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Textile item of clothing

The invention relates to a textile item of clothing having a ballistic protection equipment.

5 The invention also relates to a textile item of clothing according to claim 14.

A textile item of clothing of the generic type is known from DE 10 2012 110 104 A1. WO 2014/060094 A1 discloses underwear having a ballistic equipment according to the preamble of claim 1.

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The term “ballistic protection equipment” is to be understood in particular as an item of personal protection equipment by way of items of clothing that are worn close to the body, on account of which the wearer of the item of clothing is to be protected from the effects of an explosion and from the shrapnel arising therefrom, or the effects of the latter on the wearer are to be reduced, respectively.

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It has been established in investigations that in the case of military personnel but also in the case of the civilian population in crisis zones, in particular in the regions in which terrorist activities arise regularly, injuries to the groin, in particular in the region of the genitals, increase sharply. The reason for this is inter alia that non-conventional blasting and incendiary devices, so-called IEDs, are used by terrorists. Said IEDs are in most instances blasting devices that are positioned on the ground, the effect thereof unfolding so as to proceed from the ground upward. Primary shrapnel and secondary shrapnel is created herein, both causing injuries in particular to the groin. Particles of sand, dust and dirt are also accelerated by the explosion. Furthermore, a shock wave and fire emanate from the blasting and incendiary devices.

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Underwear having a ballistic equipment is known from the prior art, reference being made to this end to US 6 961 958 B1. The underwear herein, for example underpants, has pockets into which the ballistic protection packs are pushed. The ballistic protection packs can be, for example, ballistic material with the designation SPECTRAFELX® by the Allied Signal Company. From US 6 961 958 B1 it is also known for aramid filaments or polyethylene filaments, for example Twaron™ and Dyneema® to be used in order for the protection packs which are to be pushed into the pockets to be produced.

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The device known from US 6 961 958 B1 protects comparatively well against frontal gun fire but can only insufficiently protect against explosions of the aforementioned non-conventional and close-to-ground blasting and incendiary devices. In the case of the protection packs that are

incorporated into the pockets there is furthermore the risk of said protection packs being unintentionally displaced. Moreover, the wearer of the underwear is restricted by the protection packs, for example when he/she has to move when lying or crawling on the ground.

- 5 A further disadvantage of known ballistic underpants lies in that the protection packs of the latter are only insufficiently adapted to the points in the groin which actually require protection in particular.

10 The document of the generic type discloses an item of underwear of which the base area is composed of a knitwear from UHMWPE (ultra-high-molecular-weight polyethylene) that impedes the ingress of shrapnel, and from a further textile material that deviates from the former. The dissimilar textile materials, or the dissimilar zones, respectively, from which the underwear is assembled, are sewn to one another. This invention was based on the concept that the entire item of underwear does not have to be configured from a uniform knitwear that impedes the ingress of
15 shrapnel, but substantially only those regions which require particular protection. In the context of this invention it has thus been assumed that it suffices for the knitwear from UHMWPE to be used in a first zone of the base area that requires particular protection. In contrast with the prior art such as is known from US 6 961 958 B1, the invention was furthermore based on the concept of dispensing with initially producing the underwear completely from a material without ballistic
20 equipment and of subsequently providing pockets for receiving ballistic protection packs. In contrast thereto, the document of the generic type discloses that the underwear is assembled by sewing to one another a plurality of mutually dissimilar textile materials. It is to be achieved on account thereof that the underwear has comparatively low weight per unit area and nevertheless a good protective effect.

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It has however been demonstrated that the protective effect of an item of underwear that is produced in a manner corresponding to the disclosure of the document of the generic type still deserves improvement. One issue is that the aforementioned IED explosive traps release their effect in three waves (shock, fire, fragments). A shock wave first acts on the textile item of clothing,
30 in particular the underwear. The latter is inflated on account thereof, and the seams by way of which the individual textile surfaces are sewn to one another can burst. Those surfaces that are intended to ensure ballistic protection do indeed remain substantially undamaged but are no longer necessarily located at the envisaged points, since all other surfaces have been destroyed and the seams in particular could have ruptured. Now, when shrapnel and dirt act on the body in the
35 second wave on account of the explosion, a ballistic protective effect is no longer reliably provided. The shrapnel and the dirt can thus ingress the body.

It has been demonstrated that a positive pressure is generated by the first wave that downright pumps up or inflates, respectively, the textile item of clothing. The protective clothing bursts on account of said pressure and inflation.

5 A disadvantage of all known textile items of clothing furthermore lies in that the buffering of perspiration as well as the transport of perspiration is unsatisfactory, in particular when UHMWPE is used. The perspiration is not transported to the outside but accumulates between the skin of the wearer and the item of clothing.

10 Quite generally textile items of clothing having a ballistic protection equipment cannot be worn comfortably on the skin.

A further significant disadvantage of the known textile items of clothing having a ballistic protection equipment lies in that they are ill suited to camouflaging. UHMWPE is available only in the colors
15 white and black. Both colors are ill suited to camouflaging of the textile item of clothing. Aramid products, as an alternative to UHMWPE, cannot be used to some extent and moreover have yellow patches which is very unfavorable in terms of camouflage.

A further disadvantage of aramid products lies in that they are not UV-resistant and therefore have
20 to be pushed into the clothing as packs welded into a black film, this again being detrimental to camouflaging. Furthermore, there is clothing from aramid products. Said clothing is indeed in most instances worn as underwear but is exposed to UV radiation in laundering and drying. Furthermore, the mechanical stability of aramid products is compromised by laundering.

25 The present invention is based on the object of achieving a textile item of clothing having a ballistic protection equipment which resolves the disadvantages of the prior art, offers a high level of protection, is easy to handle, and restricts the wearer as little as possible.

This object is achieved according to the invention by the features of claim 1.

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This object for a so-called combat shirt is also achieved by claim 14.

The textile item of clothing having a ballistic protection equipment has a knitted construction or a warp-/weft-knitted construction from at least two yarns, wherein the knitted construction or the
35 warp-/weft-knitted construction has ballistic proportions and flame-resistant proportions.

On account of the textile item of clothing being configured from a knitted construction or a warp-/weft-knitted construction from at least two yarns, the textile item of clothing can be designed in such a manner that the latter has a ballistic protective effect, preferably in particular a shrapnel

protection, and nevertheless is comfortable to be worn on the skin. The inventor has recognized that a textile item of clothing which can be designed so as to be of high strength in order for the wearer of the item of clothing to be protected from the effects of an explosion and from the shrapnel arising on account thereof, and additionally can have further properties, can be produced
5 by way of a combination of at least two yarns. As has been set forth, this has not been possible in the prior art.

The inventor has in particular recognized herein that in order for a sufficient ballistic protection to be achieved it is not necessary for the textile item of clothing to be produced only from a high-
10 strength material that protects against ballistic effects, but that it is possible for the textile item of clothing to be imparted further properties without compromising the ballistic protection.

The solution according to the invention enables in particular also that the buffering of perspiration as well as the transport of perspiration which is particularly unsatisfactory in the case of a pure
15 UHMWPE can be improved by adding a further yarn or in that at least one further yarn possesses corresponding moisture-absorbing and/or moisture-transporting properties.

The further yarn, or one of the further yarns, is preferably designed in such a manner that said yarn absorbs moisture from the body and thus supports the thermoregulation of the body. This property
20 is particularly advantageous in the case of textile items of clothing which are worn directly on the skin and potentially also under other layers of clothing.

A knitted construction is particularly suitable in those regions of a textile item of clothing in which a high elasticity is required. This applies in particular to those items of clothing which are worn
25 directly on the body. A particular advantage is derived in the case of so-called combat shirts in which it is provided that the torso part is worn directly on the body.

The solution according to the invention is in principle particularly suitable for combat shirts. The latter are long-sleeved or else short-sleeved shirts, the torso part of said shirts being worn tightly
30 on the body, wherein the (long-sleeved or short-sleeved) sleeve parts are designed from a woven material. The sleeve parts can preferably be designed as is commonplace in the case of sleeves of jackets. In the case of a combat shirt it is particularly advantageous for the torso part according to the invention to be configured from a knitted construction or a warp-/weft-knitted construction which has at least two yarns, wherein the knitted construction or the warp-/weft-knitted construction has
35 ballistic proportions and flame-resistant proportions. It is particularly advantageous herein for the entire torso part to be produced from the knitted construction or the warp-/weft-knitted construction.

The torso part herein is preferably configured in a seamless manner, wherein it can optionally be provided that the textile item of clothing has a seam so as to be able to form a textile structure, in

this case a torso, that is closed in an encircling manner from a flat-knitted textile part. It can optionally also be provided that the sleeve parts are attached to the torso part by seams or in another manner. The seams herein are preferably composed of high-strength ballistic yarns.

- 5 According to the invention the yarns are interknitted and form the knitted construction or the warp-/weft-knitted construction.

On account of the yarns being interknitted, the knitted construction or the warp-/weft-knitted construction can be produced in one piece and have the desired advantageous properties, that is
10 to say at least offer a ballistic protection and have a flame-resistant design embodiment.

The entire textile item of clothing is preferably formed by the knitted construction according to the invention or the warp-/weft-knitted construction according to the invention. It can be optionally provided that cuffs, in particular wristbands or neckbands, of the textile item of clothing are made
15 from another material or in a manner deviating from the above, and are subsequently connected to the knitted construction or to the warp-/weft-knitted construction. However, the cuffs can also be configured so as to be integral to the knitted construction or the warp-/weft-knitted construction.

It is in particular provided according to the invention that the textile item of clothing has a main
20 body produced in a unitary manner from the knitted construction or warp-/weft-knitted construction according to the invention having the ballistic and flame-resistant proportions. The knitted construction or the warp-/weft-knitted construction preferably forms the textile item of clothing.

The knitted construction or warp-/weft-knitted construction can be designed, for example be
25 knitted, in a unitary manner. However, it is also possible for the knitted construction or warp-/weft-knitted construction to have zones of dissimilar densities and/or thicknesses such that a plurality of zones can be configured, for example zones having a higher level of ballistic protection, or zones having a higher elasticity. The knitted construction or warp-/weft-knitted construction is nevertheless preferably embodied in a seamless manner.

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The configuration of knitting zones that are increased in density and/or thickness is particularly suitable for those points on the item of clothing where a higher level of ballistic protection is advantageous.

- 35 Interknitting the at least two yarns in order for the knitted construction or warp-/weft-knitted construction according to the invention to be configured can be performed, for example, in that each of the yarns used is provided on one or a plurality of wound packages, and the yarns are then mutually interknitted by way of a knitting program. It can also be provided herein that, for example, two yarns having ballistic proportions are interknitted with a yarn having flame-resistant

proportions. It can also be provided that the infed yarns have dissimilar thicknesses, for example the yarn having the ballistic proportion being configured so as to be thicker than the yarn having the flame-resistant proportion. Even further yarns having deviating properties can also be provided.

- 5 A particularly advantageous textile item of clothing results in that the yarns are collectively knitted to form a knitted construction or warp-/weft-knitted construction, as opposed to the solution known from the prior art in which the knitted construction has been produced only by one UHMWPE yarn.

Knitting one yarn which enables a ballistic protection with at least one further yarn expands the
10 protective function and the wear comfort of the textile item of clothing.

On account of being collectively knitted, the yarns result in an improved surface.

It is advantageous for the ballistic proportions of the knitted construction or warp-/weft-knitted
15 construction to be formed by a yarn impeding the ingress of shrapnel, said yarn comprising polyester or polyethylene, preferably ultra-high-molecular-weight polyethylene.

The use of a high-strength filament from polyester or polyethylene is particularly suitable for generating a ballistic protective effect for the textile item of clothing. Polyethylene, preferably ultra-
20 high-molecular-weight polyethylene, has proven particularly successful herein.

It can be provided according to the invention that the yarn impeding the ingress of shrapnel is composed of Dyneema®.

25 It is advantageous for a synthetic filament called Dyneema®, developed by the Dutch group Royal DSM N.V., or a synthetic filament called Spectra® by Honeywell International Inc. to be used as the yarn for configuring the ballistic proportion of the knitted construction or the warp-/weft-knitted construction.

30 The use of Dyneema® for the yarn which is to effect the ballistic protection has proven particularly suitable, in particular since Dyneema® has a high protective effect in terms of shrapnel and moreover is highly resistant to abrasion and scrubbing.

Besides the ballistic protective effect, a high-performance yarn from Dyneema® also has the
35 advantage that Dyneema® has very positive scrubbing indicators and high strength indicators such that the solution according to the invention, despite the ballistic protective effect, is also suitable for other applications which per se do not require any ballistic protective effect, such as, for example, for motorcyclists to whom a high scrubbing resistance is advantageous in the event of a fall.

Furthermore, the wear on the textile item of clothing is reduced on account of the high resistance to scrubbing.

Therefore, Dyneema® as one of the at least two yarns is particularly suitable for forming the
5 knitted construction or the warp-/weft-knitted construction and for representing a basic material therefor.

Dyneema® currently is commercially available in a black or a white color, wherein Dyneema® in a
black color, combined with a yarn in a further color, with a view to a particularly advantageous
10 camouflage for the textile item of clothing, as will yet be illustrated in more detail hereunder, is particularly suitable for the textile item of clothing according to the invention.

It is advantageous for the flame-resistant proportions of the knitted construction or of the warp-
/weft-knitted construction to be formed by a yarn having flame-retardant properties. The yarn can
15 be preferably configured from viscose or comprise viscose. Alternatively, the yarn can likewise preferably be configured as a spun-fiber yarn from a plurality of fiber components.

A configuration of this type in experiments has proven particularly suitable for providing textile
items of clothing with flame-retardant properties, or for imparting the flame-resistant proportion to
20 the knitted construction or warp-/weft-knitted construction. Furthermore, the yarns mentioned can be particularly advantageously processed using Dyneema® or another yarn which imparts the ballistic proportions to the knitted construction or the warp-/weft-knitted construction. The aforementioned yarns furthermore have further advantageous properties which enable the textile item of clothing to be imparted even further properties, as will be illustrated in yet more detail
25 hereunder.

