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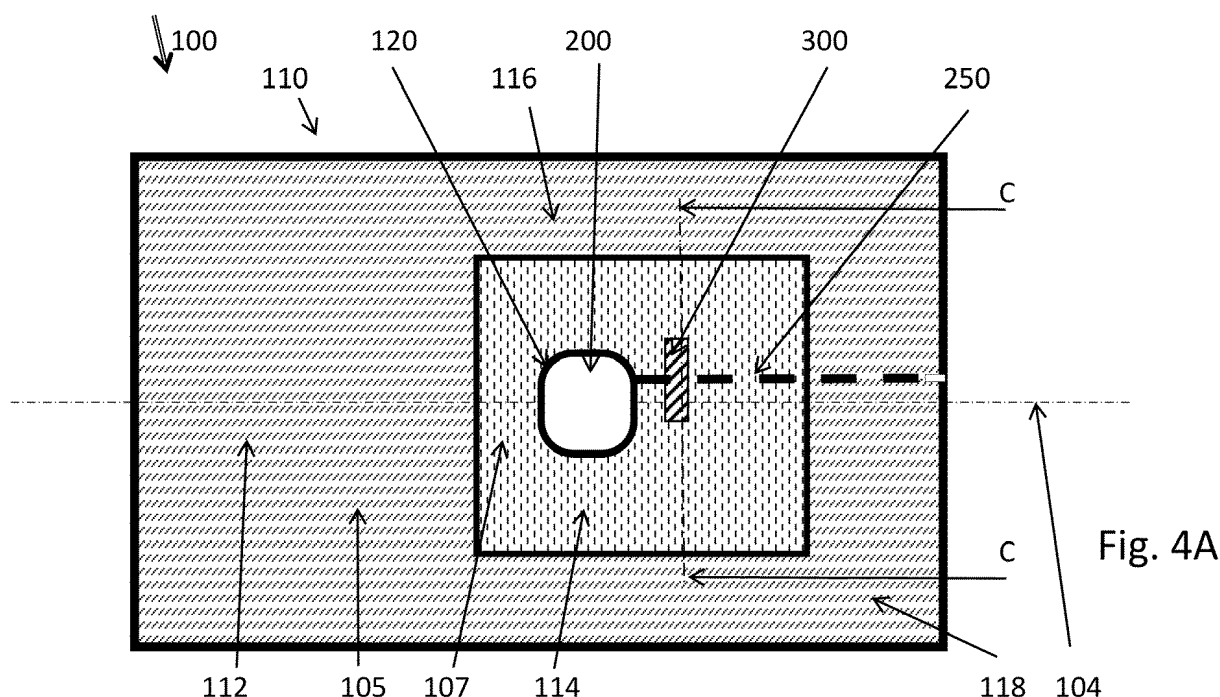
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(54) **APRON WITH IMPROVED NECK OPENING SIZE ADAPTATION**

(57) The present invention is an apron or bib having a neck opening and a size adjustment element comprising an elastically extensible element and a closure system of the hook-and-loop type.



DescriptionField of the invention

- 5 **[0001]** The present invention is an apron or bib to be positioned around the neck of a wearer comprising improved size adaptation or adjustment means for the neck opening.

Background

- 10 **[0002]** Within the present context, aprons or bibs are articles that are to be placed around the neck of a wearer such that the head is not covered but the front chest, back and shoulders are protected, as are generally well known in the art.
- [0003]** A first well known execution, see e.g. US4620323B or US5819314B, comprises a front chest panel and two side extensions that are adapted to cover the shoulders and extend into the back region. There, they either overlap or at least are positioned so as to leave only a small gap in the back region. Optionally, at the intersection of the panel and
- 15 the extensions an opening for the neck can be positioned. The extensions are held in their in-use configuration by closure or connecting means such as knotted or otherwise connected straps or tapes. This execution may have drawbacks with regard to relative complicated application, in particular when good closure is required for good protection of the body. During manufacturing, the application of the closure means may imply relatively complex process steps and results in increased costs.
- 20 **[0004]** Several approaches aim at improving the fit of the apron around the neck of the wearer.
- [0005]** CN20205999U describes a bib with a mechanical fastener system, also referred to as a hook and loop system. In US2123436 a hair cutting cloth is described with elasticated bands around the neck. Another well-known execution comprises an aperture in an essentially continuous sheet, see e.g. EP0991331A1. The aperture is adapted to allow the head to pass through so as to be positioned around the neck of the wearer. In some executions, the rear panel is executed
- 25 smaller than the front panel or may be adapted to be torn open, such as by a pre-applied tear line.
- [0006]** This execution may be simple to manufacture, but because of head circumference being larger than neck circumference, the aperture does not fit well around the neck well.
- [0007]** In GB2454756, a vest is described with an elastomeric collar such as made of latex rubber which may be adjusted around a wearer's neck by releasable fastener. In US6571395, a drape is disclosed, wherein an upstanding collar may comprise a strip of relative elastic material, which is backed by a non-elastic material, like GORE-TEX™.
- 30 Thus, the elasticity of the collar cannot be used to adapt to varying circumference of the neck.
- [0008]** Further, disclosure of a poncho is made in US2010/0064412, however there is no specific description of how to adjust the opening of the poncho. In US6374411 a bib is shown, which may comprise hook patches for closure, or strips, drawstrings or the like.
- 35 **[0009]** Thus, there is still a need for bibs or aprons that simultaneously satisfy wearers comfort, user's ease of application and producers simplicity and cost requirements.

