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(71) Applicants:
- **INSERM (Institut National de la Santé et de la Recherche Médicale)**
  75013 Paris (FR)
- **Université de La Réunion**
  97490 Saint Denis (FR)

(72) Inventor: **MEILHAC, Olivier**
97490 Sainte Clotilde - La Réunion (FR)

(74) Representative: **Plasseraud IP**
66, rue de la Chaussée d'Antin
75440 Paris Cedex 09 (FR)

(54) PREVENTING DEVICES AND METHODS FOR THE PREVENTION OF THE SPREAD OF GERMS, DISEASE, AND INFECTION

(57) The present invention relates to the field of prevention of the spread of pathogens during epidemics.

People touch their face frequently (between nine and 23 times per hour), therefore increasing the risk of self-contamination during epidemics.

Measures such as quarantine are efficient to stop the spread but are humanly and economically costly. It is thus temporary measures and a particularly high risk of outbreak rebound exists with the end of quarantine.

The existing solutions to limit the absorption of pathogens through the face are mainly the wearing of goggles, gloves and face masks. Nevertheless, during pandemics, a stock shortage can occur, therefore leaving people without effective solutions.

Moreover, these solutions are cumbersome, aesthetically undesirable and need to be changed regularly otherwise they participate to the spread of epidemics.

In order to overcome these limitations, the inventors proposed solutions that are ergonomic, discreet, lightweight and low-cost so as to prevent self-contamination.

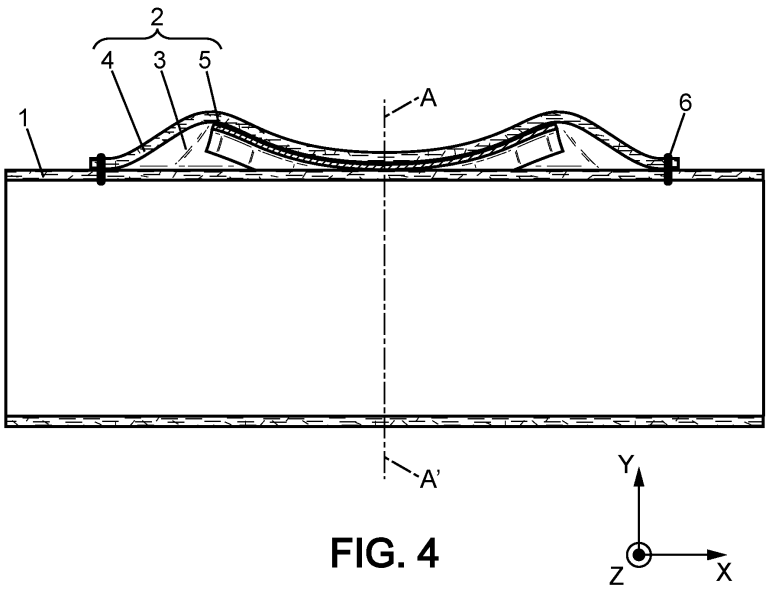

FIG. 4

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Description

FIELD

[0001] The disclosure relates to methods and apparatus for preventing a person to touch her face, eye, mouth or nose with hand in order to avoid the inadvertent transfer of infectious pathogens from the hand to the face.

BACKGROUND

[0002] Public health officials consistently promote hand-washing as a way for people to protect themselves from epidemics. However, virus can live on different materials for days and it is difficult, if not impossible, to be able to wash hands every time after touching anything. Trivial actions such as handling money or touching a door handle may thus result in the gathering of infectious pathogens and thus, the spread of epidemics.

[0003] People touch their face frequently (e.g. wiping eyes, scratching nose, biting nails, touching beard or mustache, etc.), moreover when they are anxious, embarrassed or stressed. Different studies show that people touch their faces between nine and 23 times per hour, on average, which increase the risk of self-contamination.

[0004] Measures such as quarantine are efficient to stop the spread of epidemics but are humanly and economically costly. It is thus temporary measures that governments are not willing to maintain for too long, sometimes stopping them before an effective vaccine or treatment is available. A particularly high risk of outbreak rebound therefore exists with the end of quarantine measures. The risk is even greater with children returning to school and playing together, as they are less likely to pay attention to barrier gestures.

[0005] The existing solutions to limit the absorption of pathogens through eyes, nose or mouth are mainly the wearing of goggles, gloves and face masks. Nevertheless, it has come to light that during pandemics, a stock shortage for masks and gloves can occur, leading to leave people without effective solutions. Moreover, masks are often misused by the general population because they can reposition of scratch their face through of under the mask, which can also participate to the spread of epidemics. Masks are also often touched, which is contraindicated.

[0006] Wearing gloves is likewise contraindicated for the general public, as it is necessary to know how to use them and not to touch one's face with gloves that have touched possibly contaminated surfaces.

[0007] Furthermore, gloves and masks are cumbersome, can be aesthetically undesirable and need to be changed regularly because they carry pathogens which can still be transferred to the face or in the work / home environment if one is not careful, therefore participating to the spread of epidemics.

