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(54) **METHOD OF MANUFACTURING A GLOVE AND A GLOVE**

(57) The method of manufacturing a glove, which glove comprises top layer (10), which top layer is made by knitting or by sewing pieces of fabrics or leather together, an outer surface (12) and an inner surface, which method comprises a step of providing the inner surface with pathogens inactivating compounds. Inner surface is the surface, which is configured to be in skin contact when the glove is worn in hand. The method may comprise a step of manufacturing a lining (18), said lining having an inner surface and attaching the lining inside the top layer, whereby the inner surface of the lining forms the inner surface of the glove.

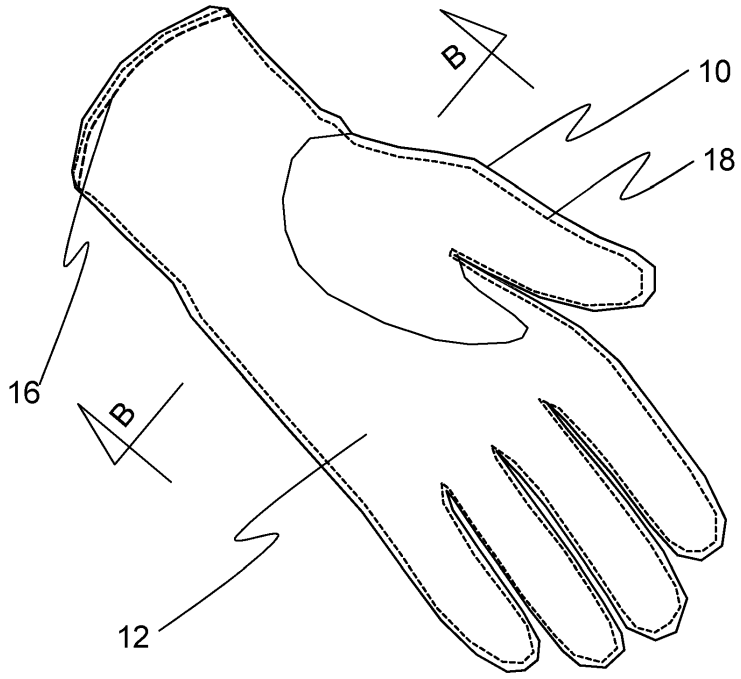


**Fig. 2a**

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## Description

### Technical Field

**[0001]** The invention relates to method of manufacturing a glove and a glove, which glove comprises top layer, which top layer is made by knitting or by sewing pieces of fabrics or leather together, an outer surface and an inner surface, which inner surface is configured to be in skin contact when the glove is worn in hand.

### Background Art

**[0002]** Pathogens, such as bacteria and viruses cause diseases, which may be difficult to cure and require a long time to recover. Some diseases may even fatal. On way to reduce the risk of having a contamination of harmful pathogens is to wear gloves. By wearing gloves skin contacts with possibly contaminated surfaces can be reduced. Gloves are widely used in occupations and workplaces, where there is an increased risk of being infected by harmful pathogens. Usually, the gloves used to reduce infection risk are disposable, i.e. they are not intended to be reused after removal. Disposable protective gloves are difficult to put on and take off and their mechanical durability is weak. Gloves are effective in avoiding contamination only, if the hands are disinfected before the gloves are put on. Therefore, gloves lose their protective effect easily in everyday use, where occasional removing the gloves is necessary. Problems relating to the use of the disposable gloves lower the willingness of the people to use gloves for protection.

**[0003]** Documents WO 2008/014423 A2, US 2017/055607 A1 and EP 1537796 A2 disclose gloves containing pathogen inactivating compound on the inner surface of the glove. These gloves are made by dipping a glove-shaped form into a polymeric emulsion, forming a polymeric layer in the shape of a glove and curing the polymeric layer to a glove. These gloves are designed to be disposable protective gloves for workers. The polymeric top layer of the glove is impermeable, which make the gloves uncomfortable especially during prolonged wearing.