The aforementioned yarns having the flame-retardant properties, in addition to the shrapnel
protection on account of the ballistic proportions, also impart the textile item of clothing flame-
retardant properties in particular on account of the yarns being interknitted. The yarns having the
30 flame-retardant properties are preferably chosen in such a manner, or present to such a proportion in the knitted construction or warp-/weft-knitted construction, respectively, that the knitted construction or warp-/weft-knitted construction withstands an exposure to a flame as per DIN EN 15025 for 10 seconds without dripping, melting, or the like, without the knitted construction or the warp-/weft-knitted construction having to be covered by a further textile layer (outerwear).

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The yarn having the flame-retardant properties is preferably composed largely of viscose. This
herein is a modified or flame-retardant viscose.

In the context of the invention, wherever mention is made of the term “viscose” this is to be generally understood to be a flame-retardant viscose.

5 The yarn having flame-retardant properties can preferably be produced from Viscont®. Viscont® is a filament yarn from 100% viscose. Alternatively, another yarn, preferably composed of 100% viscose can also be used as the flame-retardant yarn.

10 It can furthermore be provided according to the invention that the flame-retardant yarn as a spun-fiber yarn is composed of at least three fiber components including modacrylic, viscose, and one antistatic fiber, preferably Belltron®.

The spun-fiber yarn herein is preferably composed of only these three component parts, but can optionally also include even further components.

15 The spun-fiber yarn which has the flame-retardant properties can be configured from Protal®, for example. Protal® is a spun-fiber yarn from three fiber components (modacrylic, viscose, Belltron®), thus a yarn blend. The distribution of the three fiber components and the proportions thereof does not have to be performed in a uniform manner in the spun-fiber yarn but can be selected in a suitable manner.

20 A configuration of the yarn having the flame-retardant properties as a spun-fiber yarn offers further advantages; in particular, the spun-fiber yarn can be further modified in order for the textile item of clothing to be imparted additional desired properties such as illustrated hereunder.

25 It can be advantageous for the yarns having the flame-retardant properties to have a brown and/or green and/or beige color, for example. As opposed to most of the high-strength yarns such as, for example UHMWPE or aramid products, the yarns having the flame-retardant properties can be provided in various colors which with a view to a preferably provided camouflaging of the textile item of clothing is associated with particular advantages, as will be set forth hereunder.

30 It can be provided according to the invention that the knitted construction or the warp-/weft-knitted construction includes yarns which have a vector protection.

35 On account of the textile item of clothing having a vector protection, the wearer of the item of clothing is largely protected against sanguivorous insects and arachnids. The vector protection herein is preferably integrated into the yarns.

It is advantageous for the yarns having the flame-retardant properties to additionally have a vector protection. The inventor has established that a vector protection can be integrated into the yarns

having the flame-retardant properties in a particularly advantageous manner. Alternatively thereto, however, a further yarn could of course also be integrated into the knitted construction or the warp-/weft-knitted construction, or be interknitted with the other yarns, respectively, in order for a vector protection to be offered.

5

It is advantageous for the yarns which have the flame-retardant properties to be composed of viscose or to comprise viscose such as, for example, the aforementioned spun-fiber yarn, and for part of the viscose to be substituted by the vector protection. The proportion of viscose which is substituted by the vector protection, or the proportion of the vector protection on the flame-
10 retardant yarn, respectively, can be chosen in such a manner that the textile item of clothing has a suitable vector protection and it is simultaneously ensured that the incorporated quantity of the vector protection, or of the insecticide, preferably permethrin, respectively, does not have any negative effect on the wearer of the textile item of clothing. In terms of potential limit values, reference is made herein to the guidelines or parameters, respectively, of the WHO.

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It can be advantageous for the flame-retardant yarns to have a proportion by weight from 5 to 50%, preferably 10 to 30%, particularly preferably 10 to 20%, of a vector protection.

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It can be provided according to the invention that the flame-retardant yarn has a proportion of Cell Solution® Protection. Cell Solution® Protection is a natural cellulose fiber, the active ingredient permethrin for effectively repelling insects being stored in the interior thereof. The depositary structure of the fiber enables the permethrin to make its way from the interior of the fiber to the fiber surface in each laundry cycle. Alternatively, a similar product, in particular a product produced from similar component parts, can be used and integrated into the flame-retardant yarn, in
25 particular in that in the case of a spun-fiber yarn, or in the case of a yarn which otherwise would be produced from viscose up to a content of 100%, such as for example Viscont®, part of the viscose is substituted with Cell Solution® having the insect protection.

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The textile item of clothing according to the invention thus has a knitted or warp-/weft-knitted construction which can be provided in that two yarns are conjointly interknitted to form a knitted construction or to a warp-/weft-knitted construction, wherein the one yarn is a yarn, preferably a high-strength polyethylene, in particular UHMWPE, which impedes the ingress of shrapnel. The other yarn can be a yarn having flame-retardant properties (FR yarn) which is preferably modified in such a manner that said yarn additionally has a vector protection as has been described above.

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The vector protection can preferably be permethrin. On account of the optionally provided integration according to the invention of the vector protection into the flame-retardant yarn, said vector protection is distributed uniformly across the textile item of clothing such that the textile item

of clothing is equipped with the insect protection, or the vector protection, preferably permethrin, respectively, in a uniform manner.

The vector protection is preferably admixed to the flame-retardant yarn.

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Cell Solution® can be procured as a spinning compound and be mixed with a spun-fiber yarn, preferably Protal®. A yarn can then be produced by way of a spinning process.

10 The flame-retardant yarn (FR yarn) can preferably be a combination of Protal® and Cell Solution®, the latter two being mixed with one another and representing a yarn which is interknitted with the yarn having the ballistic properties, preferably UHMWPE, and particularly preferably Dyneema®.

A flame-retardant yarn which additionally has a vector protection is unknown in the prior art.

15 The yarn having the flame-retardant properties (FR yarn) can be produced from any arbitrary suitable material. This herein need not be a yarn which is composed of viscose or comprises viscose.

Flame-retardant yarns are well known in the prior art.

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A textile item of clothing which, besides a shrapnel protection, has flame-retardant properties, a positive wear comfort, and a vector protection is derived on account of the aforementioned design possibilities.

25 A vector protection is optional since a vector protection is not necessary for all applications. This applies in particular when the textile item of clothing is configured as underwear. In the case of underwear, in particular in military use in crisis zones, a shrapnel protection as well as flame-retardant properties are however advantageous, this also applying to the outerwear.

30 It is advantageous if the knitted construction or warp-/weft-knitted construction includes yarns which have an antistatic property.

To this end, it can be provided that the knitted construction or the warp-/weft-knitted construction has an additional yarn. The antistatic property of the textile item of clothing can however be
35 particularly preferably established in that one of the yarns already used, preferably the yarn having the flame-retardant properties, additionally also possesses antistatic properties. Antistatic properties can be achieved by admixing fiber components in the production of the yarn, for example. The flame-retardant yarn is preferably configured as a spun-fiber yarn and has a component part of an antistatic fiber component, for example Belltron®. The flame-retardant yarn

is preferably Protal® which is composed of three fiber components, wherein one of the fiber components is Belltron®. It can be sufficient for Belltron® to be added in a minor proportion by percentage, in particular of < 10%, preferably < 5%, particularly preferably 2% +/- 1%.

- 5 Any electrostatic charging which can inter alia be created by friction between different items of clothing is counteracted by way of the antistatic properties of the knitted construction.

It is advantageous for an external side of the textile item of clothing to have camouflage.

- 10 It can be furthermore provided according to the invention that the knitted construction or the warp-/weft-knitted construction includes yarns which are capable of being dyed in an arbitrary manner.

- In particular when the textile item of clothing is used in the military sector, and in particular when the textile item of clothing is an item of clothing which the wearer of the item of clothing wears on the outside, it can be advantageous for the textile item of clothing to have camouflaging.

- 15 Camouflaging can be particularly easily produced in that yarns of the knitted construction or warp-/weft-knitted construction are dyed in a suitable manner. To this end, it can be provided that the knitted construction or warp-/weft-knitted construction additionally comprises dyed yarns which optionally possess a vector protection and/or antistatic properties and/or properties which improve perspiration buffering and/or perspiration transport.

- 20 The inventor has however recognized that the yarn which possesses the flame-retardant properties is additionally also dyed in a suitable manner. As opposed to the known yarns which possess a ballistic protective effect, the FR yarns, that is to say the yarns which possess a flame-retardant property, can be readily dyed.

A camouflage effect can thus be generated by way of suitable dyeing of the yarns.

- It is advantageous for the camouflage to be provided by way of a coloration of the yarns of the knitted construction or of the warp-/weft-knitted construction.

- 30 Camouflaging can be produced in a particularly advantageous manner when said camouflage is generated by the yarns per se. It is to be noted herein that the yarns which generate a ballistic protective effect are in most instances present in predefined colors (for the sake of simplicity, white and black are also referred to as colors in the context of this description). A particularly suitable yarn, specifically UHMWPE, in particular present as Dyneema®-yarn, is available in white and more recently also in black. The inventor has recognized that the use of a black Dyneema® yarn for producing camouflaging is particularly suitable in conjunction with the flame-retardant yarn. It is particularly advantageous herein for the flame-retardant yarn to be used in a brown color, for

example light brown or dark brown, in a green color or in beige. At least a mottled surface, or a significantly better camouflage effect than to date, respectively, can be generated in conjunction with, for example, a black Dyneema® yarn. The yarns from a high-strength material known to date have not been suitable for camouflaging. Despite the color of the yarn having the ballistic
5 properties being awkward with a view to camouflaging, an overall design that is quite suitable for camouflaging can nevertheless be achieved by interknitting the at least two yarns. Additional yarns comprising further colors can be optionally added to the mix.

By mixing the preferably black filaments from the ballistically protective yarn, and in particular by a
10 design of the fiber having the flame-retardant properties that deviates in terms of color, it can be achieved that the knitted construction or warp-/weft-knitted construction has a mottled visual impact. A mixing ratio which leads to a black-brown appearance, black-green appearance, or a black-beige appearance, is particularly suitable to this end in terms of a color design.

15 The textile item of clothing according to the invention can have yarns which are dyed in an arbitrary color. A visual camouflage can be ensured on account thereof despite the awkward camouflaging parameters in terms of color of UHMWPE, for example. These properties enable the textile item of clothing to be worn not only when covered but also as an outerwear.

20 Alternatively or additionally to a suitable choice of colors for the yarns, the textile item of clothing can be printed with a camouflage color, on account of which the camouflaging effects can be further improved.

The invention enables a textile item of clothing to be provided with a ballistic protection and a
25 flame-retardant protection, and to additionally ensure even a suitable camouflage. This has not been possible in the prior art. For example, aramid products to some extent cannot be dyed and display yellow traces, this being very unfavorable in terms of camouflaging. The colors (white and black) in which UHMWPE is available are likewise unsuitable for camouflaging. The design embodiment of the invention described above now enables the textile item of clothing to also be
30 worn as an outerwear in the military sector.

It is advantageous for the knitted construction or the warp-/weft-knitted construction to have a mixture of yarns with different colors.

35 It can be furthermore advantageous for the camouflage to be formed or supported by printing the external side of the textile item of clothing with a camouflage color.

It is advantageous for the yarns having the flame-retardant proportion to be printed with a camouflage color in order for the camouflage to be configured.

A further advantage of the solution according to the invention lies in that yarns which have a proportion of viscose and thus in the case of a corresponding design embodiment can form the yarns having the flame-retardant properties, can be printed such that a camouflage print can be
5 produced.

The yarn having the flame-retardant properties can thus preferably have further properties combined therein, specifically have a vector protection and enable camouflaging, or contribute toward camouflaging, respectively, for example in that the yarn is suitably dyed in order for a
10 suitable effect to be achieved in conjunction with the high-strength yarn, and/or by printing the yarn having the flame-retardant properties.

In principle, it is also possible for the camouflaging design of the yarn having the flame-retardant properties, for example when said yarn is present as a spun-fiber yarn, in particular as Protal®, to
15 be influenced in that carbon black is admixed to the yarn in order for the remission values to be adapted.

It is advantageous for the knitted construction or the warp-/weft-knitted construction to be formed seamlessly from the interknitted yarns.
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The textile item of clothing is preferably composed of the knitted construction or the warp-/weft-knitted construction, and is preferably produced seamlessly.

In one design embodiment of the invention it can be provided that the textile item of clothing has a torso part which is composed seamlessly of the knitted construction or the warp-/weft-knitted
25 construction, and for example the sleeve parts of the textile item of clothing are additionally formed from another material, for example a woven material.

The inventor has recognized that the protective effect of the textile item of clothing can be significantly improved by way of a seamless design embodiment of the knitted construction or of
30 the warp-/weft-knitted construction, preferably of the entire textile item of clothing. An issue to date, specifically the bursting of seams on account of the shock wave in the event of an explosion, and the loss of the protective effect on account thereof, is thus avoided.

35 The inventor has furthermore recognized that it is very advantageous for the textile item of clothing to bear tightly on the body of the wearer, in particular when the textile item of clothing is an item of underwear or a T-shirt or a combat shirt, on account of which it is avoided that the textile item of clothing is inflated by the first shock wave.

It is particularly advantageous herein for the textile item of clothing to be designed in such a manner that said textile item of clothing bears tightly on the body of the wearer of the item of clothing not only by way of optionally provided cuffs, but for the item of clothing to be designed in such a manner that said item of clothing overall bears tightly on the wearer of the item of clothing.

5

The inventor furthermore has identified and solved another issue with the ballistically protected textiles from the prior art, in particular according to the document of the generic type. When individual zones are knitted independently of one another and are then assembled to form a textile item of clothing, open edges or default rupture points, respectively, are inevitably created. These open edges prevent the forces acting thereon from being ideally distributed, since the filaments on the periphery are directly severed and the force can be absorbed by the filaments only up to this cut surface. However, the function mode of soft ballistics is based on the absorption and distribution of the kinetic energy arising. The directly affected threads of the item of clothing are destroyed and/or elongated on account of the ingress of the projectile, and thus distribute the energy to the surrounding threads. On account of the woven fabric and the cross-laid structure generally having been produced in an orthogonal manner, said energy distribution is performed largely in the longitudinal and the transverse direction. The force by way of the intersection points of the fibers is distributed further to the surrounding threads, leading to a type of chain reaction. The energy thus spreads ever further to the individual threads until the projectile in its attempt to penetrate the textile layer has dispersed its kinetic energy and becomes lodged.

