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(54) **LINESMAN'S GLOVE**

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(71) Applicants: **Jeffery W. Palese**, North Ridgeville, OH (US); **Aaron D. Pearson**, Harrow (CN)

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(72) Inventors: **Jeffery W. Palese**, North Ridgeville, OH (US); **Aaron D. Pearson**, Harrow (CN)

(57) **ABSTRACT**

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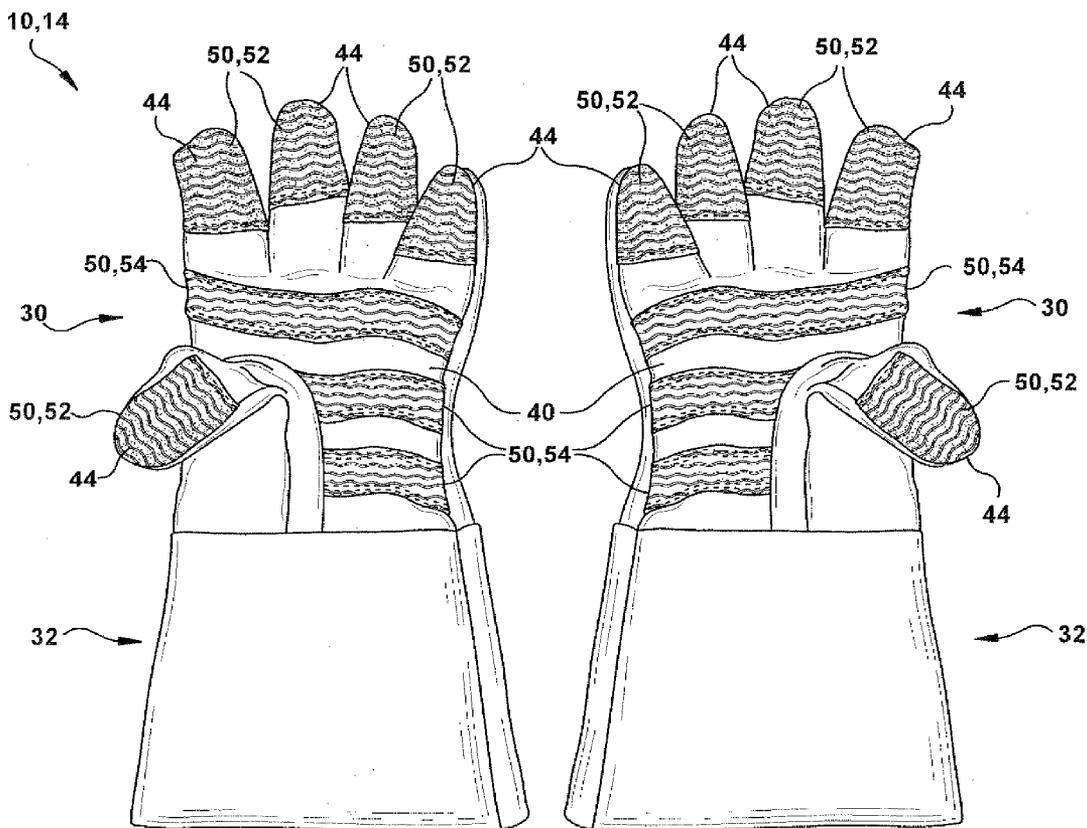
Related U.S. Application Data

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Publication Classification

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A linesman's outer glove (14) for being worn over an electrically insulative linesman's inner glove (12) includes a hand portion (30) for covering the linesman's hand and a cuff portion (32) for covering the linesman's lower arm. The hand portion (30) includes a palm portion (40), a back hand portion (42), and finger portions (44). The cuff portion (32) is connected to the hand portion (30). At least one pad (50) is secured to at least one of the palm portion (40) and finger portions (44). The pads (50) include a substrate (52) and at least one rib (60) disposed on the substrate. The at least one rib (60) improves the linesman's grip while wearing the outer glove (14).



