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TRAVELL

(54) **HAND PROTECTION SYSTEM**

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(57) **ABSTRACT**

A system which in use is mounted onto a glove for protecting the back of a user's hand comprises a plurality of elongate, flexible strips, each overlying a respective finger. Each strip has a first end portion serving as sole means of fixedly attaching the strip to the glove, usually in the vicinity of the fingertips, and a remaining portion, extending to the second end of the strip, which is free to move relative to the glove. In this respect, a plurality of discrete guide structures are attached to the glove at a spacing remote from the first end portion) of each strip so that the strip extends across, through or into the guide structure and is held in position on the glove in a manner which allows sliding displacement of the remaining portion of the strip along the longitudinal axis of the strip. The guide structures may be configured to provide a closed tunnel through which the strip extends, or in other versions may be open so that opposing engagement lugs slidingly retain side edges of the strip. Optionally, a plate assembly is mounted over the knuckle and/or metacarpal region of the hand and is configured to provide plural guide portions into which the free second end portions of at least some of the strips are received in slidable manner.

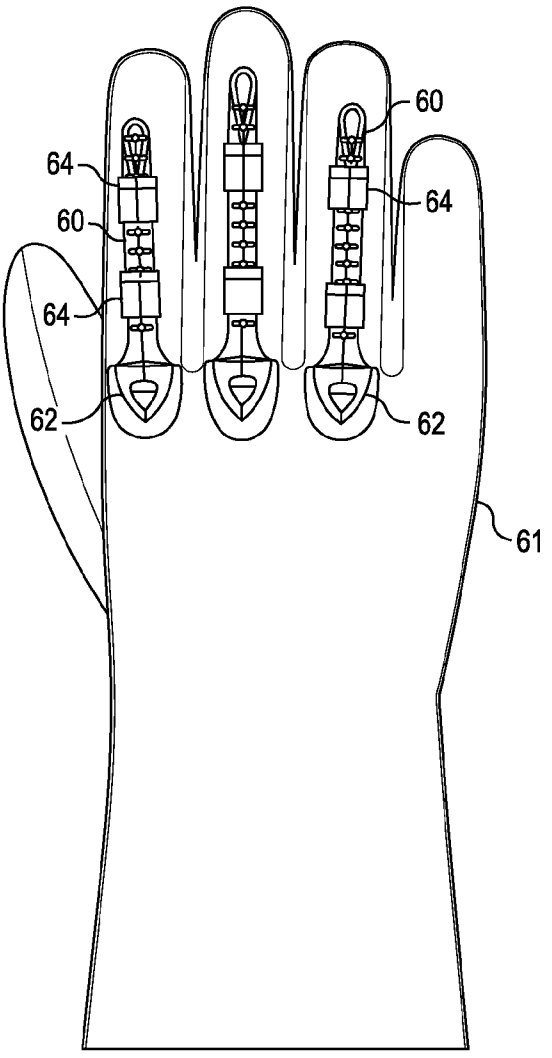

FIG. 1

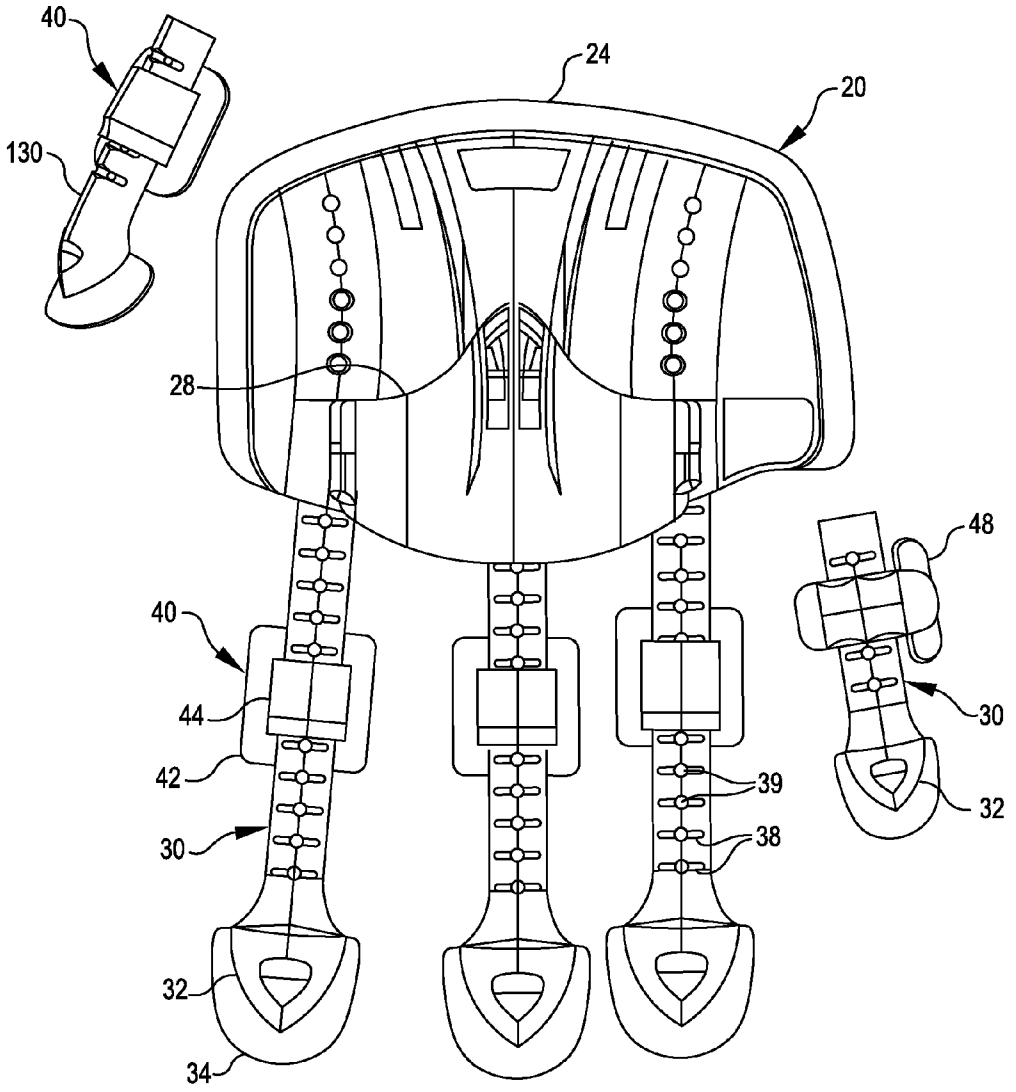

FIG. 2

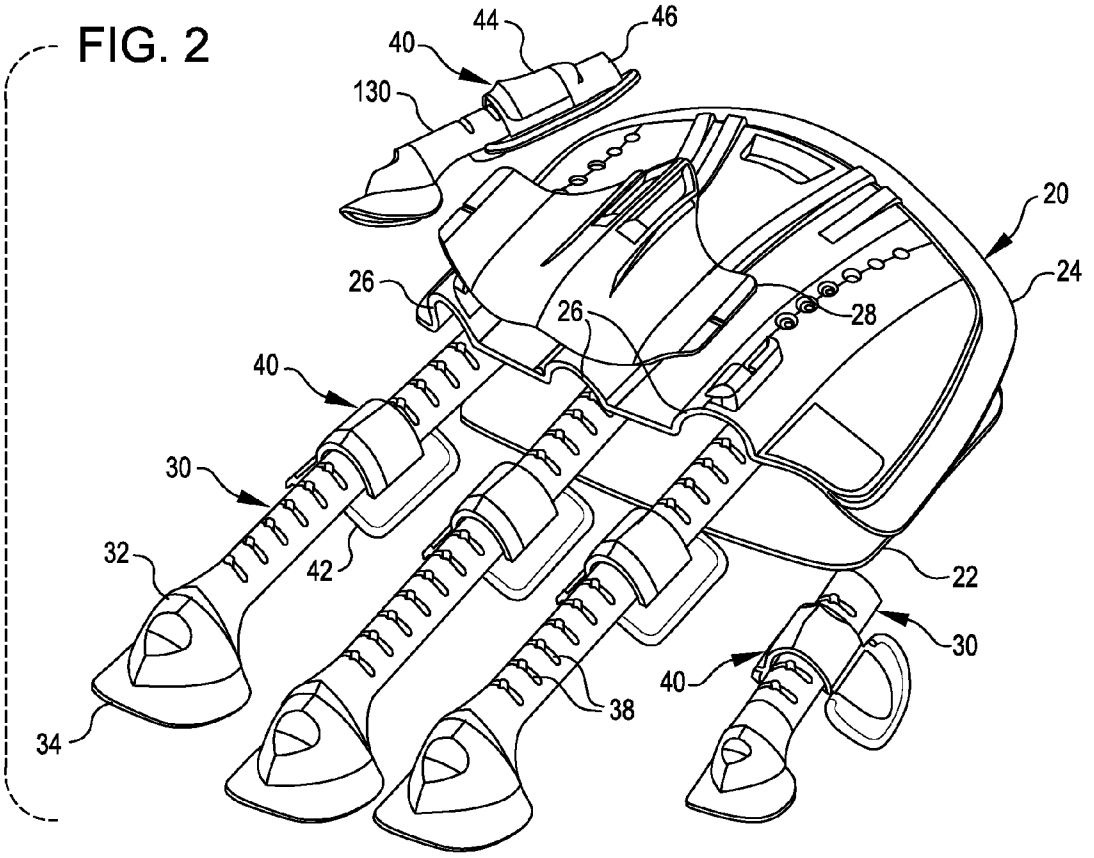

FIG. 3

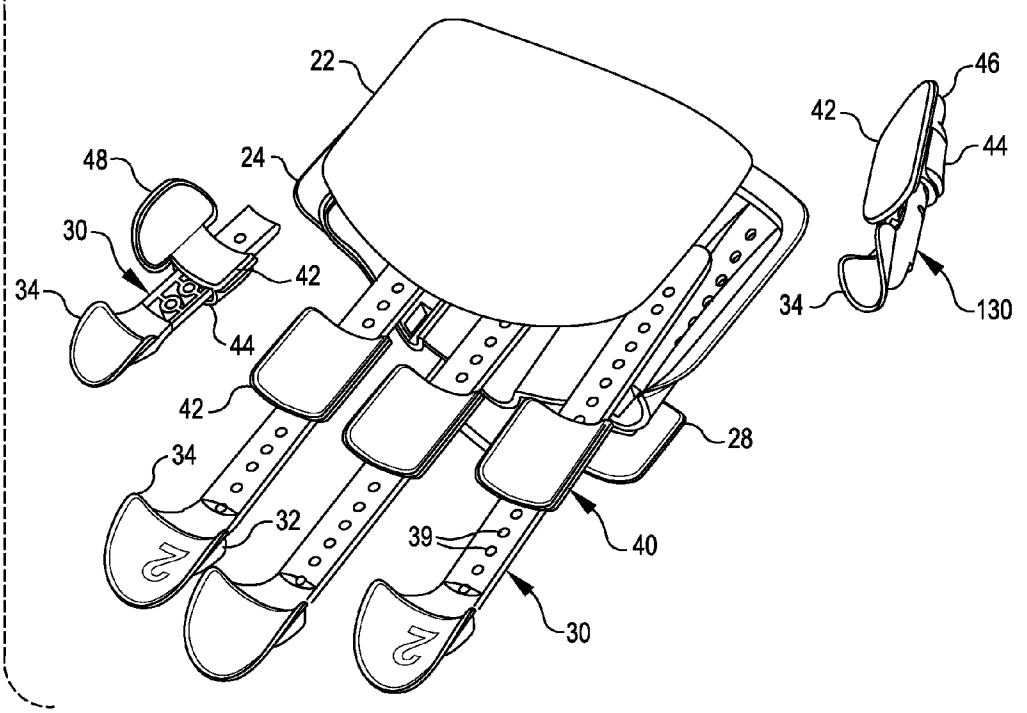
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FIG. 4

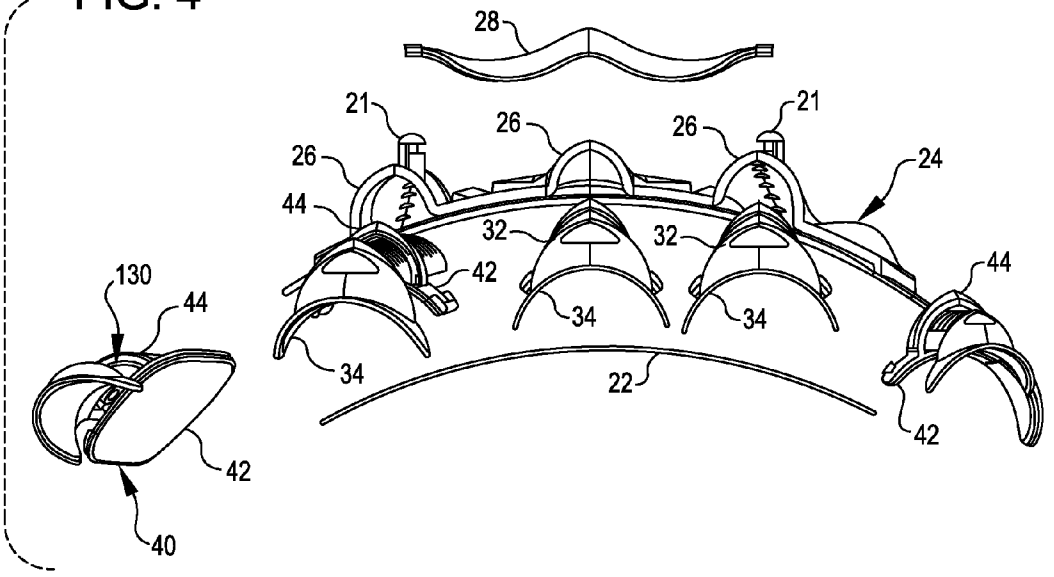
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FIG. 5

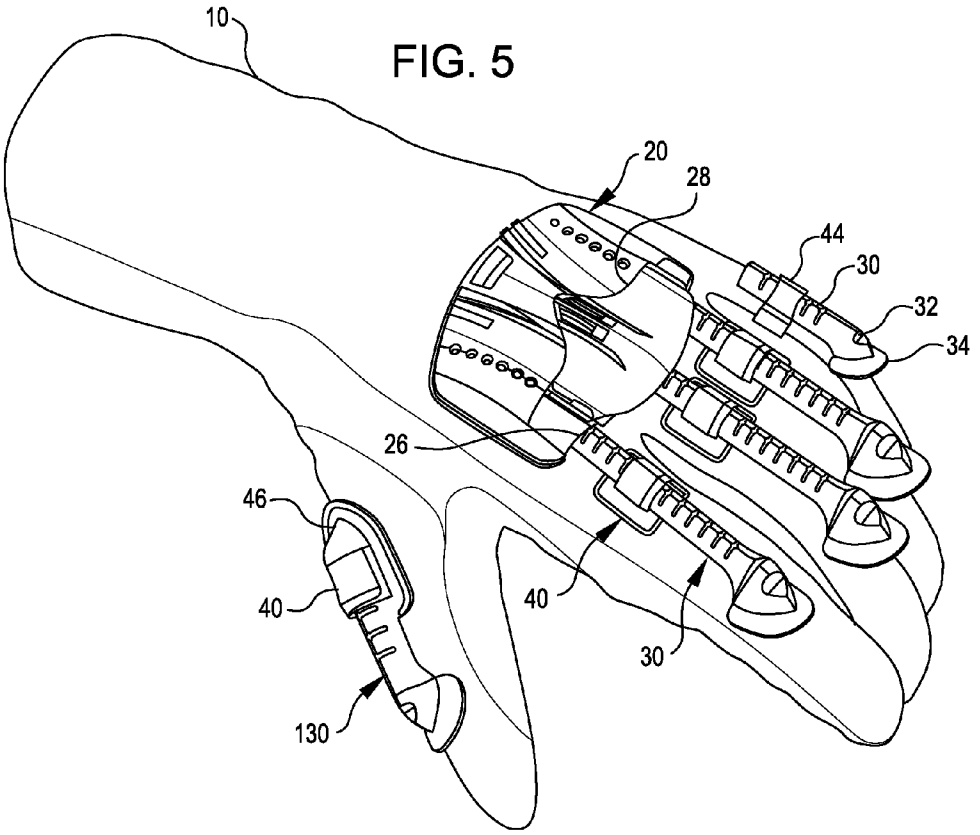
10
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FIG. 6

