A safety glove having a unique design on the palm portion of the glove, the palm portion comprising a plurality of pyramid shaped protrusions formed in a predetermined pattern extending from the surface of a molded silicone palm piece.
GLOVE HAVING HEAT RESISTANT SILICONE MOLDED PALM PIECE WITH PROTRUSIONS EXTENDING THEREFROM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention provides a glove having a palm piece with a plurality of protrusions extending from the surface of the palm piece, the palm piece and protrusions comprised of silicone.

[0003] 2. Description of the Prior Art

[0004] A number of heat protected gloves have been available in the prior art. For example, the leather gloves having synthetic and natural insulation, knit cotton gloves, oven mitts using cotton or other fiber fabrics with insulation, silicon molded grips and mitts, aluminized coating on cotton, wool, aramid fibers (such as Kelvar® or Nomex® and racing gloves (combination of cut and sewn aramid fabrics and leather) all have some heat protection features.

[0005] U.S. Pat. No. 7,086,992 discloses a glove having a heat insulating barrier which is removably inserted into a pocket or pouch positioned adjacent the back of a user's hand. The insulating barrier reduces heat conduction from the back side of the hand enabling the user's hand to remain warm in cold environments. The heat insulating barrier is constructed, for example, of closed-cell neoprene with fleece laminated therewith.

[0006] U.S. Pat. No. 5,598,582 discloses a glove construction which includes a thin layer of silicone material on the palm surface, a raised pattern of silicone being provided over the thin silicone layer to provide both an enhanced gripping surface and improved thermal protection. The thin layer of silicone and the raised pattern of silicone in addition to the other components of the glove, make the glove relatively expensive to fabricate.

[0007] Although the prior art glove constructions noted above provided heat protection, when the glove is intended for work applications certain disadvantages arise. In particular, for fabrication, metal forming metal casting/stamping, manufacturing/assembly and racing pit crew activities, the user requires a glove, which in addition to providing basic heat resistant features, provides enhanced grip and dexterity capabilities, along with enhanced heat resistant properties. In addition, from a cost standpoint, it is desirable to provide a glove having properties which is relatively simple to fabricate.

[0008] Publication No. US 2004/0025226 discloses a glove construction having a palm portion comprising a molded rubber having a pattern of protrusions formed thereon. The palm portion has joint areas which are devoid of rubber, which as noted in the disclosure, allows the user's joints to flex. The glove disclosed in the '226 publication is designed for, inter alia, improved gripping qualities and not for heat resistant capabilities. In addition the palm portion of the glove incorporates sewing channels with stitches therein which reduces the wear capability of the glove.

SUMMARY OF THE INVENTION

[0009] The present invention provides a safety glove having a unique design on the palm piece that is particularly adaptable for use in the safety industry for handling hot or cold objects. In particular, the palm design comprises a plurality of pyramid shaped protrusions formed in a predeter-
hand side of the glove, to further decrease thermal transfer to the wearer’s hand can be provided if desired.

DESCRIPTION OF THE DRAWINGS

[0018] For a better understanding of the present invention as well as other objects and further features thereof, reference is made to the following description which is to be read in conjunction with the accompanying drawing wherein:

[0019] FIG. 1 is a plan view of the glove palm;
[0020] FIGS. 2 and 3 are details of a portion of the palm glove;
[0021] FIG. 4 is a cross sectional view along line 4-4 of FIG. 3;
[0022] FIG. 5 is a simplified view of the pyramid shapes on the palm area of the glove; and
[0023] FIGS. 6 and 7 illustrate the dimensions of the pyramid cell design.

DESCRIPTION OF THE INVENTION

[0024] FIG. 1 is a simplified front view of glove 10 of the present invention illustrating in detail the palm portion 10 of the glove of the present invention. In particular, palm portion 10 comprises palm piece 12 (although only the right hand glove of a glove pair is illustrated, the construction of the left hand glove is identical), palm piece 12 comprising an integral, single silicone molded rubber member having a plurality of defined pattern portions 13, 14, 15, . . . 23 and 25. Palm portion 10 includes cuff 31 preferably made of synthetic rubber treated with heat resistant silicone. Reference number 32 refers to synthetic leather which is considered part of the glove back piece and thus will not be described herein. As will be set forth in more detail hereinafter, using silicone rubber for the palm piece material provides a glove that is heat resistant, a key feature of the present invention. In accordance with the teachings of the present invention, a plurality of protrusions 30 (as shown in FIGS. 2-7), preferably of a pyramid shape, extended from the surface of molded silicone rubber piece 12. Molded silicone rubber piece 12 is preferably glued, heat pressed and sewn onto a synthetic leather substrate 32. Although molded silicone rubber piece 12 preferably comprises a single, integral piece as illustrated, multiple pieces can be utilized. A glove using a non-silicone molded rubber piece having protrusions formed thereon is disclosed in Publication No. US 2004/0025226A1. The pattern of the molded silicone rubber piece 12 is such that silicone rubber is utilized in the joint or flex areas 34 of the palm and fingers as illustrated in order to enhance the glove lifetime and avoids using synthetic leather in those areas as disclosed in the '226 publication. These areas also function to separate the glove palm patterns having protrusions 30 extending therefrom and are themselves devoid of protrusions.

[0025] As is well-known, the term “rubber” comprises a wide array of organic elastomers. Silicone rubber, a specific type of rubber which contains organosiloxane polymers have a number of unique properties which organic elastomers do not have as set forth hereinabove. One such property which has resulted in its use in the glove of the present invention is its wide operating temperature range from approximately −100°C to approximately 316°C. In such conditions, the tensile strength, elongation, tear strength and compression set is typically superior to conventional rubbers. Organic rubbers are susceptible to ozone, UV, heat and other aging factors that silicone can readily withstand.