[0008] To this end, several solutions have been proposed in order to prevent people from touching their face:

- The document US10201202B2 discloses a wearable device for preventing the spread of disease by detecting when a wearer's hand comes into close proximity of the wearer's face and warn him.
- The document US2016140830A1 discloses a hand module and a face module configured to generate an alert when the hand module comes within a predefined range of the face module.
- The document US2015320340A1 discloses a method for preventing a viral related infection by warning the person of undesired hand-to-face contacts by means of at least one sensor positioned to detect when a person's hand approaches a predetermined position related to the ground or their own body.
- The document US2004160326A1 discloses a device and method for preventing upper respiratory diseases by means of a sensor assembly that warn the wearer when the wearer's hand comes to close to his face.
- The document US2004027247A1 discloses an apparatus that warns the wearer when he attempts to touch his hand to his face, eyes, nose, or mouth for the purpose of preventing the spread of germs, disease, and infection.

[0009] However, none of the methods and devices described above can efficiently prevent persons from touching their face, eyes, nose or mouth. The problem is particularly important with children who are more able to ignore these signals. Moreover, the electronics components of said devices and methods make them costly, time-consuming to produce, fragile and prone to faults.

[0010] Other solutions have also been proposed in order to prevent people from touching their face:

- The document US2007283966A1 discloses devices for minimizing the absorption of pathogens collected on a person's hands by contact between the hand and the face of said person. One of the embodiments disclosed consists of a barrier consisting of a foldable hinge having two wings and a stop element placed in the crook of the elbow that limits the flexion of the elbow as the hand approaches the face. This document also discloses a compressible implement through the use of an inflatable bladder made of two pouches.

[0011] This first embodiment (foldable hinge) lacks ergonomics because it is inconvenient to install / uninstall, it is heavy due to the necessary use of mainly metal parts and it presents a risk of injuries through pinching due to the hinge, or blows because of the presence of protruding parts. This risk is even higher with children as they play, run or jump. On a more aesthetic side, it also lacks of discretion and is not convenient to wear in a professional environment, for example under a shirt or a jacket.

[0012] The second embodiment (inflatable bladder) is nevertheless fragile, can burst easily and also lacks ergonomics due to its volume.

[0013] There is therefore a need for practical, discreet and ergonomic solutions, quickly producible to face a global demand in the event of a cessation of quarantine measures.

[0014] There is as well a demand for solutions that are easy to implement by the greatest number of people, without generating weariness, thus abandonment, because of solutions too cumbersome or too inconvenient to use on a daily basis.

[0015] To this end, it is hereby provided solutions that are ergonomic, discreet, lightweight, low-cost and easily usable by the greatest number of people, in order to limit the possibility for persons to touch their face, with or without masks.

SUMMARY OF THE DISCLOSURE

[0016] It is hereby provided practical solutions to minimize the absorption of pathogens collected on a person's hands by limiting the flexion of the arm of said person so that the possibility of contact between the face, eyes, mouth and nose of a person and said person's hands can be reduced.

[0017] Notably, the solutions provided therein are ergonomic, discreet, lightweight, low-cost and easily usable by the greatest number of people so as to prevent self-contamination and thus, the spread of pathogens.

[0018] In particular, they can be worn on or under clothing in a discreet and effective way, while allowing most daily gestures such as driving, using a keyboard, writing, cooking, etc.; which do not require the hand to be carried at face level. They can also be used on children without any risk of injury because of the absence of protruding parts. In addition, they can be easily and rapidly installed or removed with just one hand.

Therefore, preventing methods and preventing devices for preventing the spread of germs, diseases or infections by limiting the flexion of the elbow are provided.

[0019] A preventing device for preventing the spread of germs, diseases or infections is provided, said device comprising:

- a soft sleeve adapted to be slipped on a person's arm, said arm having a forearm, an elbow and an upper arm, said sleeve extending along a longitudinal direction and having a first end portion, a middle portion and a second end portion which are adapted to cover respectively at least part of said forearm, at least part of said elbow and at least part of said upper arm when the soft sleeve is slipped on said arm;
- a movement limiting member which is attached to the sleeve in register with at least the middle portion, said movement limiting member dimensioned to limit a flexion of the elbow.

[0020] The device may further include one and / or other of the following features:

- said movement limiting member is a unique piece of longitudinal shape disposed along the longitudinal direction and being shaped an sized so as to cover an inside but not an outside of said elbow;
- said movement limiting member is an elastic band of longitudinal shape disposed along the longitudinal direction so as to cover an outside but not an inside of said elbow;
- said movement limiting member is dimensioned to limit the flexion of the elbow to a maximum flexion angle of 90 deg;
- the sleeve is made of stretch textile material;
- said movement limiting member is a longitudinally curved longitudinal piece of rigid material having a length between 10 and 20 cm and having a radius of curvature adapted to limit the flexion of the elbow to a maximum flexion angle of 90° when the soft sleeve is correctly positioned around the arm so that the movement limiting member covers an inside of said elbow;
- said movement limiting member further has a transverse curvature on a side oriented radially inwardly of the soft sleeve;
- said rigid material constituting said movement limiting member can be chosen amongst metallic, plastic or wood materials.
- the movement limiting member is either integral with the soft sleeve, or removably secure to the soft sleeve.