Summary

- 40 **[0010]** The present invention is an apron for being positioned during its intended use around the neck of a wearer which is adapted to cover the shoulders, the chest and at least an upper portion of the back of a wearer, thereby defining a user oriented direction. The apron comprises a main sheet made of a web material, preferably made of one or more material(s) selected from the group consisting of polymeric film material, polymeric fiber material, polymeric fiber / film composite, and natural fiber material. Further, the apron comprises
- 45
- an in-use neck opening comprising a cut-out adapted for being positioned around the neck of a wearer;
 - a weakening line extending from the cut-out towards an outer edge of the main sheet; and
 - a size adjustment element adapted to adjust the size of the neck opening,
- 50 characterized in that the size adjustment element comprises
- a) an elastically extensible element; and
 - b) a closure system.
- 55 **[0011]** Preferably, the closure system is of the hook-and-loop type, comprising a first connecting element comprising hooks and a second connecting element adapted to receive the hooks during use, wherein the first and second connecting element being are positioned on a surface oriented away from a wearer during use and such that at least one second connecting element is on the side of the weakening line opposite to the first connecting element. Optionally, the apron

may comprise a tape system comprising the elastically extensible element and a first connecting element of the closure system.

[0012] The apron may comprise a further web material positioned around the neck opening, preferably positioned away from the user relative to the main sheet, whereby the further web material is preferably adapted to function as second connecting element of the closure system.

[0013] In a particular execution, there is essentially no further web material present in the cut-out whilst the main sheet is essentially continuous in the cut-out in a manufacturing configuration and being adapted to be removed from the cut-out upon use, preferably by an extension of the weakening line extending into the cut-out.

[0014] The weakening line may extend from the cut-out towards an outer edge of the apron and intersects the outer edge of the apron, and the weakening line maybe a slit with a full separation of the slit materials or a perforation line with alternating regions of separation and no separation along the weakening line.

[0015] In another aspect, the present invention is a process for the manufacturing of an apron comprising the steps of

a) providing

- an essentially continuous main sheet web material from a main sheet web supply,
- one or more separation tool(s) for creating a neck opening and/or a weakening line;
- a supply system for a closure system, the closure system comprising

a tape element comprising an elasticated region and hook elements and a landing web element;

- cutting, application and connecting tools;
- optionally a supply system for a further web material;

b) feeding the main sheet web material along a main sheet web machine direction;

c) optionally combining the further web material, if present, with the main sheet web material;

d) creating a weakening line for an in-use neck opening in at least one of the main sheet web material and the further web material, wherein the weakening line is a slit with a full separation of the slit material(s) or is a perforation line with alternating regions of separation and no separation along the weakening line;

e) positioning one or more landing web element(s) around the periphery of the neck opening or adjacent to the weakening line and connecting it or them directly or indirectly to the main sheet web material, whereby optionally the landing web element is integral with the further web material;

f) positioning the tape element on the main sheet web material or further material, and connecting it directly or indirectly to the main sheet web material, such that at least one second connecting element is on the side of the weakening line opposite to the first connecting element;

g) cutting the main sheet web material to it's in use size;

g) folding the resulting apron.

Optionally, the weakening line may be positioned in a trailing position relative to the cut-out of the neck opening, whereby the process further preferably comprises the step of

h) positioning the tape element on the main sheet such that at least a part of the hook elements of the tape element overlies a portion of the landing web element(s) and engages releasably therewith, and at least a further portion of the tape element is positioned on the opposite side of the weakening line and connected to the main sheet directly or indirectly, preferably permanently.

Optionally, the process for the manufacturing of an apron may further comprises the step of

i) forming the tape element, comprising the sub-steps of

i1) providing along a machine direction of the materials

- a web of hook material;
- a web of elastic material, extensible at least in its cross-machine direction;
- one or more web(s) of essentially non-extensible material;
- optionally adhesive material;
- cutting, application, and bonding tools;

i2) positioning the webs of step i1) in a relative cross-directional and optionally at least partially overlapping order

- non-extensible material,

- elastic material,
- non-extensible material,
- hook material,
- non-extensible material;

i3) connecting the webs of step i1) to form a tape by

- optionally applying adhesive material,
- optionally compressing overlapping regions, and
- bonding by applying energy, preferably by applying pressure, heat or ultrasonic energy;

i4) cutting the connected materials to a predetermined length.

