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(54) **Anti-perforation protective glove**

(57) A protective glove comprising a palmar part (1), parts (3) located in the inter fingers space and a dorsal part (2), said dorsal part (2) comprising a main part (21) including at least one textile layer, characterized in that said dorsal part further comprises at least one reinforced part (22), said reinforced part (22) and said palmar part being formed from a multi-layer textile complex (10) consisting of an internal layer (11) of a semi-rigid composite material resisting to perforation and of an external coating layer (12) of a flexible textile material, said multi-layer textile complex (10) being bonded by leaving a free edge (13) at said external coating layer (12) allowing the assembly of various parts of the glove together along seams lines (14) practiced on said free edges (13).

sisting of an internal layer (11) of a semi-rigid composite material resisting to perforation and of an external coating layer (12) of a flexible textile material, said multi-layer textile complex (10) being bonded by leaving a free edge (13) at said external coating layer (12) allowing the assembly of various parts of the glove together along seams lines (14) practiced on said free edges (13).

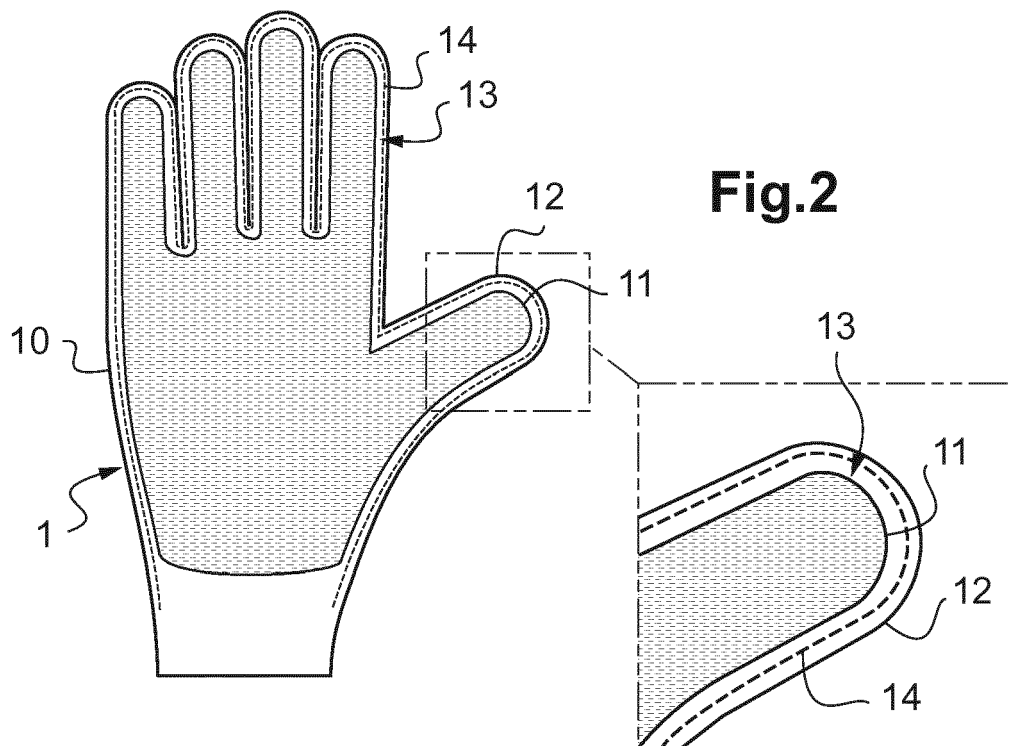


Fig.2

Description

[0001] The present invention relates to an anti-perforations and cuts protective glove, which is more particularly intended to professionals of the waste collecting and sorting industry, the sewer, the cleaning, the green spaces, as well as of the glass and metals industries and of the policing forces.

[0002] Such professionals can be accidentally confronted with very perforating and/or sharp objects being able to cause punctures and cuts risks that can have extremely serious medical consequences. Particularly, a significant concern relates to the protection of these professionals against syringe needles.

[0003] At the same time as to be able to benefit of an effective protection against perforations and cuts, the practice of these professionals further requires to have a very good mobility of the hand, a significant dexterity and a gripping capacity.

[0004] However, it does not currently exist on the market any protective glove filling satisfactorily these constraints.