Artificial "default rupture points" are created in the cutting of the ballistic clothing such that the force acting on the yarns can only be absorbed up to the cut point. The preferably provided seamless configuration of the knitted construction or warp-/weft-knitted construction solves this issue. The arising force of the projectile can thus be transmitted across the entire textile area instead of only across the directly affected area. The interknitted yarns would thus discharge the force in a (theoretically) almost infinite manner, this leading to improved trauma values.

It can be provided according to the invention that the textile item of clothing is configured as underwear, underpants, groin protection, T-shirt, head scarf, bandanna, shrapnel-protection collar, scarf, balaclava, tubular scarf, combat shirt, torso part, or long-sleeved shirt.

It can also be provided that the textile item of clothing is configured as a glove, an inner glove, as a sock, as a spat, as a knee sock, as a bra, as a T-shirt, or as underwear having feminine shapes, respectively, as a shirt or as a long-sleeved shirt.

The textile item of clothing in all potential design embodiments can also be worn directly on the skin, that is to say that the textile item of clothing can also serve as underwear, or replaces an item of underwear, respectively.

In a design embodiment of the textile item of clothing as underpants it is advantageous for the latter to be designed in such a manner that the underpants, when correctly worn by the wearer, reach so far up that said underpants also cover even the navel, said underpants running in an encircling manner at this height. This has the advantage that the underwear overlaps with any potential protection vest that is additionally worn; in particular the kidneys can also be fully protected by the underwear and optionally by the protective vest on the rear of the person wearing the underwear.

It is furthermore advantageous if the textile item of clothing in a design embodiment as underpants reaches to the knee of a wearer, preferably terminating directly above the knee, when the wearer wears the underpants correctly.

The textile item of clothing according to the invention can have cuffs which are preferably connected to the knitted construction or warp-/weft-knitted construction in a seamless manner. The cuffs can comprise an elastic yarn or be formed by an elastic yarn. The cuffs herein can also be configured so as to be flame-retardant and/or breathable.

The cuffs in the case of the textile item of clothing do not have to be mandatorily present and/or be connected seamlessly to the knitted construction or warp-/weft-knitted construction according to the invention.

The term “cuffs” in the context of the invention also includes a design embodiment of the textile item of clothing having only one cuff.

An antibacterial equipment of the knitted construction or warp-/weft-knitted construction according to the invention can be advantageous.

It is advantageous for the knitted construction or warp-/weft-knitted construction according to the invention to have hydrophilic properties.

It is advantageous for the knitted construction or the warp-/weft-knitted construction according to the invention to be embodied with close-knit loops.

In the case of a design embodiment of the textile item of clothing as an item of clothing for the upper body, for example as an undershirt, T-shirt, or combat shirt, it can be advantageous for a padding to be incorporated or configured in the shoulder region, in order to facilitate the carrying of packing containers or backpacks. It can furthermore be advantageous for pockets to be

incorporated, preferably knitted thereinto, in the region of the sleeves and/or of the cuffs, for example for receiving smart phones, keys, access cards, pens, or the like.

5 It can be provided according to the invention that pockets and/or drawstring assemblies are integrated seamlessly into the knitted construction or warp-/weft-knitted construction.

The design embodiment illustrated above of a textile item of clothing for the upper body, having a padding and/or pockets, is suitable for both undershirts or T-shirts, respectively, for men as well as for undershirts or T-shirts, respectively, for women, wherein the undershirts and T-shirts can have
10 corresponding feminine shapes. The aforementioned design embodiments are moreover also suitable for a long-sleeved shirt, wherein the pocket in this case can preferably be configured in the sleeve parts, particularly preferably in the region of the upper arm.

15 It can be provided according to the invention that the textile item of clothing has a seam so as to be able to form a textile structure that is closed in an encircling manner from a flat and seamlessly knitted textile item of clothing.

This does not imply any change in the optionally provided seamless configuration of the knitted construction or warp-/weft-knitted construction of the item of clothing, but is owed only the
20 preferably provided production method which can provide that the ends of the flat-knitted item of clothing are to be interconnected so that a textile structure which the wearer can dress in is produced.

25 Depending on the knitting method, the seam so as to be able to form a textile structure that is closed in an encircling manner from a flat-knitted textile item of clothing can also optionally be completely dispensed with.

The aforementioned seam can optionally be designed as a “medical release” seam, so as to be able to rapidly remove the textile item of clothing from the body in the event of injury to the wearer.
30 A design embodiment of the seam as a “medical release” seam can also be expedient in particular in a configuration of the textile item of clothing as an inner glove or glove.

The textile item of clothing is preferably produced on a flat knitting machine.

35 It is provided according to the invention that the textile item of clothing is produced such that the latter bears on the body as tightly as possible.

The cuffs can be produced from an elastic and skin-friendly material. The cuffs are preferably connected to the remainder of the textile item of clothing, in particular of the underwear, the

underpants, the undershirt, the T-shirt, the head gear, the sock, the knee sock, the bra, the inner glove, the combat shirt, the glove, or the long-sleeved shirt, without seams.

5 It is advantageous for underpants designed according to the invention to be used in conjunction with an undershirt or a T-shirt, respectively, designed according to the invention.

10 It is also advantageous for the underpants and/or the undershirt, or the T-shirt, respectively, to be used in conjunction with a sock, a knee sock, a glove, an inner glove, and optionally a bra, designed according to the invention. A particularly advantageous comprehensive protection of the wearer results on account thereof.

15 In one particularly advantageous design embodiment, the glove, or the inner glove, can have tactile zones preferably on the finger tips. The glove can be worn alone, or else as an inner glove in a further glove.

20 The glove is preferably designed in such a manner that said glove has a high level of tactility in particular in the region of the finger tips, so as to enable or facilitate, respectively, the typical activities of a soldier such as shooting, or the operation of displays. A high level of tactility herein is particularly relevant in the region of the index finger in the bent state, and on the thumb.

25 The glove, or the inner glove respectively, according to the invention preferably has a seamless knitted construction or warp-/weft-knitted construction. Provided herein is at most one seam so as to form a closed structure from a flat-knitted textile. The seam in this instance is preferably embodied as a "medical release" seam, as has already been described.

30 The glove as well as the inner glove are preferably embodied so as to be pre-bent. The inner glove as well as the glove preferably have a fit that is as tight as possible. In the case of one design embodiment as an inner glove it can be provided that said inner glove fits under a combat glove.

35 In one design embodiment of the inner glove intended for being fixedly sewn to an outer glove it can be provided that the inner glove at the finger tips does not have any tabs by way of which the inner glove can be fixedly sewn into the outer glove.

It can be provided according to the invention that in the case of a design embodiment as an inner glove the latter in part-regions has silicone yarns or a partial application of silicone. On account thereof it is to be prevented, if necessary, that the gloves slide excessively on one another and no grip is offered. Silicone can furthermore facilitate the operation of buttons and other apparatuses.

It can be provided according to the invention that the internal side of the glove is equipped so as to be hydrophilic, for example by way of plasma processing.

5 A particularly preferred design embodiment of a textile item of clothing according to the invention can be derived from claim 15. The combat shirt illustrated therein can be combined with the further features and combinations of features which are disclosed in the present description, insofar as this is not precluded.

10 In one particularly preferred embodiment of the invention the textile item of clothing has a torso part which is formed from a knitwear having at least two interknitted yarns, wherein sleeve parts from a woven material are attached to the torso part.

The torso part and the sleeve parts herein, in one particularly preferred design embodiment, configure a combat shirt.

15 The torso parts are preferably knitted in a seamless manner from the at least two yarns. The sleeve parts are preferably sewn to the torso part.

20 The torso part can be designed in such a manner as has been illustrated above in the context of the invention, or as will be illustrated hereunder, respectively.

The torso part is that part of an item of clothing that covers a human torso, the sleeve parts being that part of the item of clothing that at least partially covers the human arms when the item of clothing is worn correctly.

25 The torso part is preferably produced completely from the knitted construction or warp-/weft-knitted construction according to the invention, and thus has a unitary construction. A construction of this type has proven suitable in particular for the production of a so-called combat shirt which meets the function of an item of underwear, or of a shirt, respectively, as well as that of a combat jacket, or
30 can substitute said item of clothing, respectively. The sleeve parts can be configured so as to be short-sleeved but preferably also long-sleeved.

The sleeve parts from the woven material preferably likewise have a ballistic protective effect. The sleeve parts from the woven material additionally preferably also have flame-retardant properties.

35 The torso part can be provided with cuffs, in particular in the region of the neck opening and also on the lower end of the torso part that faces away from said neck opening. The cuffs can be designed and attached in such a manner as has already been described.

The textile item of clothing having the torso part from a knitwear and the sleeve parts from a woven material, hereunder (and hereabove) being referred to as a combat shirt, is particularly suitable in the case of comparatively high outdoor temperatures, in order for said combat shirt to be worn instead of a combat jacket. The sleeve parts herein can preferably be formed by a woven item
5 having a camouflage print. The woven item, or the woven material, respectively, lead to the sleeve parts withstanding high loads, in particular also under the influence of moisture, and having high strength values. The sleeve parts can furthermore be produced such that said sleeve parts have a high air permeability.

10 The torso part of the combat shirt is preferably embodied having a high collar.

The combat shirt is particularly suitable for use in combination with a ballistic protection vest. Irritating or rubbing seams are dispensed with on account of the knitted embodiment of the torso
15 part.

The torso part and also the sleeve parts can possess flame-retardant properties and/or antistatic properties and/or antibacterial properties. The combat shirt can be configured so as to be hydrophilic.

20 It can be provided according to the invention that the combat shirt is used as underwear, that is to say that an additional layer of underwear worn underneath is not necessary. An optimal transport of moisture can be guaranteed by a conception of the combat shirt close to the body. A duct that runs continuously from the hem to the neckband, embodied in knitting technology, can be provided in order to achieve a Venturi effect, on account of which the transport of moisture through the shirt
25 is improved.

A positive discharge of heat and moisture by way of the neck region to the environment is achieved on account of the knitting technology for achieving the Venturi effect, to which end the high collar is also particularly suitable.

30

The sleeve parts of the combat shirt are preferably made from a light, flame-retardant twill. The upper material can be embodied in a camouflage print. A vector protection, preferably applied to both sides, and hydrophilic properties on the internal side of the sleeves, can be provided. It can be provided according to the invention that pre-shaped pockets, preferably from a highly abrasion-
35 resistant and flame-retardant polyamide, are provided on the elbows, in particular flexible elbow protectors, preferably in the design embodiment as described in DE 20 2013 100 788 U1, being receivable in said pockets.

The elbow protectors can be provided so as to be right-specific/left-specific, having pressed motion creases and special convexities for protecting the elbow and/or the upper forearm. The sleeve parts can furthermore have pockets in the region of the upper arms, said pocket serving as storage space. A loop-fastener tape which serves for receiving a rank badge and optionally serves
5 simultaneously as a pen holder can furthermore be provided.

The sleeve parts can preferably have even further pen pockets, for example in the region of the front left sleeve.

10 The sleeve ends are preferably tailored so as to be relatively wide in such a manner that said sleeve ends can be turned up in the region of the pulse.

It can also be provided that the width of the sleeve end is adjustable by way of a tab having an adhesive closure.

15 According to the invention, a ventilation having a mosquito net can be incorporated in the lower arm region of the sleeve parts. To this end, a zip fastener, in particular a two-way zip fastener, which can preferably be opened in an O-shaped manner can be provided.

20 It is advantageous if short zip fastener slides and optionally a zip fastener accommodation are provided at the ends of the ventilation openings, on account of which the generation of noise is reduced. The sleeve parts can preferably be embodied in a raglan construction. The sleeve parts can preferably be connected to the torso part by way of a flatlock seam.

25 The combat shirt preferably has a highly raised stand-up collar in which all opening possibilities have been dispensed with. This is advantageous in order for pressure points to be avoided in this region when a protective vest or a carrying or protective equipment is used.

30 The upper material of the torso part can possess camouflaging properties, but this is not mandatory since the torso part in use is covered by a carrying and protective equipment which already has a camouflage function. The material of the torso part and of the stand-up collar can preferably be configured so as to be hydrophilic and antibacterial.

35 The combat shirt can be worn in particular in combination with a ballistic protection vest and a carrying and protective equipment as is commonplace in the case of military personnel. This represents a particularly advantageous inventive use.

The combat shirt described above can represent an independent invention, since the solution according to the invention is particularly suitable therefor.

The figures show in each case exemplary embodiments in which individual features of the present invention are illustrated in combination with one another. The features of one exemplary embodiment are implementable also independently of the other features of the same exemplary embodiment and can correspondingly be combined by a person skilled in the art to form further expedient combinations with features of other exemplary embodiments.

In the figures:

10

figure 1 shows a front view onto a textile item of clothing in a design embodiment as underpants;

figure 2 shows a rear view of the underpants illustrated in figure 1;

15

figure 3 shows a front view onto a textile item of clothing in a design embodiment as a T-shirt or undershirt, respectively;

20

figure 4 shows a rear view of the T-shirt or of the undershirt, respectively, illustrated in figure 3;

figure 5 shows a front view onto a textile item of clothing in a design embodiment as a headgear;

25

figure 6 shows a rear view of the headgear illustrated in figure 5;

figure 7 shows a front view onto a textile item of clothing in a design embodiment as a knee sock;

30

figure 8 shows a front view onto a textile item of clothing in a design embodiment as a glove or an inner glove, respectively;

figure 9 shows a rear view of the glove or inner glove, respectively, illustrated in figure 8;

35

figure 10 shows a front view onto a textile item of clothing in a design embodiment having a torso part from a knitwear and sleeve parts from a woven material;

figure 11 shows a rear view of the textile item of clothing illustrated in figure 10;

figure 12 shows a schematic illustration of a section through a spun-fiber yarn having flame-retardant properties and a vector protection; and

figure 13 shows a schematic illustration of a knitting process for producing the knitted construction according to the invention.

The production of textiles and the various processing methods for textiles are well known from the general prior art, only the specific particularities of the textile item of clothing according to the invention therefore being discussed in more detail hereunder.

A flat knitting machine is particularly suitable for the production of the textile item of clothing according to the invention.

All of the features of the exemplary embodiments illustrated hereunder, in particular those features that are illustrated by means of the various embodiments of the textile item of clothing, can be combined with one another in an arbitrary manner. Those features that are mentioned in the context of one embodiment can also be transferred to the other embodiments so as to produce further advantageous variants of the textile item of clothing according to the invention. Furthermore, those features of the embodiments that are not explicitly identified as relevant to the invention can also be omitted.