[0016] The step f) of positioning the tape element on the main sheet web material or further material may be executed such that the cross-directional arrangement of the tape elements is positioned in a cross-directional orientation of the main sheet web material.

Brief description of the Figures

[0017]

Fig. 1A and B schematically show a first execution according to the present invention.

Fig. 2A and B depict schematically a further execution according to the present invention.

Fig 3. depicts schematically an element suitable for the present invention.

Fig 4A and B depict schematically a preferred element suitable for the present invention.

Fig. 5A and B depict schematically a further preferred element suitable for the present invention. Same numerals depict same or equivalent features or elements.

Detailed description

[0018] Within the present context, the terms aprons, bibs or gowns are considered as corresponding expressions, which relate to articles that are to be placed around the neck of a wearer such that the head is not covered but the front chest, back and shoulders are protected, as are well known in the art.

[0019] The wearers may be babies or adults, and - without intending any limitation - the application may be as broad as protecting clothing during eating or feeding, during hair cutting or other cosmetic treatments, or in the medical field both for patients to avoid spillage such as during dental treatments or for medical personal such as nurses or doctors to prevent contamination.

[0020] An apron may be a disposable or single use item, i.e. it is intended to be thrown away and disposed of in an environmentally conscious manner. It may also be a limited use item, such as being generally suitable as a disposable item, but being adapted to a limited number of repeated uses, optionally including a cleaning or washing step between use incidents. An apron may also be intended for essentially unlimited uses, such as when being used and cleaned or washed multiple times.

[0021] Generally, such an apron comprises a first panel, as may be a front panel which may be positioned over the chest or front waist. A first and a second side panel cover the shoulders of a wearer during use. At the rear, the apron may comprise a second panel or the side panels may extend to also cover at least portions of the back and are preferably connected to each other. Alternatively, the side panels may extend into the front or chest region.

[0022] Typically though not necessarily, an apron does not comprise sleeves though panels may be connected to each other under the arms at the sides of a wearer, such that a sleeve-like structure like known from ponchos results.

[0023] In the in-use configuration, an apron is adapted to be positioned around the neck of the wearer, either by fully encircling the neck, or by comprising side panels that are adapted to be arranged in an overlapping arrangement. The in-use neck opening may already be present as a hole in the material in the manufacturing configuration, or it may be formed by a user prior to or upon donning of the apron, as will be discussed in more detail herein below.

[0024] Aprons according to the present invention shall be made efficiently from a material usage as well production simplicity point of view, which implies that they can be produced on continuous manufacturing machines, where essentially endless web materials are converted into individual items or pieces of aprons.

[0025] An apron according to the present invention may be made from a multitude of materials, which are generally not limiting for the specific design, but that should be rather adapted to the intended application.

[0026] Suitable web materials may be any textile materials, such as woven or knitted material, whilst non-woven

materials or films or composites thereof are often preferred.

[0027] Nonwoven materials are well-known the art and may be made from a variety of materials, typically thermoplastic materials of natural or synthetic base materials. Preferred resins for nonwovens are polyester, polyamides or polyolefins like polypropylene or polyethylene.

[0028] Often, nonwoven materials exhibit fiber thicknesses from micro fibers of below one micron to several micron, or expressed in dTex from below one dTex to well over 10 dTex. Basis weights may range from as low as below 10 g/m² to well over 100 g/m².

[0029] Nonwoven materials may - and often do - be composed of several strata or sub-layers, such as when spun-bonding layers are combined with meltblown layers. Also film materials are well known in the art, such as polyolefin films, such as cast or - often preferred - blown films of polyethylene or polypropylene resins. Further, suitable webs may also comprise both fibrous or non-woven material in combination with film materials, i.e. by positioning two or more layers z-directionally, i.e. along the thickness direction, relative to each other. These layers may be pre-formed and combined such as by heat or adhesive bonding, or one of these layers may be formed in-situ, e.g. when a polymeric material is cast onto a fibrous material forming a film thereon, or if fibers are laid onto a film. Optionally, and often preferably, the materials are breathable, referring to the well-known property of allowing gases like air or vapor to pass through, whilst retaining liquids. Such breathability may be achieved by perforation of film materials, or by employing intrinsically gas permeable materials, such as non-woven webs, or moisture permeable but not liquid permeable films or foams.

[0030] The article forming materials are typically provided as roll-stock materials, i.e. as essentially continuous webs. Such webs may be separated into a series of individual pieces or sheets just prior to or during the forming of articles according to the present invention.

[0031] Within the present context, an apron can be looked at in a production configuration, which may comprise an unfolded, partly folded or fully folded configuration and an in-use configuration.

