(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 443 948 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.04.2012 Bulletin 2012/17

(51) Int Cl.:
A41D 19/00 *(2006.01)*

(21) Application number: **11161392.3**

(22) Date of filing: **06.04.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **20.10.2010 LK 1603310**

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(54) Laminated glove with inner protective layer and a method of building and incorporating inner protective layer

(57) A protective laminated glove comprises an inner fabric layer, an intermediate inner jacket, and a water-proof outer layer which covers the index finger, middle finger, and thumb partially or all the fingers including the palm and back of the palm, exposing the fingertips and part of the finger, where extra protection around finger and crotches are provided by the intermediate inner jacket made of stretch fabric to provide dexterity.

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Description

Background of the invention

[0001] In gripping an object, man uses thumb, index finger and middle finger extensively, with other two fingers playing a supportive role where the grip of ring finger's grip is relatively small. With the relative position of the thumb, the index finger and the middle finger do the bulk of the work from gripping lighter objects to functioning like a clamp or a jaw to exert a heavy grip.

[0002] In accidents, it s the thumb, the index finger and the middle finger which gets often hurt, be it from coming to contact with a moving object or from cut, puncture, tear, and abrasion related injuries. The other more vulnerable area is the finger crotches, specially between these three fingers. Crotches are made of soft tissue for mobility and prone to serious injury even with relatively less force, and impact.

[0003] An injury in these areas could immobilize the hand and could be very painful as well. When a falling object strikes the fingers, it may bend/flex and allow the object to "bump off' without taking the full impact head on, but the crotches, sitting "squarely" between the fingers, stand no such protection. In facing imminent danger, we have instincts to spread fingers to wade off or to protect ourselves, which gravely exposes finger crotches.

[0004] There are many protective appendages for fingers and even metal clamps to protect fingers. Those are very cumbersome and difficult to wear. Some other crotch protections are simple elastomeric films, coated on a liner as part of the glove making process but hardly any care has gone into this specific area. There are gloves which offer thumb crotch protection but the extent of protection is very limited to few centimeters around the thumb crotch.

[0005] In addition, the areas of constant contact with the object being held need to be protected more than the other areas.

[0006] Protecting crotches and finger without seriously affecting dexterity of fingers is a challenge, and even a simple reinforcement makes it very stressful to bend fingers and the user will naturally reject it, and opt not to use such stressful protection.

[0007] When bending a finger, skin on the back of the finger has to stretch to allow bending. This is provided for by the folds on skin on top of the knuckle which allows the extra length required to bend the finger like in a bimetal strip, otherwise human skin, by nature, is not elastic enough to provide a bend of more than 90 degrees. The allowance provided by the folds of the skin offers over 50% stretch, sometimes going over 80%. This is observed when the 10mm stretch of skin on top of the knuckle is measured for its capacity for stretching.

[0008] It is in this natural mechanism that lies the solution to the problem of avoiding rigidity and yet being able to offer dexterity in the extra protective part of the glove.

[0009] Reinforcing the knuckles using simple wrap around fabrics or laminating various pieces of elastomeric, thermoplastic sections offer some respite, but they all come at a cost of either partial protection or loss of dexterity.

[0010] Using fabric made of crimped yam such as nylon in wrap around, provides additional protection and also offers stretchability because the crimped structure of nylon has the ability to straighten the crimps or "curls" to provide that extra length. The extent of stretchability is limited by extent of crimping.

[0011] In addition to the characteristics of the material, the nature of interweaving inside a fabric also seriously hamper strechability, and by using an approprtae stiching pattern, strechbility could be improved..

Prior Art

[0012] EN 388 is the European standard for mechanical protection. The test methods and scale for ratings are given for Abrasion, Cut, Tear and Puncture protection. Rating scale is from 1 to 4 for all but for Cut resistance. Cut Resistance has a scale of 1 to 5. From a scale 1 to 4 (or 1 to 5 in Cut protection) the improvement is not linear but exponential.

[0013] Some products available in the market , provide extra protection for fingers. Tips of fingers and some section of distal phalanx, middle phalanx and proximal phalanx have been kept bare in open finger structure which provides sense of touch. EN 388 rating of 2121 indicates abrasion rating of 2 which offers very little value for hard abrasing applications as in construction industry or in use of power tools.

[0014] These products are difficult to stitch and expensive, somewhat cumbersome by their construction. In such constructions, to provide breathability, protection is compensated. Also, these gloves, due to the nature of construction, are not water proof.

[0015] Also, in these constructions, reinforced knuckle protection is limited to a narrow stretch which offers very little protection from jagged edges of the real world accidents.

[0016] Considering all of above, there exists a need for a glove with all round protection for fingers and the "working area" which is in constant contact with the object being handled and for water proofing while retaining dexterity. The present invention reveals such a product and the manufacturing process thereof.

Description of the invention

[0017] Process

Die cut liner using pre knit fabric
Knit fabric for Intermediate inner jacket
Die cut Intermediate inner jacket -Palm and, Back of Palm separately

Stitch liner
Sub process - Attaching Intermediate inner jacket

Knit fabric for Intermediate inner jacket
Die cut Intermediate inner jacket -Palm and, Back of Palm separately
Dress liner to the mould
Apply adhesive onto the liner
Apply adhesive to the Intermediate inner jacket - on to both halves
Dry
Paste Palm piece of Intermediate inner jacket on to the dressed liner
Paste Back of Palm piece of Intermediate inner jacket on to the dressed

liner

Dry
Remove from mould

End of sub process
Dress elastomeric glove on to the mould
Dip in Adhesive
Dry
Wet the liner using wetting solution
Dress the liner on top of the dressed glove as second layer
Dry
Strip the glove off the mould
Cut to required length
End of process

[0018] Proposed construction is to provide fabric support system to protect the working area up to the wrist. The constraints in dexterity of fabric support is overcome by the following methodology.

