GLOVES FOR HANDLING BARBED WIRE

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Abstract

Gloves for handling razor sharp materials such as barbed tape, barbed wire, razor wire, concertina wire comprise a liner for a hand; an outer shell affixed to the liner; and a plurality of metal fasteners on a palm-side of the outer shell configured in a substantially staggered arrangement. Such gloves can comprise a cut resistant liner for a hand comprising a body yarn knitted to form four finger components, a thumb component, at least two palm components, and a wrist component, wherein the body yarn comprises a cut resistant fiber, a wire, or both; an outer shell comprising leather that forms digits, a palm-side, a knuckle-side, and a cuff such that the outer shell is affixed over the cut resistant liner; a palm patch affixed to the palm-side of the outer shell; a first plurality of staples on the palm patch configured to provide a substantially staggered arrangement; a second plurality of staples, a cut resistant seam, or both along the periphery of the glove; and a third plurality of staples on one or more digits of the outer shell.
GLOVES FOR HANDLING BARBED WIRE

CROSS-REFERENCE TO RELATED APPLICATIONS


TECHNICAL FIELD

[0002] This invention pertains generally to gloves used for handling razor sharp materials. More specifically, this invention is directed to a two-layered glove having metal fasteners such as staples configured in a staggered arrangement for handling barbed tape, barbed wire, razor wire, concertina wire, and the like.

BACKGROUND

[0003] Handling razor sharp materials poses many hazards. Cut/slash, puncture, and snag are the primary hazards confounding those who handle barbed tape, barbed wire, razor wire, concertina wire, and other types of temporary barrier and security wire. These multiple hazards are not easily addressed with a single material.

[0004] Historically, leather has provided some amount of protection. Leather provides some resistance to abrasion and puncture, but offers little resistance to cut/slash. The thicker and heavier the leather, the more puncture resistance that is provided. Performance can vary greatly even over an increase of just 1 ounce per square yard (osy). Unfortunately increasing weight/thickness in an attempt to increase puncture resistance can come at the expense of decreasing flexibility and increasing bulk.

[0005] Due to the constant presence of razor sharp materials, traditional threads that are unable to withstand any cut/slash are typically not used in constructing gloves for handling such materials. Metal fasteners such as staples are suitable, but can inhibit dexterity. Also, protection of the wearer’s hand from the metal fasteners then becomes a requirement. Traditionally, a flocked cotton liner is used under a leather glove for this purpose. The flocked cotton liner offers some additional cut resistance as compared the leather, but the overall result still is inadequate to provide the high levels of cut resistance desired for handling razor sharp materials.

[0006] It is a goal to improve upon current hand protection used for handling razor sharp materials. There is also a goal to provide gloves having excellent dexterity and cut resistance that are form-fitting and comfortable.

SUMMARY

[0007] Provided are gloves for handling barbed wire that significantly improve overall dexterity, cut resistance, weight, and comfort as compared to prior gloves for the same purpose. The gloves are at least two-layered, having a knitted, seamless liner that is affixed within an outer leather shell. The liner is cut resistant, and can be formed from a composite yarn that includes para-aramid fibers, wire, and non-performance fibers such as nylon, cotton, and/or polyester. Metal fasteners such as staples are provided on a palm-side of the glove in a staggered arrangement so that sharp edges are readily deflected during use. Preferably, the lengths of the staples are oriented in a direction that is perpendicular to the direction of any cutting and/or slashing motion.

[0008] In a first aspect, provided are gloves for handling razor sharp materials that comprise a liner for a hand; an outer shell affixed to the liner; and a plurality of metal fasteners on a palm-side of the outer shell configured in a substantially staggered arrangement.

[0009] A detailed aspect provides that the glove comprises a cut resistant liner for a hand comprising a body yarn knitted to form four finger components, a thumb component, at least two palm components, and a wrist component, wherein the body yarn comprises a cut resistant fiber, a wire, or both; an outer shell comprising leather that forms digits, a palm-side, a knuckle-side, and a cuff such that the outer shell is affixed over the cut resistant liner; a palm patch affixed to the palm-side of the outer shell; a first plurality of staples on the palm patch configured to provide a substantially staggered arrangement; a second plurality of staples along the periphery of the glove; and a third plurality of staples on one or more digits of the outer shell.

[0010] In a further aspect, methods of making a glove for handling razor sharp materials comprise: providing a liner for a hand; affixing an outer shell to the liner; and configuring a first plurality of metal fasteners on a palm-side of the outer shell in a substantially staggered arrangement.

[0011] Another aspect is a method of handling razor sharp materials, the method comprising wearing a glove that provides a plurality of metal fasteners in a substantially staggered arrangement such that the lengths of the fasteners are oriented in a direction that is substantially perpendicular to the cutting or slashing direction of the razor sharp materials.