[0005] Thus, the protective gloves currently available on the market, either provide a sufficient protection at the palm level, but are very rigid, at the detriment of comfort and flexibility, or present satisfactory flexibility and comfort, but this time at the detriment of their protecting capacity, particularly against the needle perforations.

[0006] Also known from the patent document EP2378906 is a protective glove equipped on its internal part, at the palm and the fingers palmar face of the user, with an anti-puncture insert made of at least one layer of a semi-rigid composite material formed by an aramid fiber fabric covered with a synthetic material into which are embedded ceramic microparticles, this anti-puncture insert being introduced into a pocket of a textile material, typically of cotton, formed into a holding envelope further defining a receiving housing for the user's hand. The unit consisting in the anti-puncture insert and the textile material pocket is bonded and shaped by heating.

[0007] The protection provided by the insert made of an aramid fiber fabric is however strictly limited to the palm and the fingers palmar face of the user, while protection is inexistent at other areas of the user's hand, particularly at the dorsal face of the hand, as well as at the fingers dorsal face than at the dorsal face of the hand part formed by the metacarpus, and also between fingers. Further, the installation and the securing of the insert on the glove, which is made by sewing and/or sticking of the insert, is difficult because of the rigid nature of the material constituting the insert and affect the required final dexterity for the user. Lastly, the resulting assembly of the glove and the insert present a great thinness which, if it is favorable to the search of some dexterity, is, on the other hand, unfavorable to the product longevity.

[0008] The aim of the invention is to develop an anti-perforation protective glove free of at least one of the previously evoked limitations and, more particularly, to

develop a protective glove which is easy to manufacture, which provide improved resistance to punctures performances, while being comfortable and allowing dexterity, and finally having a great durability.

[0009] For this purpose, the invention relates to a protective glove comprising a palmar part designed to be accommodated to the hand palm and to the fingers palmar face of a user, parts located in the inter fingers space and a dorsal part designed to be accommodated to the hand backside part and to the fingers dorsal face of the user, said dorsal part comprising a main part including at least one textile layer. According to the invention, said dorsal part further comprises at least one reinforced part, said at least one reinforced part of said dorsal part and said palmar part being formed from a multi-layer textile complex consisting of at least one internal layer of a semi-rigid composite material resisting to perforation and of an external coating layer of a flexible textile material, said multi-layer textile complex being bonded by leaving a free edge at said external coating layer allowing the assembly of various parts of the glove together along seams lines practiced at least on said free edges.

[0010] Surprisingly, the applicant could note that such an assembly of an internal layer made of a semi-rigid composite material resisting to perforation with an external coating layer made of a flexible textile material, which layers being bonded together so as to form a unique multi-layer textile complex material, provide to the various reinforced parts of the glove thus made up, significantly improved performances in terms of anti-punctures or anti-cuts protection, particularly when compared to the same configuration of material layers but not having this particular assembly as a multi-layer complex, or also compared to the glove that is the subject of the patent document EP2378906 also integrating a same internal layer of a semi-rigid composite material resisting to perforation, but as an insert shape.

[0011] By bonded, it must be understood that the surfaces of the two associated layers are attached the one to the other in an substantially continuous way, so that the two layers are anywhere substantially interdependent the one to other in the bonding area.

[0012] Thanks to the use of the semi-rigid composite material resisting to perforation provided under the form of a layer of the multi-layer complex, it is possible to provide to the obtained end glove particularly interesting properties in terms of protection against needle punctures or cuts, without affecting the thickness and flexibility of the glove. Thus, it is possible to provide an anti-puncture or anti-cuts protection to glove parts requiring a good flexibility, particularly some parts of the dorsal part or parts of inter fingers space of the glove.

[0013] Further, according to the invention, after cutting of the elements intended to form the multi-layer textile complex, the assembly of the multi-layer textile complex is carried out by leaving a free edge at the external coating layer made of a flexible textile material, so that a particularly advantageous assembly of the various glove parts

by sewing can be implemented, insofar as it is then possible to sew the multi-layer textile complex by the free edge only made of a flexible textile material. Thus, the sewing areas where the seam lines are practiced for the glove assembly are free of any semi-rigid composite material resisting to perforation, which, on the one hand, makes much easier the sewing operations and, on the other hand, makes the seam more flexible, which provide more dexterity to the thus obtained end glove.

[0014] Advantageously, at least some of said parts located in the inter fingers space may be made of said multi-layer textile complex in order to reinforce the glove within said parts.