[0026] FIG. 4 is a cross-section along lines 4-4 of FIG. 1 and illustrates a preferred construction of the glove palm. In particular, a molded silicone rubber layer 12 with the molded protrusions 30 extending vertically from its surface is secured to the base layer (base material) 22 of synthetic leather (leather or fabric can be used in lieu of synthetic leather) and the synthetic leather base material 22 is, in turn, secured to an insulation layer 40, preferably formed of Kevlar® or Nomex®, wool or synthetic insulation could also be used. As shown in FIGS. 1-3, the use of a single, integral molded silicone rubber layer as the entire palm material eliminates the necessity of using sewing channels, thus increasing the overall life of the glove.

[0027] The height of each pyramid is approximately 3 mm; the base approximately 3 mm wide and the separation between pyramids 30 approximately 3 mm.

[0028] As shown in FIGS. 6 and 7, pyramids 30 each have five different dimensions, A, B, C, D and E. Dimensions A, B, C and D are equal for a given pyramid 30. Dimensions F and G represent the spacing between pyramids 30. In the preferred embodiment, these dimensions are equal to dimensions A, B, C and D (in a given section of the glove). Dimensions A, B, C, D, E, F and G range from 0.5 to 10 mm, with either pointed tops (as shown in the preferred embodiment) or flat tops. It should be noted that other arrangements of the pyramids 30 can be used; similarly, dimensions other than those set forth hereinafter can be implemented to provide the features of the present invention. For example, the protrusions 30 can take various shapes such as columns with substantially parallel walls, multi-faceted pillars with substantially parallel walls, conical with a larger base and smaller tip, polyhedron pyramids of multiple sides, four sided pyramids aligned with the vertical and horizontal axis of the hand, cylinders, partial spheres, rectangle, etc.

[0029] In the preferred embodiment, the entire rubber piece is made of the same silicone as noted hereinabove. However, variations can include different durometer values and color silicones in different portions of the mold. Examples include the following: lower durometer in the finger sections, higher durometer in the palm and thumb areas; lower durometer in the base of the mold, higher durometer and different color in the pyramids 30; lower durometer in base, silicone blended with binders (for increased strength or heat resistance) in the pyramids 30. In essence, the silicone material can be blended with various agents to enhance durability, thermal stability, thermal protection, chemical resistance and/or visual enhancement such as silica, ceramics, iron oxide, and naturally occurring stone and colorants.

[0030] The pyramids, or protrusions, 30 are spaced apart such that the distance between adjacent pyramids in the vertical plane will decrease as the hand is flexed inwards. In effect, two pyramids come closer together as the glove user’s hand is closed in a grip. In the preferred embodiment, the pyramids 30 are arranged such that the bottom of four edges of the pyramids 30 are aligned parallel to the axis of the user’s wrist.

[0031] The four faces of each pyramid provide for gripping in all directions (left, right, up and down) at all points of the glove palm piece. This provides for a superior grip when a user is lifting an object vertically, or holding an object in the horizontal position.
[0032] As noted hereinabove, the silicone palm piece 12 and protrusions 30 consist of a single molded piece, thermally and chemically adhered to a base material (inner substrate lining) 22 in the preferred embodiment. The silicone molded palm piece 12 completely covers the base material such that there is no need to sew these two items together. The lack of stitching decreases potential failure locations on the glove, further increasing durability and glove life.

[0033] The use of base material 22 increases strength and durability of the palm of the glove, while providing comfort to the wearer. Additional insulation layers are optional. In the preferred embodiment, Kevlar®, a cut and heat resistant para-amid fabric produced from fibers supplied by DuPont corporation, is utilized as an insulation layer on the palm side and back of hand side of the glove.

[0034] While the invention has been described with reference to its preferred embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the true spirit and scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from its essential teachings.

What is claimed is:

1. A glove construction comprising:
   - glove back means formed in the shape of a human hand for forming a portion of the back of the glove;
   - glove palm means formed in the shape of a human hand for forming a portion of the palm of the glove; said glove back means and said glove palm means forming a glove when joined together, said glove having fingers associated therewith; and
   - a layer of molded silicone rubber being secured to said glove palm means, a plurality of protrusions extending away from the surface of said silicone rubber member.

2. The glove of claim 1 wherein said silicone rubber layer comprises a plurality of predetermined surface patterns, said protrusions extending from the surface of each surface pattern.

3. The glove of claim 2 wherein said predetermined surface patterns are separated by molded silicone rubber not having protrusions extending from the surface thereof.

4. The glove of claim 1 wherein said protrusions are pyramidal in shape.

5. The glove of claim 4 wherein the top of each of said pyramids are pointed.

6. The glove of claim 4 wherein the top of each of said pyramids are flat.

7. The glove of claim 4 wherein said pyramids comprise four sides, each side having an edge at the bottom of said pyramids.

8. The glove of claim 7 wherein said glove is positioned on the hand of a human, at least one bottom edge of each pyramid being substantially parallel to the axis of the user’s wrist.

9. The glove of claim 8 wherein at least one of the bottom edges of said pyramid is substantially perpendicular to the axis of the user’s wrist.

10. The glove of claim 1 wherein the spacing between said protrusions vary depending upon their location on the surface of said molded silicone rubber member.

11. The glove of claim 1 wherein said silicone rubber layer and said protrusions comprise an integral molded piece.

12. The glove of claim 1 wherein said molded silicone rubber layer is adhered to a substrate.

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