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[Continued on next page]

(54) Title: GLOVE HAVING INJECTION MOLDED COMPONENTS

(57) Abstract: A glove having a glove liner adorned with at least one injection-molded component that provides the glove with specific characteristics tailored to a specific glove application. The liner may comprise a fabric and/or an elastomeric material. The position, composition, and/or contour of the injection-molded components define the characteristics of the glove.

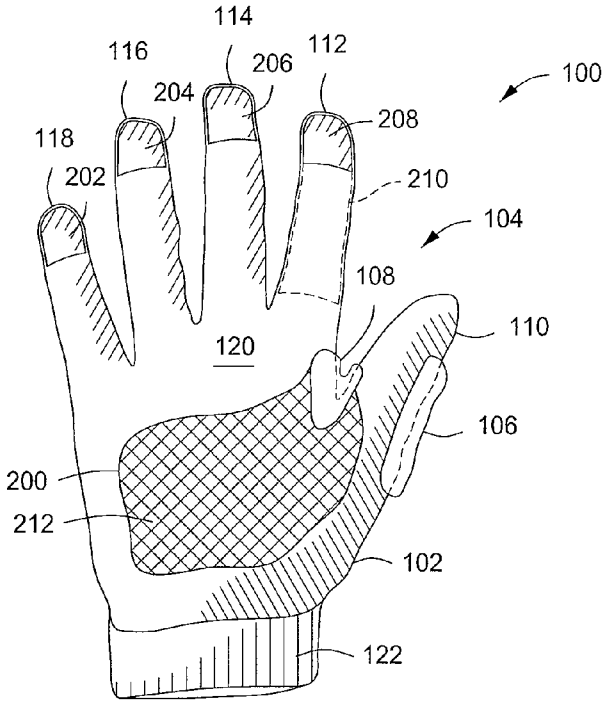


FIG. 2

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GLOVE HAVING INJECTION MOLDED COMPONENTS

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] Embodiments of the present invention generally relate to a glove specifically designed for certain applications and, more particularly, to a glove adorned with injection molded components that provide certain characteristics commensurate with the intended application for the glove.

Description of the Related Art

[0002] Gloves are currently available that have an injection molded component adhered to a fabric liner. Such molded components are used to provide a three-dimensional molded palm portion to enable the glove to more comfortably fit a user. The molded component may be fabricated from an elastomeric material (elastomers) such as thermoplastic vulcanizate (TPV) or thermoplastic rubber (TPR). The glove liner is typically a heat resistant hydrophilic knitted fabric that can withstand the injection molding process, e.g., approximately 400°F.

[0003] Heretofore, gloves with injection-molded components have typically found use as utility gloves where the injection molded component is positioned in a high wear location on the glove. Such positioning is intended to extend the life of the glove. However, such gloves can suffer from a lack of grip, flexibility, dexterity, and tactility characteristics.

[0004] Therefore, there is a need in the art to utilize injection-molded components to provide gloves specifically designed for use in a variety of applications, which can provide grip, flexibility, dexterity, and tactility characteristics.

SUMMARY OF THE INVENTION

[0005] Embodiments of the present invention generally comprise a glove having a glove liner adorned with injection-molded components that provide the glove with specific characteristics tailored to a specific glove application. The liner may

comprise a fabric and/or an elastomeric material. The position, composition, and/or contour of the injection-molded components define the gripping, flexibility, dexterity, and tactility characteristics of the glove.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

[0007] Figure 1 is a back of the hand view of a glove in accordance with one embodiment of the present invention;

[0008] Figure 2 is a palm view of the glove of Figure 1;

[0009] Figure 3 is a side view of an injection molded component for a glove in accordance with one embodiment of the present invention;

[0010] Figure 4 depicts a palm view of a glove utilizing an injection molded component to anchor another element to the glove in accordance with one embodiment of the present invention;

[0011] Figure 5 depicts a back of the hand view of an elastomeric glove adorned with at least one injection-molded component in accordance with one embodiment of the present invention;

[0012] Figure 6 depicts a close up of a section of the elastomeric glove of Figure 5 having an electronic device embedded into a component of the glove;

[0013] Figure 7 depicts a palm view of a glove having several injection molded components in accordance with one embodiment of the present invention;

[0014] Figure 8 depicts a side view of a glove having several injection molded components in accordance with one embodiment of the present invention;

[0015] Figure 9 depicts a palm view of a glove having one contiguous injection molded component in accordance with one embodiment of the present invention; and

[0016] Figure 10 depicts a side view of a glove having one contiguous injection molded component in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION

[0017] Embodiments of the present invention comprise a glove having a liner adorned with at least one injection molded component adhered thereto to form an application specific glove. The liner may be fabric and/or an elastomeric material (e.g., natural or synthetic rubber). The at least one injection molded component may be fabricated from an elastomeric material such as silicone, thermoplastic vulcanizate, thermoplastic rubber, thermoplastic elastomer, and the like, or blends or alloys thereof. In some embodiments, the injection molded components comprise thermoplastic polyolefins, such as polyethylene, polypropylene, and the like. In some embodiments, the injection molded components comprise engineered resins, such as nylons, acrylonitrile-butadiene-styrene, saturated styrene block copolymer thermoplastic elastomers (SEBS), polyurethanes, thermoplastic polyurethane alloys, modified-styrenics, styrene-butadiene-styrene, and polybutylene terephthalate resins, and blends and/or alloys thereof. In some embodiments, these rubbers, elastomers, vulcanizates, olefins, and other resins further comprise fillers and/or reinforcements, such as silica, metallic and ceramic powders, glass-fibers, and the like to provide grip, texture, strength, and other physical properties. Such fillers and reinforcements can, for example, comprise between 2-20% of a material by weight. In other embodiments, fillers and reinforcements may comprise between 20-50% by weight for various applications tailored to end properties. Other additives are added as needed, such as for flame- and arc-retardance, adhesion promoters, ultra-violet stabilization, hardness, pigments, and the like.