[0032] In the in-use configuration, an apron comprises a longitudinal or x-directional or length extension, defined by the direction from the front (or chest) portion towards the back or rear portion of the article. Accordingly, the width of the article extends perpendicularly thereto, corresponding to a left-right direction on a wearer. The article further exhibits an extension in the z-direction corresponding to the thickness of the article.

[0033] Typically, the apron shows a non-flat configuration when worn, e.g. taking the shape of an inverted U in a cross-sectional view.

[0034] During the manufacturing process, the web from which the apron is formed is typically in a flat configuration, such as when being unwound from a roll. However, such a web may already be folded along a machine-directional fold line, or two sub-webs may be positioned in a facing relationship forming a z-directional composite, wherein the sub-layers or strata may be continuously or discontinuously connected to each other. Two or more of these z-directionally positioned sub-layers may exhibit the same dimension. If not, one may be positioned in the proximity of the outer edge, or the inner or neck edge, or of any fastening elements as will be described in more detail herein below.

[0035] The web(s) exhibit(s) a machine direction that may correspond to the length direction of the in-use configuration though "cross-machine producing", where the machine direction of the web corresponds to the width direction of the apron during use, may be used. In either case, the thickness, respectively z-direction of the web corresponds to the thickness, respectively z-direction of the apron.

[0036] Also, more than one apron may be produced from one width of the web material, such as when the web is separated by longitudinal separation lines that may be straight or curved, into essentially parallel extending sub-webs, each forming a series of pieces of aprons.

[0037] An apron according to the present invention comprises a main sheet, preferably made of a single continuous material, though an x-y-directional composite may be used, wherein two or more materials are positioned next to each other in machine or cross-machine direction and connected to form a continuous composite. Without intending any limitation, a central portion of the apron extending length directionally and comprising the neck region, may be made of breathable, or softer, or otherwise more comfortable material, whilst laterally outwardly portions are made of non-breathable material.

[0038] The main sheet is typically separated from an essentially endless web material, and may have varying sizes and shapes. In a preferred execution, the main sheet has a rectangular shape, as this can be easily manufactured and does not imply portions that need to be discarded. If desired, however, the main sheet may have an oblong shape with rounded corners, such as an oval or ovate, or an elliptic shape. The main sheet comprises a circumferential outer edge that may also form the outer edge of the apron.

[0039] An apron according to the present invention may have various aesthetic appearances, such by being uniformly or partially colored, or printed. The latter may be applied to the web, from which a main sheet is separated, and the printing may be registered with the length of the main sheet. Printing may also be applied to the main sheet after being separated from the web material.

[0040] An apron according to the present invention further comprises at least in the in-use configuration a neck opening

in the main sheet.

[0041] In a flat, unfolded length-width-view of the apron, the neck opening comprises a cut out portion and a size adjustment element.

[0042] The cut-out portion exhibits a shape that can be readily separated from the main sheet, preferably during the manufacturing process or alternatively by the user, when tear-lines are applied during manufacturing. Thus, preferably, the cut out portion exhibits a shape selected from the group consisting of triangular, quadrangular such as rectangular or rhombic, elliptical, circular, semi-elliptical or semi-circular, chevron shape, or crescent shape. The cut-out portion forms the inner edge of the apron.

[0043] Whilst using the term "cut-out" portion, it should be noted that any other method for removing the material other than cutting in the narrow meaning of the word may be used, such as by a pair of scissors, a blade, or a punching or stamping tool, or by water jets, application of energy, such as heat, including laser, flame, or plasma cutting, or pressure, or ultrasonic energy. Also, a "cut-out" portion may be opened only in the in-use configuration, whilst during manufacturing, the portion may be demarcated by an incomplete slit or a weakening line that allows opening prior to or upon donning of the apron by a user.

[0044] Thus, an apron further comprises a slit or weakening line, intersecting and extending away from the neck opening, i.e. the inner edge of the apron. Hereinafter, the term "slit" and "weakening line" may be used interchangeably, unless expressly mentioned otherwise.

[0045] The apron may be executed in an open configuration, wherein a slit extends from the inner edge through to the outer edge. The slit may have various shapes, such as being a straight or curved cut-line, or the edges of the slit may taper away from each other, when laid out flat, be it wider towards the outer or the inner edge of the apron. The slit may be formed by any means, as described in the context of forming the cut-out portion.

[0046] The apron may also be executed in a closed configuration, when the slit does not extend from inner edge of the cut out portion through to the outer edge of the apron, i.e. there exists a thought line encircling the cut-out portion, which does not intersect both of the inner and the outer edge of the apron.

[0047] In this execution, the size of the opening may be increased by a slit extending away from the inner edge of the apron towards the outer edge of the apron without intersecting the latter. The slit may be executed as for the open configuration, except for stopping before the outer edge.

[0048] When a slit is executed as a weakening line, it may be not fully separated during the manufacturing at least for a portion of its length, such that it can readily be torn open by the user or wearer upon donning or removing of the apron, such as when employing a "prefn pop" line of intermittent separation.