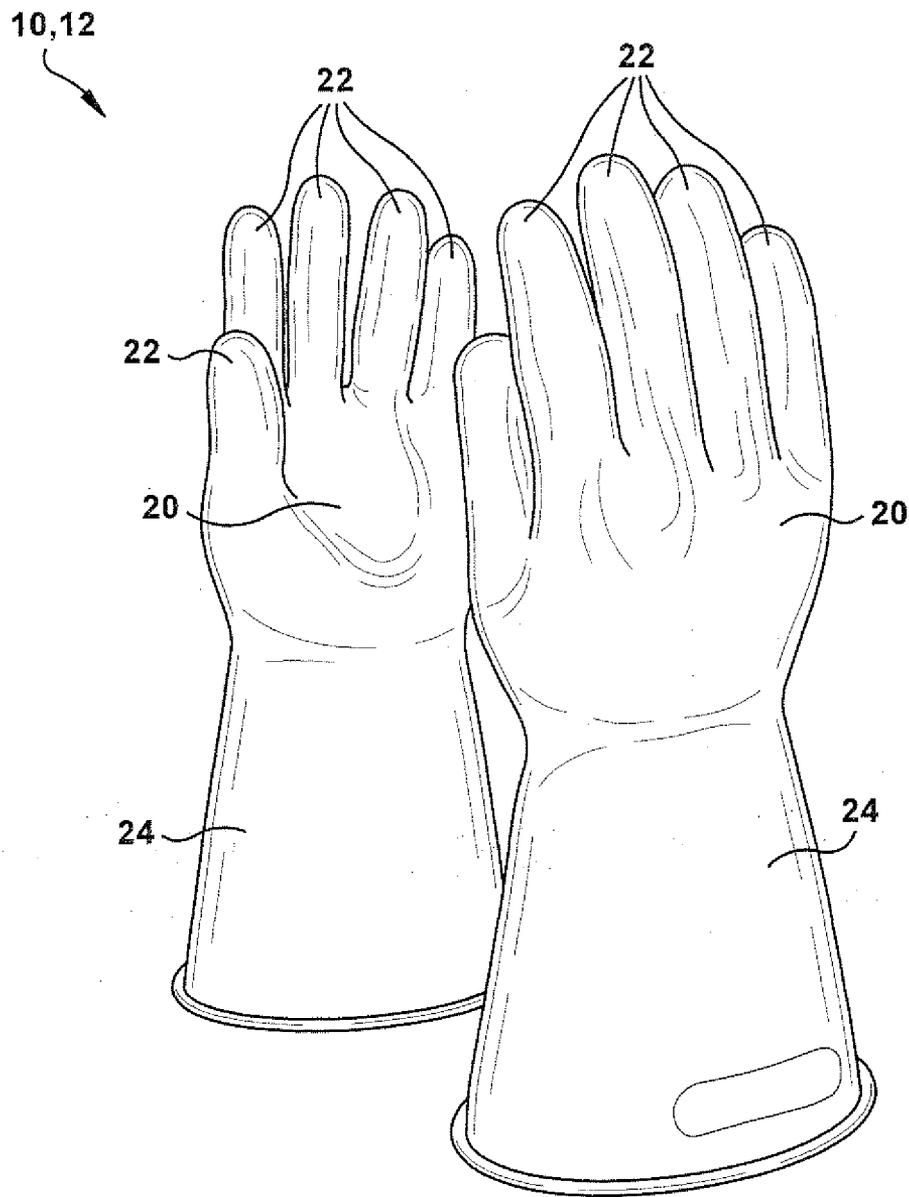


Fig. 1

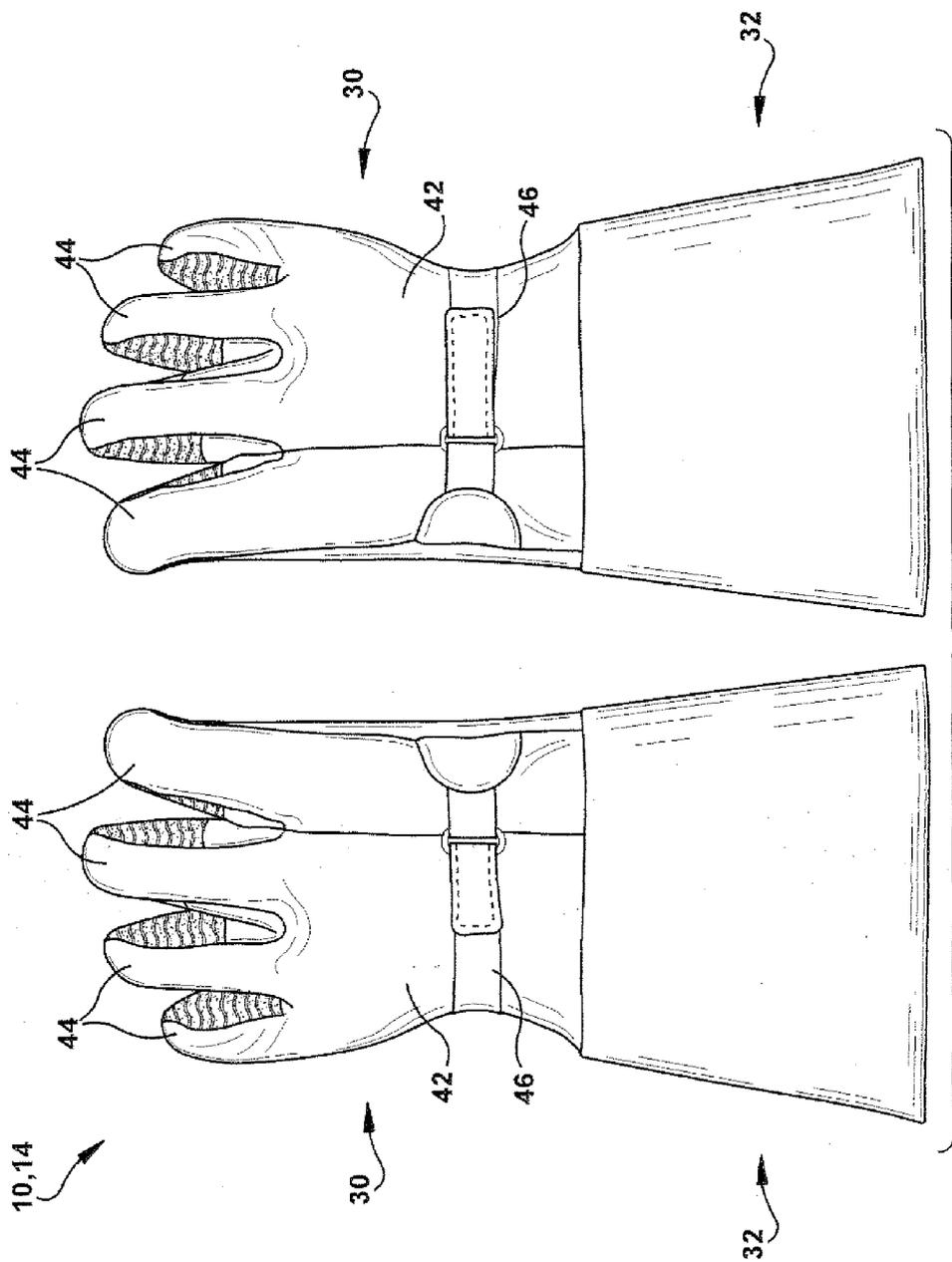


Fig. 2

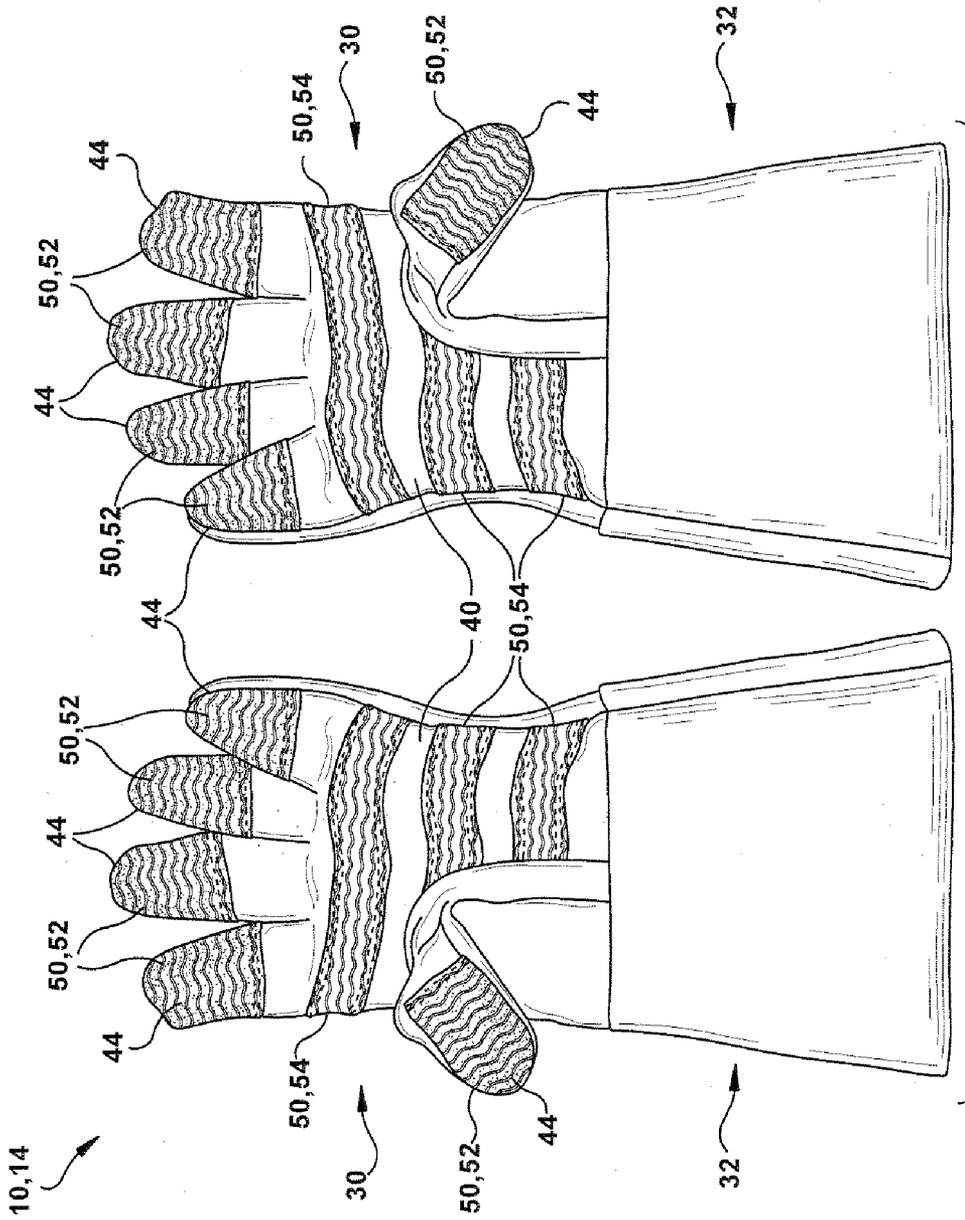


Fig. 3

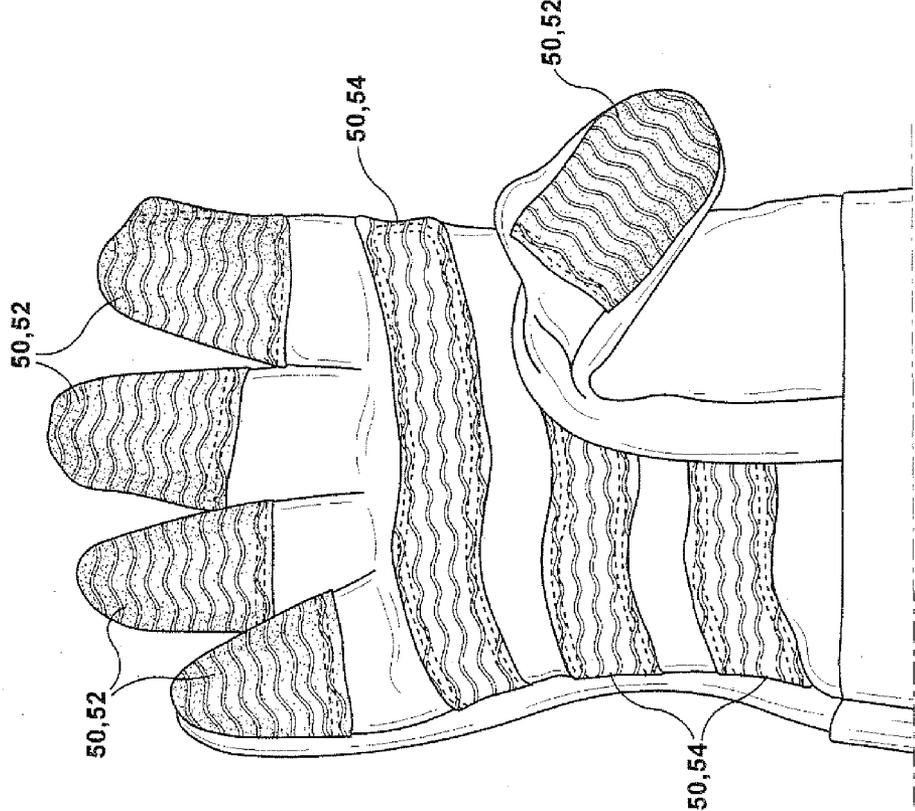