[0018] Figure 1 is a back of the hand view of a glove 100 having a fabric (e.g., knitted or sewn) liner 102 and at least one injection molded component 104. The fabric liner comprises a material that is heat resistant to facilitate attachment of the at least one injection molded component 104. As such, the liner material should be capable of withstanding a temperature, for example, of approximately 400°F. In other embodiments, the melting or processing temperature for the injection-molding material may be 450°-500°F and the liner material selected accordingly. In some embodiments, irrespective of the melting or processing temperature of the material or resin, the material or resin will comprise additives, such as a low molecular weight additive or plasticizer, that depress the melting or processing temperature well below 400°F, so that the melting temperature of the material of the liner is the same or above that of the injection molding material. The liner 102 comprises a thumb portion 110, index finger portion 112, a middle finger portion 114, ring finger portion 116, a pinky finger portion 118, back of the hand portion 120, and a cuff portion 122. Fabrication of knitted liners for gloves is well-known in the art, for example, as described in commonly assigned US patent number 7,246,509, incorporated herein by reference in its entirety. A fabric liner may comprise hydrophobic or hydrophillic yarns (which can provide a push-pull effect to wick moisture from one area of the glove to another, as is disclosed in commonly-assigned patent US number 61/571,569, filed on June 30, 2011, which is herein incorporated by reference in its entirety), cut resistant yarns, fire resistant yarns, resilient yarns, and the like. In some embodiments, yarns comprise cut resistant yarns, such as, but not limited to, steel wire, glass fibers, filaments, ultra-high molecular weight polyethylenes, nylons, p-aramids, m-aramids, aliphatic nylons, aromatic nylons, NOMEX®, TWARON®, KEVLAR®, DYNEEMA®, SPECTRA®, VECTRAN®, and the like or any composite or blend of the fibers and materials. Elastic yarns such as SPANDEX® may also be included, whether as a main yarn or plaited within the main yarn, for comfort and enhanced fit. In other embodiments for various glove applications, the yarn(s) may comprise cotton, nylon, rayon, polyester, polypropylene, and the like.

[0019] The at least one injection molded component 104 comprises, for example, a back of the thumb component 106 and a thumb crotch component 108

(located between the thumb and index finger portions 110, 112). In this embodiment, the component 106 protects the thumb from impact using a resilient material such as flexible thermoplastic. The component 108 is positioned in a high wear region of the glove 100 to provide reinforcement and extend the life of the glove. By leaving the back of the glove uncoated with any elastomeric material, the glove is breathable and flexible. Workers and all other glove wearers, including construction, industrial workers, and other laborers may find such a glove useful in protecting their hands as well as for comfort. To enhance usefulness, such as for gripping, tactility, flexibility, dexterity, impact-resistance, abrasion-resistance, as well as for comfort, the injection-molded components may be contoured to provide additional application specific functionality as described below. In this context, contoured indicates features and profiles of the injection molded components having variable thicknesses across a cross-section of one area, for example, a finger area, knuckle area, palm area, and the like. Contoured also includes different features, raised and lowered areas and patterns, surface textures, and the like. For other applications, for example, a carpenter's glove, the liner may be cut resistant with further protection provided by injection-molded components located on an index finger and thumb; for a mason, the finger tips may have injection molded components; for a sheet metal worker, the palm and finger tips may comprise the injection-molded components, and so on.

[0020] Figure 2 is a palm view of the glove 100 depicted in Figure 1. This view depicts a plurality of optional positions, compositions and contours of injection-molded components 104. In one embodiment of the invention, the palm portion 120 may comprise an injection-molded component 200. Component 200 may be contoured to be thinner than the thumb crotch component 108 to provide flexibility and comfort. This component 200 (as well as any other component described herein) may have a specific composition commensurate with a particular application. For example, particles 212 may be added to the elastomeric material of the component 200 to facilitate abrasion resistance, surface grip, antimicrobial properties, enhanced anti-vibration characteristics, enhanced impact characteristics, and/or enhanced visibility. The addition of such materials to achieve these

characteristics may be performed in degrees to tailor the desired characteristic to the application of the glove. To enhance abrasion resistance the elastomeric material of the component may be selected for hardness or inorganic additives such as boron nitride may be mixed in the elastomeric material. Once cured, the additives will promote abrasion resistance.

[0021] For example, and not by way of limitation, a glove for use by masons can comprise a composition such as the following. A saturated styrene block copolymer (SEBS) providing good abrasion resistance and hardness properties (for example, a Shore A durometer hardness of 25), such as grade RTP 2799SX 127556 A TPE, sold by the RTP Co., between 80-100 percent by weight, and a pigment. Other additives can comprise sand, silica, ultraviolet additives, and the like. In some embodiments, the TPE grade by weight is approximately 95 percent or more. A material for the injection molded components for an oil and gas glove can comprise thermoplastic vulcanizate elastomer, such as grade RTP 2899 X 128802 B by the RTP Co. and further comprise flame retardance and ultraviolet stabilizers. Another embodiments for an oil and gas glove comprises between 80-100 percent by weight material grade RTP 2099 E X 117792 C, which is a thermoplastic urethane alloy, a flame retardant, and an adhesion promoter, increasing the adherence of the material to, for instance, polycarbonate, ABS, and polyesters.

[0022] To enhance surface grip, the surface of the injection molded features may be roughened using a chemical treatment, the mold for the injection molded component may emboss a surface texture onto the component, particles may be embedded in the surface (e.g., sand, silica) or the like for grip and durability. In other embodiments, the injection molded components of the molded glove are chemically etched to provide surface textures. In other applications, lesser grip may be desirable and lubricity-enhancing additives may be added to the component, such as carbon black, graphite, fluoro-chemicals, and the like.

[0023] To enhance antimicrobial properties, antimicrobial materials such as iodine, silver, zinc, silane quaternary ammonia salt, or the like may be incorporated into the injection-molded component. Such materials neutralize or kill any microbes

that contact the surface of the component and/or are active for biostatic properties. An antimicrobial glove may be used by food or health workers.

[0024] To enhance anti-vibration characteristics the surface must mitigate mechanical stresses that physically deform the glove material. Such deformation may arise from a motor (continuous vibration), an impact (single event vibration), electrical (piezo-electric effect), water flow, and the like. Upon deformation, both longitudinal and shear waves components (a mechanical wave) is imparted into the glove surface and propagates thru the glove material. The wave continues propagating until attenuated by imperfections and features in the glove material. Imperfections and features selected to attenuate waves may include porosity, reinforcing materials, laminations, differing material phases, and the like. Different thicknesses and different topographies of the injection molded components are also contemplated herein for any embodiment in accordance with the invention, such as ranging between approximately 0.020 to 0.200 of an inch, which are designed for application-specific purposes. Any one injection molded component may have a variable thickness or for embodiments having more than one injection molded component, even where one component has a non-variable thickness, other components may have different thicknesses.