[0015] Preferably, the glove may be reinforced within the area between the thumb and the index.

[0016] Advantageously, the glove may comprise a comfort textile layer, preferably consisting in a knitted fabric, sandwiched between said multi-layer textile complex and the hand skin.

[0017] In a preferred embodiment, said at least one internal layer of semi-rigid composite material resistant to perforation of said multi-layer textile complex consists in an aramid fiber fabric covered with a synthetic material, especially of polyurethane, in which are embedded ceramic micro-particles, especially of corundum.

[0018] Advantageously, said external coating layer made of a flexible textile material of said multi-layer textile complex consists in a synthetic leather.

[0019] Preferably, said multi-layer textile complex is bonded by heat-welding or sticking.

[0020] Said main part of said dorsal part may consist in a knitting containing polyester/elasthane, polyamid/elasthane or polyester/cotton/elasthane.

[0021] Advantageously, said at least one reinforced part of said dorsal part is laid out at least at the end of at least one finger and extends in order to at least partially cover the phalanges.

[0022] In a particular embodiment, said at least one reinforced part of said dorsal part may at least partially overlap the part of the hand formed by the metacarpus.

[0023] Advantageously, the glove may comprises protection pads fixed on said main part of said dorsal part, said protection pads do not extend on said at least one reinforced part of said dorsal part.

[0024] Preferably, said protection pads may be made from plastics of the PVC, silicone, PU, TPE or similar type, fixed by sticking, sewing, welding or injection at said main part of said dorsal part.

[0025] Other characteristics and advantages of the invention will arise from the following description of an exemplary embodiment. Reference will be made to the attached drawings in which:

Figure 1 illustrates various front, rear and profile views, respectively, of an exemplary embodiment of a protective glove according to the invention ;

Figure 2 is a schematic view of the reinforced palmar part entering in the assembly of a protective glove

according to the invention;

Figures 3a to 3c illustrate various configurations of the dorsal part 2 of the glove according to the invention;

Figure 4 illustrates a particular embodiment of the glove dorsal part according to the invention.

[0026] The protective glove according to the present invention is a glove of the cut and sewn type. As illustrated on figure 1, the protective glove comprises primarily a palmar part 1, intended to be accommodated to the hand palm and to the fingers palmar face of the user, a dorsal part 2, intended to be accommodated to the hand back part and the fingers dorsal face of the user, inter fingers parts 3 and a wrist part 4, these various parts of the glove being cut into matter pieces to be then assembled by sewing. The grayed parts on figure 1 represent anti-perforation reinforced parts of the glove, particularly ready to effectively protect the user against needle punctures or cuts. In accordance to the invention, these reinforced parts of the glove consist in a multi-layer textile complex made of at least one internal layer of a semi-rigid composite material resisting to perforation and of an external coating layer of a flexible textile material, the structural characteristics of which will be thereafter described more in detail. Thus, in accordance with the invention, the dorsal part 2 comprises, in addition to a main part 21 as a not reinforced textile layer, at least such a reinforced part 22, substantially laid out, according to the figure 1 example, so as to cover the last phalanges (distal phalanges) on the side of the user's fingers dorsal face. According to figure 1 example, these reinforced parts affect also the palmar part 1, as well as the area 31 between the thumb and the index.

[0027] The not reinforced main part 21 of the glove dorsal part 2 is made of at least one textile layer preferentially formed by a knitting, for example made of a polyamid/elasthane, polyester/elasthane or polyester/cotton/elasthane mixture.

[0028] The matter constituent the wrist part 4 is preferentially an elastic fabric or an elastic knitted fabric and the wrist part further integrates a fastening 41, of the zipper, snap button, hook and loop fastener or other type.

[0029] The structural characteristics of the glove reinforced parts according to the invention will be now described in more detail with reference to figure 2, which illustrates an assembly step of the glove according to the invention and, more precisely, a step consisting in the realization of the glove palmar part 1, reinforced in accordance with the invention in order to ensure the protection of an user hand at his/her palm and fingers palmar face. To do this, as indicated above, the palmar part 1 appears as a multi-layer textile complex 10 consisting in the superposition of two layers, namely an internal layer 11, intended to be placed on the palmar face side of the hand, and an external coating layer 12, intended to be placed on the opposite side of the palmar face relatively to the internal layer 11.

