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(54) **DEVICE FOR PERSONAL PROTECTION AGAINST IONIZING RADIATIONS SUITABLE FOR WASHING**

WASCHBARE VORRICHTUNG ZUM PERSÖNLICHEN SCHUTZ GEGEN IONISIERENDE STRAHLUNG

DISPOSITIF PERMETTANT UNE PROTECTION PERSONNELLE CONTRE DES RAYONNEMENTS IONISANTS, APPROPRIÉ POUR UN LAVAGE

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Description

[0001] The present invention refers to a device for the individual protection from ionizing radiations, particularly from X-rays, having an arrangement such to enable an easy and effective washing.

[0002] The term "individual protection device" means an equipment suitable for being worn by an individual in order to protect him/her from one or more risks capable of threatening the safety of health, and also each complement or accessory suitable for such object. The present invention is directed to devices for the individual protection from ionizing radiations, particularly from X-rays.

[0003] The ionizing radiations are radiations having an energy sufficient to directly or indirectly ionize the atoms or molecules which they interact with, so that alterations of the electronic structure are made. Such radiations are particularly dangerous when the individual is subjected to an extended and repeated exposition. Indeed, they can attack the biological tissues, causing damages which can be also serious, particularly cancers. Examples of ionizing radiations are α-rays, β-rays, γ-rays, and X-rays.

[0004] With a particular reference to the X-rays, as it is known, they are used for example in sanitary environments (such as hospitals, medical offices, surgeries, dental offices) for diagnostic purpose, for example for making radiographs. Moreover, radioactive artificial sources can be used for a therapeutic purpose.

[0005] Due to the possible danger of the ionizing radiations, it is vital that, during the execution of radiographs, the X-rays hit only the portions of an individual body on which it is necessary to perform a radiological inspection. Therefore, the areas of a patient which are not radiographed, must be protected.

[0006] A further particularly felt need is of protecting the operators, such as radiological technicians or doctors, from X-rays. Indeed, due to professional reasons, they are repeatedly exposed to the radiations and therefore it is a prerequisite to provide systems suitable for their protection.

[0007] In order to protect patients and operators, it is known the use of suitable individual protection devices. They can for example comprise gowns, skirts, wraps, aprons, armcovers, thyroid collars, shouldercovers, handcovers, intraoral exam aprons, based on the body portion which must be protected. Such individual protection devices comprise a core made of a radiation shielding material. For example, they can be made of lead which is particularly suited to the X-ray protection; or they are made of lead rubber or materials alternative to lead for manufacturing the devices for the protection from ionizing radiations. The shielding material core is wrapped by an envelope for example made of cloth, which internally receives the same core.

[0008] The individual protection devices, particularly gowns or the like, are generally heavy and tight, and therefore they can cause the user to severely perspirate.

[0009] Moreover, the individual protection devices since are used for example in operating rooms or similar environments, often become dirty because they come in contact with blood or other organic liquids.

[0010] Therefore, a particularly felt need is of suitably washing and sanitizing the individual protection devices. However, due to the their structure, the individual protection devices are difficult to be suitably washed. Indeed, since the washing is made by dipping individual protection devices in water or by dropping water on them, the water enters the space inside the envelope, wherein it is received the protection core, and it cannot readily flow out through the stitches of the envelope cloth. Therefore, drying the individual protection device can require also some days, during this time it is not possible to use the individual protection device.

[0011] Alternatively, the individual protection devices are simply washed by sponges soaked in water and/or detergent. However, this type of washing is inadequate for sanitizing the individual protection device because it is superficial and therefore inadequate.

[0012] Known individual protection devices are described in documents EP 1 321 947 A2 and CN 201 733 891 U.

[0013] Therefore, it is the object of the present invention to make available a device for the individual protection from ionizing radiations which can be effectively washed and sanitized and does not require too much time to be dried.

[0014] This and other objects are met by a device for the individual protection from ionizing radiations according to claim 1.