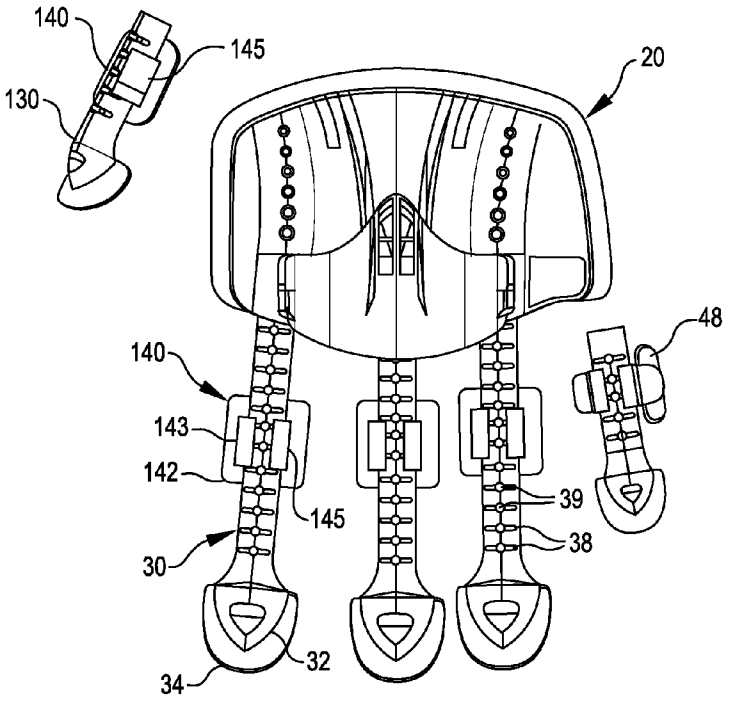
140
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FIG. 7