[0030] The internal layer 11 is a layer made of a semi-rigid composite material resisting to perforation, formed by an aramid fiber fabric, and preferentially with para-
 amid fibers, such as Kevlar® or Twaron®, carrying on one of its faces or external face a polyurethane coating in which microparticles of ceramic, especially of corundum, are embedded. The external coating layer 12 is a layer of a flexible textile material, preferentially made of a knitting or natural leather and still more advantageously, made of a synthetic leather. The use of leather and still more of synthetic leather for the external coating layer 12 indeed allows to provide to the multi-layer textile complex a greater abrasion resistance and therefore, a greater durability for the obtained end glove incorporating parts made of this multi-layer textile complex.

[0031] These two layers 11 and 12 are intended to be bonded together and are preferentially bonded together by heat-welding, by means of a hot press, in order to form the multi-layer textile complex 10 constituting the palmar part 1 of the glove in accordance with the invention. This bonding of both layers 11 and 12 by hot pressing in order to form the multi-layer textile complex 10 advantageously provide to the later improved resistance to perforation properties, particularly when compared to the same layers assembly not having undergone such a heat treatment. Alternatively, both layers 11 and 12 can be bonded together by heat-sealing, sticking or welding.

[0032] As illustrated on figure 2, the two parts making both layers 11 and 12 of the multi-layer textile complex 10 are each one initially cut out at the shape of the palm and the fingers of the user, while having substantially different dimensions between the two shapes. Thus, the dimensions of the shape cut for the part making the external coating layer 12 made of a flexible textile material are substantially larger than those of the shape cut for the part making the internal layer 11 made of a semi-rigid composite material resisting to perforation.

[0033] Thus, when the two layers 11 and 12 thus cut out are bonded together and more precisely, when the internal layer 11 of a semi-rigid composite material resisting to perforation is heat-welded to the external coating layer 12 of a flexible textile material, the multi-layer textile complex 10 as illustrated on figure 2 is obtained, advantageously having a free edge 13 at the external coating layer 12, on all the periphery of its shape.

[0034] Advantageously, when mounting the glove, a comfort textile layer preferentially made of a knitting for example of cotton, polyester or a cotton/polyester mixture fibers, is provided to be assembled while being sandwiched between the skin and the multi-layer textile complex 10. This comfort textile layer allows particularly to limit perspiration due to the presence of the underlying internal layer 11 of a semi-rigid composite material resisting to perforation. The comfort layer is, for example, assembled by sewing on the free edge 13 at the external coating layer 12 made of a flexible textile and is superimposed on the internal layer 11 made of a semi-rigid composite material resisting to perforation at the opposite

of the external coating layer 12 of flexible textile relatively to the internal layer 11 made of a semi-rigid composite material resisting to perforation.

[0035] The free edge 13 left at the layer 12 of flexible textile material when mounting of the multi-layer textile complex 10 is advantageously free of any semi-rigid composite material resisting to perforation constituting the internal layer 11. In this manner, the assembly by sewing of the multi-layer textile complex 10 constituting the reinforced palmar part of the glove with the other parts of the glove can easily be carried out by making seam lines 14 only on flexible textile material thanks to the presence of the free edge 13 at the external coating layer 12 of a flexible textile material, while the semi-rigid composite material resisting to perforation constituting the internal layer 11 is generally never sewn.

[0036] The illustrated example of the reinforced palmar part 1 of the glove according to the invention is of course transposable, after necessary changes, to the other reinforced parts of the glove according to the invention, such as the reinforced parts 22 of the dorsal part 2, like at least some areas of the inter fingers parts, particularly the area 31 between the thumb and the index, being given that the multi-layer textile complex described with reference to figure 1 can be also used to constitute these other reinforced parts of the glove, simply with a different choice for the shape of these different other reinforced parts. It should be noted that some parts at least parts of the inter fingers parts 3 can be constituted from the multi-layer textile complex, particularly and preferentially the area 31 between the thumb and the index, which is the inter fingers part the more solicited during the use of the glove. The not reinforced parts of the inter fingers parts can as for them be constituted of a layer of textile matter being advantageously able to form the external coating layer of a flexible textile material entering into the composition of the multi-layer complex, said layer being preferentially made of a synthetic leather.

[0037] Thus, all the reinforced parts of the glove made of the multi-layer textile complex can be assembled by sewing to other, reinforced and/or not reinforced, parts of the glove by their free edges defining sewing areas of flexible textile material free of semi-rigid composite material resisting to perforation. The sewing areas remain thus flexible, providing a great dexterity to the obtained end glove.