[0015] In order to better comprehend the invention and appreciate its advantages, in the following some exemplifying non limiting embodiments thereof will be described with reference to the attached drawings, wherein:

Figure 1 is a perspective view of an individual protection device, particularly a gown, according to a possible embodiment, and of some enlarged portions thereof;

Figure 2 is a perspective view of an individual protection device, particularly a gown, according to a further possible embodiment, and of some enlarged portions thereof.

[0016] With reference to the figures, reference 1 indicates a device for the individual protection from ionizing radiations. Examples of ionizing radiations which the device 1 is capable of protecting an user from, are α-rays, β-rays, γ-rays, and X-rays.

[0017] The present description will mainly refer to an individual protection device to be used in a sanitary environment, suitable for protecting the user from X-rays. Still more particularly, it will be made reference to a gown which can be worn for example by a sanitary operator which usually works adjacent to X-ray emitters, or by a patient. However, it is noted that the X-ray protection san-

itary gown should be understood in a non limiting way as a simple example of a device for the individual protection from ionizing radiations. For example, the device 1 can be a skirt, a wrap, an apron, a glove, an armcover, a thyroid collar, a shouldercover, a coverarm, an intraoral exam apron, or the like.

[0018] The individual protection device 1 comprises a protection core 2 having the function of shielding from the ionizing radiations, in other words suitable for attenuating such radiations in order to prevent them from being transmitted to the user when wearing the device 1. With reference to a gown, the protection core 2 can be for example shaped as a plate suitable for making wearable the gown, and can be made of a material suitable for shielding from X-rays. Materials suitable for shielding from ionizing radiations are known per se. An example of a material suitable for X-ray shielding is lead. A further possible material is lead rubber.

[0019] Besides the protection core 2, the individual protection device 1 comprises a covering envelope 3 wrapping the protection core 2, by internally receiving the latter into a housing 4 defined by the same covering envelope 3. The covering envelope 3 is per se suitable for shielding from ionizing radiations and is preferably made of a cloth, for example a waterproof polyamide. The covering envelope 3 can be equipped with further components improving the wearability and usability thereof. For example, the covering envelope 3 can comprise paddings, zippers, buttons, closing laces, sleeves, belts or the like.

[0020] It is to be noted that the individual protection device 1 can alternatively comprise a single covering envelope internally receiving a single protection core or a plurality of covering envelopes separated from each other and connected to each other, for example by suitable stitches, each internally receiving an independent protection core.

[0021] For example, Figure 1 shows a gown having at least one first and one second covering envelopes 3', 3" internally receiving respective protection cores, while Figure 2 represents a gown having a single covering envelope 3 internally receiving a protection core. Of course, several solutions alternative to the illustrated ones from the point of view of the number and placement of the protection cores and covering envelopes are possible.

[0022] Thanks to said arrangement of the covering envelope 3, when the individual protection device 1 is washed, for example by dipping it in water or by dropping water from above on it, the housing 4 is at least partially flooded by the water flowing for example through the stitches of the clothes forming the covering protection envelope 3.

[0023] Therefore, the individual protection device 1 comprises means 5 for draining water or other liquids possibly collected in the housing 4 due to operations of washing the individual protection device. Also, the drainage means 5 enable to rapidly empty the housing 4 of the collected water and therefore a rapid drying of the individual protection device 1 after the washing. Therefore, the individual protection device 1 can be rapidly used again after a washing.

[0024] The drainage means 5 can be differently positioned. The individual protection device 1 comprises an inner side 6 and an outer side 7. The inner side 6 is the side of the individual protection device 1 suitable, during the use, for facing the user, while the outer side 7 is the side opposite to the inner side 6. With reference to a gown, the inner side 6 is the side of the individual protection device, suitable for facing the user torso, and usually it comes in contact with it. Advantageously, the drainage means 5 are arranged at the inner side, or outer side, or preferably at both. In the latter case, the drainage is much more rapid and uniform.