**[0004]** An object of the invention is to provide a method for manufacturing a glove and a glove, with which drawbacks relating to the prior art can be reduced.

**[0005]** The object of the invention is achieved with a method and a glove which are characterized in what is disclosed in the independent patent claims. Some preferred embodiments of the invention are disclosed in the dependent claims.

### Summary of the invention

**[0006]** The present invention relates to a method of manufacturing a glove, which glove comprises top layer, which top layer is made by knitting or by sewing pieces of fabrics or leather together, an outer surface and an inner surface, which inner surface is configured to be in skin contact when the glove is worn in hand. Said method comprises a step of providing the inner surface with pathogen inactivating compounds.

**[0007]** Preferably, the method comprises a step of manufacturing a lining of knitted or woven fabric or textile, said lining having an inner surface and attaching the lining inside the top layer, whereby the inner surface of the lining forms the inner surface of the glove.

**[0008]** In a preferred embodiment of the method according to the invention the inner surface is treated with a substance containing pathogen inactivating compounds, said substance comprising solvent and coniferous resin acids in the range of 0,01 to 30 weight-% of the substance.

**[0009]** In a second preferred embodiment of the method according to the invention liquid containing pathogen inactivating compounds is sprayed on the inner surface and the sprayed liquid is allowed to dry to a coating at least partly covering the inner surface.

**[0010]** In a third preferred embodiment of the method according to the invention the glove is soaked in a liquid containing pathogen inactivating compounds to impregnate the glove with pathogen inactivating compounds and the soaked glove is allowed to dry.

**[0011]** In yet another preferred embodiment of the method according to the invention the lining is soaked in a liquid containing pathogen inactivating compounds to impregnate the lining with pathogen inactivating compounds and the soaked lining is allowed to dry. Preferably, the lining is soaked in a liquid containing pathogen inactivating compounds before the lining is attached inside the top layer.

**[0012]** In yet another preferred embodiment of the method according to the invention the lining is manufactured of fabrics or of threads which fabrics or threads are treated with a substance containing pathogen inactivating compounds before the lining is manufactured.

**[0013]** In yet another preferred embodiment of the method according to the invention the top layer is treated with a substance containing pathogen inactivating compounds before the lining is attached inside the top layer.

**[0014]** A glove according to the invention comprises a top layer, which top layer is made of knitted or woven fabric or textile or leather, an outer surface and an inner surface, which inner surface is configured to be in skin contact when the glove is worn in hand. Said inner surface contains pathogen inactivating compounds.

**[0015]** A preferred embodiment of the glove according to the invention comprises a lining inside the top layer, which lining is made of knitted or woven fabric or textile, said lining having an inner surface, whereby the inner surface of the lining forms the inner surface of the glove.

**[0016]** In a second preferred embodiment of the glove according to the invention the top layer and the lining are separate parts, which are connected together by a joint knitting at wrist surrounding area of the glove.

**[0017]** In a third preferred embodiment of the glove ac-

cording to the invention the inner surface has a coating comprising pathogen inactivating compounds.

**[0018]** In yet another preferred embodiment of the glove according to the invention the top layer and/or the lining is impregnated with pathogen inactivating compounds.

**[0019]** In yet another preferred embodiment of the glove according to the invention the outer surface has a coating comprising pathogen inactivating compounds.

**[0020]** In yet another preferred embodiment of the glove according to the invention the said pathogen inactivating compounds comprise coniferous resin acids.

**[0021]** An advantage of the invention is, that it reduces the risk on being infected by pathogens in everyday situations.

**[0022]** Another advantage of the invention is, that the reduces the need and use of disposable gloves, which saves material and environment.