[0021] Besides, it is also disclosed a method for preventing the spread of germs, diseases or infections is provided, said method comprising limiting movement of a person's arm with a preventing device according to any preceding claims, said arm having a forearm, an elbow and an upper arm, wherein said soft sleeve is slipped on said arm, wherein said first end portion, middle portion and second end portion cover respectively at least part of said forearm, at least part of said elbow and at least part of said upper arm, and wherein said movement limiting member limits a flexion of said elbow.

[0022] The method may further include one and / or other of the following features:

- said movement limiting member is a unique piece of longitudinal shape disposed along the longitudinal direction and being shaped an sized so as to cover an inside but not an outside of said elbow;

- said movement limiting member is dimensioned to limit the flexion of the elbow to a maximum flexion angle of 90 deg;

- the sleeve is made of stretch textile material;

- said movement limiting member is a longitudinally curved longitudinal piece of rigid material having a length between 10 and 20 cm and having a radius of curvature adapted to limit the flexion of the elbow to a maximum flexion angle of 90° when the soft sleeve is correctly positioned around the arm so that the movement limiting member covers an inside of said elbow;

- said movement limiting member further has a transverse curvature on a side oriented radially inwardly of the soft sleeve;

- the movement limiting member is either integral with the soft sleeve, or removably secure to the soft sleeve.

BRIEF DESCRIPTION OF DRAWINGS

[0023] Other features and advantages of the disclosure appear from the following detailed description of one non-limiting example thereof, with reference to the accompanying drawings.

[0024] In the drawings:

Fig. 1 illustrates a person equipped with a preventing device according to a first preferred embodiment. 1a illustrates an extension of the arm equipped with a preventing device according to said first preferred embodiment and Fig. 1b illustrates the same arm with a flexion limited at 90 degrees by said preventing device according to said first preferred embodiment.

Fig. 2 illustrates a person equipped with a preventing device according to a second preferred embodiment. 2a illustrates an extension of the arm equipped with a preventing device according to said second preferred embodiment and Fig. 1b illustrates the same arm with a flexion limited at 90 degrees by said preventing device according to said second preferred embodiment.

Fig. 3 illustrates a movement limiting member according to a first preferred embodiment.

Fig. 4 is a diagrammatic partial cross-sectional side view of a preventing device according to a first embodiment.

Fig. 5 is a diagrammatic partial cross-sectional front view of a preventing device according to a first embodiment.

DETAILED DESCRIPTION

[0025] In the Figures, the same references denote identical or similar elements.

[0026] The instant preventing solutions provide a practical way to minimize the spread of pathogens collected on a person's hand by limiting the possibilities for this person to touch her face, with or without mask. Movement limiting members integrated to a soft sleeve and positioned on an inside and/or on an outside of the elbow limit the range of flexion of the elbow. Unconscious movements leading to touch the face are thus prevented thanks to a substantial resistance to said flexion. Preventing methods using preventing devices disclosed therein for limiting movements of a person's arm are also provided.

[0027] The instant preventing solutions provide preventing devices that comprise a soft sleeve (1), preferably made of any stretch or elastic material, more preferably made of stretch textile, adapted to be slipped on a person's arm, said arm having a forearm, an elbow and an upper arm, in order to cover at least said person's elbow. Preferably, the soft sleeve encloses said parts of the arm without blocking the blood circulation, nor causing discomfort or pain.

[0028] Said soft sleeve is designed to extend along a longitudinal direction and possesses a first end portion, a middle portion and a second end portion which are adapted to cover respectively at least part of said forearm, at least part of said elbow and at least part of said upper arm when the soft sleeve is slipped on said arm, as shown is **Fig. 1a, 1b** and **Fig 2a, 2b.**

[0029] Said soft sleeve further comprises a movement limiting member which is attached to the sleeve, in register with at least the middle portion, said movement limiting member being dimensioned to limit a flexion of the elbow.

[0030] Some embodiments provide preventing devices that comprise a movement limiting member which is a unique piece of longitudinal shape being disposed along the longitudinal direction of the sleeve. Said movement limiting member can be integral with the soft sleeve or can be removably secure to the soft sleeve so that it can be inserted and removed when needed, for example during lunch time, without having to remove the soft sleeve from the arm.

[0031] Some embodiments provide preventing devices that comprise a movement limiting member which is shaped and sized so as to cover an inside but not an outside of said elbow and / or a movement limiting member which is shaped and sized so as to cover an outside but not an inside of said elbow.

[0032] In some embodiments, said movement limiting member is a non-articulated piece, even more preferably made of substantially rigid material and / or material having elastic properties. Said substantially rigid material and / or material having elastic properties can be selected from metals and their alloys, plastic materials, elastic materials and wood. Said movement limiting member is preferably dimensioned so as to limit the flexion of the elbow to a maximum flexion angle of 90 degrees, more prefer-

ably without breaking or folding.