[0025] In addition to the foregoing macroscopic imperfections, the material may attenuate the wave due to internal friction, localized heating, and microscopic imperfections. For elastomers, attenuation arises from internal friction and movement of the polymeric chains within the material. Because many of the polymers used are non-crystalline, and comprised of millions of polymeric chains, very effective wave attenuation results. Polymers vary as to wave attenuation effectiveness due to variations in polymeric chains and/or the extent of vulcanization cross-linking. Elastomers with high attenuation properties may be selected for use in the injection-molded components when anti-vibration characteristics are desired.

[0026] To enhance visibility, photoluminescent pigments, reflective materials and additives, and similar pigments may be mixed, compounded, incorporated, or embedded in the elastomeric material of the injection-molded component. Such

characteristics may find use in situations where the gloves are used at night and safety may be enhanced via glove visibility, for example, highway worker gloves.

[0027] In other applications for the glove 100, impact resistance may be selectively enhanced by utilizing zonal application of thickened regions within the injection molded component, or using particular materials for the component such as shear thickening fluids as part of the component. As such, a glove may be designed to improve hand protection for a user.

[0028] The glove 100 may comprise injection-molded components 104 that are located on, for example, the fingertips of fingers 112, 114, 116, and 118; specifically, as components 208, 206, 204, or 202. These fingertip components may provide protection, such as impact and tactile enhancement, enhanced grip, and the like. Furthermore, the fingertip components may comprise a conductive material (either coating or mixed with the elastomeric material) to enable a user to operate a touchscreen without removing the glove 100.

[0029] If the glove 100 is used as a military glove, the index finger portion 112 may comprise a zonal contoured index finger component 210 whereby the fingertip region may be thinner than other portions of the component 210 to facilitate easy movement and tactile sensitivity, for example, for a trigger finger.

[0030] Components 104 may also be molded in multicolored layers such that an overlayer of a first color being worn through to an underlayer of a second color discloses the underlayer and indicates a worn glove. As such, a glove can be injection molded with a plurality of different color component layers to form a wear indicator.

[0031] Using an injection molded component atop a previously rubberized glove forms a hybrid glove comprising a fabric liner that is at least partially dipped in natural or synthetic rubber followed by application of injection molded components. Techniques for fabricating such a dipped glove are well known and disclosed, for example, in commonly assigned US patent number 7,803,438, incorporated herein by reference in its entirety. In other embodiments, the injection-molded component

may coat the palm area or be extended to a ¾ coating (palm, fingers, knuckles) or full coat to the wrist. The injection-molded components may have engineered profiles or contours. In other embodiments, components 104, which may comprise nylons, polyolefins, TPEs, TPVs, TPRs, and the like, may be injection molded over a glove comprising a latex or elastomeric coating. Injection molding such materials over latex promotes a good adhesion between the components 104 and the latex coating because of the inherent mixing due to the relative similarities in melting or processing temperatures.

[0032] In other embodiments, the injection-molded components comprise elastomers that are fire- and/or heat resistant or arc-resistant. Such gloves could find use with chefs, first responders, electricians, or any application where heated or electrically enabled articles need to be moved or touched.

[0033] Figure 3 depicts a side view of a finger portion 300 of a glove comprising a liner 304 adorned with an injection-molded component 306. To promote flexibility and breathability, the injection-molded component 306 defines an open region 302 to expose the liner 304 at a flex point. Such open regions may be applied to various flex points such as knuckles, joints, and the back of the hand. In other embodiments of the invention, fingertips may also be exposed to promote tactile sensitivity.

[0034] Figure 4 depicts a glove 400 having a non-injection molded component 406 affixed to a liner 402 via an injection molded component 404. In one embodiment of the invention, the injection molded component 404 forms an anchoring substrate upon which the non-injection molded component 406 can be adhered or otherwise affixed. For example, component 406 may be made of leather and sewn to the substrate component 404 using thread 408. In other embodiments, another injection-molded component can be overmolded onto an existing injection molded component 404. In other embodiments, the component 406 may be glued, epoxied, thermally cemented, and the like to the substrate component 404. In addition to applying structural components, such a technique may be useful for adhering labels to the glove 400. This technique is useful in promoting adhesion in

situations where components may not be readily attached to the fabric of the liner due to the material used in the liner or the type of knit that is used to make the liner.

[0035] Figure 5 depicts a back of the hand view of a glove 500 comprising a liner 502 made of an elastomeric material (e.g., natural or synthetic rubber) having injection molded components 514 applied thereto. The liner 502 comprises a thumb portion 504, and index finger portion 506, a middle finger portion 508, a ring finger portion 510, a pinky finger portion 512, back of the hand portion 516 and cuff portion 518. For certain applications of elastomeric gloves (e.g., surgery or examination), it may be advantageous to have reinforced regions to facilitate user comfort and/or enhanced protection. For example, an application specific laparoscopic surgery glove may comprise injection-molded thumb component 520 and injection-molded index finger component 522. The components 520 and 522 are positioned to provide cushioning of the thumb and index finger during manipulation of laparoscopic surgical devices. Furthermore, in some embodiments, a flexible steel mesh may be placed on the liner in the mold and injection molded over it, fixing it in place, to provide puncture resistance. In other embodiments, a fine gauge metallic or ceramic screen and the like may be placed within the mold and subsequently molding component 514 over it.

[0036] In other embodiments of elastomeric gloves, regions of the glove that are prone to sharps and the like may be protected with an injection-molded component 524. To facilitate such protection, the protective component 524 adorns the back of a thumb portion 504. In other embodiments, the protective component or components 524 may be positioned in other locations on the glove 500 to protect other areas from sharps, needle sticks, and the like.

[0037] In another embodiment, an injection-molded component 526 may be formed at the cuff 518 to strengthen the cuff from tearing during donning.