**[0023]** A further advantage of the invention is, that it reduces the need of using disinfectants.

**Brief** Description of Drawings

**[0024]** In the following the invention will be described in detail, by way of examples, with reference to the accompanying drawings in which,

Fig. 1a shows one preferred embodiment of a glove according to the invention seen obliquely from above,

Fig. 1b shows a cross-section of the embodiment of the glove depicted in fig. 1a,

Fig. 2a shows another preferred embodiment of a glove according to the invention seen obliquely from above and

Fig. 2b shows a cross-section of the embodiment of the glove depicted in fig. 2a.

**Detailed Description**

**[0025]** In figure 1a an embodiment of the glove according to the invention is shown oblique from above. In fig. 1b a cross-section the glove of fig. 1a along line A-A is depicted. In the following both figures are explained simultaneously.

**[0026]** The glove is a known handheld garment comprising a top layer 10, which has a shape of a hand. The top layer is made by knitting or by sewing pieces of fabrics or leather together to a desired shape. The top layer 10 has an outer surface 12 and an inner surface 14 (fig. 1b). Here the inner surface is defined to be the surface, which is configured to be in skin contact, when the glove is worn in hand. The outer surface is the surface of the top layer, which remains visible, when a hand is inserted inside the glove.

**[0027]** In the method according to the invention the inner surface 14 is treated with a substance containing pathogen inactivating compounds. As a result of this treatment pathogen inactivating compounds adhere to inner surface forming a pathogen inactivation coating covering substantially the whole area of the inner surface. Pathogens may include bacteria, viruses and/or fungus. Inactivation here means making the pathogens harmless either by killing them or by significantly reducing their ability to reproduce on animate or inanimate surface and/or infect a human being.

**[0028]** The treatment can be made by immersing the substantially finished glove into a liquid containing pathogen inactivating compounds. The soaked glove is then lifted out of the liquid and allowed to dry completely. When the glove dries the molecules of the pathogen inactivating compounds form a dense network on the inner surface and on the outer surface of the clove. If the top layer is knitted or woven fabric or textile or other fibrous material, which is water permeable, the compounds form a covering around the fibres of the top layer. Thus, the whole top layer material becomes impregnated with pathogen inactivating compounds. If the top layer is made of substantially waterproof material, such as artificial or genuine leather, a coating in a form of thin molecular net containing pathogen inactivating compounds is formed and adhered to the inner and outer surfaces of the glove.

**[0029]** In a second preferred embodiment of the invention the treatment with a substance containing pathogen inactivating compounds is made by spraying liquid containing pathogen inactivating compounds on the inner surface 14 of the glove and allowing the sprayed liquid to dry to a coating on the inner surface. Preferably, a single spray treatment comprises a number of consecutive sprayings and a drying period between each spraying. The number of sprayings in a single spray treatment may be 10 to 20, preferably 15. The drying period between each spraying may be 5 to 10 minutes. The top layer of the glove can be turned inside up for the duration of the spray treatment. Naturally, a similar spray treatment can be made for the outer surface of the glove also.

**[0030]** In figure 2a a second embodiment of the glove according to the invention is seen oblique from above. In fig. 2b a cross-section the glove of fig. 2a along line B-B is depicted. In the following both figures are explained simultaneously.

**[0031]** The embodiment of the glove depicted in figs. 2a and 2b differs from the embodiment of figs. 1a and 1b in that it further comprises a lining 18 inside the top layer 10. The lining and the top layer have a substantially similar shape, but the lining is slightly smaller, which makes possible to insert the lining inside the top layer. In the embodiment of figs 2a and 2b the inner surface of the glove, which is defined to be the surface, which is configured to be in skin contact, when the glove is worn in hand, is now the inner surface 14a of the lining 18. One purpose of the lining is to increase the comfort of the use of the glove. Therefore, the lining is made of soft knitted

or woven fabric or textile. The lining is attached to the top layer 10 by joint knitting 16 locating in the edge of the wrist surrounding area of the glove.