[0049] The slit exhibits a slit length as defined by a straight line connecting the intersection of the slit with the inner edge of the apron and the end point of the slit respectively its intersection with the outer edge.

[0050] The apron further comprises size adjustment element for the opening.

[0051] If the apron is executed in an open configuration, the size adjustment element is intended to close the neck opening around the neck of the wearer. If the apron is executed in a closed or hybrid configuration, the size adjustment element is intended to adapt the neck opening to the appropriate size.

[0052] A size adjustment element comprises a closure system and an elastically extensible element.

[0053] The closure system comprises a first and a second connecting element that are positioned on a surface that is oriented away from the wearer and which are spaced apart from each other in the vicinity of the neck opening and on opposite sides the slit.

[0054] The first connecting element is executed as a connecting tape, such as well-known in the art such as for closure systems of disposable diapers. The tape interacts with the second connecting element, which may also be referred to as in-use landing zone and be a strip of material positioned on and connected to the main sheet.

[0055] For ease of application as well as for ease of manufacturing, the closure system is of the "hook-loop" type, as also well-known in the diaper industry, wherein the first connecting element comprises hooks adapted to engage with loops of the second connecting element.

[0056] A skilled person will readily realize, that the second connecting element may be integral with the web material of the main sheet, such as when the main sheet, or at least a portion thereof, is adapted to engage with the first size adjustment element.

[0057] Thus, upon donning of the apron, the closure system is fixed around the neck of the wearer and the effective size of the neck opening can be adjusted to the size of the neck of the wearer to allow good fit.

[0058] In a particular execution, the second connecting element is made of two or more pieces that are positioned in the proximity of the inner edge of the apron and may then simultaneously function as re-enforcement means. Then, the overall size of the second connecting element can be reduced, thus resulting in lower material usage, whilst still maintaining a wide fit range. For such an application, it is preferred that the closure system exhibits good omni-directionality. For example, the hooks of a first connecting element may be shaped such that the engage well with the loops of the second connecting element, regardless of the relative orientation of these materials. Accordingly, also the loops of the second connecting element may be formed such that the loops engage well with the hooks regardless of the orientation,

such as by being very open.

[0059] In a particular execution, the apron may comprise a further web material that is generally positioned around the neck opening. Preferably, such a further web material is a fibrous web material, and more preferably such a further web material is positioned such that it forms a surface of the apron that is oriented away from the wearer. The further web material is preferably executed such that it can function as a second connecting element of the closure system. The further web material may be connected to the main sheet by conventional means, such as lamination, glue connection or thermo-fusioning.

[0060] When such a further material is employed, the neck opening in the in-use configuration may only be created just prior or upon donning, and the manufacturing configuration may show no opening though a demarcation or weakening line maybe present and visible. In order to improve the comfort of a wearer as well as ease of application, it is a further element of the present invention that the size adjustment element comprises an elastically extensible element.

[0061] Preferably, to ease manufacturing, the elastically extensible element is essentially stretchable in only one direction.

[0062] The elastically extensible element may be connected to the first connecting element, which may then be executed as a tape comprising several sections:

In a first tape section, the tape is anchored to the main sheet, as can be achieved by conventional means, such as adhesives, though a glue free application such as by heat, pressure, or ultrasonic bonding is often preferred. It is also within the scope of the present invention, that also this anchoring may be of a releasable type, such as by a hook-loop system as described in the above.

[0063] A further tape section comprises a gripping element, which may be a free edge of the tape opposite of the first tape section without connecting element.

[0064] A third tape section carries the hooks for connecting to the landing zone.

[0065] A stretch zone is a fourth zone of the tape, preferably not carrying connection means but being extensible in at least one but preferably only one direction.

[0066] The sections are positioned relative to each other - thereby defining the length direction of the tape - such that the tape is anchored to the main sheet at one end, the gripping section on the opposite end, the connecting section between the two and adjacent to the gripping section, and the stretch section between the connecting section and the anchoring section.

[0067] The tape may be placed directly on the main sheet, and it may be temporarily connected thereto by the connecting element. It may also comprise a pre-use landing zone between the tape and the main sheet for easing the temporary connecting especially during manufacturing.

[0068] It should be noted, that the tape does not necessarily need to be aligned with the longitudinal direction of the apron main sheet. It should also be noted, that typically such tapes are delivered on an essentially endless roll, the width of the roll corresponding to the length of the tape as described herein, and the cut-length from the roll corresponding to the width of the tape as described herein. Such tapes may, of course, also be manufactured in-line, such as when providing the materials for the respective zones as web materials to the line and combining these just prior to being applied to the web. Such an approach eases manufacturing, as no intermediate storage of the prefabricated tapes is required.

[0069] Upon use, the tape is gripped at the gripping section, lifted from the mainsheet or the pre-use landing zone, and applied to the in-use landing zone. Thereby, the stretch zone may be extended to a suitable degree to fit comfortably, or it may be left essentially unstretched in either case allowing increase of the neck circumference such as when swallowing or at other action or movement of the wearer.