[0033] In some embodiments, said movement limiting member is a substantially flat, elongated and curved piece of rigid material having a curvature so that, when said movement limiting member is inserted in said soft sleeve and said soft sleeve is correctly positioned on a person's arm, it allows the flexion of the elbow until an angle of 90 degrees. Said movement limiting member has a length between 6 and 20 cm, preferably between 8 and 15, more preferably between 10 and 12 cm; and a width between 1 and 8 cm, preferably between 2 and 6 cm, more preferably between 3 and 4 cm.

[0034] In some embodiments, said movement limiting member further has a transverse curvature on a side oriented radially inwardly of the soft sleeve so as to conform to the natural shape of the arm.

[0035] In some embodiments, said movement limiting member is an elastic band integrated to the sleeve and disposed along the longitudinal direction of the sleeve so as to be positioned and so as to cover the outside of the elbow of a person when the sleeve is worn. Said elastic band is dimensioned so as to limit the flexion of the arm of said person to a maximum of 90 degrees when the sleeve is positioned of the arm of said person.

[0036] The preventing devices disclosed therein therefore help the wearer to easily position the device on his arm with one hand. The preventing devices disclosed therein are light and discreet so that they can be worn under clothing. Said preventing devices also allow most of the daily gestures that do not require the hand to be carried at face level (for e.g. driving, writing, using a keyboard, etc.). They can also be used with children without risk of injury thanks to the absence of protruding /foldable parts. In addition, they can be easily and rapidly installed and removed with one hand.

[0037] The instant preventing solutions also provide preventing methods for preventing the spread of germs, diseases or infections, said methods comprising limiting movement of a person's arm with a preventing device according to the present disclosure, said arm having a forearm, an elbow and an upper arm, wherein said soft sleeve is slipped on said arm, wherein said first end portion, middle portion and second end portion cover respectively at least part of said forearm, at least part of said elbow and at least part of said upper arm, and wherein said movement limiting member limits a flexion of said elbow.

[0038] With reference to the drawings, there is shown in **Fig. 1a, 1b** and **Fig. 2a, 2b** a person's arm equipped with a preventing device according to a first (**Fig. 1a** and **1b**) and a second (**Fig. 2a** and **2b**) preferred embodiment, to minimize the spread of pathogens collected on a person's hand by limiting the possibilities for this person to touch her face. The devices according to **Fig. 1a, 1b** and **Fig. 2a, 2b** are designed to limit the range of movement of the person's hand towards the face by limiting the flexion of said person's arm to a maximum of 90 degrees, from full extension of the arm and forearm.

[0039] **Fig. 1** illustrates a first preferred embodiment and shows a soft sleeve (1) slipped over an arm of a person, said soft sleeve having a first end portion covering a least a part of said person's forearm, a middle portion covering at least a part of said person's elbow and a second end portion covering at least a part of said person's upper arm. The soft sleeve comprises a longitudinal housing (2) comprising in its interior a movement limiting member being a longitudinally curved longitudinal piece of rigid material (5) as shown in **Fig. 3,** preferably made of plastic, metal or wood; having a length so as to extend on either side of the cubital fossa of the elbow from a part of the biceps proximal to the cubital fossa to a part of the forearm proximal to the cubital fossa. Said movement limiting member has radius of curvature along a longitudinal direction adapted to limit the flexion of the elbow to a maximum flexion angle of 90 degrees when the soft sleeve is correctly positioned around the arm so that the middle of the movement limiting member covers the cubital fossa of said elbow. Said movement limiting member further has a transverse curvature on a side oriented radially inwardly of the soft sleeve so as to fit the natural transverse curvature of the arm. Said movement limiting member can be inserted in or removed from its housing when appropriate.

[0040] **Fig. 4** is a diagrammatic partial cross-sectional side view along a plan XY of said preventing device according to a first embodiment. Said preventing device comprises a longitudinal housing (2) delimited by the soft sleeve (1) and an envelope (4) made of the same material as the soft sleeve (1) and sealed to the soft sleeve (1) by means of stiches (6), said housing (2) delimiting an inside cavity (3) comprising a movement limiting member (5) being a longitudinally curved longitudinal piece of rigid material, which extremities are oriented to the opposite direction as the inside of the soft sleeve (1).

[0041] **Fig. 5** is a diagrammatic partial cross-sectional front view along a plan YZ and along an axis AA' (see **Fig. 4**) of said preventing device according to a first embodiment. Said preventing device comprises a longitudinal housing (2) delimited by the soft sleeve (1) and an envelope (4) made of the same material as the soft sleeve (1) and sealed to the soft sleeve (1) by means of stiches (6), said housing (2) delimiting an inside cavity (3) comprising a movement limiting member (5) which possesses a transverse curvature on a side oriented radially inwardly of the soft sleeve so as to conform to the natural shape of the arm.

