect since the material on the posterior of the hand needs to adapt to the larger contoured area about a closed fist or bent fingers, while material on the anterior side covering the palmar aspect of the hand generally needs to compress as fingers bend or a hand closes into a fist. Alternately, the formed or longer cross-sectional cuff length film layer defines the anterior side of a glove and the flat film layer defines the posterior side of a glove.

[00109] The formed glove **165** having formed geometry portrayed in **FIGs 5A – 5B** has substantially equally formed film layers **102** and **103** for both sides of the glove making the glove ambidextrous. Cuff opening edges **140** and **143** are substantially equal in length with both sides being substantially equally formed. **FIG. 5B** also shows the equivalent cross-sectional cuff length across the cuff region where the cross-sectional cuff lengths **147** and **148** are substantially equal and the glove is used for either the left hand or the right hand. In accordance with one embodiment of the present invention, both sides of a glove are formed where a difference in cross-sectional cuff length exists between cross-sectional cuff length **147** and **148** and said glove is made specific for either a left hand or a right hand or no cuff length differential exists and a glove still has geometry or material differences or some other difference making it hand specific or a cross-sectional cuff length differential does exist where the glove is made without being hand specific. Forming both layers of a formed glove **165** increases the ability to more closely form the glove to the shape of an actual hand, such as forming a glove with a deeper thumb **110** region in one form side for one layer of a formed

glove **165** and having a deeper finger **111** region defined in an opposing cavity to more appropriately match the non-planar shape of a hand. In accordance with another embodiment of the present invention, one glove layer is formed and the opposing glove layer is bowed, bunched, folded or the like to generate a lengthened cross-sectional cuff length or increase the film area in a non-formed side of a glove. In accordance with another embodiment of the present invention, both glove film layers **102** and **103** are bowed, bunched, folded or the like to generate a lengthened cross-sectional cuff length or increase the film area on each side of a glove where the layers are equal or different from the opposing layer. In accordance with another embodiment of the present invention, the cuff region of both film layers is left unformed and other regions of one or both layers are formed or feature differential amounts of material relative to an opposing layer or bunched or bowed material on both layers.

[00110] In accordance with embodiments of the present invention, the required two-dimensional surface area of the film is reduced and the maximum number of differential layer sized gloves **164** or formed gloves **165** that fit in a two-dimensional footprint of film is increased. Often the fingers of two-layer gloves are extra wide and are splayed apart due to the size required to transition from a two-dimensional shape to a three-dimensional shape, which significantly increases the footprint of film required to fabricate a glove. In accordance with embodiments of the present invention, a differential layer sized glove **164** or formed glove **165** reduces the amount of surface area and material required for fabrication compared to a conventional two-layer glove. A reduced width **119** exists, as identified in **FIG. 6**, where the width **119** is measured as the maximum extents across the glove that is parallel or approximately parallel to a glove opening **121** location is 9-inches or more for a conventional two layer glove for large or extra-large or even larger hands. In accordance with an embodiment of the present invention, a formed glove **165** or differential layer sized glove **164** is fabricated with a width **119** of less than 8.75-inches such as for a user with large or extra-large hands. In accordance with an embodiment of the present invention, a formed glove **165** or differential layer sized glove **164** is fabricated with a width **119** of less than 8.5-inches. In accordance with an embodiment of the present invention, a formed glove **165** or differential layer sized glove **164** is fabricated with a width **119** of less than 8.25-inches. In accordance with an embodiment of the present invention, a formed glove **165** with formed geometry or differential layer sized glove **164** is fabricated with a width **119** of less than 8-inches. In accordance with an embodiment of the present invention, a formed glove **165** or

differential layer sized glove **164** is fabricated with a width **119** of less than 7.75-inches. In accordance with an embodiment of the present invention, a formed glove **165** or differential layer sized glove **164** is fabricated with a width **119** of less than 7.5-inches. In accordance with an embodiment of the present invention, a formed glove **165** or differential layer sized glove **164** is fabricated with a width **119** of less than 7.25-inches. In accordance with an embodiment of the present invention, a formed glove **165** or differential layer sized glove **164** is fabricated with a width **119** of less than 7-inches such as for a user with medium or small or extra-small hands. The smaller two-dimensional shape of a differential layer sized glove **164** or formed glove **165** also provides for a corresponding decrease in the packaging size, for packaging stacks of gloves in particular, without requiring the need to fold the gloves or portions of the gloves causing kinks and bends that negatively impacts donnability. The smaller package and glove size improves shipping costs, storage and point-of-use space, and also provides visual benefits for the glove product a user chooses to don.

[00111] **FIG. 7** illustrates a formed glove **165** where film layer **103** at cuff **115** is formed to increase the size of glove opening **121** making the formed glove **165** even easier to don.

[00112] **FIG. 8** identifies a formed glove **165** with formed geometry where articulating rib features **112** are positioned along fingers **111** and thumb **110** or just at joint locations **113**, which expand and flatten to the contour of joint locations **113** as a finger or thumb is bent and is able to re-coil to its natural rib-shaped state as a finger or thumb is straightened. This provides for a tight fitting glove that does not give the user the feeling of restricted motion or stress.

[00113] To further improve the form, fit, comfort, flexibility, usability, donnability, breathability, venting, air circulation, grip, texture or any other features not mentioned herein, additional three-dimensional structures are formed or molded into the film or added by some other means to create a glove such as a differential layer sized glove **164** or formed glove **165**. Such structures include rib-like features, bulbous regions, rippled geometry or other geometric forms not mentioned.

[00114] **FIG. 9** details a formed glove **165** with expansion ribs or channels **166** that provide extra film that expand as needed for larger hand sizes and are inclined to retain their

natural shape for smaller hand sizes in accordance with an embodiment of the present invention. The expansion ribs or channels **166** also serve to provide improved venting or air circulating capabilities in accordance with another embodiment of the present invention. Extending expansion ribs or channels **166** into the finger region, in accordance with one embodiment of the present invention, provide improved venting or air circulating capabilities or glove expansion capabilities.

[00115] Features such as expansion ribs or channels **166** also function as a rippled cuff to promote improved donnability in accordance with an embodiment of the present invention. One or more formed features, such as expansion ribs or channels **166** in a cuff **115** region, provide a means for more easily separating film layers **102** and **103** when a glove is in a flattened state causing cuff **115** region to have a further predisposition to not lay flush with an opposing layer making glove opening **121** easier to access. Compressive forces, such as those generated by packing gloves together in a package for shipping and storage, are generally required to hold formed gloves or differential layer sized gloves as flat or compressed as possible to minimize the biased open state to decrease the required packaging size. **FIG. 2A**, **FIG. 3A**, and **FIG. 5A** identify differential layer sized gloves or formed gloves that are in an unnaturally flattened shape having been previously compressed or otherwise loaded to achieve such a state. Those of skill in the art will appreciate that the rib-like features in **FIG. 8** and **FIG. 9** and any three-dimensional features mentioned or not mentioned are combinable or able to be rearranged as desired in any operable combination.

[00116] **FIG. 10** illustrates a box **114** of randomly packaged and compressed formed gloves **165** for a user to pull out and don. Removing the compressive forces such as by removing a formed glove **165** from a box **114** results in stress relief such that the material transitions to a stress relieved and biased open position, which is of a less compressed state and a state that better serves the separation of film layers **102** and **103** for donning. As formed gloves **165** are removed from glove box **114** the remaining gloves inside of box **114** are able to transition to a more stress relieved and less compressed state until a sufficient number of gloves have been removed to relieve most of the compressive forces on said gloves.

[00117] **FIG. 11** shows a glove box **114**, where the formed gloves **165** are dispensed cuff **115** first to minimize the user's need to contact other parts of the glove and contaminate the

outside surface. The formed gloves **165** are assembled and compressed in a stack **116** of overlapping layers to generate the cuff **115** first dispensing. Box **114** and overlapping and interlacing glove stack **116** are designed such that the act of pulling a formed glove **165** from box **114** makes the next cuff **115** available to a user to pull said glove from box **114** and don.

[00118] Additional features are incorporated into a formed glove shape such as formed glove **165** of **FIG. 12A** and **FIG. 12B** that provides for collapsing the formed glove **165** in a manner that makes it more manageable for packaging, such as with stacking of gloves, or for re-taking its natural shape prior to donning in accordance with embodiments of the present invention. A crease line **160**, or the like, formed close to the perimeter of a formed glove **165** such as about the non-planar formed layer **103**, or at appropriate locations in a glove shape, allow the glove to be elastically deformed, compressed and fold neatly into a flattened shape in a consistent manner and re-shape when the flattened state load is released prior to donning, whether re-shaping occurs by material memory or an external load or some other means. Pleats, gussets, or the like are also practicable in place of crease line **160** or in conjunction with crease line **160** to promote flattening and re-shaping of a glove.

[00119] Using compressive forces in manufacturing, such as forces between 1 and 50 tons, on individual gloves or gloves in a stack or gloves on a roll, particularly for gloves with differential layer sized gloves **164** or formed gloves **165**, assists with minimizing the overall glove thicknesses and packaging volume as well as donning setup requirements, although compressive forces below 1 ton and greater than 50 tons are also practicable. Some relaxation effects are likely to occur over time and the overall thickness of differential layer sized gloves **164** or formed gloves **165** increases if a compressive load is not maintained such as a load induced by packaging although loads induced by packaging are generally substantially less than initial compressive forces induced in a manufacturing process. Compressive forces induced by packaging, such as vacuum packaging, of 0.01 pounds to 10 pounds are more typical although forces less than 0.01 pounds or greater than 10 pounds are practicable.

[00120] In accordance with embodiments of the present invention, **FIG. 13** illustrates a formed glove **165** where the thickness of film layer **102** at finger tips **170** is thinned to improve tactile sensitivity and the thickness of film layer **103** at the knuckle locations **171** is thinned to increase flexibility for finger articulation. In accordance with embodiments of the

present invention, material thickness is reduced down to 20% in one or more areas of a glove or increased up to 200% in one or more areas of a glove or reduced in one or more areas of a glove and increased in one or more areas of a glove. The process of thinning the material results in thick regions **172** and **173** surrounding the thin regions **170** and **171** respectively, providing some structure and protection for thinned regions **170** and **171**. The cross-sectional thickness profile is manipulated with manufacturing equipment design and is manufactured to achieve the desired geometry such as by extruding the material. For example, bulging the thick regions **172** or **173** into the formed glove **165** or bulging thick regions **172** or **173** equally in and out or at any thickness variations therebetween is easily achieved. Centering the thin regions **170** or **171** between both surfaces of a film layer **102** or **103** or making the thin regions **170** or **171** biased or flush with either an external glove surface **161** or an internal glove surface **162** are additional options for optimizing glove performance.

[00121] Increasing or decreasing the film layer thickness in one or more locations of formed glove **165**, or any other glove discussed thereof or herein, is used to change its characteristics such as improving sensitivity, protection, motion resilience, strength, flexibility, texture, or some other characteristic. Increasing or decreasing the thickness at the seam **118** is also used to improve the ability to fuse film layers **102** and **103** together or minimize the resulting fused seam size. Besides changing the characteristics at target areas of the glove shape, increasing or decreasing the thickness provides a further means to reduce the weight and cost. Changing the film layer thickness is performed in conjunction with forming three-dimensional geometry for further product enhancement or cost reduction or other reason. Such characteristic changes are achieved by physically loading, heating, molding, drawing or the like of one or more film layers **102** or **103** in one or more locations and at any stage of the glove manufacturing process. Said characteristic changes being applicable and practicable with any of the glove embodiments discussed thereof or herein.

[00122] In accordance with one embodiment of the present invention, alternate materials are used for the posterior layer and anterior layer of a two layer glove or are of altering thickness, color, translucency, or feature some other alternate properties or features or any combination of differences. Changing the properties between the posterior side of a hand and the anterior side of a hand provides additional benefits where stretch and flexibility on the posterior side of a hand is typically desirable where the material needs to adapt to the

elongated geometry as fingers are bent towards the palm and a hand is closed whereas material properties such as grip, strength/resilience, and barrier related properties are typically more desirable on the anterior side of the hand where the majority of external contact is occurring. Changing the texture, robustness, permeability, or color provide numerous benefits. For example, color or translucency differences for branding or easily identifying the appropriate sides for donning a glove or providing an easily identifiable glove opening based on the contrast between layers for more easily donning a glove or a visual perception of a surface in contact with a food item are practicable.

[00123] In accordance with one embodiment of the present invention, film layer **102** and film layer **103** of formed glove **165** or any other glove discussed thereof or herein, are composed of one or more sub-layers. The use of particular materials or alternate materials for the anterior and posterior or the addition of material sub-layers is implemented for improved comfort, permeability characteristics, bonding capabilities, flexibility properties, grip and texture, strength, protection, cost advantages or for any other properties known in the art. It should be understood that any of the layers or sub-layers do not have to consist of the same layering, be composed of the same materials, be of the same thickness, finish, geometry, be manufactured or applied in the same manner or have any other characteristics not mentioned herein and is practicable in accordance with embodiments described thereof or herein.

[00124] In accordance with one embodiment of the present invention, a three-dimensionally formed glove **165** is composed of two layers of common food grade plastic material, such as polyethylene, with film layer thicknesses between 0.5 mils and 3 mils where at least one film layer is extruded to a depth of 0.1 inches to 2.5 inches. In accordance with an embodiment of the present invention, gloves are made of a polylactic acid (PLA) such as a vegetable starch, or root starch or grain starch or combinations thereof providing fully recyclable or compostable gloves and therefore a sustainable and eco-friendly solution for a product that generates excessive amounts of trash in the world today. Further, starch is inherently lubricious and is not excessively tacky and sticky when contacting wet or sweaty hands providing for a good quick donning glove solution. Said gloves, fabricated from other materials or film layer thicknesses or extrusion depths or combinations of materials and film layer thicknesses and extrusion depths that are incorporated into a formed glove **165** are also

practicable and are usable in any combinations mentioned or not mentioned and combinations and variations understood by those of skill in the art.

[00125] To further improve the donnability of formed or unformed two-layer gloves, additional features are incorporated at glove opening **121** in **FIG. 14A** and **FIG. 14B**, such as non-overlapping layer regions in accordance with some aspects of the present invention. **FIG. 14A** and **FIG. 14B** illustrate an example of a two-layer glove **101** that features a non-overlapping tab on each material layer that provides a simple means for a user to grab and pull the tabs apart to open a glove. **FIG. 14A** shows said two-layer glove **101** in a flat state and **FIG. 14B** shows said two-layer glove **101** in an open and donnable state. Non-overlapping cuff tab **156** is a protrusion from the cuff of top film layer **103** of the glove that has at least a portion of its region without any material from film layer **102** opposing it. Non-overlapping cuff tab **155** protruding from the cuff on the bottom film layer **102** of the glove has at least a portion of its region without any material from film layer **103** opposing it. In accordance with an embodiment of the present invention, gloves featuring one or more tabs at any location along the cuff opening edge for either layer are also practicable. It is also contemplated that one or more non-overlapping tabs or non-overlapping regions exist on just a top layer or just a bottom layer in accordance with an embodiment of the present invention.

[00126] **FIG. 15A** portrays a two-layer glove **101** in a flat state featuring cuff **115** with an offset and **FIG. 15B** shows said two-layer glove **101** with said cuff **115** in an open and donnable state. Said cuff **115** having a region **128** where film layer **102** has no material from film layer **103** opposing it. This offset feature of the cuff makes it easier for a user to separate the film layers and don said glove. In accordance with an embodiment of the present invention, a user manually opens a glove with their fingers or simply applying a load to the non-overlapping layer or applying an alternate force such as a shear force to one or more layers causes the film layers to separate and the cuff to open enough for a user to get their hand into said glove.

[00127] One or both cuff opening edges **140** and **143** are optionally straight across, angled, curved or feature tabs or ripples, or include any other geometry that may be desired in a glove for donning purposes or for some other reason mentioned or not mentioned herein. In

accordance with an embodiment of the present invention, the cuff region features differential cross-sectional cuff lengths between film layers **102** and **103** to further facilitate donning.

[00128] **FIG. 16** shows a formed glove **165** where the cuff **115** has been angle cut to create glove opening **121** when in its three-dimensional formed shape during the manufacturing process, resulting in an offset cuff feature for easy donnability. **FIG. 16** also shows a side view of said formed glove **165**. Said angle cut occurring within a range of 5-degrees and 60-degrees off of a cut perpendicular to film layer **102** though angles greater than 60-degrees or less than 5-degrees are viable. Said angle cut being curved or cut on a second axis is also practicable.

[00129] **FIG. 17** shows a box **114** of gloves in a stack **116** for a user to pull out and don. The depicted gloves in **FIG. 17** feature a non-overlapping cuff tab **156** on the top film layer **103** of the gloves in a stack **116** where the user pulls out the top two-layer glove **101** by the non-overlapping cuff tab **156** causing glove film layers **102** and **103** to separate at the cuff **115** as the glove is pulled from the box making the glove easier to don and reducing the need for a user to contact the exterior areas of the glove other than the non-overlapping cuff tab **156** or cuff **115** region. In accordance with another embodiment of the present invention, a user presses down on a non-overlapping tab such as the non-overlapping tab on the lower layer of a glove causing a glove opening for a user to don the glove.

[00130] In accordance with embodiments of the present invention, the boxed glove configurations identified in **FIG. 10**, **FIG. 11**, and **FIG. 17** may include any of the gloves or glove features described thereof or herein such as gloves with an offset cuff, differential cross-sectional cuff lengths, offset tabs, non-overlapping tabs, formed features, or thinned or thickened regions as well as other glove features described or not described herein and combinations or variations being understood by those of skill in the art.

[00131] In accordance with embodiments of the present invention, two layer disposable gloves **101**, **164** or formed gloves **165** may further include mounting features for mounting the disposable glove. Mounting features comprise extra material extending from one of the first layer **102** or second layer **103** of the glove providing a surface for mounting the glove and/or connecting the glove to other gloves in a stack **116**. In accordance with certain embodiments the mounting features can be configured to separate from the glove when the

glove is donned. In other embodiments, the mounting features are configured to release with the glove when the glove is donned.

[00132] In accordance with one embodiment of the present invention, **FIGs 18A – 18C** identifies a stack **116** of two-layer gloves **101** fused, stapled, or otherwise joined together within a separation region **149** mounting feature where a perforated or weakened material line **122** resides alongside the separation region **149** of film layer **102**, which separates the separation region **149** from the two-layer glove **101**. Where said separation region **149** is appropriately constrained or mounted such that said perforated or weakened material line **122** is of sufficient strength to remain intact until a user has fully donned said glove, at which point the additional force, such as a force between 0.5 pounds and 4.0-pounds, applied by a user breaks the perforated or weakened material line **122** and separates said glove from said separation region **149**. Said perforated or weakened material line **122** being of any curve or shape to achieve the desired effect or glove geometry.

[00133] In accordance with one embodiment of the present invention, the separation region **149** includes material from both film layers **102** and **103** or is composed of material from the bottom film layer **102** and does not include any material from top film layer **103**. In accordance with one embodiment of the present invention, a region **159** exists where no material is present from top film layer **103** providing an offset cuff to improve the accessibility of the glove opening although a slit through the top film layer **103** of film is used to define the glove opening in accordance with another embodiment of the present invention. As the number of gloves in stack **116** is reduced, the remaining height of the separation region **149** becomes an increasing impediment as it is directly in the path of where a user needs to place their hand for donning. A large distance between cuff opening edge **143** and perforated or weakened material line **122** helps reduces the negative impact caused by the remnant separation region **149**. In accordance with one embodiment of the present invention, cuff opening edge **143** and perforated or weakened material line **122** are aligned. Folding the separation region **149** out of the path of donning is also practicable but suffers from other shortcoming such as increasing the space requirements, changing the feel of glove donning as a stack depletes, creating a slanted stack, as well as producing other issues.

[00134] Glove opening reliefs **150**, such as separation lines are featured at one or both ends of the perforated or weakened material line **122** such as those shown in **FIG. 18A** in

accordance with other embodiments of the present invention. **FIG. 18A** shows a stack **116** of gloves with two glove separation line opening reliefs **150** intact on a topmost two-layer glove **101** and **FIG. 18B** shows a topmost two-layer glove **101** of stack **116** having been opened and said glove separation line opening relief **150** torn apart to provide a more open and donnable glove where separation region **149** is rigidly or semi-rigidly connected to a stack or dispenser. **FIG. 18C** depicts two-layer glove **101** torn from stack **116**. In accordance with an embodiment of the present invention, said glove separation line style opening relief **150** is a weaker perforated or weakened length or lengths than perforated or weakened material line **122** that are designed to tear apart to create slack as glove opening **121** is accessed, making it easier for the cuff **115** to be opened for improved donning capability.

[00135] In accordance with one embodiment of the present invention, the force to separate a two-layer glove **101** after donning from stack **116** is between 0.5 and 4.0 pounds for ease of use and still ensures that the user is able to get their hand fully into the glove prior to said two-layer glove **101** separating from said stack **116**. In accordance with one embodiment of the present invention, the force holding the separation line opening relief **150** intact is 2 to 100 times less than the force to separate a donned two-layer glove **101** from said stack **116**. In accordance with one embodiment of the present invention, the force to hold glove separation line opening relief **150** intact are more than 100 times less than the force to separate a donned two-layer glove **101** from said stack **116**. In accordance with other aspects of the present invention, a glove opening relief **150** is a fully cut through length.

[00136] In accordance with one embodiment of the present invention, glove opening relief **150** is a slotted region as shown in **FIG. 19A**. Material relief areas are identified as glove opening reliefs **150** in **FIG. 19B** are also present, in accordance with another embodiment of the present invention, by simply narrowing the separation region **149**. **FIG. 19C** provides the glove opening relief function with an angular glove opening relief **150** region at both sides of the cuff **115**. Any combination of relief methods described or not described herein are also practicable and said combination being understood by those of skill in the art.

[00137] Since conventional quick don glove solutions do not have a glove opening relief feature of the present invention, other accommodations with various shortcomings are used to assist donning such as the incorporation of an overly wide cuff or excess length between the

separation region and the glove opening. Without appropriately relieving the glove opening, the cuffs of the gloves are generally more resistant to opening for donning where the gloves are effectively held taut by a separation region or mounting posts or some other donning apparatus feature. If a stack is fabricated with a feeble weakened material line, such as perforated or weakened material line **122** of **FIG. 19A**, to assist with opening; it prevents the glove from being held taut or the glove separates from the stack prematurely before the glove is properly donned.

[00138] In accordance with one embodiment of the present invention, **FIG. 19D** features tear propagation prevention features **154**, such as a hole, serving as distinct points of transition for the low tearing strength separation line opening reliefs **150** and the high tearing strength perforated or weakened material line **122**.

[00139] The function of the glove opening reliefs **150** is also achieved by other means. For example, in accordance with an embodiment of the present invention, a perforated or weakened material line **122** varies in strength across its length without having a defined glove opening reliefs **150** region. Said varied strength perforated or weakened material line **122** begins to tear at the ends for a user to access the glove opening and then provides a greater force to hold two-layer glove **101** to stack **116** for a user to don before fully tearing free from stack **116** once sufficient force is applied.

[00140] The function of the glove opening reliefs **150** is also achieved by differential cross-sectional cuff lengths or formed features. Combining glove opening reliefs with differential cross-sectional cuff length gloves or formed gloves produces additional benefits and such combinations being understood by those of skill in the art.

[00141] In accordance with embodiments of the present invention, **FIG. 20A** and **FIG. 20B** portray a means for achieving the function of glove opening reliefs by curving or creasing stack **116** to bias stack **116** and film layer **102** away from glove opening **121**. **FIG. 20A** shows glove film layer **103** of the top most two-layer glove **101** curved with stack **116** and **FIG. 20B** shows glove film layer **103** curved away from stack **116** to create glove opening **121** for donning. Keeping film layer **102** taut or deflected away from the location where a user positions their hand for donning promotes ease of access.

[00142] Since donning is increasingly impeded as a glove stack **116** is reduced with a separation region **149** mounting feature positioned in front of the glove openings **121** where the separation region **149** remains intact and in the way of where a user is attempting to place their hand to access the cuff **115** of a topmost glove per **FIGs. 18 – 20**, a further embodiment in accordance with aspects of the present invention is identified in **FIGs. 21A – 21C** featuring side separation regions **138** mounting features located at the sides of a cuff **115** where said side separation regions **138** are mounted on a donning apparatus using one or more mount holes **153** or some other mounting feature such as clips. In accordance with one embodiment of the present invention, glove side separation regions **138** feature a perforated or weakened material line **122** tear location between a side separation region **138** and a two-layer glove **101** as shown in **FIG. 21A** and **FIG. 21B** such that the side separation region or side separation regions **138** tear free of a glove at said perforated or weakened material line **122** and remains with the donning apparatus when a glove is pulled free. **FIG. 21B** shows said two-layer glove **101** of **FIG. 21A** but in an open and donnable position with the cuff **115** easily opening up to create glove opening **121** due to the function of glove opening reliefs **150** where constrained separation regions **138** would otherwise limit the ability of the glove to properly open to a donnable position. **FIG. 21C** shows said two-layer glove **101** in a donned state having been separated from side separation regions **138**, which remain with a stack, donning apparatus, web or film roll, or the like. In accordance with aspects of the present invention, glove side separation regions **138** are connected to adjacent glove side separation regions or are independent. In accordance with other embodiments of the present invention, each glove side separation region **138** is composed of one or both glove material layers or any portion or combination thereof.

[00143] **FIG. 22A** shows a stackable two-layer glove **101** with glove opening reliefs **150** and glove mounting features **204** that remain with the glove when separated from a donning apparatus instead of side separation regions **138** of **FIG. 21A** that stay with the donning apparatus when a glove is removed. **FIG. 22B** shows said stackable two-layer glove **101** of **FIG. 22A** but in an open and donnable position with the cuff **115** easily opening up to create glove opening **121** due to the function of the glove opening reliefs **150**. **FIG. 22C** portrays a two-layer glove **101** in an open and donned state with perforated or weakened separation tearing lines **152** on glove mounting features **204** having been separated, signifying that the glove has been removed from a donning apparatus. In accordance with another embodiment

of the present invention, the gloves shown in **FIGs. 22A – 22C** do not feature glove opening reliefs and said gloves have a differential cross-sectional cuff length, are folded or curved, are formed, or have no additional opening relief means or rely on film stretch or donning apparatus compliance or the like or features any other means discussed thereof or herein for accessing a glove opening **121**.

[00144] Since the glove transitions to a three-dimensional shape as it is opened, glove mounting locations such as mount holes **153** of glove mounting features **204**, are positioned inboard of cuff side edges of the glove in a flat state, as shown in **FIG. 23A** without interfering with a user's hand when they attempt to don a glove in accordance with one embodiment of the present invention. **FIG. 23A** shows a two-layer glove **101** in its otherwise flattened state with mount holes **153** of the mounting features **204** positioned inboard of cuff side edges **141** and **142**. **FIG. 23B** identifies the two-layer glove **101** of **FIG. 23A** but in an opened and donnable state where glove opening relief **150** locations provide a means for cuff side edges **141** and **142** to pull in towards the glove region as the glove is opened to create glove opening **121** and causing cuff side edges **141** and **142** to be inboard of the glove mount holes **153** of the mounting features **204**. In accordance with an embodiment of the present invention, a mounting width **205**, defined by the minimum distance between mounting locations on a glove, is less than the minimum flat donning path width **206** of a flat or flattened glove on a glove dispenser where opening of said glove to a maximum opening depth **207** of 1 to 3 inches results in a maximum open donning width **208** that is equal to or less than the glove mounting width **205** providing a clear path for a user to don a glove where said widths **205**, **206**, and **207** are generally parallel to a glove opening as shown in **FIG. 23A** and **FIG. 23B**.

[00145] Per **FIG. 24A** and **FIG. 24B**, in accordance with another embodiment of the present invention, a mounting width **205**, defined by the minimum distance between mounting locations on a formed glove **165**, is equal to or larger than the minimum flat donning path width **206** of a flat or flattened glove where the mount holes **153** are still positioned inboard of cuff side edges **141** and **142** such that the minimum flat donning path width **206** is the smallest location in a glove where a user's full hand or the bulk of a user's hand has to pass through in order to don a glove. Opening of said glove to a maximum

opening depth **207** of 1 to 3 inches results in a maximum open donning width **208** that is less than the glove mounting width and providing a clear path for a user to don a glove.

[00146] It should be understood by one of skill in the art that mount holes **153** or other aspect of mounting features **204** can be in-board or outboard or in line with cuff side edges **141** or **142** and any of the cuff features for the gloves shown in **FIG. 21A**, **FIG. 22A**, **FIG. 23A**, and **FIG. 24A** or any other gloves discussed thereof or herein such as gloves with opening reliefs are interchangeable or combinable or removable in accordance with an embodiment of the present invention. In accordance with an embodiment of the present invention, glove mounting features **204** or separation regions **149** or side separation regions **138** are composed of material from one or both material layers or additional layers of material. Using both layers or additional layers of material for generating tear locations provides another means for increasing the tear strength other than geometry changes or material changes or process changes or the like. In accordance with an embodiment of the present invention, glove mounting regions or separation regions or side separation regions are composed of one or more material layers or additional layers of material where both layers of a mounting feature or features reside on one side of a glove. In accordance with an embodiment of the present invention, the two-layer gloves of **FIG. 21A**, **FIG. 22A**, **FIG. 23A**, or **FIG. 24A** or any of the embodiments discussed thereof or herein are made from starch-based thermoplastic and have mounting feature or features to be used on a dispenser.

[00147] A donning box **114** is shown in **FIG. 25** where formed gloves **165** are integrally arranged in a stack **116** of sheets. Separation region **149** mounting features, about all or a portion of formed glove **165**, includes material from flat film layer **102** or formed film layer **103** or material from both film layers **102** and **103**. A cut and perforated or weakened material line **122** outlines the formed gloves such that the top-most formed glove **165** can be donned and torn free from a stack **116** and its corresponding separation region **149**. Separation region **149** or stack **116** can in turn be tethered to donning box **114**. Tearing free the top-most formed glove **165** opens a subsequent glove **117** in accordance with an embodiment of the present invention. In accordance with another embodiment of the present invention, the donning box **114** is fully open and exposed in front of glove openings **121** as not to impede donning throughout the stack **116**.

[00148] In accordance with aspects of the present invention, film layer **102** is held in an elastically deformed, compressed flat (not three-dimensionally formed) or substantially flat form to hold lower layers down and permit only the formed film layer **103** of the top formed glove **165** in stack **116** to open to a formed position for donning. Creating formed geometry in just the top film layer **103** for each glove shape in stack **116** provides for all of the formed geometry to open away from stack **116** for improved donnability.

[00149] With fingers **111** positioned in a non-splayed state or a minimally splayed state, donning box **114** footprint is also reduced in size. In accordance with one embodiment of the present invention, excess separation region **149** material between fingers **111** and thumb **110** is removed prior to packaging or fully slit prior to packaging such that the fingers **111** and thumb **110** are free once the formed glove **165** is torn away and fingers **111** and thumb **110** do not have to be individually separated from each other.

[00150] Other than removing or slitting locations of separation region **149** from between fingers **111** and thumb **110**, removing portions of the separation region **149** is practicable for improving the donning process, reducing the packaging weight and consumer waste, eliminating the potential for loose strings of material and for other reasons not mentioned.

[00151] **FIG. 26** identifies another donning box **114**, similar to **FIG. 25**, where the mounting features comprise side separation regions **138** near the cuff **115** region and not positioned in front of glove opening **121**. Side separation regions **138** hold film layer **102** down and relatively tight keeping all film layer cuff regions below formed glove **165** flat such that the formed film layer **103** is easily separable from film layer **102** to form glove opening **121**. Said donning box **114** features any of the glove types described herein or thereof including differential layer sized gloves and gloves with glove opening relief features in accordance with embodiments of the present invention.

[00152] **FIGs. 27A – 27C** portray an embodiment of the present invention where a set of two or more three-dimensionally formed gloves **165** are overlaid and compressed into an elastically deformed flattened stack **116**. In accordance with one embodiment of the present invention, said gloves are tethered together at one or more locations such as along cuff side edges **141** and cuff side edges **142** although said gloves are left untethered and independent of one another in accordance with another embodiment of the present invention. Although

FIGs. 27A – 27C depicts formed gloves where a cuff opening edge **143** is longer than cuff opening edge **140** to promote easy access for donning, other methods to promote easy access for donning are practicable in accordance with other embodiments of the present invention, such as curving or creasing stack **116** to bias stack **116** and film layer **102** away from glove opening **121**, similar to glove stack shown in **FIG. 20A** and **FIG. 20B**, or by adding one or more glove opening reliefs **150** or other methods as described herein.

[00153] **FIG. 27A** shows a glove stack **116** where the topmost formed glove **165** is open and ready for donning. **FIG. 27B** illustrates formed glove **165** in the process of separating from stack **116** where it is still attached to now open subsequent glove **117**. Having the act of tearing away a donned formed glove **165** open a subsequent glove **117** removes the need for the user to manually open subsequent glove **117** prior to donning as this slows down the donning process and generally results in the user having to contact the exterior of the glove and causing the spread of contamination. **FIG. 27C** shows formed glove **165** being fully separated from subsequent glove **117** and subsequent glove **117** open and prepared for donning. Opening the entire subsequent glove **117** to its natural formed shape is helpful for donning but simply opening the cuff **115** or partially opening the cuff **115** is sufficient to separate film layers **144** and **145** to allow the user's hand to enter the glove. In accordance with an embodiment of the present invention, gloves are connected to or otherwise attracted to material from one or more adjacent gloves in a region or regions within the perimeter of the glove such that donning a glove causes a subsequent glove to open in preparation for donning. In accordance with certain embodiments, treatments such as chemical, electrostatic or heat can be applied to connect or otherwise attracted the material of adjacent gloves in the stack **116**.

[00154] Features or mechanisms that cause a subsequent glove **117** to open at glove opening **146** as the previous glove is pulled away and removed from stack **116**, such as the formed glove **165** shown in **FIGs. 27A – 27C**, include adhesive, staking, melted or sealed glove layers, mechanical engagement such as texturing, interlaced and folded layers, corona treated surfaces, frictional properties and glove separation methods, or by some other means that are appreciated by those of skill in the art. Treating, charging, composing layers of differing materials, or otherwise fabricating the two internal surface layers of the gloves such that they oppose one another and are inclined to separate resulting in an open state or an

easily openable state further aid in the opening of gloves for donning. In accordance with embodiments of the present invention, additional mechanisms are employed to assist with opening the glove opening **121** of the uppermost glove in a stack **116** such as a spring-loaded mechanism; air bladder, pump, or the like; electromechanical means such as air flow, vacuum, ruffling or the like; and other methods not mentioned including methods that are understood by those of skill in the art. In accordance with other embodiments of the present invention, any of the gloves or glove stacks described thereof or herein feature a glove interconnection means for removing a glove to open the cuff of a subsequent glove in preparation for donning.

[00155] In accordance with one embodiment of the present invention, the act of removing a formed glove **165** and opening a subsequent glove **117** from a stack **116** does not create a load substantial enough to open any other gloves in stack **116** other than subsequent glove **117** or separate any other glove other than formed glove **165** that is being removed as depicted in **FIGs. 27A – 27C**. Gloves below subsequent glove **117** in stack **116** are held flat or substantially flat by film layer **144** assuming gloves in a stack are tethered such as at or near cuff side edge **141** and **142**, and are therefore not inclined to take a formed shape and is in a tensioned state or subject to potential tension if deflected. The shorter length of cuff opening edge **140** of film layer **102** compared to formed cuff opening edge **143** of film layer **103** also promotes the formation of glove opening **121**. In accordance with one embodiment of the present invention, the holding force between each glove to the stack **116** or a donning apparatus, such as a holding force at or near cuff side edges **141** and **142**, is greater than the bond between a glove and a subsequent glove. This ensures that formed glove **165** tears free from stack **116** and only subsequent glove **117** opens. In accordance with one embodiment of the present invention, the force to separate a formed glove **165** after donning from stack **116** or dispenser is between 0.5 and 4.0 pounds for ease of use and still ensures that the user is able to get their hand fully into the glove prior to said formed glove **165** separating from said stack **116** or donning apparatus. In accordance with one embodiment of the present invention, the holding force between each glove in a stack is 2 to 100 times less than the force to separate a donned formed glove **165** from stack **116** or a donning apparatus so that removing formed glove **165** consistently opens subsequent glove **117** without tearing away or starting to tear away subsequent glove **117** from stack **116** or a donning apparatus. In accordance with one embodiment of the present invention, the holding force of formed glove

165 to subsequent glove **117** at forces as low as 0.01 pounds or less is sufficient to still open subsequent glove **117** when removing formed glove **165**. In accordance with one embodiment of the present invention, cuff **115** is predisposed to re-form when in an unloaded state due to material memory. Cuff **115** features a folded layer or the addition of material or a material treatment operation or alternate material or some other method mentioned or not mentioned, including methods that are understood by those of skill in the art, to provide structure or an ability to retain its shape after being opened or be inclined to open when not held shut.