The exemplary embodiments illustrated hereunder show a textile item of clothing which is configured as underpants 100, or as an undershirt 200 or T-shirt, respectively, or as a headgear 300, head scarf, scarf, tubular scarf, or balaclava, respectively. However, the invention is not limited thereto. These can also be other items of clothing in which a ballistic protection is advantageous.

The exemplary embodiments illustrated likewise show a textile item of clothing which is configured as a knee sock 400, or as a glove or an inner glove 500, respectively.

Figures 10 and 11 show a design embodiment of the textile item of clothing as a so-called combat shirt 600 which will be illustrated in yet more detail hereunder.

The underpants 100 illustrated relates to underpants for men. Underpants for women can however also be designed in an analogous manner.

Figure 1 shows a textile item of clothing having a ballistic protection equipment in a design embodiment as underpants 100. The underpants are configured as a knitted construction 1, or as a knitwear from at least two yarns 2, 3 (not illustrated in more detail in figure 1), respectively. Exactly

two yarns are provided in the exemplary example, however another number of yarns is also possible here. The yarns 2, 3 are schematically illustrated in figure 13 by means of the knitting process.

5 A knitted construction 1 is illustrated and described in the exemplary embodiment; the textile item of clothing can also be constructed in an analogous manner as a warp-/weft-knitted construction. A few embodiments of the textile item of clothing are furthermore illustrated in only an exemplary manner in the exemplary embodiment.

10 The knitted construction 1 in figure 1, as well as in figures 2 to 11, is configured in such a manner that said knitted construction 1 has ballistic proportions and flame-resistant proportions.

The yarns 2, 3 which form the knitted construction 1 are interknitted, as is schematically shown in figure 13.

15

The knitting process which is shown in an exemplary manner in figure 13 can be performed in a known manner; circular knitting can also be provided, for example.

The yarns 2, 3 can be mutually entwined, twisted, or be interknitted in another manner.

20

It is provided in the exemplary embodiments that the ballistic proportions of the knitted construction 1 are configured by a yarn 2 that impedes the ingress of shrapnel. The yarn 2 herein can be composed of polyester or polyethylene. A configuration of the yarn 2 as UHMWPE (ultra-high-molecular-weight polyethylene) is provided in the exemplary embodiment.

25

A particularly suitable UHMWPE is marketed by the Dutch chemical company Royal DSM N.V. under the trade name Dyneema®. Dyneema® is a high-strength polyethylene filament having a tensile strength of 3 to 5 GPa. Dyneema® is a highly crystalline, highly oriented UHMWPE. The Dyneema® filament is indeed very suitable for the production of the yarn 2; the invention is
30 however not limited thereto.

The Dyneema® used in the exemplary embodiment has a black color.

35

It is furthermore provided in the exemplary embodiment that the flame-resistant proportions of the knitted construction 1 are formed by a yarn 3 having flame-retardant properties. To this end, a yarn from viscose, in particular from 100% viscose, for example Viscont®, is particularly expedient. It is furthermore expedient for the yarn 3, as is schematically illustrated in the exemplary embodiment by means of figure 12, to also be configured as a spun-fiber yarn 3 from a plurality of fiber components.

The spun-fiber yarn 3 can be made available by way of a Protal® yarn. The plurality of fiber components from which the spun yarn 3 is formed can preferably be modacrylic 4, viscose 5, and Belltron® 6. This represents a usual construction for a Protal® yarn.

5

The yarn 3 having the flame-retardant properties in the exemplary embodiment has a brown color. However, other designs in terms of color, in particular also green or beige, are also possible here.

10

A particularly advantageous configuration of the yarn 3 as a spun yarn is provided in the exemplary embodiment, wherein a further fiber component 7 which provides a vector protection has been additionally added. The yarn 3 thus also includes a vector protection 7 in addition to the flame-retardant property. The vector protection can account for a proportion by weight of 5 to 50%, preferably 5 to 20%, particularly preferably 10 to 20%, of the weight of the flame-retardant yarn. The values are preferable; the invention is not limited thereto.

15

As can be derived from figure 12, the yarn 3 can preferably have four components, specifically modacrylic 4, viscose 5, Belltron® 6, and the vector protection 7. The vector protection 7 can be configured, for example, as Cell Solution® which is provided with an insect protection. The yarn 3 herein can be achieved in that, for example, the fiber components modacrylic 4, viscose 5, and Belltron® 6, in particular potentially also already assembled as Protal®, are mixed with a Cell Solution® fiber and by way of known processes are connected, for example spun, so as to form a yarn 3.

20

These methods in principle are known from the prior art.

25

The knitted construction 1 illustrated in the exemplary embodiments has antistatic properties. In the exemplary embodiment this is achieved in that the yarn 3 preferably has an antistatic component. Belltron® 6 is illustrated here in an exemplary manner as an antistatic component in figure 12. However, other antistatic components can also be used here.

30

It is provided in the exemplary embodiment that at least those textile items of clothing that are worn by the wearer of the item of clothing on the external side, or as an outer layer, respectively, have camouflaging 8. Camouflaging of this type can be dispensed with in the case of the underpants 100, or of the T-shirt 200, respectively. However, it is advantageous for the glove 500 illustrated in figures 8 and 9 to also have camouflaging, in particular when said glove is an outer glove. This can optionally be dispensed with for an inner glove.

35

The camouflaging 8 in the exemplary embodiment can be achieved in particular by a suitable coloration of the yarns 2, 3 of the knitted construction 1. It is to be observed herein, in particular

when the yarn 2 is configured as a Dyneema® yarn, that only two colors are available, specifically white and black. A black yarn 2 is used here in the exemplary embodiment, wherein the yarn 3 in this instance has a suitable deviating color so as to produce camouflaging, preferably also a mottled effect.

5

Additionally, it can also be provided in a manner not illustrated in more detail that the external side of the textile item of clothing is printed with a camouflage color in order for camouflaging 8 to be produced.

10

It is furthermore provided in the exemplary embodiment that the yarn 3 enables a perspiration buffering and/or perspiration transport, the yarn 3 preferably being configured so as to be hydrophilic.

15

It is furthermore provided in the exemplary embodiment that the knitted construction 1 is produced seamlessly from the interknitted yarns 2, 3. However, as is illustrated in an exemplary manner in figure 1, it can be provided herein that the textile item of clothing has two seams 9 in order for a textile structure that is closed in an encircling manner, this in the exemplary embodiment being the underpants 100, to be formed from the flat-knitted textile item of clothing.

20

The textile item of clothing can possess pockets 10 (figures 3 and 4) or else drawstring assemblies, which are preferably integrated in a seamless manner.

25

It is not illustrated in the exemplary embodiment but in principle possible that the textile item of clothing is not composed completely of the knitted construction 1 but has further elements, in particular elastic inserts in order for the wear comfort to be enhanced. However, this is preferably not provided, but is in principle possible in particular in the embodiments as per figures 1 to 11.

30

The knitted construction 1 in the exemplary embodiments can in each case be knitted in a unitary manner. However, it is also possible for the knitted construction 1 to have zones that are knitted in a dissimilar manner, in particular zones of dissimilar densities and/or thicknesses.

35

As can be derived from figures 1 and 2, the underpants 100 illustrated there has cuffs 11, wherein the cuffs 11 can comprise an elastic yarn or be formed by an elastic yarn (not illustrated in more detail). A particularly high elasticity is advantageous in this region. A flame-retardant design embodiment can again be provided also here. The yarn that is used for producing the cuffs 11 can be an entwined yarn of a suitable construction.

A material which is typically used for producing cuffs and in particular has a high elasticity can also be used here.

A seam 9 is illustrated in an exemplary manner in figure 1. This seam 9 serves only for forming a textile structure that is closed in an encircling manner, this being underpants according to figure 1, from the flat-knitted and seamlessly knitted textile knitwear. This depends on the knitting machine.

5 The use of a flat knitting machine is provided in the exemplary embodiment, wherein the ends of the flat-knitted and seamlessly knitted knitwear produced are to be interconnected in order for a closed textile structure to be configured. A closed textile structure herein is to be understood in that the latter has, for example, the shape of underpants 100, an undershirt 200, a T-shirt, a headgear 300, a headscarf, the tubular scarf, a balaclava, a sock, a knee stock 400, a glove or an inner
10 glove 500, respectively, a jacket, combat shirt 600, pants, combat pants for the military, a shrapnel-protection collar, groin protection, or a torso part 17.

Figure 2 shows the underpants 100 from the rear side.

15 Figures 3 and 4 show a design embodiment of the textile item of clothing according to the invention as an undershirt 200 or T-shirt. For reasons of simplification, reference is made hereunder to an undershirt 200, however this can likewise also be a T-shirt. The undershirt 200 in figures 3 and 4 in an exemplary manner is configured having sleeves, this however being optional.

20 A carrying strap or rescue handle 9, respectively, is optionally configured in figures 3 and 4, by way of which it is intended to be possible for the wearer of the undershirt 200 to be lifted or for said wearer in the event of an injury to be transported out of the danger zone, respectively. The rescue handle 9 herein in the exemplary embodiment, proceeding from the back, runs across the chest and/or from the back under the armpits up to the shoulder and on the rear around the nape of the
25 wearer when the undershirt 200 is worn correctly. In terms of the exact profile reference is made to the drawn illustration in figures 3 and 4. The rescue handle 9 is of course not limited to the exact profile.

As can be derived from figures 3 and 4, the rescue handle 9 preferably runs in such a manner that
30 said rescue handle 9 has a spacing from the cuffs 4 which runs around the neck of the wearer, such that a hand can grip below the rescue handle 9 in this region so as to lift the wearer of the undershirt 200. The rescue handle 9 in the case of the undershirt 200 is preferably formed from a high-strength yarn.

35 In the case of a configuration as an undershirt 200 according to figures 3 and 4 it is optionally provided that two paddings 13 are configured in the region of the shoulders, so as to facilitate the carrying of backpacks or packing containers. Said paddings 13 can be implemented in that a separate pad is attached, or in that the knitted construction 1 in this region has a corresponding

design, for example also on account of the configuration of a knitted spacer, optionally without a ballistic protective effect being provided here.

5 It is likewise optionally provided in the case of the undershirt 200 illustrated in figures 3 and 4 that pockets 10 are configured, preferably knitted, into the region of the sleeves and/or in the region of the waist, in particular in the region of the cuffs 4 running around the waist. The pockets 10 are intended to be suitable, for example, for receiving a smart phone, a key, an access card, or other small items.

10 Figures 5 and 6 show a design embodiment of the textile item of clothing as a headgear 300, scarf, headscarf, tubular scarf, or balaclava. For reasons of simplification, reference is made hereunder only to a headgear 300. This herein can however also be a scarf, a headscarf, a tubular scarf, or a balaclava.

15 It is provided in figures 5 and 6 that the mouth is covered by a zone 14 which has a higher air permeability and optionally is not part of the knitted construction 1 according to the invention.

The headgear 300 can have an elastic knitwear 15 in the manner of a net, which is preferably breathable and in particular elastic. The elastic knitwear 15 in the manner of a net can be located
20 in the upper head region of the headgear and optionally not be part of the knitted construction 1 according to the invention.

The terms “upper head region of the headgear 300” is understood to be that region of the headgear 300 which, when the headgear 300 is worn correctly, bears on an upper region of the
25 head of the wearer, said upper region proceeding from a lower region of the forehead of the wearer and in an encircling manner extends upward. This region in the case of deployed forces is typically protected by a helmet such that the headgear 300 in this region does not have to possess any high-strength yarn, that is to say no ballistic protection.

30 The headgear 300 preferably has camouflaging 8.

Figure 7 shows a potential design embodiment of the textile item of clothing as a knee sock 400. Alternatively, a design as a sock can also be provided. The knee sock 400 (not illustrated in more detail in figure 1) can optionally have elastic zones. A cuff 11 is illustrated in figure 7.

35

Figures 8 and 9 show a potential design embodiment of the textile item of clothing as a glove, or as an inner glove 500, respectively.

As can be derived from figure 9, the glove 500 optionally has tactile zones 16 at the fingertips. The tactile zones 16 are designed in such a manner that the operation of displays or else the operation of a trigger of a weapon is simplified.

- 5 A silicone yarn or a partial silicone application can be provided on part-locations of the inner glove 500 in a manner not illustrated in more detail. It can also be provided that the tactile zones 16 are configured from silicone. The glove 500 in a manner likewise not illustrated in more detail can have at most one seam which preferably serves as a “medical release” seam.
- 10 The glove illustrated in figures 7 and 9 is preferably pre-bent, as illustrated. The inner glove 500 in a manner not illustrated in more detail can have small tabs on the fingertips, the inner glove 500 with the aid of said small tabs being able to be fixedly sewn into an outer glove (not illustrated). The inner glove 500 can however also be configured as an outer glove.
- 15 The inner glove 500 according to figures 8 and 9 is preferably a seamless knitted construction 1 from two yarns 2, 3.

Figures 10 and 11 show a textile item of clothing in a particularly preferred embodiment as a combat shirt 600. The combat shirt 600 has a torso part 17 and two sleeve parts 18. The torso part 17 is a knitwear, or is preferably formed entirely by the knitted construction 1 according to the invention, respectively. The knitted construction 1 is preferably formed by the yarns 2, 3. The torso part 17 of the combat shirt 600 is seamlessly knitted from the knitted construction 1. The sleeve parts 18 are formed from a woven material, that is to say from a woven item. The sleeve parts 18 herein are configured so as to be long-sleeved, but a short-sleeved configuration is also possible.

25 The sleeve parts 18 in the exemplary embodiment are sewn to the torso part 17. The torso part 17 has a highly-raised collar 19 which is configured as a cuff 11. The torso part 17 furthermore has a further cuff 11 preferably on the lower end that faces away from the neck opening. The torso part 17 as well as the collar 19 in the exemplary embodiment have flame-retardant properties and are configured so as to be antistatic and preferably also antibacterial and hydrophilic. The torso part 17 in the exemplary embodiment is configured as a seamless tube.

30 The torso part 17 according to the exemplary embodiment can preferably be provided in order for said torso part 17 to be worn directly on the body, that is to say that wearing underwear there below is not required. The torso part 17 meets the function of underwear.

