PROTECTIVE OVERGLOVE FOR GLOVE-BOX GLOVES

Apparatus and associated methods relate to a protective overglove configured to be worn over a glove-box glove, the protective overglove having a hand portion and a gauntlet portion extending from the hand portion to a cuff portion, the cuff portion having a locking device to attach the cuff portion to the overglove at an upper-arm region of a user. In an illustrative example, the overglove may have a protective material to protect a user's arm from a hazard presented within a glove-box. In some embodiments, the protective material may include non-woven fibers of high tenacity. In an exemplary embodiment, the non-woven fibers may include Ultra-High-Molecular-Weight Poly-Ethylene (UHMWPE) fibers. In some embodiments, the locking device may include a hook and loop fastener. In an exemplary embodiment, the protective overglove may advantageously protect the integrity of the glove-box glove from a hazard presented within a glove-box.
<table>
<thead>
<tr>
<th></th>
<th>Protective fabric</th>
<th>Conventional leather glove</th>
<th>Conventional UHMWPE knitted glove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion resistance EN 388</td>
<td>Level 3</td>
<td>Level 2 or 3</td>
<td>Level 3 or 4</td>
</tr>
<tr>
<td>Cut resistance EN 388</td>
<td>Level 3</td>
<td>Level 1</td>
<td>Level 3</td>
</tr>
<tr>
<td>Perforation resistance EN388</td>
<td>Level 4</td>
<td>Level 1 or 2</td>
<td>No perforation protection</td>
</tr>
<tr>
<td>Wire puncture resistance (not standardized test)</td>
<td>22.5N No wire crosses the material during test</td>
<td>18N 100% of wires cross material during test</td>
<td>No perforation protection</td>
</tr>
</tbody>
</table>

FIG. 7
<table>
<thead>
<tr>
<th>Unit</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion</td>
<td>Cycle</td>
<td>≥ 100</td>
<td>≥ 500</td>
<td>≥ 2000</td>
<td>≥ 8000</td>
</tr>
<tr>
<td>Cut</td>
<td>Index</td>
<td>≥ 1.2</td>
<td>≥ 2.5</td>
<td>≥ 5.0</td>
<td>≥ 10.0</td>
</tr>
<tr>
<td>Perforation</td>
<td>Newton</td>
<td>≥ 20</td>
<td>≥ 60</td>
<td>≥ 100</td>
<td>≥ 150</td>
</tr>
</tbody>
</table>

FIG. 8
PROTECTIVE OVERGLOVE FOR GLOVE-BOX GLOVES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit under Title 35, United States Code, Section 119(e) of U.S. provisional patent application entitled “Protective Overglove For Glove-Box Gloves”, Ser. No. 61/915,751, which was filed on Dec. 13, 2013. The 61/915,751 application is currently pending. The 61/915,751 application is hereby incorporated by reference into this application.

TECHNICAL FIELD

[0002] Various embodiments relate generally to protective gloves, and more specifically to those protective overgloves that protect glove-box gloves and their users.

BACKGROUND

[0003] Glove boxes are used when an environment is hazardous. Many commercial activities involve operations within a hazardous environment. Many more commercial activities involve materials that present a danger to a human. Some of these commercial activities are performed in cordoned-off environments, so as to separate an operator from the environment. Glove boxes are one way to safely separate a worker from the environment in which the worker operates. The worker may put the worker’s arms into glove-box portals and extend the arms into gloves securely attached to the portals. The gloves are typically sealed at the portal so that the glove box environment is securely contained within the glove box. Often, the user faces a window so that the user can visually track the operations that the worker is conducting. In some applications, only the materials present a hazard to the worker. In some embodiments, however, the atmosphere within the glove-box may be toxic or otherwise hazardous to the worker. In the nuclear industry, for example, a radioactive atmosphere may present a grave danger to an exposed worker, thus necessitating glove box operations.