[00156] **FIGs. 28A – 28C** identifies a residual strip of material **133** from a removed formed glove **165** that remains attached to cuff **163** of subsequent glove **117** and provides additional structure to cuff **163** for holding glove opening **146** open. A perforated or weakened material line **135** in film layer **102** defines the separation location for residual strip of material **133**. The process of sealing, adhering, or other means of attaching the residual strip of material **133** of film layer **102** to formed film layer **136** of the subsequent glove **117** also increases the strength, rigidity, or ability to hold its form after opening. In accordance with other embodiments of the present invention, the residual strip of material **133** is composed of multiple strips or sections, alternate materials or adhesives, a folded layer or layers, or some other form to assist in separation or structure not mentioned thereof or herein.

[00157] **FIG. 28A** shows the topmost formed glove **165** of a glove stack **116** open and ready for donning where all of the side separation region mounting features **138** on each side of the gloves are held together with the adjacent side separation regions **138** to create side separation units **209** and hold said formed glove along perforated or weakened material lines **122**. The side separation units **209** also provide for a mounting means such as mount holes **153** for mounting on wicketed dispenser **167**. **FIG. 28B** illustrates formed glove **165** in a donned state and separated from its corresponding side separation regions **138** where perforated or weakened material lines **122** have been torn through and formed glove **165** still connected to subsequent glove **117** along the residual strip of material **133** region where subsequent glove **117** has been opened. **FIG. 28C** shows formed glove **165** separated from subsequent glove **117** where residual strip of material **133** from film layer **102** remains on cuff **163** of subsequent glove **117** and side separation regions **138** remain with dispenser **167**. Said perforated or weakened material lines **135** having less strength than perforated or

weakened material lines **131** holding subsequent glove **117** to stack **116** such that perforated or weakened material lines **131** are able to remain intact even though glove **165** is removed.

[00158] Having no mounting features such as tether material or separation region positioned in front of the glove opening **121** ensures that the donnability remains constant throughout the stack **116** where the user does not have to concern themselves with avoiding any remnant material layers when inserting their hand. Alternately, separation regions can remain in front of the opening and should therefore not be considered limiting to the present invention. Side separation regions or glove mounting regions can be implemented with any of the glove configurations described herein including flat gloves or differential layer sized gloves in accordance with other embodiments of the present invention.

[00159] In accordance with an embodiment of the present invention, **FIG. 29** shows glove mounting features **204** instead of side separation regions where the glove mounting features **204** remain a part of the formed glove **165** when removed. Perforated or weakened separation tearing line **152** provide tear through points for the formed gloves **165** to easily separate. In accordance with one embodiment of the present invention, a perforated or weakened tab tearing line is not necessary, however, and the formed gloves **165** simply tear through for separation or slide off or free from wicketed dispenser **167** or some other donning apparatus. Such embodiments eliminate scrap plastic material that is common with other glove separation methods.

[00160] In accordance with an embodiment of the present invention, the mount holes of a glove stack or alternate holes or edges of a mounting feature are hot staked or melted by another means such that the gloves in a stack are connected and remain intact for stack management making it easy to handle and mount on a dispenser. In accordance with an embodiment of the present invention, the mount holes of a glove stack or alternate holes or edges are hot staked or melted by another means such that the gloves are connected and serve as a connection means for separation of gloves from one another such as for opening a subsequent glove or rigidly attaching on a dispenser. In accordance with an embodiment of the present invention, gloves are melted or sealed together along a side edge such as sealing a side edge with a hot knife or hot staking or a localized cut seal so just a small tear point and low force of separation for glove to glove separation is needed. In accordance with an embodiment of the present invention, hot staking one or more of the mounting holes or

staking mounting regions in a compressed state provides an integral or semi-integral mounting feature for improved mounting capability. In accordance with an embodiment of the present invention, gloves require 0.5 to 4.0 pounds to separate a glove from a stack and 1.5x to 100x less force to separate a glove from a dispenser. In accordance with an embodiment of the present invention, gloves require 0.5 to 4.0 pounds to separate a glove from a dispenser and 1.5x to 100x less force to separate a glove from a glove stack. In accordance with an embodiment of the present invention, gloves require approximately the same amount of force to separate a glove from a dispenser or from stack. In accordance with an embodiment of the present invention, 1.5x to 1000x less separation force for opening a subsequent glove or the force to separate from an adjacent glove as a function of having opened said glove than the force required to separate a glove from a dispenser or a glove from a stack. It should be noted that opening a subsequent glove using more than 1000x less separation force than the 0.5 to 4.0 pounds to separate a glove from a stack or a dispenser is practicable as the force needed to separate the two layers of film of a glove is generally a trivial amount of force. In accordance with an embodiment of the present invention, the holding forces between gloves includes any tacked or welded feature, corona treatment, adhesives, static, mechanical engagement, or the like or any combination thereof or herein.

[00161] **FIG. 30** illustrates a wicketed dispenser **167** where formed gloves **165** hang from the dispenser for donning and tear free at perforated or weakened material line **122** with side separation regions **138** remaining with the wicketed dispenser **167**. **FIG. 31** provides an alternate wicketed dispenser **167** where a single wicket post **123** is positioned close to a corner of glove opening **121** with a small perforated or weakened material line **122** for the formed glove **165** to tear free from. A double-sided wicketed dispenser **167** is shown in **FIG. 32A** where a user dons a formed glove **165** and an opposing hand formed glove **124** simultaneously. **FIG. 32B** shows the donned formed glove **165** and the opposing hand formed glove **124** from double-sided wicketed dispenser **167**. In other embodiments of the present invention, a double-sided wicketed dispenser is implementable such as using the single-post dispenser method portrayed in **FIG. 31**. It should be understood to one of skill in the art that any of the glove types described herein or thereof including differential layer sized gloves, gloves with glove opening relief features or binding regions or side separation regions or glove mounting regions are usable with various donning methods such as having one or more wicketed posts or clips or mounting region holders or side separation region

holders or other donning methods such as those methods discussed in **FIGs. 18 – 32** or not discussed thereof or herein.

[00162] **FIG. 33** shows an embodiment of the present invention featuring a double-sided wicketed dispenser **167** with a stack **116** of two-layer gloves **101** having slotted glove opening reliefs **150** and glove mounting features **204** inboard of the cuff side edges **141** and **142**, when gloves are mounted and closed, where the glove mounting features **204** remain with the glove and the gloves are independent of one another. Removing two-layer glove **101** from stack **116** causes perforated or weakened separation tearing lines **152** to tear, separating two-layer glove **101** from wicketed dispenser **167**. In accordance with embodiments of the present invention, said stack **116** can be lightly tethered together or can simply slide off the posts or tear through the gloves **101** or glove mounting features **204** without perforated or weakened separation tearing lines **152**. In accordance with an embodiment of the present invention, one or more wicket posts **123** are designed to bend or move such that wicket posts **123** get closer together as a donning load is introduced allowing for a more opened and donnable glove and providing similar glove opening functionality as glove opening reliefs **150**. In accordance with an embodiment of the present invention, one or more wicket posts **123** are designed to bend or move closer together for loading gloves or glove stacks onto a dispenser to make it easier to load or for holding the gloves tight on the stand or ensuring the gloves don't fall off or come off without intentionally removing them or removing them by donning or for some other reason. In accordance with another embodiment of the present invention, the dispenser **167** contains features to retain a glove or glove stack against a mounting face with a retention means such as vacuum, suction cups, adhesive or tacky surface, static, or some other means.

[00163] **FIG. 34A** illustrates the posterior sides of a glove set **182** in accordance with an embodiment of the present invention, where the mounting features are not symmetric on each side along the width of a glove and do not match between a left hand formed glove **104** and a right hand formed glove **174** such that corresponding mounts on a dispenser **167**, as shown in **FIG. 35**, prevent or limit the possibility of a right hand formed glove **174** from being mounted on the left-handed side **180** of dispenser **167** and a left hand formed glove **104** from being mounted on the right-handed side **181** of a dispenser **167** and also prevent or limit a glove or glove stack from being mounted backwards such that the pinky side **183** of each

glove is unable to be properly loaded on the dispenser thumb side **184** and the thumb side **185** of a glove is unable to be properly loaded on the dispenser pinky side **186**. In accordance with an embodiment of the present invention, a dispenser **167** exists featuring non-matching mounting provisions for a left hand or right hand glove, or both right and left hand gloves to be mounted on a single dispenser such that gloves are able to be donned simultaneously. For example, a glove set **182** includes a left formed glove **104** having a slotted hole **120** on thumb side mounting features **134** and a pinky side hole **151** on the pinky side mounting features **157** and right hand gloves **174** having two right thumb side holes **175** on a thumb side mounting features **176** and a pinky side hole **177** on a pinky side mounting features **178** serving as non-symmetry between right and left gloves and between thumb side mounting features and pinky side mounting features for mounting onto dispenser **167**. In accordance with embodiments of the present invention, a perforated or weakened separation tearing line **152** exists at one or more hole locations on a glove. In accordance with an embodiment of the present invention, the perforated or weakened separation tearing line **152** is angled or directed to tear toward the side edge of a mounting feature to reduce the resulting flap **191** of loose material on the glove, as shown in **FIG. 33**, by having two smaller flaps **192** on both sides of a perforated or weakened separation tearing line **152**, as depicted in **FIG. 34B**, providing aesthetic benefits. In accordance with embodiments of the present invention, one or more gloves has one or more features to uniquely define it as a right or left glove such as an offset cuff, mounting features, formed features, differential cuff lengths or any other glove characteristic capable of differentiating it from an opposite glove as described thereof or herein.

[00164] **FIG. 35** illustrates left and right hand formed gloves **104** and **174** of **FIG. 34A** mounted on a dispenser **167**. The thumb side slotted holes **120** of left hand formed gloves **104** are installed onto the elongated left thumb side mount, such as mounting hook **187** as shown in **FIG. 36A** followed by hooking the pinky side mounting hole **151** onto the corresponding left-handed pinky side hook mount **188** as in **FIG. 36B**. For mounting the right hand formed gloves **174** as shown in **FIG. 36C** and **FIG. 36D**, the right thumb side holes **175** are installed onto the right thumb mount, such as side mounting hooks **189** followed by hooking the right-handed pinky side hole **177** onto its corresponding right-handed pinky side hook mount **190**. The identified mounts are intended to engage one more of glove slots and holes to ensure proper mounting and orientation on a dispenser where said

mounts make it easy to identify correct installation location and orientation and also impede or make it difficult for a user to install gloves backwards or on the wrong side of a dispenser **167**.

[00165] In accordance with an embodiment of the present invention, a dispenser **167** as shown in **FIG. 37A** and **FIG. 37B** is provided comprising a base **200**, a frame **196** extending from base, and first and second mounting faces **193** with mounts such as mounting hooks or posts where the distance **201**, of **FIG. 36A**, between the installation points of one or more sets of mounting hooks or posts is greater than the distance **202**, of **FIG. 34A**, between the corresponding mounting holes or slots or provisions on one or more gloves or glove stacks as well as the distance **203**, of **FIG. 35**, between the installed glove mounted positions of said set of mounts such that a one or more mounting hooks or posts needs to be removable or is able to move into a loading position to install one or more gloves or glove stacks or one or more gloves or glove stacks require being installed onto said posts in an order such that any remaining mounting hooks or posts with no gloves or glove stacks installed are still accessible for loading without having to stretch and potentially damage the one or more gloves or gloves stacks. Adding the described non-symmetric glove retention and installation means across the width of gloves limits a user's ability to install the gloves incorrectly and provides an increased level of retention where a glove or glove stack needs to be removed in a particular way as well, other than by donning or otherwise damaging or stressing the one or more gloves or glove stacks.

[00166] It should be understood by one of skill in the art that the number, location, shape, or size of the holes is able to be rearranged or reconfigured or changed and still achieve the intent of preventing or limiting the potential for gloves from being installed backwards, upside-down, or on the wrong side of a dispenser **167**. For non-hand specific gloves, non-symmetric mounting provisions still ensure that the thumb side of a glove only mounts to the appropriate location and the pinky side of a glove to its corresponding location so that gloves are properly oriented for donning purposes.

[00167] As shown in **FIG. 37A**, mounts, such as mounting hooks can be oriented at different angles. The thumb side hooks **187** and **189** are oriented away from the pinky side hooks **188** and **190** to make it so a glove has to be installed on said thumb side hook or hooks first and is generally in a direction where gravity will hold it on the stand and is oriented in

the direction of tension between the hooks and gloves won't come off of the thumb side hook without being torn off or first being removed from the pinky side hook and also encourages the user to install correctly and get the one or more gloves or glove stacks correctly installed on the thumb side hook or hooks first before installing onto the pinky side hook.

[00168] In accordance with other embodiment of the present invention, mounting hooks are oriented in alternate directions or mounting hooks or provisions are mounted in the same direction such as hooks oriented opposite of the donning direction such as the direction of pinky side hooks **188** and **190** of **FIG. 37A**. In accordance with other embodiments of the present invention, hooks are oriented in the same direction so that both sides of a glove have the ability to be loaded at the same time such as loading both sides straight onto posts or pins or hooked on from the donning side. In accordance with other embodiment of the present invention, low profile glove mounting pins such as pins with mushroom heads are used where the glove mounting holes are stretched over the heads so the gloves are mounted straight on or gloves are simply placed onto the pins and another glove retention means is used for holding the gloves onto a dispenser. In accordance with an embodiment of the present invention, a dispenser **167** features stationary mount hooks, posts, or pins where the distance between the tips of the mounts is greater than the distance between the mounting holes on a glove or glove stack as well as the installed mounting positions on the dispenser when said dispenser is in a configuration for donning where one specific side of a glove must be mounted on first in order to mount the other side of a glove.

[00169] In accordance with other embodiments of the present invention, hooks are pulled or deflected towards each other in order to mount gloves and ensure they remain retained on the dispenser **167**. In accordance with other embodiments of the present invention, hooks rotate, such as being manually rotated or rotationally spring loaded so that one or more hooks is rotated while loading and returns or is returned to a position that ensures retention of the gloves or glove stacks.

[00170] In accordance with other embodiments of the present invention, a dispenser **167** features a movable mechanism such that a glove or stack of gloves is biased toward the end of protruding mounts to minimize interference in the donning path. In accordance with an embodiment of the present invention, a force is applied to one or more mounting faces **193** or other mechanisms, such as with one or more springs or spring-like mechanisms or gravity

acting on the mounting faces, to maintain a force on a glove or glove stack to force the gloves toward the end of the mounts, such as holding pins or hooks or glove or glove stack retention means. Forcing a glove or glove stack to the end of the mounts minimizes or eliminates interferences in the path of a users' hand for donning that could injure, catch or otherwise impede the user. Watch bands, bracelets, or the cuff of a shirt or the like are additional articles that are apt to get caught on protrusions from the donning stand that are in close proximity to the donning path. In accordance with an embodiment of the present invention, spring-loaded mounting faces **193** also feature grooves **194** for the angled hooks to reside when no gloves are present or to force the gloves to deflect into grooves **194** residing between each hook and mounting faces **193** such that hooks are close to or below the top surface of a top glove on dispenser **167** as identified in **FIG. 37A** and **FIG. 37B**.

[00171] Spring loaded mounting faces **193** further feature angled surfaces at the hook location such that placing a hole of a glove stack over a hook and pushing or pulling the glove or glove stack further onto the hook causes the mounting face to deflect away from the end of the hook such that the gloves are easily loaded. In accordance with an embodiment of the present invention, a mounting face **193** is manually deflected by the user when loading a glove or glove stack. In accordance with an embodiment of the present invention, mounting face **193** features a spring such as compression spring **195** located within frame **196** although torsion springs or tension springs or some other spring load or force, such as gravity, are also practicable. In accordance with another embodiment of the present invention, mounting face **193** pivots in relation to frame **196** at pivot locations **179** to provide angular deflection at the hook locations where the gloves are mounted although fully spring-loading and retaining the mounting faces without pivots or retaining the mounting faces **193** by some other means or having an alternate mechanism other than mounting faces such as individual hooks with localized loading mechanisms or simply a frame **196** with hooks or mounting pins serve as the moveable mechanism to pull a glove or glove stack toward the mounting face of the dispenser such as having the pins or hooks spring-loaded or moveable by some other means is also practicable.

[00172] In accordance with an embodiment of the present invention, the mounting face **193** of dispenser **167** features a depression or open area **212** to allow the anterior layer of a glove to be pushed in to aid in separation of anterior and posterior layers and create a glove

opening to enhance donnability as shown in **FIG. 37B**. In accordance with another embodiment of the present invention, mounting face **193** of dispenser **167** is curved such that when the posterior layer of the glove is pulled away from the anterior layer, which remains the same shape as the curve of the dispenser, a larger glove cuff opening is formed in comparison to a flat mounting face.

[00173] In accordance with an embodiment of the present invention, a dispenser **167** is angularly adjustable with dispenser pivot **197** in order to change the donning angle **198** as shown in **FIG. 37A** and **FIG. 37B** and provide an ergonomically correct donning angle based on the dispenser mount height and the height of a user. In accordance with an embodiment of the present invention, dispenser pivot **197** provides resistance such that excess force is used to change the position of the dispenser **167** or the dispenser pivot **197** is set to a position and locked or requires pressing or pulling a release for adjusting the donning angle **198** or any other means for providing angular locking or position adjustment or resistance adjustment.

[00174] In accordance with another embodiment of the present invention, **FIG. 38A – 38C** show a dispenser **167** with an adjustable donning angle **198** that is in the 90-degree (vertical) donning position. In accordance with an embodiment of the present invention, dispenser **167** is configured with an angular splay **210** of 5-degrees to 150-degrees between the faces of a left hand and a right hand glove or glove stack such that the cuff opening edges are not parallel to one another and the thumb side of a left and right glove are closer together than a pinky side of a left and right glove, as shown in **FIG. 38C**, where the position of a left glove for a user's left hand is in an equivalent position to a right glove positioned for a user's right hand with a user standing in a centered location in front of said dispenser. In accordance with an embodiment of the present invention, said angular splay **210** providing an ergonomic donning position or a balance between an ergonomically optimal donning position and the size or cost or other attribute or combination of attributes of dispenser **167** for a user to don both a left and a right glove simultaneously. In accordance with another embodiment of the present invention, the faces of the left and right gloves on a dispenser are parallel to each other. In accordance with another embodiment of the present invention, the cuff opening edges of left and right gloves on a dispenser are parallel to each other.

[00175] In accordance with another embodiment of the present invention, said angular splay **210** further providing a glove or glove stack support benefit where angularly adjusting

the dispenser **167** or the position of the dispenser **167** to change the donning angle **198** relative to the direction of gravitational effects on a glove or glove stack, as shown by a 70-degree donning angle in **FIG. 39A** and **FIG. 39B** and a 30-degree donning angle in **FIG. 40A** and **FIG. 40B**, results in a range where the dispenser support angle **211** increases such that gloves are increasingly supported by the dispenser **167** at decreased donning angles or over a range of decreased donning angles. As shown in **FIG. 38B** and **FIG. 39B**, the support angle **211** is negative and the glove or gloves or glove stack or glove stacks are able to simply hang from the dispenser **167**. **FIG. 40B** shows a positive support angle **211** where the decreased donning angle of 30-degrees, as indicated in **FIG. 40A**, causes mounting face **167** to provide an angled supporting surface for the glove, gloves, glove stack or glove stacks to rest on and help maintain shape. At high donning angles such as at 90-degrees, angular support is generally not needed as a glove or glove stack or gloves or glove stacks simply hang down from a dispenser from mounting locations at or around the cuff region that are positioned higher than other areas of the glove that are prone to fold or flop over at lower donning angles.

[00176] In accordance with an embodiment of the present invention, forming of a layered glove or gloves and compressing of said glove or gloves such that the non-planar shape of flattened gloves provides structure, increasing the rigidity and the ability to hold shape at extreme donning angles such that gloves that are 3 mils thick or less are able to maintain their shape when the donning angle **198** of a glove opening or cuff edges that are generally perpendicular to the donning direction are positioned at angles less than 70-degrees without having to tether or hold other locations of the glove away from the cuff region such as at the fingers or palm area to prevent a glove or glove stack from flopping over on itself making it difficult to don and is also messy and visually unpleasant. In accordance with another embodiment of the present invention, tethering or otherwise holding or constraining gloves at the fingers or palm or other regions of the glove to maintain the shape or structure of the gloves is practicable. Additionally, in accordance with some embodiments of the present invention, compressing and elastically deforming a stack of formed gloves produces non-planar layers of gloves resulting in additional structure and an interlacing effect to further promote the ability of a glove stack to maintain its shape and structure for glove mounting angles reliant on the glove and stack structure to maintain a shape.

[00177] In accordance with embodiments of the present invention, angling the face of the glove stack from a vertical position, such as increasing the support angle to angles such as 5 to 90-degrees from vertical to create a resting surface for the gloves additionally aides in the ability of the gloves to maintain a donnable shape when in a position that would otherwise subject the gloves to kinking or folding. Conventional glove donning setups are oriented for vertical donning or flat donning or have finger tethering features. Besides relying on the formed structure to hold the shape of a glove when the glove is mounted on an angle that makes a glove or glove stack prone to bending or flopping over, in accordance to some embodiments of the present invention, material additives or increased layer or location thicknesses to increase strength or structure are incorporated. In accordance with an embodiment of the present invention, formed ribs or features to further improve glove donning or holding the glove structure for angled donning configurations such as forming features for particular mounted angles or incorporating any of the other embodiments described thereof or herein also provide for holding the structure of a glove for angled donning. Formed features such as ribs positioned generally vertical along a glove surface with respect to the glove as it is positioned on an angled donning setup is also practicable. In accordance with an embodiment of the present invention, curving the stack or having curved geometry on the donning stand provides an additional means for promoting structure to hold gloves from folding out or flopping over by generating additional structure. In accordance with one embodiment of the present invention, formed gloves have sufficient enough structure such that a dispenser has mounting provisions for gloves where said gloves are able to hold their shape regardless of the orientation of the gloves whether they lie flat, sideways, upside-down, vertically or at any other orientation and a glove dispenser contains mounting provisions to mount said gloves on a vertical surface or horizontal surface or at any angles therebetween.

[00178] In accordance with an embodiment of the present invention, dispenser **167** features a swivel **199** for rotating the dispenser side-to-side relative to a mounted base **200** as shown in **FIG. 37A** and **FIG. 37B**. In accordance with an embodiment of the present invention, swivel **199** provides resistance such that excess force is used to change the rotational position of the dispenser **167** or swivel **199** is set to a position and locked or requires pressing or pulling a release for adjusting the swivel position or any other means for providing rotational locking or position adjustment or resistance adjustment.

[00179] In accordance with another embodiment of the present invention, a dispenser **167** is not mounted and is able to sit on a table top or counter or the like. In accordance with other embodiments of the present invention dispenser **167** has a heavy or large base **200** to resist moving as a user loads gloves or dons gloves or changes the angle or rotation or the like. In accordance with other embodiments of the present invention, dispenser is mounted with screws, bolts, magnets, adhesives, glue, suction cups, or other retention means or any combination of retention means. In accordance with an embodiment of the present invention, the dispenser **167** is wall mountable or mountable on other surfaces at other orientations.

[00180] In accordance with an embodiment of the present invention, an air assist device is incorporated into a dispenser **167** as in **FIG. 41** that is directed towards the glove opening location of a topmost glove **165** of a glove stack **116** such that activation of said air assist device causes air to flow through air flow nozzle **127** causing film layer **102** and **103** to separate as the formed glove **165** is effectively reformed or partially reformed to its natural formed shape and creating an accessible glove opening **121**. In accordance with an embodiment of the present invention, an air flow nozzle is integral and built into one or more mounting features such as hooks or pins where the proximity of a hook or pin and the positional consistency of a hook or pin relative to a glove where said glove is pushed towards the end of said hooks or pins by way of a spring loaded mounting face or other dispenser mechanism and providing a means for consistently directing air at a glove opening location without the need for another dispenser appendage or other air delivery means. In accordance with another embodiment of the present invention, triggers for an air assist device include proximity sensors or other sensors that activate just prior to a user attempting to don a glove or a manual button or sensor that the user activates to separate the posterior and anterior layer and open the glove or a glove is simply opened after a prior glove is donned such that the glove is ready prior to a user attempting to don a next glove. In accordance with an embodiment of the present invention, said air assist device produces air mechanically and is activated by the user such as with a bellows or is electro-mechanical in nature and is run by batteries or connected by a power cord or an alternate powering means to produce air by a fan or pump or the like or said air is supplied from a pressurized canister or pneumatic system or some other means. In accordance with an embodiment of the present invention, said air assist mechanism is active to re-open a subsequent glove after a prior glove is donned, is active to

open and hold a glove open as a user dons a glove, or is continuously active or intermittently active for any other reason or duration to provide a donnable glove or gloves.

[00181] An automated donning apparatus **168**, such as the one shown in **FIG. 42**, is employed for formed gloves **165** in a web **125** that unspools from glove roll **126**, although web material in a box or by some other means besides glove roll **126** is used to feed web **125** in accordance with an embodiment of the present invention. In accordance with an embodiment of the present invention, the perimeter of the gloves remains separably attached to one or more material layers from which it was manufactured such that a roll of gloves or gloves otherwise organized to supply a number of gloves as a single unit are available for donning. After a user dons a formed glove **165**, the automated donning apparatus **168** rewinds or collects the web **125**, with a glove removed leaving open area **137**, feeding into material take up roll **132** while unspooling glove roll **126** to move a next formed glove **169** into position for donning. In accordance with one embodiment of the present invention, the automated donning apparatus **168** actively separates film layers **102** and **103** to produce glove opening **121** by mechanisms or electromechanical means previously mentioned, such as opening it or reforming it or partially reforming it to its natural formed shape with air flow using air flow nozzle **127** directed at the glove opening **121**. In accordance with one embodiment of the present invention, simply unwinding the roll or strategically varying the tension on web **125** is sufficient to splay film layers **102** and **103** to create glove opening **121**. Said glove roll **126** can feature any of the glove types described herein or thereof including differential layer sized gloves, formed gloves, and gloves with glove opening relief features.

[00182] **FIG. 43** presents an alternate automated donning apparatus **168** where formed gloves **165** and opposing hand formed gloves **124** are positioned in the transverse web direction in accordance with an embodiment of the present invention. In accordance with another embodiment of the present invention, glove openings **121** alternate from side-to-side or end-to-end or at any angles therebetween. Glove orientations and positioning can be adjusted or offset as desired to reduce material waste or for the convenience of donning or for other reasons not mentioned as would be appreciated by those of skill in the art.

[00183] In accordance with an embodiment of the present invention, a dispenser is equipped with a reminder alert such as a light or alarm if the donning stand has been unused

for a period of time. In accordance with another embodiment of the present invention, the dispenser has recognition technology such as voice or facial recognition or RFID bracelets worn by the user or the like such that the dispenser alerts individuals to change their gloves if they have not changed them for a period of time or if moving between particular activities or alert to change gloves or load more glove or the like.

[00184] **FIG. 44** illustrates a means of manufacturing formed gloves **165** where a cavity or form **105** is used to extrude the three-dimensional geometry of the formed glove **165** in one or more of the layers of film layer **102** and film layer **103** in accordance with yet another embodiment of the present invention.

[00185] A perimeter sealer **129** on sealer block **139** is used to create the sealed profiles **107** as film layer **102** and film layer **103** unspool from film roll **106** and film roll **130** respectively. In accordance with another embodiment of the present invention, a single roll of two-ply film material is used in place of film roll **106** and film roll **130**. A roll of folded film to form two-ply is also practicable. In accordance with an embodiment of the present invention, each film layer is generally between 0.5 and 3 mils thick although thicker and thinner glove material layers are also practicable. In accordance with an embodiment of the present invention, said material layers are composed of a thermoplastic material such as PLA or polyethylene.

[00186] The sealed profiles **107** are achieved by any thermal bonding, ultrasonic welding, or some other fusing or binding operation to define and seal the contour of the glove. The order of operation for fusing the layers, forming the geometry, and cutting or perforating the profile can be re-ordered, combined, or altered as needed. Slit lines, perforations, creases, weakened material, less material or some other method for promoting separation can also be incorporated at any points about the perimeter, in between the fingers, at the glove opening or at any other locations not mentioned.

[00187] In accordance with one embodiment of the present invention, the formed glove **165** is produced with the glove opening at the edge of the film layer **102** and film layer **103** as shown in **FIG. 44** or it is positioned in-board of the film edge and either cuff **115** is cut or slit open or the material not sealed to create glove opening **121**. In accordance with one embodiment of the present invention, the edge of one or more film layers is offset from the

edge to assist in creating the glove opening **121** or for some other reason such as donning or packaging.

[00188] In accordance with one embodiment of the present invention, to create the three-dimensional geometry of a formed glove **165**, one or more film layers is positioned on or in the cavity or form **105**, resembling a hand typically with heat involved in the form, on the web, or on a film roll and also with a load applied to the film such as pneumatically pushed or pulled, such as with vacuum or pressure, with a mechanical load, or other known methods or any combination of methods mentioned or not mentioned. In accordance with one embodiment of the present invention, the posterior layer is mechanically or pneumatically pushed or pulled, such as with a vacuum, into a mold resembling a hand shape and in accordance with another embodiment of the present invention, the anterior layer is mechanically or pneumatically pushed or pulled, such as with a vacuum, into a mold resembling a hand shape. Forming with film in a hot or molten state generally eases the forming operation and assists with minimizing thickness variability within one or more material layers or is used to create thickness variability within one or more material layers if desired. In accordance with an embodiment of the present invention, gloves are cold-formed at ambient temperatures without the presence of heat or formed with low levels of heat. To form and seal film layer **103** of formed glove **165** without forming film layer **102**, a means to allow air to enter the space between the two film layers **102** and **103** is needed such as air inlet **108**. As the forming operation takes place, film layer **103** is formed while film layer **102** remains flat. In accordance with an embodiment of the present invention, layers of a two layer glove are sealed together while still in a cavity or on a form. In accordance with one embodiment of the present invention, the formed glove **165** is cut during the sealing operation using a cut seal device around the perimeter of a formed glove **165** to remove it from the web or formed glove **165** is removed in a subsequent step.

[00189] In accordance with one embodiment of the present invention for a glove forming operation, a material thickness reduction occurs as the material stretches to a formed shape and thicker gauge material is used to accommodate the forming operation.

[00190] In accordance with an embodiment of the present invention, **FIG. 45** defines a means of manufacturing where the formed glove **165** is created by forming both film layer **103** and film layer **102** using cavity or form **105** and opposing cavity or form **109**

respectively. Opposing cavity or form **109** and cavity or form **105** have mirrored geometry or different geometry such as having a deeper thumb **110** region in the opposing cavity or form **109** and a deeper fingers **111** region defined in cavity or form **105** to more appropriately match the non-planar shape of a person's hand.

[00191] In accordance with an embodiment of the present invention, an additional method for manufacturing formed gloves is identified in **FIG. 46** where a series of cavities or forms **105** is used in a carousel to provide dwell time for the forming operation without having to stop film layer **103** from unspooling from film roll **130**. An opposing cavity or form **109** may or may not be used and may or may not also be in a carousel and may be a cover or plate or the like. Film layer **102** from film roll **106** is introduced while film layer **103** is forming in a cavity or form **105** or after film layer **103** has been formed in said cavity or form **105**. In accordance with one embodiment of the present invention, the perimeter seal operation occurs between a perimeter sealer **129** on perimeter sealing block **139** and a cavity or form **105**. Perimeter sealing block **139** is also practicable in a carousel or not. The perimeter sealing step also separates or removes formed glove **165** from the web composed of film layers **102** and **103** in accordance with an embodiment of the present invention.

[00192] **FIG. 47** defines an additional formed glove manufacturing operation in accordance with an embodiment of the present invention, where a material take up roll **132** collects the non-glove material that can then go to regrind in order to melt and reuse the material. Angle blades **158** that are designed to plunge through the formed glove **165** and into the glove cavity or form **105** to create an angled offset cuff are also depicted in **FIG. 47** such that an offset cuff area featuring material removed from only the posterior layer of the glove, is created by cutting across the width of the glove at an angle while glove is still in the mold. Cavities featuring areas for generating both a formed glove **165** and an opposing hand formed glove **124** are also shown in an effort to optimize the space utilization of the sheet material.

[00193] In accordance with one embodiment of the present invention, pellet material is melted and extruded in sheet form and then formed in a heated state after exiting the extruder as shown in **FIG. 48**. Melting and forming the material after exiting the extruder simplifies the manufacturing process and provides for the creation of stress-free and uniform material thickness formed glove **165**. For the manufacturing operation depicted in **FIG. 48**, a layer of

extruded material is dispensed onto or into a glove cavity or form **105**, which may or may not include vacuum forming, where a glove shape is created in film layer **103**. A second film layer **102** of extruded material is introduced to overlay the glove and conveyed glove cavities retaining film layer **103** where film layer **102** is not formed and retains its flat state, which is then sealed to film layer **103** and cut to create formed glove **165**. Although melting pellet material and extruding film layers is depicted in **FIG. 48**, other film manufacturing methods are also practicable in accordance with other embodiments of the present invention such as melting pellet material and extruding film for only one layer. Cavities featuring areas for generating both a formed glove **165** and an opposing hand formed glove **124** are also shown in **FIG. 48** although cavities or forms with individual glove cavities or forms with alternating left and right gloves or some other variation that is understood by those of skill in the art is also practicable in accordance with other embodiments of the present invention.

[00194] In accordance with one embodiment of the present invention, gloves manufactured per the operations identified in **FIGs. 44 – 48** are further processed for packaging and preparation for dispensing. Stacking gloves, staking or otherwise attaching or interconnecting gloves, or compressing gloves or any combination of steps described thereof or herein are also implementable as part of a manufacturing operation, in accordance with some embodiments of the present invention. In accordance with an embodiment of the present invention, gloves are stacked and compressed together to effectively flatten the formed layers for packaging as part of a manufacturing operation and are connected together in one or more glove mounting regions or gloves are packaged together as a stack per any of the embodiments described thereof or herein. In accordance with embodiments of the present invention, gloves compressed for packaging and dispensing out of a box or gloves are interwoven together to dispense cuff first from a box.

[00195] The gloves of the present invention are not restricted to particular applications and can be used in any application that a user sees fit including food preparation, cleaning, gas pumping, sanitary bathroom use, janitorial tasks, medical applications, industrial applications and the like. It should be noted that other gloves besides thermoplastic and two-layer disposable gloves, such as nitrile gloves and molded gloves, are usable with regards to glove stacks and dispensers in accordance with embodiments of the present invention.