[0042] **Fig. 2a** and **2b** illustrate a second preferred embodiment and show a soft sleeve (1) slipped over an arm of a person, said soft sleeve having a first end portion covering a least a part of said person's forearm, a middle portion covering at least a part of said person's elbow and a second end portion covering at least a part of said person's upper arm. The soft sleeve comprises a movement limiting member (7) which is an elastic band integrated longitudinally to the sleeve, on a side intended to be positioned on the outside of the elbow when the sleeve

is worn. Said elastic band has a length so as to extend on either side of the elbow, on a posterior side of the elbow, from a part of the upper arm proximal to the olecranon to a part of the forearm proximal to the olecranon. Said movement limiting member develops a tension along a longitudinal direction adapted to limit the flexion of the elbow to a maximum flexion angle of 90 degrees, as shown in **Fig. 2b,** when the flexion force of the arm is no greater than a predefined threshold, preferably no greater than the force required to perform routine gestures; and when the soft sleeve is correctly positioned around the arm so that the middle of the movement limiting member covers the olecranon of said elbow.

[0043] The preventing devices shown in **Figures 1** to **5** therefore provide a practical solution to minimize the absorption of pathogens collected on a person's hands by limiting the flexion of the arm of said person so that the possibility of contact between the face, eyes, mouth and nose of a person and said person's hands can be reduced.

[0044] Notably, these preferred embodiments are ergonomic, discreet, lightweight, low-cost and easily usable by the greatest number of people so as to prevent self-contamination and thus, the spread of pathogens.

[0045] In particular, they can be worn on or under clothing in a discreet and effective way, while allowing most daily routine gestures such as driving, using a keyboard, writing, cooking, etc.; which do not require the hand to be carried at face level. They can also be used on children without any risk of injury because of the absence of protruding parts. In addition, they can be easily and rapidly installed or removed with just one hand; or the movement limiting member can be inserted in or removed from its housing when required, for example at lunch time.

Claims

1. A preventing device for preventing the spread of germs, diseases or infections, said device comprising:

   - a soft sleeve adapted to be slipped on a person's arm, said arm having a forearm, an elbow and an upper arm, said sleeve extending along a longitudinal direction and having a first end portion, a middle portion and a second end portion which are adapted to cover respectively at least part of said forearm, at least part of said elbow and at least part of said upper arm when the soft sleeve is slipped on said arm;
   - a movement limiting member which is attached to the sleeve in register with at least the middle portion, said movement limiting member dimensioned to limit a flexion of the elbow.

2. The preventing device according to claim 1, said movement limiting member being a unique piece of longitudinal shape disposed along the longitudinal direction and being shaped an sized so as to cover an inside but not an outside of said elbow.

3. The preventing device according to claim 1, said movement limiting member being an elastic band disposed along the longitudinal direction so as to cover an outside but not an inside of said elbow.

4. The preventing device according to claim 1 or 2, wherein said movement limiting member is dimensioned to limit the flexion of the elbow to a maximum flexion angle of 90 deg.

5. The preventing device according to any of the preceding claims, wherein the sleeve is made of stretch textile material.

6. The preventing device according to any of claims 1, 2, 4 or 5, wherein said movement limiting member is a longitudinally curved longitudinal piece of rigid material having a length between 10 and 20 cm and having a radius of curvature adapted to limit the flexion of the elbow to a maximum flexion angle of 90° when the soft sleeve is correctly positioned around the arm so that the movement limiting member covers an inside of said elbow.

7. The preventing device according to claim 6, wherein said movement limiting member further has a transverse curvature on a side oriented radially inwardly of the soft sleeve.

8. The preventing device according to any of the preceding claims, wherein the movement limiting member is either integral with the soft sleeve, or removably secure to the soft sleeve.

9. A preventing method for preventing the spread of germs, diseases or infections, said method comprising limiting movement of a person's arm with a preventing device according to any preceding claims, said arm having a forearm, an elbow and an upper arm, wherein said soft sleeve is slipped on said arm, wherein said first end portion, middle portion and second end portion cover respectively at least part of said forearm, at least part of said elbow and at least part of said upper arm, and wherein said movement limiting member limits a flexion of said elbow

10. The preventing method according to claim 8, wherein said movement limiting member is a unique piece of longitudinal shape disposed along the longitudinal direction and being shaped an sized so as to cover an inside but not an outside of said elbow.

11. The preventing method according to claim 8, wherein said movement limiting member is an elastic band

disposed along the longitudinal direction so as to cover an outside but not an inside of said elbow.

12. The preventing method according to claim 9 or 10, wherein said movement limiting member is dimensioned to limit the flexion of the elbow to a maximum flexion angle of 90 deg.

13. The preventing method according to any of the preceding claims, wherein the sleeve is made of stretch textile material.

14. The preventing method according to any of claims 9, 10, 12 or 13, wherein said movement limiting member is a longitudinally curved longitudinal piece of rigid material having a length between 10 and 20 cm and having a radius of curvature adapted to limit the flexion of the elbow to a maximum flexion angle of 90° when the soft sleeve is correctly positioned around the arm so that the movement limiting member covers an inside of said elbow.

15. The preventing method according to claim 14, wherein said movement limiting member further has a transverse curvature on a side oriented radially inwardly of the soft sleeve.