[0070] The size of the apron is not particularly limiting for the present invention and depends on the particular application.

[0071] The mains sheet - and hence the overall apron in a flat unfolded configuration - may have a length ranging from 500 mm, such as for small baby bibs to 1200 mm, such as for larger babies, to 1500 mm, or 1700 mm, or 1800 mm, or even 2000 mm for female or male adults.

[0072] It may have a width ranging from as low as 300 mm for small babies, to 700 for larger babies to 900 mm or 1000 mm or even 1300 mm or even more for female and male adults.

[0073] The cut out portion may be positioned with its front end at a distance from the front end of the apron ranging from about 50% to 55% to 75% or even up to 90% of the overall length of the apron. So it may be positioned at a range from about 150 mm from the front end to about 500 mm to about 900 mm or even 1200 mm or more. Most preferably, the cut-out portion is positioned with its midpoint aligned with the longitudinal center line of the apron.

[0074] The cut out portion may extend in its width from about 3% of the width of the apron to about 5% or to 10%, or even 15% or more. So it may range from about 40 mm to 60 mm to 105 mm or even to 220 mm or more.

[0075] The cut out portion may extend in its length from about 2% of the length of the apron to about 3% or to 10%, or even 15% or more. It may range from about mm to 30 mm to 50 mm or even to 220 mm or more.

[0076] The size increase element may extend from the cut out portion towards an outer edge of the apron or even intersect the outer edge. It may have a length ranging from about 30 mm to 45 mm or 50 mm or 65 mm when not intersecting the outer edge, or even 300 mm or over 400 mm when intersecting the outer edge.

[0077] The tapes may have a width ranging from 20 mm to 30 mm or 35 mm or even over 40 mm and a length ranging from about 80mm to 90 mm or 110 mm or 115 mm or even 130mm or more, whereby width of the tape relates to the length of the tapes in machine direction.

[0078] The further web material around the neck opening may be dimensioned so as to generally extend at least 20 mm, 30 mm or even 50 mm from the opening. The further web material may have a shape essentially following or at least encircling the shape of the opening. For ease of manufacturing, it may have a rectangular shape.

[0079] The dimensions of the landing zone should be adapted to the size of the tapes. In a particular execution, they may have an extension in the length direction of the apron from about 20 mm to 30 mm or even 35 mm, or 85 or even 115 mm or 135 mm in the width dimension of the apron. From a manufacturing point of view, the present invention provides an easy process for manufacturing the apron.

[0080] The required equipment is well known in the industry, comprising unwinding stands for the web materials, cutting or severing tools, and applicators for webs to each other and, optionally for adhesives. Also the folding may be achieved by conventional equipment.

[0081] The essentially endless web material forming the main sheet may be supplied from a roll or a box, if not manufactured in-line. Also the closure system elements may be provided either as preformed or in-line formed tapes and non-woven web materials.

[0082] Preferably, the direction of the elastic extensibility of the elastically extensible element is such that it is perpendicular or cross-directional to the machine direction.

[0083] The creation of the cut-out portion of the neck opening may be achieved by conventional tools, preferably, though not necessarily, prior to or concurrently with the application of the closure system.

[0084] The closure system may be positioned on the main sheet by conventional processes, such as well-known "cut-and-slip" process. The connecting of the closure system to the main sheet may be achieved by applying adhesives, such as hot-melts, onto either the main sheet or onto the connecting means, such as a tape. In addition or alternatively, the connecting may be achieved by applying energy such as in the form of pressure, heat, or ultrasonic energy.

[0085] In a preferred execution, the second connecting elements are applied before the connecting tape is applied, and the latter is positioned such that the anchoring zone is positioned on an opposite side of the slit, relative to the landing zone, whilst the connecting zone of the tapes engages with the landing zone on the other side of the slit. In particular when the manufacturing direction and orientation is such that the opening is downstream of the slit, i.e. when the intersections of the slit and the inner edge is such that the air stream during manufacturing may lift the corners of the material, this may hold down these corners.

[0086] The folding of the apron can be achieved by conventional folding boards for longitudinal folds or cross-directional folding, such as described in EP1866225A1.

[0087] Preferably, the folding is executed such that the neck cut-out can be readily gripped by the user or wearer. Depending on the particular execution, the apron may be fully opened for being applied around the neck, or the neck opening may be sufficiently widened to be pulled over the head. Optionally, the tape for forming the first closure element may be formed in-line.

[0088] To this end, webs of hook material, elastic material, essentially non-extensible material, and optionally adhesive are provided.

[0089] These webs may be positioned in a relative cross-directional order and partially overlapping order of elastic material, hook material, non-elastic material, optionally a further stripe of non-elastic material between the elastic and the hook material.