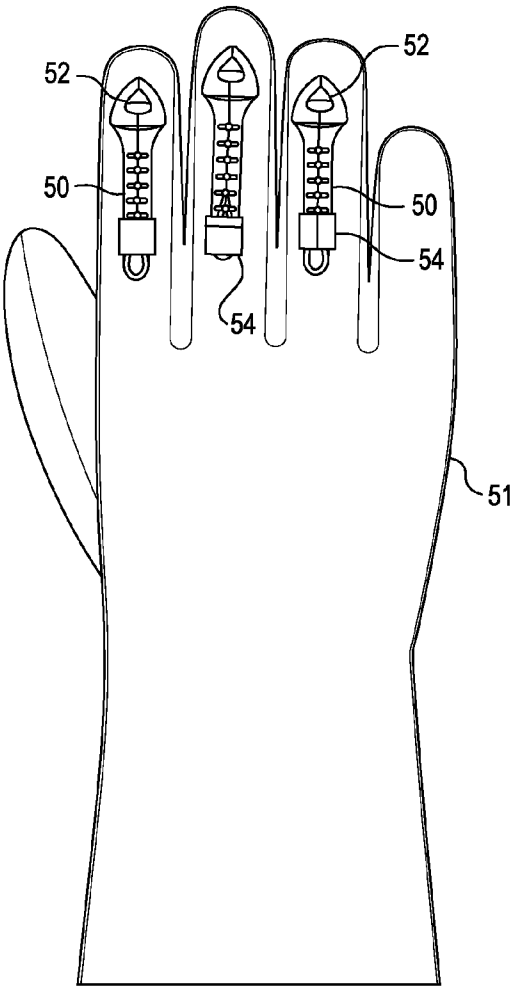


FIG. 8

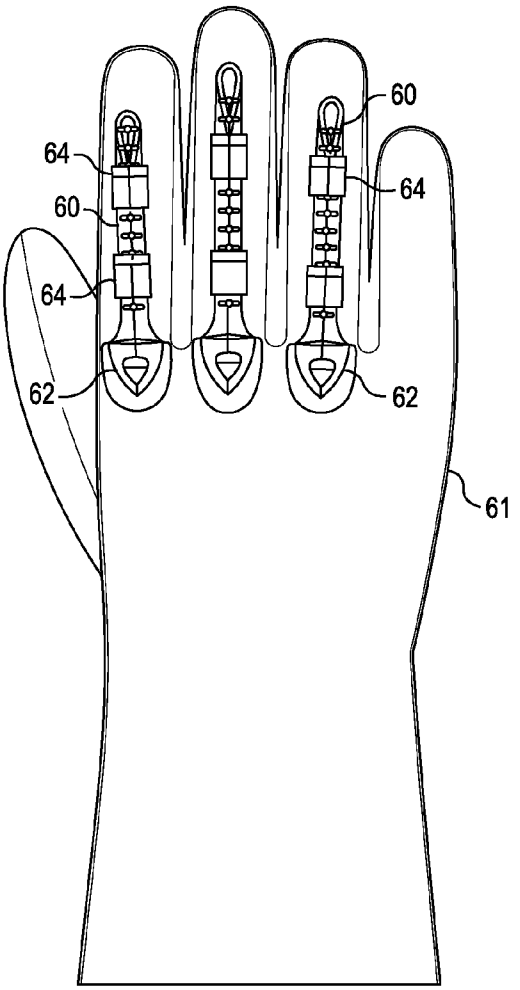
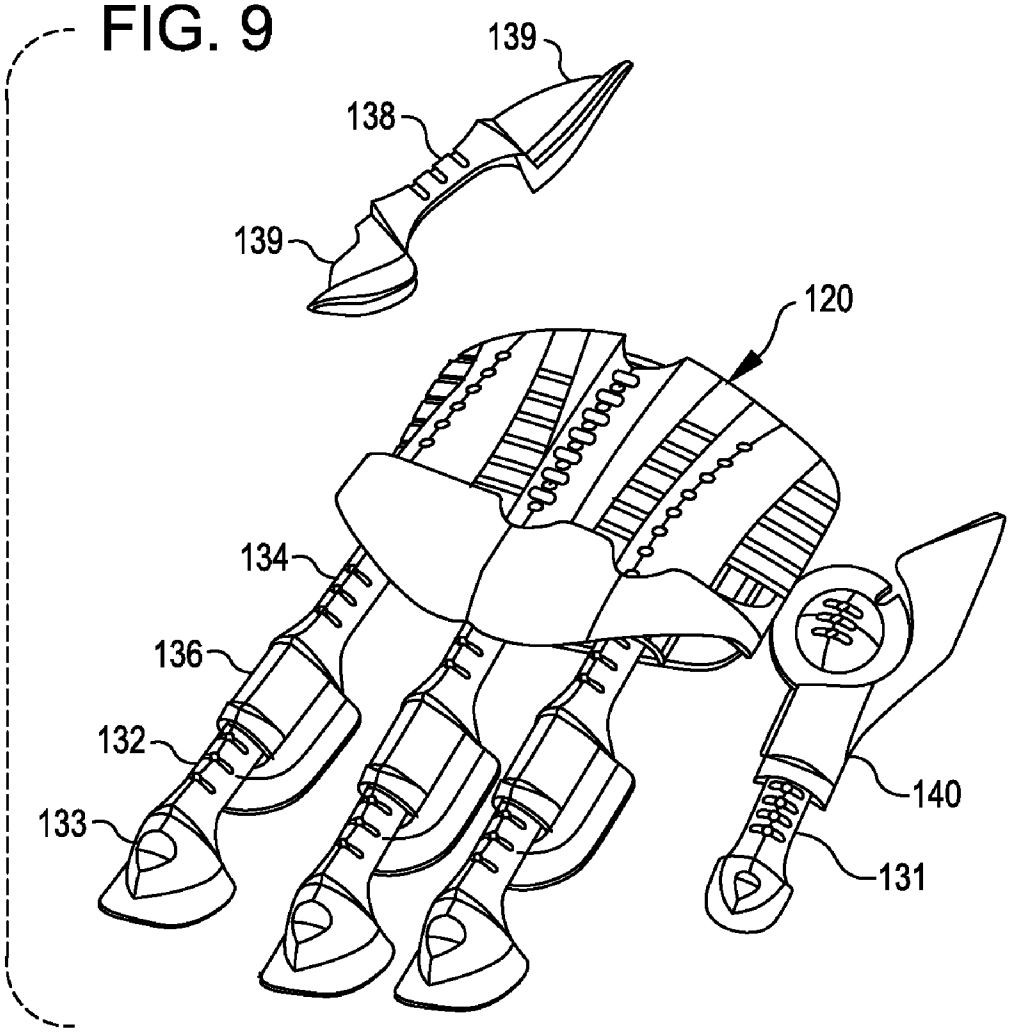


FIG. 9



HAND PROTECTION SYSTEM

REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to European patent application no. EP 09173334.5, filed Oct. 16, 2009.

FIELD OF THE INVENTION

[0002] This invention relates to a hand protection system for a glove, particularly but not exclusively for use in sports such as motorcycling.

BACKGROUND

[0003] Most currently available protective gloves for use in motorcycling incorporate protective pads over the region of the main knuckles (where the metacarpal bones connect to the proximal phalanges). These are often rigid and uncomfortable and only provide limited protection at the front of the knuckle, a region particularly prone to impact. Some currently available protective gloves also include protective pads positioned over the proximal and intermediate phalanges bones of at least some of the individual fingers, but provided no protection at the joint between these bones, again a region particularly prone to impact and injury.