Fig. 4

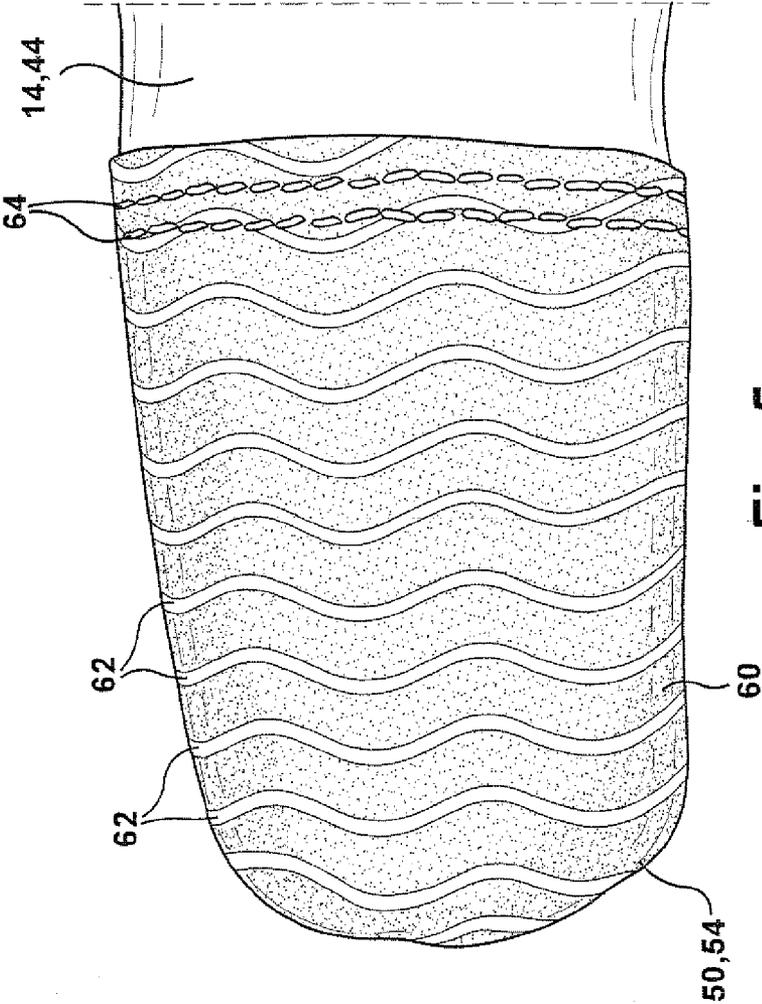


Fig. 5

LINESMAN’S GLOVE

DESCRIPTION

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application Ser. No. 61/691,950, filed Aug. 22, 2012, and U.S. Provisional Application Ser. No. 61/692,423, filed Aug. 23, 2012. The disclosures of these provisional applications are hereby incorporated by reference in their entireties.