SUMMARY

[0004] Apparatus and associated methods relate to a protective overglove configured to be worn over a glove-box glove, the protective overglove having a hand portion and a gauntlet portion extending from the hand portion to a cuff portion, the cuff portion having a locking device to attach the cuff portion to the overglove at an upper arm region of the user. In an illustrative example, the overglove may have a protective material to protect a user’s arm from a hazard presented within a glove-box. In some embodiments, the protective material may include non-woven fibers of high-tenacity. In an exemplary embodiment, the non-woven fibers may include Ultra-High-Molecular-Weight Poly-Ethylene (UHMWPE) fibers. In some embodiments, the locking device may include a hook and loop fastener. In an exemplary embodiment, the protective overglove may advantageously protect the integrity of the glove-box glove from a hazard presented within a glove-box.

[0005] Apparatus and associated methods relate to a protective overglove configured to be worn over a glove-box glove, the protective overglove including a layer of non-woven high tenacity polymer fibers. In some examples, an additional abrasion resistant layer may be exterior to the non-woven layer. Exemplary abrasion resistant layers may include woven or knitted fabrics. In some exemplary abrasion resistant layers natural leather or synthetic leather may be used. Various exemplary overgloves may releasably attach to a glove-box glove at a forearm, upper arm, or shoulder region of a user. In an exemplary embodiment, the protective overglove may advantageously provide puncture, cut, and abrasion protection of a glove-box glove while facilitating a user’s dexterity.

[0006] Various embodiments may achieve one or more advantages. For example, some embodiments may provide protection against chemical exposure. In an illustrative embodiment, an exemplary protective overglove may provide puncture resistance. In some embodiments, an exemplary protective overglove may protect against cuts and/or abrasions. For example, a metal mesh material may provide for protection against cuts. In some embodiments, the functional capability of a glove-box glove may be expanded by using an appropriate overglove. For example, a puncture resistant protective overglove may be donned over a low-puncture resistant glove-box glove when the glove-box environment poses a puncture hazard.

[0007] In an exemplary situation, a host of different types of overgloves may be stowed within a glove-box to provide a user with multiple overglove protection solutions associated with multiple hazards. A user may select and don an appropriate overglove for the hazard presented by the task assigned by the user. The user may first put his/her arms in the glove-box gloves. The user may then select the overglove that provides protection for the user’s upcoming task. The user may then don the protective overgloves, attaching them to the glove-box glove using a hand operated locking mechanism. The user may then proceed to perform the hazardous task with an enhanced degree of safety resulting from the protective qualities of the overglove. When finished with the task, the user may then detach the overgloves using the hand operated locking mechanism, and remove the overgloves. The use may then withdraw from the glove box.

[0008] In some embodiments, the overglove may provide protection against a hazard while only minimally inhibiting a user’s dexterity. In various embodiments, a non-woven fabric may provide protection while permitting an operator to work nimbly with his/her hands and fingers. A lightweight overglove may provide light-weight hazard protection. In some embodiments, the user may select a metal-mesh overglove for protection against sharp objects. In some examples, various chemically resistive materials may provide safety to user’s working with various chemicals or in toxic or hazardous glove-box atmospheres. In some environments, such as, for example, bio hazard environments, a breach of the glove-box integrity may be too dangerous for a user to operate without use of a protective overglove.

[0009] In some embodiments, a material to enhance a grip and/or protection may be added to a palm and fingers area of the overglove. The material may be sewn, glued, or welded to the palm, for example. The material may cover all of the palm area in some exemplary embodiments. In some embodiments, the material may cover only specific parts of the palm area. In other embodiments, the material may cover only specific parts of the finger tips. The protective and/or grip enhancing material may be natural or synthetic leather in some embodiments. In some exemplary embodiments, the material may be a knitted fabric. In some exemplary embodi-
ments, the material may be a woven fabric. In other exemplary embodiments, the material may be a non-woven fabric.

**0010** The details of various embodiments are set forth in the accompanying drawings and the description below. Other features and advantages will be apparent from the description and drawings, and from the claims.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**0011** FIG. 1 depicts an exemplary scenario in which an exemplary protective glovebox may be used.

