An embodiment of the present invention provides a protective sports glove having a novel combination of liner sections, breathable mesh sections, stretch joints, and shock absorbing cushions to provide maximum protection to the user’s fingers, hands, wrists, and lower forearms while maintaining as much flexibility within the glove and tactile feel on both palmar and dorsal sides of the glove as possible. The pattern and construction employs strategically-placed stretch zones, strategic padding placement, and a variety of improved padding constructions all for more flex without compromising protection.

**ABSTRACT**

**PROTECTIVE SPORTS GLOVE**

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PROTECTIVE SPORTS GLOVE
CROSS-REFERENCE TO RELATED APPLICATION(S)


BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates generally to lacrosse gloves and, more particularly, to a protective sports glove and padding for the same that provides improved flexibility, breathability, maneuverability and finer tactile feel without compromising protection.

[0004] 2. Description of the Background

[0005] Protective sports gloves are commonly used and, indeed, are required to be used in many organized sports such as lacrosse, hockey, and other contact sports. Such gloves protect the wearer from impact of lacrosse sticks, hockey sticks, balls, pucks, skates, and other players.

[0006] Protective sports gloves include padding to protect the player's fingers, hands, wrists and lower forearms. Despite their protective function, such gloves must balance other design factors such as weight, feel and flexibility. For example, the handling of a lacrosse stick requires a player to hold and control a lacrosse stick handle in specific ways, with many different combinations of hand placement over the length of the handle. A lacrosse player constantly moves his hands along the handle in multiple positions.

[0007] In executing game skills, lacrosse players must be able to grip and control the lacrosse stick handle, e.g., “stick handling.” Effective stick handling requires a player to constantly reposition his hands along the handle to control the head of the lacrosse stick. For effective stick handling, a lacrosse player needs to maintain utmost flexibility of the hand, a sure grip, and a precise tactile feel for the stick. However, the hand also needs protection and so players typically wear padded gloves to protect their hands and wrists. These gloves usually include foam padding or other protective padding covering the back of a wearer’s hand, fingers, and thumb.

[0008] Some conventional sports gloves have pad segments (e.g., made of foam) that are covered with leather or synthetic leather and, in the breaks between the segments, are affixed to one another and to a liner material (also known as the scrim), such as a woven fabric. In these conventional gloves individual foam pads are typically sandwiched between two fabric layers and the layers are sewn together, and to the liner, between breaks in adjacent pads. However, this conventional construct is fairly rigid in design and compromises flexibility and tactile feel for protection. When such a protective athletic glove undergoes deformation due to normal use by a wearer, adjacent pads come into contact with each other and this arrests/resists farther motion. In addition, the inflexibility of the fabric layers and liner resist stretching and further arrests/resists motion, all counter to comfort and ease of movement in all directions.

[0009] Even with gaps or breaks between the protective pads to allow for flexibility, there is a limitation to how far adjacent pads can move relative to each other and still maintain adequate protection of a player. What is needed is a protective sports glove and padding for the same that provides improved flexibility, adequate protection, and finer tactile feel.

SUMMARY OF THE INVENTION

[0010] In one aspect, a protective glove includes a hand receiving portion that includes a plurality of finger portions, a thumb portion, a metacarpal portion and a wrist portion. The hand receiving portion includes a dorsal side and a palm side. The dorsal side of the hand receiving portion includes an inner liner and a plurality of protective elements attached to an exterior surface of the inner liner. The palmar side of the hand receiving portion includes an inner liner. Between the dorsal and palm side, a thin liner pad, also known as a comfort pad, made of pliable material can extend all or part of the glove’s length and optionally extend beyond the glove’s length to connect to a generally circular wrist guard or subcuff. In accordance with the invention, the protective elements include a novel floating knuckle pad on the dorsal side of the glove that improves protection, flexibility and breathability. In addition, venting is provided to set up airflow in conjunction with the floating knuckle pad. The vents in conjunction with the floating knuckle pad promote airflow through the glove interior for improved ventilation/cooling.

[0011] In another aspect, a novel cuff tongue is provided for seating and centering the cuff attached below the hand receiving portion. The cuff tongue is both protective and adds maneuverability where prior cuff elements resisted wrist or hand movement in certain directions.

[0012] Optional storage options are also provided such as a comfort pad pocket for heat/cold pack retention and a cuff pocket or slot for securing miscellaneous player items such as a mouth guard that players regularly remove between play and frequently misplace. The disclosed combination of liner sections and shock absorbing cushions provide suitable protection to the user’s fingers, hands, wrists, and lower forearms while maintaining as much flexibility, breathability and maneuverability as possible. The pattern and construction employs strategically-placed padding with a variety of improved padding constructions to increase flexibility where needed without compromising protection. Flexibility is desired by the wearer so as to impart freedom of movement to the fingers, hand, wrists and lower forearms, all needed for lacrosse, hockey or other stick sports.

[0013] The present invention is described in greater detail in the detailed description of the invention, and the appended drawings. Additional features and advantages of the invention will be set forth in the description that follows, will be apparent from the description, or may be learned by practicing the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Other objects, features, and advantages of the present invention will become more apparent from the following detailed description of the preferred embodiments and certain modifications thereof when taken together with the accompanying drawings in which:

[0015] FIG. 1 is a perspective illustration of the dorsal side of a protective sports glove 2 in accordance with an embodiment of the present invention.

[0016] FIGS. 2(A)-2(E) collectively illustrate the dorsal side of the protective sports glove 2 of FIG. 1. FIG. 2(A) is a back view of the dorsal side of the protective sports glove 2.
FIG. 2(B) is a back view of knuckle pad 20. FIG. 2(C) is a side view of knuckle pad 20. FIG. 2(D) is a cross-section of knuckle pad 20. FIG. 2(E) is a front view of shock absorbing cushions 133. FIG. 2(F) is a side view of two shock absorbing cushions 133. FIG. 2(G) is a side cross-section of two shock absorbing cushions 133.