[0025] More advantageously, the drainage means 5 are placed at the lower portions of the envelope or envelopes, in case the latter are in number greater than one. The term "lower" refers to the normal conditions of use of the individual protection device. With reference for example to a gown, the lower portions of the gown are the portions facing the user legs in a condition of use. The position of the drainage means 5 in the lower portions of the individual protection device causes the water eventually collected in the housing 4 due to a washing, to exit by gravity without forming collecting areas wherein water remains trapped in. With reference to a gown, the water can be drained, for example, by hanging the gown to suitable supports, so that water exits by gravity.

[0026] Further, the drainage means 5 can be variably shaped.

[0027] According to a possible embodiment, the drainage means 5 comprise one or more drainage openings 8 formed in the protection envelope. According to what has been previously said, the drainage openings 8 can be placed in the inner side 6 and/or outer side 7 of the individual protection device 1, preferably at the lower portion of the covering envelope or envelopes 3. Moreover, the drainage means 5 comprise one or more net-shaped elements 9 placed at said drainage openings 8 (see Figures 1a, 1b, 1c and 2a, 2b, for example). The net-shaped elements 9 enable to drain the water from the housing of the individual protection device to the outside and preferably have a size such to prevent for example the hands of the users to gain access into the housing from the outside. Therefore, the protection core is protected.

[0028] Advantageously, the net-shaped elements 9 are made of a material ensuring a high tensile and tear strengths, and also a good washability. For example, the net-shaped elements can be made of polyester.

[0029] The net-shaped elements 9 form meshes enabling, besides allowing the passage of water and detergents, also the passage of air, however at the same time they are sufficiently tight to prevent the passage for example of the operator hands.

[0030] According to a possible embodiment, the individual protection device 1 comprises one or more closure edges 15 extending along the contours of the covering envelopes 3, particularly for forming a side closure of the

covering envelopes. Advantageously, the closure edges 15, the net-shaped elements 9 and the protection core 2 are connected to each other by stitches 16. Further advantageously, the net-shaped elements 9 are in turn connected to the covering envelopes 3 by second stitches 17. In this manner, the covering envelopes 3, the net-shaped elements 9 and the closure edges 15 form a single body. Further, the protection cores 2 are also connected to the closure edges 15 - not just at the areas wherein the net-shaped elements 9 are provided - and therefore they are blocked and extend inside the housing 4, in order to therefore ensure a good wearability and a considerable protection since the movements inside the housing 4 are prevented.

[0031] The net-shaped elements 9 are a possible example of the water drainage means having a fixed-type configuration. According to an alternative embodiment (not shown in the figures), the drainage means 5 comprise means for reversibly closing the drainage openings 8, in other words means shaped so that the drainage openings can switch from a closed configuration to an open one, and viceversa. For example, the reversible closure means can comprise zipper systems, so that during the washing, the drainage openings can be opened for draining the water, and during the normal use of the individual protection device, such drainage openings are kept closed.

[0032] Of course, further different arrangements of the means for closing the drainage openings 8 can be provided. For example, according to a possible embodiment (not shown in the figures), closure rings fixed to the covering envelope 3 such to keep closely spaced the opposed edges of the drainage openings can be provided. In this way, the water can freely run down when the individual protection device is washed, through the drainage openings. During the normal use of the gown, the rings prevent to gain access into the housing through the drainage openings.

[0033] The individual protection device can comprise one or more pockets 10. The pockets 10 can be placed on the inner side 6 (Figures 1e and 2d), on the outer side 7 (Figures 1d and 2c), or on both the sides of the individual protection device 1. The pockets 10 can be for example made by a closure flap 14, for example of cloth, connected, for example stitched, to the covering envelope 3 in order to leave accessible an opening for gaining access to the same pocket. For example, in case the closure flap 14 has a rectangular shape, this can be stitched to the covering envelope 3 along three sides, keeping free the fourth side, for example, the upper side. Advantageously, the pockets 10 comprise second means 11 for draining water or other liquids eventually collected in the same pockets due to operations of washing the individual protection device.

[0034] The second drainage means 11 can be variably shaped.