**0012** FIG. 2 depicts an exemplary glove-box environmental chamber with glove-box gloves.

**0013** FIGS. 3A-3B depict an exemplary glove-box glove both with and without an exemplary protective overglove.

**0014** FIGS. 4A-4B depict both a top view and a bottom view of an exemplary overglove.

**0015** FIGS. 5A-5C depict a top view, a bottom view, and a close-up of the palm of an exemplary overglove.

**0016** FIGS. 6A-6B depict an exemplary cinch for attaching a protective overglove to an arm.

**0017** FIG. 7 depicts a table of experimental rubbing, cutting, tearing and puncture results of an exemplary embodiment of a protective overglove.

**0018** FIG. 8 depicts a table of various levels of protection as defined by European standard EN388.

**0019** Like reference symbols in the various drawings indicate like elements.

**DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS**

**0020** To aid understanding, this document is organized as follows. First, protective overgloves for glove-box gloves are briefly introduced with reference to an exemplary use scenario depicted in FIG. 1. Second, with reference to FIG. 2 the use of an exemplary glove-box is described. With reference to FIGS. 3-6, the discussion then turns to exemplary embodiments that illustrate various aspects of protective overgloves. Specifically, material attributes and protective metrics are discussed.

**0021** FIG. 1 depicts an exemplary scenario in which an exemplary protective overglove may be used. In the FIG. 1 glove box scenario 100, a worker 105 has animated a pair of glove-box gloves 110 using the worker's arms 115. The worker 105 is pouring a hazardous liquid chemical 120 from a first beaker 125 into a second beaker 130. The worker 105 is depicted wearing exemplary protective overgloves 135 over the glove-box gloves 110. The protective overgloves 135 may have been donned for the purpose of providing chemical resistance to the particular hazardous liquid chemical 120 being used by the worker 105. Additional protective overgloves may have been selected by the worker 105 if the worker needed to perform a different operation. For example, if the worker needed to protect against a cut or a puncture, the user may don a glove made of HPPE or para-aramid fibers. A metal-mesh overglove 140 may have been donned if a high risk of cuts is present. Or if the worker needed protection against a thermal hazard, he may have donned a thermal protective glove 145, for example. The depicted protective overgloves 135 have a hand-sealing device 150 attached to a cuff-region 155 of the overgloves 135. The hand-sealing device 150 may be operable by a glove-box gloved worker 105 both to secure the overgloves 135 before use and to unsecure the overgloves 135 after use. Various embodiments may provide an operator with the optimal protective overglove material to perform a hazardous job.

**0022** FIG. 2 depicts a conventional glove-box environmental chamber with glove-box gloves. The depicted glove-box environment 200 includes two glove-box gloves 205 for use within an environmental chamber 210. The environmental chamber 210 presents a window 215 to a user when the arms of the user are inserted into the glove-box gloves 205. The user may perform many hand operated activities within the non-environmental chamber 210 while observing these activities through the window 215. The glove-box gloves 205 are sealed to the environmental chamber 210 at a cuff region 220 of the glove-box gloves 205.

**0023** FIGS. 3A-3B depict an exemplary glove-box glove both with and without an exemplary protective overglove. In FIG. 3A an exemplary glove-box glove 300 is animated by a user. The glove-box glove 300 may provide a user with access to a controlled environment chamber 305. The activity that the user may intend to perform may present a specific hazard to the glove-box glove 300 and thus to the user. For example, the glove-box glove 300 may be made of a nitrile rubber. The nitrile rubber may provide chemical resistance to a chemical that the user intends to risk exposure. But the nitrile rubber may not provide puncture resistance, and glass breakage may be another risk within the environmental chamber. In such a scenario, the user may desire to don a puncture-resistant overglove 310. In this way, the combination of the glove-box glove 300 and the puncture-resistant overglove 310 may provide both puncture resistance and chemical resistance, for example. The overglove 310 has a cuff region 315, a gauntlet region 320 and a hand region 325.