[0038] In another embodiment, one or more of the injection-molded components may be used to embed electronics into the glove. Figure 6 depicts a close up of a section of the elastomeric glove of Figure 5 having an electronic device embedded

into a component of the glove. For example, active and passive electronics, a magnet, a magnetic strip, or a radio frequency identification (RFID) circuit 528 or the like may be embedded in a component (cuff component 526). Consequently, the circuit 528 is protected from the environment as well as permanently attached to the glove 500 to facilitate user tracking, glove use profile generation and the like. This technique of embedding electronics within an injection-molded component may be applied to any of the embodiments described herein.

[0039] Figure 7 depicts a palm view of a glove 700 having several injection molded components in accordance with one embodiment of the present invention. Glove 700 comprises a liner 702 (e.g., fabric, such as knitted or sewn) and at least one injection molded component 704. The liner 702 comprises a thumb portion 710, index finger portion 712, a middle finger portion 714, ring finger portion 716, a pinky finger portion 718, palm area of the hand portion 720, and a cuff portion 722. Glove 700 has several injection molded components that are not contiguous with other injection molded components. For example, injection molded component 704, which covers palm area 720 and parts of fingers 710, 712, 714, 716, and 718 is not contiguous with injection molded component 726.

[0040] Figure 8 depicts a side view of a glove having several injection molded components in accordance with one embodiment of the present invention. Glove 700 shows that injection molded component 728 is not contiguous with other injection molded component 704 and 726, and is disposed on fingertip 742. In this embodiment, injection molded component 728 does not comprise more than 50% of fingertip 742. In other words, using midline 740 as a reference point, which could be the parting line of an injection mold (not shown) in which the gloves are molded, the thermoplastic rubber or other material or composition of which injection molded components are made, injection molded component does not traverse any area over midpoint 740. In some embodiments, such as shown by injection molded component 738, finger 742 does comprise an injection molded component traversing more than 50% of the circumference of a finger 742.

[0041] Figure 9 depicts a palm view of a glove 900 having one contiguous injection molded component in accordance with one embodiment of the present invention. Glove 900 shows that injection molded component 904 is a one-piece contiguous injection molded component. Glove 900, as above, comprises a fabric (e.g., knitted or sewn) liner 902 and at least one injection molded component 904. The liner 902 comprises a thumb portion 910, index finger portion 912, a middle finger portion 914, ring finger portion 916, a pinky finger portion 918, palm area of the hand portion 920, and a cuff portion 922. With reference to Fig. 9, injection molded component 904, covers palm area 920 and parts of fingers 910, 912, 914, 916, and 918 contiguously. Cutouts 930, which can be on fingers 910, 912, 914, 916, 918, and palm area 920, are all connected by the rubber or engineered resin. In some embodiments, injection molded component 904 covers cuff 922.

[0042] In this embodiment, injection molded component 904 may, but need not, comprise more than 50% of fingertip 942 or other fingers or the palm area. In other words, the midline of the finger or liner 902 cannot be viewed because it is covered with the thermoplastic rubber or other material or composition of which injection molded component 904 is made.

[0043] Figure 10 depicts a side view of a glove having one contiguous injection molded component in accordance with one embodiment of the present invention. Glove 900 further comprises cutouts 930, which indicate that the rubber forming injection molded cutout 904 is contiguous through glove 900 by bridges 950.

[0044] To apply injection-molded components to a liner, the liner is positioned on a former. The former is typically a steel mold of a hand, although the mold may comprise any suitable material, such as aluminum, ceramics, plastics (acrylics, epoxies, or urethanes, high-melting temperatures resins, and the like), wood, or the like. If the liner is an elastomeric liner, the former may be used to first make an elastomeric liner via a well-known latex dipping process. Once the liner is cured, it is not stripped from the former before the liner and former are used in the injection molding process. For fabric liners, the liner is positioned on the former. In some embodiments, the fabric liner may be dipped in an elastomeric material (e.g., natural

or synthetic latex). After curing, the fabric liner while positioned on the former is adorned with injection-molded components as discussed above.

[0045] The former supporting the liner is encased in a mold, as is known in the injection molding industry, having an internal formed surface that inversely matches the positioning and contour of the components. By using injection molding, the components can be positioned at any location on the glove liner. Thermoplastic is injected under pressure into the mold surrounding the liner such that the thermoplastic fills the voids between the liner and the surface of the mold. Upon curing (cooling) the thermoplastic, the mold is opened and the former, with the liner now adorned with in injection-molded complements, is removed from the mold. The glove can now be stripped from the former and the former reused. Typical molds may comprise two mold halves or more, and further include slides, cams, cam fingers, and the like to provide molded features within the injection molded components of the gloves, such as undercuts, cantilevers, threads, and similar profiles, textures, and the like, which would otherwise be difficult to eject from the mold without damaging the molded features. Additionally, the former itself can form a portion of the mold.

[0046] In some embodiments, the material used for the liner may have a melting point or processing temperature that is commensurate with the temperature of the thermoplastic for injecting into the mold. Consequently, contact of the heated thermoplastic with the material of the liner causes the liner to bond with the injection-molded component. Without intending to be bound by theory, it is believed that the fiber bundle of the knitted liner is impregnated with the polymer of the injection molded component, promoting a mechanical interlock or strong adhesion between the injection molded component and the knitted liner. The combination of appropriate melting or processing temperatures, injection, clamp, and mold cavity pressures, generally, low pressure, in some embodiments, less than 1000 psi, and in some embodiments, less than 500 psi, and inherent and processing viscosities of the engineered materials, along with the tightness of the knit structure and a complementary function regarding the melt temperature of the knitted liner and the injection molded component, allows the design of a glove having optimum flexibility,

dexterity, and tactility balanced with other desirable protective properties, such as grip, abrasion-, impact-, flash-, and arc-resistance, and the like. Complementary in this context indicates that melting and/or processing temperatures for materials comprising injection molded components, elastomeric coatings, and knitted liners are approximately the same, which is defined as being within 50°F of each other for the purpose that adhesion is promoted without burning or destroying features.

[0047] In various embodiments, a fabric liner may be knitted using conventional knitting equipment and processes or, alternatively, a Knit Variable Stitch Dimension (KVSD) technology as disclosed in commonly assigned US Patent 6,962,064, incorporated herein by reference in its entirety.

[0048] In various embodiments, the injection-molded component may be applied for aesthetic purposes to add contour or color to a glove or a labeling.