[0038] Figures 3a to 3c illustrate various configurations of the dorsal part 2 of the glove according to the invention and, particularly, various fitting configurations between the reinforced part(s) 22 (as grayed) and the not reinforced main part 21 of the dorsal part 2. According to the desired protection extent on the dorsal part of the glove, the reinforced parts 22 of the dorsal part 2 are provided at least at the end of at least one finger, for example, the index, and preferentially of all the fingers, and extend from the finger ends in order to at least partially cover the phalanges and preferentially at least the distal phalanges. As illustrated on figure 3c, these various con-

figurations also cover a configuration where the reinforced part 22 of the dorsal part 2 overlap at least partially the hand part formed by the metacarpus.

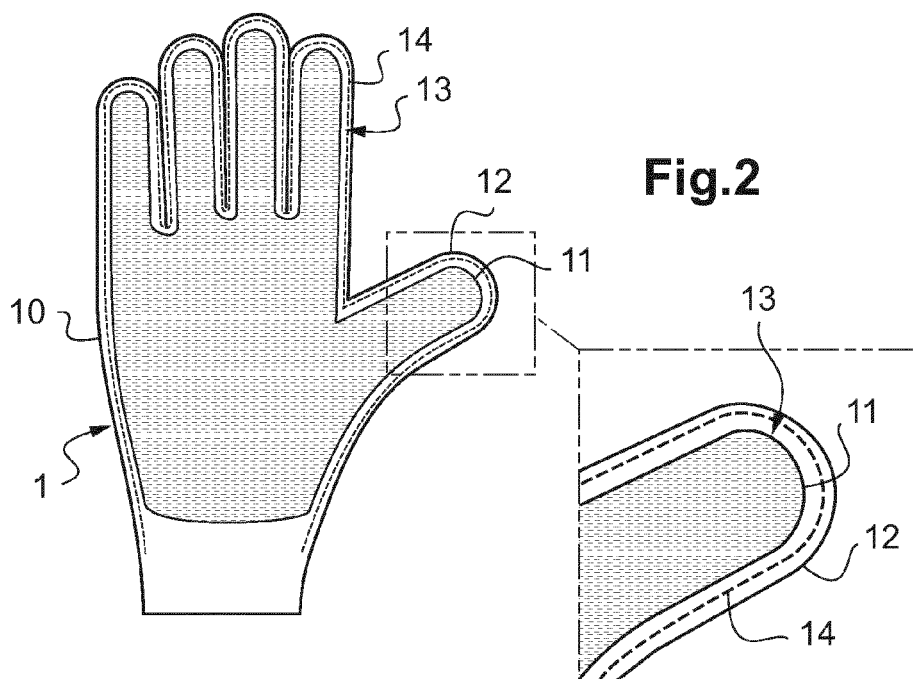
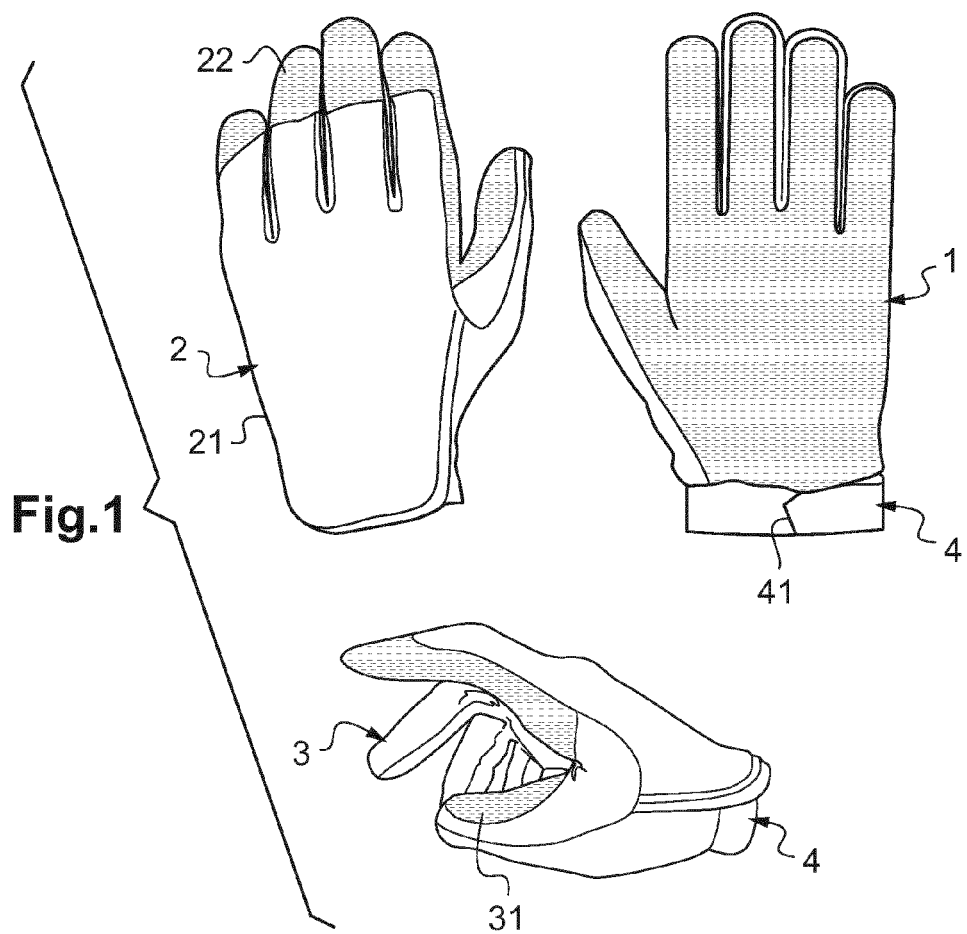
[0039] According to a particular embodiment illustrated on figure 4, the glove can also be provided on its dorsal part 2, with protection pads 23, particularly against shocks. These protection pads are fixed on the main part 21 of the glove dorsal part 2, out of the reinforced parts 22 of the dorsal part 2. These protection pads 23 are carried out of a plastic material of the PVC, silicone, PU, TPE or similar type and can be fixed by sticking, sewing, injection or welding on the main part 21 of the glove dorsal part 2.