[0035] Generally, they can have the same arrangement of the previously described drainage means 5. Specifically, they can comprise one or more second drainage openings 12 formed in the closure flap 14, and one or more net-shaped elements 13 placed at said drainage openings 12 (see Figure 1d and 2c, for example). Alternatively (this embodiment is not shown in the figures), the second drainage means 11 can comprise second means for reversibly closing the drainage openings 12, in other words means shaped so that the drainage openings can switch from a closed configuration to an open one, and viceversa. For example, the second reversible closure means can comprise zipper systems. According to a possible further embodiment (not shown in the figures), closure rings fixed to the covering envelope 3 and to the closure flap 14 can be provided. The second drainage openings 12 of the pockets 10 are preferably placed at the lower portions of the latter, in order to enable to drain the water by gravity.

[0036] According to a further possible embodiment (see for example Figures 1e and 2d), the closure flap 14 is at least partially shaped as a net, in order to hold objects contained in the pocket, enabling to drain the water during the washing.

[0037] From the above given description, a person skilled in the art can appreciate that the individual protection device according to the invention can be accurately washed avoiding collections of water or detergents. This enables to rapidly dry it and therefore the possibility to rapidly use it again after the washing. Indeed, the presence of the drainage means enables the water or detergents possibly collected in the housing receiving the protection core, and also in the pockets, when provided, to rapidly flow out.

[0038] The individual protection device can be for example washed by totally dipping it in water or by dropping water from above on it, ensuring in this way an effective sanitization. The scope of the invention is defined in the appended claims.

Claims

1. Device (1) for the individual protection from ionizing radiations, particularly X-rays, comprising at least one protection core (2) suitable for shielding from said ionizing radiations, and at least one covering envelope (3) internally defining a housing (4) receiving said protection core, wherein said covering envelope (3) comprises means (5) for draining water or other liquids possibly collected in the housing (4) due to washing operations of the individual protection device (1), **characterized in that** said drainage means (5) comprise one or more drainage openings (8) formed in the protection envelope (3) and one or more net-shaped elements (9) placed at said one or more drainage openings (8).

2. Individual protection device (1) according to claim 1, wherein said covering envelope (3) comprises an

inner side (6) suitable for facing an user wearing the individual protection device (1), and an outer side (7) opposed to the inner side (6), wherein said drainage means (5) are placed at said inner side (6) and/or said outer side (7) of the covering envelope (3).

3. Individual protection device (1) according to claim 1 or 2, wherein, with reference to the normal arrangement of the individual protection device (1) when worn by an user, said drainage means (5) are placed at one or more lower portions of the covering envelope (3) of the individual protection device (1).

4. Individual protection device (1) according to anyone of the preceding claims, wherein the individual protection device (1) comprises one or more closure edges (15) extending along the contour of said covering envelope (3), said closure edges (15), said net-shaped elements (9) and said protection core (2) being connected to each other by stitches (16).

5. Individual protection device (1) according to anyone of the preceding claims, wherein said net-shaped elements (9) are made of polyester.

6. Individual protection device (1) according to anyone of the preceding claims, wherein said covering envelope (3) comprises one or more pockets (10) placed at one inner side (6) and/or one outer side (7) of the covering envelope (3), wherein the one or more pockets (10) comprise second means (11) for draining water or other liquids possibly collected in the same pockets due to washing operations of the individual protection device (1).

7. Individual protection device (1) according to claim 6, wherein said second draining means (11) comprise one or more second drainage openings (12) formed in the same pockets (10) and one or more second net-shaped second elements (13) placed at said one or more second drainage openings (12).

8. Individual protection device (1) according to claim 6, wherein said one or more pockets comprise a closure flap (14) connected to the covering envelope (3), said closure flap (14) being at least partially net-shaped.

9. Individual protection device (1) according to anyone of the preceding claims, selected in the group consisting of: lead-gowns, lead-skirts, lead-wraps, lead-aprons, lead-armcovers, lead-shouldercovers, lead-handcovers, lead intraoral exam aprons.