[00196] To any extent utilized herein, the terms “comprises” and “comprising” are intended to be construed as being inclusive, not exclusive. As utilized herein, the terms “exemplary”, “example”, and “illustrative”, are intended to mean “serving as an example, instance, or illustration” and should not be construed as indicating, or not indicating, a preferred or advantageous configuration relative to other configurations. As utilized herein, the terms “about” and “approximately” are intended to cover variations that may exist in the upper and lower limits of the ranges of subjective or objective values, such as variations in properties, parameters, sizes, and dimensions. In one non-limiting example, the terms “about” and “approximately” mean at, or plus 10 percent or less, or minus 10 percent or less. In one non-limiting example, the terms “about” and “approximately” mean sufficiently close to be deemed by one of skill in the art in the relevant field to be included. As utilized herein, the term “substantially” refers to the complete or nearly complete extent or degree of an action, characteristic, property, state, structure, item, or result, as would be appreciated by one of skill in the art. For example, an object that is “substantially” circular would mean that the object is either completely a circle to mathematically determinable limits, or nearly a circle as would be recognized or understood by one of skill in the art. The exact allowable degree of deviation from absolute completeness may in some instances depend on the specific context. However, in general, the nearness of completion will be so as to have the same overall result as if absolute and total completion were achieved or obtained. The use of “substantially” is equally applicable when utilized in a negative connotation to refer to the complete or near complete lack of an action, characteristic, property, state, structure, item, or result, as would be appreciated by one of skill in the art.

[00197] Numerous modifications and alternative embodiments of the present invention will be apparent to those skilled in the art in view of the foregoing description. Accordingly, this description is to be construed as illustrative only and is for the purpose of teaching those skilled in the art the best mode for carrying out the present invention. Details of the structure may vary substantially without departing from the spirit of the present invention, and exclusive use of all modifications that come within the scope of the appended claims is reserved. Within this specification embodiments have been described in a way which enables a clear and concise specification to be written, but it is intended and will be appreciated that embodiments may be variously combined or separated without parting from the invention. It

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is intended that the present invention be limited only to the extent required by the appended claims and the applicable rules of law.

[00198] It is also to be understood that the following claims are to cover all generic and specific features of the invention described herein, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

CLAIMS

What is claimed is:

1. A disposable glove comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and the second layer are coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the disposable glove;

a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

wherein the first middle section and the second middle section have different total areas from each other in such a way that when one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening to maintain a steady-state open state facilitating donning of the disposable glove.

2. The disposable glove of claim 1, wherein at least one of the first layer and second layer comprises a starch based thermoplastic.

3. The disposable glove of claim 1, wherein at least one of the first layer and second layer comprises sub-layers.

4. The disposable glove of claim 1, wherein the thermoplastic material of at least one of the first layer and second layer has a thickness between 0.5 mils and 3 mils.

5. The disposable glove of claim 1, wherein the first layer and second layer are made of different thermoplastic materials.
6. The disposable glove of claim 1, wherein at least one of the first layer and second layer comprises formed geometry.
7. The disposable glove of claim 6, wherein the formed geometry comprises a three-dimensional form generally shaped to fit a human hand.
8. The disposable glove of claim 6, wherein the formed geometry comprises extruded features.
9. The disposable glove of claim 8, wherein the thickness of extruded features can vary between about 20% and about 250% of material thickness.
10. The disposable glove of claim 8, wherein the geometry is formed by extruding the thermoplastic material to a depth between about 0.1 inches to about 2.5 inches.
11. The disposable glove of claim 6, wherein the formed geometry comprises features for facilitating compression of the disposable glove for storage.
12. The disposable glove of claim 11, wherein the features for facilitating compression and elastic deformation of the disposable glove comprise creases for folding the extra material.
13. The disposable glove of claim 12, wherein the creases are located around the perimeter border of the disposable glove.
14. The disposable glove of claim 11, wherein when in a compressed state, the extra material of the formed geometry provides structural rigidity to disposable glove.

15. The disposable glove of claim 1, wherein at least one of the first layer or second layer has extra cuff length to extend beyond the cuff opening of an outer layer resulting in an offset cuff.
16. The disposable glove of claim 1, further comprising one or more mounting features for mounting the disposable glove.
17. The disposable glove of claim 16 wherein the one or more mounting features comprise extra material extending from the biased open cuff opening of the disposable glove.
18. The disposable glove of claim 16, wherein the one or more mounting features are configured to separate from the disposable glove when the disposable glove is unmounted and donned by user.
19. The disposable glove of claim 16, wherein the one or more mounting features are configured to release with disposable glove when the disposable glove is unmounted and donned by user.
20. The disposable glove of claim 16, wherein the one or more mounting features are attached to one of the first layer and second layer.
21. The disposable glove of claim 16, wherein the one or more mounting features are configured to facilitating the stacking of one or more disposable gloves in a compressed closed state.
22. The disposable glove of claim 15, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting.
23. The disposable glove claim 1, wherein the disposable glove is configured to be interchangeably right handed or left handed.
24. The disposable glove of claim 1, further comprising a tab extending from the biased open cuff opening of the disposable glove on at least one of the first layer and second layer.

25. The disposable glove of claim 23, wherein the biased open cuff opening of one layer of the disposable glove comprises a first tab extending from the biased open cuff opening and the biased open cuff opening of an other layer of the disposable glove comprises a second tab extending from the biased open cuff opening not opposite and not opposing the first tab.

26. The disposable glove of claim 1, the biased open cuff opening wherein when the disposable glove is disposed within a stack of a plurality of disposable gloves underneath the plurality of disposable gloves, the biased open cuff opening is held in a closed state by the stack of the plurality of disposable gloves and returns to the steady-state open state when the disposable glove is disposed in a top most position on top of the stack of the plurality of disposable gloves.

27. A stack of disposable gloves for storage and dispensing, the stack comprising:
one or more disposable gloves comprising:

- a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

- a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

- the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

- a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

- wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening of the one or more disposable gloves to have a steady-state open state facilitating donning of the one or more disposable gloves;

wherein the one or more disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff opening of the one or more disposable gloves is held in a closed state by the one or more other disposable gloves in the stack of disposable gloves and transitions to the steady-state open state when the one or more disposable gloves holding the biased open cuff opening in a closed state are removed.

28. The stack of claim 27, wherein the one or more disposable gloves further comprise mounting features.

29. The stack of claim 27, wherein the one or more mounting features are configured to separate from the one or more disposable gloves.

30. The stack of claim 27, wherein the one or more mounting features are configured to release with disposable glove when the disposable glove is unmounted and donned by user.

31. The stack of claim 27, wherein the one or more mounting features comprises excess material around at least a portion of the first perimeter border and second perimeter border of the one or more disposable gloves.

32. The stack of claim 27, wherein the one or more mounting features are attached to one of the first layer and second layer of the one or more disposable gloves.

33. The stack of claim 27, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting the stack in a dispenser.

34. The stack of claim 27, wherein the one or more disposable gloves are stacked in an alternating interwoven orientation.

35. The stack of claim 27, wherein the one or more disposable gloves are all the either right handed or left handed gloves.

36. The stack of claim 27, wherein the one or more disposable gloves are treated to adhere to each other to facilitate stacking.

37. The stack of claim 36, wherein a treatment to create adhesion is chemical.
38. The stack of claim 36, wherein a treatment to create adhesion is electrostatic.
39. The stack of claim 36, wherein a treatment to create adhesion comprises application of heat.
40. A method of manufacturing a disposable glove, the method comprising:
providing a first layer of thermoplastic material;
providing a second layer of thermoplastic material;
forming at least one of the first layer and second layer into a three-dimensional shape generally conforming to a human hand including a middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;
coupling the first layer to the second layer such that a resulting middle section of the first layer and a resulting middle section of the second layer have different total areas from each other in such a way that when one of the resulting middle section of the first layer and the resulting middle section of the second layer contain extra material and does not lay flat, causing a biased open cuff opening of the disposable glove to be in a steady-state open state facilitating donning of the disposable glove; and
cutting the coupled first layer and second layer to have a perimeter border generally in a shape of a human hand.
41. The method of claim 40, wherein forming at least one of the first layer or second layer of material comprises vacuum forming at least one of the first layer and second layer on a mold.
42. The method of claim 41, wherein the coupling of the first layer and second layer is performed while at least one of the first layer and second layer is still on the mold.
43. The method of claim 41, wherein the cutting the coupled first layer and second layer is performed while at least one of the first layer and second layer is still on the mold.

44. The method of claim 40, wherein at least one of the first layer and second layer comprises a starch based thermoplastic.
45. The method of claim 40, wherein at least one of the first layer and second layer comprises sub layers.
46. The method of claim 40, wherein at the thermoplastic material of at least one of the first layer and second layer has a thickness between about 0.5 mils and about 3 mils.
47. The method of claim 40, wherein the first layer and second layer are made of different thermoplastic materials.
48. The method of claim 40, wherein the extra material comprises between about 0.1% to about 10% more material.
49. The method of claim 40, wherein at least one of the first layer and second layer comprises formed geometry.
50. The method of claim 49, wherein the formed geometry comprises a three-dimensional form generally shaped to fit a human hand.
51. The method of claim 49, wherein the formed geometry comprises extruded features.
52. The method of claim 49, wherein the thickness of extruded features can vary between about 20% and about 250% of material thickness.
53. The method of claim 49, wherein the geometry is formed by extruding the thermoplastic material to a depth between about 0.1 inches to about 2.5 inches.
54. The method of claim 49, wherein the formed geometry comprises features for facilitating compression and elastic deformation of the disposable glove for storage.

55. The method of claim 40, wherein at least one of the first layer and second layer further includes one or more mounting features.

56. The method of claim 40, wherein at least one of the first layer and second layer further includes a tab extending from the biased open cuff opening of the disposable glove.

57. The method of claim 40, wherein at least one of the first and second layers is formed by melting pellets of thermoplastic material and extruding the thermoplastic material into a sheet.

58. The method of claim 40, further comprising:
wherein when the disposable glove is disposed within a stack of a plurality of disposable gloves underneath the plurality of disposable gloves, compressing and elastically deforming the biased open cuff opening and holding the biased open cuff opening in a closed state.

59. A disposable glove, comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the disposable glove; a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

wherein at least one of the first or second sections have a formed geometry comprising a three-dimensional form generally shaped to fit a human hand and causing the biased open cuff opening of the disposable glove to be in a steady-state open state facilitating donning of the disposable glove.

60. The disposable glove of claim 59, wherein at least one of the first layer and second layer comprises a starch based thermoplastic.
61. The disposable glove of claim 59, wherein at least one of the first layer and second layer comprises sub layers.
62. The disposable glove of claim 59, wherein at the thermoplastic material of at least one of the first layer and second layer has a thickness between 0.5 mils and 3 mils.
63. The disposable glove of claim 59, wherein the first layer and second layer are formed of different thermoplastic materials.
64. The disposable glove of claim 59, wherein the formed geometry further comprises extruded features.
65. The disposable glove of claim 64, wherein the thickness of extruded features can vary between 20% and 250% of material thickness.
66. The disposable glove of claim 59, wherein the geometry is formed by extruding the thermoplastic material to a depth between 0.1 inches to 2.5 inches.
67. The disposable glove of claim 59, wherein the formed geometry comprises features for facilitating compression and elastic deformation of the disposable glove for storage.
68. The disposable glove of claim 59, further comprising one or more mounting features.
69. The disposable glove of claim 68, wherein the one or more mounting features are configured to separate from the disposable glove.
70. The disposable glove of claim 68, wherein the one or more mounting features are configured to release with disposable glove when the disposable glove is unmounted and donned by user.

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71. The disposable glove of claim 68, wherein the one or more mounting features are attached to one of the first layer and second layers.
72. The disposable glove of claim 68, wherein the one or more mounting features are configured to facilitating the stacking of one or more disposable gloves in an elastically deformed compressed closed state.
73. The disposable glove of claim 68, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting.
74. The disposable glove claim 59, wherein the disposable glove is configured to be either right or left handed.
75. The disposable glove of claim 59, further comprising a tab extending from the biased open cuff opening of the disposable glove on at least one of the first layer and second layer.
76. The disposable glove of claim 59, wherein the biased open cuff opening of one layer of the disposable glove comprises a first tab extending from the biased open cuff opening and the biased open cuff opening of an other layer of the disposable glove comprises a second tab extending from the biased open cuff opening not opposite and not opposing the first tab.
77. The disposable glove of claim 59, wherein the disposable glove is compressed in a stack of one or more disposable gloves, such that the biased open cuff opening is held in an elastically deformed closed state by the one or more disposable gloves in the stack of one or more disposable gloves and transitions to the steady-state open state when the one or more disposable gloves holding the biased open cuff opening in a closed state are removed.
78. A dispenser for disposable gloves, the dispenser comprising:
a housing with an internal chamber; and
a stack of disposable gloves, the stack comprising:
one or more disposable gloves comprising:
a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section

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configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening of the one or more disposable gloves to have a steady-state open state facilitating donning of the one or more disposable gloves;

wherein the one or more disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff opening of the one or more disposable gloves is held in a closed state by the one or more other disposable gloves in the stack of disposable gloves and transitions to the steady-state open state when the one or more disposable gloves holding the biased open cuff opening in a closed state are removed;

wherein the housing has an opening from which protrudes at least the biased open cuff opening of an uppermost disposable glove of the stack such that when the uppermost disposable glove is removed from the housing, the biased open cuff opening of a next disposable glove in the stack transitions from a closed to state to a steady-state open state and protrudes from the opening.

79. The dispenser of claim 78, wherein the one or more disposable gloves of the stack further comprise one or more mounting features.

80. The dispenser of claim 78, further comprising one or more mountings corresponding to the one or more mounting features of the one or more disposable gloves for holding the one or more disposable gloves of the stack in the housing.
81. The dispenser of claim 80, wherein the one or more mounting features are configured to separate from the one or more disposable gloves.
82. The dispenser of claim 80, wherein the one or more mounting features are configured to release with disposable glove when the disposable glove is unmounted and donned by user.
83. The dispenser of claim 80, wherein the one or more mounting features comprises excess material around at least a portion of the first perimeter border and second perimeter border of the one or more disposable gloves.
84. The dispenser of claim 80, wherein the one or more mounting features are attached to one of the first layer and second layers.
85. The dispenser of claim 80, wherein the one or more mounting features are connected to the layer of the one or more disposable gloves not containing extra material.
86. The dispenser of claim 80, wherein the one or more mounting features are configured to facilitate the stacking of one or more disposable gloves in an elastically deformed compressed closed state.
87. The dispenser of claim 80, wherein the one or more mounting features of each of the one or more disposable gloves in the stack are connected to the mounting features of the next disposable glove in the stack.
88. The dispenser of claim 80, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting.
89. The dispenser of claim 80, wherein the one or more disposable gloves of the stack are all either right handed or left handed gloves.

90. The dispenser of claim 80, wherein the one or more disposable gloves are treated to adhere to each other to facilitate stacking.
91. The dispenser of claim 90, wherein a treatment to create adhesion is chemical.
92. The dispenser of claim 90, wherein a treatment to create adhesion is electrostatic.
93. The dispenser of claim 80, wherein the one or more disposable gloves of the stack further comprise a tab extending from the biased open cuff opening of the one or more disposable gloves on at least one of the first layer and second layer.
94. The dispenser of claim 93, wherein the biased open cuff opening of one layer of the one or more disposable gloves comprises a first tab extending from the biased open cuff opening and the biased open cuff opening of an other layer of the one or more disposable gloves comprises a second tab extending from the biased open cuff opening not opposite and not opposing the first tab.
95. The dispenser of claim 80, wherein the opening is generally in a shape of a human hand.
96. A stack of disposable gloves, the stack comprising:
one or more disposable gloves comprising:
a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand;
a second layer of thermoplastic material having a second perimeter border generally in the shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a cuff opening configured to receive a user's left hand or a user's right hand therethrough;

one or more mounting features extending from at least one of the first layer or the second layer at the cuff opening of the one or more disposable gloves for connecting the one or more disposable gloves to the stack of disposable gloves; and

one or more opening reliefs where the one or more mounting features extend from at least one of the first layer or second layer at the cuff opening of the one or more disposable gloves;

wherein the one or more opening reliefs provide slack in the cuff opening facilitating donning of the one or more disposable gloves while the one or more mounting features are connecting the one or more disposable gloves to the stack.

97. The stack of claim 96, wherein at least one of the first layer and second layer of the one or more disposable gloves is formed of a starch based thermoplastic.

98. The stack of claim 96, wherein the one or more opening reliefs comprise separation lines, that when torn, provide slack in the cuff opening facilitating donning of the one or more disposable gloves while the mounting features still couple the one or more disposable gloves to the stack.

99. The stack of claim 96, wherein at least one of the first layer or the second layer has extra cuff length so to extend beyond the cuff of the other layer resulting in an offset cuff from which the one or more mounting features extend.

100. The stack of claim 96, wherein when the one or more disposable gloves is disposed within a stack of a plurality of disposable gloves underneath the plurality of disposable gloves, the cuff is held in a closed state by the stack of the plurality of disposable gloves and transitions to a steady-state open state when the one or more disposable gloves is disposed in a top most position on top of the stack of the plurality of disposable gloves enabling the one or more opening reliefs to provide slack in the cuff opening.

101. The stack of claim 96, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting the stack in a dispenser.

102. The stack of claim 96, wherein the one or more mounting features are configured to release with the one or more disposable gloves when the one or more disposable gloves are removed from the stack.

103. The stack of claim 96, wherein the one or more disposable gloves are all the either right-handed or left-handed gloves.

104. A dispenser for disposable gloves, the dispenser comprising:
a base for supporting dispenser; and
a backplane extending perpendicular from base and having a set of one or more mounts for holding a stack of disposable gloves.

105. The dispenser of claim 103, further comprising a stack of disposable gloves, the stack comprising:

one or more disposable gloves comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

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one or more mounting features for mounting the one or more disposable gloves on the set of one or more mounts of the backplane of the dispenser;

wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening of the one or more disposable gloves to have a steady-state open state facilitating donning of the one or more disposable gloves;

wherein the one or more disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff opening of the one or more disposable gloves is held in a closed state by the one or more other disposable gloves in the stack of disposable gloves and transitions to the steady-state open state when the one or more disposable gloves holding the biased open cuff opening in a closed state are removed.

106. The dispenser of claim 105, wherein the one or more mounting features are configured to separate from the one or more disposable gloves.

107. The dispenser of claim 105, wherein the one or more mounting features are configured to release with disposable glove when the disposable glove is unmounted and donned by user.

108. The dispenser of claim 105, wherein the one or more mounting features are attached to one of the first layer and second layers.

109. The dispenser of claim 105, wherein the one or more mounting features are connected to the layer of the one or more disposable gloves not containing extra material.

110. The dispenser of claim 105, wherein the one or more mounting features are configured to facilitating the stacking of one or more disposable gloves in an elastically deformed compressed closed state.

111. The dispenser of claim 105, wherein the one or more mounting features of each of the one or more disposable gloves in the stack are connected to the mounting features of a next disposable glove in the stack.

112. The dispenser of claim 105, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting.

113. The dispenser of claim 104, wherein the one or more disposable gloves of the stack are all either right handed or left handed gloves.

114. The dispenser of claim 104, further comprising a stack one or more disposable gloves, the disposable gloves comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand;

a second layer of thermoplastic material having a second perimeter border generally in the shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a cuff opening configured to receive a user's left hand or a user's right hand therethrough;

one or more mounting features extending from at least one of the first layer or the second layer at the cuff opening of the one or more disposable gloves for connecting the one or more disposable gloves to the stack of disposable gloves; and

one or more opening reliefs where the one or more mounting features extend from at least one of the first layer or second layer at the cuff opening of the one or more disposable gloves;

wherein the one or more opening reliefs provide slack in the cuff opening facilitating donning of the one or more disposable gloves while the one or more mounting features are connecting the one or more disposable gloves to the stack.

115. The dispenser of claim 104, wherein the backplane further comprises a second set of one or more mountings on the opposite side of the backplane from the first set of mounts for holding a second stack of disposable glove.

116. The dispenser of claim 115, further comprising a second stack of disposable gloves.

117. A dispenser for disposable gloves, the dispenser comprising:
a base for supporting dispenser;
a support frame extending from the base;
a first mounting face attached to the support frame;
a first set of mounts for holding a first stack of disposable gloves on the first mounting face;
a second mounting face attached to the support frame opposite and adjacent to the first mounting face; and
a second set of mounts for holding a second stack of disposable gloves on the second mounting face.

118. The dispenser of claim 117, further comprising a first stack of disposable gloves mounted on the first mounting face and a second stack of disposable gloves mounted on the second mounting face, the first stack and second stack of disposable gloves comprising one or more disposable gloves comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

a second layer of thermoplastic material having a second perimeter border generally in the shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

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the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the disposable gloves;

a biased open cuff opening configured to receive a user's left hand or a user's right hand therethrough;

one or more mounting features for mounting the disposable gloves on the one or more mounts of at least one of the first or second mounting faces of the dispenser; wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening of the disposable gloves to have a steady-state open state facilitating donning of the disposable gloves;

wherein the disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff opening of the disposable gloves is held in a closed state by other disposable gloves and transitions to the steady-state open state when the disposable gloves holding the biased open cuff opening in a closed state are removed.

119. The dispenser of claim 117, further comprising a first stack of disposable gloves mounted on the first mounting face and a second stack of disposable gloves mounted on the second mounting face, the first stack and second stack of disposable gloves comprising one or more disposable gloves comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand;

a second layer of thermoplastic material having a second perimeter border generally in the shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a cuff opening configured to receive a user's left hand or a user's right hand therethrough;

one or more mounting features extending from at least one of the first layer or second layer at the cuff opening of the one or more disposable gloves for connecting the one or more disposable gloves to a respective stack of disposable gloves and mounting on at least one of the one or more mounting features; and

one or more opening reliefs where the one or more mounting features extend from the at least one of first or second layers at the cuff opening of the one or more disposable gloves;

wherein the one or more opening reliefs provide slack in the cuff opening facilitating donning of the one or more disposable gloves while the one or more mounting features are connecting the one or more disposable gloves to the stack.

120. The dispenser of claim 117, wherein the second mounting face is not orientated parallel with the first mounting face.

121. The dispenser of claim 120, wherein an orientation of the first mounting face and second mounting face are angularly splayed to each other.

122. The dispenser of claim 120, wherein an orientation of the first mounting face and second mounting face are adjustable in relation to the each other and the dispenser.

123. The dispenser of claim 117, wherein at least one of the first mounting face and second mounting face are biased in relation to the first set of mounts and the second set of mounts so as to provide a retention force for holding the first stack and second stack of disposable gloves on the mounts.

124. The dispenser of claim 117, wherein the at least one of the first set of mounts and second set of mounts are biased in relation to at least one of the first mounting face and second mounting face so as to provide a retention force for holding the first stack and second stack of disposable gloves on the mounts.

125. The dispenser of claim 117, wherein the mounts are asymmetrical to facilitate mounting stacks of disposable gloves in a correct orientation.

AMENDED CLAIMS

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CLAIMS

What is claimed is:

1. A disposable glove comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and the second layer are coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the disposable glove;

a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening to maintain a steady-state open state facilitating donning of the disposable glove.

2. The disposable glove of claim 1, wherein at least one of the first layer and second layer comprises a starch based thermoplastic.

3. The disposable glove of claim 1, wherein at least one of the first layer and second layer comprises sub-layers.

4. The disposable glove of claim 1, wherein the thermoplastic material of at least one of the first layer and second layer has a thickness between 0.5 mils and 3 mils.

5. The disposable glove of claim 1, wherein the first layer and second layer are made of different thermoplastic materials.
6. The disposable glove of claim 1, wherein at least one of the first layer and second layer comprises formed geometry.
7. The disposable glove of claim 6, wherein the formed geometry comprises a three-dimensional form generally shaped to fit a human hand.
8. The disposable glove of claim 6, wherein the formed geometry comprises extruded features.
9. The disposable glove of claim 8, wherein the thickness of extruded features can vary between about 20% and about 250% of material thickness.
10. The disposable glove of claim 8, wherein the formed geometry is formed by extruding the thermoplastic material to a depth between about 0.1 inches to about 2.5 inches.
11. The disposable glove of claim 6, wherein the formed geometry comprises features for facilitating compression of the disposable glove for storage.
12. The disposable glove of claim 11, wherein the features for facilitating compression of the disposable glove comprise creases for folding the extra material.
13. The disposable glove of claim 12, wherein the creases are located around a perimeter border of the disposable glove.
14. The disposable glove of claim 11, wherein when in a compressed state, the extra material of the formed geometry provides structural rigidity to the disposable glove.
15. The disposable glove of claim 1, wherein at least one of the first layer or second layer has extra cuff length to extend beyond the cuff opening of an outer layer resulting in an offset cuff.

16. The disposable glove of claim 1, further comprising one or more mounting features for mounting the disposable glove.
17. The disposable glove of claim 16 wherein the one or more mounting features comprise extra material extending from the biased open cuff opening of the disposable glove.
18. The disposable glove of claim 16, wherein the one or more mounting features are configured to separate from the disposable glove when the disposable glove is unmounted and donned by the user.
19. The disposable glove of claim 16, wherein the one or more mounting features are configured to release with the disposable glove when the disposable glove is unmounted and donned by the user.
20. The disposable glove of claim 16, wherein the one or more mounting features are attached to one of the first layer and second layer.
21. The disposable glove of claim 16, wherein the one or more mounting features are configured to facilitating the stacking of one or more disposable gloves in a compressed closed state.
22. The disposable glove of claim 15, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting.
23. The disposable glove claim 1, wherein the disposable glove is configured to be interchangeably right handed or left handed.
24. The disposable glove of claim 1, further comprising a tab extending from the biased open cuff opening of the disposable glove on at least one of the first layer and second layer.
25. The disposable glove of claim 23, wherein the biased open cuff opening of one layer of the disposable glove comprises a first tab extending from the biased open cuff opening and

the biased open cuff opening of another layer of the disposable glove comprises a second tab extending from the biased open cuff opening not opposite and not opposing the first tab.

26. The disposable glove of claim 1, the biased open cuff opening wherein when the disposable glove is disposed within a stack of a plurality of disposable gloves underneath the plurality of disposable gloves, the biased open cuff opening is held in a closed state by the stack of the plurality of disposable gloves and returns to the steady-state open state when the disposable glove is disposed in a top most position on top of the stack of the plurality of disposable gloves.

27. A stack of disposable gloves for storage and dispensing, the stack comprising:
one or more disposable gloves comprising:

- a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

- a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

- the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

- a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

- wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening of the one or more disposable gloves to have a steady-state open state facilitating donning of the one or more disposable gloves;

- wherein the one or more disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff opening of the one or more disposable gloves is held in a closed state by the one or more other disposable gloves in the stack of

disposable gloves and transitions to the steady-state open state when the one or more disposable gloves holding the biased open cuff opening in a closed state are removed.

28. The stack of claim 27, wherein the one or more disposable gloves further comprise mounting features.

29. The stack of claim 27, wherein the mounting features are configured to separate from the one or more disposable gloves.

30. The stack of claim 27, wherein the mounting features are configured to release with the one or more disposable gloves when the one or more disposable gloves are unmounted and donned by the user.

31. The stack of claim 27, wherein the mounting features comprises excess material around at least a portion of the first perimeter border and second perimeter border of the one or more disposable gloves.

32. The stack of claim 27, wherein the mounting features are attached to one of the first layer and second layer of the one or more disposable gloves.

33. The stack of claim 27, wherein the mounting features are asymmetrical for facilitating correct orientation when mounting the stack in a dispenser.

34. The stack of claim 27, wherein the one or more disposable gloves are stacked in an alternating interwoven orientation.

35. The stack of claim 27, wherein the one or more disposable gloves are all either right handed or left handed gloves.

36. The stack of claim 27, wherein the one or more disposable gloves are treated to adhere to each other to facilitate stacking.

37. The stack of claim 36, wherein a treatment to create adhesion is chemical.

38. The stack of claim 36, wherein a treatment to create adhesion is electrostatic.
39. The stack of claim 36, wherein a treatment to create adhesion comprises application of heat.
40. A method of manufacturing a disposable glove, the method comprising:
providing a first layer of thermoplastic material;
providing a second layer of thermoplastic material;
forming at least one of the first layer and second layer into a three-dimensional shape generally conforming to a human hand including a middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;
coupling the first layer to the second layer such that a resulting middle section of the first layer and a resulting middle section of the second layer have different total areas from each other in such a way that one of the resulting middle section of the first layer and the resulting middle section of the second layer contain extra material and does not lay flat, causing a biased open cuff opening of the disposable glove to be in a steady-state open state facilitating donning of the disposable glove; and
cutting the coupled first layer and second layer to have a perimeter border generally in a shape of a human hand.
41. The method of claim 40, wherein forming at least one of the first layer or second layer of material comprises vacuum forming at least one of the first layer and second layer on a mold.
42. The method of claim 41, wherein the coupling of the first layer and second layer is performed while at least one of the first layer and second layer is still on the mold.
43. The method of claim 41, wherein the cutting the coupled first layer and second layer is performed while at least one of the first layer and second layer is still on the mold.

44. The method of claim 40, wherein at least one of the first layer and second layer comprises a starch based thermoplastic.
45. The method of claim 40, wherein at least one of the first layer and second layer comprises sub layers.
46. The method of claim 40, wherein at the thermoplastic material of at least one of the first layer and second layer has a thickness between about 0.5 mils and about 3 mils.
47. The method of claim 40, wherein the first layer and second layer are made of different thermoplastic materials.
48. The method of claim 40, wherein the extra material comprises between about 0.1% to about 10% more material.
49. The method of claim 40, wherein at least one of the first layer and second layer comprises formed geometry.
50. The method of claim 49, wherein the formed geometry comprises a three-dimensional form generally shaped to fit a human hand.
51. The method of claim 49, wherein the formed geometry comprises extruded features.
52. The method of claim 49, wherein the thickness of the extruded features can vary between about 20% and about 250% of material thickness.
53. The method of claim 49, wherein the formed geometry is formed by extruding the thermoplastic material to a depth between about 0.1 inches to about 2.5 inches.
54. The method of claim 49, wherein the formed geometry comprises features for facilitating compression and elastic deformation of the disposable glove for storage.

55. The method of claim 40, wherein at least one of the first layer and second layer further includes one or more mounting features.
56. The method of claim 40, wherein at least one of the first layer and second layer further includes a tab extending from the biased open cuff opening of the disposable glove.
57. The method of claim 40, wherein at least one of the first layer and second layer is formed by melting pellets of thermoplastic material and extruding the thermoplastic material into a sheet.
58. The method of claim 40, further comprising:
wherein when the disposable glove is disposed within a stack of a plurality of disposable gloves underneath the plurality of disposable gloves, compressing and elastically deforming the biased open cuff opening and holding the biased open cuff opening in a closed state.
59. A disposable glove, comprising:
a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and
a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;
the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the disposable glove;
a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;
wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material having a formed geometry comprising a three-dimensional form generally shaped to fit a human hand and does not lay flat, causing the biased open cuff

opening of the disposable glove to be in a steady-state open state facilitating donning of the disposable glove.

60. The disposable glove of claim 59, wherein at least one of the first layer and second layer comprises a starch based thermoplastic.

61. The disposable glove of claim 59, wherein at least one of the first layer and second layer comprises sub layers.

62. The disposable glove of claim 59, wherein the thermoplastic material of at least one of the first layer and second layer has a thickness between 0.5 mils and 3 mils.

63. The disposable glove of claim 59, wherein the first layer and second layer are formed of different thermoplastic materials.

64. The disposable glove of claim 59, wherein the formed geometry further comprises extruded features.

65. The disposable glove of claim 64, wherein the thickness of the extruded features can vary between 20% and 250% of material thickness.

66. The disposable glove of claim 59, wherein the formed geometry is formed by extruding the thermoplastic material to a depth between 0.1 inches to 2.5 inches.

67. The disposable glove of claim 59, wherein the formed geometry comprises features for facilitating compression and elastic deformation of the disposable glove for storage.

68. The disposable glove of claim 59, further comprising one or more mounting features.

69. The disposable glove of claim 68, wherein the one or more mounting features are configured to separate from the disposable glove.

70. The disposable glove of claim 68, wherein the one or more mounting features are configured to release with the disposable glove when the disposable glove is unmounted and donned by the user.

71. The disposable glove of claim 68, wherein the one or more mounting features are attached to one of the first layer and the second layer.

72. The disposable glove of claim 68, wherein the one or more mounting features are configured to facilitating the stacking of one or more disposable gloves in an elastically deformed compressed closed state.

73. The disposable glove of claim 68, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting.

74. The disposable glove claim 59, wherein the disposable glove is configured to be either right or left handed.

75. The disposable glove of claim 59, further comprising a tab extending from the biased open cuff opening of the disposable glove on at least one of the first layer and second layer.

76. The disposable glove of claim 59, wherein the biased open cuff opening of one layer of the disposable glove comprises a first tab extending from the biased open cuff opening and the biased open cuff opening of another layer of the disposable glove comprises a second tab extending from the biased open cuff opening not opposite and not opposing the first tab.

77. The disposable glove of claim 59, wherein the disposable glove is compressed in a stack of one or more disposable gloves, such that the biased open cuff opening is held in an elastically deformed closed state by the one or more disposable gloves in the stack of one or more disposable gloves and transitions to the steady-state open state when the one or more disposable gloves holding the biased open cuff opening in a closed state are removed.

78. A dispenser for disposable gloves, the dispenser comprising:
a housing with an internal chamber; and

a stack of disposable gloves, the stack comprising:

one or more disposable gloves comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening of the one or more disposable gloves to have a steady-state open state facilitating donning of the one or more disposable gloves;

wherein the one or more disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff opening of the one or more disposable gloves is held in a closed state by the one or more other disposable gloves in the stack of disposable gloves and transitions to the steady-state open state when the one or more disposable gloves holding the biased open cuff opening in a closed state are removed;

wherein the housing has an opening from which protrudes at least the biased open cuff opening of an uppermost disposable glove of the stack such that when the uppermost disposable glove is removed from the housing, the biased open cuff opening of a next disposable glove in the stack transitions from a closed to state to a steady-state open state and protrudes from the opening.

79. The dispenser of claim 78, wherein the one or more disposable gloves of the stack further comprise one or more mounting features.

80. The dispenser of claim 78, further comprising one or more mountings corresponding to the one or more mounting features of the one or more disposable gloves for holding the one or more disposable gloves of the stack in the housing.

81. The dispenser of claim 80, wherein the one or more mounting features are configured to separate from the one or more disposable gloves.

82. The dispenser of claim 80, wherein the one or more mounting features are configured to release with the one or more disposable gloves when the one or more disposable gloves are unmounted and donned by the user.

83. The dispenser of claim 80, wherein the one or more mounting features comprises excess material around at least a portion of the first perimeter border and second perimeter border of the one or more disposable gloves.

84. The dispenser of claim 80, wherein the one or more mounting features are attached to one of the first layer and the second layer.

85. The dispenser of claim 80, wherein the one or more mounting features are connected to a layer of the one or more disposable gloves not containing extra material.

86. The dispenser of claim 80, wherein the one or more mounting features are configured to facilitate the stacking of one or more disposable gloves in an elastically deformed compressed closed state.

87. The dispenser of claim 80, wherein the one or more mounting features of each of the one or more disposable gloves in the stack are connected to the mounting features of a next disposable glove in the stack.

88. The dispenser of claim 80, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting.
89. The dispenser of claim 80, wherein the one or more disposable gloves of the stack are all either right handed or left handed gloves.
90. The dispenser of claim 80, wherein the one or more disposable gloves are treated to adhere to each other to facilitate stacking.
91. The dispenser of claim 90, wherein a treatment to create adhesion is chemical.
92. The dispenser of claim 90, wherein a treatment to create adhesion is electrostatic.
93. The dispenser of claim 80, wherein the one or more disposable gloves of the stack further comprise a tab extending from the biased open cuff opening of the one or more disposable gloves on at least one of the first layer and second layer.
94. The dispenser of claim 93, wherein the biased open cuff opening of one layer of the one or more disposable gloves comprises a first tab extending from the biased open cuff opening and the biased open cuff opening of an other layer of the one or more disposable gloves comprises a second tab extending from the biased open cuff opening not opposite and not opposing the first tab.
95. The dispenser of claim 80, wherein the opening is generally in a shape of a human hand.
96. A stack of disposable gloves, the stack comprising:
one or more disposable gloves comprising:
a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand;

a second layer of thermoplastic material having a second perimeter border generally in the shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a cuff opening configured to receive a user's left hand or a user's right hand therethrough;

one or more mounting features extending from at least one of the first layer or the second layer outboard of the cuff opening of the one or more disposable gloves for connecting the one or more disposable gloves to the stack of disposable gloves; and

one or more opening reliefs where the one or more mounting features extend from at least one of the first layer or second layer outboard of the cuff opening of the one or more disposable gloves;

wherein the one or more opening reliefs provide slack in the cuff opening facilitating donning of the one or more disposable gloves while the one or more mounting features are connecting the one or more disposable gloves to the stack.