[0049] By using injection molded components, a worn or damaged glove may be "resurfaced" and/or recycled to replace or add injection molded components. A process of washing and reprocessing extends the life of a given glove.

[0050] Embodiments of the invention include the use of injection molded components onto other plastics, which may or may not be injection-molded on the glove, mesh screens, and electronics. Embodiments of the invention include injection molded components on one or both sides of an injection mold parting line.

[0051] While the foregoing is directed to embodiments of the present invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof, and the scope thereof is determined by the claims that follow.

CLAIMS

1. A glove comprising a liner adorned with at least one injection molded component where a position, composition, and contour of the injection molded component provides characteristics for a specific application for the glove.

2. The glove of claim 1 wherein the liner comprises an elastomeric material.

3. The glove of claim 1 wherein the liner comprises fabric at least partially coated with an elastomeric material.

4. The glove of claim 1 wherein the liner comprises a yarn.

5. The glove of claim 4 wherein the yarn comprises steel wire, glass fibers, filaments, ultra-high molecular weight polyethylene, nylons, NOMEX®, TWARON®, KEVLAR®, DYNEEMA®, SPECTRA®, VECTRAN®, SPANDEX®, and the like or any blend of the fibers and materials.

6. The glove of claim 1 wherein the injection molded component comprises an elastomeric material such as silicone, thermoplastic vulcanizate, thermoplastic rubber, thermoplastic polyolefin, aliphatic nylons, aromatic nylons, modified-styrenics, and styrene block copolymers, and blends or alloys thereof.

7. The glove of claim 1 wherein the melting point temperature of the liner is complementary with the melting point temperatures of the material of the injection molded components to promote adhesion.

8. The glove of claim 2 wherein the melting point temperature of the elastomeric material is complementary with the melting point temperature of the material of the injection molded components to promote adhesion.

9. The glove of claim 8 wherein the melting point temperatures of the elastomeric material, liner, and injection molded components are complementary to promote adhesion.

10. The glove of claim 1, wherein the glove comprises fingers, a thumb, and a palm area, the injection molded component disposed on a finger, fingertip, thumb, thumbtip, or palm area and comprises 50% or less than the circumference of the finger, thumb, or palm area.

11. A method for producing a glove, comprising:

injecting a polymeric material onto a liner made of a yarn, the polymeric material specified to facilitate abrasion resistance, surface grip, antimicrobial properties, biostatic properties, enhanced anti-vibration characteristics, and/or enhanced visibility, to form an injection molded component, providing characteristics for a specific application for the glove.

12. The method of claim 11 wherein the liner comprises an elastomeric material.

13. The method of claim 11 wherein the liner comprises fabric at least partially coated with an elastomeric material.

14. The method of claim 11 wherein the yarn comprises steel wire, glass fibers, filaments, ultra-high molecular weight polyethylene, nylons, NOMEX®, TWARON®, KEVLAR®, DYNEEMA®, SPECTRA®, VECTRAN®, SPANDEX®, and the like or any blend of the fibers and materials.

15. The method of claim 11 wherein the injection molded component comprises an elastomeric material such as silicone, thermoplastic vulcanizate, thermoplastic rubber, thermoplastic polyolefin, aliphatic nylon, aromatic nylon, modified styrenics, and styrene block copolymers, and blends or alloys thereof.

FIG. 1

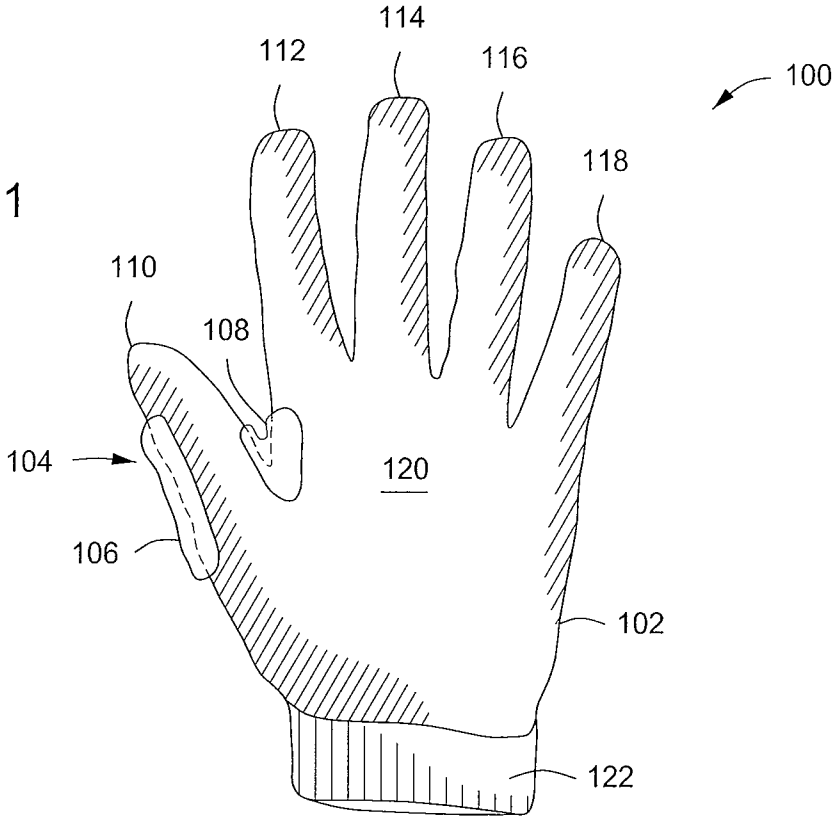
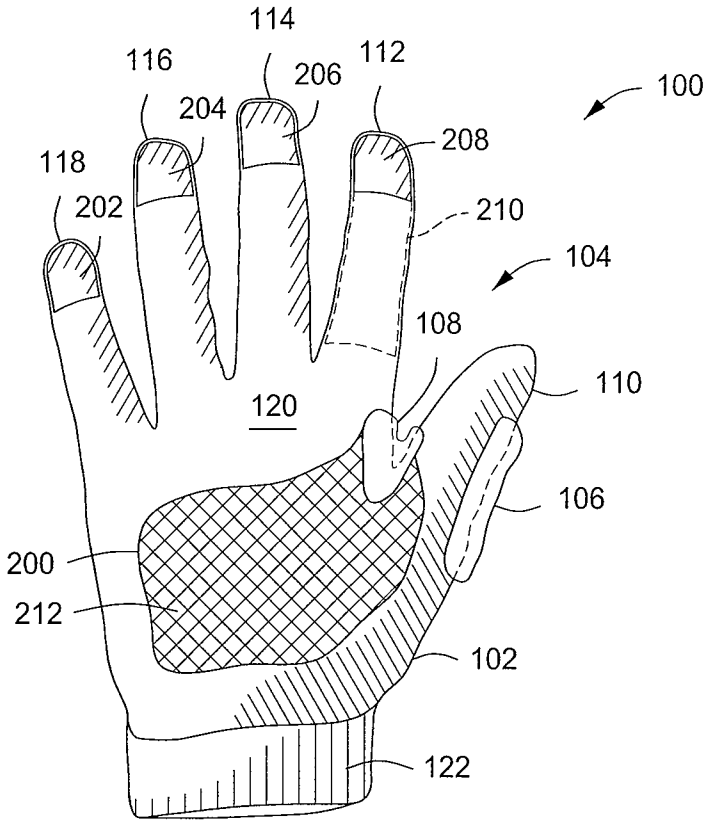