[0090] A tape may be formed by connecting these materials by applying adhesive material, if desired, and bonding by applying energy, preferably by applying pressure, heat or ultrasonic energy.

[0091] The connected materials may then be cut to a predetermined length, which corresponds to a tape widths when applied to the apron.

[0092] After the donning, the adaptation element are positioned to adapt the neck opening size of the apron the neck size of the wearer, whilst the elastic tape is stretched at a sufficiently low tension so as to not create an uncomfortable feel to the wearer. However, the size of the neck opening adapts well to an increase of the neck circumference, such as by movement, swallowing, or speaking of the wearer.

Examples

[0093] In order to further explain the present invention, reference is made to the figures, depicting exemplarily executions, which, however should not be seen limiting in any way. In particular, individual elements of the depicted executions may very suitably be combined with each other. Fig. 1 depicts an apron 100 of a closed configuration, here exemplarily

shown in a rectangular execution, exhibiting a longitudinal centerline 104, which divides the apron into a first (114) and a second (116) side or lateral portion, corresponding to the left and right side of a wearer. As shown, the apron has a front portion 112, positioned over the chest of the wearer and a rear portion 118 positioned on the back of a wearer during its intended use.

[0094] The main sheet 105 further exhibits an outer edge 110 and comprises an opening 200, adapted to fit around the neck of a wearer. The opening comprises a cut-out portion 230 and a slit 250.

[0095] As shown, the cut-out portion 230 has a rectangular shape and the center of the cut-out portion is positioned symmetrically in the lateral direction, i.e. is positioned on the longitudinal center line 105 of the apron.

[0096] The inner edge 120 of the cut-out portion intersects the slit 250, which extends away from cut-out portion.

[0097] The apron further comprises a first size adjustment element 300, and a second size adjustment element 400, both positioned on the same surface of the main sheet and on opposite sides of the slit 250.

[0098] In Fig. 1B, a cut out portion of the apron is shown, detailing the execution of the first size adjustment element 300. This is anchored in the anchoring zone 310 to the main sheet 105, such as may be achieved by thermal bonding 315. It further comprises a stretch zone 320 and a connecting element zone 330, where connecting element, such as hooks, may be attached. Further it comprises a gripping zone 340.

[0099] Upon use, the tape is gripped at the gripping zone 340 and positioned on the landing zone 400. Thereby, the effective size of the neck opening is reduced and adapted to the neck size of the wearer. Fig. 2 depicts an apron of an open configuration, here shown with a circular cut-out 200 and a straight slit 250 extending parallel to but offset of the longitudinal centerline 105. The second connecting element comprises two patches (440' and 400") as first and second landing zone that are applied in an angled configuration. The first connecting means 300 is shown to be placed to cross-directionally bridging the slit 250, thereby easing a stable production, in particular if the direction of movement is towards the left side in Fig 2B, i.e. with the front portion 112 as leading portion and the back portion 118 trailing.

[0100] Table 1 shows exemplarily key dimensions for various product executions according to Fig. 1A (three leftmost columns) and Fig. 1B (right column).

Table 1
Exemplary Dimensions Slit is not extending through to outer edge Slit is extending through to outer edge

	Baby	Lady	Man	Lady
main sheet				
length	1200	1800	1700	1500
width	700	900	940	1300
cut out portion distance from front end	900	1000	1200	900
length	45	50	65	diameter:
width	60	105	105	220
size increase element				
length	45	50	65	356 (through to rear edge)
tape				
length	115	115	115	100
width	35	35	35	30
elastic extensibility first landing zone	100%	100%	100%	100%
length	100	140	170	115
width	35	35	35	30
second landing zone				
length	n.a	n.a	n.a	30
width	n.a	n.a	n.a	115

[0101] Fig. 3 depicts an apron that comprises a weakening line 250 which is executed as a discontinuous perforation line. Further, the neck opening is depicted therein in the form of an oval, though asymmetric executions may also be envisaged.

[0102] Fig 4A and B show schematically an execution with a further web material 107 surrounding the neck opening.

[0103] Further in Fig. 5A and B a further variation is depicted, wherein a further web material is overlaying the main sheet 105 that is not removed from the neck opening in the manufacturing. The weakening line 250 is extended into the

neck opening (indicated as line 255 with small dots), here in a particularly preferred execution where upon donning a user may easily tear it open, thereby allowing easy arrangement of the tape elements with hooks on the further material as landing zone.

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Claims

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1. An apron

for being positioned during its intended use around the neck of a wearer and being adapted to cover the shoulders, the chest and at least an upper portion of the back of a wearer, thereby defining a user oriented orientation, said apron comprising a main sheet made of a web material, preferably made of one or more material(s) selected from the group consisting of polymeric film material, polymeric fiber material, polymeric fiber / film composite, and natural fiber material, said apron further comprising

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- an in-use neck opening comprising a cut-out adapted for being positioned around the neck of a wearer;
- a weakening line extending from said cut-out towards an outer edge of said main sheet; and
- a size adjustment element adapted to adjust the size of said neck opening,

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characterized in that said size adjustment element comprises

- a) an elastically extensible element; and
- b) a closure system.