[0004] US 2006/048259 (EP 1632273) discloses a finger protector for a sports glove, in particular a goalkeeper glove, comprising a plate that is connected in one piece with strips which overlie respective fingers of one hand. Each strip consists of a chain of members and an underlying band. The chain of members are connected in one piece with each other but can be moved relative to each other (towards and away) by virtue of through holes extending transverse to the chain direction. The underlying band has nipples which are pushed into the through holes. Such a finger protector is integrated into that part of a glove associated with the back portion of the user's hand, embedded in a layer of soft foam plastic or foamed textile composite, possibly detachably and interchangeably. The aforesaid chain of members has flexibility but is attached at multiple points to the nipples of the underlying band and the whole protector is mounted into the fabric of the glove with no provision for displacement relative to the glove.

[0005] An object of the present invention is to provide an improved hand protection system which allows for protection of the entire fingers, including joints, which are the most vulnerable parts, without compromising the ability of the user to bend and stretch the fingers, thus enabling gripping in the normal manner, and without compromising comfort for the user.

BRIEF SUMMARY OF THE DISCLOSURE

[0006] In accordance with a first aspect of the present invention a hand protection system for mounting onto a glove is provided that comprises a plurality of elongate flexible strips, each strip positioned to overlie a respective finger, and each strip having a longitudinal axis between first and second opposing ends, characterized in that each strip has a first end portion serving as sole means of fixedly attaching the strip to the glove and a remaining portion, and in that a plurality of discrete guide structures are provided, adapted for attachment to the glove at a spacing remote from the first end portion of each strip so that the respective strip can extend across, through or into the guide structure and be held in position on the glove in a manner which allows sliding displacement of the remaining portion of the strip along the longitudinal axis of the strip.

[0007] In accordance with a second aspect of the present invention a glove on to which such a hand protection system is mounted is provided, the glove having a plurality of elongate flexible strips overlying respective fingers, each strip having a longitudinal axis between first and second opposing ends, characterized in that each strip has a first end portion whereby the strip is fixedly attached to the glove and a remaining portion, extending to the second end, which is free to move relative to the glove and in that a plurality of discrete guide structures are attached to the glove, at least one for each finger, at a spacing remote from the first end portion of each strip such that the strip extends across, through or into the guide structure and is thereby held in position on the glove in a manner which allows sliding displacement of the remaining portion of the strip along the longitudinal axis of the strip.

[0008] At present, two basic forms of the guide structures are envisaged. A first version is configured to provide only edge engagement means for slidingly retaining side edges of the respective strip. Such a version is open across the upper surface of the strip. Such a version may comprise a unitary structure having opposing confronting edge engagement means, or may comprise two separate halves which face each other and provide the respective edge engagement means.

[0009] A second version is configured to provide a tunnel through which or into which the respective strip extends. Such a version extends completely across the upper surface of the strip. The tunnel provided may be open at each end, in which case the strip may extend right through. Alternatively, the tunnel may be closed at one end so as to form, effectively, a socket for receiving the second end of the respective strip, i.e. into which the second end of the strip will project in use.

[0010] The aforesaid flexible strips and guide structures may be provided on the glove as the totality of the hand protection system. However, it is possible, even likely, that an additional protective plate or pad, which may be of entirely conventional form, may be provided in addition to the aforesaid strips and guide structures, said plate being mounted over the knuckle and/or metacarpal region of the hand. Whether or not such an additional plate or pad is provided, the first end portions of the strips may be secured to the fingers either adjacent tips of the fingers with the displaceable remaining portions extending towards the knuckles or adjacent to the knuckles with the displaceable remaining portions extending towards the fingertips, in each case passing across or through or into respective guide structures.

[0011] In a development of the present invention a plate mounted or mountable onto the glove over the knuckle and/or metacarpal region of the hand is additionally provided, said plate being configured to provide plural adjacent guide portions for the second ends of the respective strips. Of course, with such an arrangement the first end portions of the strips are secured to the fingers, distally of the plate, adjacent the tips of the fingers, with the displaceable remaining portions of the strips extending towards and into the aforesaid guide portions of the plate. Just as with the discrete guide structures, these guide portions also may provide only edge engagement means for slidingly retaining side edges of the respective strips or alternatively may be configured to provide tunnels into which the respective second ends of the strips project.

[0012] Also within the scope of the invention are embodiments where first end portions of the respective strips are

permanently connected to a plate, which plate is fixedly mounted or mountable onto the glove over the knuckle and/or metacarpal region. The remaining portions of the strips then extend away from the plate to overlie the fingers and be guided by respective guide structures mounted on those fingers.

[0013] Preferably, each strip is formed of a plurality of alternate thicker and thinner regions as provided, for example, by a series of transverse slits along the longitudinal axis of each strip, to enhance the flexibility of the strip.