BRIEF DESCRIPTION OF DRAWINGS

[0012] FIGS. 1A-1B are photographs of a top/knuckle-side view of an embodiment;

[0013] FIG. 2 is a photograph of a bottom/palm-side view of an embodiment;

[0014] FIG. 3 is a photograph of an exemplary cut resistant liner;

[0015] FIG. 4 is a schematic of an end view of an embodiment of the glove; and

[0016] FIG. 5 is a schematic of an exemplary knitted liner.

DETAILED DESCRIPTION

[0017] Gloves for handling barbed wire are provided, which have excellent dexterity, cut resistance, weight, and comfort. The gloves have at least two layers: a knitted, seamless liner that contacts a hand and an outer leather shell that contacts razor sharp materials. Metal fasteners such as staples are configured in a staggered arrangement on a palm-side of the outer shell so that sharp razor edges are readily deflected during use.

[0018] The knitted liner is form-fitting and cut resistant. Cut resistant yarns include those yarns comprising a para-aramid such as that sold under the tradename Kevlar® or an ultra high molecular weight polyethylene sold under the trade names Spectra® or Dynema®. The liner can be formed from a composite yarn that includes para-aramid fibers, wire, and non-performance fibers such as nylon, cotton, and/or polyester. In one or more embodiments, the knitted liner is 10 gauge. In a detailed embodiment, the composite yarn has 2 plies, where each ply is a blend of p-aramid, modacrylic, and nylon and one of the plys has a 0.05 mm steel wire. The inside of the
liner can be provided with an internal layer for comfort and moisture/sweat wicking. In a detailed embodiment, the liner is plaited with two yarns 50/50 polyester/cotton, each having a different dimension (on having a 10/1 count and the other having a 16/1 count). The thumb crotch is preferably reinforced with 1 end of 20/2 Kevlar stitched along the edge of the first finger from the tip to the beginning of the thumb crotch, and 3 ends of 20/2 Kevlar can be used as over edging in the thumb crotch. The conformable fit of the knitted liner accommodates a wider range of hand sizes and minimizes slippage of the glove by keeping the glove in better contact with the hand thus preventing inadvertent or accidental separation of the glove from the wearer. Integration of the knitted liner at both the fingertips and wrist edge to the outer shell can promote easy donning and doffing.

[0019] The outer shell is leather, meaning it can be natural or synthetic leather or a combination thereof. The outer shell can be formed from a pre-curved modified gunn cut pattern with an extended set-in wing style thumb. The gunn cut pattern means that the design of the glove digits is flat such that a top piece is secured to a bottom piece and there is no side portion to the digits. By providing a pattern that is pre-curved, the glove is shaped to accommodate the natural curvature of a hand. Use of the gunn cut pattern avoids a heavy seam on the knuckle-side of the outer shell thus improving overall flexibility of the glove. A cuff of the outer shell is flared and can be lengthened or shortened to meet protection requirements. Use of the wing-style thumb and flared cuff affords the wearer with a high degree of flexibility and ample room to tuck their garment sleeve inside the cuff of the glove. The pre-curved pattern includes an offset of the crotch between the fourth and fifth fingers to better conform to the hand. This design is repeated in the knitted liner which in combination eliminates a loose generic fit and the concept of “one size fits all.” A palm patch can be used to provide yet another layer of cut resistance where the palm patch is sewn to the palm-side of the outer shell and the plurality of staples in the staggered arrangement also affixes the palm patch to the palm-side of the outer shell. The palm patch allows for greater freedom in the placement of staples to improve their overall functionality. The palm patch can extend to cover a portion of any digit of the outer shell. Additional patches can be sewn and or stapled to any digit as desired. Additional staples can be added to each digit as needed.

[0020] Metal fasteners such as staples are provided on a palm-side of the outer shell in a staggered arrangement so that sharp edges are readily deflected during use. Preferably, the lengths of the staples are oriented in a direction that is perpendicular to the direction of any cutting and/or slashing motion. With regard to the metal fasteners, staples are preferred, but it is recognized that other metal materials could be suitable for deflecting the razor sharp materials. The staples can be 60 mm.

[0021] Turning to the figures, FIGS. 1A and 1B are photographs of a top/knuckle-side view of an embodiment of the invention. An outer shell 10 of leather forms digits 12 (thumb, first finger, middle finger, ring finger, and pinky finger), a palm-side (not shown), a knuckle-side 14, and a flared cuff 18 which joins the knuckle-side at seam 20 with a plurality of staples. The thumb is secured to the knuckle-side at seam 22. A seam 16 between the palm-side and the knuckle-side 14 is secured by a plurality of staples. Desired locations along the periphery of the outer shell, in addition to the staples, can be sewn with a cut resistant thread comprising a para-aramid fibers such as those sold under the trade name Kevlar®. For example, a sewn seam can be provided from the tip of the first finger to the tip of the thumb. Additional leather protection is provided by patches and staples 24 and 26, on the thumb and first finger, respectively.