97. The stack of claim 96, wherein at least one of the first layer and second layer of the one or more disposable gloves is formed of a starch based thermoplastic.

98. The stack of claim 96, wherein the one or more opening reliefs comprise separation lines, that when torn, provide slack in the cuff opening facilitating donning of the one or more disposable gloves while the mounting features still couple the one or more disposable gloves to the stack.

99. The stack of claim 96, wherein at least one of the first layer or the second layer has extra cuff length so to extend beyond the cuff of the other layer resulting in an offset cuff from which the one or more mounting features extend.

100. The stack of claim 96, wherein when the one or more disposable gloves is disposed within a stack of a plurality of disposable gloves underneath the plurality of disposable

gloves, the cuff is held in a closed state by the stack of the plurality of disposable gloves and transitions to a steady-state open state when the one or more disposable gloves is disposed in a top most position on top of the stack of the plurality of disposable gloves enabling the one or more opening reliefs to provide slack in the cuff opening.

101. The stack of claim 96, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting the stack in a dispenser.

102. The stack of claim 96, wherein the one or more mounting features are configured to release with the one or more disposable gloves when the one or more disposable gloves are removed from the stack.

103. The stack of claim 96, wherein the one or more disposable gloves are all either right-handed or left-handed gloves.

104. A dispenser for disposable gloves, the dispenser comprising:

- a base for supporting the dispenser;

- a backplane extending perpendicular from the base and having a set of one or more mounts for holding a stack of disposable gloves; and

- a stack of disposable gloves, the stack comprising:

- one or more disposable gloves comprising:

- a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

- a second layer of thermoplastic material having a second perimeter border generally in a shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

- the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a biased open cuff opening configured to receive a user's left hand and a user's right hand therethrough;

one or more mounting features for mounting the one or more disposable gloves on the set of one or more mounts of the backplane of the dispenser;

wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening of the one or more disposable gloves to have a steady-state open state facilitating donning of the one or more disposable gloves; and

wherein the one or more disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff opening of the one or more disposable gloves is held in a closed state by the one or more other disposable gloves in the stack of disposable gloves and transitions to the steady-state open state when the one or more disposable gloves holding the biased open cuff opening in a closed state are removed.

106. The dispenser of claim 104, wherein the one or more mounting features are configured to separate from the one or more disposable gloves.

107. The dispenser of claim 104, wherein the one or more mounting features are configured to release with the disposable glove when the disposable glove is unmounted and donned by the user.

108. The dispenser of claim 104, wherein the one or more mounting features are attached to one of the first layer and the second layer.

109. The dispenser of claim 104, wherein the one or more mounting features are connected to a layer of the one or more disposable gloves not containing extra material.

110. The dispenser of claim 104, wherein the one or more mounting features are configured to facilitating the stacking of one or more disposable gloves in an elastically deformed compressed closed state.

111. The dispenser of claim 104, wherein the one or more mounting features of each of the one or more disposable gloves in the stack are connected to the one or more mounting features of a next disposable glove in the stack.

112. The dispenser of claim 104, wherein the one or more mounting features are asymmetrical for facilitating correct orientation when mounting.

113. The dispenser of claim 104, wherein the one or more disposable gloves of the stack are all either right handed or left handed gloves.

114. A dispenser for disposable gloves, the dispenser comprising:
a base for supporting the dispenser;
a backplane extending perpendicular from the base and having a set of one or more mounts for holding a stack of disposable gloves; and
a stack one or more disposable gloves, the disposable gloves comprising:
a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand;
a second layer of thermoplastic material having a second perimeter border generally in the shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;
the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;
a cuff opening configured to receive a user's left hand or a user's right hand therethrough;

one or more mounting features extending from at least one of the first layer or the second layer outboard of the cuff opening of the one or more disposable gloves for connecting the one or more disposable gloves to the stack of disposable gloves; and

one or more opening reliefs where the one or more mounting features extend from at least one of the first layer or second layer outboard of the cuff opening of the one or more disposable gloves;

wherein the one or more opening reliefs provide slack in the cuff opening facilitating donning of the one or more disposable gloves while the one or more mounting features are connecting the one or more disposable gloves to the stack.

115. The dispenser of claim 104 or 114, wherein the backplane further comprises a second set of one or more mounts on the opposite side of the backplane from the first set of one or more mounts for holding a second stack of disposable gloves.

116. The dispenser of claim 115, further comprising a second stack of disposable gloves.

118. A dispenser for disposable gloves, the dispenser comprising:

a base for supporting the dispenser;

a support frame extending from the base;

a first mounting face attached to the support frame;

a first set of mounts for holding a first stack of disposable gloves on the first mounting face;

a second mounting face attached to the support frame opposite and adjacent to the first mounting face;

a second set of mounts for holding a second stack of disposable gloves on the second mounting face; and

a first stack of disposable gloves mounted on the first mounting face and a second stack of disposable gloves mounted on the second mounting face, the first stack and second stack of disposable gloves comprising one or more disposable gloves comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand; and

a second layer of thermoplastic material having a second perimeter border generally in the shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the disposable gloves;

a biased open cuff opening configured to receive a user's left hand or a user's right hand therethrough;

one or more mounting features for mounting the disposable gloves on the one or more mounts of at least one of the first or second mounting faces of the dispenser;

wherein the first middle section and the second middle section have different total areas from each other in such a way that one of the first middle section and second middle section contain extra material and does not lay flat, causing the biased open cuff opening of the disposable gloves to have a steady-state open state facilitating donning of the disposable gloves;

wherein the disposable gloves are in an elastically deformed and compressed closed state wherein the biased open cuff opening of the disposable gloves is held in a closed state by other disposable gloves and transitions to the steady-state open state when the disposable gloves holding the biased open cuff opening in a closed state are removed.

119. A dispenser for disposable gloves, the dispenser comprising:
- a base for supporting the dispenser;
 - a support frame extending from the base;
 - a first mounting face attached to the support frame;
 - a first set of mounts for holding a first stack of disposable gloves on the first mounting face;
 - a second mounting face attached to the support frame opposite and adjacent to the first mounting face;
 - a second set of mounts for holding a second stack of disposable gloves on the second mounting face; and

a first stack of disposable gloves mounted on the first mounting face and a second stack of disposable gloves mounted on the second mounting face, the first stack and second stack of disposable gloves comprising one or more disposable gloves comprising:

a first layer of thermoplastic material having a first perimeter border generally in a shape of a human hand and including a first middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is left hand or right hand;

a second layer of thermoplastic material having a second perimeter border generally in the shape of a human hand and including a second middle section configured to span interchangeably a palmar aspect and a dorsal aspect of a user's hand based on whether the user's hand is a left hand or right hand;

the first layer and second layer coupled together at and along the first perimeter border and the second perimeter border in such a way that results in the one or more disposable gloves;

a cuff opening configured to receive a user's left hand or a user's right hand therethrough;

one or more mounting features extending from at least one of the first layer or second layer outboard of the cuff opening of the one or more disposable gloves for connecting the one or more disposable gloves to a respective stack of disposable gloves and mounting on at least one of the one or more mounting features; and

one or more opening reliefs where the one or more mounting features extend from the at least one of first or second layers outboard of the cuff opening of the one or more disposable gloves;

wherein the one or more opening reliefs provide slack in the cuff opening facilitating donning of the one or more disposable gloves while the one or more mounting features are connecting the one or more disposable gloves to the stack.

120. The dispenser of claim 118 or 119, wherein the second mounting face is not orientated parallel with the first mounting face.

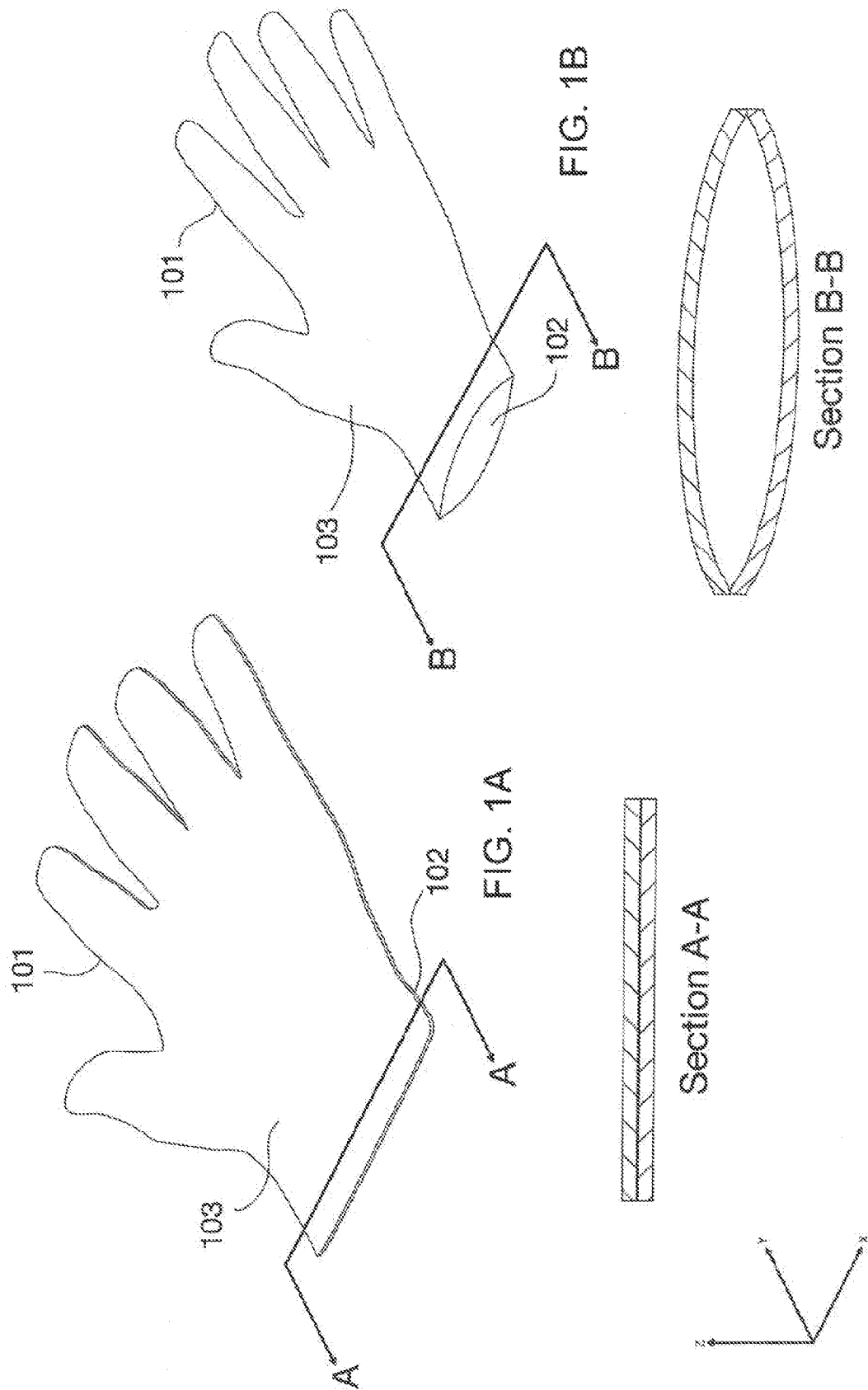
121. The dispenser of claim 120, wherein an orientation of the first mounting face and second mounting face are angularly splayed to each other.

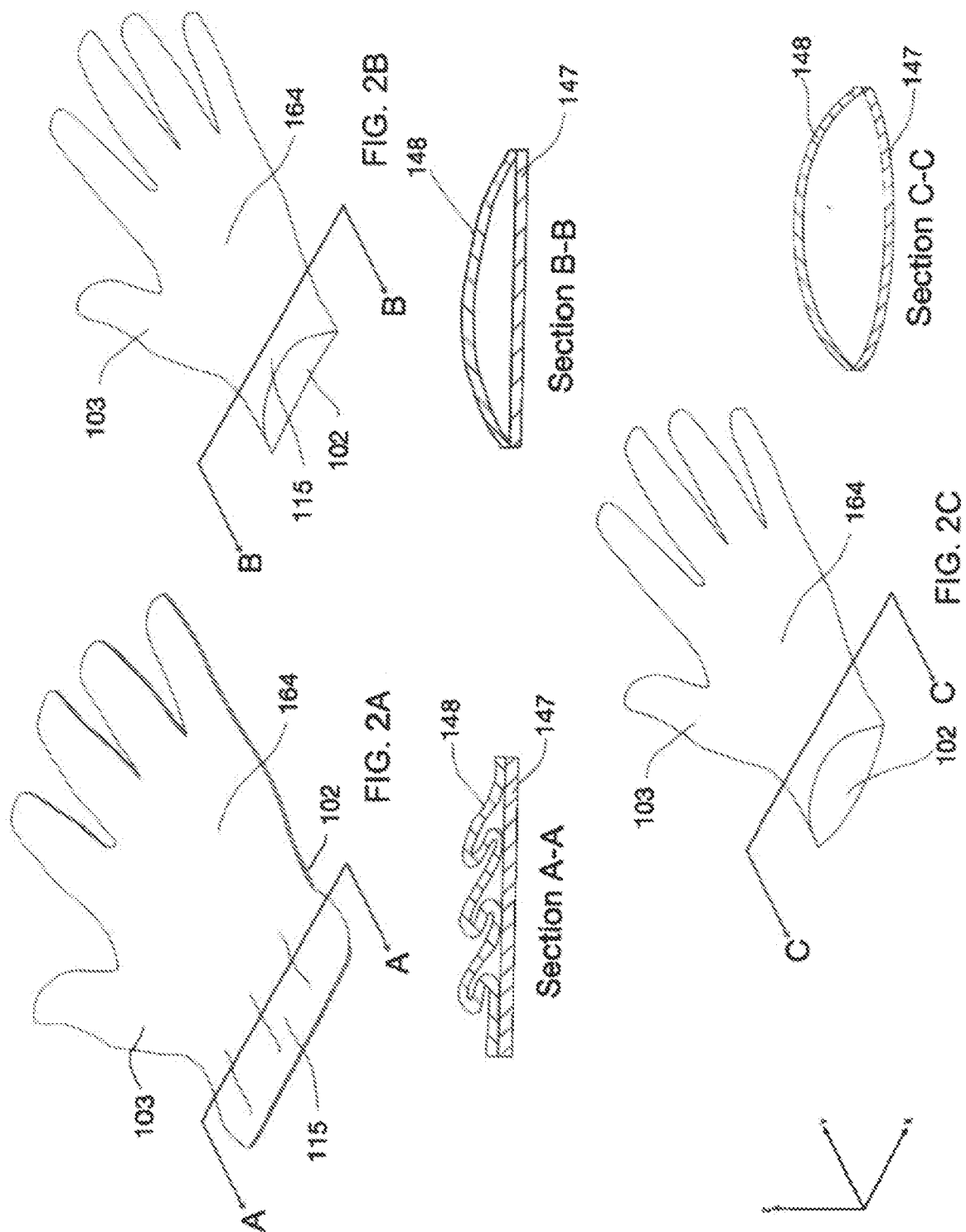
122. The dispenser of claim 120, wherein an orientation of the first mounting face and second mounting face are adjustable in relation to the each other and the dispenser.

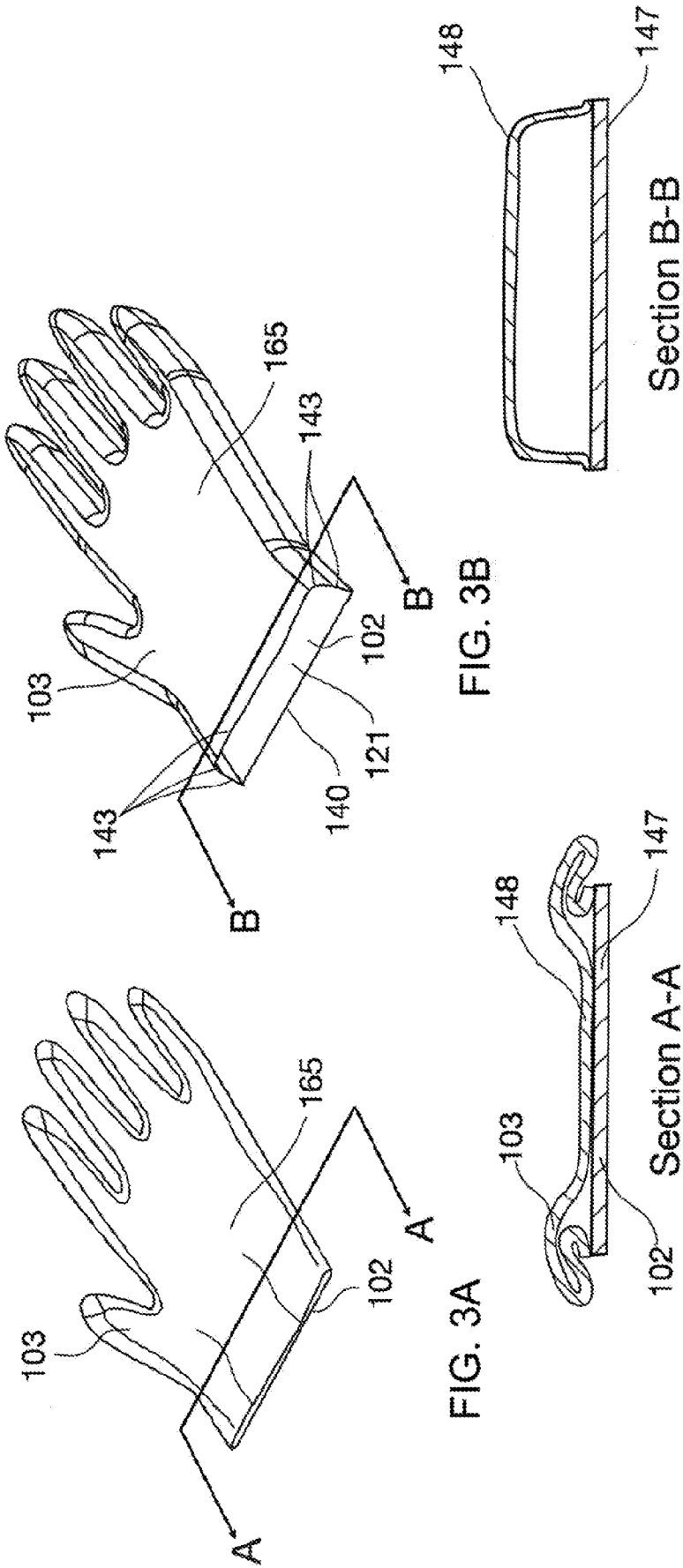
123. The dispenser of claim 118 or 119, wherein at least one of the first mounting face and second mounting face are biased in relation to the first set of mounts and the second set of mounts so as to provide a retention force for holding the first stack and second stack of disposable gloves on the mounts.

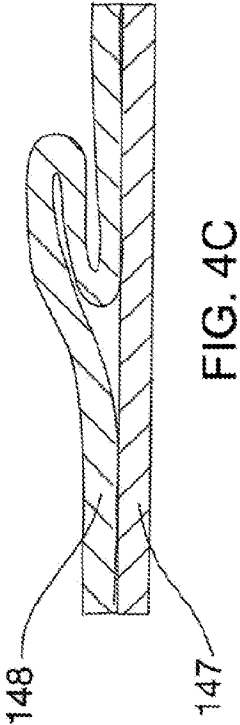
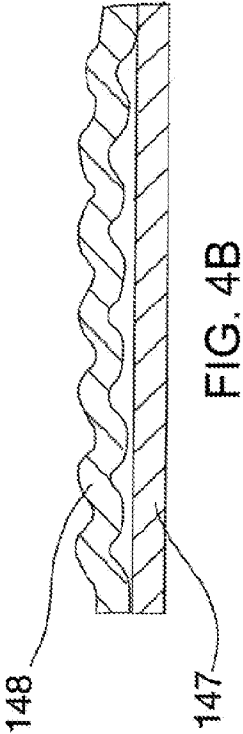
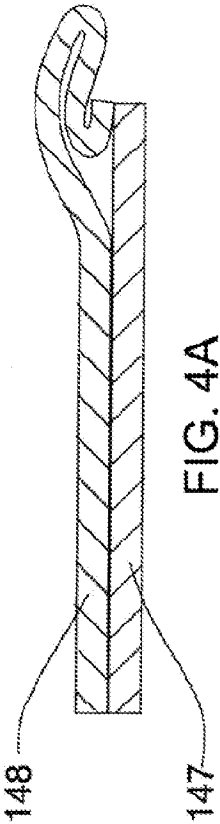
124. The dispenser of claim 118 or 119, wherein at least one of the first set of mounts and the second set of mounts are biased in relation to at least one of the first mounting face and second mounting face so as to provide a retention force for holding the first stack and second stack of disposable gloves on the mounts.

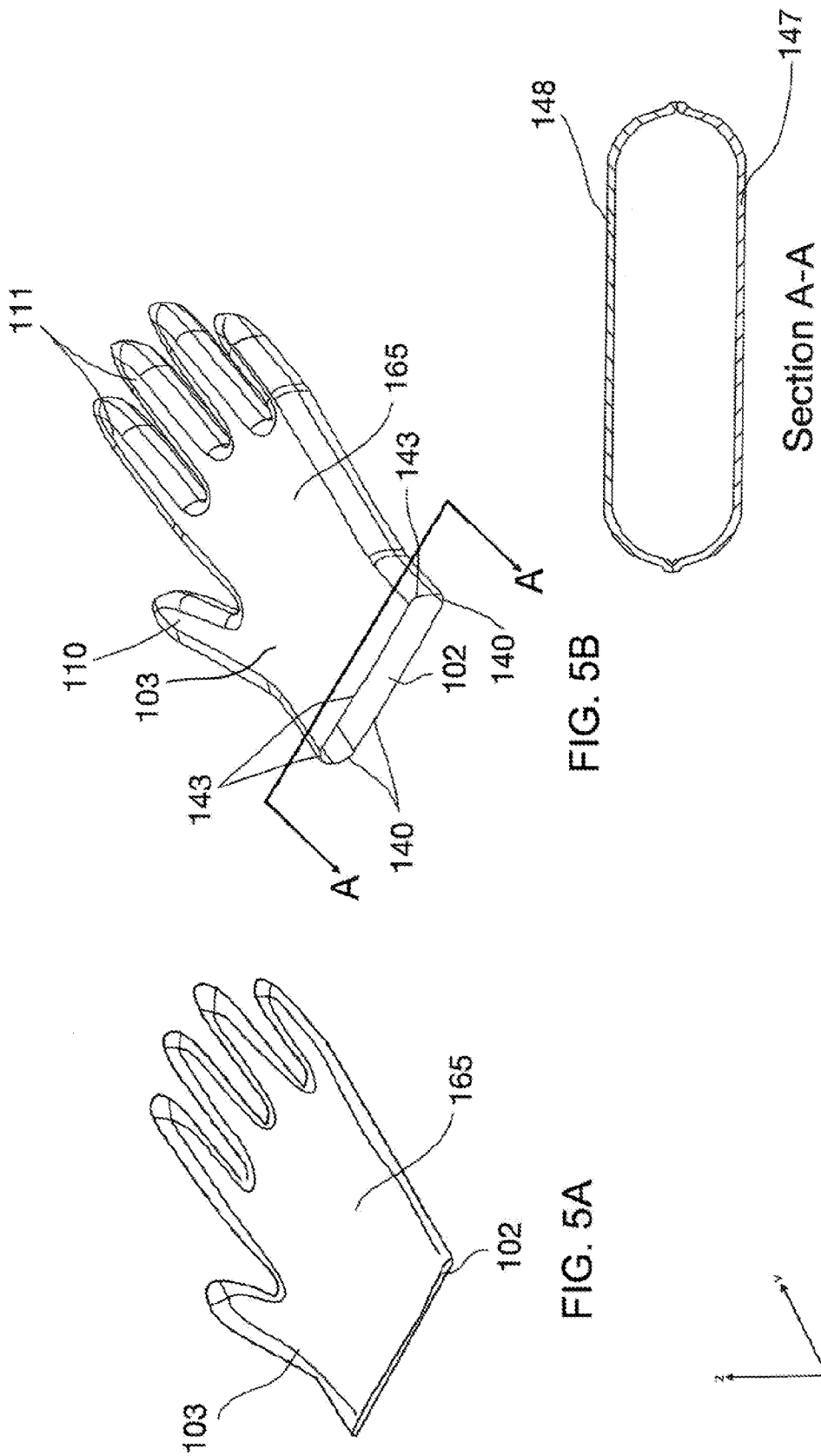
125. The dispenser of claim 118 or 119, wherein at least one of the first set of mounts and the second set of mounts are asymmetrical to facilitate mounting stacks of disposable gloves in a correct orientation.