[0017] FIGS. 3(A)-3(C) collectively illustrate an alternate embodiment of the floating knuckle pad 20 of FIGS. 1-2. FIG. 3(A) is a front view of the knuckle pad 20. FIG. 3(B) is a side view of knuckle pad 20. FIG. 3(C) is a side cross-section of knuckle pad 20.

[0018] FIGS. 4(A)-4(C) collectively illustrate another alternate embodiment of the floating knuckle pad of FIGS. 1-2. FIG. 4(A) is a front view of the knuckle pad 20. FIG. 4(B) is a side view of knuckle pad 20. FIG. 4(C) is a side cross-section of knuckle pad 20.

[0019] FIG. 5 is a perspective illustration of the dorsal side of the protective sports glove 2 of FIG. 1 with inset showing the cuff tongue 70 construction.

[0020] FIG. 6(A) shows the dorsal side of the protective sports glove 2 of FIG. 1 with a comfort pad 27 (dotted lines) fitted within the interior of glove 2.

[0021] FIG. 6(B) shows the dorsal side of the protective sports glove 2 of FIG. 1 with an exemplary hot/cold pack retention pocket 15 (dotted lines).

[0022] FIG. 7 is a perspective illustration of the dorsal side of the protective sports glove 2 of FIG. 1 with inset showing an exemplary cuff pocket or slot 40.

[0023] FIG. 8 is a perspective illustration of the dorsal side of the protective sports glove 2 of FIG. 1 with inset showing an exemplary side vent 50 which, in conjunction with the floating knuckle pad promote airflow through the glove interior for improved ventilation/cooling.

[0024] FIG. 9 is a perspective illustration of the palmar side of the protective sports glove 2 of FIG. 1.

[0025] FIG. 10 is a perspective illustration of the palmar side of glove 2 including optional fingertip padding 156.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Reference will now be made in detail to preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0027] Lacrosse, hockey and other stick-wielding sports players need to be able to flex in all directions freely in order to grip their stick and engage in necessary wrist action while still maintaining an acceptable level of protection. However, as discussed above, conventional glove design limits the amount of flex that is available to a player when they are manipulating a lacrosse or hockey stick. Specifically, conventional protective sports gloves have, by virtue of their padding constructions, limited flexion and extension as well as difficult radial and ulnar deviation, and poor dorsiflexion. The padding intended to protect a user’s knuckles and the pads intended to protect a user’s wrist in conventional gloves are examples of overly restrictive padding. Described herein is a protective sports glove and padding for the same that increases flexibility without compromising protection, thereby affording more overall glove comfort for greater user satisfaction.

[0028] An embodiment of the present invention provides a protective sports glove closely fitted to the hand using a particular pattern of different material sections including liner sections (formed of leather, synthetic woven, knit materials or the like), breathable mesh sections, stretch joints formed of elastic Lycra™ for other stretch nylon, polyester, Daeron™, neoprene or suitable material), and shock absorbing cushions that provide general protection against strikes and blows to the player’s hand. The shock absorbing cushions are attached to the glove only over certain defined areas and sewn or otherwise attached thereto in a particular pattern as described herein so as to cover dorsal portions of both hand and wrist.

[0029] With reference to FIG. 1, the protective athletic glove 2 includes a hand receiving portion 22 covering all five digits and the carpometacarpal joints of the hand and extending down approximately to the wrist crease, and a lower wrist/forearm portion 24 extending down from the wrist crease to a distance from one to three inches. Glove 2 includes both hand receiving portion 22 and lower wrist/forearm portion 24 has both a palmar side and a dorsal side (FIG. 1). The junction of the hand receiving portion 22 and lower wrist/forearm portion 24 is partially encircled by an off-centered, irregularly-shaped cuff inclusive of a wrist cushion 25 that partially surrounds the dorsal side and an adjustable collar 26 that extends below the hand receiving portion 22 and wrist cushion 25 and which may be tightened across the palmar side by hook-and-loop pads. The hand receiving portion 22 further includes a first (little finger) receiving portion 30, second (ring), third (middle) and fourth (index) finger receiving portions 28, and a fifth (thumb) receiving portion 29.

[0030] The hand receiving portion 22 inclusive of finger and thumb receiving portions 28, 29, 30, as well as lower wrist/forearm portion 24 are formed with layers of liner, breathable mesh sections, stretch joints, and shock absorbing cushions. The particular pattern of liner sections, breathable mesh sections, stretch joints, and shock absorbing cushions is designed to provide maximum protection to the user’s fingers, hands, wrists, and lower forearms while maintaining as much flexibility within the glove and tactile feel on the palmar side of glove 2 as possible. Flexibility is desired by the wearer so as to impart freedom of movement to the fingers, hand, wrist and lower forearms needed to properly participate in lacrosse, hockey or other sports while protection is required to reduce injury from normal stick checking.

[0031] FIG. 2 illustrates this pattern on the dorsal side of glove 2. Each of the finger receiving portions 28, 30 and thumb receiving portion 29 are fully encapsulated in a liner section of fabric and all bear a plurality of shock absorbing cushions on the dorsal side sewn to the liner section beneath. The liner material 21 is also known as the “scrim”. Shock absorbing cushions can be made of one or more blocks of micro-cellular foam, preferably open cell, urethane foam (e.g., Poron™, PVC nitrite foam, or another suitable impact-absorbing closed cell foam material). As shown in FIG. 2(G), the shock absorbing blocks maybe encased in a fabric material, such as Nyron™ or other suitable fabric material. The various cushions on the dorsal side are separated from one another by breaks 23 that provide flexibility between the cushions when a wearer’s hand is flexed during routine stick handling. As described below, this particular array of shock absorbing cushions with different seam constructions enhances flexibility.