In the exemplary embodiment it is provided in a manner not illustrated in more detail that the sleeve parts 18 are made from a light, flame-retardant twill. It is likewise provided in a manner not illustrated that the sleeve parts 18 have a camouflage print, preferably a three-colored camouflage

print. Pockets 20, preferably for receiving flexible elbow protectors (not illustrated) are provided on the elbows of the sleeve parts 18.

5 The sleeve parts 18 in the region of the sleeve ends have in each case one tab 21 having adhesive closures in order for the width of the sleeve ends to be able to be adjusted. This, like the pockets 20, is optional.

10 It is furthermore optionally provided in the exemplary embodiment for a pen pocket 22 to be configured in the region of the front end of the left sleeve part 18. A mosquito net which can preferably be opened and closed by a zip fastener can be provided in a manner not illustrated in more detail for ventilation in the region of the forearm of the sleeve parts 18.

15 Further pockets 20 can be optionally provided as storage space in the region of the upper arms of the sleeve parts 18. Furthermore, a loop-fastener tape for receiving rank badges and optionally for simultaneously serving as a pen holder can be provided.

20 The collar 19 in the exemplary embodiment is embodied as a stand-up collar in which all potentials for openings have been dispensed with in order to avoid pressure points which can be created when the combat shirt 600 is preferably conjointly worn with a carrying and protective equipment. The combat shirt 600 replaces the underwear, preferably an undershirt, and can be worn as the bottom-most layer on the body. The combat shirt 600, on account of the design embodiment having the sleeve parts 18, furthermore substitutes a combat jacket, in particular in the case of high temperatures. A comprehensive protection for the upper body results when the combat shirt 600 is worn conjointly with the ballistic protective vest; camouflaging 8 for the torso part 17 can
25 therefore optionally also be dispensed with.

30 However, camouflaging 18 which can be derived by a suitable choice of color of the yarns 2, 3, in particular of the yarn 3, and optionally alternatively and additionally by a camouflage print, is provided in the exemplary embodiment as per figures 10 and 11.

The textile item of clothing according to the invention can also be a so-called smock which is a combat jacket or a so-called deployment or commando jacket.

35 Figure 12 shows a potential construction of the flame-retardant yarn 3, wherein the flame-retardant yarn 3 as component part has modacrylic 4, viscose 5, Belltron® 6, and a vector protection 7, preferably Cell Solution®.

Figure 13 shows a knitting process in principle. Underpants 100 which have a knitted construction 1, produced by the yarns 2, 3, are illustrated. The yarns 2 and 3 are unwound from the wound

packages 23. A knitting machine 24 is provided herein for knitting. According to the invention it can also be provided herein that in particular the yarn 2 is unwound from two wound packages 23 such that the knitted construction 1 is composed of two yarns 2 and one yarn 3. This is however optional. Two wound packages 23 for the yarn 3 are also illustrated in figure 13.

Patentkrav

- 1.** Tekstilbeklædningsgenstand med et ballistisk beskyttelsesudstyr, hvor tekstilbeklædningsgenstanden har en strikkonstruktion (1) eller en vævningskonstruktion af mindst to garner (2, 3), hvor strikkonstruktionen (1) eller vævningskonstruktionen har ballistiske afsnit og ildbestandige afsnit,
kendetegnet ved, at
garnerne (2,3) er strikket sammen og danner strikkonstruktionen (1) eller vævningskonstruktionen.
- 10 **2.** Tekstilbeklædningsgenstand ifølge krav 1,
kendetegnet ved, at
de ildbestandige afsnit af strikkonstruktionen (1) eller af vævningskonstruktionen er dannet af et garn (3) med flammehæmmende egenskaber, hvor garnet (3) er udformet af viskose, eller garnet (3) er udformet af spun-fibergarn med en flerhed
15 fiberkomponenter.
- 3.** Tekstilbeklædningsgenstand ifølge krav 2,
kendetegnet ved, at
garnet (3) med de flammehæmmende egenskaber er dannet af Viscont, eller at
20 det flammehæmmende garn (3) som et spun-fibergarn består af mindst tre fiberkomponenter, herunder modakryl, viskose og Belltron.
- 4.** Tekstilbeklædningsgenstand ifølge et af kravene 2 eller 3,
kendetegnet ved, at
25 garnerne (3) med de flammehæmmende egenskaber har en brun og/eller grøn og/eller beige farve.
- 5.** Tekstilbeklædningsgenstand ifølge et af kravene 1 til 4,
kendetegnet ved, at
30 strikkonstruktionen (1) eller vævningskonstruktionen indeholder garnet (3), som har en vektorbeskyttelse (7).
- 6.** Tekstilbeklædningsgenstand ifølge krav 5,
kendetegnet ved, at

garnerne (3) med de flammehæmmende egenskaber yderligere har en vektorbeskyttelse (7).

7. Tekstilbeklædningsgenstand ifølge krav 6,

5 kendetegnet ved, at

de flammehæmmende garner (3) har en vægtandel på 5 til 50%, fortrinsvis 5 til 30%, mere fortrinsvis 10 til 20%, af en vektorbeskyttelse (7).

8. Tekstilbeklædningsgenstand ifølge et af kravene 1 til 7,

10 kendetegnet ved, at

strikkonstruktionen (1) eller vævningskonstruktionen indeholder garner (3), som har en antistatisk egenskab.

9. Tekstilbeklædningsgenstand ifølge et af kravene 1 til 8,

15 kendetegnet ved, at

strikkonstruktionen (1) eller vævningskonstruktionen indeholder garner (3), som kan farves efter ønske.

10. Tekstilbeklædningsgenstand ifølge et af kravene 1 til 9,

20 kendetegnet ved, at

strikkonstruktionen (1) eller vævningskonstruktionen er dannet sømløst af de sammenstrikkede garner (2, 3).

11. Tekstilbeklædningsgenstand ifølge et af kravene 1 til 10,

25 kendetegnet ved, at

tekstilbeklædningsgenstanden har mindst en strikning og mindst vævning forbundet med strikningen.

12. Tekstilbeklædningsgenstand ifølge et af kravene 1 til 11,

30 kendetegnet ved, at

tekstilbeklædningsgenstanden er udformet som en torsodel (17), og torsodelen (17) er en strikning af mindst to sammenstrikkede garner (2, 3), hvor ærmedele (18) af et vævet materiale er påsat torsodelen (17).

13. Tekstilbeklædningsgenstand ifølge krav 12,

kendetegnet ved, at

torsodelen (17) er strikket sømløst af de mindst to garner (2, 3), og ærmedelene (18) er syet derpå.

5

14. Tekstilbeklædningsgenstand (600) med et ballistisk beskyttelsesudstyr, omfattende en torsodel (17) og to ærmedele (18),

kendetegnet ved, at

torsodelen (17) er dannet af en strikkonstruktion (1) eller en vævnings-

10 konstruktion af mindst to garner (2, 3), hvor garnerne (2, 3) er strikket sammen og danner strikkonstruktionen (1) eller vævningskonstruktionen, hvor et garn (2) er dannet af polyester eller polyethylen og er egnet til at hæmme indtrængning af splinter, og har et garn (3) med flammehæmmende egenskaber, og hvor
15 torsodelen (17) på ydersiden har en camouflage (8), og hvor ærmedelene (18) er dannet af et vævet materiale.