**0024** The cuff region 315 may have means for removably securing the puncture-resistant overglove 310 to the glove-box glove 300. In some embodiments, the means for removably securing may include an elastomeric section at the cuff region 315. The overglove 310 may have a different length depending on the protection needed. The gauntlet region may go from a wrist region to a mid-forearm region or to an elbow region or a mid-upper arm region or to a shoulder region, for examples. In some embodiments, a cuff region 315 may have an additional layer over the protective layer. In some embodiments, the cuff region will have a coated fabric over the non-woven fabric, for example. In some embodiments, the cuff region may extend from the middle of a wearer bicep to a wearer shoulder.

**0025** In an exemplary embodiment, a hook and loop fastener may be removably secured a protective overglove. In some embodiments, a hand-operated buckle may provide removably securing means. Some embodiments may provide snaps for removably securing means. Removably Securing means may include magnetic attachment means in various embodiments. In some embodiments, adhesives may removably secure a protective overglove to a glove-box glove, for example. Hand attachment means may enable a user to removably secure an exemplary protective overglove using hand operations conducted by a glove-box gloved hand.

**0026** FIGS. 4A-4B depict both a top view and a bottom view of an exemplary overglove. In the figures, an exemplary protective overglove 400 including non-woven high-tenacity fibers is depicted. The non-woven fibers may provide cut resistance. Various non-woven fibers provide puncture resistance. In some embodiments an Ultra-High-Molecular-Weight Poly-Ethylene fiber may be used. In some embodi-
ments para-aramid fibers may be used. In some embodiments meta-aramid fibers may provide puncture resistance. In some embodiments, polyester fibers may be used. In an exemplary embodiment, polyamide fibers may be used. In some embodiments polypropylene fibers may be used. In some embodiments, polyamide-imide or aromatic polyester fibers may be used. Acryllic fibers, cotton fibers, and/or wool fibers may be used in some examples. Various embodiments may use combinations of fibers in a single layer. In some embodiments multiple layers of different fibers or fiber combinations may be used. In some embodiments a combination of non-woven and woven materials may be used. For example, some glove regions may use non-woven fibers, and others may use woven fibers. In some embodiments, one layer may be non-woven and another layer may be woven. In another example, the overglove 400 may be composed of two or more layers in selected glove locations. For example, some embodiments may have one or more additional layers in a palm region and/or at a back-of-hand region. Non-woven materials may be used for an internal layer on a palm region and/or a back-of-hand region. A knitted or woven fabric may be used for an external layer, for example, on a region with an additional layer. Natural leather or synthetic leather may be used as an additional external layer in some regions.

[0027] The non-woven fibers may be bonded together by one or more bonding techniques. For example, mechanical bonding techniques may bond non-woven fibers together. In some embodiments, needle punching may bond non-woven fibers. In some embodiments spun lace (also called hydroentanglement) processes may be used, for example. Thermal bonding may be used in some embodiments, for example. Calendering may be used to bond non-woven fibers. In an exemplary embodiment, chemical bonding may be used to bond fibers together. Various chemical bonding agents may be used in chemical bonding operations. Calendering processes may also be employed for decreasing non-woven fabric thickness. Calendering processes may also substantially fix the mechanical dimensions of a fabric.

[0028] Various embodiments may use different thicknesses of protective materials. For example, in some embodiments, the non-woven basis weight may be between 100 and 500 g/mm². In some embodiments the basis weight may be between 250 and 350 g/mm². In some embodiments the basis weight may be between 200 and 400 g/mm². The thickness of the non-woven material may vary in different embodiments, or even within a specific embodiment. For example, in some embodiments, the non-woven material may be between 1 mm and 3 mm thick. In some embodiments, the non-woven material may be between 1.4 mm and 2.4 mm thick, for example. These weights and thicknesses may provide puncture protection while permitting good dexterity of fine motor skill operations by a user, while wearing such protective overgloves.