[0032] Specifically, the small finger receiving portion 30 can bear two or more shock absorbing cushions 133 prefer-
ably comprising multiple discrete foam blocks encased in fabric material and sewn peripherally around and between the cushions to the underlying liner 21, thereby forming a single break 23 there between as shown in FIG. 2(E). The shock absorbing cushions 133 may extend along a majority of the length of the dorsal side of small finger receiving portion 30. The second (ring) finger receiving portion 28 can also bear multiple shock absorbing cushions 133 as above, in this case extending approximately along the first and second phalanges.

The small finger receiving portion 30 may optionally bear a wart pad 136 comprising a covered or uncovered single foam block or other protective element protruding sidelong from the third phalange and sewn peripherally to the underlying liner section. Wart pad 136 provides protection from sideward impact to the small finger.

Similarly, the index finger receiving portion 28 may optionally have one or more wart pads 137 comprising a covered or uncovered single foam block or other protective element protruding sidelong along its length and sewn peripherally to the underlying liner section. Wart pad 137 provides protection from sideward impact to the index finger.

In addition, the second (ring) finger receiving portion 28 can bear one or more shock absorbing cushions 134 comprising one or more foam block(s) or other protective element(s) encased in fabric material and sewn peripherally around the block to the underlying liner, thereby forming an "island" cushion 134. The island cushion 134 may extend approximately along the third phalange of the dorsal side of second (ring) finger receiving portion 28.

The third (middle) and fourth (index) finger receiving portions 28 may also bear an island cushion 134 extending approximately along the third phalanges of the dorsal side of the third and fourth finger receiving portions 28.

In addition, the third and fourth finger receiving portions 28 may also each bear multiple shock absorbing cushions 135 comprising at least two discrete foam blocks or other protective element encased in fabric material aid joined by a unique "overlapped tab" construction to increase flexibility.

FIG. 2(E-F) illustrates the overlapped tab double shock absorbing cushions 135 as per above, with top view at (1) and side views at (2). As seen therein, each piece/plate of thin padding including shock absorbing cushions 135 and other portions of padding formed on the dorsal portion of glove 2 may be formed or made in any conventional manner, including by two thin sheets of foam 179A, 179B and one thin-gauge piece of polyethylene (PE) board 179C, all cut to the desired shape and encased in vinyl fabric 179D. The sheets of foam range in durometer from highest (top) at 179C to lowest (at bottom) 179A in the stack. Each plate of padding may be sewn to the underlying liner, and all are separated by breaks located to accommodate flex points at each phalangeal and metacarpal joint when a player wearing glove 2 wraps his hand around a stick during play.

The overlapped tab cushions 135 comprising two (or more) discrete foam blocks or other protective element may be covered by two discrete sections of fabric material each cut substantially in a cross-shape to define four protruding tabs. The bottoms of the foam blocks are not covered. The three outlying tabs of each block are sewn to the underlying liner as shown. However, the two adjoining tabs (between blocks) are overlapped. Specifically, one adjoining tab (tab 1) (FIG. 2(F)) is tucked under its block, and the other tab (tab 2) (FIG. 2(E)) is tucked under tab 1. Note that the tucked tab 2 is preferably longer so as not to dislodge. These adjoining tabs (1 and 2) are not sewn, but remain free to shift as the finger is flexed. This overlapped tab cushion 135 increases flexibility compared to tabs that are sewn to an underlying liner and constrict movement of the blocks when stretched during gripping action. Moreover, the overlapped tab cushions 135 are optionally extended approximately along the second and first phalanges of the dorsal side of the third and fourth mid-finger receiving portions 28, but can be anywhere along the dorsal side of finger receiving portions 28 to increase flexibility where needed. FIGS. 2(A)-(B) show the preferred shape of knuckle pad 20, which is roughly a convex irregular pentagon. Referring to FIG. 2(B), knuckle pad 20 has a top edge 60 that spans the bottoms of all four finger receiving portions 28, 30 of glove 2. In use, the top edge 60 of knuckle pad 20 sits just above the wearer's knuckles, i.e. at the bottom of the wearer's proximal phalanges. Knuckle pad 20 further has a bottom edge 63 that crosses at approximately a midpoint of the wearer's proximal phalanges on the dorsal side of the wearer's hand while in use. As seen in FIGS. 2(A) and 2(B), bottom edge 63 is contoured away from top edge 60 at a lateral location approximately even to the finger receiving portions 28 for the third (middle) and fourth (index) fingers of the wearer's hand.

Top edge 60 and bottom edge 63 are connected by outer 61 and inner 62 edges, which generally trace the outer edges of the dorsal portion of the glove corresponding to the outer edges of the dorsal portion of the wearer's hand. Thus, in top view as shown in FIGS. 2(A) and 2(B) and as traced by top 60, bottom 63, inner 62, and outer 61 edges, knuckle pad 20 has a roughly rounded rectangular shape with an arched bottom edge 63 such that the pad is widest in the middle and tapered to either side.

Knuckle pad 20 preferably has a semi-hollow or concave underside, with a hollow section represented by reference character 64 (FIG. 2(D)). In one preferred embodiment, knuckle pad 20 comprises a dual-density compression molded elastomeric foam member, which may include a thin-gauge, high-density upper layer and high-performance, low-density foam pad segment(s) compression molded onto the upper layer. The optional dual-density molding of knuckle pad 20 and other dual-density foam blocks described herein may be accomplished by injection molding, which process comprises the steps of sequentially injecting one of the two different foam formulations into a mold, curing, and then injecting the second foam formulation. As is known in the art, knuckle pad 20 and any additional pads in glove 20 may be manufactured using other methods for foam-based parts, such as compression molding or co-molding. As is known, any dual-density foam blocks described herein, including knuckle pad 20, may be comprised of two (2), three (3), or four (4) layers of foam with varying densities using any of the foam molding processes described above. Similarly, the herein-described foam blocks may be comprised of a protective material other than foam. Further, the number of layers within the herein-described foam blocks, their composition and their densities, including the order of the different densities as they are stacked from lowest to highest within the foam pad, may be varied to accomplish desired performance characteristics.