FIG. 1a

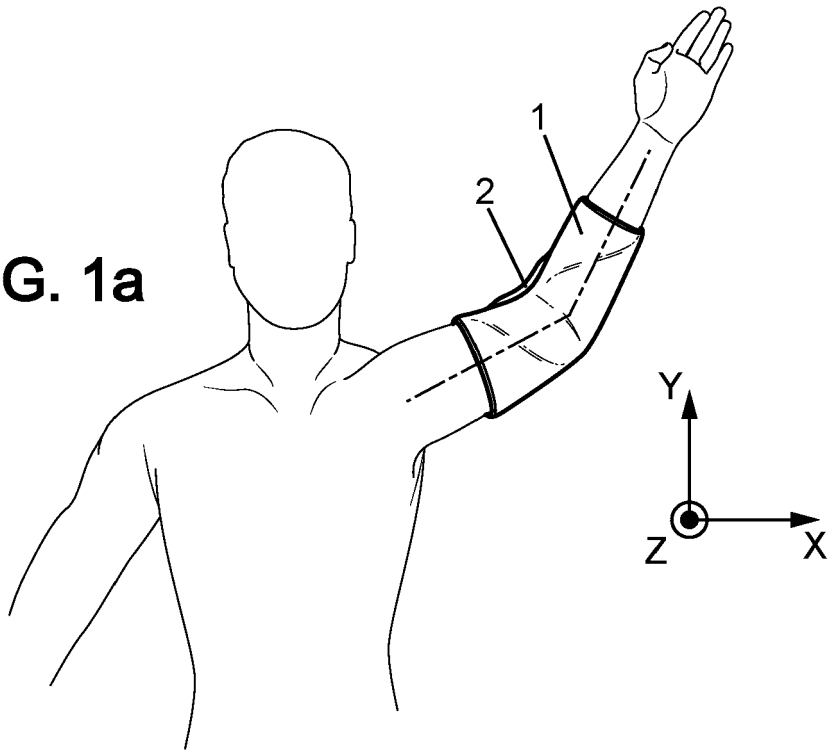


FIG. 1b

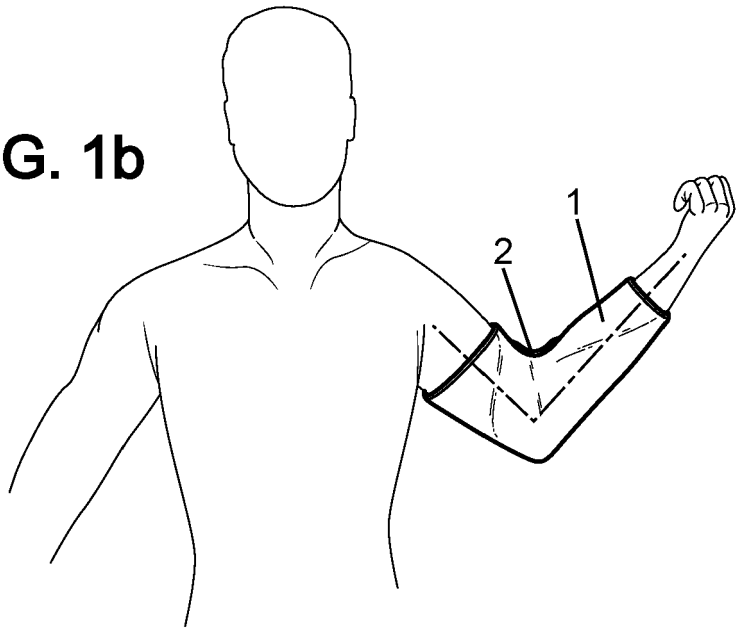


FIG. 2a

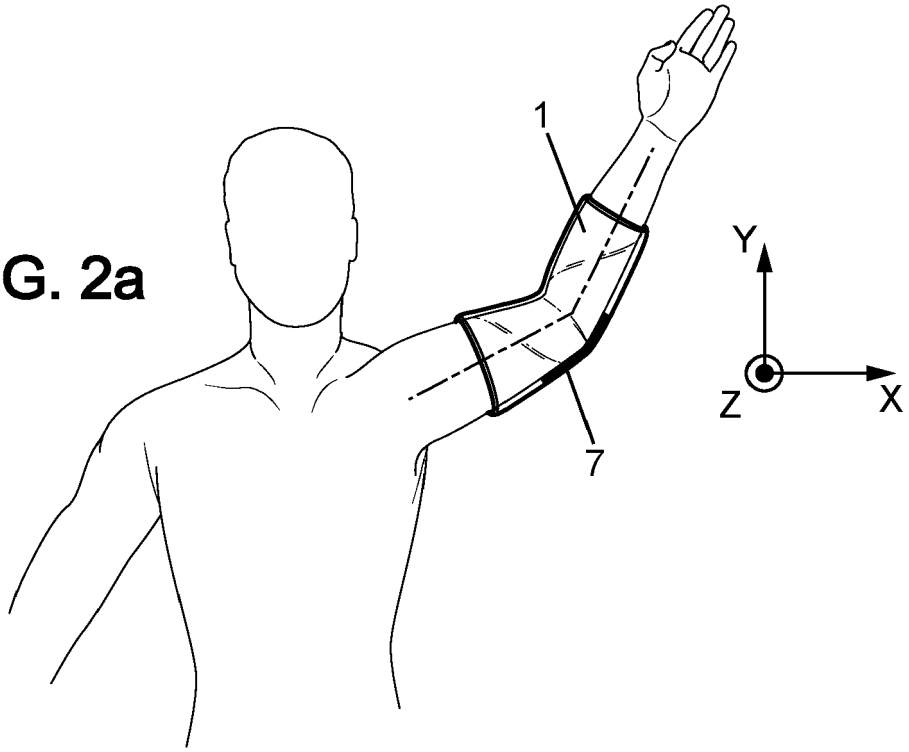
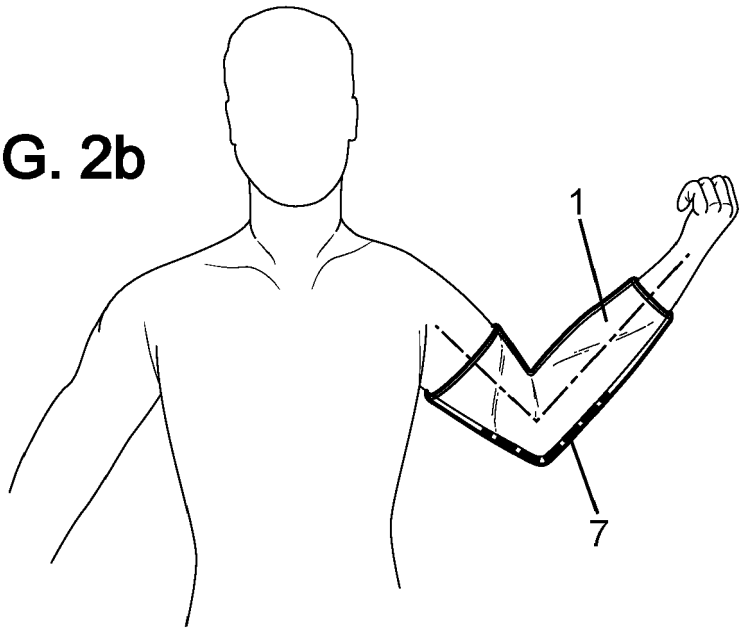