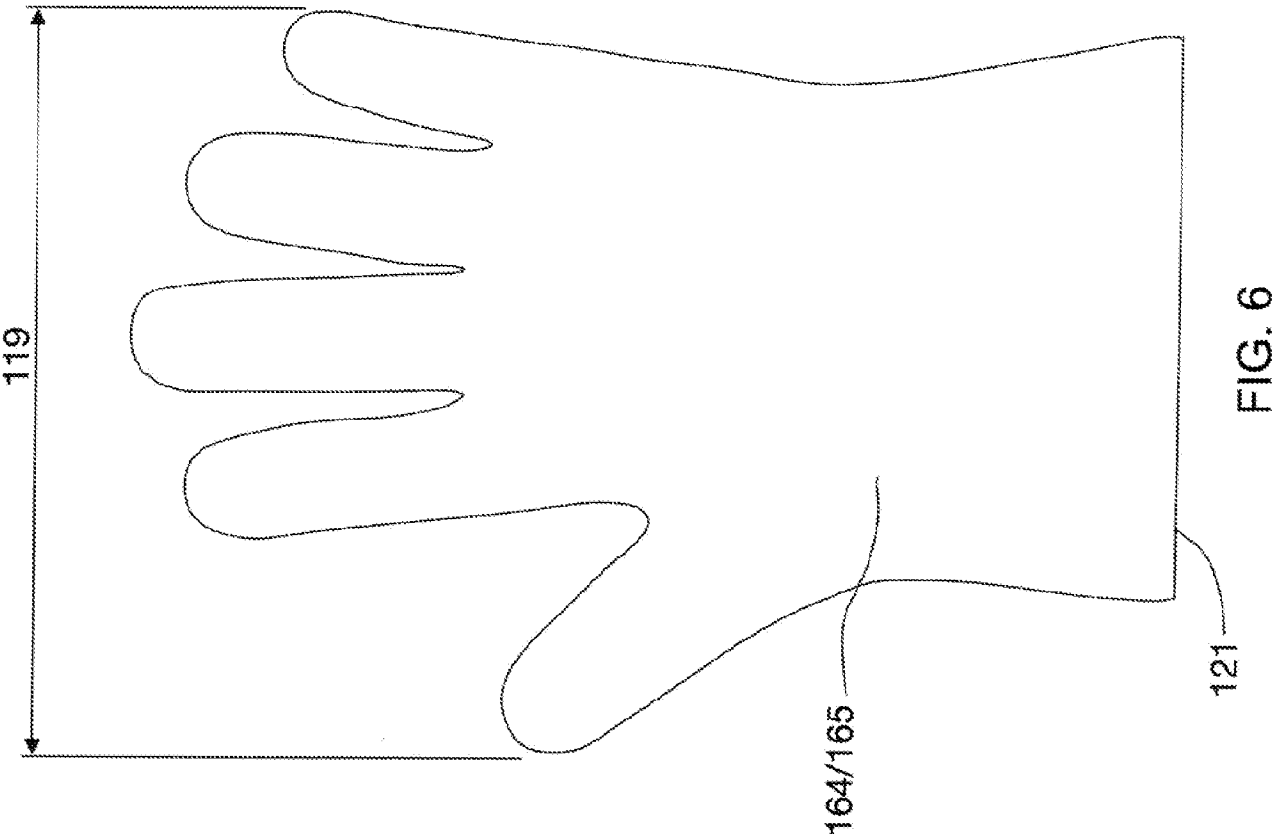












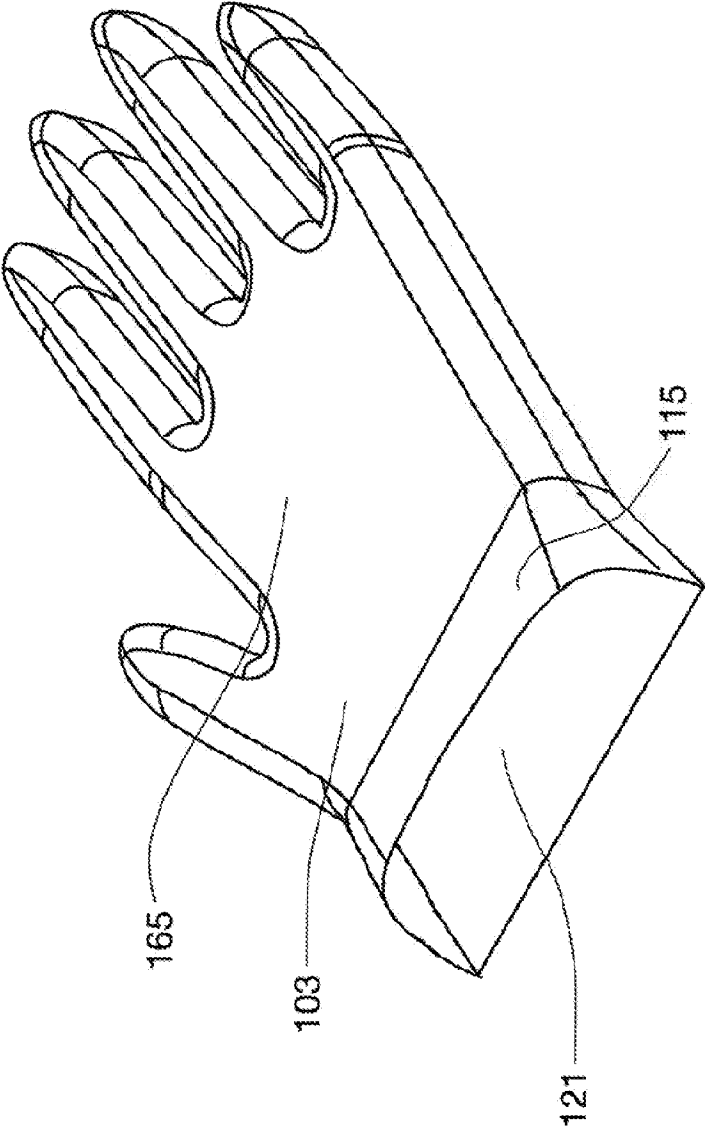


FIG. 7

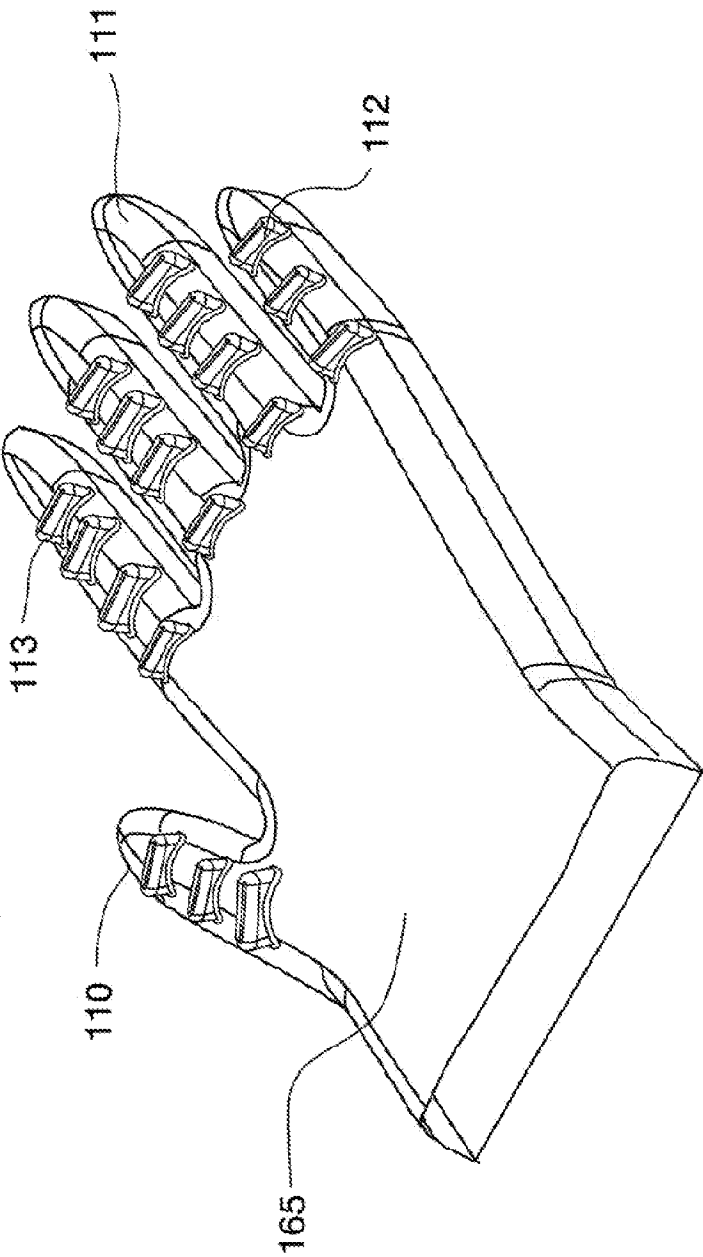


FIG. 8

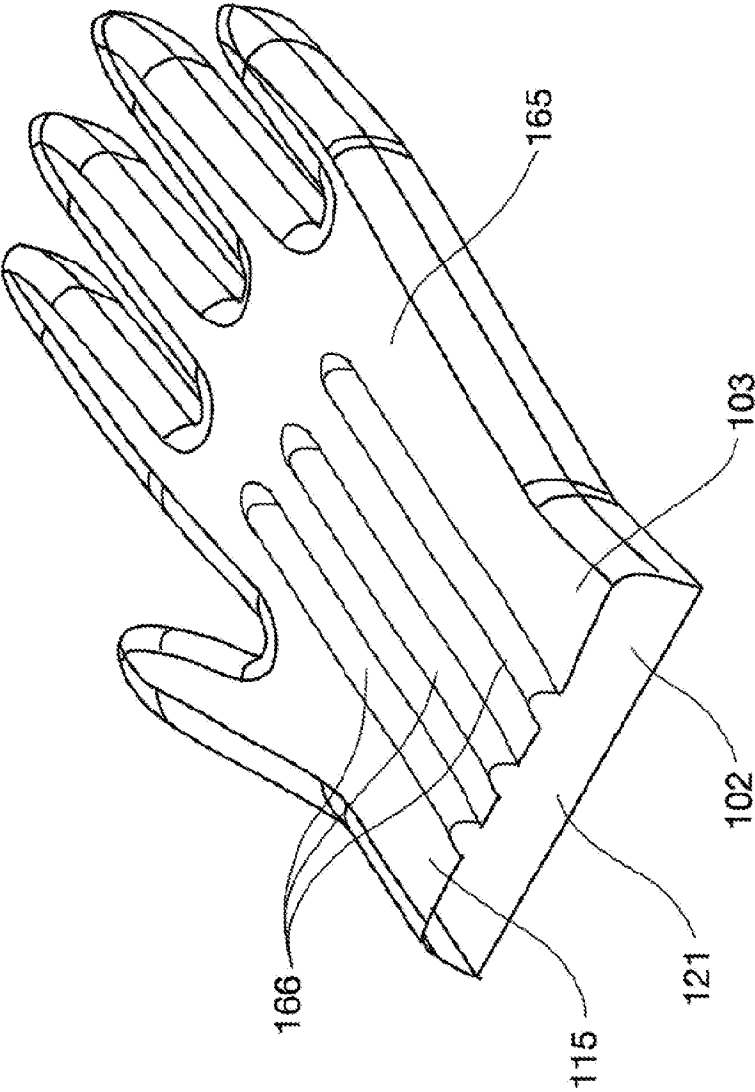


FIG. 9

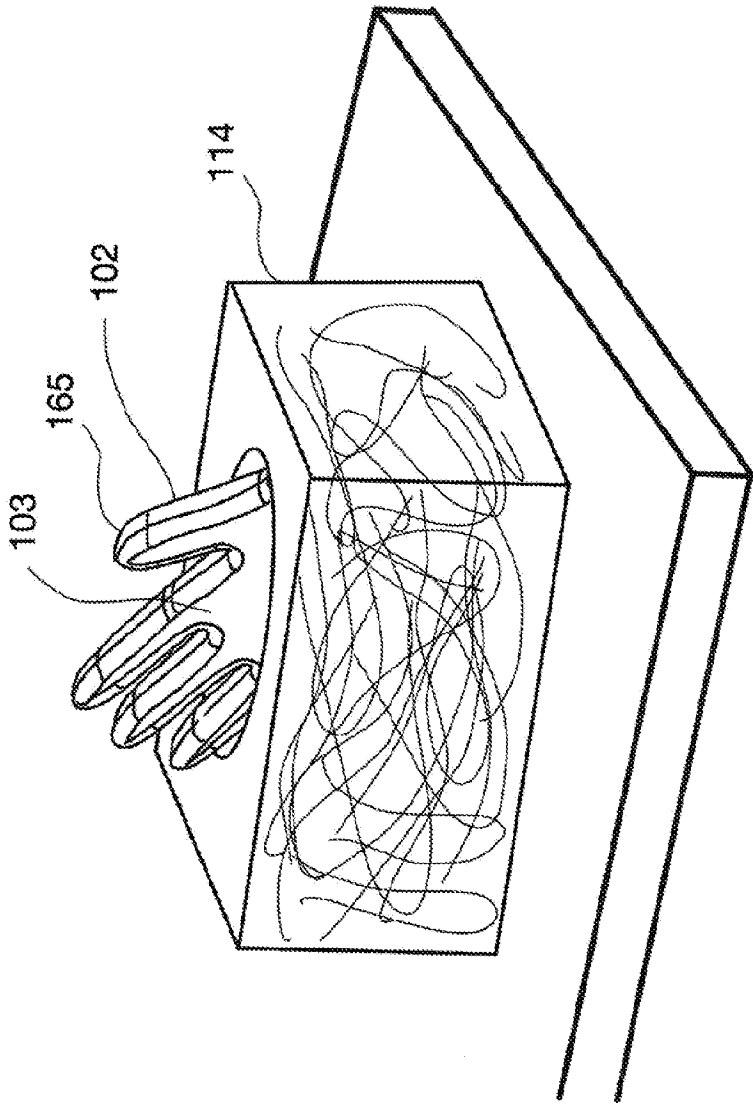


FIG. 10

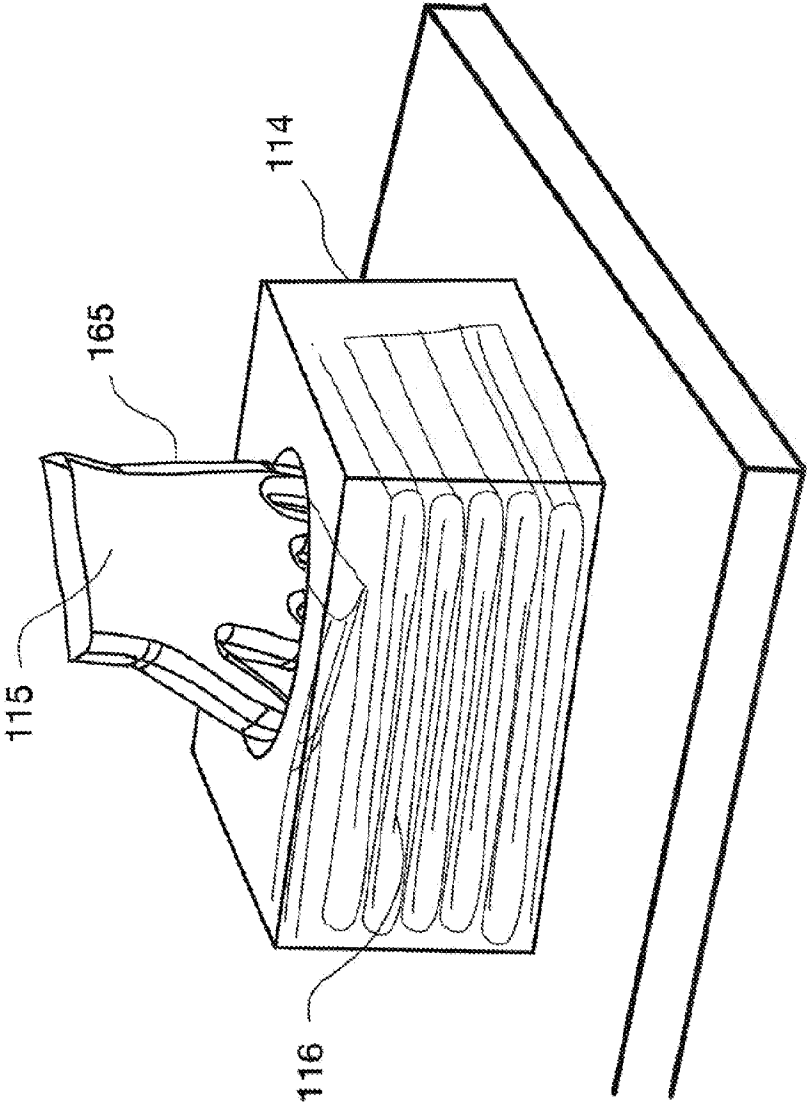


FIG. 11

FIG. 12B

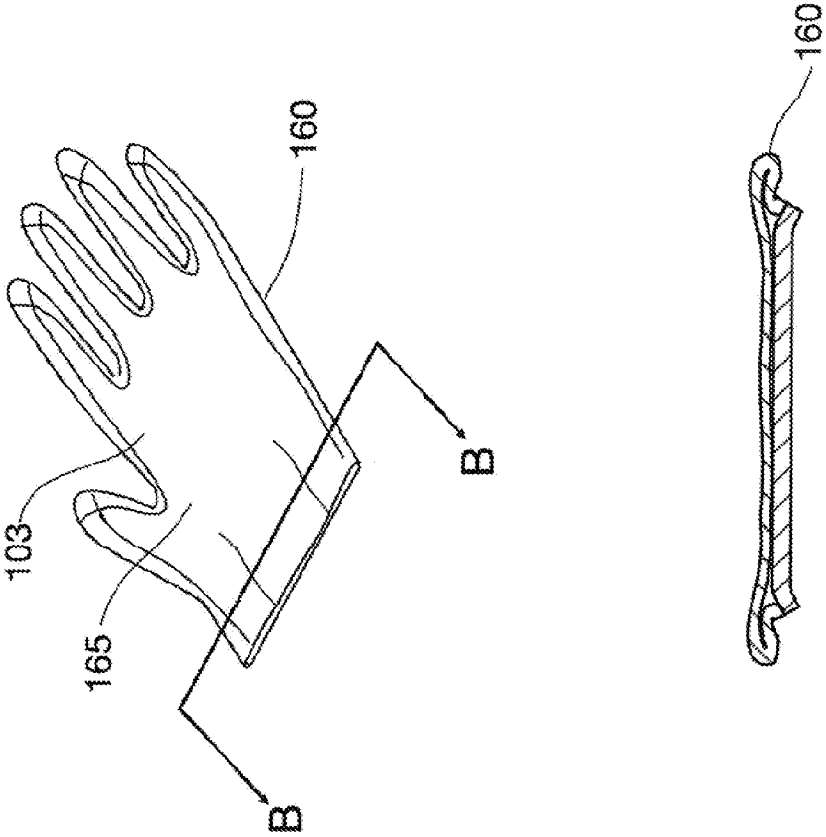


FIG. 12A

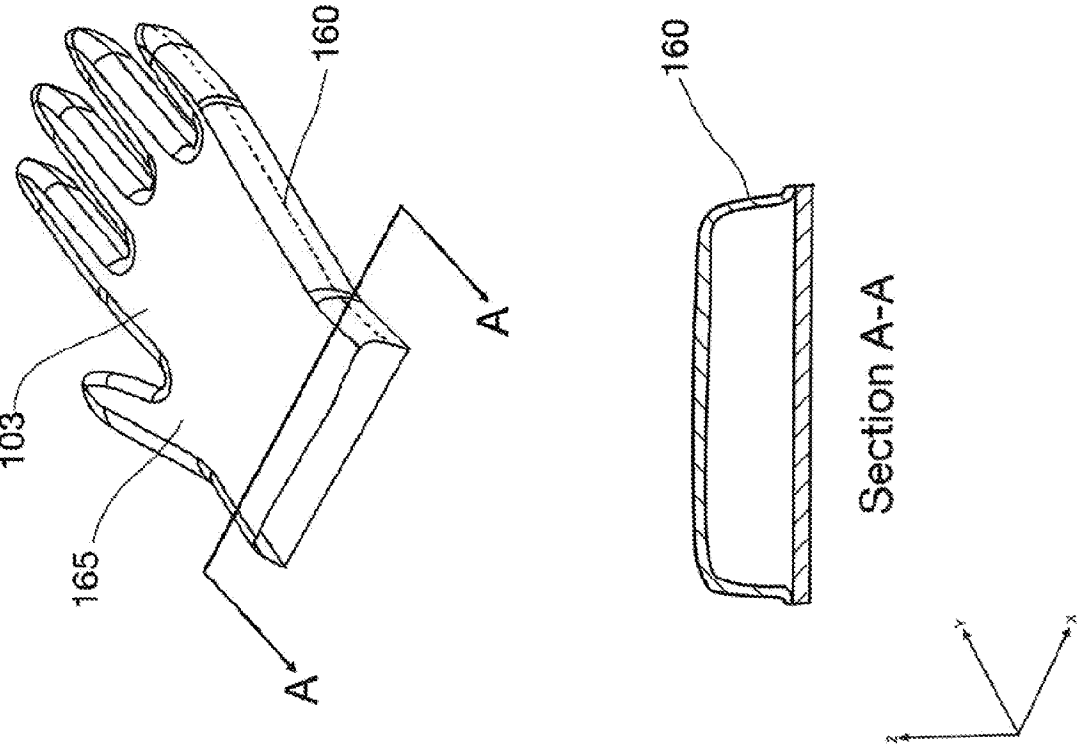
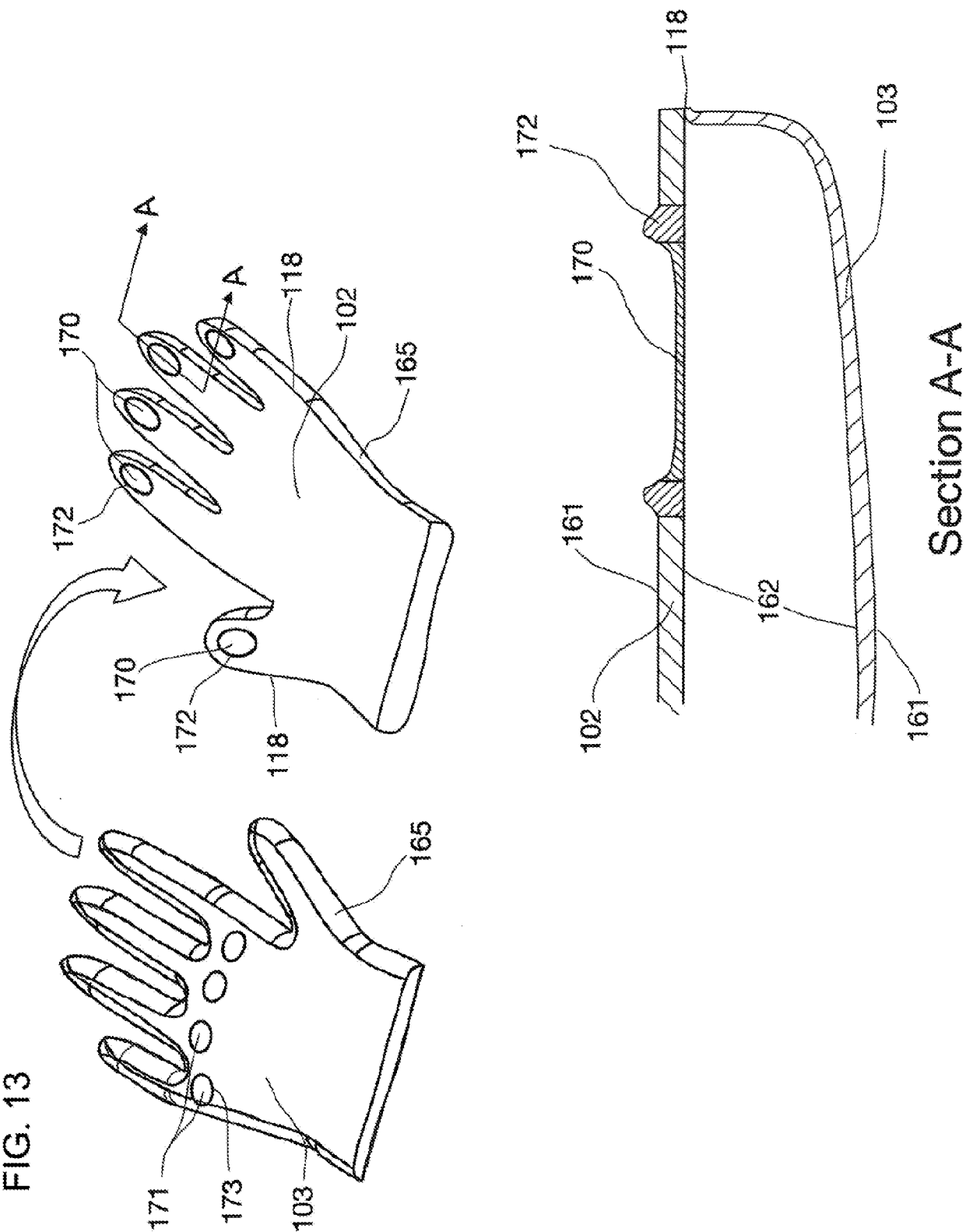
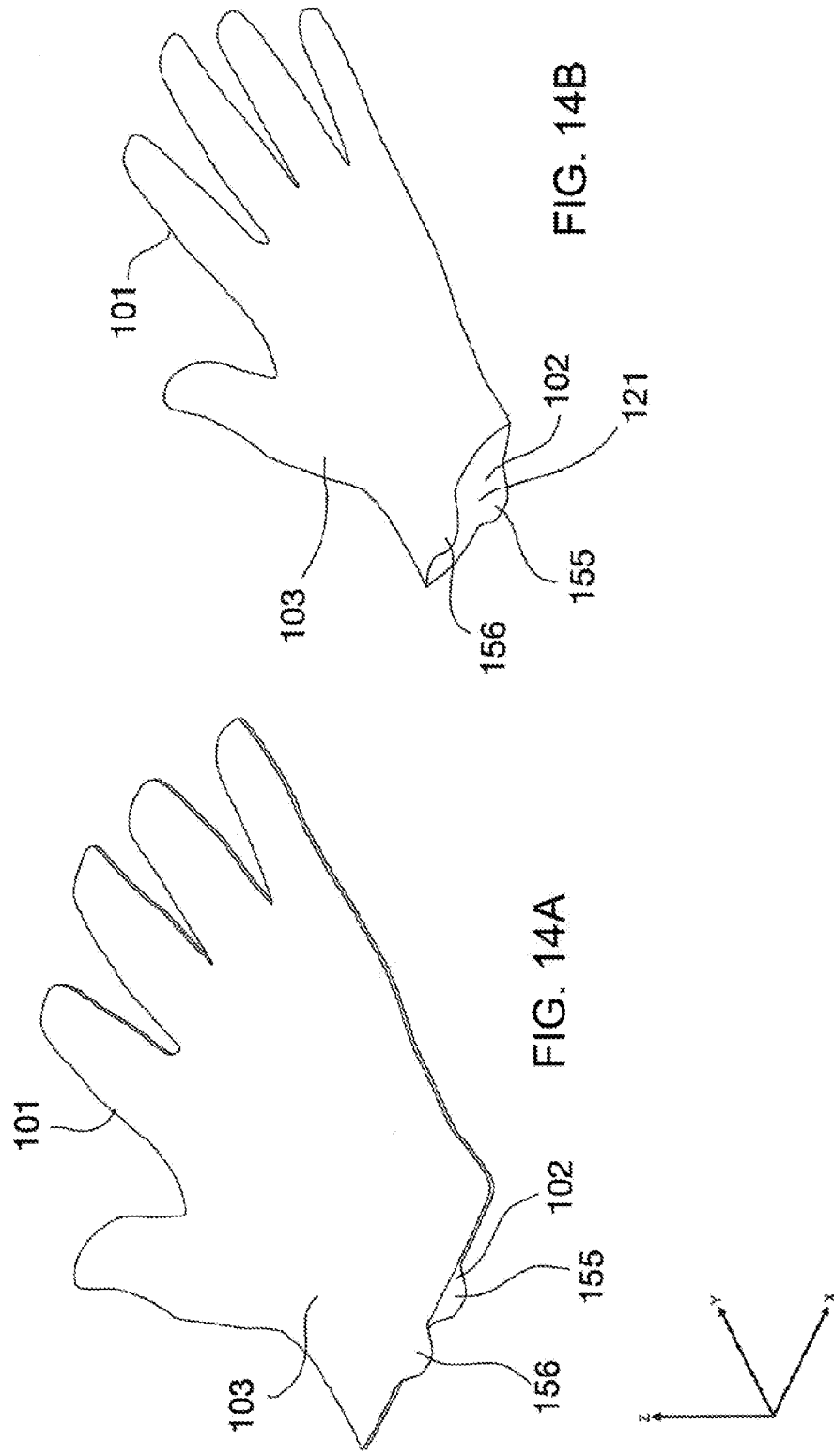
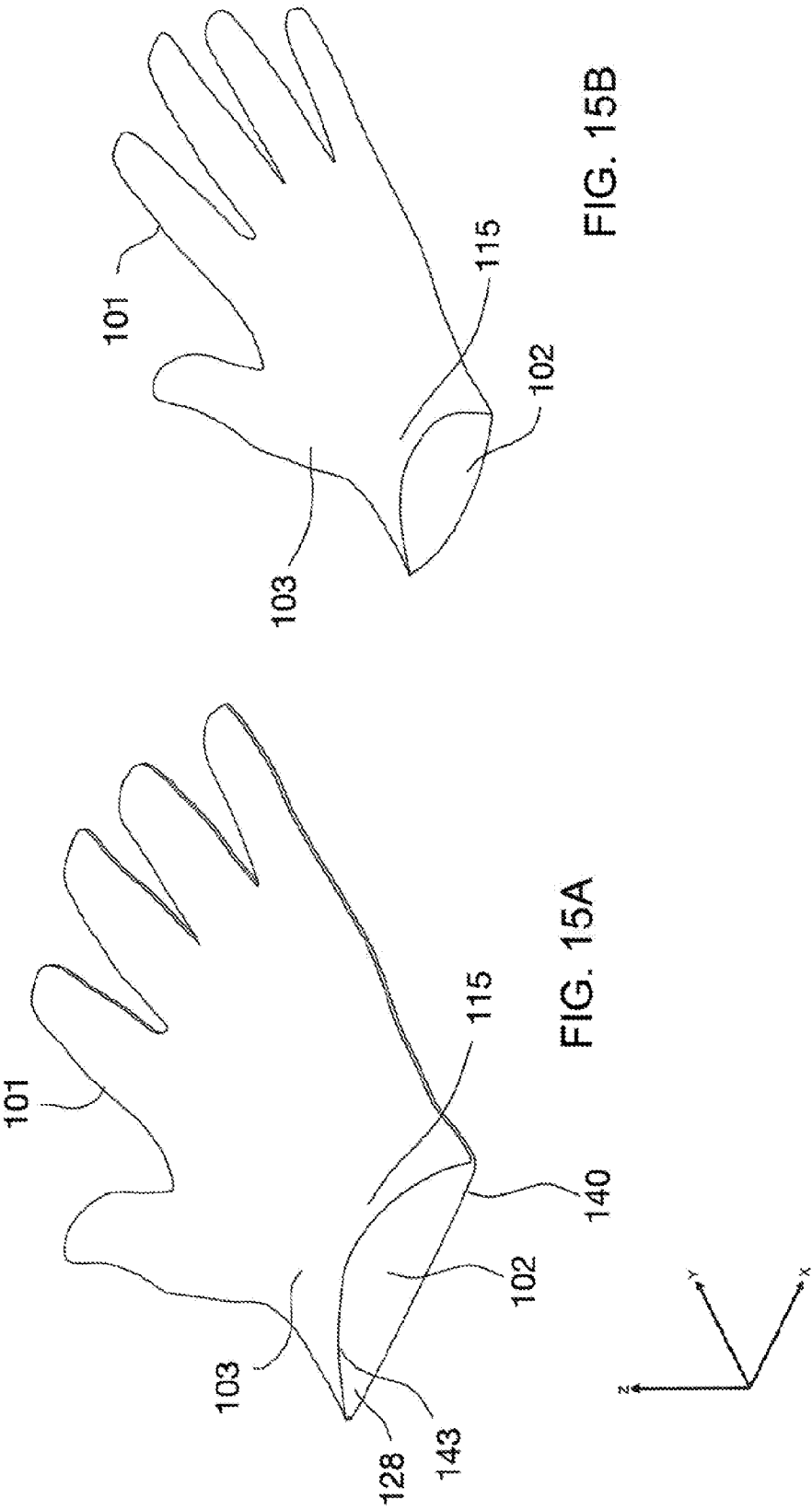
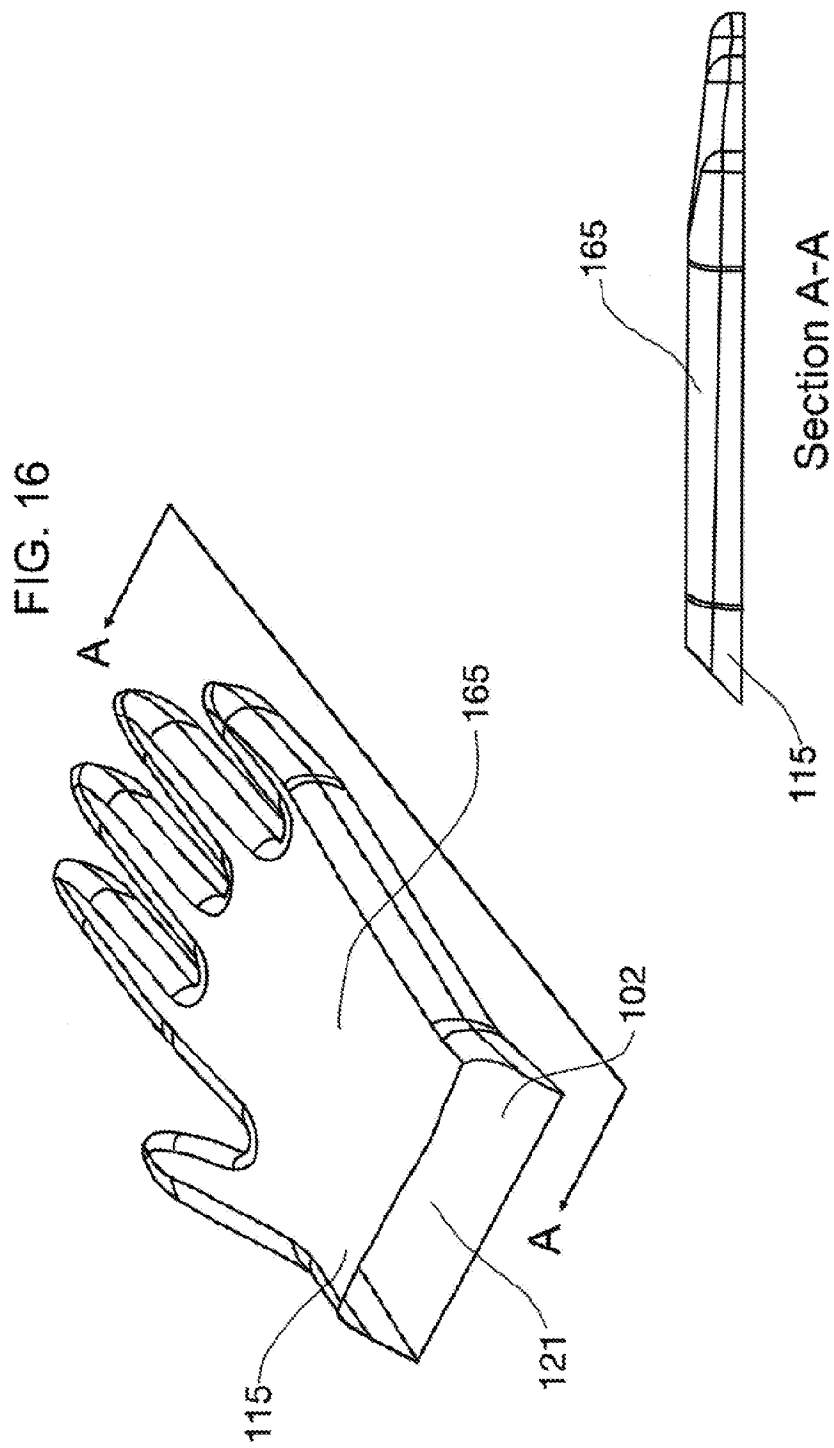