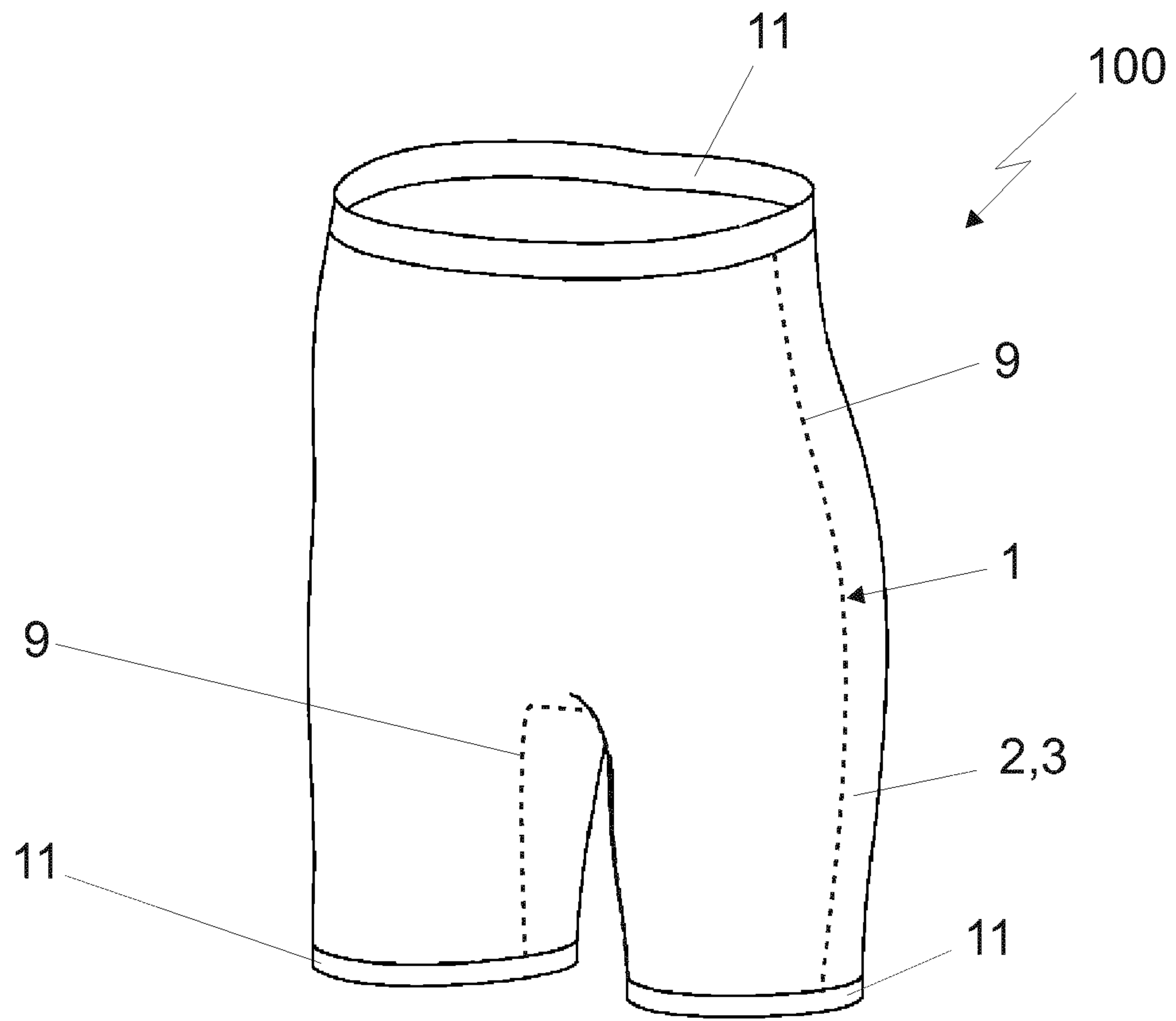


Fig. 1

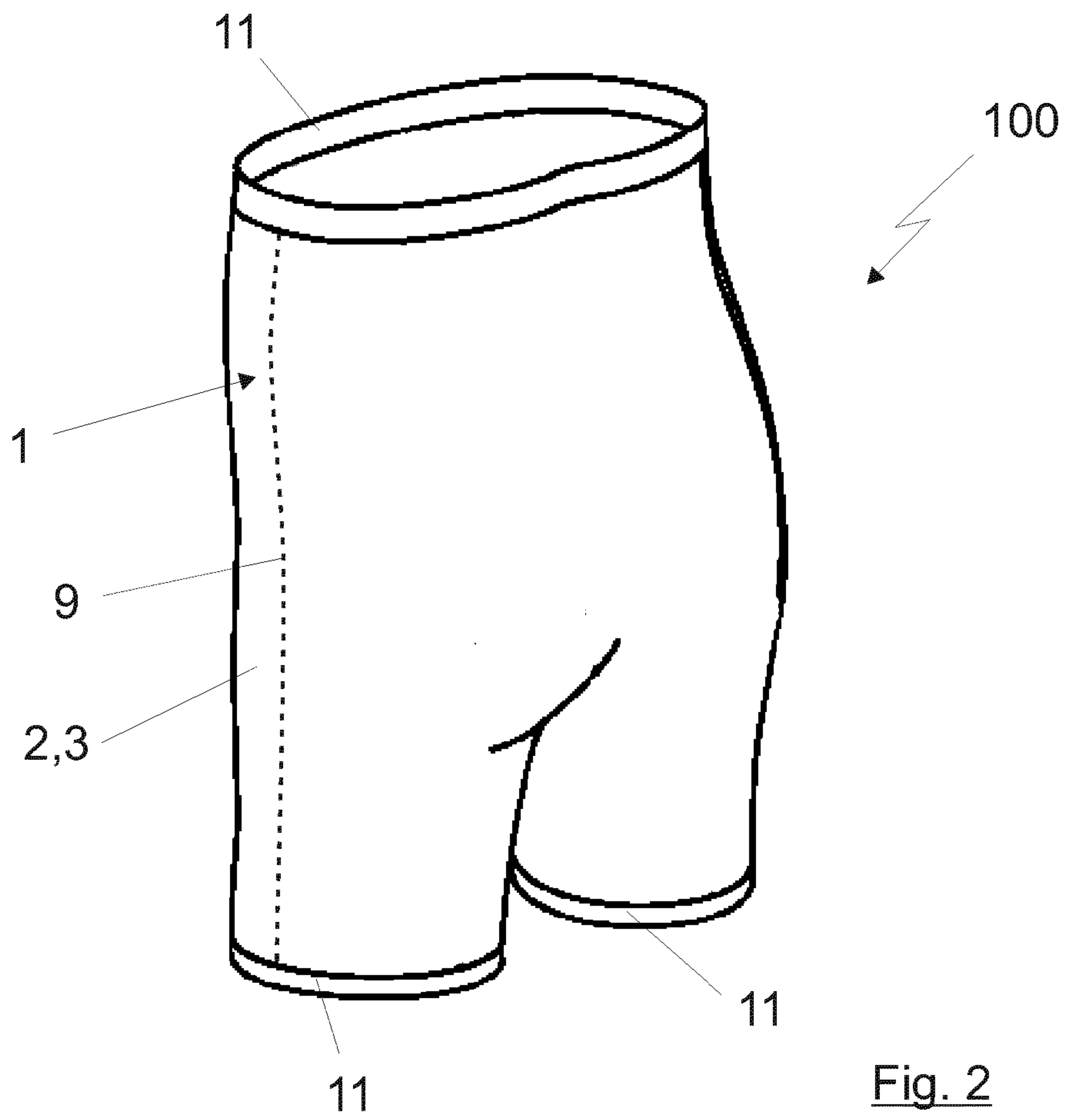


Fig. 2

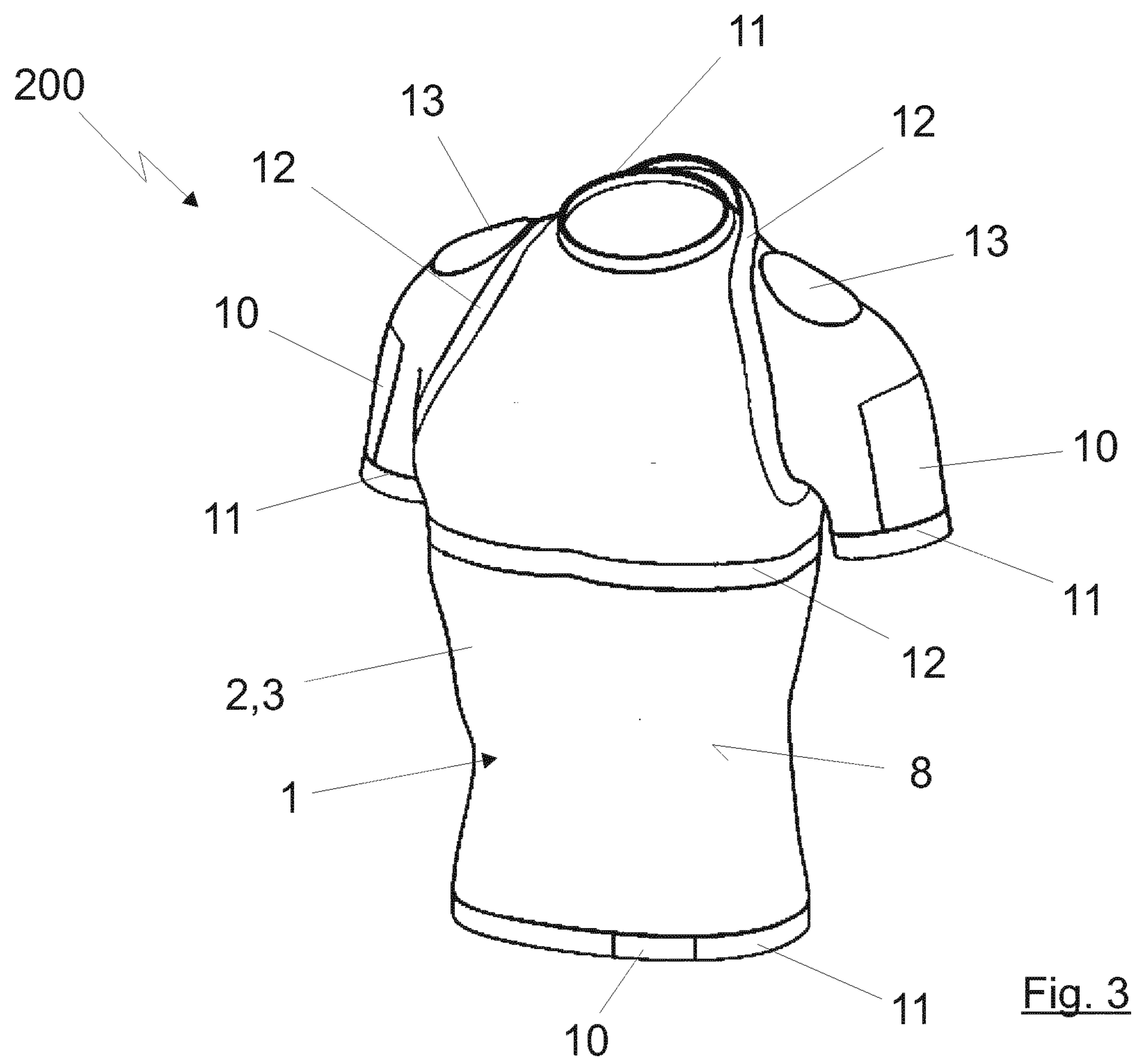


Fig. 3

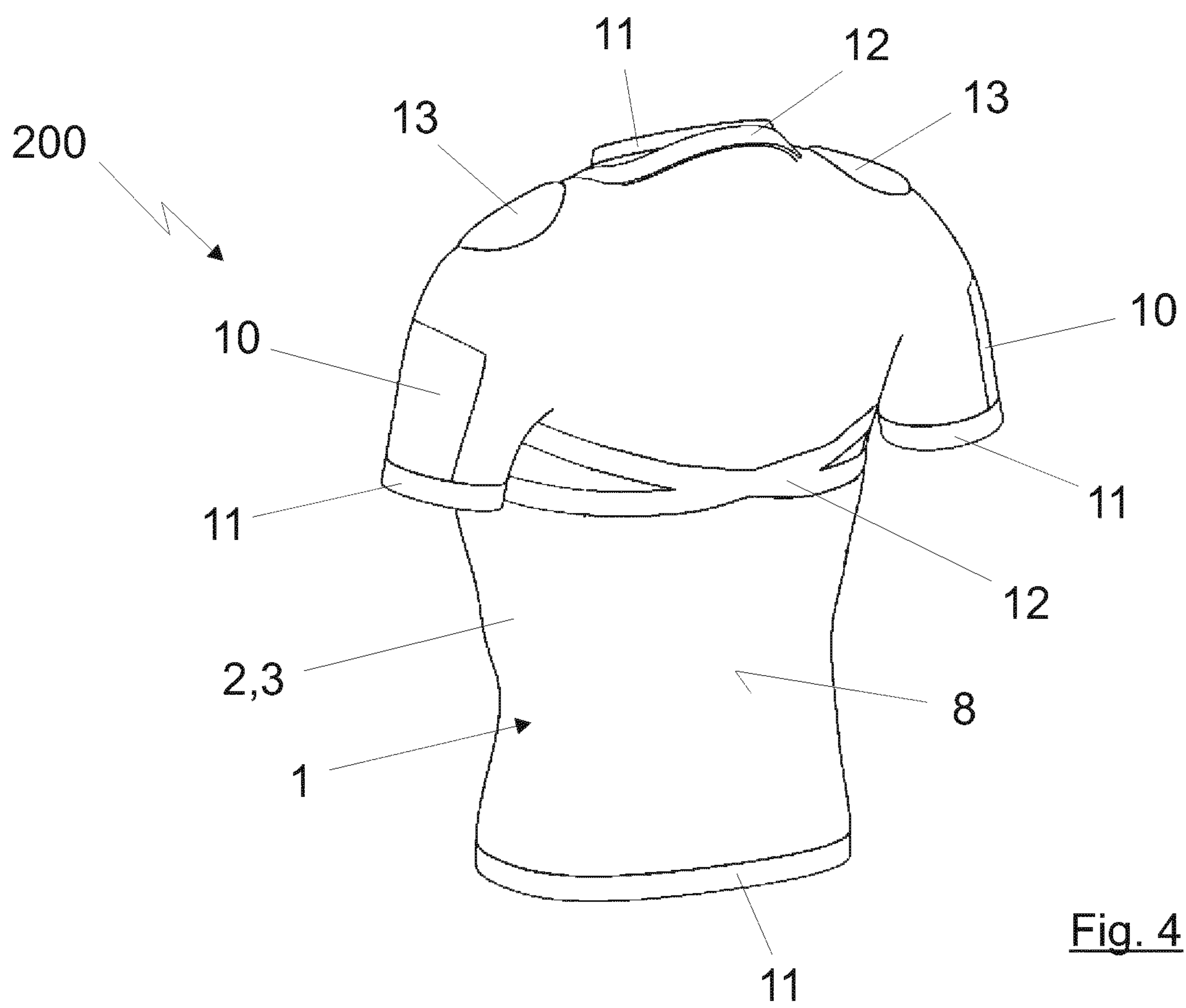
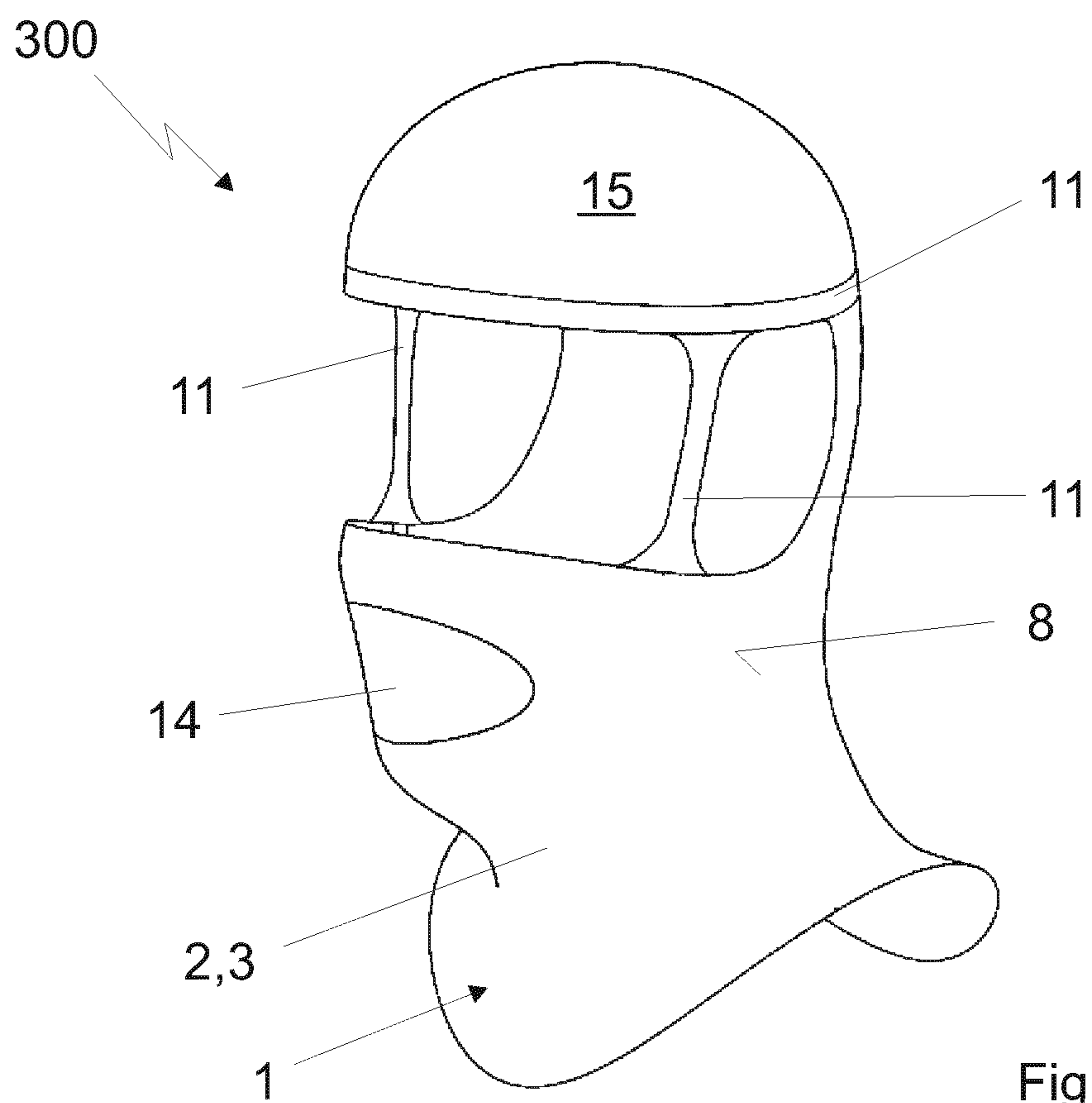
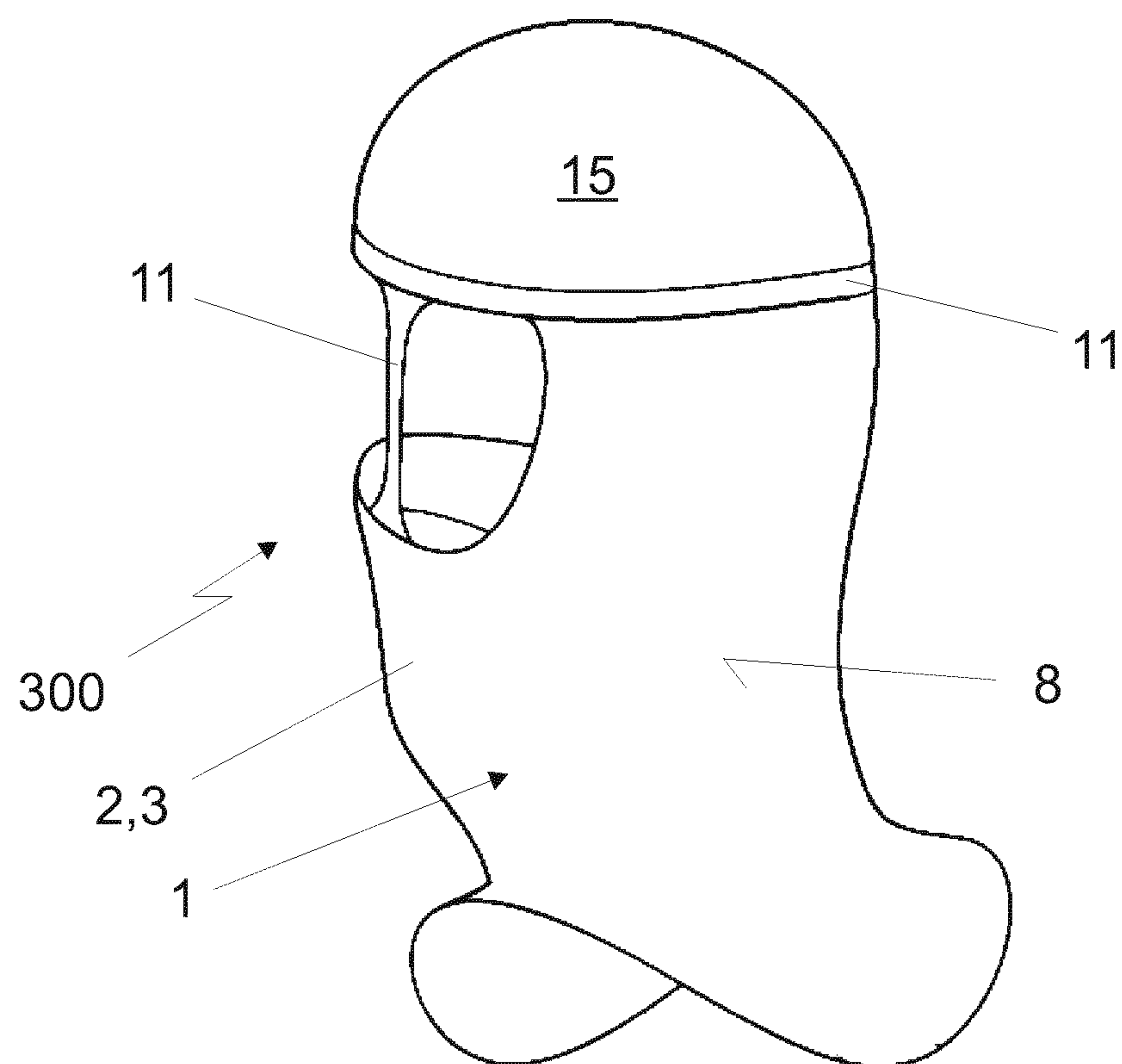