[0029] FIGS. 5A-5C depict a top view, a bottom view, and a close-up of the palm of an exemplary overglove. In the FIGS. 5A-5C embodiment, a protective overglove 500 is depicted having additional material 505 in specific regions of the protective overglove 500. In this exemplary embodiment, the additional material is presented on the ends of each finger and thumb, as well as in the palm region of the protective overglove 500. In some embodiments, the additional materials, either alone or in combination, may provide increased protection in the applied regions. For example, in some embodiments, the additional material may be sewn onto the glove. In some embodiments, additional material may be glued. In some exemplary embodiments, additional material may be welded.

[0030] In some embodiments, the additional materials may provide increased local protection against a risk corresponding to the additional material. The additional materials may advantageously provide a tactile benefit to the user, for example. In an exemplary embodiment, a friction material may be located at the fingertip region of the protective overglove. Such additional materials may advantageously improve a user’s grasp of objects within the glove-box, for example. In some embodiments, additional material may be located in the palm region of a protective overglove. In an exemplary embodiment, additional material may be located up to and perhaps past an elbow region of a protective overglove.

[0031] In various embodiments, the fabric of the protective overgloves may be coated with one or more coatings to provide one or more beneficial attributes to the glove. For example, some embodiments may be coated with Poly Vinyl Chloride (PVC). Glove fabrics may be coated with Poly Urethane (PU), for example. In one exemplary embodiment, natural latex may coat a region of the fabric. In some embodiments, a coating material may include silicone. In some embodiments, nitrile rubber may be used to coat glove fabric. In various embodiments, only a portion of the glove may be coated. In some embodiments substantially all or most of the glove may be coated. In some exemplary embodiments, the hand portion, the gauntlet portion, and the cuff portion of the overglove may be coated. Such coating may provide increased protection against hazards that correspond to the coating material. In some embodiments, a coating may be applied to the fingers or finger tips. In an exemplary embodiment, a coating may be applied to a hand portion of a protective overglove. In some embodiments, a coating may be applied to a cuff portion of a protective overglove, for example.

[0032] FIGS. 6A-6D depicts an exemplary cinch for releasably coupling a protective overglove to an arm. In the depicted embodiments, a protective overglove 600 includes a cuff region 605. An attachment mechanism 610 is coupled to the cuff region 605. In the depicted embodiment, the attachment mechanism 610 includes a strap 615. The strap is attached to the cuff region 605 at a fixed end 620. The depicted strap has a free end 625. The strap may have a loop fabric on the fixed end 620 and a loop fabric on the free end 625. A turn buckle 630 may be used to reverse the strap direction back onto itself so that the loop fabric at the free end 625 may be attached to the hood fabric at the fixed end 620. In some exemplary embodiments, the attachment mechanism 610 may be located near the upper region of the gauntlet portion. In some exemplary embodiments, the attachment mechanism 610 may be located near the mid region of the gauntlet portion. In some exemplary embodiments, the attachment mechanism 610 may be located near the lower region of the gauntlet portion.

[0033] FIG. 7 depicts a table of experimental rubbing, cutting, tearing and puncture results of an exemplary embodiment of a protective overglove. The European standard EN388 discloses “standards for assessing the performance of a fabric or layers of fabric for their ability to resist heavy rubbering, cutting by a blade or sharp object, tearing and puncture by a pointed object.” (EN 388:2003, page 2) The standard is titled “Standards for Gloves,” and subtitled “Gloves Giving Protection from Mechanical Risks,” the entire disclosure of which is herein incorporated by reference.
FIG. 8 depicts a table of various levels of protection as defined by European standard EN388. The levels of protection designated by level number are described in the EN388 standard with higher levels providing better protection.

Although various embodiments have been described with reference to the Figures, other embodiments are possible. For example, protective overgloves may have a hanger mechanism for hanging stowage within a glove box. In some embodiments, the locking mechanism may double as a hinging mechanism. In some embodiments, separate securing and stowage mechanisms may be provided. In some embodiments, the protective overgloves may attach to the inside access portal of the glove-box. In some embodiments, the protective overgloves may releasably couple to an upper-arm region of the glove-box gloves. In an exemplary embodiment, the protective overglove may releasably couple to a shoulder region of a glove-box glove. In some embodiments, the protective overglove may releasably couple to the glove-box glove at a location less than 50% of the distance from the entry aperture of the glove-box glove to the distal end or fingertip of the glove-box glove. In some examples, the protective overglove may releasably couple to the glove-box glove at a location less than 40% of the distance from the entry aperture to the fingertip, for example. In an exemplary embodiment, the protective overglove may releasably couple to the glove-box glove at a location less than 20% of the distance from the entry aperture to the fingertip.