**[0032]** The treatment for a glove shown in figs 2a and 2b with a substance containing pathogen inactivating compounds can be made in a similar way as to the gloves shown in figs. 1a and 1b, i.e. by immersing the substantially finished glove into a liquid containing pathogen inactivating compounds and allowing glove to dry completely. The water permeable lining material becomes impregnated with pathogen inactivating compounds and on the inner surface 14a of the lining a coating containing pathogen inactivating compounds is formed. The top layer becomes impregnated in a similar manner. If the top layer is made of substantially waterproof material, such as artificial or genuine leather, water repellent or waterproof fabric or PU-coated textile, a thin coating containing pathogen inactivating compounds is formed and adhered to the inner and outer surfaces of the top layer. This soaking treatment is a possible treatment method for cloves, if the material of the outer surface of the glove can withstand soaking and wetting without harmful side-effects, such as colour chances.

**[0033]** In another preferred embodiment of the invention the treatment of the lining 18 and the treatment of the top layer 10 are made in separate phases. The treatment of the lining 18 can be made either by immersing the substantially finished lining into a liquid containing pathogen inactivating compounds and allowing the lining to dry completely or by spraying liquid containing pathogen inactivating compounds at least on the inner surface 14a of the lining and allowing the sprayed liquid to dry as explained above.

**[0034]** During the treatment the lining can be detached from the top layer whereby it is attached to the top layer with a joint knitting 16 after the treatment of the lining is finished. The lining is usually attached to the top layer only by the joint knitting at wrist surrounding area of the glove. Therefore, it is also possible to attach the lining to the top layer before treatment and pull the lining out the top layer in a way that only a short strip of lining next to joint knitting remains inside the top layer. When the lining is pulled outside of the glove, the treatment with a substance containing pathogen inactivating compounds is performed. After the treatment is finished and the lining 18 is dry, the lining is pushed back inside the top layer. Further, it possible to treat the manufacturing materials of the lining, i.e. the yarns and fabrics, already before the manufacturing of the lining is started.

**[0035]** These embodiments of the invention, where the treatment of the lining and top layer are separated, are especially suitable for gloves, in which the material properties of the lining and the top layer are diverging. For example, an immersing treatment method is probably not a best choice for a top layer made of coloured leather. For leather gloves the top layer can be treated with a more sensitive spray treatment. It is also possible to leave the top layer totally without the treatment and pathogen inactivating coating.

**[0036]** The substance containing pathogen inactivating compounds used in the method contains natural, biodegradable compounds, which are harmless for the human and for the environment. Preferably, the substance comprises primary solvent, coniferous resin acids in the range of 0,01 to 30 weight %, water and an auxiliary solvent selected from E and P series glycol ethers. The amount of primary solvent is preferably in the range from 50 to 95 weight -% and the amount of auxiliary solvent is preferably in the range from 0,001 weight-% to 5 weight -% of the substance.

**[0037]** Aforementioned substance has an inactivating effect to numerous bacteria and viruses including SARS, MERS, influenza virus, H1N1 and human coronavirus. The substance has also proven to have adequate adhesion properties, i.e. it sticks and stays in on the inner and outer surface of the glove for an expected lifetime of the glove.

**[0038]** Aforementioned properties make the substance suitable for the method and glove according to the invention. However, other substances having a similar or corresponding proven antimicrobial and antiviral performance and adhesion properties may be used in the method. Preferably, the used substance does not include heavy metals, borax, terbinafines, parabens or quaternary ammonium compounds.

**[0039]** The inner surface of the glove according to the invention contains aforementioned pathogen inactivating compounds. When the glove is used, i.e. when a hand is inserted inside the glove, the hand is in skin contact with the inner surface and the compounds therein. If the hand carries pathogens, such as bacteria or viruses, the compounds in the inners surface will soon inactivate them. Thus, a hand is disinfected each time the hand is inserter and kept inside a glove for a sufficient time. The glove according to the invention may be a workglove or a leisure time glove. These kinds of gloves are usually kept in hand quite long periods, whereby the pathogen inactivating compounds easily have sufficient time to influence to the pathogens.

**[0040]** Above, some preferred embodiments of the invention are explained. The invention is not limited to the solutions described above, but the inventive idea can be applied in numerous ways within the scope of the claims.