Patentansprüche

1. Vorrichtung (1) zum individuellen Schutz vor ionisierenden Strahlungen, insbesondere Röntgenstrahlung, die wenigstens einen Schutzkern (2), der zum Abschirmen gegen die ionisierenden Strahlungen geeignet ist, und wenigstens eine Abdeckhülle (3) umfasst, die im Inneren ein Gehäuse (4) definiert, das den Schutzkern empfängt, wobei die Abdeckhülle (3) Mittel (5) zum Ableiten von Wasser oder anderen Flüssigkeiten umfasst, die sich möglicherweise aufgrund eines Waschvorgangs von der individuellen Schutzvorrichtung (1) in dem Gehäuse (4) angesammelt haben, **dadurch gekennzeichnet, dass** die Ableitungsmittel (5) eine oder mehrere Ableitungsöffnungen (8), die in der Schutzhülle (3) ausgebildet sind, und ein oder mehrere netzförmige Elemente (9) umfassen, die an der einen oder den mehreren Ableitungsöffnungen (8) platziert ist/sind.

2. Individuelle Schutzvorrichtung (1) nach Anspruch 1, wobei die Abdeckhülle (3) eine Innenseite (6), die geeignet ist, um einem Benutzer gegenüberzuliegen, der die individuelle Schutzvorrichtung (1) trägt, und eine Außenseite (7) gegenüber der Innenseite (6) umfasst, wobei die Ableitungsmittel (5) an der Innenseite (6) und/oder der Außenseite (7) von der Abdeckhülle (3) platziert sind.

3. Individuelle Schutzvorrichtung (1) nach Anspruch 1 oder 2, wobei, unter Bezugnahme auf die normale Anordnung von der individuellen Schutzvorrichtung (1), wenn diese durch einen Benutzer getragen wird, die Ableitungsmittel (5) an einem oder mehreren unteren Abschnitten von der Abdeckhülle (3) von der individuellen Schutzvorrichtung (1) platziert sind.

4. Individuelle Schutzvorrichtung (1) nach einem der vorstehenden Ansprüche, wobei die individuelle Schutzvorrichtung (1) einen oder mehrere Schließränder (15) umfasst, die sich entlang der Kontur von der Abdeckhülle (3) erstrecken, wobei die Schließränder (15), die netzförmigen Elemente (9) und der Schutzkern (2) durch Nähte (16) miteinander verbunden sind.

5. Individuelle Schutzvorrichtung (1) nach einem der vorstehenden Ansprüche, wobei die netzförmigen Elemente (9) aus Polyester hergestellt sind.

6. Individuelle Schutzvorrichtung (1) nach einem der vorstehenden Ansprüche, wobei die Abdeckhülle (3) eine oder mehrere Taschen (10) umfasst, die an einer Innenseite (6) und/oder einer Außenseite (7) von der Abdeckhülle (3) platziert sind, wobei die eine oder die mehreren Taschen (10) zweite Mittel (11) zum Ableiten von Wasser oder anderen Flüssigkeiten, die sich möglicherweise in denselben Taschen aufgrund eines Waschvorgangs von der individuellen Schutzvorrichtung (1) angesammelt haben, umfassen.

7. Individuelle Schutzvorrichtung (1) nach Anspruch 6, wobei die zweiten Ableitungsmittel (11) eine oder mehrere zweite Ableitungsöffnungen (12), die in denselben Taschen (10) ausgebildet sind, und ein oder mehrere zweite netzförmige Elemente (13) umfassen, die an der einen oder den mehreren zweiten Ableitungsöffnungen (12) platziert sind.

8. Individuelle Schutzvorrichtung (1) nach Anspruch 6, wobei die eine oder die mehreren Taschen eine Schließklappe (14) umfasst/umfassen, die mit der Abdeckhülle (3) verbunden ist/sind, wobei die Schließklappe (14) wenigstens teilweise netzförmig ist.