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FIG. 2


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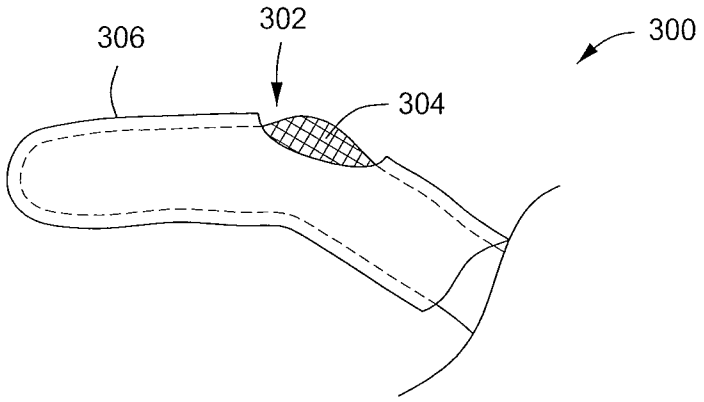


FIG. 3

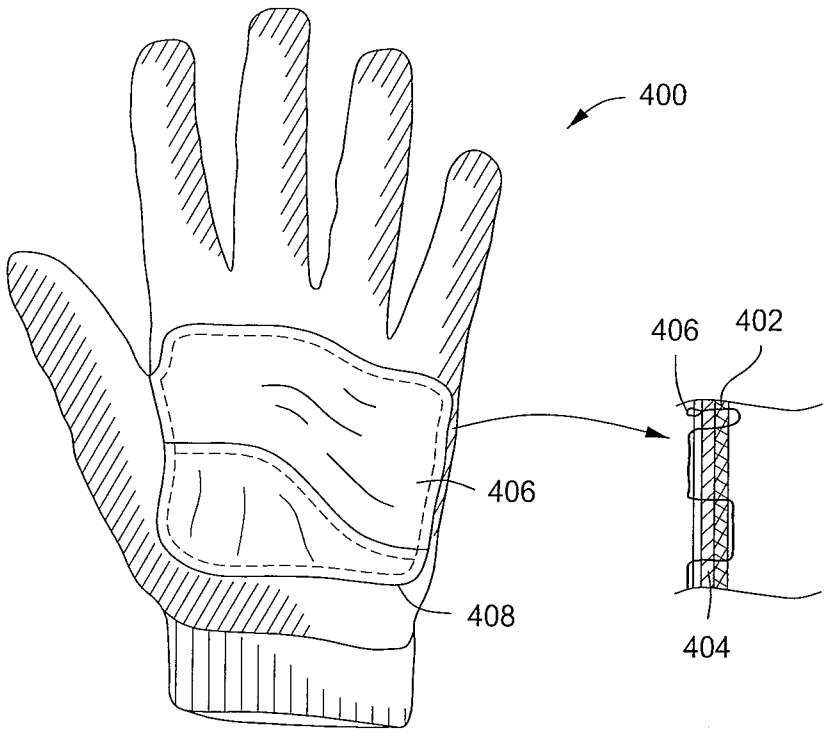