[0022] FIG. 2 is a photograph of a bottom/palm-side view of an embodiment of the invention. An outer shell 10 of leather forms digits 12 (thumb, first finger, middle finger, ring finger, and pinky finger), a palm-side 38, a knuckle-side (not shown), and a flared cuff 18 which joins the palm-side at seam 20 with a plurality of staples. The thumb is secured to the knuckle-side at seam 22. A seam 16 between the palm-side 38 and the knuckle-side is secured by a plurality of staples. Desired locations along the periphery of the outer shell, in addition to the staples, can be sewn with a cut resistant thread comprising a para-aramid fiber. For example, a sewn seam can be provided from the tip of the first finger to the tip of the thumb. Additional leather protection is provided by palm patch 32 which has a plurality of staples 34 arranged in a staggered configuration. The palm patch 32 extends to the thumb and the first finger. The digits 12 also each have pluralities of staples 36. Other embodiments of gloves include those using cut resistant yarns only to form a cut resistant seam between the palm-side and the knuckle-side. Suitable cut resistant yarns include those containing para-aramid fibers, ultra high molecular weight polyethylene fibers, wire, or combinations thereof.

[0023] FIG. 3 is a photograph of an exemplary knitted liner 50 having finger components 54, a thumb component 52, a palm component 56, and a wrist component 58. A reinforced crotch 60 is provided between the first finger component and the thumb component 56.

[0024] FIG. 4 provides an end view of the knitted liner 104 secured by stitches 102 (or glue or any suitable way) to the outer shell 100.

[0025] FIG. 5 shows an exemplary knitted liner 500 according to one embodiment of the present invention. The knit 500 includes nine components, including each of the nine components 510, 512, 514, and 516, the thumb component 518, three palm components 504, 506, and 507, and the wrist component 502. Palm component 507 is referred to as a three-fingered palm since it is attached to only three finger components 512, 514, and 516 (ring, middle, and first). The presence of palm component 507 permits an ergonomic enhancement to the glove by creating a pinky 510 component that is dropped (that is, a “dropped pinky”) as compared to the rest of the fingers. Palm component 506 is a four-fingered palm since it attaches to the pinky 510 and the three-fingered palm component 507. The wrist component optionally contains courses of a colored yarn 520. The wrist component also can have a ravel-resistant edge 522.

[0026] Liner 500 can be knit on a programmable knitting machine. It may be desired to use liners having variable stitch to achieve an overall shape that accommodates variations in size and shape of individual fingers and hands. Liner 500 can be made, for example, on a SFG knitting machine available from Shima Seiki Mfg., Ltd. based in Wakayama, Japan. Each of the components of FIG. 5 is formed from courses having a designated stitch setup. A plurality of courses creates a section within the component.

[0027] Table 1 highlights the limitation and variability in leather by summarizing cut test results in accordance with the industry standard ASTM F1790 test method.
TABLE 1

<table>
<thead>
<tr>
<th>Glove Component</th>
<th>Thickness (mils)</th>
<th>Basis Weight (osy)</th>
<th>CPPT Component (grams)</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leather</td>
<td>70.8</td>
<td>40.2</td>
<td>396 Baseline</td>
<td></td>
</tr>
<tr>
<td>1-ply Leather</td>
<td>103.9</td>
<td>48.7</td>
<td>695 70%</td>
<td></td>
</tr>
<tr>
<td>1-ply + cotton</td>
<td>127.1</td>
<td>77.3</td>
<td>690 74%</td>
<td></td>
</tr>
<tr>
<td>2-ply Leather</td>
<td>166.4</td>
<td>85.3</td>
<td>993 151%</td>
<td></td>
</tr>
<tr>
<td>2-ply + cotton</td>
<td>99.7</td>
<td>47.2</td>
<td>1112 181%</td>
<td></td>
</tr>
<tr>
<td>Kast Liner A</td>
<td>131.4</td>
<td>86.8</td>
<td>1672 322%</td>
<td></td>
</tr>
<tr>
<td>Kast Liner B</td>
<td>166.3</td>
<td>54.3</td>
<td>2960 647%</td>
<td></td>
</tr>
<tr>
<td>2-ply + Kast Liner B</td>
<td>192.5</td>
<td>96.3</td>
<td>3957 899%</td>
<td></td>
</tr>
</tbody>
</table>

*A = 100% Kevlar® string knit.