In various examples, certain embodiments may advantageously provide for enhanced protection of an upper-arm region of the operator during glove-box operations with an overglove. For example, in a nuclear facility, a plutonium ingot may be cut using a hack saw by a worker using glove-box gloves. The cutting operation may produce numerous slivers of sharp radioactive material. These slivers may be able to puncture, cut, or abrade the glove-box gloves. Should the glove-box glove barrier be compromised, serious health dangers to the wearer may arise. An abrasion resistant overglove may significantly reduce such a risk.

In an illustrative embodiment, a protective overglove may be configured to fit over a glove-box glove worn by a user. In some embodiments, the protective overglove may include a hand portion configured to fit over a hand portion of the glove-box glove when worn by the user. In some examples, the hand portion of the protective overglove may include a protective material configured to provide protection against a hazard presented within a glove-box. In an exemplary embodiment, the protective overglove may include a gauntlet portion extending from the hand portion of the protective overglove and a cuff portion of the protective overglove. In some examples, the gauntlet portion may be configured to provide continuous protective coverage over the glove-box glove from the hand portion to a cuff portion of the glove-box glove. In an exemplary embodiment, the protective overglove may include a locking device configured to removable secure the cuff portion of the protective overglove to the glove-box glove at a bicep region of the user when worn. In some examples, the locking device may be configured to be hand operated by the user wearing the glove-box glove.

Today people working with glove-box gloves may have difficulty to protect these gloves. It may be important to provide protection for them as the environment inside a glove-box may be infected or contaminated (e.g. with biological and/or nuclear agents). So the users of the glove-box gloves may need to be very careful during different handleings in order to prevent damage to the glove-box gloves.

Indeed, in some applications, users can be in contact with very small shards or parts of metal, plastic or glass which can damage glove-box glove surfaces. In such cases, the users may use an overglove to provide heightened protection. If a protective overglove proves bulky and/or rigid, however, the user may decide against the heightened protection in favor of better dexterity. Thus, the protective overglove that provides heightened protection while simultaneously being made of light-weight material may prove a good solution for the user. A protective overglove for glove-box gloves having cut and puncture resistance, providing good dexterity and comfort, having sufficient grip on palm area and fitting glove-box gloves may provide heightened safety while proving to be usable to the user.

Glove boxes can be quite small or very large. Some applications may have dozens of users simultaneously performing operations within a single large environmental chamber, each user wearing glove-box gloves. In the nuclear industry, for example, plutonium may be melted and/or cast. Pieces of the plutonium may require hacksaw operations, which may generate sharp slivers. In the pharmaceutical industry, dangerous particles may be present in an environmental chamber. These pathogens may be handled in glassware that may be accidentally broken. Performing operations on such hazardous materials may present multiple different dangers. In some exemplary embodiments a protective fabric coating the overglove may be treated with a deterrent agent through a dipping process.

In some exemplary embodiments, the attachment mechanism may be a strap configured to circumscribe the overglove. In some exemplary embodiments, the strap may circumscribe a cuff region of the overglove. In other exemplary embodiments, the strap may circumscribe a gauntlet region of the overglove. In some exemplary embodiments, the attachment mechanism to secure the overglove to the glove-box glove may be tape. In some exemplary embodiments, the attachment mechanism may include an adhesive. In some exemplary embodiments, the attachment mechanism may be a stretchable band.

A number of implementations have been described. Nevertheless, it will be understood that various modification may be made. For example, advantageous results may be achieved if the steps of the disclosed techniques were performed in a different sequence, or if components of the disclosed systems were combined in a different manner, or if the components were supplemented with other components. Accordingly, other implementations are within the scope of the following claims.