9. Individuelle Schutzvorrichtung (1) nach einem der vorstehenden Ansprüche, ausgewählt aus der Gruppe bestehend aus: Röntgenumhängen, Röntgenkittel, Röntgenschürzen, Röntgenarmabdeckungen, Röntgenschulterabdeckungen, Röntgenhandabdeckungen, Röntgenschürzen für intraorale Prüfung.

Revendications

1. Dispositif (1) pour la protection personnelle contre les rayonnements ionisants, en particulier les rayons X, comprenant au moins un noyau de protection (2) convenant à une protection contre lesdits rayonnements ionisants, et au moins une enveloppe de recouvrement (3) définissant intérieurement un logement (4) recevant ledit noyau de protection, dans lequel ladite enveloppe de recouvrement (3) comprend des moyens (5) pour drainer l'eau ou d'autres liquides éventuellement recueillis dans le logement (4) en raison d'opérations de lavage du dispositif de protection personnelle (1), **caractérisé en ce que** lesdits moyens de drainage (5) comprennent une ou plusieurs ouvertures de drainage (8) formées dans l'enveloppe de protection (3) et un ou plusieurs éléments en forme de filets (9) placés sur lesdites une ou plusieurs ouvertures de drainage (8).

2. Dispositif de protection personnelle (1) selon la revendication 1, dans lequel ladite enveloppe de recouvrement (3) comprend un côté interne (6) convenant pour faire face à un utilisateur portant le dispositif de protection personnelle (1) et un côté externe (7) opposé au côté interne (6), dans lequel lesdits moyens de drainage (5) sont placés sur ledit côté interne (6) et/ou ledit côté externe (7) de l'enveloppe de recouvrement (3).

3. Dispositif de protection personnelle (1) selon la revendication 1 ou 2, dans lequel, en se référant à l'aménagement normal du dispositif de protection personnelle (1) lorsqu'il est porté par un utilisateur, lesdits moyens de drainage (5) sont placés sur une ou plusieurs parties inférieures de l'enveloppe de recouvrement (3) du dispositif de protection personnelle (1).

4. Dispositif de protection personnelle (1) selon l'une quelconque des revendications précédentes, dans lequel le dispositif de protection personnelle (1) comprend un ou plusieurs bords de fermeture (15) s'étendant le long du contour de ladite enveloppe de recouvrement (3), lesdits bords de fermeture (15), lesdits éléments de forme de filets (9) et ledit noyau de protection (2) étant raccordés l'un à l'autre par des points de couture (16).

5. Dispositif de protection personnelle (1) selon l'une quelconque des revendications précédentes, dans lequel lesdits éléments en forme de filets (9) sont constitués de polyester.

6. Dispositif de protection personnelle (1) selon l'une quelconque des revendications précédentes, dans lequel ladite enveloppe de recouvrement (3) comprend une ou plusieurs poches (10) placées sur un côté interne (6) et/ou un côté externe (7) de l'enveloppe de recouvrement (3), dans lequel les une ou plusieurs poches comprennent des seconds moyens (11) pour drainer l'eau ou d'autres liquides éventuellement recueillis dans les mêmes poches en raison d'opérations de lavage du dispositif de protection individuelle (1).

7. Dispositif de protection personnelle (1) selon la revendication 6, dans lequel lesdits seconds moyens de drainage (11) comprennent une ou plusieurs secondes ouvertures de drainage (12) formées dans les mêmes poches (10) et un ou plusieurs seconds éléments en forme de filets (13) placés pardessus lesdites une ou plusieurs secondes ouvertures de drainage (12).

8. Dispositif de protection personnelle (1) selon la revendication 6, dans lequel lesdites une ou plusieurs poches comprennent un rabat de fermeture (14) raccordé à l'enveloppe de recouvrement (3), ledit rabat de fermeture (14) étant au moins en partie en forme de filet.

9. Dispositif de protection personnelle (1) selon l'une quelconque des revendications précédentes, choisi dans le groupe constitué des robes de plomb, des jupes de plomb, des couvertures de plomb, des tabliers de plomb, des couvre-bras de plomb, des couvre-épaules de plomb, des gants de plomb et des tabliers d'examen intra-oral de plomb.