Reference Signs:

**[0041]**

| | |
|---|---|
| 10 | top layer |
| 12 | outer surface |
| 14 | inner surface |
| 14a | inner surface of the lining |
| 16 | joint knitting |
| 18 | lining |

## Claims

1. A method of manufacturing a glove, which glove comprises top layer (10), which top layer (10) is made by knitting or by sewing pieces of fabrics or leather together, an outer surface (12) and an inner surface (14), which inner surface is configured to be in skin contact when the glove is worn in hand, **characterized in that**, said method comprises a step of providing the inner surface (14) with pathogen inactivating compounds.

2. A method according to claim 1, **characterized in that**, the method comprises a step of manufacturing a lining (18) of knitted or woven fabric or textile, said lining (18) having an inner surface (14a) and attaching the lining (18) inside the top layer (10), whereby the inner surface (14a) of the lining (18) forms the inner surface (14) of the glove.

3. A method according to claim 1 or 2, **characterized in that** the inner surface (14, 14a) is treated with a substance containing pathogen inactivating compounds said substance comprising solvent and coniferous resin acids in the range of 0,01 to 30 weight-% of the substance.

4. A method according to any of the claims 1 to 3, **characterized in that** liquid containing pathogen inactivating compounds is sprayed on the inner surface (14, 14a) and the sprayed liquid is allowed to dry to a coating at least partly covering the inner surface (14, 14a).

5. A method according to claim any of the claims 1 to 3, **characterized in that** the glove is soaked in a liquid containing pathogen inactivating compounds to impregnate the glove with pathogen inactivating compounds and the soaked glove is allowed to dry.

6. A method according to claim 2 or 3, **characterized in that** the lining (18) is soaked in a liquid containing pathogen inactivating compounds to impregnate the lining (18) with pathogen inactivating compounds and the soaked lining (18) is allowed to dry.

7. A method according to claim 6, **characterized in that** the lining (18) is soaked in a liquid containing pathogen inactivating compounds before the lining (18) is attached inside the top layer (10).

8. A method according to claim 2 or 3, **characterized in that** the lining (18) is manufactured of fabrics or of threads which fabrics or threads are treated with a substance containing pathogen inactivating compounds before the lining (18) is manufactured.

9. A method according to any of the claims 2 to 8, **characterized in that**, the top layer (10) is treated with a substance containing pathogen inactivating compounds before the lining (18) is attached inside the top layer (10).

10. A glove comprising top layer (10), which top layer (10) is made of knitted or woven fabric or textile or leather, an outer surface (12) and an inner surface (14), which inner surface (14) is configured to be in skin contact when the glove is worn in hand, **characterized in that** said inner surface (14) contains pathogen inactivating compounds.

11. The glove according to claim 10, **characterized in that**, it comprises a lining (18) inside the top layer (10), which lining is made of knitted or woven fabric or textile, said lining (18) having an inner surface (14a), whereby the inner surface (14a) of the lining (18) forms the inner surface (14) of the glove.

12. The glove according to claim 11, **characterized in that**, the top layer (10) and the lining (18) are separate parts, which are connected together by a joint knitting (16) at wrist surrounding area of the glove.

13. A glove according to any of the claims 10 to 12, **characterized in that** the inner surface (14, 14a) has a coating comprising pathogen inactivating compounds.

14. The glove according to any of the claims 11 to 13, **characterized in that**, the top layer (10) and/or the lining (18) is impregnated with pathogen inactivating compounds.

15. The glove according to any of the claims 10 to 14, **characterized in that** the outer surface (12) has a coating comprising pathogen inactivating compounds.

16. A method according to any of the claims 10 to 15, **characterized in that** said pathogen inactivating compounds comprise coniferous resin acids.