Fig. 4

Fig. 5Fig. 6

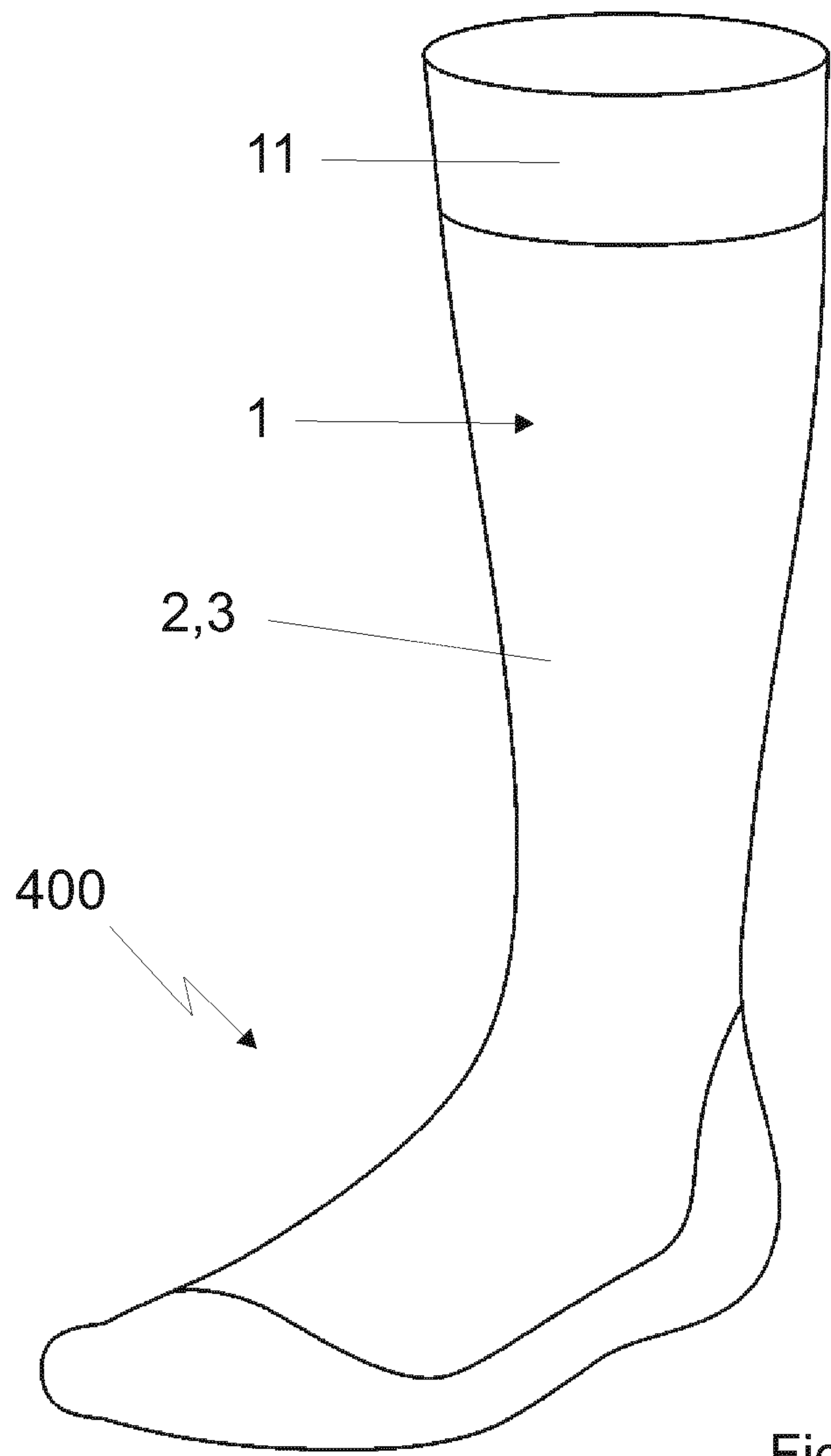


Fig. 7

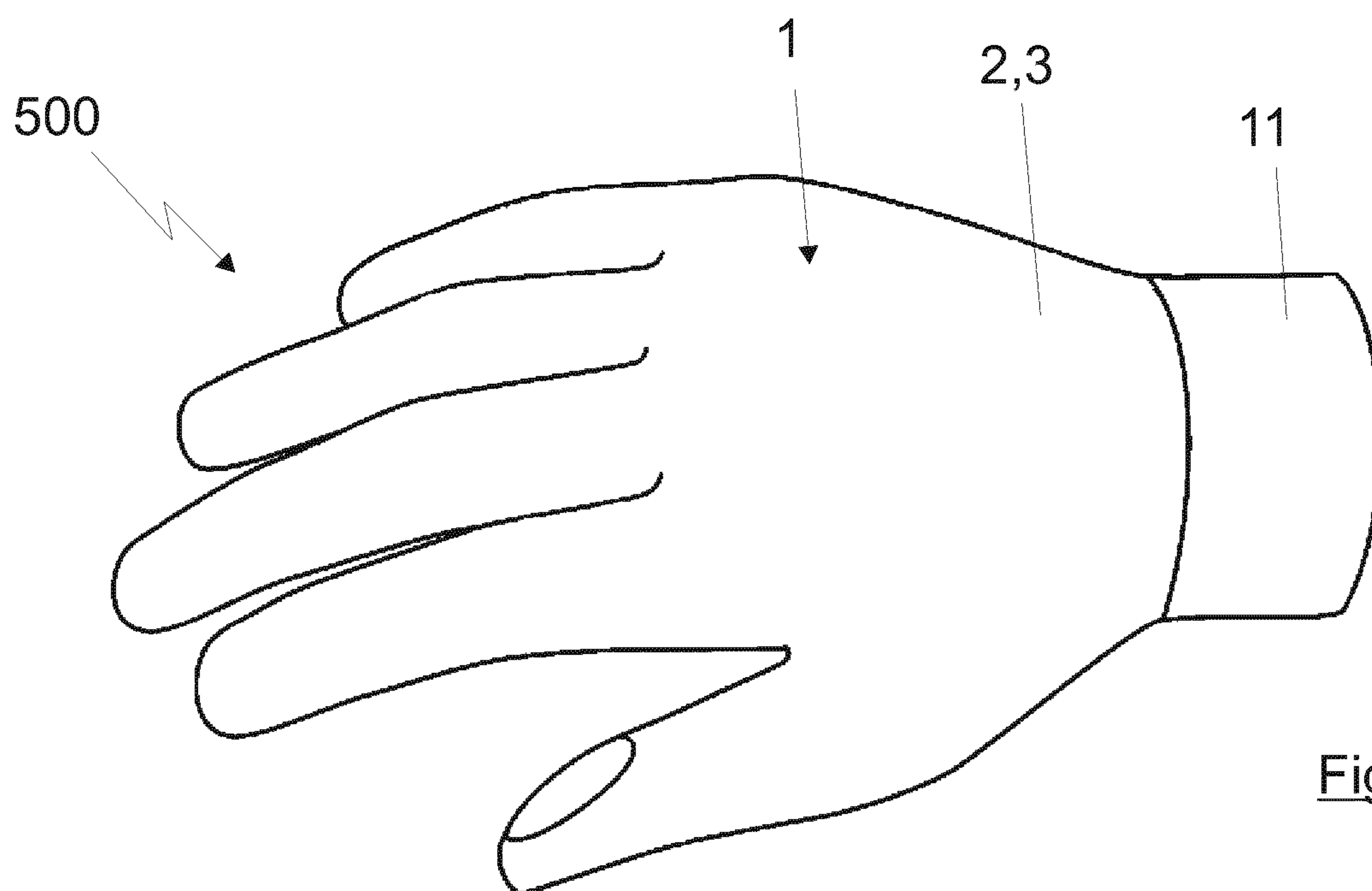


Fig. 8

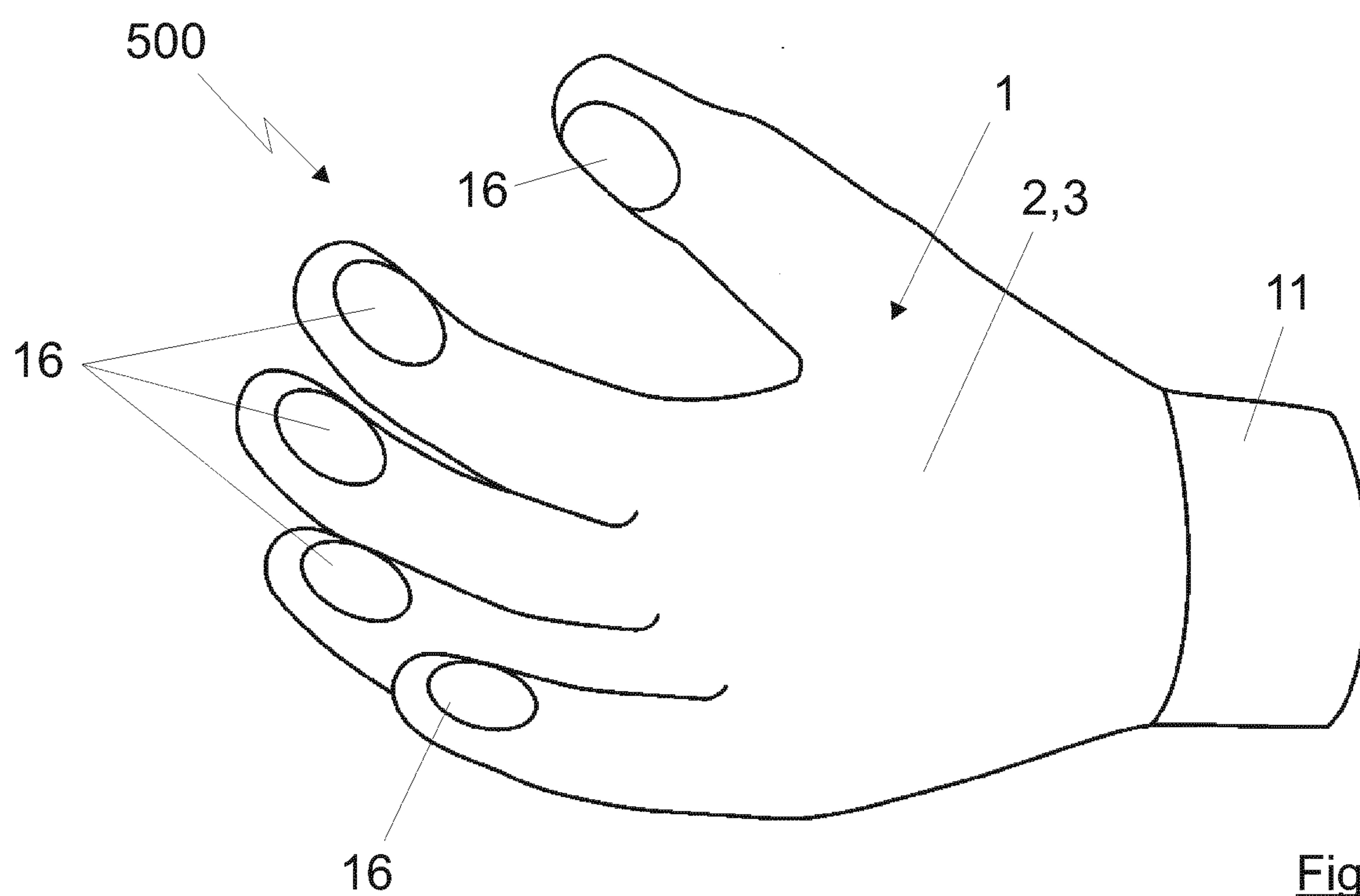


Fig. 9