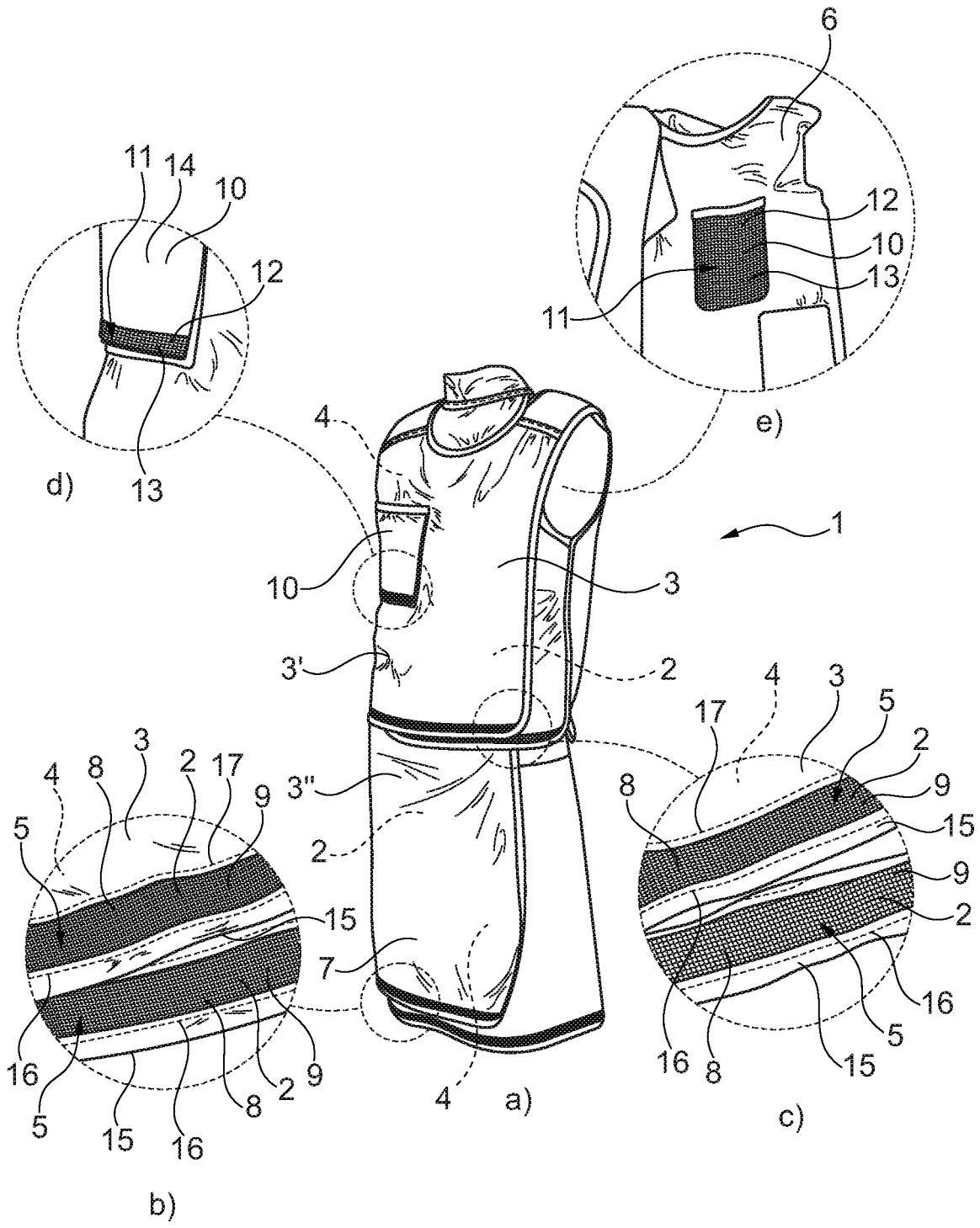
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Fig. 1