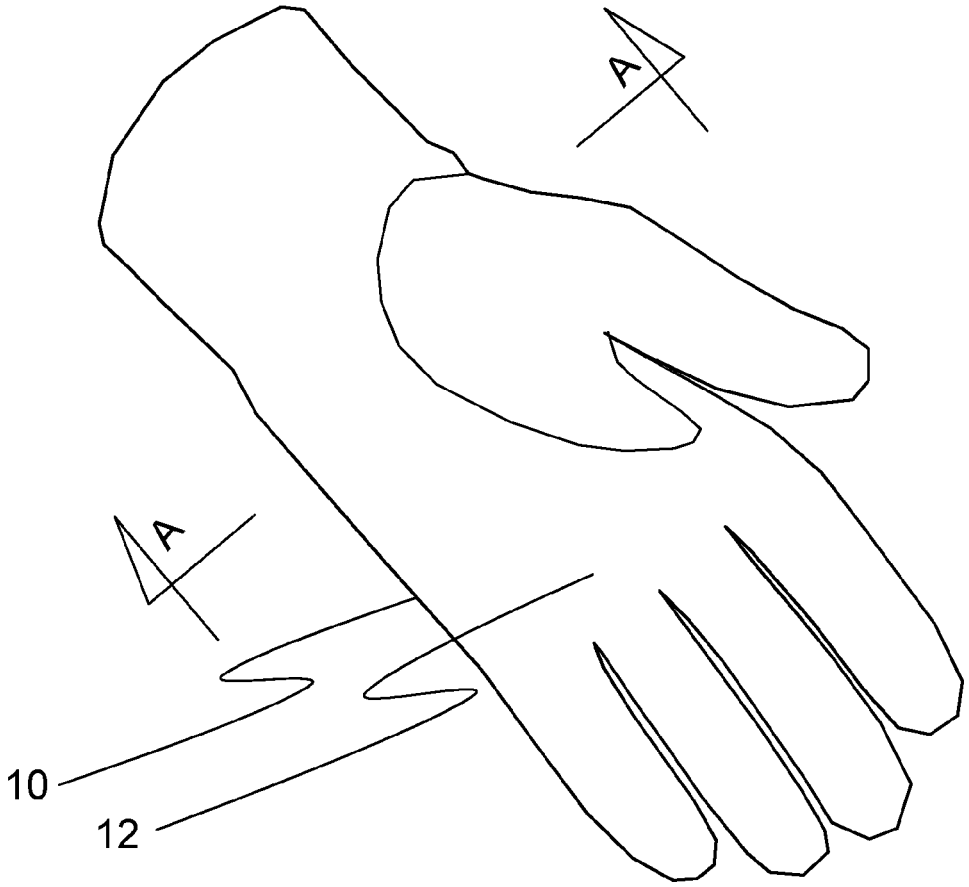


Fig. 1a

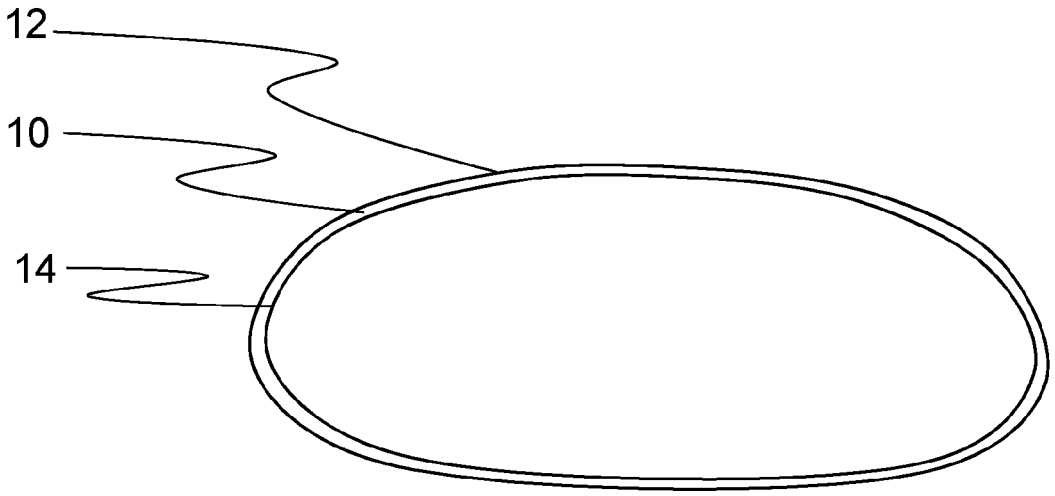


Fig. 1b

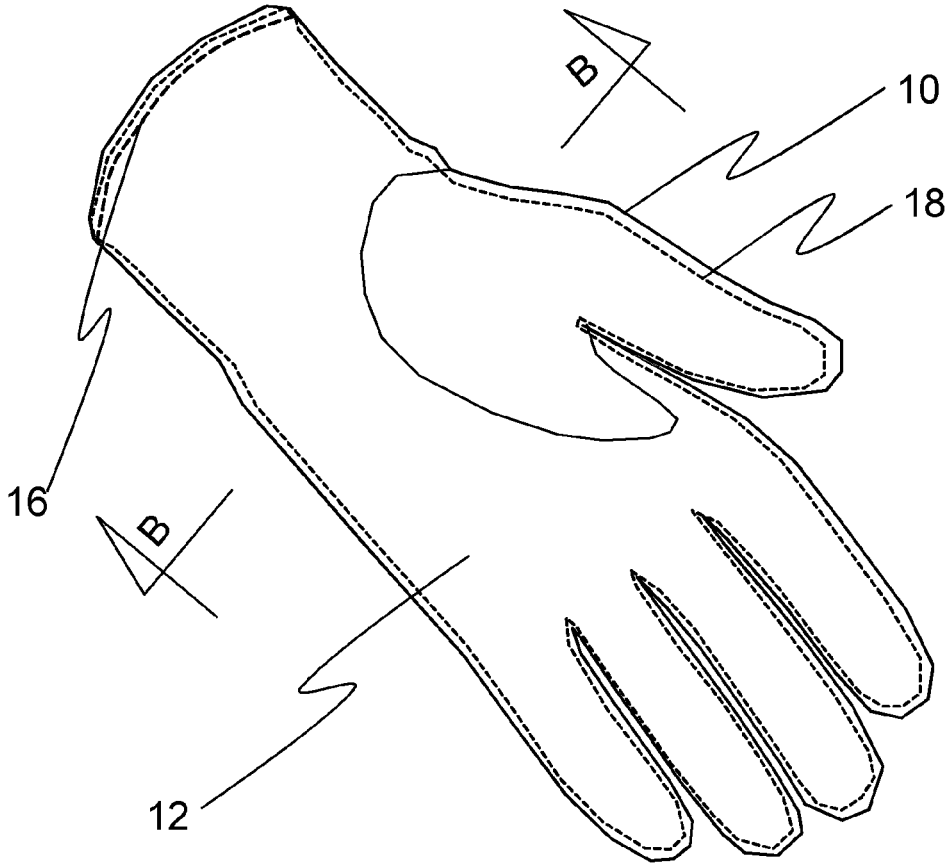


Fig. 2a

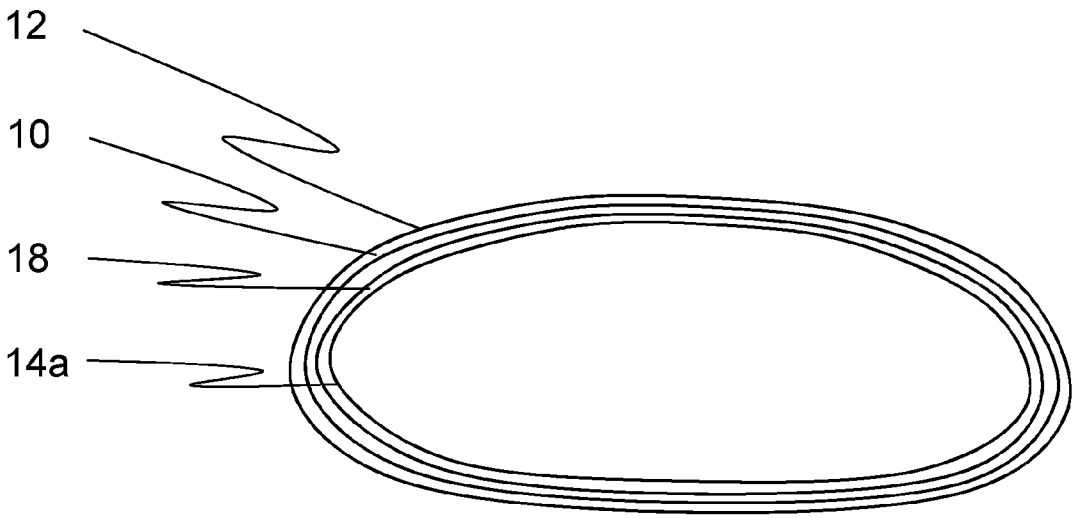


Fig. 2b

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# EUROPEAN SEARCH REPORT

Application Number
EP 21 17 2752

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X<br>A | KR 2010 0084362 A (GIM YEONG BAE [KR])<br>26 July 2010 (2010-07-26)<br>* figures 1-4 * | 1,2,4-15<br>3,16 | INV.<br>A41D19/00<br>A41D19/015 |
| A | WO 2008/014423 A2 (SHEN WEI USA INC [US]; ZHANG PING [CN]; CHOU BELLE [US])<br>31 January 2008 (2008-01-31)<br>* page 12, line 11 - line 19; figures 1,2 *<br>* page 21, line 14 - line 21 * | 1-16 | |