A front view of knuckle pad 20 is shown in FIG. 2(C). As can be seen therein, the center portion of knuckle pad 20 between inner 62 and outer 61 edges is arched up away
from the scrim layer 21 of glove 2 and from the dorsal surface of the wearer’s hand while in use. An end cross section view of knuckle pad 20 is shown in FIG. 2(D), in which the top of knuckle pad 20 faces to the left of the page as depicted therein.

Knuclke pad 20 may comprise a unitary molded quadrilateral open-bottom enclosure 142 formed in an elongate concave configuration as shown in FIG. 2(C). In a first embodiment, the entire knuckle pad 20 may be surrounded by a peripheral flange 144 that provides a flange for stability and also allows stitching through the flange 144 such that knuckle pad 20 can be sewn to the underlying scrim 21. A laceless glove artisan I would understand that the flange may be comprised of any or all of the layers that make up the foam pad, the order of which may be changed depending on desired performance characteristics. In one preferred embodiment, the flange is comprised of every layer within the foam pad, wherein said layers are compressed or molded into a minimal thickness near the base of the pad. The flange and/or surrounding margin may be attached or adhered to the underlying scrim 21 using any suitable attachment method, including stitching. The inherent elasticity of the material and the bubble-like concave configuration of the knuckle pad 20 provide excellent shock absorption capabilities against direct impact. In addition, the bubble-like configuration increases the flexibility of the knuckle pad 20 along its length and allows for easier curving of the knuckles as they naturally raise into the concave configuration as the wearer grips a lacrosse stick handle, for example. The underside of the knuckle pad 20 proximate to its connection with the underlying scrim/liner 21 may further have a concave inner domed shape 145 such that the portion of the knuckle pad 20 that is not attached to the flange 144 is curved so as not to directly contact the flange 144 when the hand is in a resting position. This configuration further increases the comfort and flexibility of the knuckle portion of the glove.

With reference to FIG. 2(B), it can be seen that, in a first preferred embodiment, the flange 144 at inner 62 and outer 61 edges of knuckle pad 20 extends further away from the bottom edge of the open-bottom portion 142 of knuckle pad 20. Preferably, this extended portion of flange 144 provides an attachment point for knuckle pad 20 to scrim 21 at the inner 62 and outer 61 edges only. Thus, in this embodiment, as shown in FIGS. 2(B) and 2(D), top 60 and bottom 63 edges are left unattached from scrim 21 to provide even more freedom of movement in the dorsal side of glove 2 as well as improved venting along the unattached edges. The underlying scrim 21 to which knuckle pad 20 is sewn may contain a slit or opening (not shown) along a portion of its length and beneath knuckle pad 20, thereby further increasing the flexibility of the knuckle portion of the glove during flexing and allowing the passage of air underneath knuckle pad 20 to the wearer’s skin, thereby reducing heat in the interior of glove 2.

In alternate embodiments of knuckle pad 20, however, either top edge 60, or both top edge 60 and bottom edge 63 are also attached to scrim 21 through sewing or some other attachment means across all or portions of the length of edges 60 and 63. In these embodiments, edges 60 and 63 may be attached directly to scrim 21 or a fabric gusset (not shown).

In another preferred embodiment, shown in FIGS. 5(A)-(C), flange 144 on the top edge 60 of knuckle pad 20 comprises one (1) or more tabs 5, each corresponding in location to one of the finger receiving portions 28, 30 of glove 2 under which knuckle pad 20 is situated when applied to the dorsal side of glove 2. Preferably, flange 144 on the top edge 60 of knuckle pad 20 is shaped to include four (4) tabs 5 extending away from the top edge 60 of knuckle pad 20 and corresponding to the finger receiving portions 28, 30 for all four fingers of the glove 2. Tabs 5 are preferably more narrow and slightly shorter than the pad covering the proximal phalanges of each finger (either shock absorbing cushions 133 and tubbed cushions 135 as shown in FIG. 2(A)). This way, tabs 5 may be received underneath the lowest foam pads on finger receiving portions 28, 30, or between the scrim 21 and bottom of cushions 133, 135. For example, the bottommost cushions 133, 135 on finger receiving portions 28, 30 can be at least partially unattached to scrim 21 at their lower edge such that tabs 5 can slide there between and be couched between cushions 133, 135 and scrim 21 at the base of each finger receiving portion 28, 30. Where cushions 133, 135 comprise protruding tabs 1, 2 as shown in FIGS. 2(E)-(F), the tab facing knuckle pad 20 may either be received on top of tab 5 of knuckle pad 20 or may be eliminated to allow tab 5 to slide freely underneath cushion 133, 135. In addition, knuckle pad 20 may also be attached to scrim 21 via flange 144 on inner 62 and outer 61 edges of knuckle pad 20. The bottom edge 63 of knuckle pad 20 may either be unattached to scrim 21, attached along one or a portion of its length to scrim 21, or attached to scrim 21 via a fabric gusset (not shown). Although four (4) tabs 5 are present in the illustrated embodiment, where less than four (4) tabs are utilized, top edge 60 of knuckle pad 20 may also be attached at one or more points along its length to scrim 21 via one or more of the attachment means described above.