FIG. 13

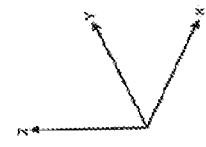


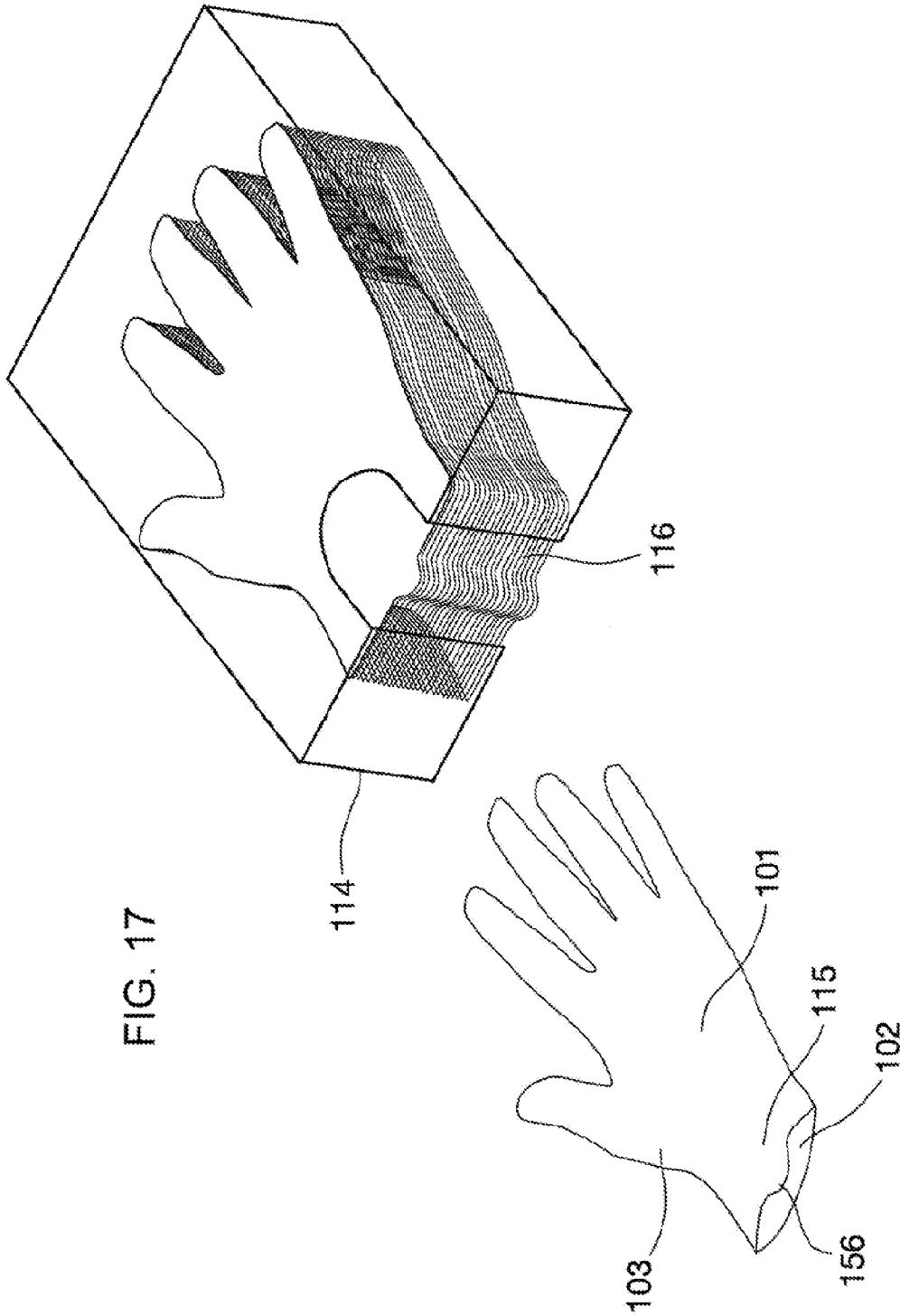


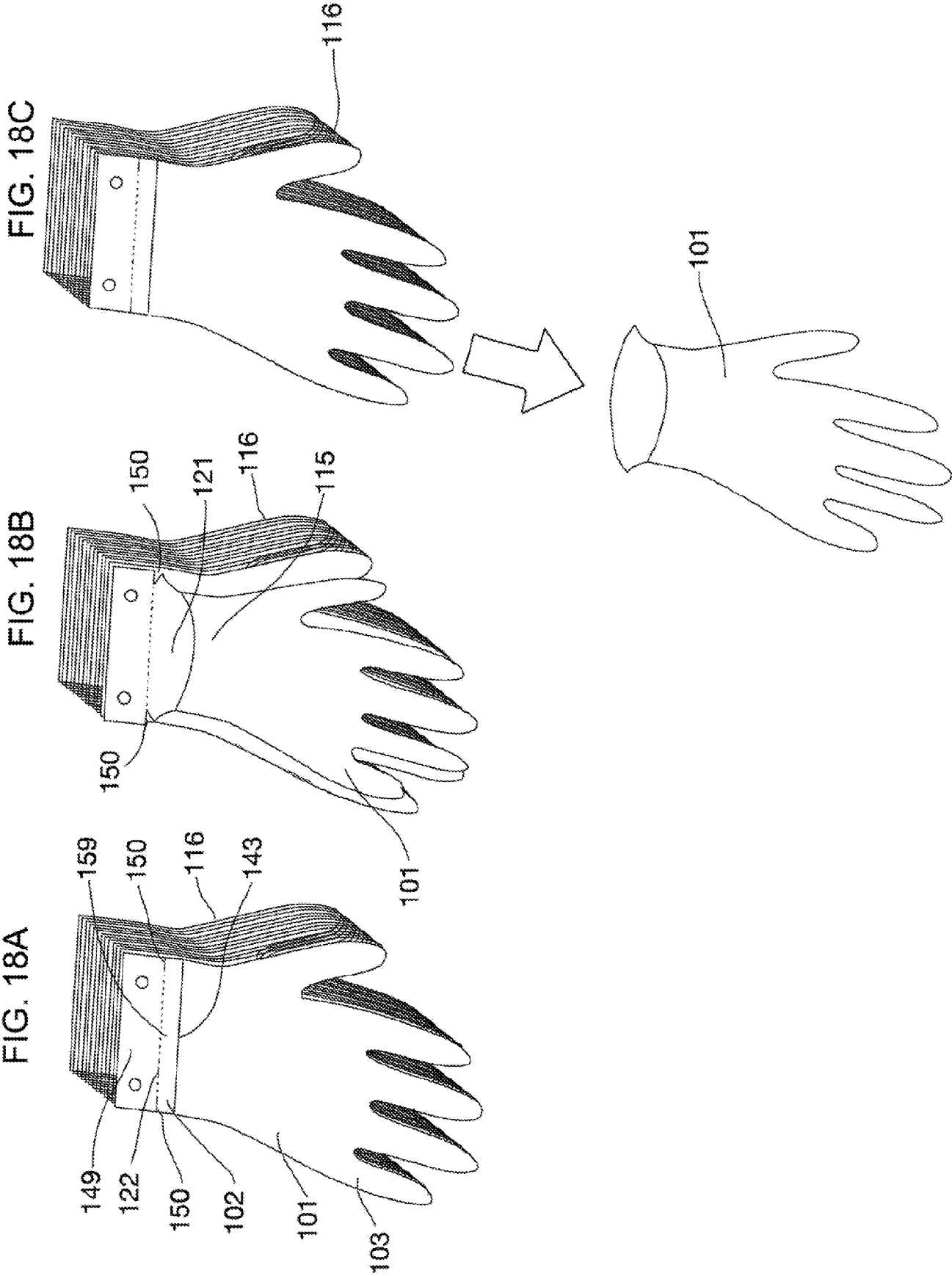




Section A-A







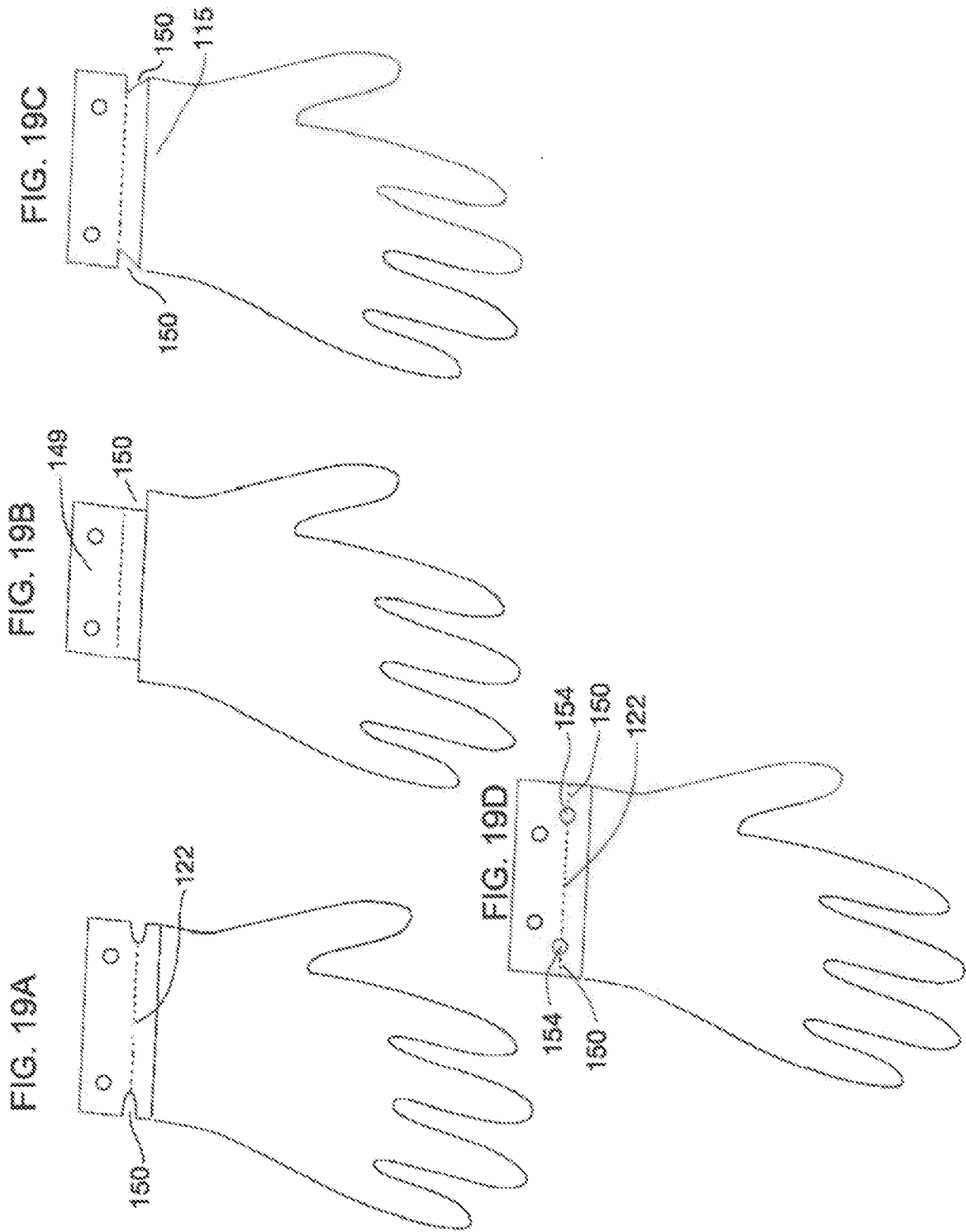


FIG. 20A

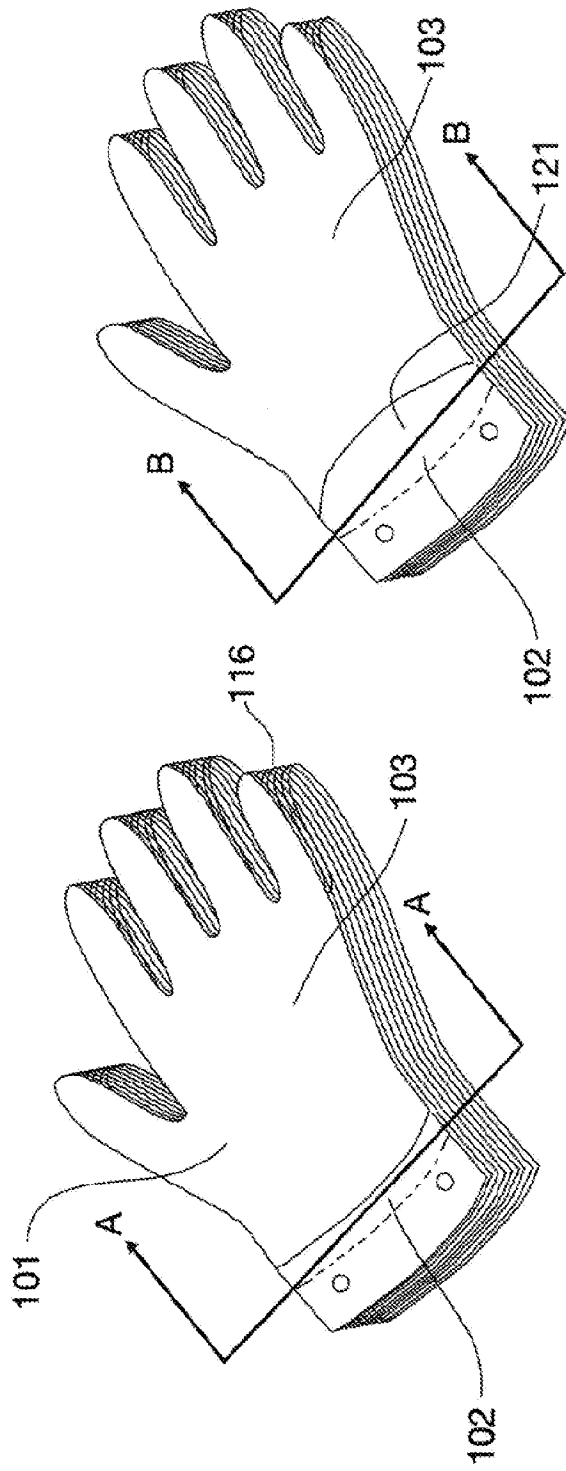
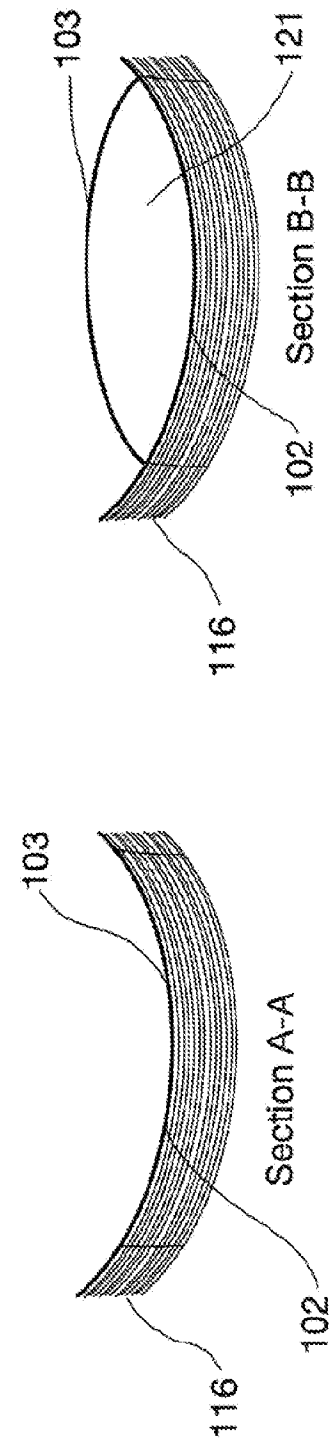
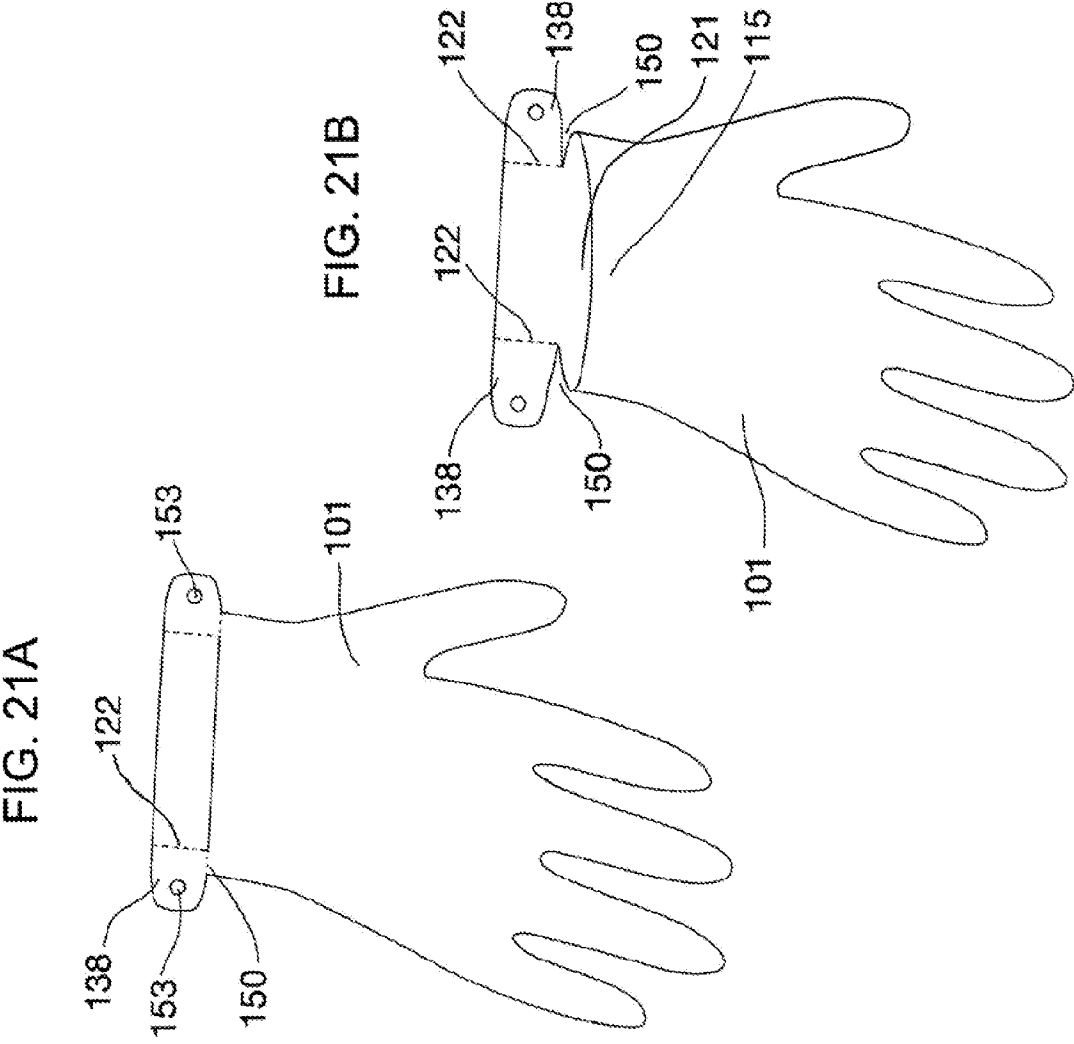
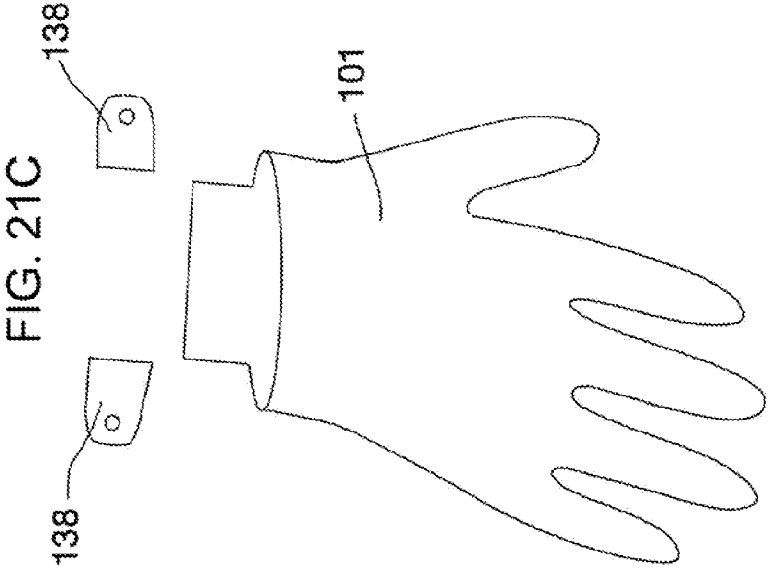


FIG. 20B





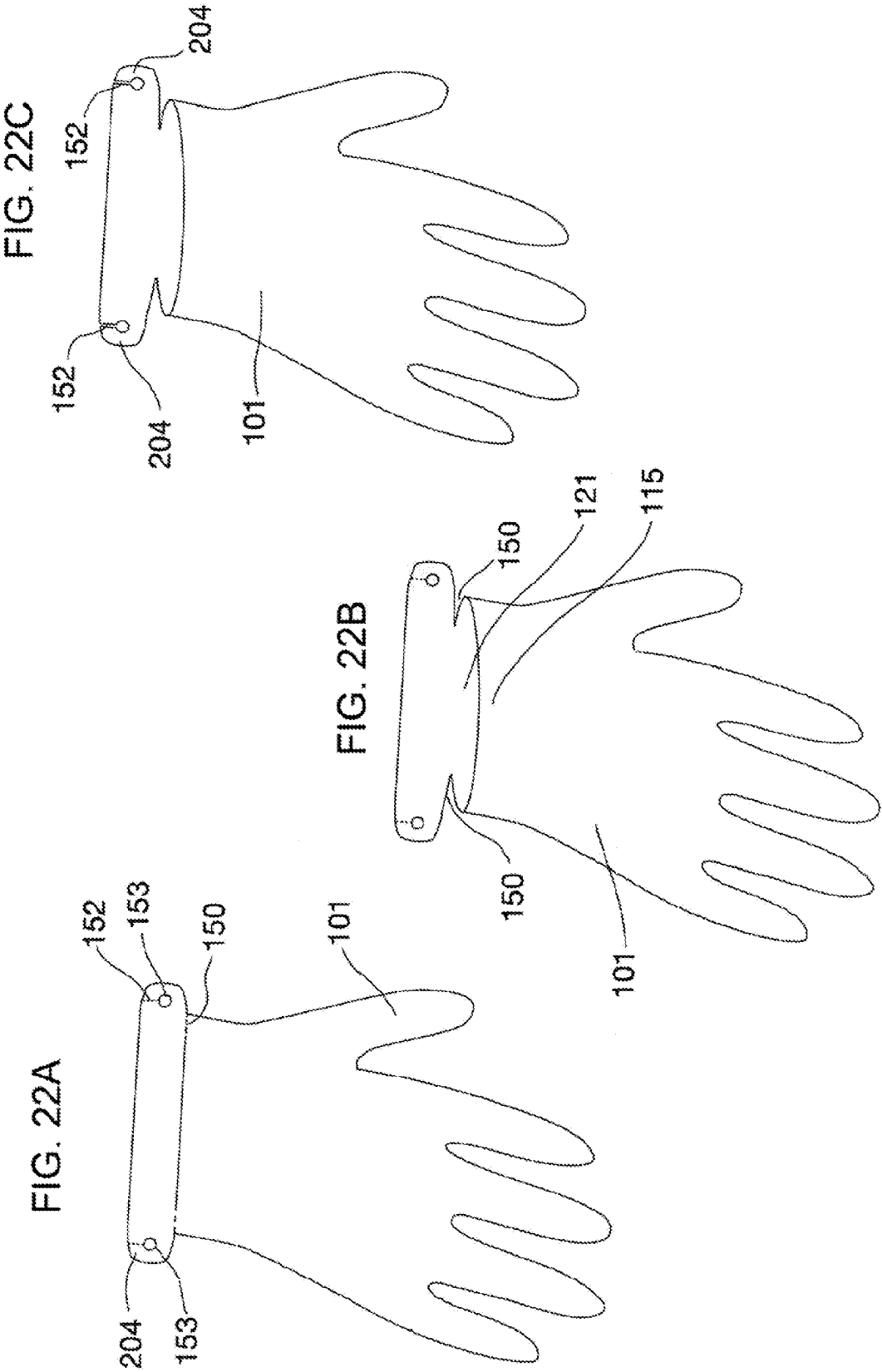


FIG. 23A

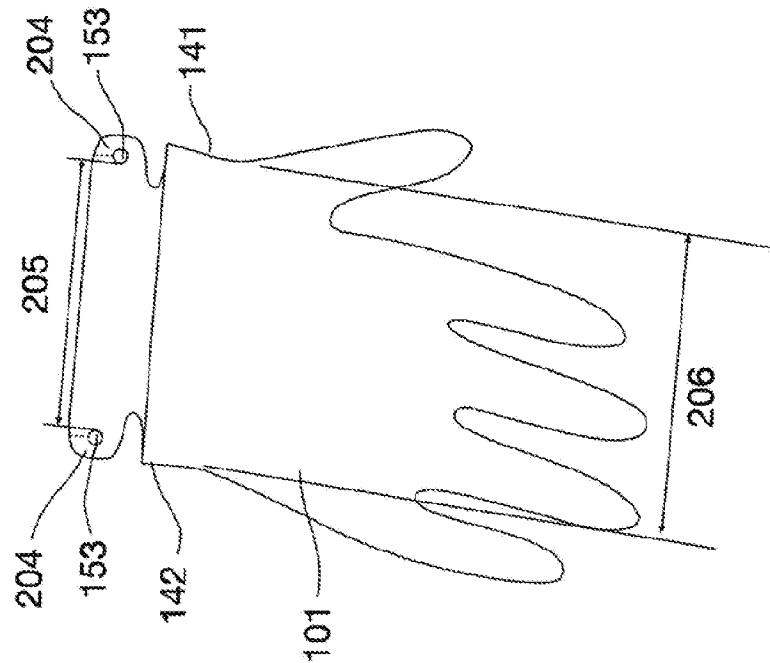
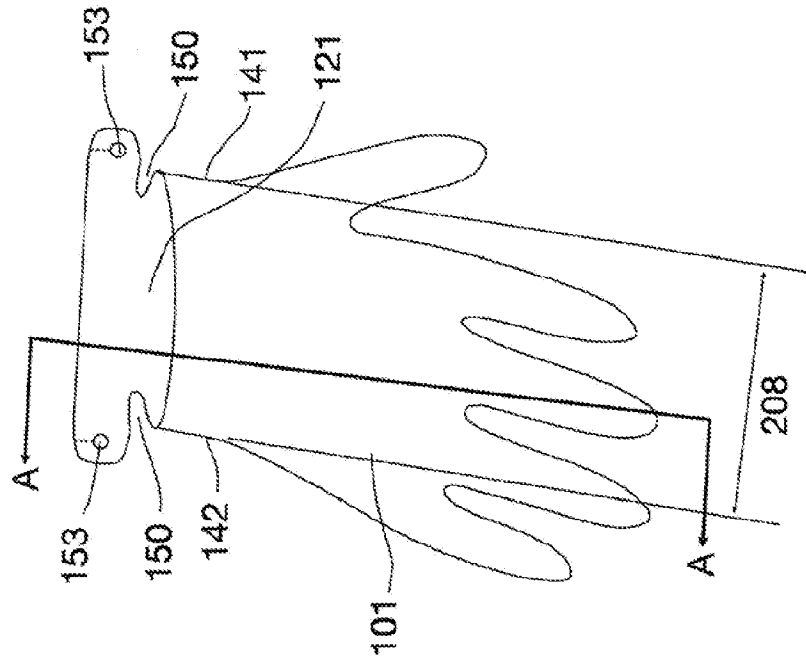
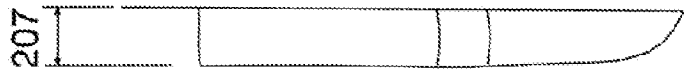
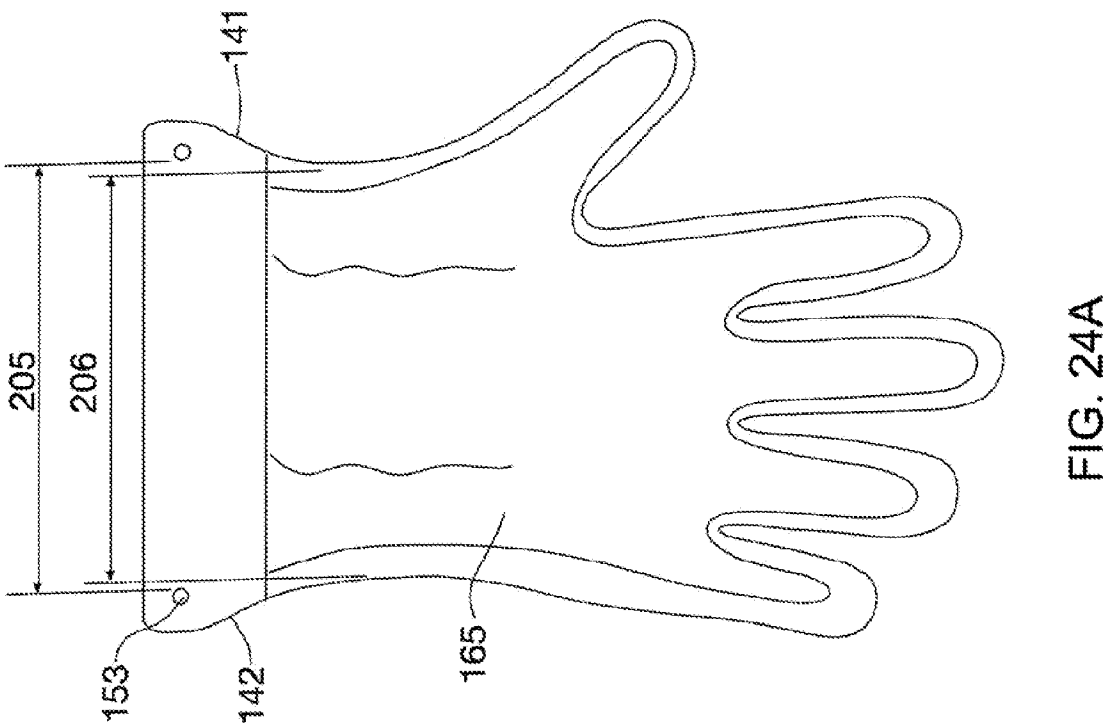
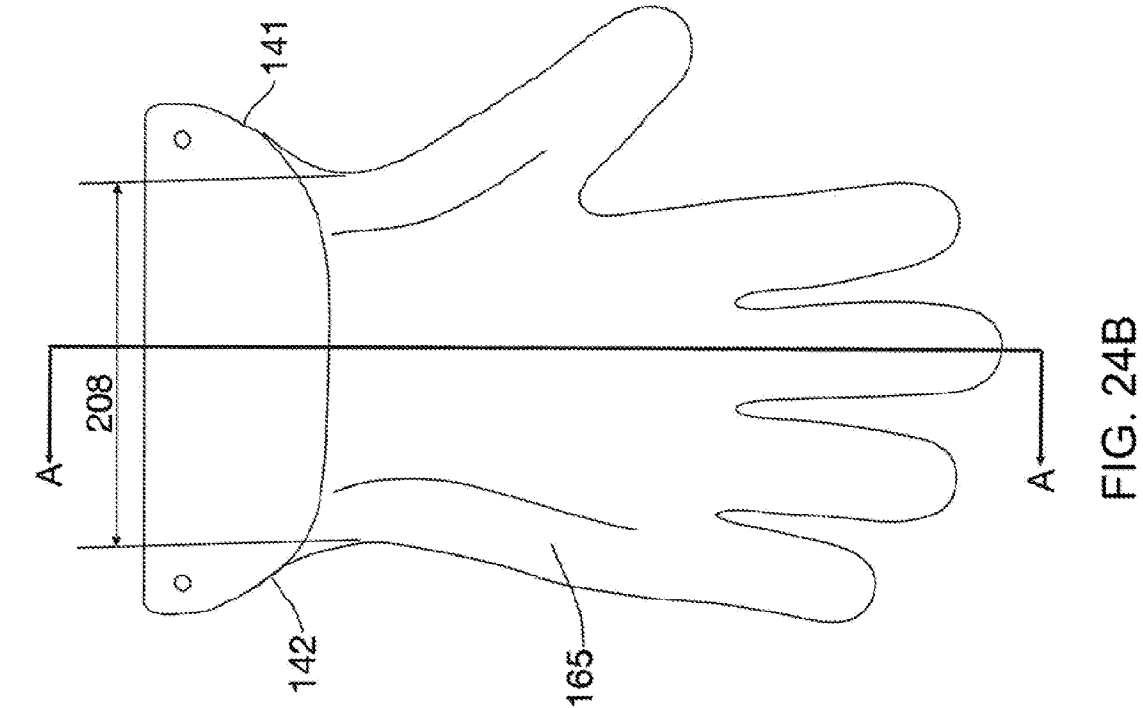
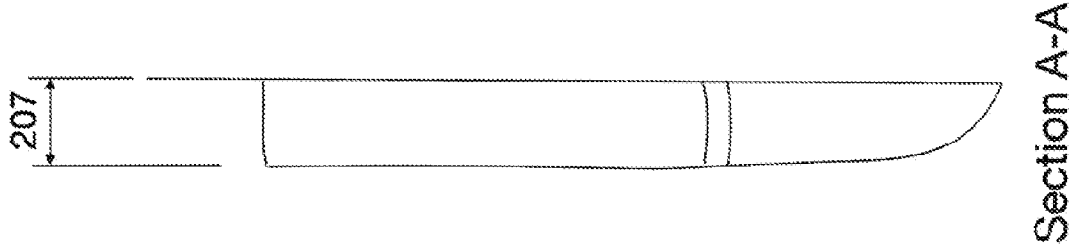


FIG. 23B



Section A-A





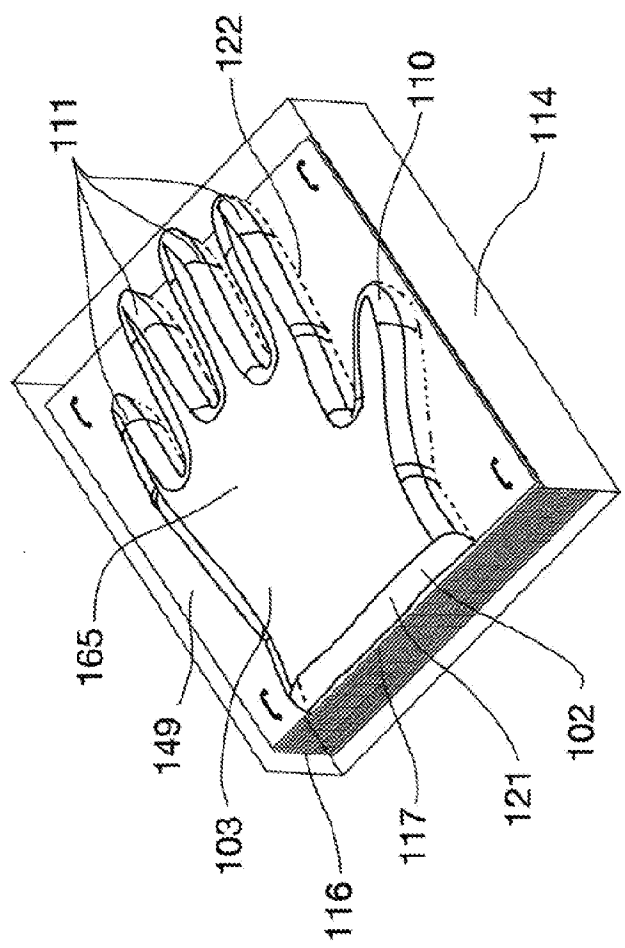


FIG. 25

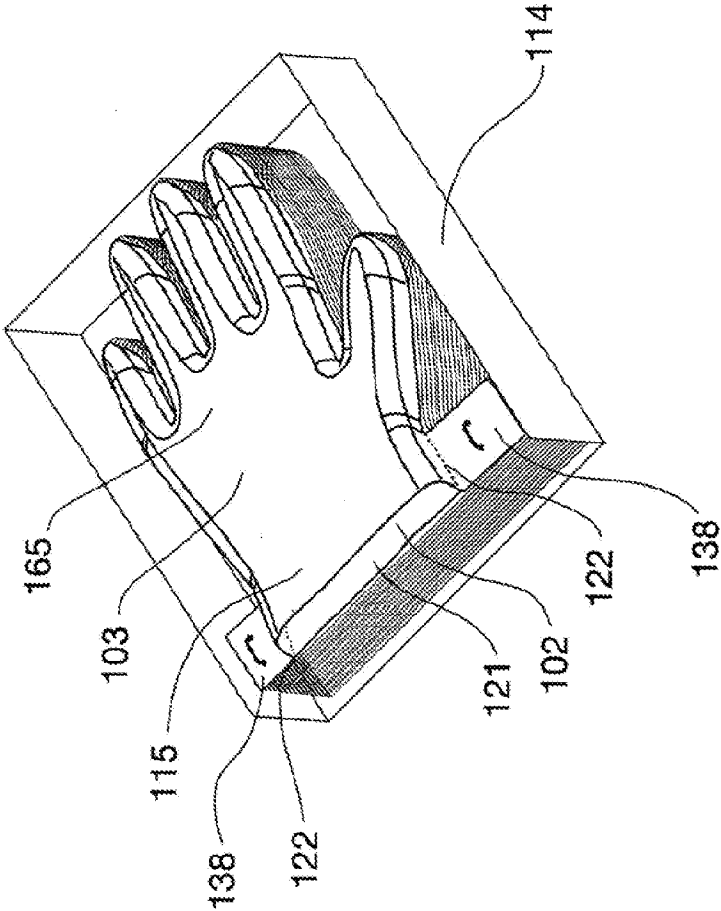
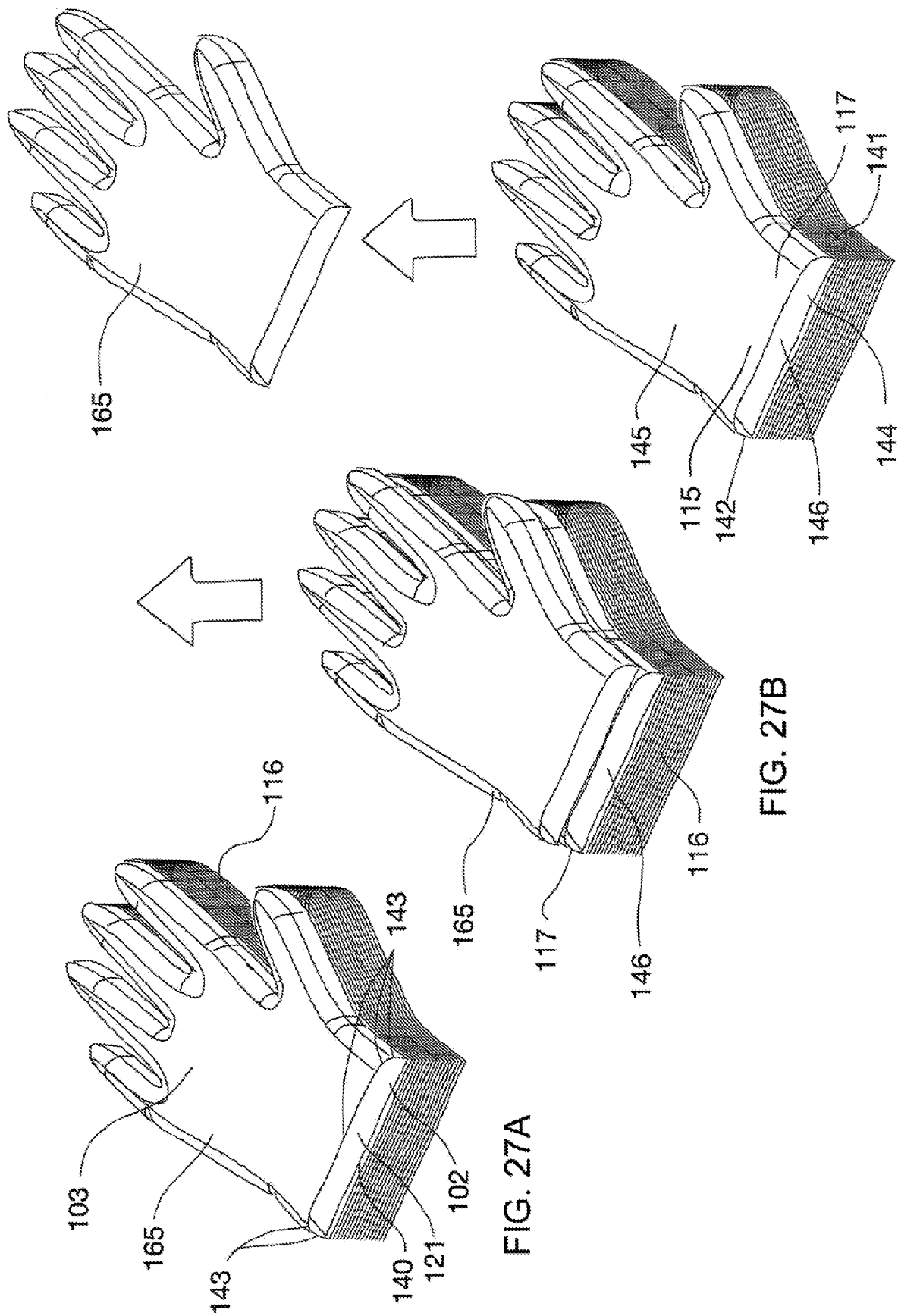
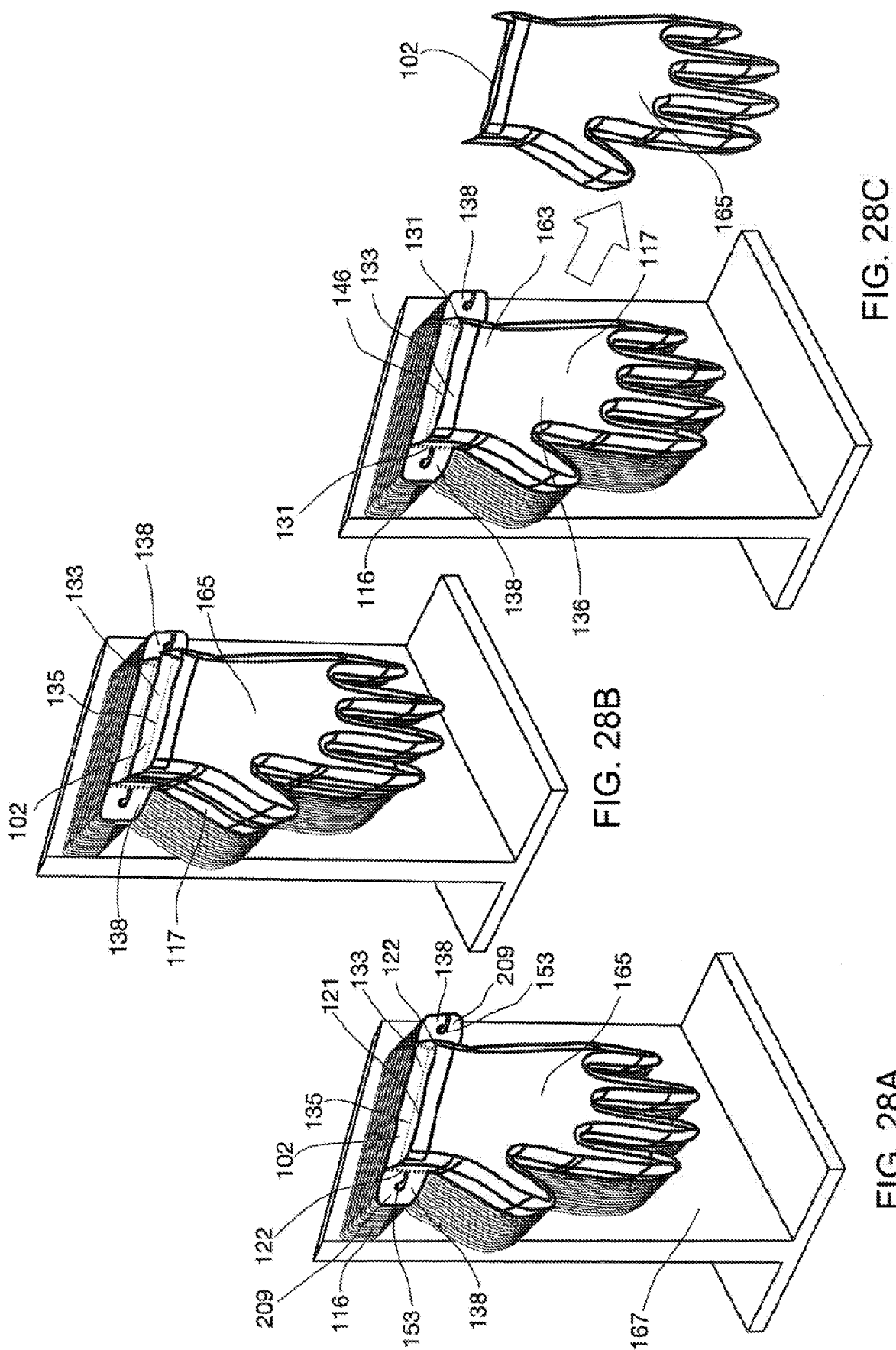