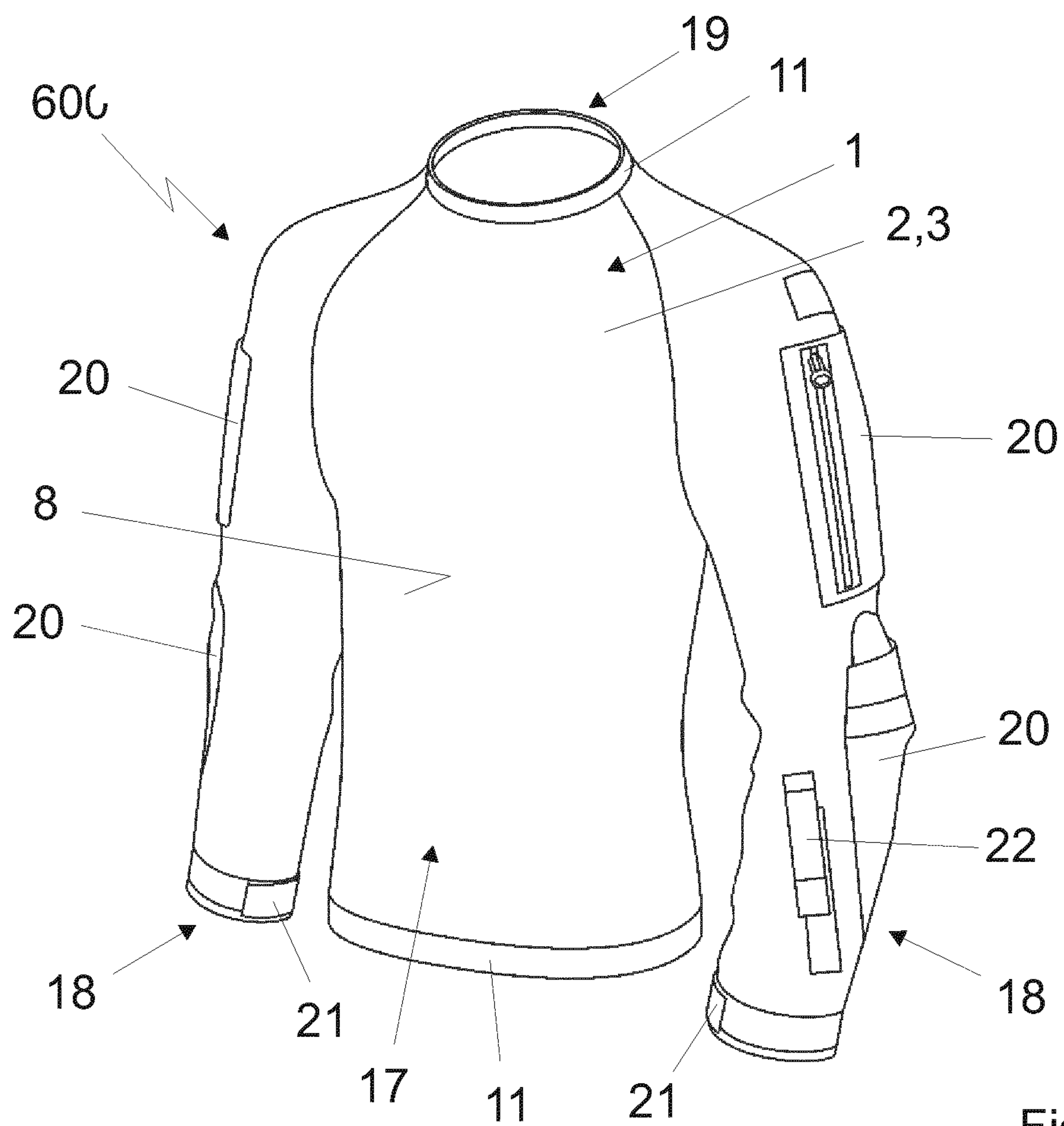


Fig. 10

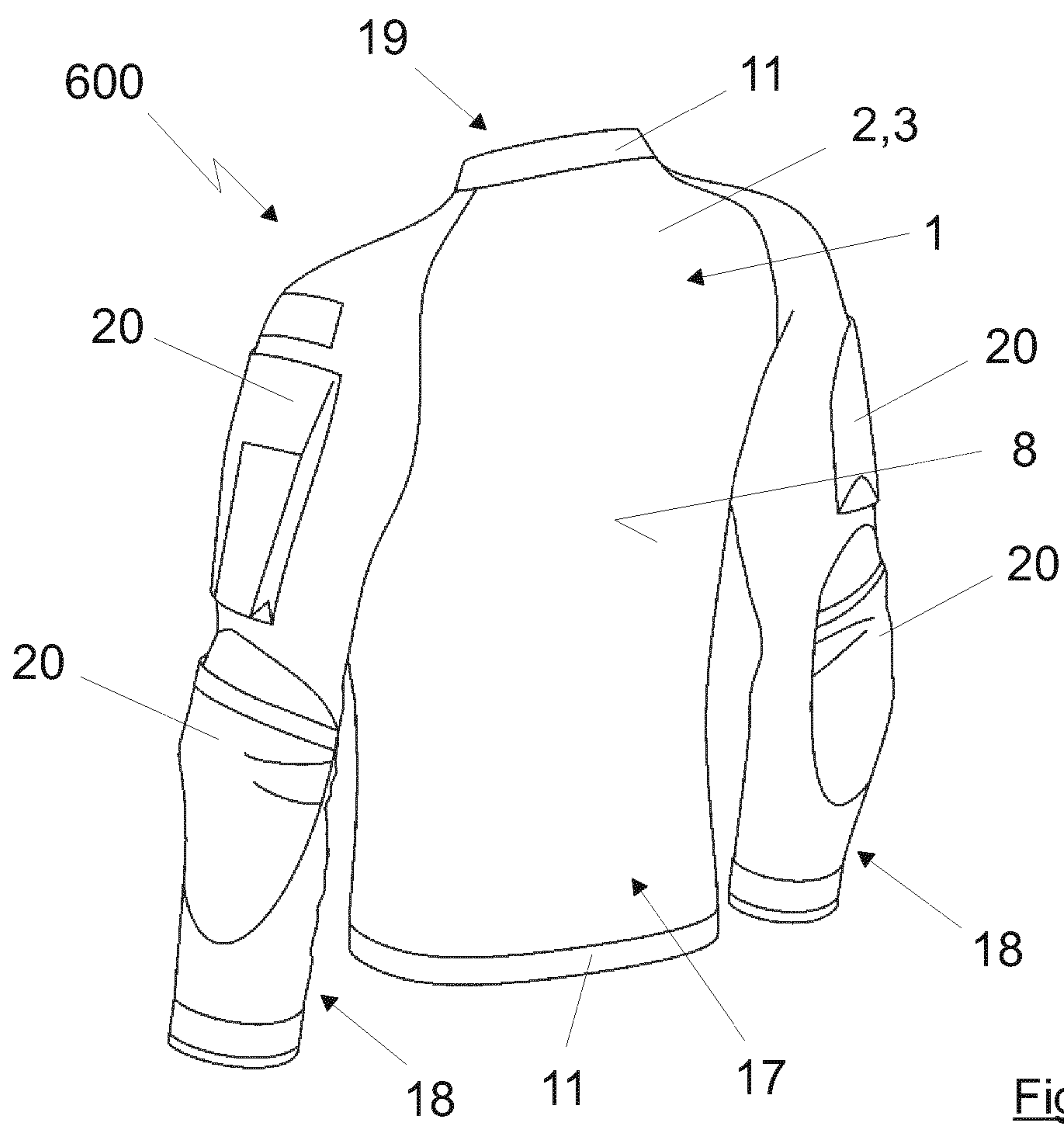


Fig. 11

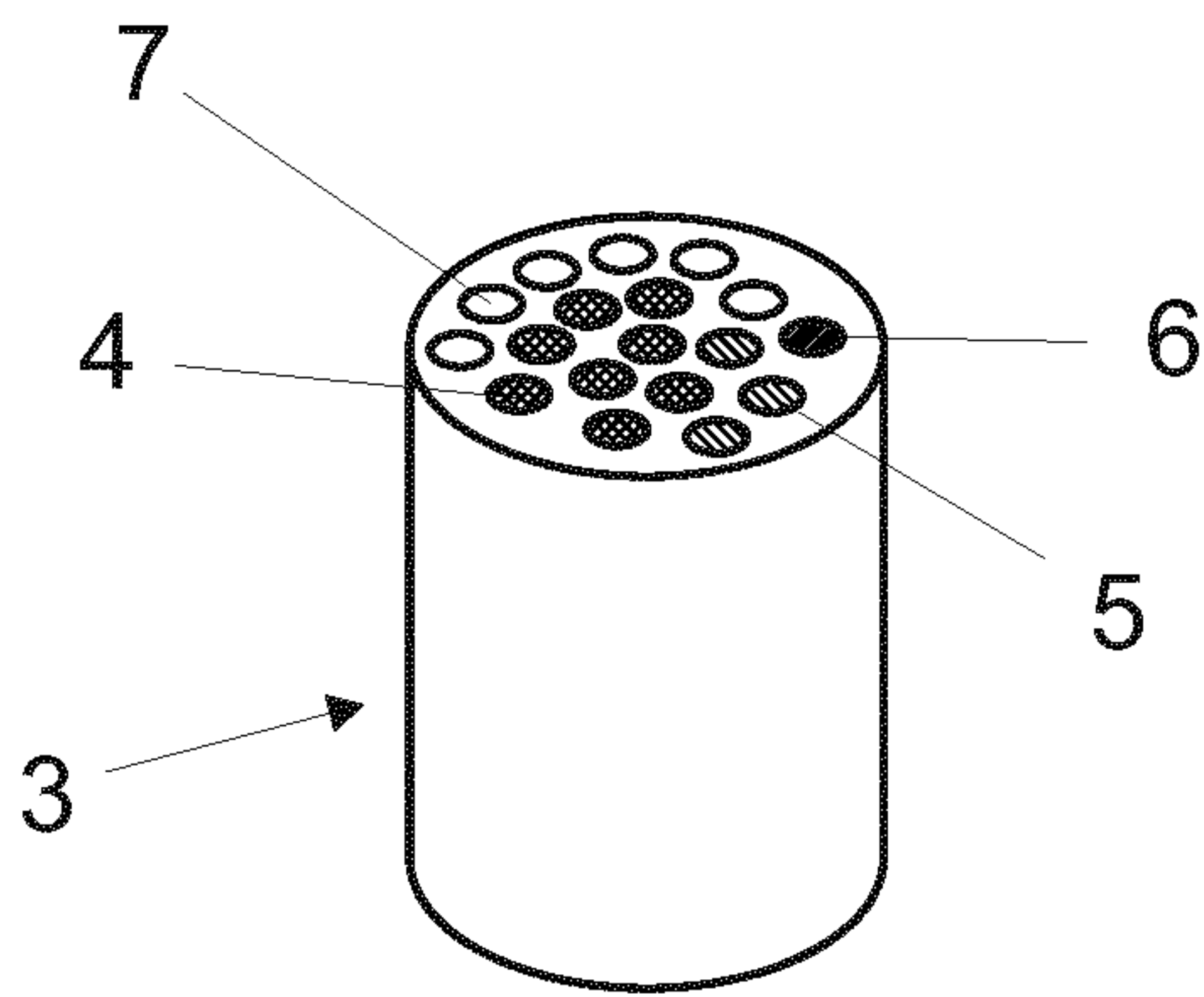


Fig. 12

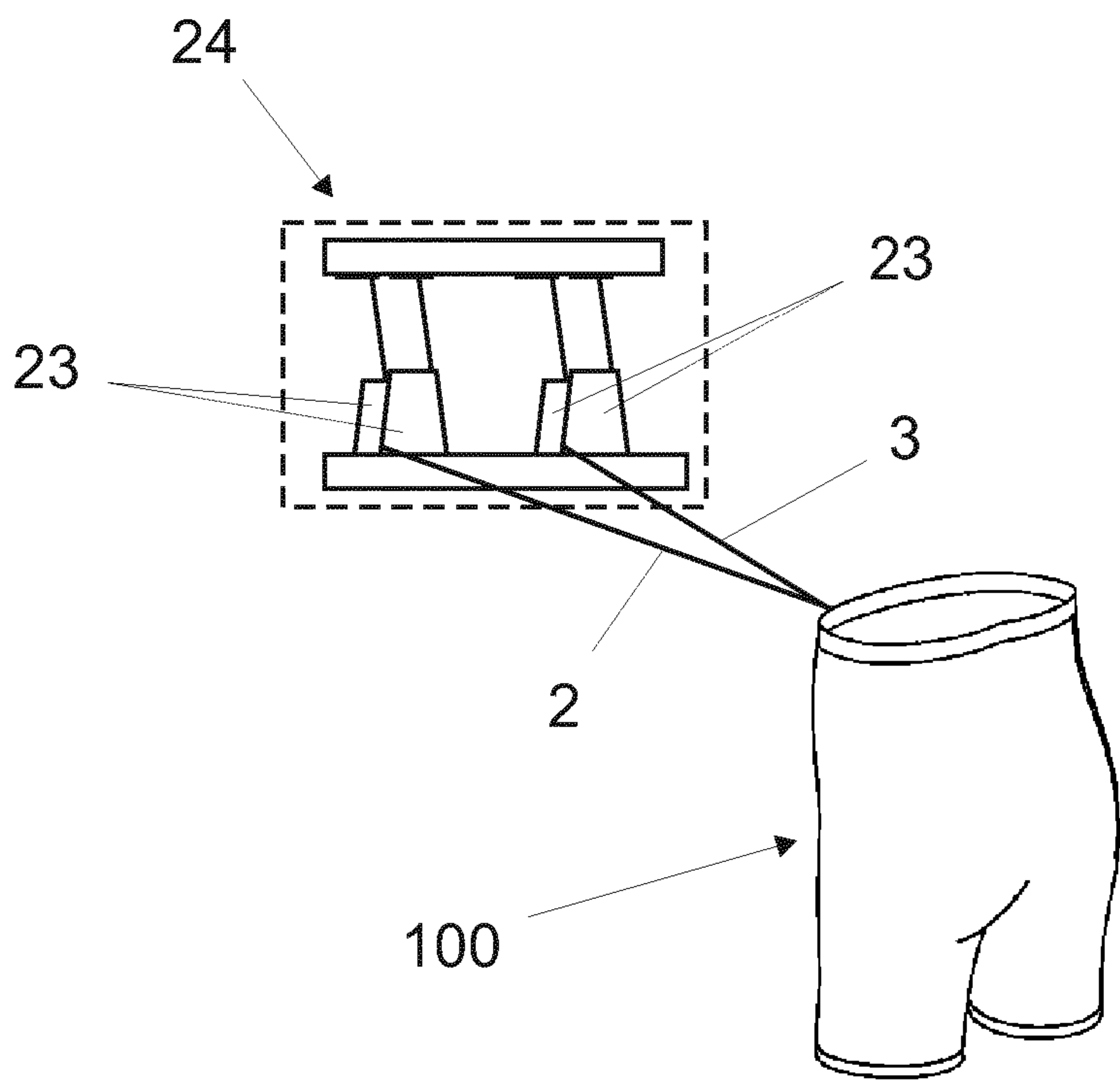


Fig. 13