Referring now to FIGS. 4(A)-(C), yet another attachment means for knuckle pad 20 is shown. In this embodiment, knuckle pad 20 is either partially or fully enclosed in a fabric pocket such that knuckle pad 20 “floats” above the dorsal side of glove 2 over the wearer’s knuckles with only the fabric covering being attached to scrim 21. In an alternate embodiment, flanges 144 on inner 62 and outer 61 edges of knuckle pad 20 (shown in dotted lines in FIGS. 4(A) and (C)) protrude from the fabric pocket surrounding the remainder of knuckle pad 20 and are attached to the underlying scrim 21 or, alternatively, to a side gusset or the palm. Where the knuckle pad 20 is fully encapsulated in fabric, extended portions of flanges 144 at inner 62 and outer 61 edges of knuckle pad 20 may be utilized to enable knuckle pad 20 to fit more compactly into the fabric pocket. In addition, either the scrim 21 underlying knuckle pad 20, the bottom layer of fabric forming the pocket to enclose knuckle pad 20, or both, may have one or more slits therein to allow better flexibility and ventilation for the glove 2.

Referring again to FIG. 2, protective pad 150 is sewn to the dorsal side of the hand receiving portion 22 of the glove 2 and can be the same basic composition as any other protective pad of glove 2 described herein. It will be understood that protective pad 150, like knuckle pad 20 and any or all other molded foam parts on the glove, may be formed using the variations described above with respect to the knuckle pad 20 as to method of formation, number, density and composition of layers, order of layer densities within the pad, composition of the surrounding margin and/or flange and method of attachment of the pad to the glove. The interstitial areas of the lower layer or scrim 21 between the laminated pad segments form hinges for flexibility. In the illustrated embodiment, protective pad 150 forms the shape of an elongate wedge extending roughly between the bottom edge 63 of knuckle pad at the inner side of the dorsal portion of glove 2 and
downward to the bottom edge of the hand receiving portion 22 of the glove 2 in an area corresponding to the outer edge of a wearer’s wrist. The bottom edge of protective pad 150 follows the top edge of the wrist cushion 25 (to be described in more detail below), which generally circumscribes an area of the glove 2 corresponding to the wrist of the wearer in the wrist/forearm section of the glove 2, and extends upward towards finger receiving portions 28, 30 towards an inner edge of glove 2. At an outer edge of glove 2, a roughly triangularly shaped protective pad 151 fits between the bottom edge 63 of knuckle pad 20 and the top edge of protective pad 150. Another protective pad 152 can sit at the outer edge of the dorsal side of glove 2 along the edge of pads 150 and 151 and drapes over the outer edge of the hand at the metacarpals to provide sidelong impact protection. Protective pads 150, 151, 152 and cuff 25 are preferably formed of low-density (LD) foam.

[0049] Thumbs receiving portion 29 is formed separately from the rest of the glove, and may be attached to the glove by a circumscibed stretch zone 180 made of Lycra™ or other suitable stretch material, as described below. With reference to FIGS. 2(A) and 9, the dorsal side of the thumb-receiving portion 29 contains three (3) or more, and preferably six (6), plates of padding 133, 153, 154, 155 as shown, all sewn to the underlying scrim/liner 21, and all separated by breaks to accommodate flex points at each phalanx and metacarpal joint when a player wearing glove 2 wraps his hand around a stick during play.

[0050] The lower wrist/forearm portion 24 is defined by a cuff attached below the hand receiving portion 22, the cuff comprising a wrist cushion 25 that partially surrounds the dorsal side and an adjustable collar 26 that extends below the wrist cushion 25 and which may be tightened across the palmar side by hook-and-loop pads. The cuff is eccentric, being both off-centered on the dorsal side, and, formed with an irregular shape. Both wrist cushion 25 and adjustable collar 26 may be formed of die cut or injection molded dual-density compression molded foam, or using other foam types and manufacturing methods described herein or known in the art. It will be understood that the wrist cushion 25, like knuckle pad 20 and any other molded foam parts on the glove, may be formed using the variations described above with respect to the knuckle pad 20 as to method of formation, number, density and composition of layers, order of layer densities within the pad, composition of the surrounding margin and/or flange and method of attachment of the pad to the glove.

[0051] The wrist cushion 25 is attached to the dorsal side of the glove by a gusset, which may be an inset strip of material such as Lycra™ or other stretch material that provides a limited degree of expansion. In another preferred embodiment, wrist cushion 25 may be stitched directly to the dorsal side of the glove without the use of a gusset. Similarly, the adjustable collar 26 is preferably attached to a comfort pad liner 27 as described below that extends from the glove interior or, alternatively, it may be attached to the wrist cushion 25 at a second gusset e.g., joined by Lycra™ or other stretch material, such as elastic. Collar 26 is tightened upon itself and fastened by hook-and-loop pads (visible in FIG. 9), or alternatively a tether across the palmar side. Wrist cushion 25 may also have a channel or opening along a portion of its length, adding flexibility and airflow for cooling. The stretch material by which collar 26 is attached to the comfort pad 27 or wrist cushion 25 is of a particular size and shape (e.g. an oblong annulus), so that it performs as intended when a player’s wrist bends forward during play. That is, when, the collar 26 is fastened tight and a player’s wrist bends or flexes forward, the stretch material does not inhibit a player’s movement and simultaneously allows the adjustable collar 26 to remain in place to cover the player’s wrist. The wrist cushion 25 and adjustable collar 26 provide a degree of caterpillar-like flexibility for a wearer during play. Moreover, the wrist cushion 25 is joined to the hand receiving portion 22 at an angled joint as illustrated, and a gusset is provided at this angled joint as described above. As a result of the angled joint and stretch zone, the prior art separate “cuff roll” extending over the cuff/glove joint can be eliminated, allowing for a more streamlined, unrestricted glove.