What is claimed is:

1. A protective overglove configured to fit over a glove-box glove worn by a user when the user inserts the user’s arm into the glove box glove to access an interior of a glove box, the protective overglove comprising:
    a hand portion configured to fit over a hand portion of the glove-box glove when worn by the user, the hand portion of the protective overglove comprising a protective
material configured to provide protection against a hazard presented within a glove-box;
a gauntlet portion extending from the hand portion of the protective overglove to a cuff portion of the protective overglove, the gauntlet portion configured to provide continuous protective coverage from the hand portion to the cuff portion over the glove-box glove; and
a securing device configured to removably secure the cuff portion of the protective overglove to the glove-box glove at an upper-arm region of the user when worn, wherein the securing device is configured to be hand operated by the user wearing the glove-box glove, wherein the protective material comprises a non-woven fabric of high-tenacity fibers, the fibers being bonded together first mechanically by needle punch and then thermally by calendaring, the fabric weighing between 200 g/m² and 400 g/m².

2. The protective overglove of claim 1, wherein the securing device comprises a hook and loop fastener.

3. The protective overglove of claim 1, wherein the non-woven fabric comprises Ultra-High-Molecular-Weight Poly-Ethylene (UHMWPE) fibers.

4. The protective overglove of claim 1, wherein the non-woven fabric has a thickness between 1.4 mm and 2.4 mm.

5. The protective overglove of claim 1, further comprising a coating.

6. A protective overglove configured to fit over a glove-box glove worn by a user when the user inserts the user’s arm into the glove box glove to access an interior of a glove box, the protective overglove comprising:
a hand portion configured to fit over a hand portion of a glove-box glove when worn by a user, the hand portion of the protective overglove comprising a protective material configured to provide protection against a hazard presented within a glove-box;
a gauntlet portion extending from the hand portion of the protective overglove to a cuff portion of the protective overglove, the gauntlet portion configured to provide continuous protective coverage from the hand portion to the cuff portion over the glove-box glove; and
a securing device configured to removably secure the cuff portion of the protective overglove to the glove-box glove at an upper-arm region of the user when worn, wherein the securing device is configured to be hand operated by the user wearing the glove-box glove.

7. The protective overglove of claim 6, wherein the protective material comprises a nitrile rubber.

8. The protective overglove of claim 6, wherein the protective material comprises a metal mesh.

9. The protective overglove of claim 6, wherein the protective material comprises a nonwoven fabric.

10. The protective overglove of claim 6, wherein the protective material has a weight between 200 g/m² and 400 g/m².

11. The protective overglove of claim 6, wherein the protective material has a weight between 280 g/m² and 350 g/m².

12. The protective overglove of claim 6, wherein the protective material has a thickness between 1 mm and 3 mm.

13. The protective overglove of claim 6, wherein the protective material has a thickness between 1.4 mm and 2.4 mm.

14. The protective overglove of claim 6, further comprising a coating.

15. The protective overglove of claim 14, wherein the coating comprises nitrile rubber.

16. A protective overglove configured to fit over a glove-box glove worn by a user when the user inserts the user’s arm into the glove box glove to access an interior of a glove box, the protective overglove comprising:
a hand portion configured to fit over a hand portion of the glove-box glove when worn by the user, the hand portion of the protective overglove comprising a protective material configured to provide protection against a hazard presented within a glove-box;
a gauntlet portion extending from the hand portion of the protective overglove to a cuff portion of the protective overglove, the gauntlet portion configured to provide continuous protective coverage from the hand portion to the cuff portion over the glove-box glove; and
means for removably securing the cuff portion of the protective overglove to the glove-box glove at an upper-arm region of the user.

17. The system of claim 16, wherein the protective material comprises a nitrile rubber.

18. The system of claim 16, wherein the protective material comprises a metal mesh.

19. The system of claim 16, wherein the protective material comprises a nonwoven fabric.

20. The system of claim 16, wherein the means for removably securing the cuff portion comprises a hook and loop fastener.