FIG. 4

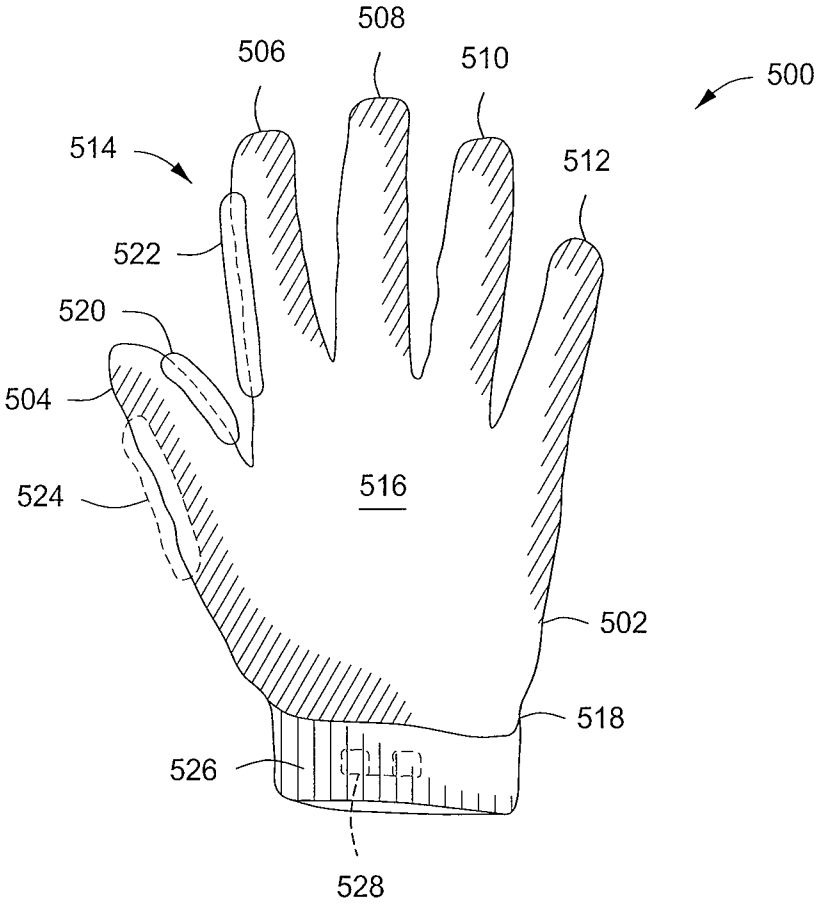

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FIG. 5

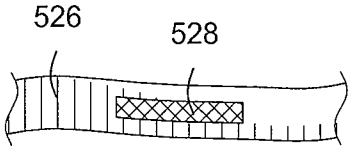

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FIG. 6