| A | US 2017/055607 A1 (FRANCISCO COSTA MARCO ANTONIO [PT] ET AL)<br>2 March 2017 (2017-03-02)<br>* paragraph [0049]; figures 1-3 * | 1-16 | |
| A | EP 1 537 796 A2 (CHOU BELLE L [US])<br>8 June 2005 (2005-06-08)<br>* paragraph [0050]; figures 1,2 * | 1-16 | |

TECHNICAL FIELDS SEARCHED (IPC)

A41D

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 17 June 2021 | van Voorst, Frank |

CATEGORY OF CITED DOCUMENTS

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17-06-2021

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| KR 20100084362 A | 26-07-2010 | NONE | |
| WO 2008014423 A2 | 31-01-2008 | EP 2068666 A2 | 17-06-2009 |
| | | JP 5750225 B2 | 15-07-2015 |
| | | JP 2009544868 A | 17-12-2009 |
| | | US 2008034467 A1 | 14-02-2008 |
| | | US 2013283499 A1 | 31-10-2013 |
| | | WO 2008014423 A2 | 31-01-2008 |
| US 2017055607 A1 | 02-03-2017 | AU 2016312955 A1 | 21-12-2017 |
| | | CN 107846997 A | 27-03-2018 |
| | | EP 3340819 A1 | 04-07-2018 |
| | | KR 20180035186 A | 05-04-2018 |
| | | US 2017055607 A1 | 02-03-2017 |
| | | WO 2017031522 A1 | 02-03-2017 |
| EP 1537796 A2 | 08-06-2005 | AT 453339 T | 15-01-2010 |
| | | BR PI0406231 A | 23-08-2005 |
| | | CN 1636474 A | 13-07-2005 |
| | | EP 1537796 A2 | 08-06-2005 |
| | | JP 4584686 B2 | 24-11-2010 |
| | | JP 2005171475 A | 30-06-2005 |
| | | MX PA04011589 A | 19-08-2005 |
| | | US 2005112180 A1 | 26-05-2005 |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- WO 2008014423 A2 **[0003]**
- US 2017055607 A1 **[0003]**
- EP 1537796 A2 **[0003]**