[0052] When gussets are used, each may be formed by attaching two opposing (caterpillar-like) segments using Lycra™ or other stretch-fabric. More specifically, the optional gusset between collar 26 and wrist cushion 25 may be formed by attaching a strip of Lycra™ or elastic stretch-fabric underneath the edges of wrist cushion 25 to the adjoining liner/scrims or to a lower edge of comfort pad 27 as will be described. Similarly, the gusset between wrist cushion 25 and hand receiving portion 22 is formed by attaching a strip of Lycra™ stretch-fabric underneath the edges of adjoining collar 26 and wrist cushion 25.

[0053] In addition to gussets as described above, the glove 2 is preferably equipped with stretch zones 180 in the thumb-metacarpal of the hand as depicted in FIG. 2(F). Each of the bordering plates of padding 171-176 are modified so that the middle sheet 170B is slightly larger than upper or lower sheets 179A, 179C such that it protrudes outward further. In effect, once ensaced in vinyl fabric 179D, this rounds the facing edges of each of the bordering plates of padding 171-176 and provides an abutting joint there between to maintain coverage. Preferably, the bordering plates of padding 150, 153, 154 and 25 are modified in this “jointed” fashion in order to facilitate the upper stretch zone 180, and all pads 20, 25-26, 150-155 may be jointed as such. In addition, jointed plates of padding may have a strip of Lycra™ stretch-fabric sewn beneath them (see FIG. 2(F)). The combination of jointed plates of padding 173, 174 and 176 in a stretch zone 180 configuration substantially closes the break between the bordering plates of padding 173, 174 and 176 (since the rounded edges of plates 173, 174, 176 overhang the break closing it off). The friction reduction between jointed plates 173, 174, 176 as they pivot provides increased flexibility and improved tactile feel.

[0054] Another feature of the disclosure, cuff tongue 70, is shown with reference to FIG. 5. Cuff tongue 70 is provided for sealing and centering hand receiving portion 22 and wrist pad 25 attached below the hand receiving portion. The cuff tongue 70 also adds protection and additional maneuverability. Cuff tongue 70 generally comprises a shock absorbing tongue pad cushion 10, which may be made of micro-cellular foam, preferably open cell, methane foam (e.g., Poron™, PVC nitrite foam, or another suitable impact-absorbing closed cell foam material) encased in a fabric material, such as Nylon™ or other suitable fabric material, to provide shock absorption to the inner portion of the dorsal side of the wrist/forearm portion 24 of glove 2. As shown in FIGS. 2(A) and 5, tongue pad 10 is generally oval or eye shaped and fits into a concave recess on the bottom edge of wrist cushion 25 such that the bottom edges of the remainder of wrist pad 25 and of tongue pad 10 form an even line perpendicular to the direction
of the finger receiving portions 28, 30 across the wrist/forearm portion 24 of glove 2. Tongue pad 10 is attached to the base of the hand receiving portion 22 of glove 2 via two "legs" 6, 7 each having attachment points along a seam at the base of the hand receiving portion 22 of glove 2 indicated by reference character 11 and preferably corresponding to a joint between wrist cushion 25 and protective pad 150. Legs 6, 7 may be formed of a similar material to tongue pad 10 or maybe made of more elastic material, but are preferably thinner to allow tongue pad 10 to seat within the recess left by the concave bottom portion of wrist cushion 25 as described in more detail below. As shown in the inset to FIG. 5, legs 6, 7 are thin strips of material joined to either side of the top edge of tongue pad 10. Preferably, legs 6, 7 are also joined by a thin strip of material at their base at the top edge of tongue pad 10 such that the entire top edge of tongue pad 10 is evenly joined to legs 6, 7. Reference character 9 in the inset to FIG. 5 indicates a void where no material exists between legs 6, 7 proximate to the hand receiving portion 22 of glove 2. This configuration provides a more flexible joint between tongue 70 and glove 2 superior in comfort and maneuverability over the prior art solid piece of material without voids 9.

[0055] Tongue pad 10 may be joined to glove 2 via legs 6, 7 in one of several ways. In a preferred embodiment legs 6, 7 extend underneath wrist cushion 25 where they are attached to an interior portion of scrim 21 at approximately the joint 11 between wrist cushion 25 and protective pad 150. Alternatively, legs 6, 7 may be attached to an exterior portion of joint 11 and extend over the top of wrist cushion 25, in which case the thickness of tongue pad 10 preferably extends towards the interior of glove 2 to encourage tongue pad 10 to abut collar 26 in the recess left by the concave bottom portion of wrist cushion 25. In yet another embodiment, legs 6, 7 may instead be attached only at their respective ends to glove 2, but may optionally also attach along their entire lengths to the top surface of cuff 26 or a bottom surface of wrist cushion 25 (when placed underneath wrist cushion 25), or to a top surface of wrist cushion 25 (when placed over top of wrist cushion 25). Alternatively, the distal ends of legs 6, 7 maybe attached at a point further towards the center of hand receiving portion 22 of glove 2 whether received underneath or above wrist cushion 25. All of these configurations allow tongue pad 10 to move into receiving negative cuff space provided under the convex recess of wrist cushion 12 when the wearer flexes his or her wrist backwards, providing consistent low profile coverage of the dorsal portion of the wearer’s wrist.