[0014] In preferred embodiments each strip is generally triangular in cross-section with an upstanding apex. This shape provides for strength, flexibility and best impact protection for the underlying delicate finger bones.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

[0016] FIG. **1** is a plan view of a preferred practical left-hand embodiment of the hand protection system of the invention;

[0017] FIG. **2** is an enlarged, exploded perspective view of the same embodiment, viewed from above;

[0018] FIG. **3** is a corresponding enlarged, exploded perspective view of the FIG. **1** embodiment, viewed from the underside;

[0019] FIG. **4** is a corresponding, enlarged, exploded end view of the FIG. **1** embodiment, viewed from the finger end;

[0020] FIG. **5** is a reduced scale perspective view of a glove fitted with the hand protection system shown in FIGS. **1** to **4**;

[0021] FIG. **6** is a plan view, corresponding to FIG. **1**, of a modified embodiment of the hand protection system according to the invention;

[0022] FIG. **7** is a plan view of a glove fitted with a second embodiment of the hand protection system of the invention;

[0023] FIG. **8** is a plan view, corresponding to FIG. **7**, of a third embodiment of the hand protection system of the invention; and

[0024] FIG. **9** is a reduced scale perspective view of a fourth embodiment (also left-hand) of the hand protection system of the invention.

DETAILED DESCRIPTION

[0025] Referring firstly to FIGS. **1** to **5**, a preferred practical embodiment of the system of the invention comprises a plurality of separately fabricated components which are assembled together for fitting onto the back portion of a glove **10** (FIG. **5**). These components comprise a plate assembly, denoted generally by reference numeral **20**, a plurality of flexible strips, also referred to as spines, **30**, one for each finger, and a corresponding plurality of guide structures **40**, again one for each finger. The housing assembly **20** is formed of three components, namely a base plate **22**, which in use is secured to the fabric of the glove **10**, an upper plate **24** which fits above the base plate **22** to provide tunnels for reception in slidable manner of proximal end regions of some of the spines **30**, and an additional top plate **28** which overlies part of the upper plate **24** to provide additional protection. All these parts are typically formed of suitable thermoplastic material, such as low-density polyurethane or polypropylene, although other materials are possible. Also, a soft silicone layer may the provided at the underside of the base plate **22** to offer increased protection to the metacarpal region of the wearer's hand.

[0026] Each spine **30** is elongate and accordingly has a longitudinal axis between first and second opposing ends. A portion **32** at the first end provides the sole means of fixing the respective spine **30** to the glove **10**, while the remainder of the spine is not fixedly attached but is held in a position to overlie the respective finger of the glove **10**. In this embodiment the first end portion **32** of each spine **30** is formed as an enlarged region with a peripheral curving flange **34** adapted for securing to the fabric of the glove **10**, for example by adhesive or stitching, and possibly with an intervening layer of fabric. For each spine **30**, the respective enlarged spine end region **32** is connected to its finger at a location a short spacing from the fingertip. The spines **30** for overlying the first (index), second, third and fourth fingers have their end regions **32** attached at a position overlying the intermediate phalanges. The three spines **30** overlying the first second and third fingers are of a suitable length to extend from aforesaid connection to the glove to sliding engagement below the upper plate **24**, which is mounted over the metacarpal region.

[0027] Each spine **30** is generally triangular in cross-section, with an upstanding apex, and is provided with a plurality of transverse slits **38** to enable a significant degree of flexing whenever the wearer of the glove curls that finger, in gripping or other movements. Small through bores **39** are provided centrally of each transverse slit **38** to enhance the flexibility of each spine **30**. The length and cross-sectional configuration of the spine **30**, along with choice of material, serves to protect the finger throughout its length, including the vulnerable regions at or adjacent the joints, against impact injuries.

[0028] As already mentioned, and as shown in FIG. **5**, the plate assembly **20** is mounted onto the back of the glove **10** overlying the metacarpal region of the wearer's hand, just behind the main knuckles. It serves to locate and guide proximal ends of the spines **30** which overlie the first, second and third fingers. The upper plate **24** includes three laterally spaced guide portions **26** of convexly curving cross-section, which thereby provide tunnels, as best seen in FIGS. **2** and **5**, for reception of the free (unfixed) ends of these spines **30**. These unfixed end regions of the spines **30** extend into the tunnels provided by the regions **26** in a freely slidable manner so that as the user's hand or any individual finger is flexed into increasing curvature they slide outwardly, but once the user's hand is straightened out again, they slide back inwardly of the respective tunnel.

[0029] The top plate **28** is secured to the upper plate **24** by its side edges clipping below appropriately spaced latching members **21** projecting upwards from the two outermost tunnel forming regions **26**.

[0030] The guide structures **40**, of which there are five, one for each finger, and one for the thumb of the glove wearer, each comprise a curving base plate **42** and an upstanding convex portion **44** defining a tunnel above the base plate. The base plate **42** of each said member **40** is mounted onto the back of the glove **10** above the proximal phalange bone of each finger. Thus, as regards the first, second and third fingers the convex portions **44** provide respective tunnels through which the respective spines **30** extend, in an freely slidable manner, part way between their distal end attachment at portion **32** and their reception in the respective housing tunnels **26**, as best shown in FIGS. **2** and **5**.

[0031] The guide structures **40** for the thumb and the little finger are slightly different as the free ends of their respective spines **30** do not locate into guide means of the plate assembly **20**. In the version shown in FIGS. **2** to **5**, the guide structure **40** for the thumb has a closed end **46** to its tunnel forming convex portion **44**, thus providing, in effect, a socket which slidingly receives the free end portion of a similar spine **130** mounted

over the thumb. (This is not shown in FIG. **1**, where the free end of the spine **130** is shown extending through a guide structure **40** of similar form to those employed for the spines of the above-mentioned fingers.) The guide structure **44** for the fourth (little) finger is also modified by having an extension **48** to its base plate **42** for more secure attachment purposes and to offer a greater abrasion resistance at the side of the little finger.