TECHNICAL FIELD

[0002] The present disclosure relates generally to protective gloves and, more particularly to gloves for helping to protect a linesman working in a high voltage environment.

BACKGROUND

[0003] Electrical linesmen typically work in environments and on hardware that exposes them to extremely high electrical voltages. Insulative linesman’s gloves for protection from shock/electrocution must be worn at all times. Typical linesman’s gloves are provided in a two-part form, with an electrically insulating inner glove liner that is typically constructed of rubber, and a protective outer glove shell that is typically constructed of leather, fabric (natural and/or synthetic), or a combination of the these materials.

[0004] Often, a linesman is required to handle tools and maneuver, assemble, disassemble, etc., small parts such as screws, nuts/bolts, caps, and various pieces or components of the various mechanical and electrical structures that they may encounter. Additionally, the working environment for an electrical linesman is typically exposed to conditions of extreme heat, cold, wind, and precipitation. Nevertheless, the linesman’s gloves must be worn at all times. Accordingly, the linesman can encounter a great deal of difficulty and frustration when performing tasks involving small and/or intricate elements/components.

SUMMARY

[0005] According to one aspect of the invention, a linesman’s outer glove for being worn over an electrically insulative linesman’s inner glove includes a hand portion for covering the linesman’s hand and a cuff portion for covering the linesman’s lower arm. The hand portion includes a palm portion, a back hand portion, and finger portions. The cuff portion is connected to the hand portion. At least one pad is secured to at least one of the palm portion and finger portions. The pads include a substrate and at least one rib disposed on the substrate. The at least one rib improves the linesman’s grip while wearing the outer glove.

[0006] According to another aspect of the invention, a linesman’s glove includes an electrically insulative inner glove and an outer glove for being worn over the inner glove. The outer glove includes a hand portion for covering the linesman’s hand. The hand portion includes a palm portion, a back hand portion, and finger portions. The outer glove also includes a cuff portion for covering the linesman’s lower arm. The cuff portion is connected to the hand portion. The outer glove further includes at least one pad secured to at least one of the palm portion and finger portions. The pads include a substrate and at least one rib disposed on the substrate. The at least one rib improves the linesman’s grip while wearing the outer glove.

[0007] FIGS. 1-5 illustrate linesman’s gloves 10. Left hand and right hand gloves are illustrated. The linesman’s glove 10 includes an electrically insulated inner glove 12 and a protective outer glove 14. The inner glove 12 is typically made of a rubber material that forms an electrically insulating barrier around a linesman’s hand and lower arm/forearm. The inner glove 12 includes a hand portion 20 with fingers 22 and a cuff portion 24 that extends along the wearer’s arm/forearm. The specifications for the inner glove 12 are dictated by federal safety standards set forth by OSHA and/or ASTM and are discussed hereinbelow.

[0008] The outer glove 14 is constructed of leather material (s) that are stitched, glued or otherwise connected to form the illustrated configuration. The outer glove 14 includes a hand portion 30 and a cuff portion 32 that is stitched to the hand portion. In one example construction, the hand portion 30 can be constructed of a soft tanned leather material and the cuff portion 32 can be constructed of a rawhide leather. The hand portion 30 could be constructed of alternative materials, such as grain cowhide, buffed grain cowhide, grain deerskin, grain pigskin, grain horsehide, or grain goatskin. For Class 0 and Class 00 protecting outer gloves 14, grain sheepskin or cape-skin can also be used to construct the hand portion 30. The cuff portion 32 can be constructed of a leather material, a polymeric material, or a combination of both.

[0009] The hand portion 30 includes a palm portion 40, a back hand portion 42, and finger portions 44 that can be constructed of different pieces of (leather) material that are stitched together to form the illustrated configuration. The cuff portion 32 can also be constructed of one or more pieces of (leather) material. The hand portion 30 can also include a tightening strap 46 for helping to secure the glove to the wearer’s hand.

[0010] The outer glove 14 also includes pads 50 that aid the wearer in gripping, manipulating and maneuvering objects such as small parts, components, tools, etc. while wearing the linesman glove 10 (i.e., while wearing both the inner glove 12 and outer glove 14). The pads 50 include finger pads 52 on all five finger portions 44 and palm pads 54 on the palm portion 40. The arrangement of the pads 50 on the outer glove 14 could differ in number and extent. For example, the outer glove 14 could include a greater number of pads 50 (e.g., two or more pads per finger portion 44) or fewer pads 50 (e.g., a single pad that covers a greater extent of the palm portion 40). As another example, the entire palm portion 40 and the finger portions 44 could be covered by a pad that extends across the entire extent of those portions.

[0011] The pads 50 include beads or ribs 60 formed on a substrate 62 that help to facilitate the wearer’s gripping and manipulating objects. The ribs 60 are illustrated as extending in a curved or wavy configuration across the pads 50. Alternative patterns, such as dots, straight (e.g., diagonally extending) lines pads, cross-hatched lines, concentric circles, etc. could also be implemented.