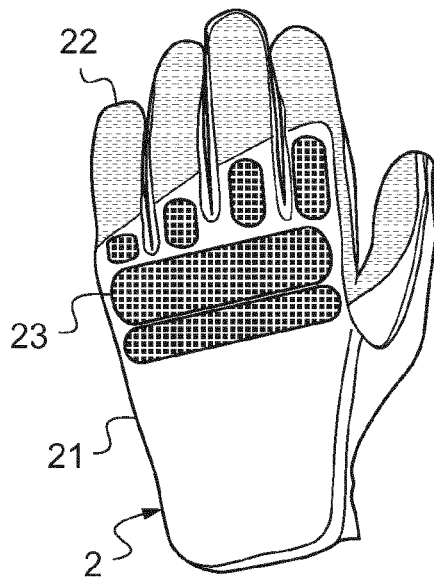
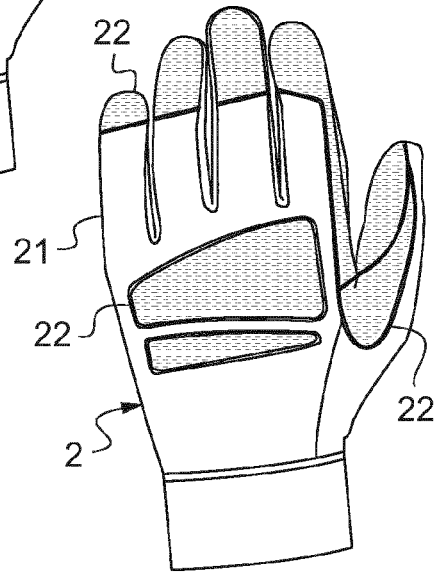
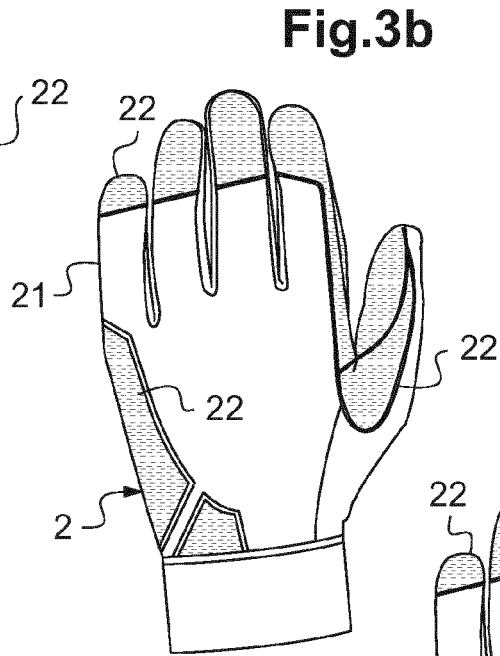
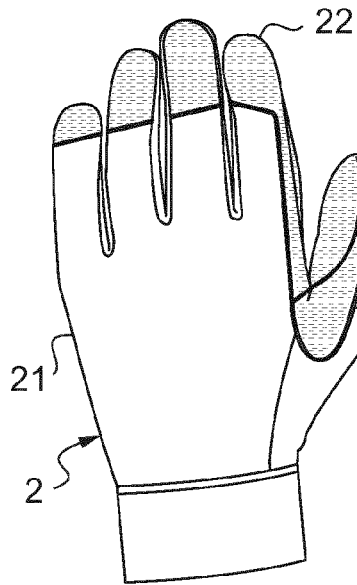
Claims