Figure 7

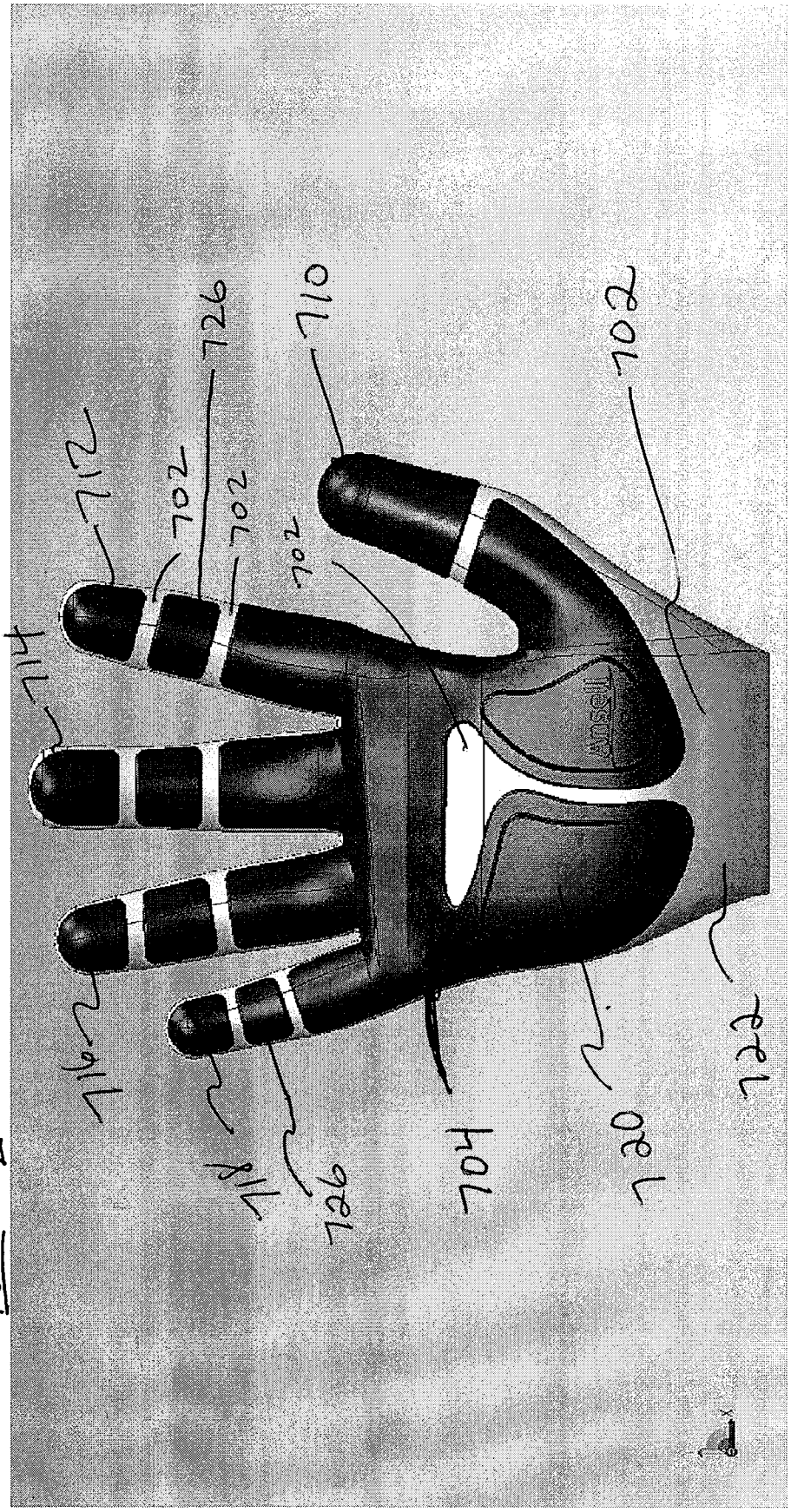


Figure 8

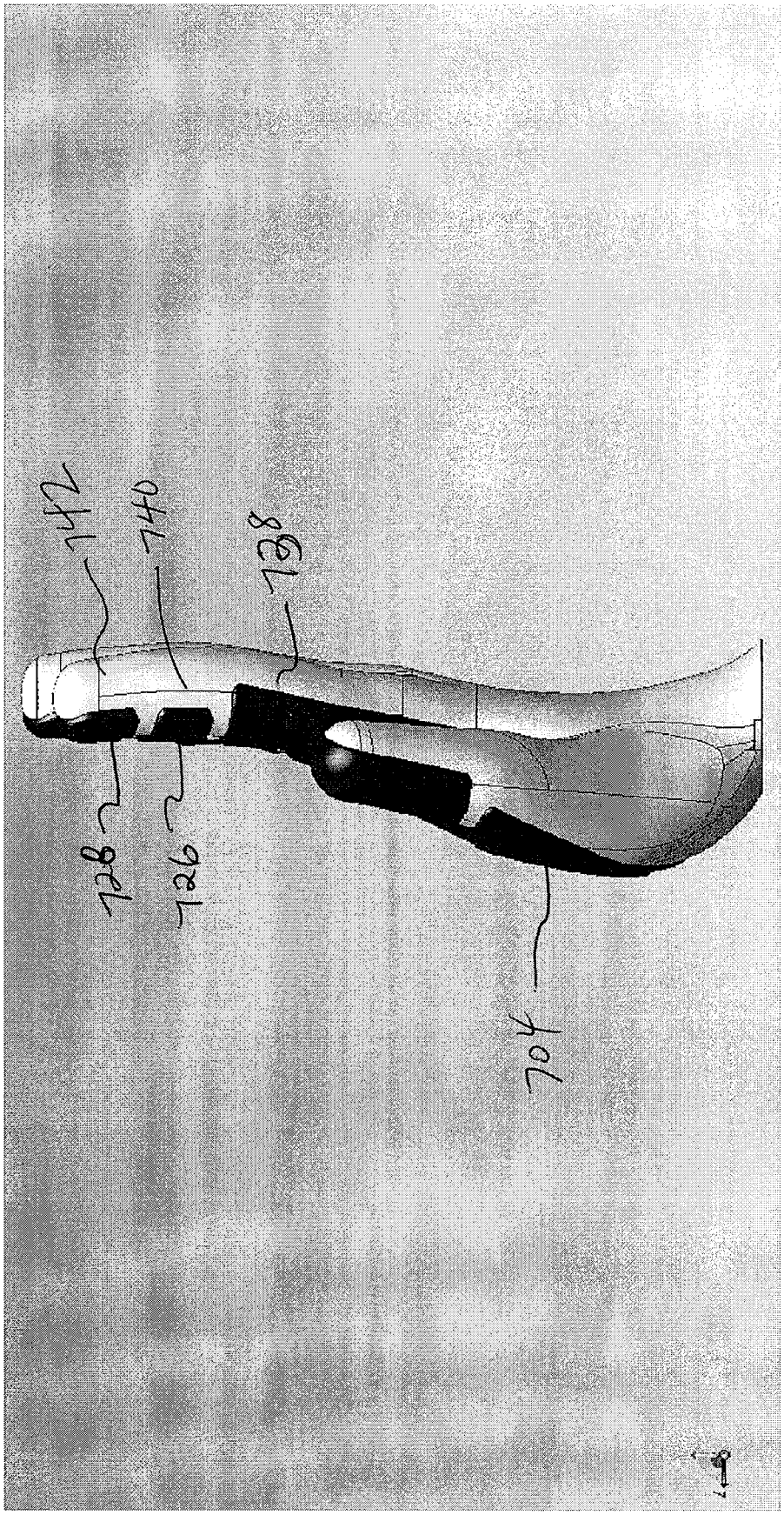


Figure 9

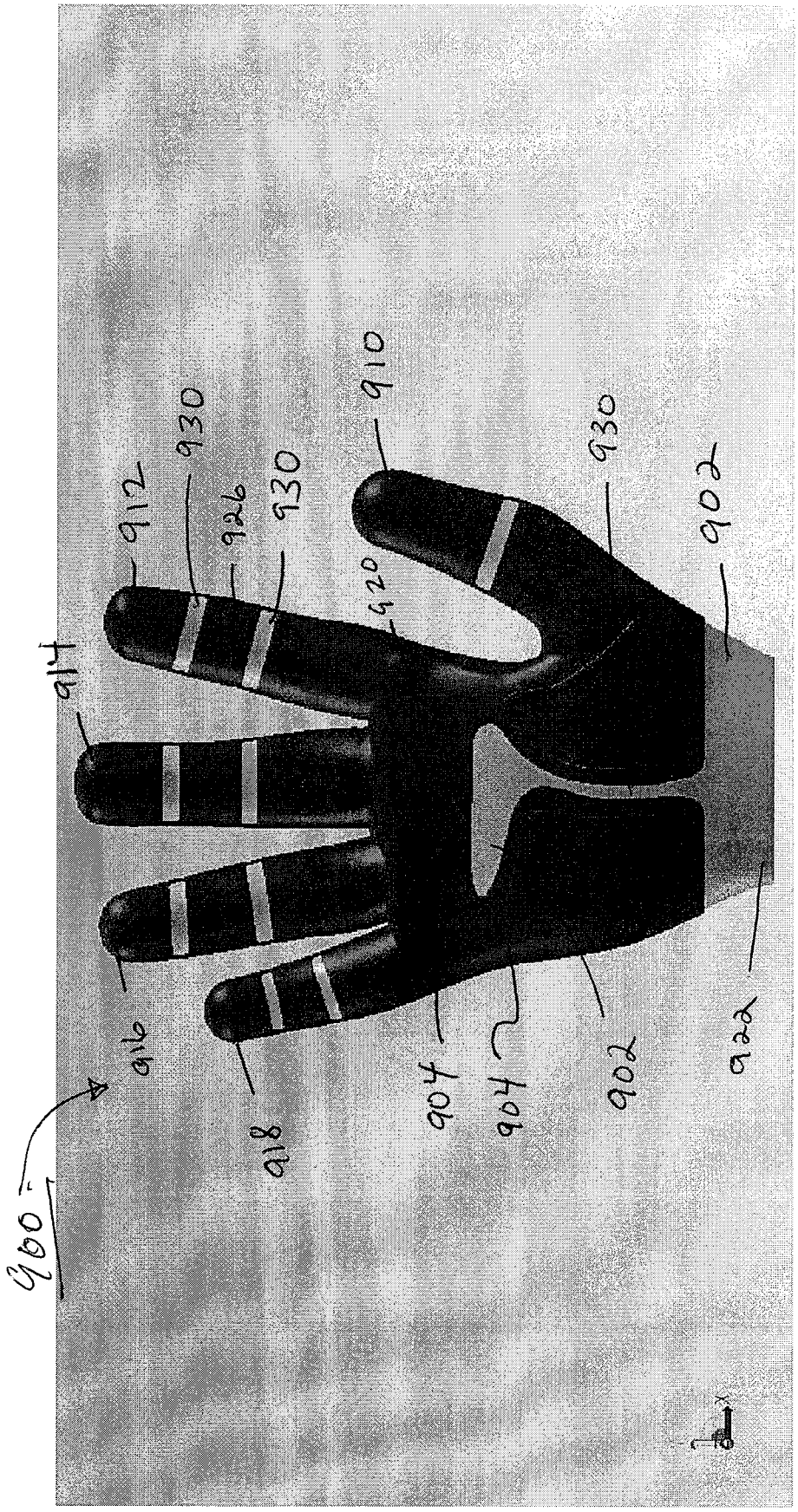


Figure 10