[0056] Yet another feature of the present invention is shown with reference to FIGS. 6(A)-(B), in which comfort pad 27 and the attachment of cuff 26 to pad 27 can be seen. As seen in FIGS. 6(A)-(B), a comfort pad 27 may be a sleeve-like liner designed to fit within the interior of glove 2 to provide an additional element of padding between the dorsal side of the wearer’s hand and the scrim layer 21 of glove 2 to which the dorsal padding is secured. The position of comfort pad 27 on the interior portion of glove 2 is illustrated in dotted line in FIG. 6(A). Comfort pad 27 is preferably formed of a low-density, flexible foam material and may be adhered to the interior portion of glove 2 at the interior side of scrim 21 by sewing or like means. Preferably, comfort pad 27 is only affixed to scrim 21 at the distal ends of finger and thumb receiving portions 28, 29, 30 to allow free movement and ventilation between scrim 21 and comfort pad 27, however comfort pad 27 may be secured to scrim 21 at additional locations per design preference. Also in preferred embodiments, comfort pad is perforated to further encourage airflow to the surface of the wearer’s hand. Comfort pad 27 may be in the shape of a fitted glove such that it fully surrounds the wearer’s hand when placed inside glove 2, or may be a flat or curved element designed to fit between only the dorsal surface of the wearer’s hand and scrim 21 or to wrap around the dorsal side and the edges of the wearer’s hand, respectively. As shown in FIGS. 6(A)-6(B), all or a portion of the top edge of cuff 26 preferably attached directly to the lower edge of comfort pad 27 via sewing or other known attachment means, or attaches to the lower edge of comfort pad 27 via a strip of elastic material as described above.

[0057] FIGS. 6(A)-6(B) also show another feature of the present invention, a heat/cool pack retention means 15 which may be situated in an interior portion of glove 2, preferably at a dorsal side thereof to prevent interference between the palm side of the wearer’s hand and his or her lacrosse or hockey stick. Pack retention means 15 may take the form of either a fabric pouch or pocket a strap or straps, a clip, hook & loop fastening means such as Velcro®, or any other adhesion methods known in the art capable of retaining a hot or cold pack (not shown) within the interior of glove 2. The retention means may either be attached to the underside of padding 150, 151, 20, 153, 25, attached to the comfort pad 27 at either an interior or exterior surface, or suspended between scrim 21 and comfort pad 27, preferably in a way such that the pack retention means 15 may be pulled out from the interior of glove 2 to adjust or replace the hot or cold pack inside the glove 2. For example, in a preferred embodiment, pack retention means 15 is secured to an exterior portion of comfort pad 27, which is attached to the interior of the glove as described above, but which, unlike the scrim 21, is somewhat movable within the glove, enabling access to a temperature pack pocket, or slot located on the outer surface of comfort pad 27.

[0058] Another feature of the present invention is shown with reference to FIG. 7, which illustrates a cuff storage slot 40 on an interior portion of cuff 26. Cuff storage slot 40 preferably comprises a loop or section of material 41 which is sewn either to die interior or the exterior of a dorsal portion of cuff 26, optionally at the location indicated by the dotted lines in FIG. 9 along one (1), two (2) or three (3) sides. Preferred dimensions for cuff storage slot 40 are 15 mm-40 mm wide by 50 mm-80 mm long. In a preferred embodiment, material 41 is attached to the interior of cuff 26 with stitching 42 along two edges in a direction substantially parallel to the main axis of glove 2. This configuration allows for items such as a player's mouth guard to be secured between cuff 26 and cuff storage 40 as indicated by arrow 4 in FIG. 7. Alternatively, material 41 may also be stitched on a bottom edge proximate the lower edge of cuff 26 so as to form a pocket for smaller items. In yet another alternative embodiment, material 41 may itself form a loop, the ends of which are both attached at one point in the interior of the cuff 26 to allow certain items having hooks or clips to be affixed thereto. Instead of stitching, cuff storage 40 may be attached to cuff 26 by welding, gluing, hook and loop fasteners such as Velcro®, or other fastening means known in the art. Cuff storage 40 is preferably made of an elastic fabric such as Lycra® but may be formed of any elastic or non-elastic material capable of forming an attachment with the interior or exterior portion of cuff 26.

[0059] Another feature of the disclosure is now described with reference to FIG. 8. As illustrated therein, a side vent 50
can comprise a thin panel of hard but resilient material such as polyethylene (PE) board cut or molded to the desired Paramecium shape and with one or more openings 51 located in and through the side vent 50. Side vent 50 may also be constructed of compression molded foams, injected molded foams or die-cut materials having impact absorption properties. Side vent 50 is located at the outer edge of the glove 2 between the dorsal side 2B and palmar side 2A of glove 2 just above the wrist crease. Side vent 50 is sewn peripherally to either a gusset, the palm or the scrim layer 21, or scrim layer 21 directly beneath side vent 50 may be omitted or comprise a slit or opening therein to encourage air flow, represented by arrows 3, into the interior of glove 2 for ventilation and cooling. In use, side vent 50 works in conjunction with the floating knuckle pad of FIGS. 1-2 to promote airflow completely through the glove interior. This is especially true for the dorsal side of the glove where maximum airflow runs across the entire dorsal surface of the user’s hand from side vent 50 to floating knuckle pad, significantly improving ventilation and cooling.

In another aspect, as shown in FIG. 10, the palmar side of glove 2 may include fingertip padding 156 adhered via stitching and/or welding to the palmar side of the glove between the distal end and approximately the distal interphalangeal joint, or over an area commonly known as the “finger pad”, with a curved bottom edge and a top edge having a shape defined by the outer outline of the palmar side of glove 2. The thickness of the fingertip material may be up to 0.8 mm. The thickness of the material making up the remainder of the outer palmar side of glove 2 may be from 0.2–10 mm.

It should now be apparent that the above-described protective sports glove 2 allows a user to flex the hand in all directions freely, to grip a lacrosse, hockey or other type of sports stick, and to maintain accurate tactile feel at every necessary wrist inclination, all while maintaining an suitable level of protection. The glove 2 allows freer flexion and extension, as well as radial and ulnar deviation, and dorsiflexion.