[0012] The pads 50 can have various constructions. In one example, the ribs 60 are formed of silicone, which exhibits flexibility, flame resistance, and provides a degree of tackiness, adhesion, or gripping quality. Alternative materials, such as flame resistant polymers, could also be used to construct the ribs 60 and/or substrate 62. The substrate 62 supporting the ribs 60 can, for example, be constructed of a microfiber material. “Microfiber” materials refer generally to synthetic fibers that measure less than one denier. The most

common types of microfibers are made from polyesters, polyamides, and combinations or conjugations of one or more polyester, polyamide and polypropylene materials. Examples of materials that can be used to form the ribs 60 are nylon, para-aramid synthetic fiber materials such as Kevlar®, aramid fiber materials such as Nomex®, and polyamide fiber materials such as Trogamide®.

[0013] Microfiber is used to make non-woven, woven and knitted textiles. The shape, size, and combinations of synthetic fibers are selected for specific characteristics, including: softness, durability, absorption, wicking abilities, water repellency, electrostatics, and filtering capabilities. The synthetic fibers are combined to create yarns which are knitted or woven in a variety of constructions. In one particular embodiment, the substrate 62 can be constructed of a microfiber synthetic leather material. This synthetic leather material can, for example, have the appearance of a fine suede leather to which the silicone ribs 60 stick to readily during manufacture, wherein the ribs 60 could be extruded onto the substrate 62. As another alternative, the substrate 62 could be constructed of a natural leather that is similar to those that can be used to construct the hand portion 30. Alternative materials, such as flame resistant polymers, could also be used to construct the ribs 60 and/or substrate 62.

[0014] The pads 50 can be connected to the outer glove 14 in a variety of manners. For example, in the illustrated embodiment, the pads 50 are connected to the outer glove 14 by stitching 64. The stitching 64 can, for example, be formed using Kevlar threads or yarns. The pads 50 can, in addition to the stitching 62, be connected to the glove 14 by an adhesive, such as glue.

[0015] Further characteristics of the inner glove 12 and outer glove 14 are set forth in the following sections, which describe certain regulatory requirements for the gloves and testing procedures for certifying the gloves.

[0016] Inner Glove Requirements

[0017] There are several classes for insulated rubber gloves, from Class 00 to Class 4, depending on the maximum use voltage that the gloves can withstand. These are set forth in Table 1:

TABLE 1

Class	Max AC Use Voltage	AC Retest Voltage	Max DC Use Voltage (Avg)	DC Retest Voltage (Avg)	Color of Label
00	500	2,500	750	10,000	Tan
0	1,000	5,000	1,500	20,000	Red
1	7,500	10,000	11,250	40,000	White
2	17,000	20,000	25,500	50,000	Yellow
3	26,500	30,000	39,750	60,000	Green
4	36,000	40,000	54,000	70,000	Orange

[0018] Instructions and requirements from the glove manufacturer are commonly printed on the box and the plastic bag in which the gloves are shipped. Among the requirements printed on the bag label are the use of leather protective outers, testing requirements, and protecting the gloves from chemicals and other contamination. On the outside of the box, there are precautions to not store the gloves inside out, folded, or in direct sunlight. OSHA addresses the testing, use, and care of rubber insulating gloves in the Personal Protective Equipment Standard 1910.137, Electrical Protective Devices. There are more details in the American Society for Testing

and Materials (ASTM) Standard Specification for In-Service Care of Insulating Gloves and Sleeves.

[0019] Inner Glove Label

[0020] In the cuff portion of each glove, there's a nonconductive label. As listed in Table 1, the label is colored depending on the glove class. Information on the label may include the glove manufacturer, the class, and the rated maximum-use voltage. The AC voltage rating is only listed on the label, since these gloves are more commonly used when working with AC voltages. The label will also indicate if the gloves are resistant to ozone (Type II) or non-ozone resistant (Type I). The label may indicate the glove size. Insulated rubber gloves are not one-size-fits all. They should be purchased based on the hand size of the linesman who will be wearing them. For some glove manufacturers, there are only three choices: small, medium, and large. Other manufacturers offer half sizes, in inches. The hand size measurement is determined by lying the hand palm down on a flat surface and measuring the circumference around the finger knuckles. Add one inch to that measurement, and that is the hand size for insulated rubber gloves.

[0021] Glove Storage

[0022] Proper storage is important to help keep the gloves in good condition. The gloves should be stored in a location as cool, dark, and dry as possible. The location should be as free as practicable from ozone, chemicals, oils, solvents, damaging vapors or fumes, and away from electrical discharges and sunlight. Fluorescent light and sunlight are especially harmful to rubber. The gloves should be stored flat, not folded, and not in any manner that will cause stretching or compression. They should be kept inside a protective container or canvas bag. The original box that the gloves came in is also a good storage compartment for the gloves.

[0023] Inspection Before Use

[0024] OSHA requires that the linesman who will use the insulated rubber gloves inspect the gloves for damage before each use and immediately following any incident that can reasonably be suspected of having caused damage. If the inspection finds any of the following, the gloves should be discarded:

[0025] Embedded foreign object

[0026] Ozone checking, which looks like dry rot. Ozone checking is a series of interlacing cracks produced by ozone on rubber under mechanical stress.

[0027] Texture changes caused by swelling, softening, hardening, or becoming sticky or inelastic.