FIG. 26





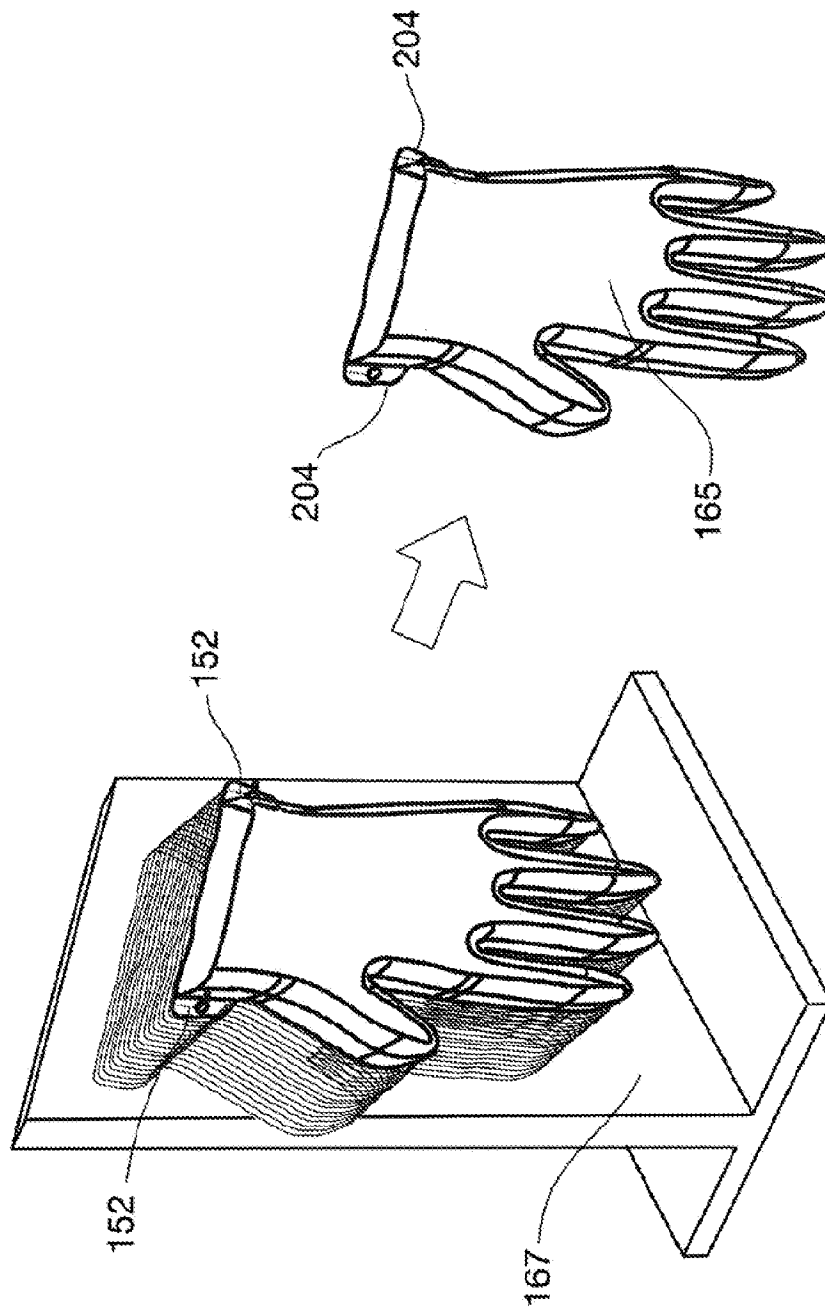


FIG. 29

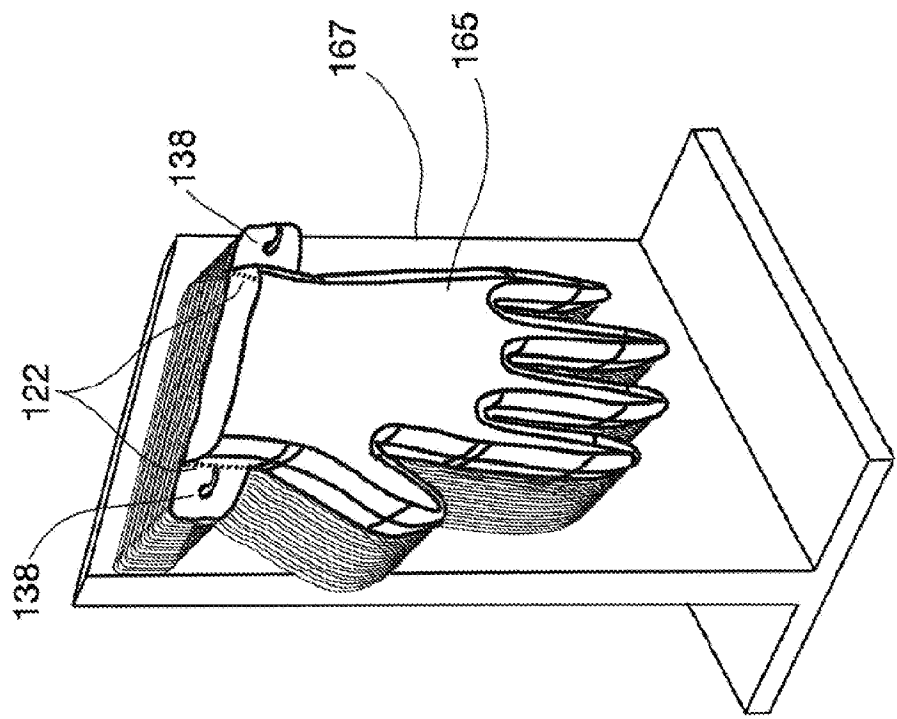


FIG. 30

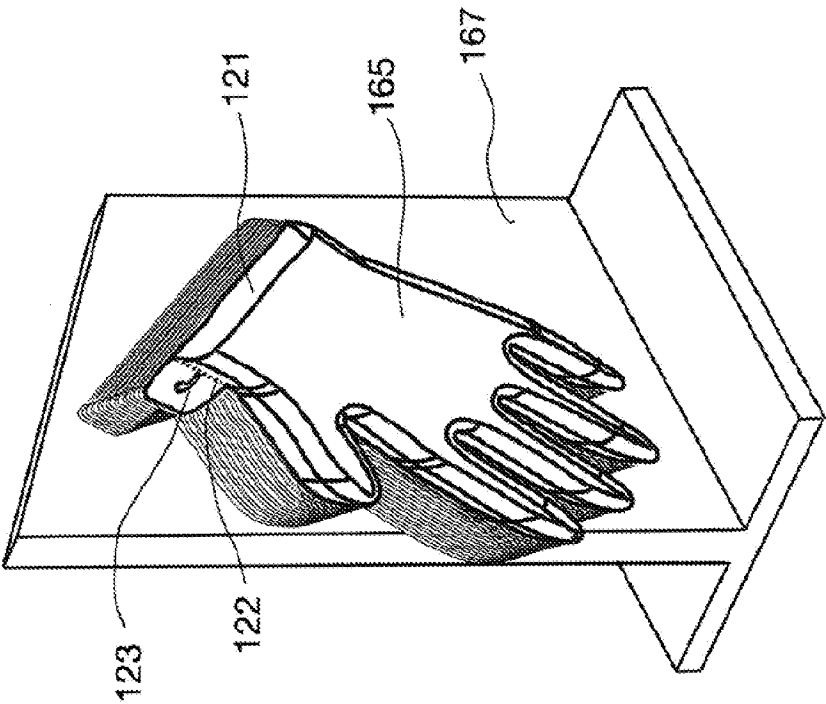


FIG. 31

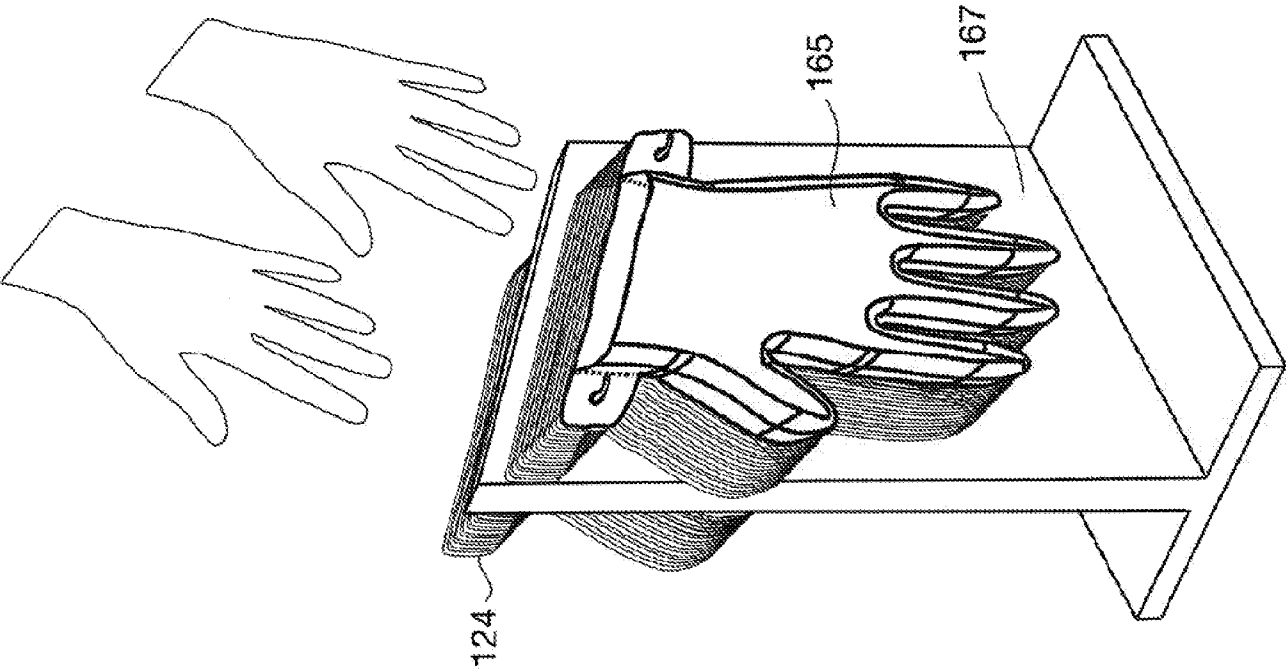


FIG. 32A

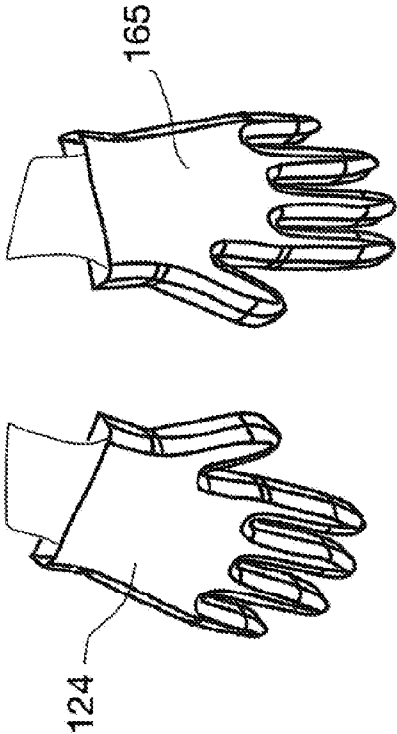


FIG. 32B

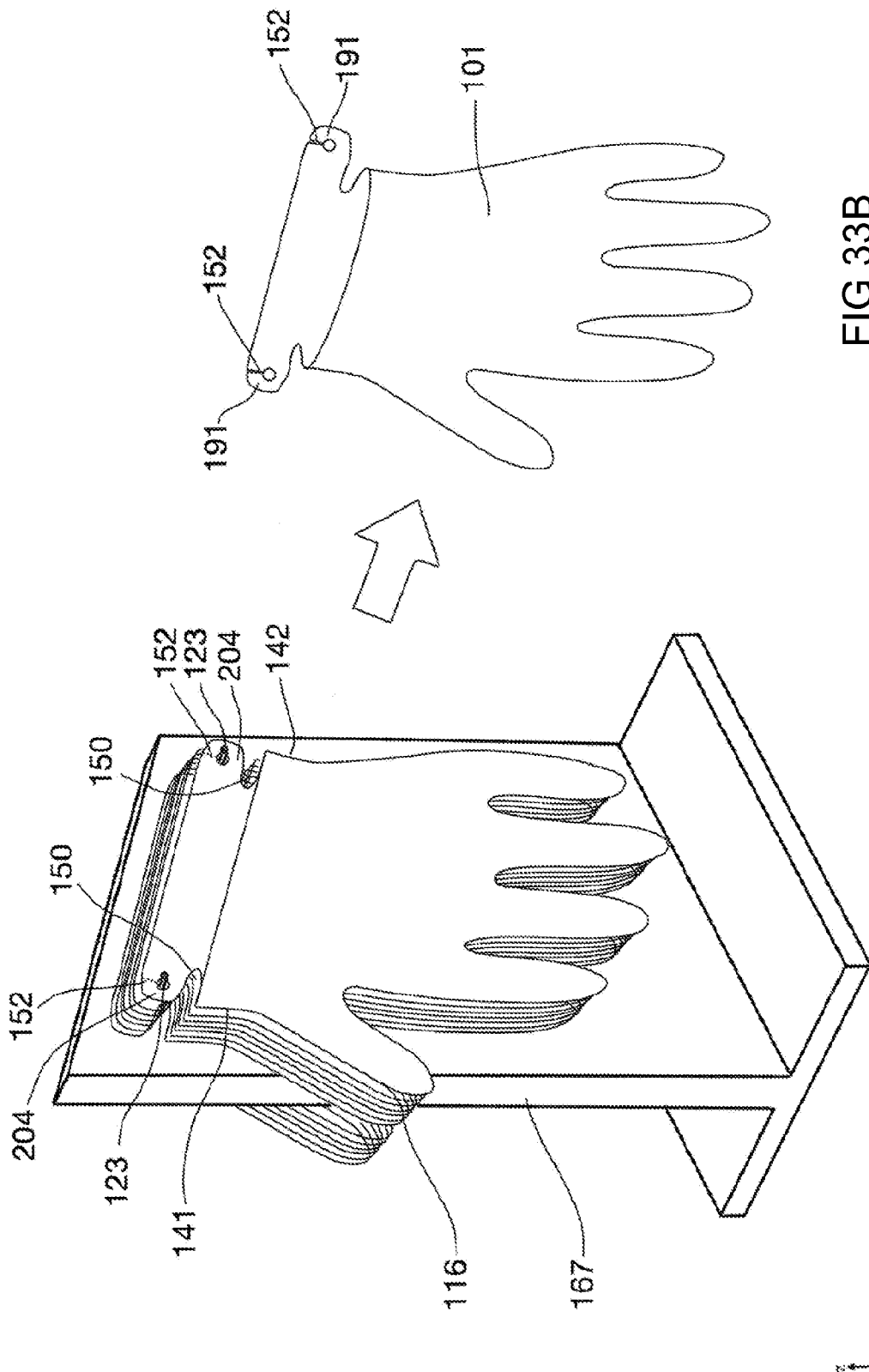
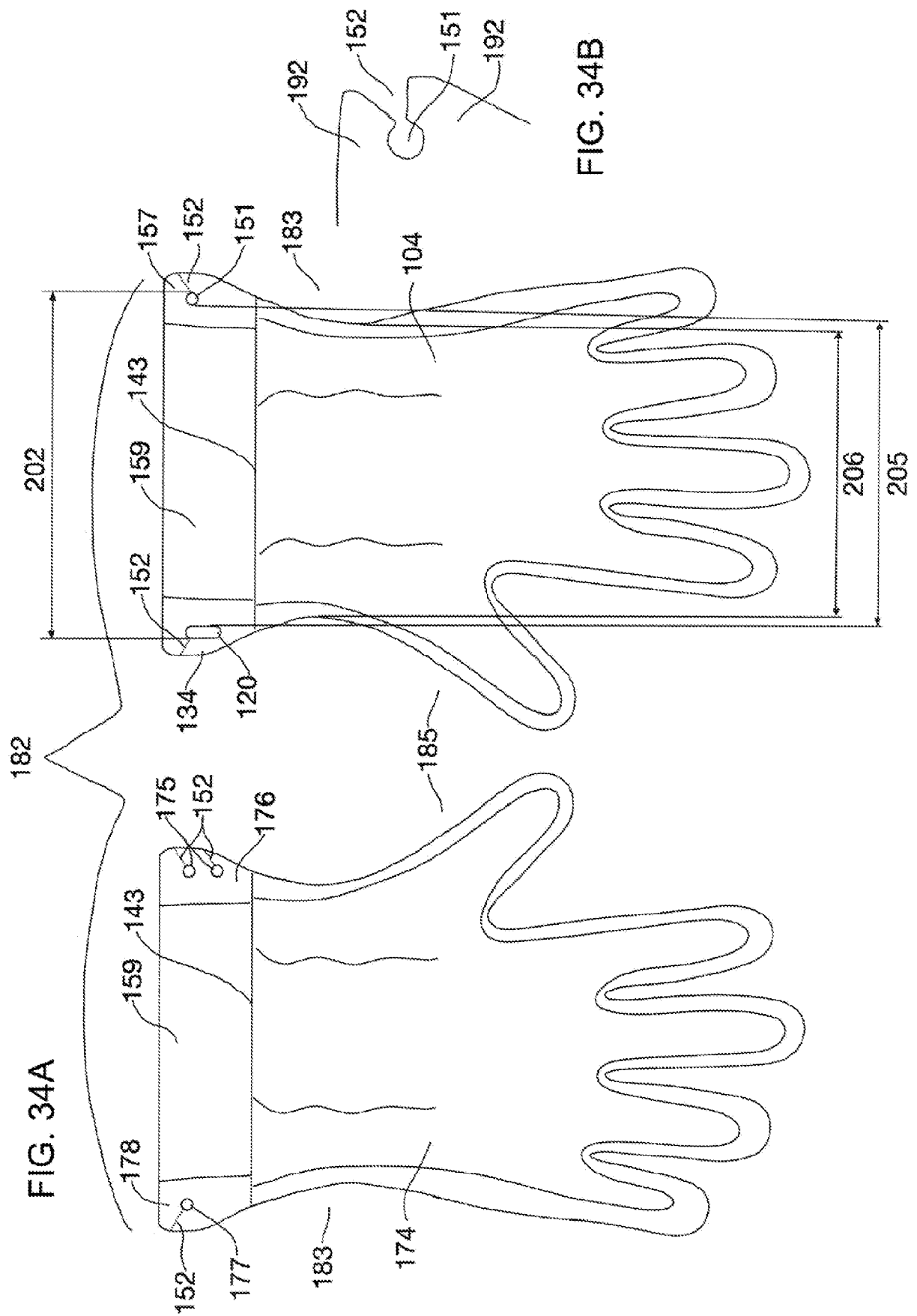