The foregoing disclosure of embodiments of the present invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many variations and modifications of the embodiments described herein will be obvious to one of ordinary skill in the art in light of the above disclosure. The scope of the invention is to be defined only by the claims, and by their equivalents.

What is claimed is:

1. A protective sports glove, comprising:
   a hand portion for covering a user’s hand inclusive of fingers, thumb and carpometacarpal joints and configured to extend down approximately to a wrist crease of said user’s hand, said hand portion including a palmar side, a dorsal side, a little finger receiving portion, ring finger receiving portion, middle finger receiving portion, index finger receiving portion, and thumb receiving portion, said hand portion comprising a fabric liner, a lower wrist portion configured to extend down from said user’s wrist crease, said lower wrist portion comprising a protective pad attached to said hand portion; a cuff portion below said protective pad and configured to partially encircle a lower wrist of said user’s hand; a pliable comfort pad occupying an interior of and extending below said hand portion, wherein said cuff portion is attached to said comfort pad;
   a plurality of shock absorbing cushions attached to said hand portion, wherein at least one of said shock absorbing cushions is a single knuckle pad configured to cover all of the knuckles of said user’s little, ring, middle and index fingers.

2. The protective sports glove according to claim 1, wherein said knuckle pad has a top edge adjacent to a base of each of said little finger receiving portion, ring finger receiving portion, middle finger receiving portion, and index finger receiving portion, and a bottom edge roughly parallel to said top edge, wherein said top and bottom edges are joined by inner and outer edges configured to be located at inner and outer edges, respectively, of said dorsal side of said hand portion, and wherein said top and bottom edges are farthest apart towards said inner edge.

3. The protective sports glove according to claim 2, wherein said knuckle pad is attached to said hand portion only at said inner and outer edges.

4. The protective sports glove according to claim 2, wherein said knuckle pad is attached to said hand portion only at said inner edge, said outer edge, and said top edge.

5. The protective sports glove according to claim 2, wherein said knuckle pad is attached to said hand portion along said inner, outer, top and bottom edges.

6. The protective sports glove according to claim 2, wherein the remainder of said knuckle pad other than said inner and outer edges is encapsulated in a fabric pocket.

7. The protective sports glove according to claim 1, wherein said knuckle pad is fully encapsulated in a fabric pocket, and wherein said fabric pocket is attached to said hand portion.

8. The protective sports glove according to claim 2, wherein said top edge of said knuckle pad comprises one or more tabs corresponding in location to at least one of said little finger receiving portion, ring finger receiving portion, middle finger receiving portion, or index finger receiving portion, and wherein said one or more tabs is configured to be received underneath one or more shock absorbing cushions on at least one of said little finger receiving portion, ring finger receiving portion, middle finger receiving portion, or index finger receiving portion.

9. The protective sports glove according to claim 8, wherein said knuckle pad is attached to said hand portion at said inner and outer edges.

10. The protective sports glove according to claim 8, wherein said knuckle pad is additionally attached to said hand portion along all or part of said bottom edge.

11. The protective sports glove according to claim 1, wherein said knuckle pad comprising a dual-durometer molded foam block.

12. The protective sports glove according to claim 1, wherein said knuckle pad comprises a unitary molded concave shape surrounded by a peripheral flange that is sewn to said liner fabric.

13. The protective sports glove according to claim 1, wherein said fabric liner underlying said knuckle pad comprises an opening.

14. The protective sports glove according to claim 1, wherein said plurality of shock absorbing cushions includes:
   a first foam block covered by a first fabric section, said first fabric section being sewn along three contiguous margins to said liner to encapsulate said first foam block there between, and said first fabric section including a fourth unsewn marginal tab; and
25. The protective sports glove according to claim 24, wherein said heat or cool pack retention means is selected from the group consisting of: fabric pocket, strap, clip, hook and loop fastener.

26. The protective sports glove according to claim 1, wherein said plurality of shock absorbing cushions includes a foam pad sewn to said fabric liner and configured to extend along the outside of the metacarpal bone for the user’s pinky finger.

27. The protective sports glove according to claim 26, wherein said foam pad configured to extend along the outside of the metacarpal bone for the user’s pinky finger further comprises one or more through holes therein capable of allowing air to pass into the interior of said sports glove.

28. The protective sports glove according to claim 1, wherein said comfort pad is attached to an interior portion of said hand receiving portion.

29. A protective sports glove, comprising:
   a hand portion for covering a user’s hand inclusive of fingers, thumb and carpometacarpal joints and extending down approximately to a wrist crease of said user’s hand, said hand portion including a palm side, a dorsal side, a little finger receiving portion, ring finger receiving portion, middle finger receiving portion, index finger receiving portion, and thumb receiving portion, said hand portion also including a fabric liner;
   a lower wrist portion attached to said hand portion and extending down from said wrist crease;
   a cuff portion partially encircling the lower wrist portion;
   a plurality of shock absorbing cushions attached to said hand portion;
   wherein said lower wrist portion comprises at least first and second distinct shock absorbing wrist cushions, and wherein at least said second wrist cushion is attached to said hand portion by one or more flexible legs.

30. The protective sports glove according to claim 29, wherein said second wrist cushion is sized to fit into a concave recess at a distal edge of said first wrist cushion, wherein said distal edge of said first wrist cushion is the edge of said second wrist cushion farthest from said hand portion.

31. The protective sports glove according to claim 29, wherein legs are attached to an interior portion of said glove at a junction of said hand portion and said wrist portion.

32. The protective sports glove according to claim 29, wherein said legs are attached to an exterior portion of said glove at a junction of said hand portion and said wrist portion.

33. The protective sports glove according to claim 29, wherein said legs are attached to an interior portion of said cuff portion.

34. The protective sports glove according to claim 29, wherein said legs are attached to an exterior portion of said cuff portion.

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