1. A protective glove comprising a palmar part (1) designed to be accommodated to the hand palm and to the fingers palmar face of a user, parts (3) located in the inter fingers space and a dorsal part (2) designed to be accommodated to the hand backside part and to the fingers dorsal face of the user, said dorsal part (2) comprising a main part (21) including at least one textile layer, **characterized in that** said dorsal part further comprises at least one reinforced part (22), said at least one reinforced part (22) of said dorsal part and said palmar part (1) being formed from a multi-layer textile complex (10) consisting of at least one internal layer (11) of a semi-rigid composite material resisting to perforation and of an external coating layer (12) of a flexible textile material, said multi-layer textile complex (10) being bonded by leaving a free edge (13) at said external coating layer (12) allowing the assembly of various parts of the glove together along seams lines (14) practiced at least on said free edges (13).
2. The protective glove according to claim 1, **characterized in that** at least some of said parts (3) located in the inter fingers space are made of said multi-layer textile complex in order to reinforce the glove within said parts.
3. The protective glove according to claim 2, **characterized in that** the glove is reinforced within the area (31) between the thumb and the index.
4. The protective glove according to any of the previous claims, **characterized in that** it comprises a comfort textile layer sandwiched between said multi-layer textile complex (10) and the hand skin.
5. The protective glove according to claim 4, **characterized in that** said comfort textile layer consists in a knitting.
6. The protective glove according to any of the previous

claims, **characterized in that** said at least one internal layer (11) of semi-rigid composite material resistant to perforation of said multi-layer textile complex (10) consists in an aramid fiber fabric covered with a synthetic material, especially of polyurethane, in which are embedded ceramic micro-particles, especially of corundum.

7. The protective glove according to any of the previous claims, **characterized in that** said external coating layer (12) made of a flexible textile material of said multi-layer textile complex consists in a synthetic leather.
8. The protective glove according to any of the previous claims, **characterized in that** said multi-layer textile complex (10) is bonded by heat-welding or sticking.
9. The protective glove according to any of the previous claims, **characterized in that** said main part (21) of said dorsal part consists in a knitting containing polyester/elasthane, polyamid/elasthane or polyester/cotton/elasthane.
10. The protective glove according to any of the previous claims, **characterized in that** said at least one reinforced part (22) of said dorsal part (2) is laid out at least at the end of at least one finger and extends in order to at least partially cover the phalanges.
11. The protective glove according to claim 10, **characterized in that** said at least one reinforced part (22) of said dorsal part (2) at least partially overlaps the part of the hand formed by the metacarpus.
12. The protective glove according to any of the previous claims, **characterized in that** it comprises protection pads (23) fixed on said main part (21) of said dorsal part (2), said protection pads do not extend on said at least one reinforced part of said dorsal part.
13. The protective glove according to claim 12, **characterized in that** said protection pads (23) are made from plastics of the PVC, silicone, PU, TPE or similar type, fixed by sticking, sewing, welding or injection at said main part (21) of said dorsal part.







EUROPEAN SEARCH REPORT

Application Number
EP 14 16 5306

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 November 2014	Examiner Goodall, Colin
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REFERENCES CITED IN THE DESCRIPTION

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