FIG. 2b



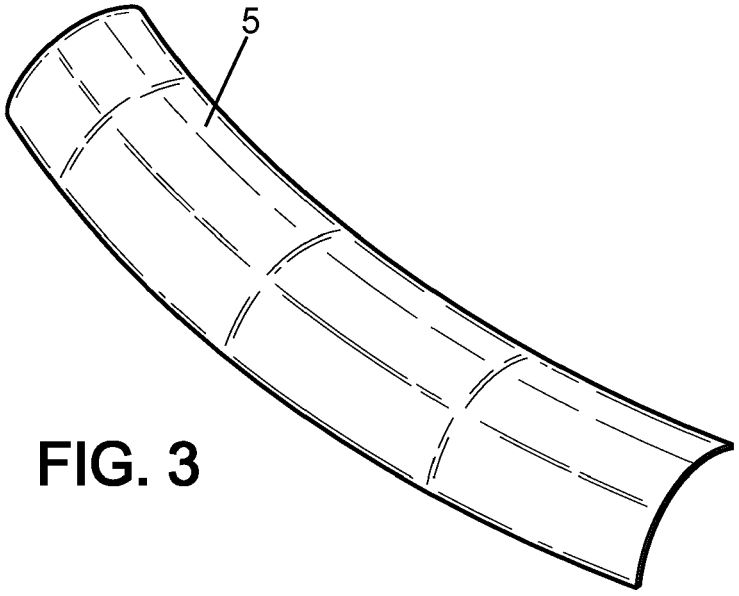


FIG. 3

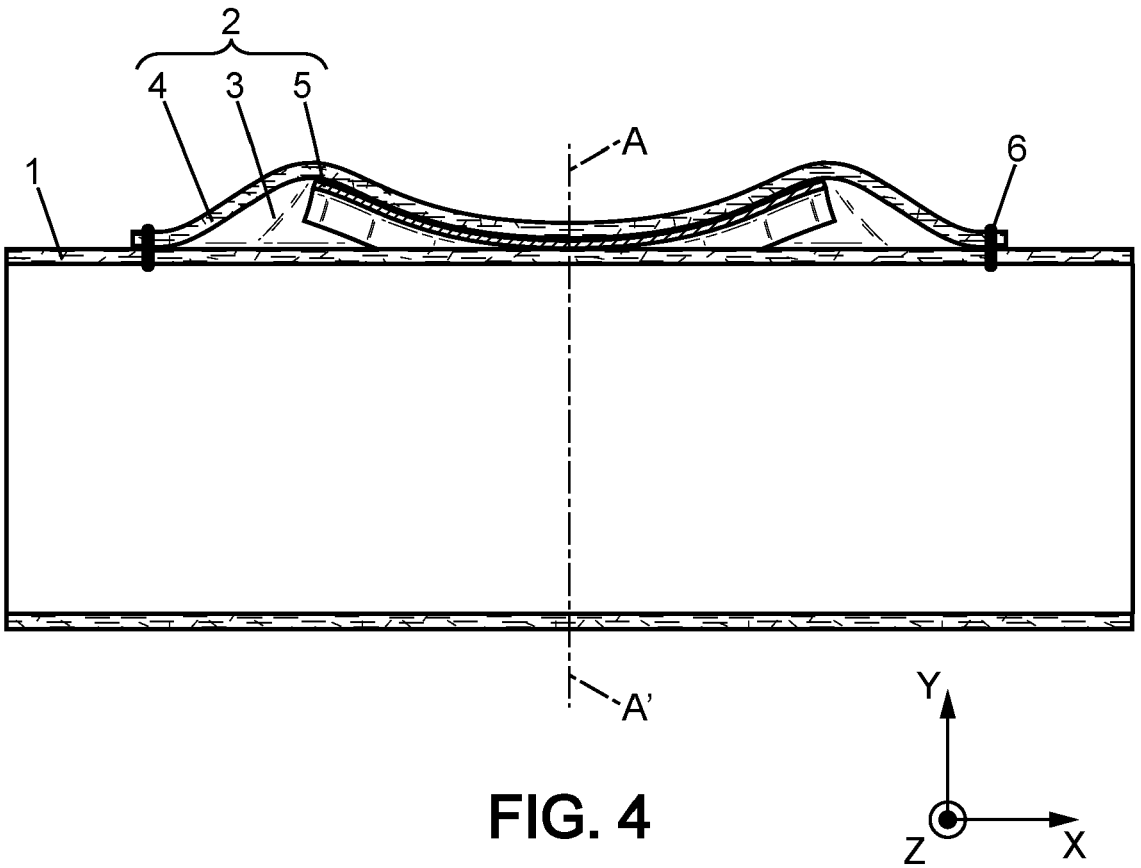


FIG. 4

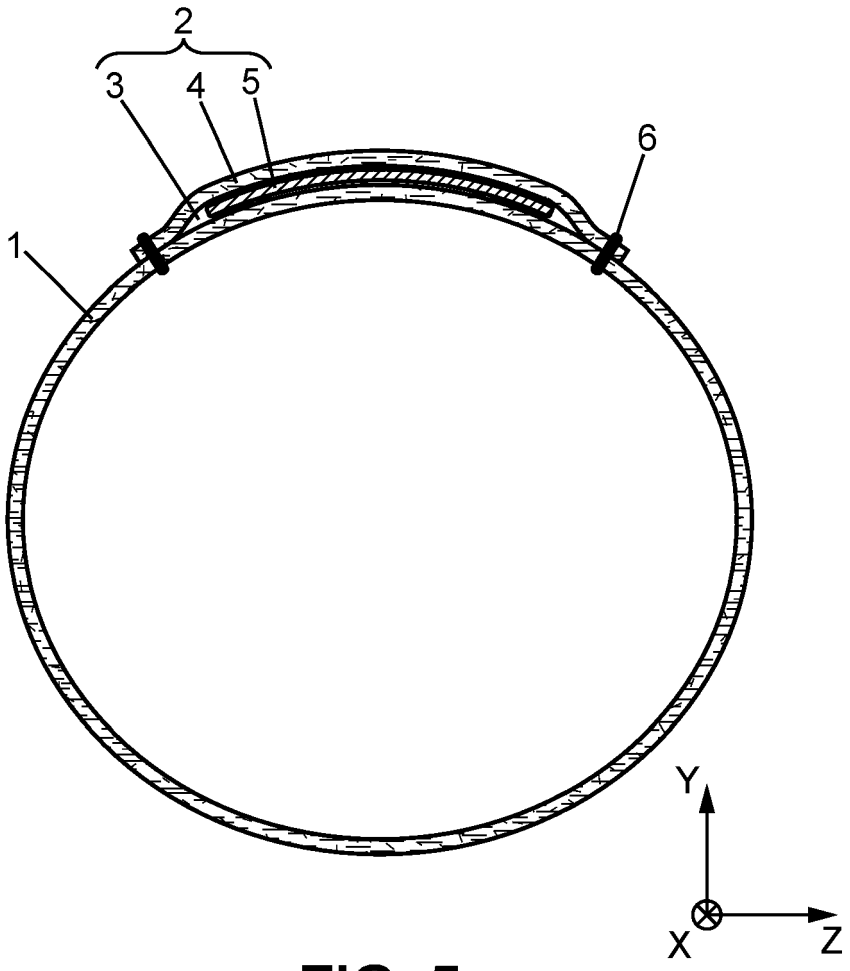


FIG. 5

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 20 30 5467

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 Y	US 2015/101095 A1 (FITCH NATHAN LEE [US]) 16 April 2015 (2015-04-16) * paragraph [0021]; figures 1,2,4 *	1,3-9, 11-15 2,10	INV. A41D13/08 A61F5/058
X Y	US 8 939 853 B1 (KARN CHARLES ALAN [US] ET AL) 27 January 2015 (2015-01-27) * figure 1 *	1,3-9, 11-15 2,10	
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TECHNICAL FIELDS SEARCHED (IPC)

A41D
A61F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 September 2020	van Voorst, Frank

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 20 30 5467

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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23-09-2020

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REFERENCES CITED IN THE DESCRIPTION

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