[0028] The gloves should be cleaned as needed to remove foreign substances. If any defect is found that might damage the insulating properties, such as spilled chemicals that do not wash off, the gloves should be submitted to a testing facility for testing. Minor damage to the gloves can be repaired, but only in the area between the wrist and the reinforced edge of the opening, called the "gauntlet area" of the glove. In this area, small cuts, tears, or punctures may be repaired by applying a compatible patch. Minor blemishes in this same area may be repaired with a compatible liquid compound. The patched area should have electrical and physical properties equal to those of the surrounding material. No more than three patches may be applied to one glove. Any gloves that are repaired should be retested by a testing facility before they are used. OSHA also specifies that an air test should be done in the field before each use, and at other times if there is cause to suspect any damage. The ASTM standard specifies that an air test can be done by holding the glove by the cuff and rolling

the gloves gently toward the fingers to form an air pocket inside the glove. While the air is entrapped, check the gloves for punctures or checking, listen for escaping air, and hold the gloves up against your cheek to feel for escaping air. If the glove will not hold pressure, the glove is damaged and should not be used. The air test can also be done with a mechanical inflator. On the higher classes of gloves, an inflator is required because the gloves are too stiff to be rolled up by hand. Remove all jewelry before putting the gloves on.

[0029] Protective Leather Outer Gloves

[0030] The inner glove **12** should be protected with the protective leather outer gloves **14**. The leather helps prevent catching the rubber gloves on sharp parts and frayed wiring, possibly puncturing the rubber. The leather outer gloves **14** should be exclusive for this purpose. Do not use the leather outers **14** as general use gloves. The leather outers **14** should be sized and shaped so that the inner rubber glove **12** is not deformed. The top of the cuff of the leather outer should be shorter than the rolled top of the insulated rubber glove by at least 13 mm (½ in). The leather outers should be inspected just as often as inspection of the insulated rubber gloves. They should not have holes, tears, or other defects that affect their ability to give protection to the insulated rubber gloves. The inner surface of the leather outers should be inspected for sharp or pointed objects. Care should be taken to keep the outers away from oils, greases, chemicals, solvents and other materials that may damage the insulated rubber gloves. This also goes for the insulated rubber gloves.

[0031] Testing at a Testing Facility

[0032] Insulated rubber gloves are tested before being sold, but that's not the last test. The gloves should be tested periodically (e.g., every six months) by an official testing facility. Once the gloves are removed from the plastic bag they were shipped in, they start to deteriorate. So even if they are used only once, they will require retesting in six months time. If the gloves were purchased, but not put into use for several months, retesting may be required before the gloves are even used for the first time. OSHA states that the gloves may not be used if they haven't been tested within the previous 12 months. The ASTM standard includes requirements that every testing facility must follow. The standard requires that the testing facility:

[0033] Wash the gloves.

[0034] Perform a preliminary inspection similar to what is done in the field.

[0035] Perform a more detailed inspection which includes turning them inside out and may include inflating them with air.

[0036] Make any necessary repairs.

[0037] Perform an electrical test.

[0038] Note in the table in FIG. 1 that the electrical retest is at a higher rated voltage than the initial test. The gloves are electrically tested while filled with water and immersed in a water bath. The test voltage is applied between one and three continuous minutes. Once the testing is completed, the test facility may note the date of the test directly on the gloves. Employers are required to certify that the gloves have been tested in accordance with the OSHA requirements. This can be done by noting the results and dates of the test in a log, or by noting whether the test dates are printed on the gloves.

[0039] OSHA Standards

[0040] OSHA Standards 29 CFR 1910 covers occupational safety and health standards for electric power generation,

transmission, and distribution. Some relevant highlights of section 1910 and other standards are set forth in the following paragraphs.

[0041] Insulating gloves and sleeves are critical PPE for electrical work on or near exposed energized parts. The "269" standard (section 1910.269(I)(2)(i) and (I)(3)) requires that insulating (rubber) gloves along with leather protectors must be worn by 269-qualified employees within the Minimum Approach Distance to exposed energized conductors. Also, insulating (rubber) sleeves must also be worn if the upper arms or shoulders are within the Minimum Approach Distance to other exposed energized parts.

[0042] Additionally, section 1910.137 provides specific design, care, and use requirements for rubber electrical protective equipment. Insulating gloves and sleeves must be rated for the voltage to which a worker will be exposed (phase to ground or phase to phase) and marked to indicate their rating. Section 1910.137 recognizes Class 0 (up to 1 KV) through Class 4 (up to 36 KV) rubber equipment (see Table 1).

[0043] Gloves and sleeves must be electrically tested before being issued for use. They must also be visually inspected and gloves need to be air tested for any possible defects (for example, cuts, holes, tears, embedded objects, changes in texture) before each days use and whenever there is a reason to believe they may have been damaged. Best practice is to inspect PPE and air test the gloves and sleeves before each use. [See section 1910.137(b)(2)].

[0044] Insulating equipment may not be used if any of the following defects are present: holes, tears, punctures or cuts, ozone cutting or ozone checking, embedded foreign objects, texture changes, including swelling, softening, hardening, or becoming sticky or inelastic, and any other defect that damages the insulating properties. [See section 1910.137(b)(2) (iii) and ASTM F1236-96, Standard Guide for Visual Inspection of Electrical Protective Rubber Products].