[B] = knitted 10 gauge liner the composite yam that has 2 plys, where each ply is a blend of 65% para-aramid, 20% modacrylic, and 15% nylon and one of the plys has a 0.05 mm steel wire.

[0032] Reference throughout this specification to “one embodiment,” “certain embodiments,” “one or more embodiments” or “an embodiment” means that a particular feature, structure, material, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. Thus, the appearances of the phrases such as “in one or more embodiments,” “in certain embodiments,” “in one embodiment” or “in an embodiment” in various places throughout this specification are not necessarily referring to the same embodiment of the invention. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments.

[0033] The invention has been described with specific reference to the embodiments and modifications thereto described above. Further modifications and alterations may occur to others upon reading and understanding the specification. It is intended to include all such modifications and alterations insofar as they come within the scope of the invention.

1. A glove for handling razor sharp materials comprising:
   a liner for a hand;
an outer shell affixed to the liner; and
a plurality of metal fasteners on a palm-side of the outer shell configured in a substantially staggered arrangement.

2. The glove of claim 1, wherein the lengths of the plurality of metal fasteners are oriented in a direction that is substantially perpendicular to the cutting or slashing direction of the razor sharp materials.

3. The glove of claim 1, wherein the liner comprises a body yarn that comprises a cut resistant fiber, a wire, or both.

4. The glove of claim 1, wherein the outer shell comprises leather.

5. The glove of claim 1, wherein the metal fasteners comprise staples.

6. A glove for handling razor sharp materials comprising:
a cut resistant liner for a hand comprising a body yarn knitted to form four fingers components, a thumb component, at least two palm components, and a wrist component, wherein the body yarn comprises a cut resistant fiber, a wire, or both;
an outer shell comprising leather that forms digits, a palm-side, a knuckle-side, and a cuff such that the outer shell is affixed over the cut resistant liner;
a palm patch affixed to the palm-side of the outer shell;
a first plurality of staples on the palm patch configured to provide a substantially staggered arrangement;
a second plurality of staples, a cut resistant seam, or both along the periphery of the glove; and
a third plurality of staples on one or more digits of the outer shell.

7. The glove of claim 6, wherein the first plurality of staples in the substantially staggered arrangement are oriented in a direction that is substantially perpendicular to the cutting or slashing direction of the razor sharp materials.

8. The glove of claim 6, wherein the cut resistant fiber comprises a para-aramid, an ultra high molecular weight polyethylene, or combinations thereof.

9. The glove of claim 6 comprising the cut resistant seam that comprises a para-aramid, an ultra high molecular weight polyethylene, a wire or combinations thereof.
10. The glove of claim 6, wherein the body yarn is a composite yarn that comprises a para-aramid fiber, the wire, and a non-performance yarn.

11. The glove of claim 6, wherein the leather comprises a natural leather, a synthetic leather, or a combination thereof.

12. The glove of claim 6, wherein the palm patch covers a portion of the palm-side and a portion of at least one digit.

13. The glove of claim 6, further comprising one or more reinforcing patches affixed to one or more digits by a plurality of metal fasteners.

14. A method of making a glove for handling razor sharp materials, the method comprising:

   providing a liner for a hand;
   stitching an outer shell to the liner; and
   inserting a first plurality of metal fasteners into a palm-side of the outer shell in a substantially staggered arrangement.

15. The method of claim 14, wherein the liner is cut-resistant and the outer shell comprises leather.

16. The method of claim 14 further comprising forming the outer shell from a gun cut pattern and a wing-style thumb.

17. The method of claim 14 further comprising securing a palm-side and a knuckle-side of the outer shell with a second plurality of metal fasteners, or a cut resistant seam, or both along a periphery of the outer shell.

18. The method of claim 14 further comprising providing a third plurality of metal fasteners on one or more digits of the outer shell.

19. A method of handling razor sharp materials, the method comprising wearing a glove that provides a plurality of metal fasteners in a substantially staggered arrangement such that the lengths of the fasteners are oriented in a direction that is substantially perpendicular to the cutting or slashing direction of the razor sharp materials.

20. The method of claim 19, wherein the glove comprises:

   a cut-resistant liner for a hand comprising a body yarn knitted to form four finger components, a thumb component, at least two palm components, and a wrist component, wherein the body yarn comprises a cut resistant fiber;
   an outer shell comprising leather that forms digits, a palm-side, a knuckle-side, and a cuff such that the outer shell is affixed over the cut resistant liner;
   a palm patch affixed to the palm-side of the outer shell, and a plurality of staples are on the palm patch;
   a second plurality of staples, a cut resistant seam, or both along the periphery of the glove; and
   a third plurality of staples on the digits of the outer shell.

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