FIG 33B

FIG. 33A



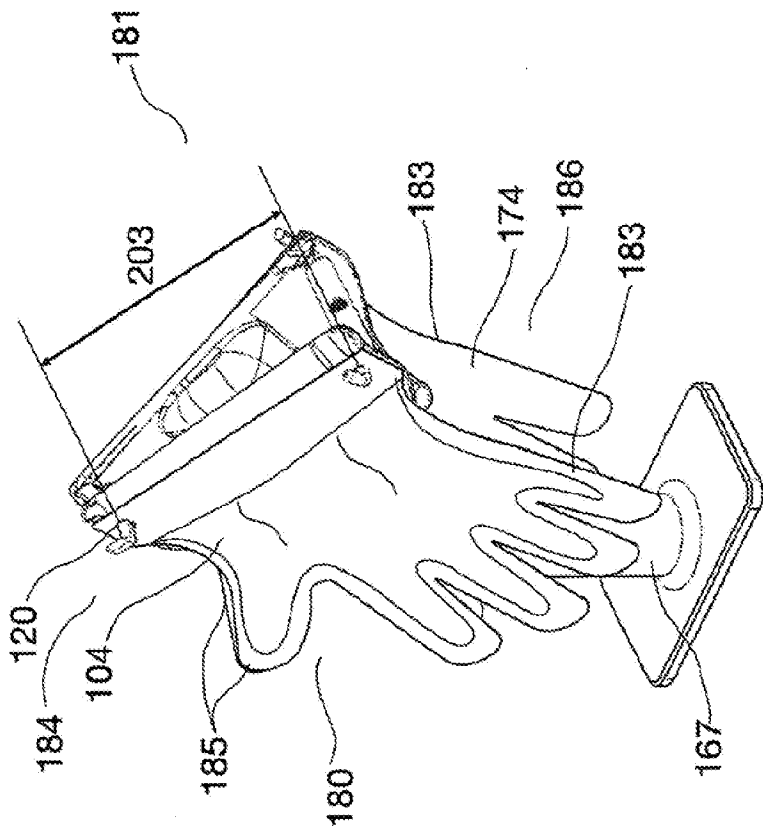


FIG. 35

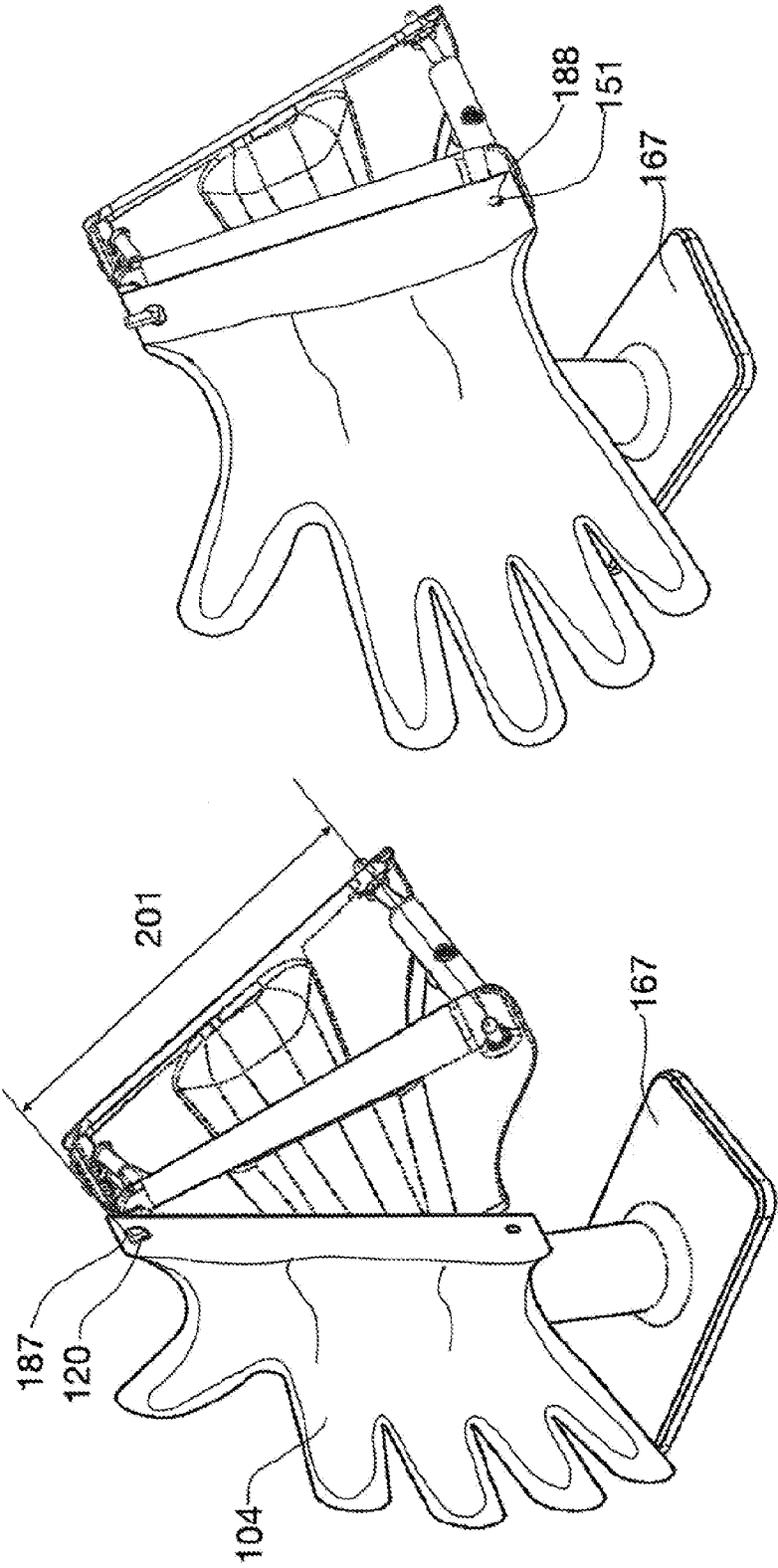


FIG. 36B

FIG. 36A

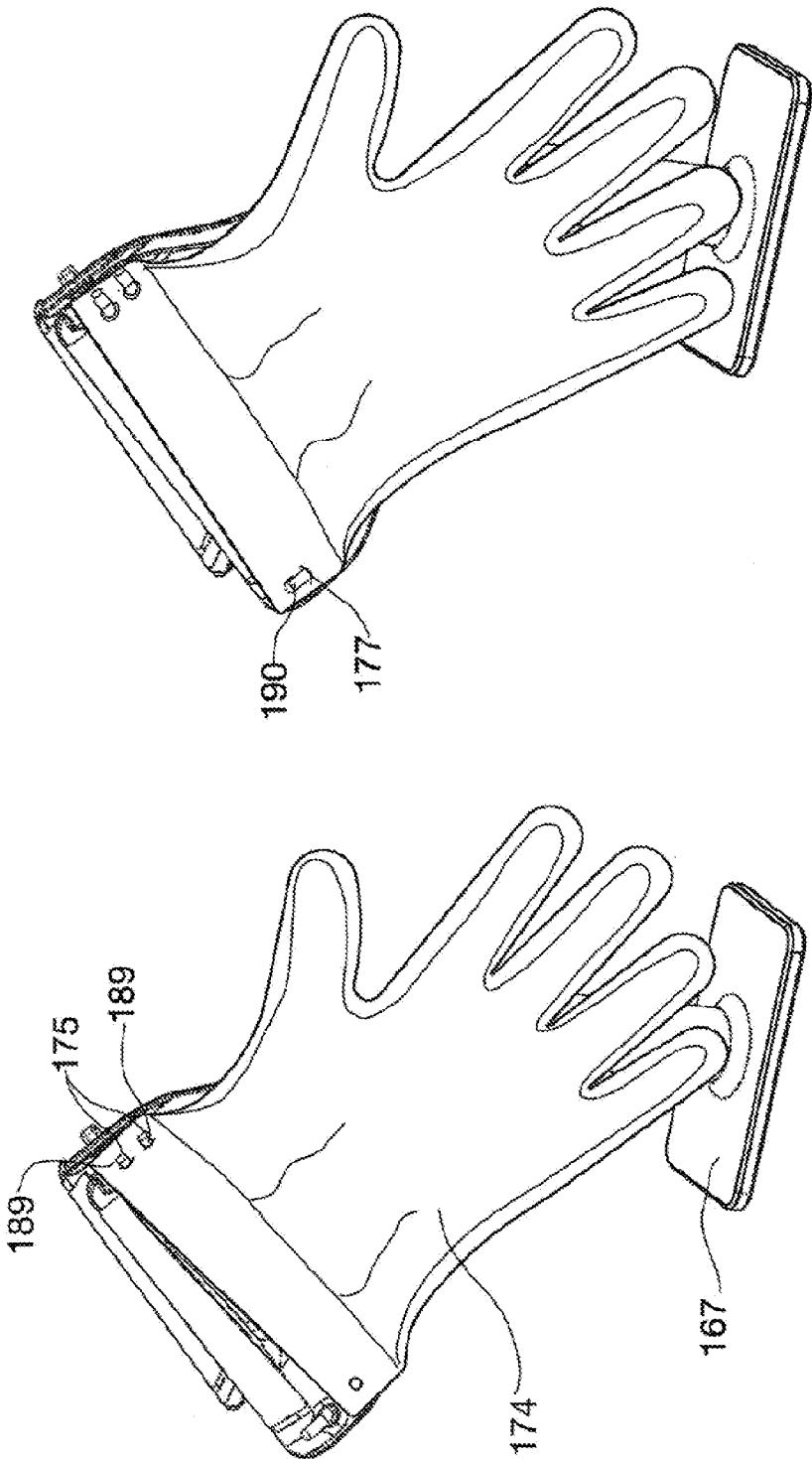


FIG. 36D

FIG. 36C

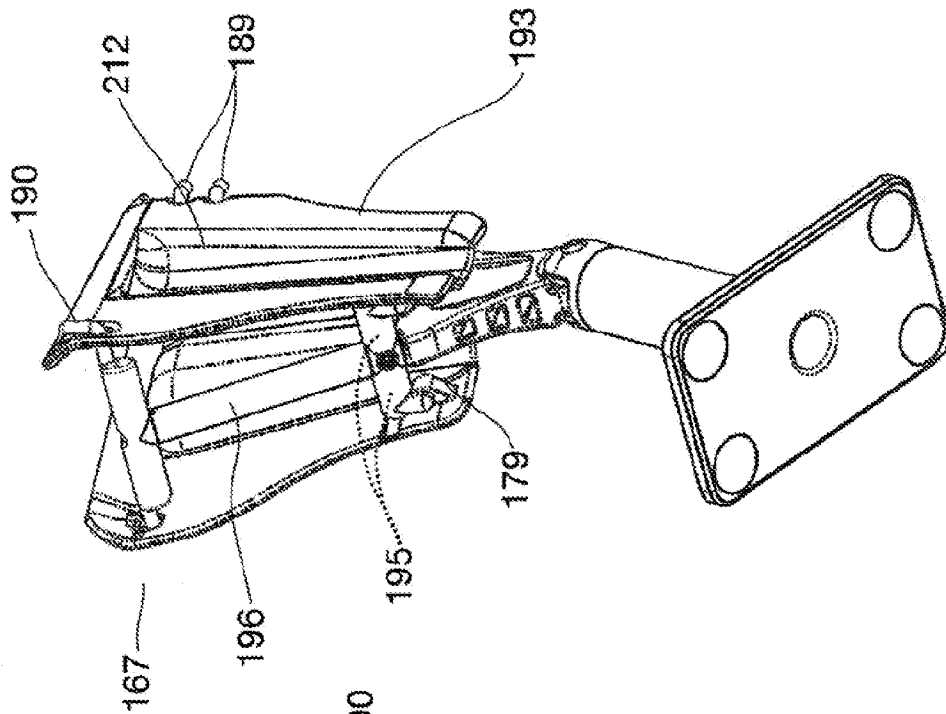


FIG. 37B

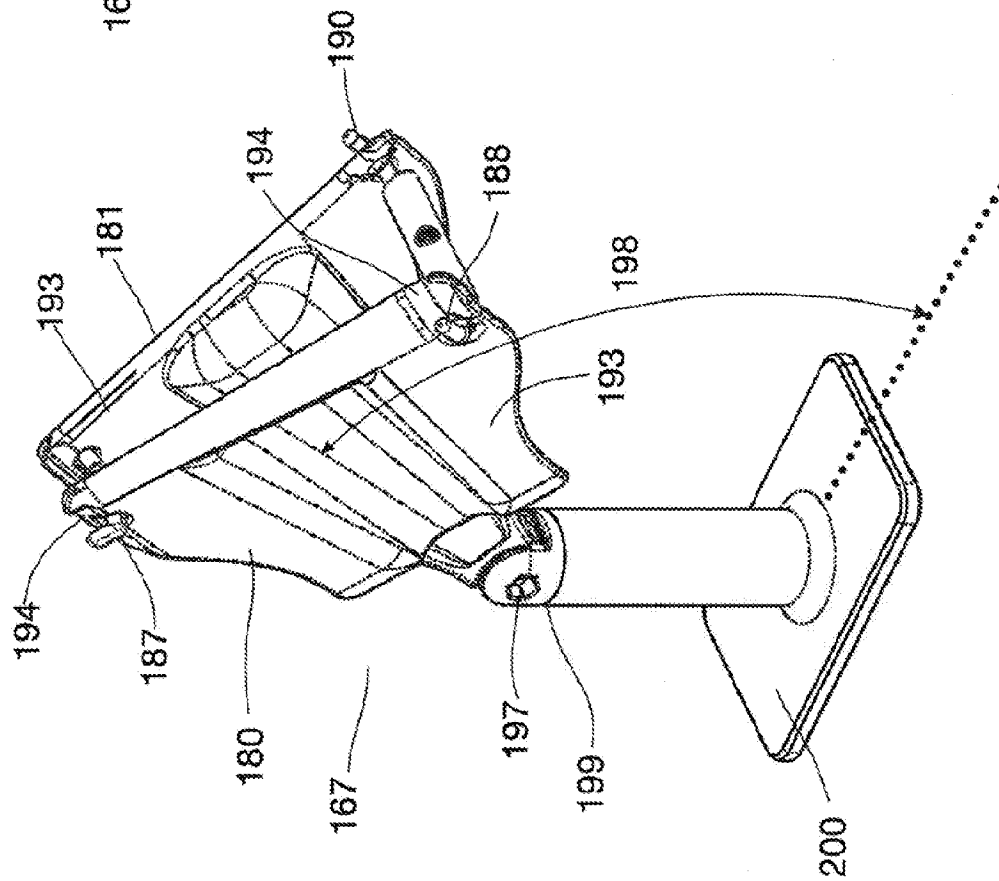


FIG. 37A

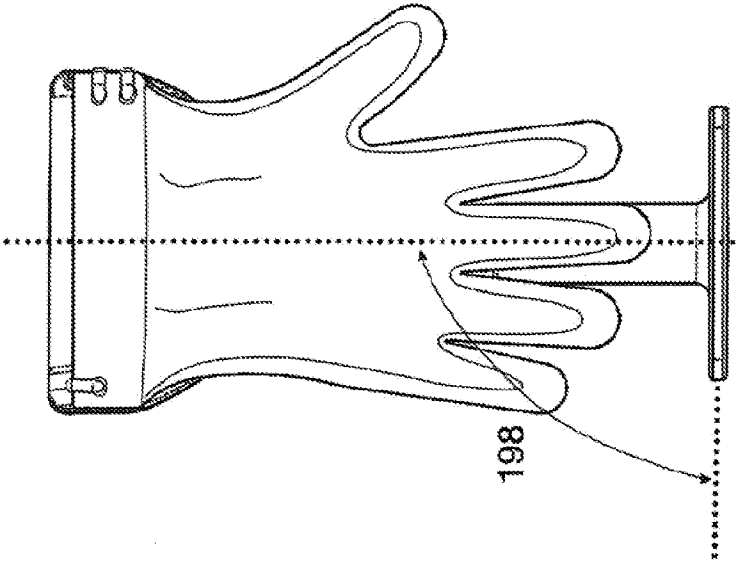


FIG. 38A

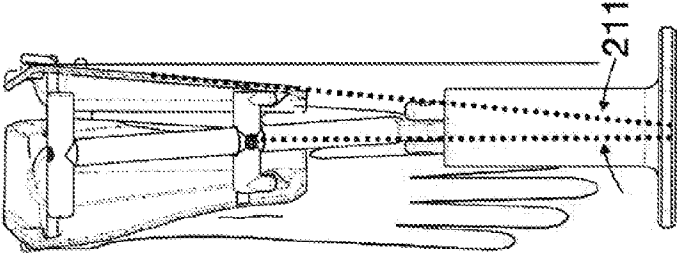


FIG. 38B

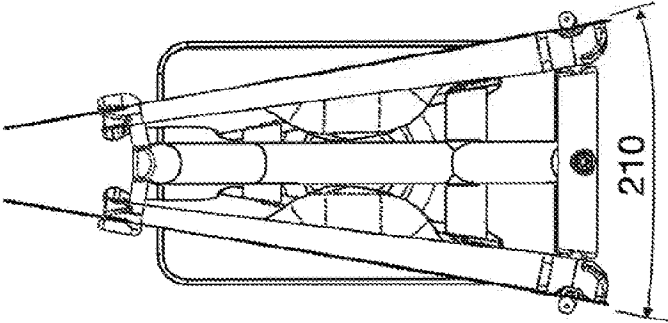


FIG. 38C

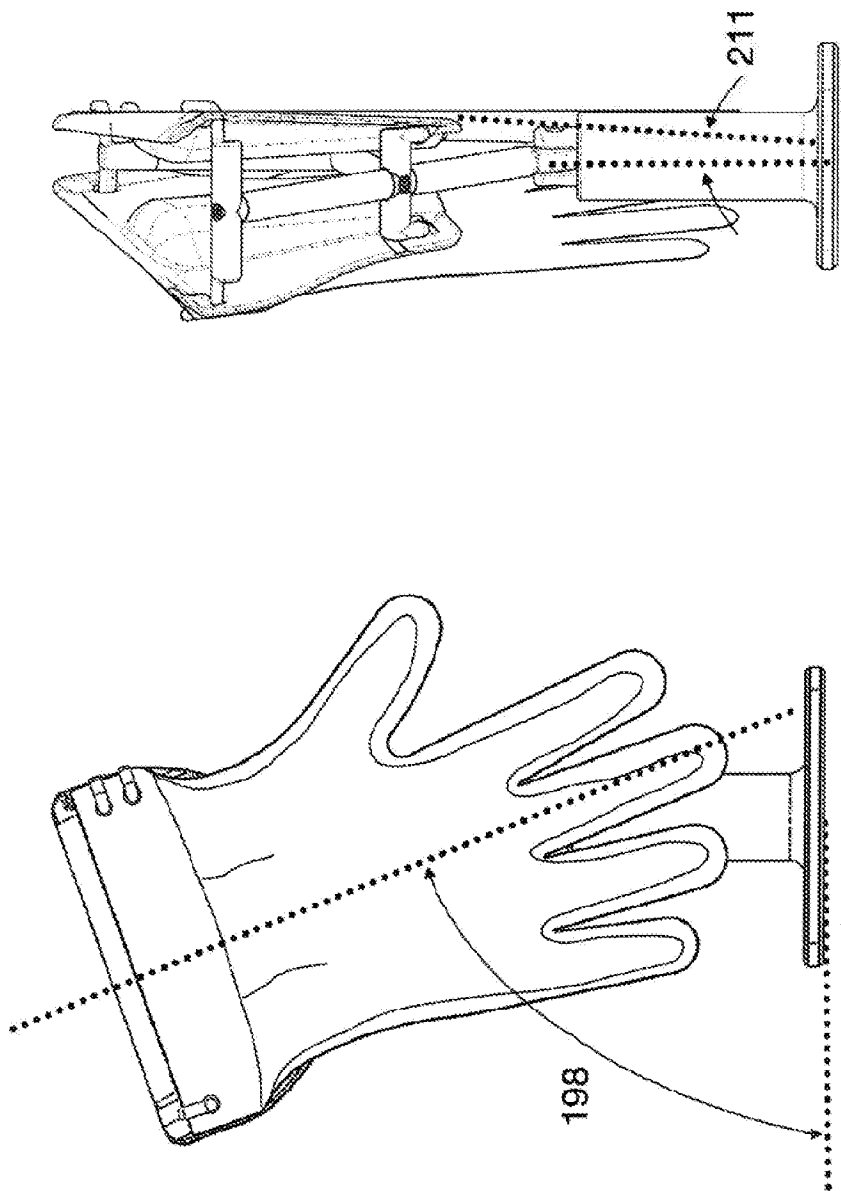


FIG. 39A

FIG. 39B

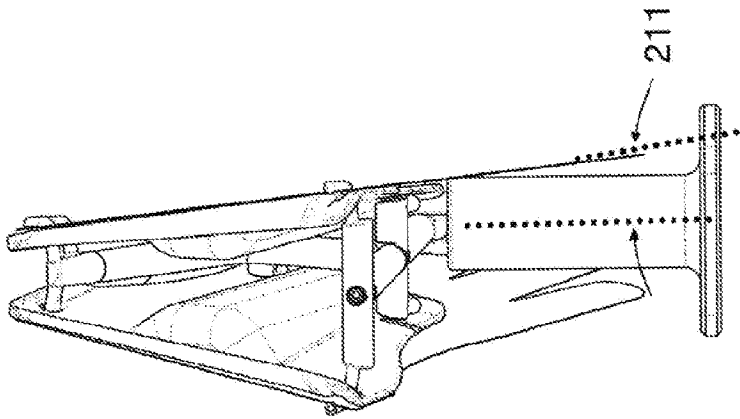


FIG. 40B

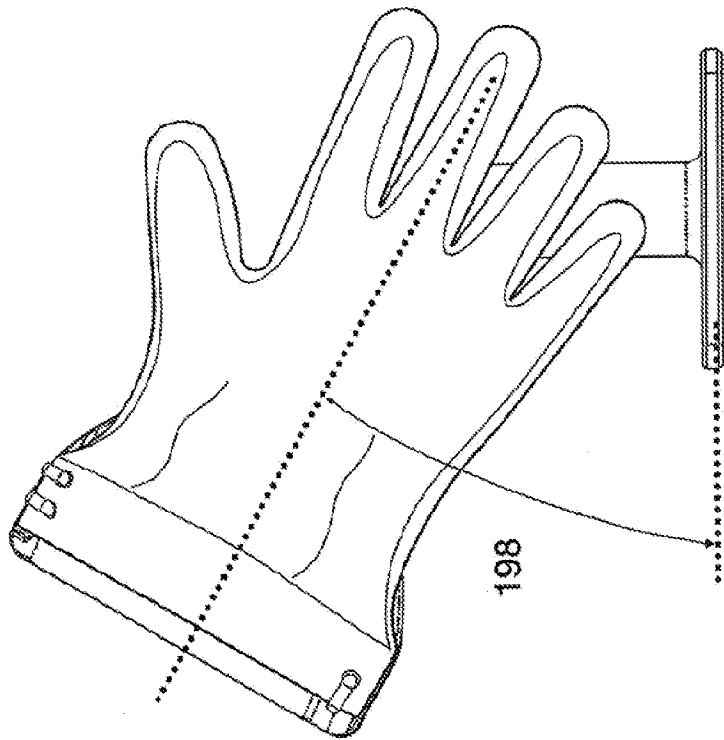


FIG. 40A

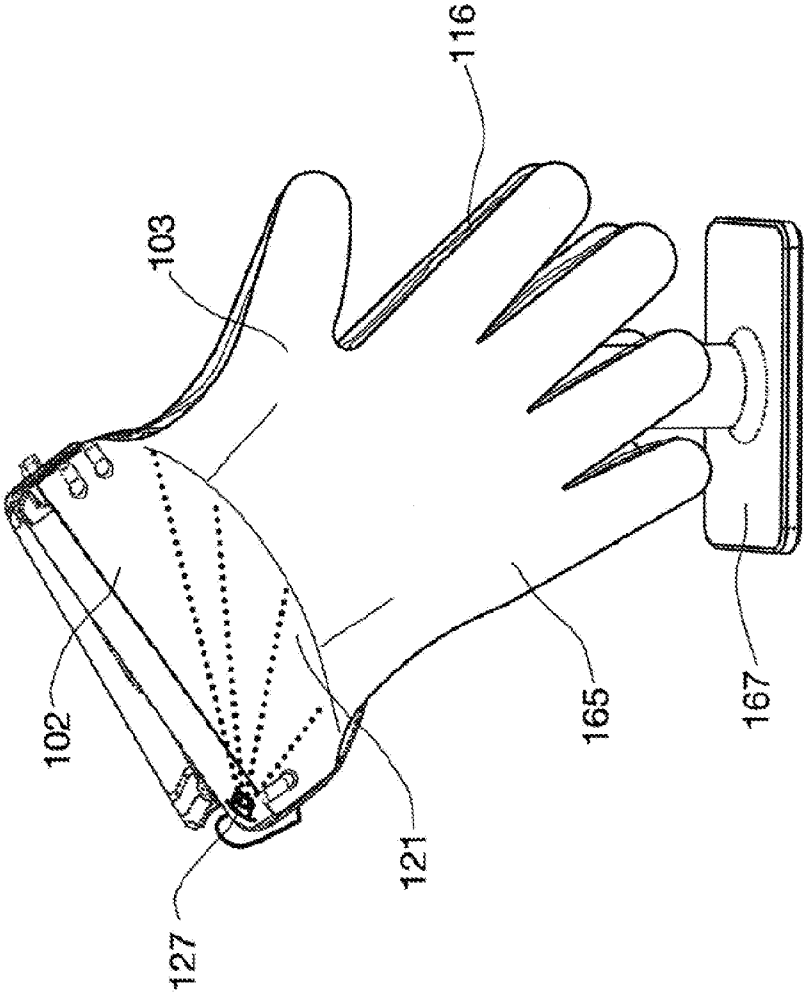


FIG. 41

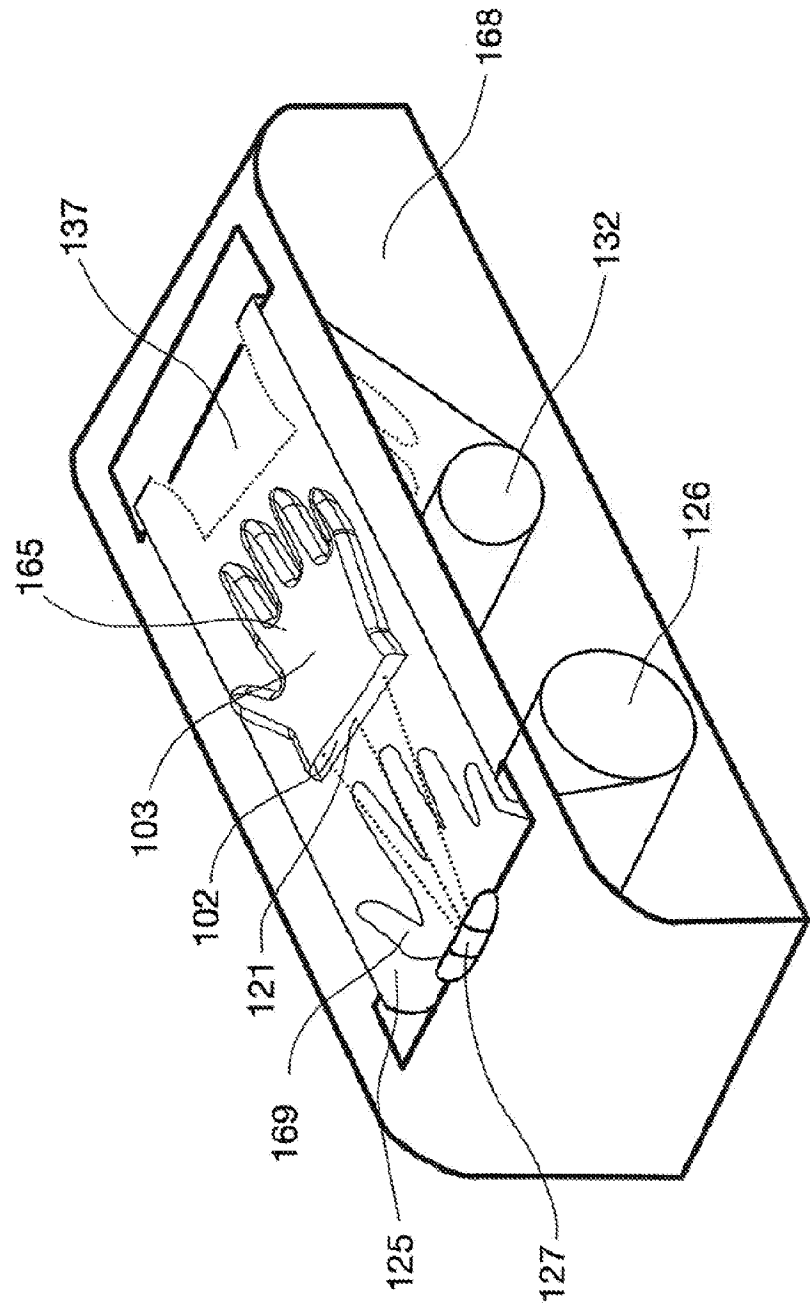


FIG. 42

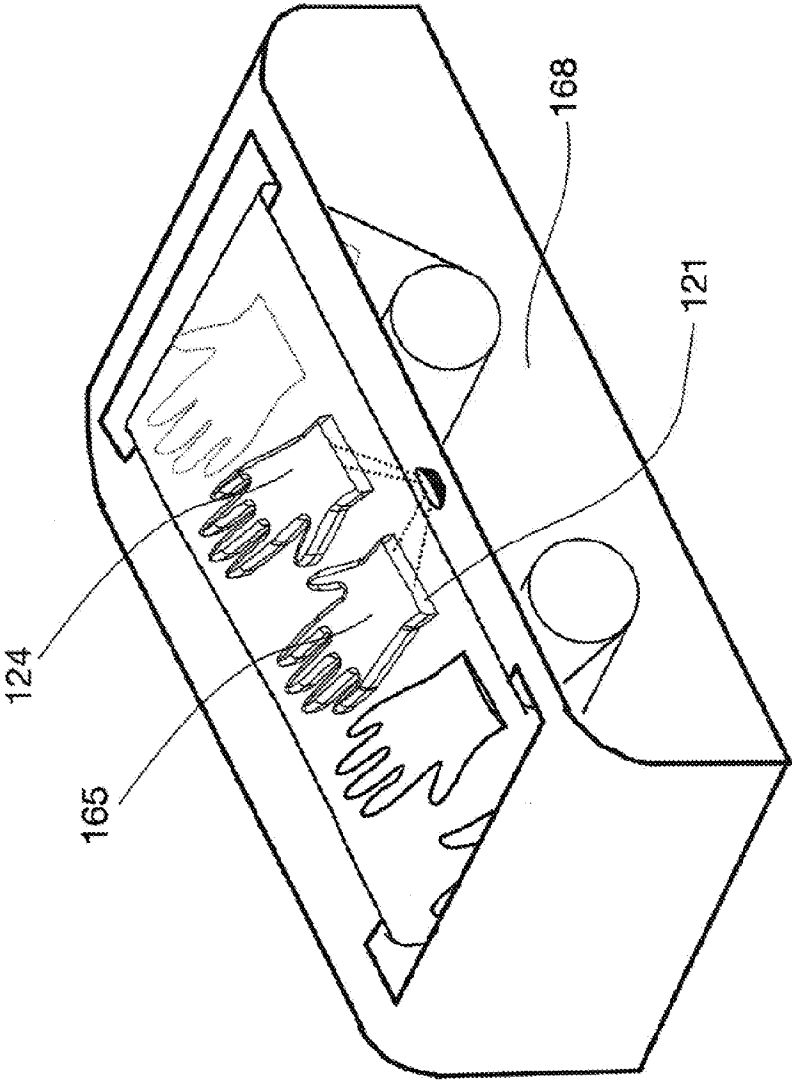


FIG. 43

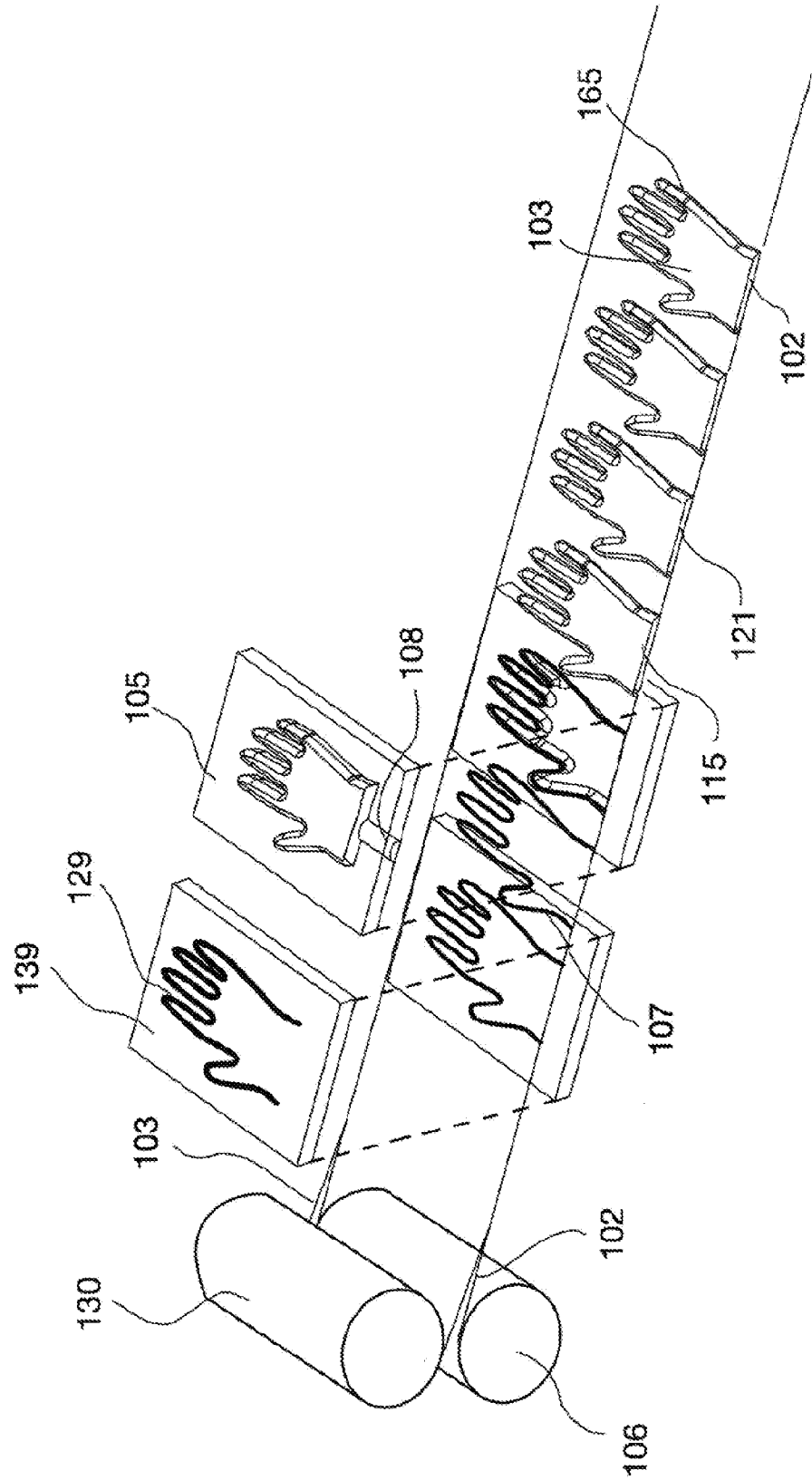


FIG. 44

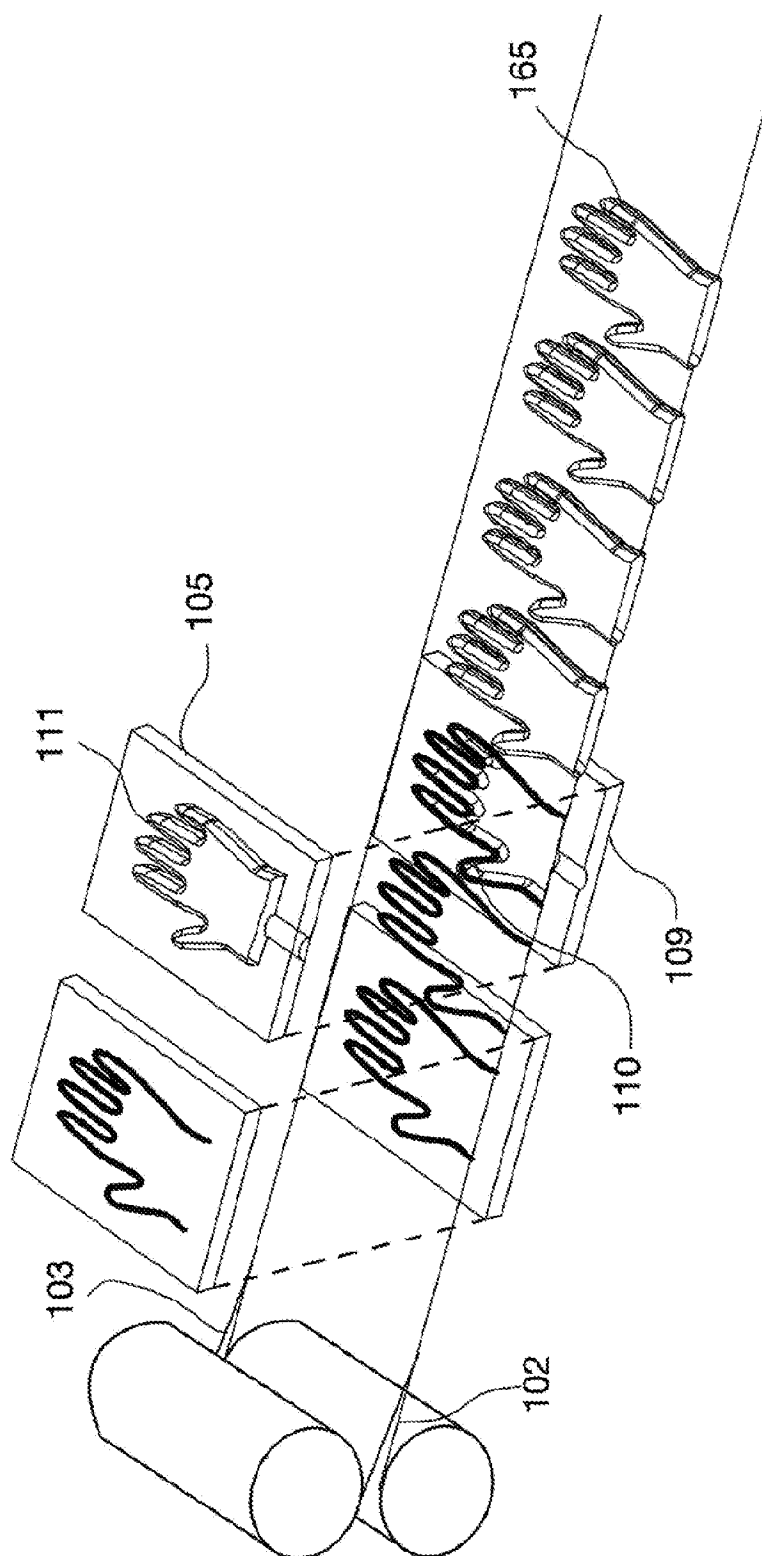


FIG. 45

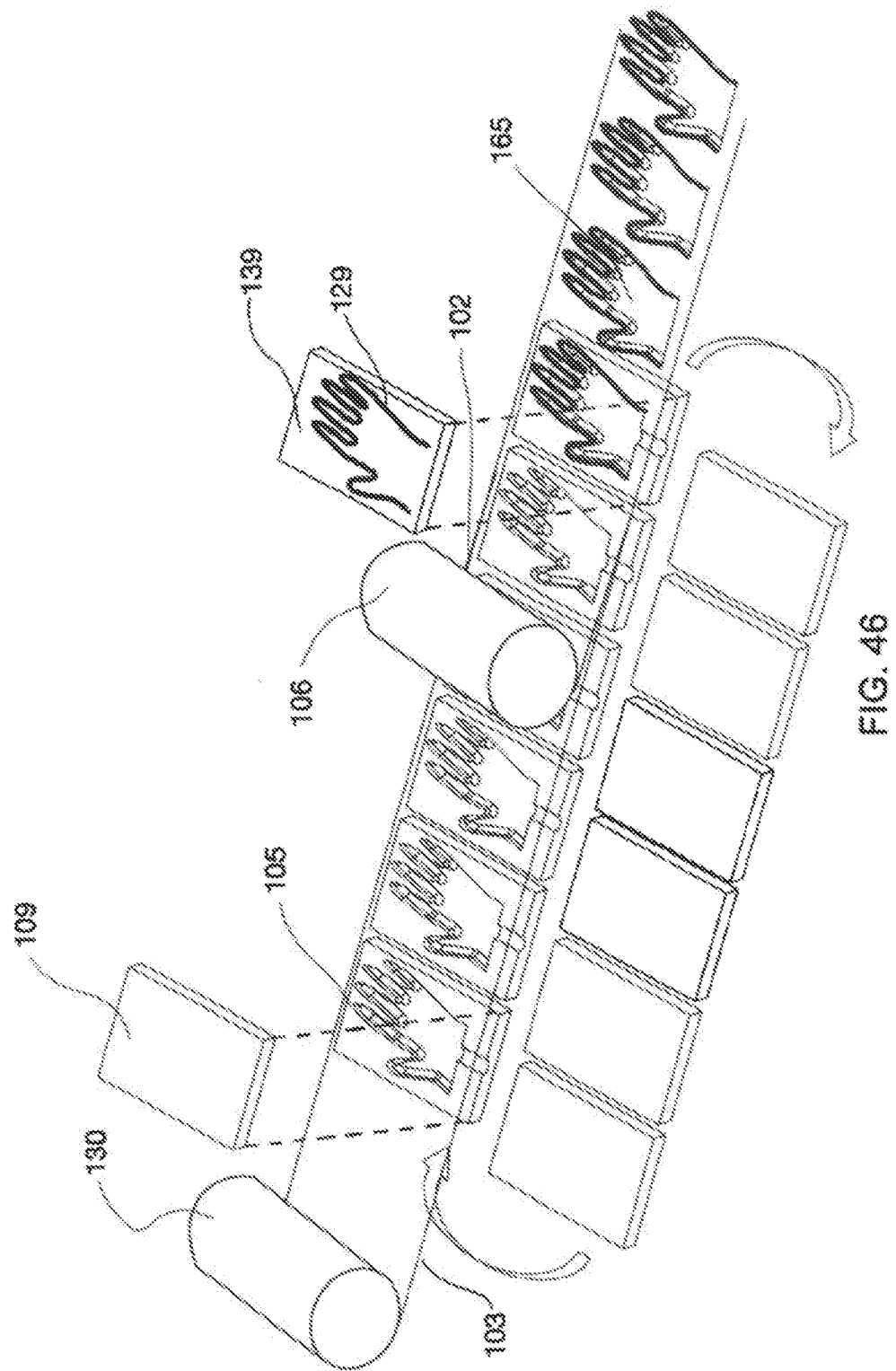


FIG. 46

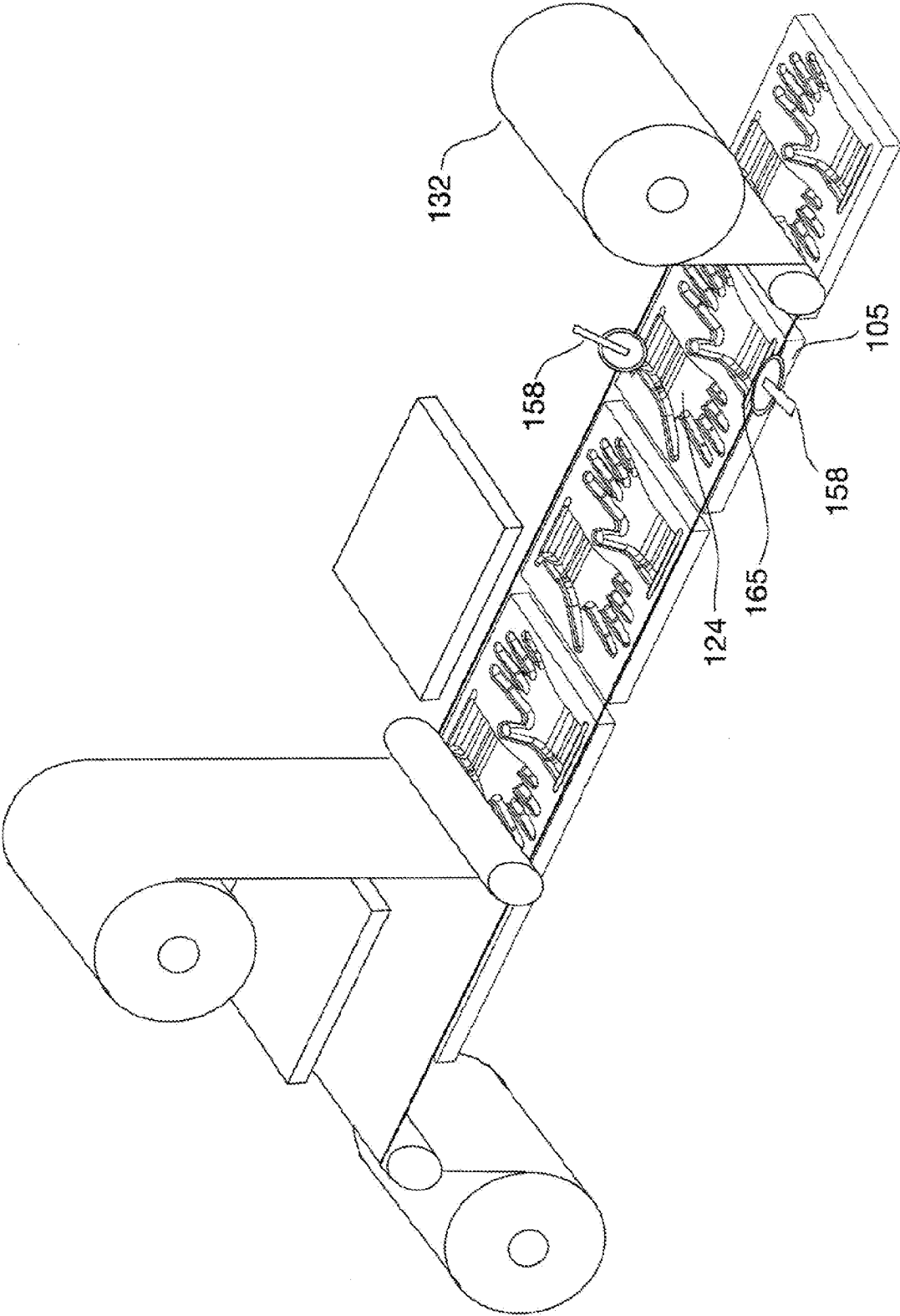


FIG. 47

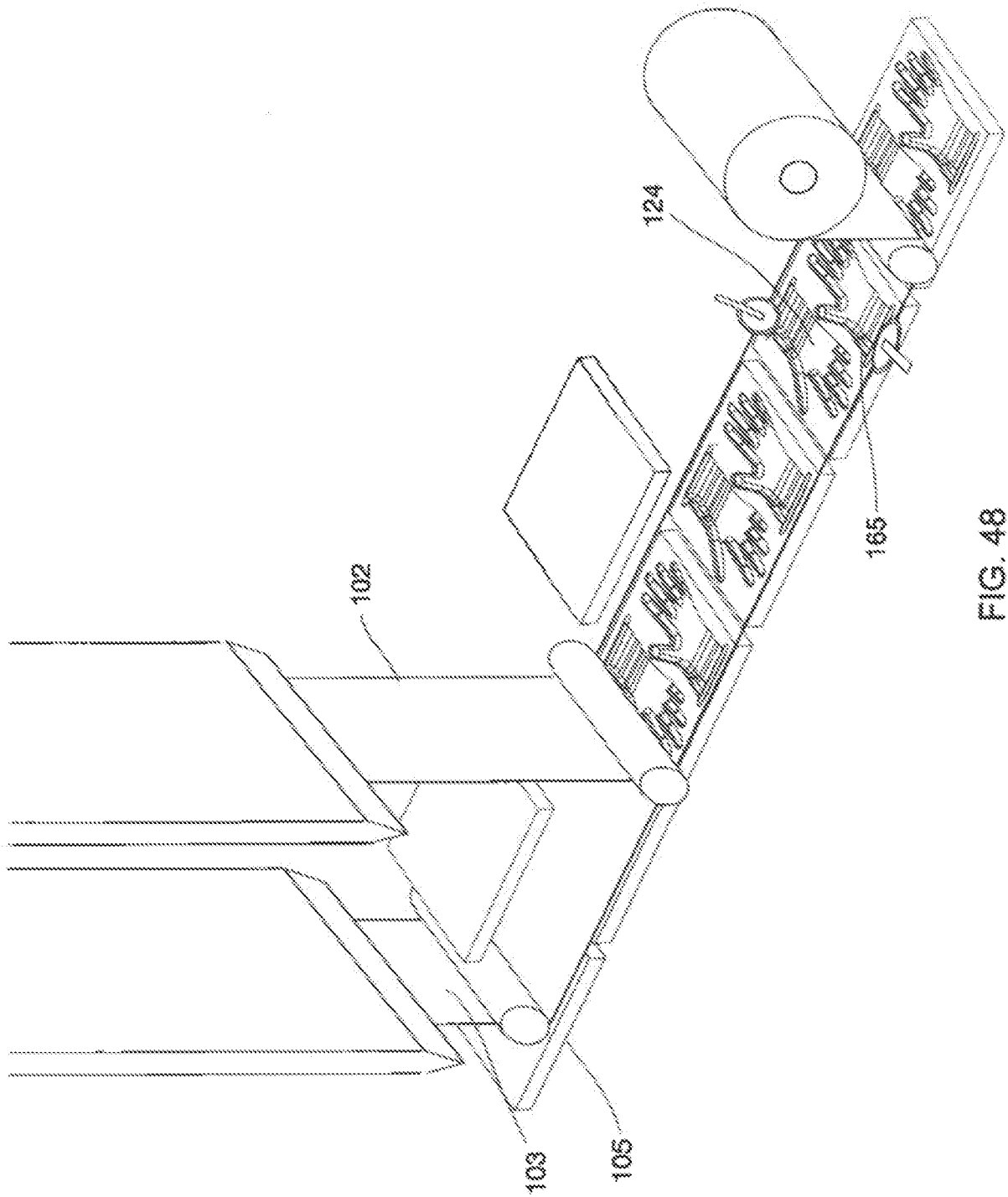


FIG. 48

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 19/38991

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A41D 19/00, A47G 25/00, B65D 83/00 (2019.01)

CPC - A41D 19/00, A41D 19/0003, A41D 19/0006, A41D 19/0055, A41D 19/0068, A41D 19/0072, A41D 19/0093, A41D 19/015, A41D 2400/00, A41D 2400/44, A47G 25/00, A47G 25/90, A47G 25/904, A47G 25/92, B65D 83/00, B65D 83/08, B65D 83/0894

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y ---- A	US 2006/0049199 A1 (WEST) 9 March 2006 (09.03.2006), entire document, especially Figs. 1-5; paras [0022]-[0041]	104, 113 ----- 59-77, 96-103, 114-117, 119-121, 123-125 ----- 1-58, 78-95, 105-112, 118, 122
Y ---- A	US 5,921,434 A (HOLLANDER et al.) 13 July 1999 (13.07.1999), entire document, especially Figs. 1, 4; col 3, ln 35-47	59, 60-63, 66-75, 77, 123-124 ----- 1-58, 78-95, 105-112, 118, 122
Y ---- A	JP 2016079521 A (SANYAMATO KK) 16 May 2016 (16.05.2016), entire document, especially Fig. 1; paras [0022], [0025] of description translation	96-103, 114, 119 ----- 1-58, 78-95, 105-112, 118, 122
Y ---- A	US 2007/0150996 A1 (MCCARVILLE) 5 July 2007 (05.07.2007), entire document, especially Figs. 3, 4, 6; para [0022]	115-117, 120-125 ----- 1-58, 78-95, 105-112, 118, 122

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

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

28 August 2019

Date of mailing of the international search report

30 SEP 2019

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Authorized officer:

Lee W. Young

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 19/38991

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2016/0157647 A1 (RAMPERSAD) 9 June 2016 (09.06.2016), entire document, especially para [0378]	60, 97
Y	US 2015/0296902 A1 (INTEPLAST GROUP, LTD.) 22 October 2015 (22.10.2015), entire document, especially Fig. 3; para [0072]	61
Y	WO 2016/077886 A1 (GLUV AUSTRALIY PTY LTD) 26 May 2016 (26.05.2016), entire document, especially Fig. 1; para [0055]	73, 101
A	US 6,708,840 B2 (GRINBERG) 23 March 2004 (23.03.2004), entire document	1-125
A	US 2017/0156809 A1 (NO TOUCH EASY GLOVES, INC.) 8 June 2017 (08.06.2017), entire document	1-125
A, P	WO 2019/022703 A1 (HYGIENEXT LLC) 31 January 2019 (31.01.2019), entire document	1-125