[0045] Insulating equipment failing to pass inspection must be removed from service and may not be used by workers.

[0046] In addition, the gloves and sleeves must be electrically tested at regular intervals of not more than 6 months for gloves and 12 months for sleeves. (See ASTM F496, Standard Specification for In-Service Care of Insulating Gloves and Sleeves for some appropriate test methods.) When gloves and sleeves are used regularly, best practice is to test as frequently as monthly. [See section 1910.137(b)(2)].

[0047] Protector Gloves and Storage. To ensure worker safety and the integrity of the gloves and sleeves, insulating gloves need to be worn along with protector gloves (such as leather), and both insulating gloves and sleeves need to be stored properly when not in use. Proper storage means that gloves must not be folded and need to be kept out of excessive heat, sunlight, humidity, ozone, and any chemical or substance that could damage the rubber. [See 1910.137(b)(2)].

[0048] ASTM Standards

[0049] OSHA Standard F696-06 covers the Standard Specification for Leather Protectors for Rubber Insulating Gloves and Mittens. The outer glove **14** should be constructed in accordance with this standard.

[0050] Testing

[0051] The outer glove **14** of the invention was subjected to testing according to ASTM Draft Method WK 14928 Item 2—Test Method for Determining Arc Thermal Performance of Hand Protective Devices by Electric Arc Exposure Method. The outer glove **14** passed the testing.

[0052] The foregoing has described linesman's gloves subject of the invention. While specific embodiments of the invention have been described, those skilled in the art will perceive improvements, changes, and modifications can be made without departing from the spirit and scope of the invention. Accordingly, the foregoing description of the disclosed embodiment of the invention is provided for the purpose of illustration only and not for the purpose of limitation. Such improvements, changes, and modifications are within the skill of the art and are intended to be covered by the appended claims.

We claim:

1. A linesman's outer glove for being worn over an electrically insulative linesman's inner glove, the outer glove comprising:

a hand portion for covering the linesman's hand, the hand portion including a palm portion, a back hand portion, and finger portions;

a cuff portion for covering the linesman's lower arm, the cuff portion being connected to the hand portion; and at least one pad secured to at least one of the palm portion and finger portions, the pads comprising a substrate and at least one rib disposed on the substrate, the at least one rib for improving the linesman's grip while wearing the outer glove.

2. The outer glove recited in claim 1, wherein the at least one rib is constructed of a flame resistant polymer.

3. The outer glove recited in claim 1, wherein the at least one rib is constructed of silicone.

4. The outer glove recited in claim 1, wherein the at least one rib is configured in at least one of a dot pattern, curved line pattern, a wavy line pattern, a straight line pattern, a cross-hatched line pattern, and a concentric circle pattern.

5. The outer glove recited in claim 1, wherein the substrate comprises one of a microfiber and natural leather material.

6. The outer glove recited in claim 5, wherein the microfiber material comprises at least one of a polyester material, a polyamide material, and polypropylene material.

7. The outer glove recited in claim 5, wherein the microfiber material comprises at least one of a nylon material, a para-aramid synthetic fiber material, an aramid fiber material, and a polyamides fiber material.

8. The outer glove recited in claim 1, wherein the pads are secured to the hand portion by at least one of stitching and an adhesive.

9. The outer glove recited in claim 8, wherein the stitching comprises Kevlar thread.

10. The outer glove recited in claim 1, wherein the hand portion is constructed of a soft leather material and the cuff portion is constructed of a rawhide leather material.

11. A linesman's glove comprising:

an electrically insulative inner glove; and

an outer glove for being worn over the inner glove, the outer glove comprising:

a hand portion for covering the linesman's hand, the hand portion including a palm portion, a back hand portion, and finger portions;

a cuff portion for covering the linesman's lower arm, the cuff portion being connected to the hand portion; and

at least one pad secured to at least one of the palm portion and finger portions, the pads comprising a substrate and at least one rib disposed on the substrate, the at least one rib for improving the linesman's grip while wearing the outer glove.

12. The outer glove recited in claim 11, wherein the at least one rib is constructed of silicone or a flame resistant polymer.

13. The outer glove recited in claim 11, wherein the at least one rib is configured in at least one of a dot pattern, curved line pattern, a wavy line pattern, a straight line pattern, a cross-hatched line pattern, and a concentric circle pattern.

14. The outer glove recited in claim 11, wherein the substrate comprises a microfiber material comprising at least one of a polyester material, a polyamide material, and a polypropylene material.

15. The outer glove recited in claim 11, wherein the substrate comprises a microfiber material comprising at least one of a nylon material, a para-aramid synthetic fiber material, an aramid fiber material, and a polyamides fiber material.

16. The outer glove recited in claim 11, wherein the pads are secure to the hand portion by at least one of stitching and an adhesive.

17. The outer glove recited in claim 16, wherein the stitching comprises Kevlar thread.

18. The outer glove recited in claim 11, wherein the hand portion is constructed of a soft leather material and the cuff portion is constructed of a rawhide leather material.

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