[0019] The problem of stretchability of fabric is avoided by making use yam with core sheath construction where the spandex forms the core and nylon spiral cover is used as the sheath. Finer counts of nylon yam is selected to make it low energy absorbing in stretching, and the core of spandex is also kept thin to make it further low energy absorbing. Wherein the resultant composite yam stretches many times over compared to nylon or any other crimped yam.. This type of yam is used to knit 15gauge stretch fabric to be used for intermediate inner jacket. Count of Nylon crimped yam used here is of 50d and the spandex core is 10Dtex to make low energy absorbing stretchable fabric.

[0020] This stretch fabric is die cut to maintain uniformity in shape and size to prepare two pieces for intermediate inner jacket. These pieces are then pasted on to the each half of a fabric liner using an adhesive.

[0021] In another embodiment, this intermediate inner jacket could be knitted using seamless knitting machines, so die cutting is not required and its simply pasted to the liner dressed over the mould.

[0022] Selecting adhesive to retain the property of stretchability is crucial, so that the stretchability is not lost in hard bonding glove construction. This is where the non hardening adhesive is used. These special adhesives are water based and when dried becomes a jelly, but never become completely dry and rigid. It is possible to laminate same surfaces many times over, while not losing the tackiness significantly. The stretchable layer allows the extra length required to bend finger easily, does not restrict the natural stretch of cotton fabric. The bonded surfaces are then dried in ventilated drying, and by hot pressed drying thereafter for 60 to 180 seconds

[0023] The bonded halves of liner is then stitched together to make a cut and sewn liner.

[0024] Fully cured elastomeric glove is then dipped in a similar non hardening adhesive. Extreme care is taken to have very smooth dipping and withdrawal process to prevent foaming, ridges of excess adhesive on the glove surface. Former is heated at 100c to 130 c for 12 to 20minutes.

[0025] The liner is soaked in wetting compound and dressed on to the adhesive coated surface of the glove.

[0026] Kept for ventilated drying for 10 to 20mts. Cured in the oven for 35 to 45minutes at temperature range of 130c to 150c.

[0027] In another embodiment the intermediate inner jacket could be made with blends of high performance yam whereby giving that area higher mechanical performance in Abrasion resistance, Cut resistance, Tear resistance and Puncture resistance, compared to the other parts of the glove.

Claims

1. A protective laminated glove comprising and inner fabric layer, an intermediate inner jacket, and a waterproof outer layer

2. The glove as claimed in claim 1 wherein the said inner jacket encloses thumb, thumb crotch, index finger, index finger crotch, and middle finger.

3. The inner intermediate jacket material as claimed in claim 2 where in the said material is stretch fabric. Stretchable elastomer, cut resistive material, abrasion resistive material, puncture resistive material, or tear resistive material.

4. A process of manufacturing a protective laminated glove comprising the steps of dipping an elastomeric glove in non hardening adhesive, removing the excess adhesive, dehydrating , dressing the fabric liner with intermediate inner jacket on to the wet elastomeric glove, ventilating, drying, and stripping off the former.

5. A process of manufacturing a protective laminated

glove as claimed in claim 4 wherein the said intermediate inner jacket is made by die cutting of knitted fabric to the shape whereby it covers thumb, index finger, middle finger partially, leaving finger tips and part of fingers up to 20 to 45 mm bare from the finger tip, and extending up to the wrist along the middle of the crotch between middle finger and ring finger from both sides.

6. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the said die cut pieces of intermediate inner jacket pasted using non hardening adhesive is subjected to heat for a time duration of 60s to 480 seconds.

7. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the said die cut pieces of intermediate inner jacket pasted on the cut fabric is sewn along the edges and along the fingers to a predetermined pattern.

8. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the said two pieces of cut fabric with pasted pieces of intermediate inner jacket is sewn together to form a cut and sewn liner.

9. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the said intermediate inner jacket is made of nylon and spandex, or any other stretchable material.

10. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the said intermediate inner jacket is made of aramide and spandex, steel with aramide and spandex, or 100% aramide, HDPE, or any other stretchable material.

11. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the said intermediate inner jacket is made by seamless knitting technology with knitting gauges ranging from 7 upwards.

12. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the said liner with intermediate inner jacket is dressed on to the mould and thermoplastic or semi cured elastomeric film is dressed over it by wrapping around it and heat setting it to the shape of the mould.

13. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the said elastomeric film is made using natural rubber, blends of natural rubber and synthetic rubber, or using dry rubber technology with different blends of natural rubber and synthetic rubber.

14. A process of manufacturing a protective laminated glove as claimed in claim 5 wherein the finger crotches of the elastomeric glove are padded with elastomeric film or high performance fabric.

15. The process of manufacturing a protective laminated glove as claimed in claim 4 wherein the said intermediate inner jacket and the liner are knitted together.

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 1392

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 January 2012	Simpson, Estelle

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 16 1392

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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