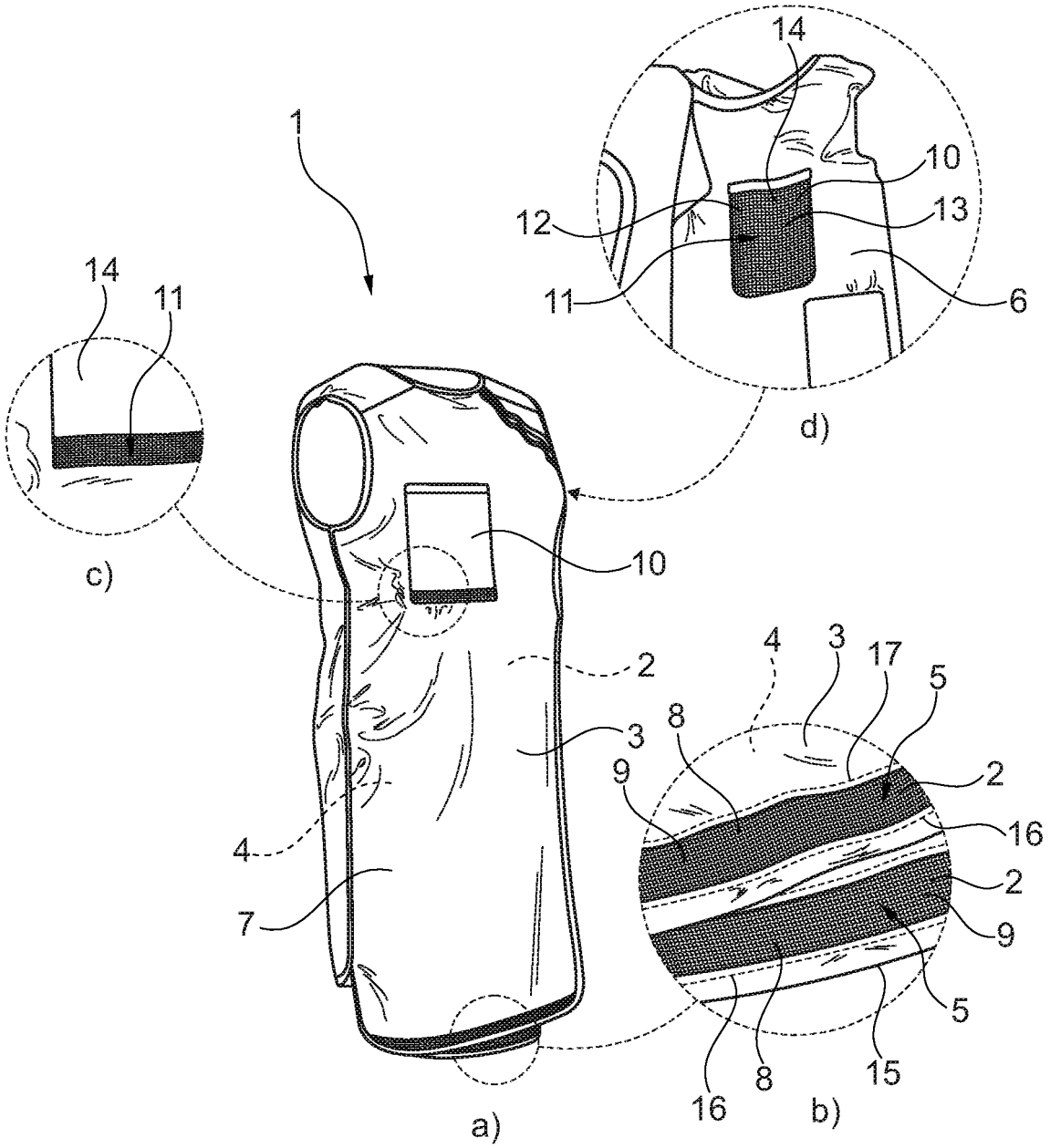

Fig. 2

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1321947 A2 **[0012]**
- CN 201733891 U **[0012]**