[0032] FIG. **6** shows an alternative version of the system where open guide structures **140** are provided in place of the above-described closed guide structures **40**. These open guide structures **140** differ only in that they do not provide a tunnel forming convex portion for the spines **30** to slide through, but instead provide two edge engagement lugs **143**, **145** upstanding from a base plate **142**. These lugs **143**,**145** face each other and slidingly retain side edges of the respective spine **30**. In all other respects, the system is the same as in FIG. **1**, and the same reference numerals have been used to denote corresponding parts.

[0033] FIGS. **7** and **8** show two further embodiments from which the plate assembly **20** is absent, as such a plate assembly is not always necessary. In the embodiment of FIG. **7**, spines **50** are shown provided over the first second and third fingers of a glove **51**. These spines **50** are essentially the same as the spines **30** in the previous embodiment, and are secured at first end portions **52** in the vicinity of the fingertips, with the remaining portion of each spine **50** being slidably displaceable along the longitudinal axis of the spine **50** by locating through a respective guide structure **54**, which is mounted onto the finger at a spacing from the secured first end portion **52**. The guide structures **54** are similar to the previously described guide structures **40** in the preceding embodiment and include a base plate attached to the glove fabric and a convex portion providing a tunnel into and through which a free end region of the spine **50** projects.

[0034] In the embodiment of FIG. **8**, spines **60** are shown provided over the first second and third fingers of a glove **61**. These spines **60** are again essentially the same in structure as the spines **30** in the previous embodiment. However, in this case they are secured at first end portions **62** in the vicinity of the knuckles, with the remaining unconnected and displaceable portion of each spine **60** extending towards the fingertips and being slidably displaceable along the longitudinal axis of the spine **60** by locating through two spaced apart respective guide structures **64**. The guide structures **64** are again similar to the previously described guide structures **40** in the preceding embodiment and include a base plate attached to the glove fabric and a convex portion providing tunnels through which the unconnected, displaceable region of the spines **60** extend.

[0035] FIG. **9** shows an alternative embodiment of the hand protection system of the invention. The tunnel housing assembly, designated generally by reference numeral **120**, is essentially the same as in preceding embodiment. The flexible spines for overlying the respective fingers are somewhat different to the preceding embodiment, as those for the first, second and third fingers are provided in two parts **132**, **134**. The distal parts **132** are each provided with a respective terminal enlargement **133** for securing onto the glove region overlying the intermediate phalanges, but otherwise are much shorter than in previous embodiment. The proximal parts **134** have enlarged end regions **136** which, in addition to being for securing onto the glove region overlying the proximal phalanges, provide tunnels, in the manner of sockets, for receiving respective ends of the distal parts **132** in slidable manner. Accordingly, the enlarged end regions **136** take the place of the separate, tunnel forming attachment members **40** in the preceding embodiment. A separate tunnel forming attachment member **140** is provided for the slidable reception of the free end of the spine **131** overlying the little finger. A spine **138** for overlying the thumb is simply designed to overlie the joint and has respective enlarged ends **139** for securing to the glove at each side of the joint.

[0036] The invention is not restricted to the precise details of any foregoing embodiments, and other variations are possible in other embodiments as will be evident to any person skilled in this technical field.

[0037] Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of them mean "including but not limited to", and they are not intended to (and do not) exclude other components. Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

[0038] Features described in conjunction with a particular embodiment or example of the invention are to be understood to be applicable to any other embodiment or example described herein unless incompatible therewith.

1. A glove comprising a plurality of elongate flexible strips overlying respective fingers, each strip having a longitudinal axis between first and second opposing ends, wherein each strip has a first end portion fixedly attached to the glove and a remaining portion, extending to the second end, which is free to move relative to the glove and wherein a plurality of discrete guide structures are attached to the glove, at least one for each finger, at a spacing remote from the first end portion of each strip such that the strip extends across, through or into the guide structure and is thereby held in position on the glove in a manner which allows sliding displacement of the remaining portion of the strip along the longitudinal axis of the strip.

2. A glove according to claim **1**, wherein each guide structure is configured to provide at least edge engagement means for slidingly retaining side edges of the respective strip.

3. A glove according to claim **1**, wherein each guide structure is configured to provide a tunnel through which or into which the respective strip extends.

4. A glove according to claim **1**, additionally comprising a plate mounted over the knuckle and/or metacarpal region of the hand, the plate being configured to provide plural adjacent guide portions for the second ends of the respective strips.

5. A glove according to claim **4**, wherein each guide portion is configured to provide at least edge engagement means for slidingly retaining side edges of the respective strip.

6. A glove according to claim **4**, wherein each guide portion is configured to provide a tunnel into which the second end of the respective strip is to project.

7. A glove according to claim **1**, wherein the first end portion of the respective strips are permanently connected to a plate which is fixedly mounted onto the glove over the knuckle and/or metacarpal region of the hand.

8. A glove according to claim **1**, wherein each strip is formed of a plurality of alternate thicker and thinner regions along its longitudinal axis.

9. A glove according to claim **1**, wherein each strip has a series of transverse slits provided along its longitudinal axis.

10. A glove according to claim **1**, wherein each strip is generally triangular in cross-section, with an upstanding apex.

* * * * *