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2. An apron according to claim 1, wherein said closure system is of the hook-and-loop type, comprising a first connecting element comprising hooks and a second connecting element adapted to receive said hooks during use said first and second connecting element being positioned on a surface oriented away from a wearer during use and such that at least one second connecting element is on the side of said weakening line opposite to said first connecting element.

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3. An apron according to claim 1 or 2, comprising a tape system comprising said elastically extensible element and said first connecting element of said closure system.

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4. An apron according to any of the preceding claims, wherein said main sheet is made of a first web material, said apron comprising a further web material positioned around said neck opening and preferably in a position oriented away from the user relative to said main sheet, whereby said further web material is preferably adapted to function as second connecting element of said closure system.

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5. An apron according to claim 4, wherein essentially no further web material is present in said cut-out whilst said main sheet is essentially continuous in said cut-out in a manufacturing configuration and being adapted to be removed from said cut-out upon use, preferably by an extension of said weakening line extending into said cut-out.

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6. An apron according to any of the preceding claims, wherein said weakening line extends from said cut-out towards an outer edge of the apron and intersects said outer edge of the apron.

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8. A process for the manufacturing of an apron, the process comprising the steps of

- a) providing

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an essentially continuous main sheet web material from a main sheet web supply,

- one or more separation tool(s) for creating a neck opening and/or a weakening line;
- a supply system for a closure system, said closure system comprising

a tape element comprising an elasticated region and hook elements and a landing web element;

- cutting, application and connecting tools;
- optionally a supply system for a further web material;

- b) feeding said main sheet web material along a main sheet web machine direction;
- c) optionally combining said further web material, if present, with said main sheet web material;
- d) creating a weakening line for an in-use neck opening in at least one of said main sheet web material and said further web material, wherein said weakening line is a slit with a full separation of the slit material(s) or is a perforation line with alternating regions of separation and no separation along the weakening line;
- e) positioning one or more landing web element(s) around the periphery of the neck opening or adjacent to said weakening line and connecting it or them directly or indirectly to said main sheet web material, whereby optionally said landing web element is integral with said further web material;
- f) positioning said tape element on said main sheet web material or further material, and connecting it directly or indirectly to said main sheet web material, such that at least one second connecting element is on the side of said weakening line opposite to said first connecting element;
- g) cutting said main sheet web material to it's in use size;

g) folding the resulting apron.

9. A process for the manufacturing of an apron according to claim 8, wherein said weakening line is positioned in a trailing position relative to said cut-out of said neck opening, the process further comprising the step of

- h) positioning said tape element on said main sheet such that at least a part of said hook elements of said tape element overlies a portion of said landing web element(s) and engages releasably therewith, and at least a further portion of said tape element is positioned on the opposite side of said weakening line and connected to said main sheet directly or indirectly, preferably permanently.

10. A process for the manufacturing of an apron according to claim 8 or 9, further comprising the step of

i) forming said tape element, comprising the sub-steps of

i1) providing along a machine direction of the materials

- a web of hook material;
- a web of elastic material, extensible at least in its cross-machine direction;
- one or more web(s) of essentially non-extensible material;
- optionally adhesive material;
- cutting, application, and bonding tools;

i2) positioning the webs of step i1) in a relative cross-directional optionally at least partially overlapping order

- non-extensible material,
- elastic material,
- non-extensible material,
- hook material,
- non-extensible material;

i3) connecting the webs of step i1) to form a tape by

- optionally applying adhesive material,
- optionally compressing overlapping regions, and
- bonding by applying energy, preferably by applying pressure, heat or ultrasonic energy;

i4) cutting the connected materials to a predetermined length.

11. A process for the manufacturing of an apron according to any of claims 8 to 10, thereby executing said step f) of positioning said tape element on said main sheet web material or further material such that the cross-directional arrangement of the tape elements is positioned in a cross-directional orientation of said main sheet web material.

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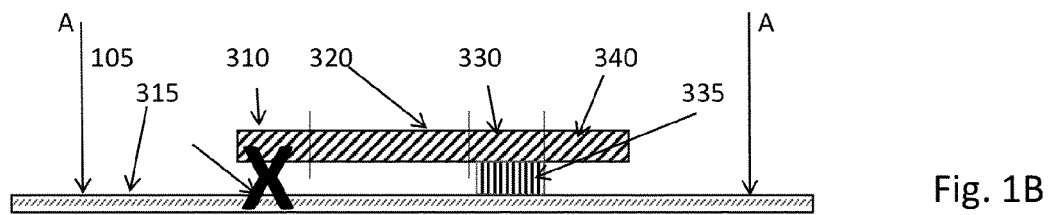
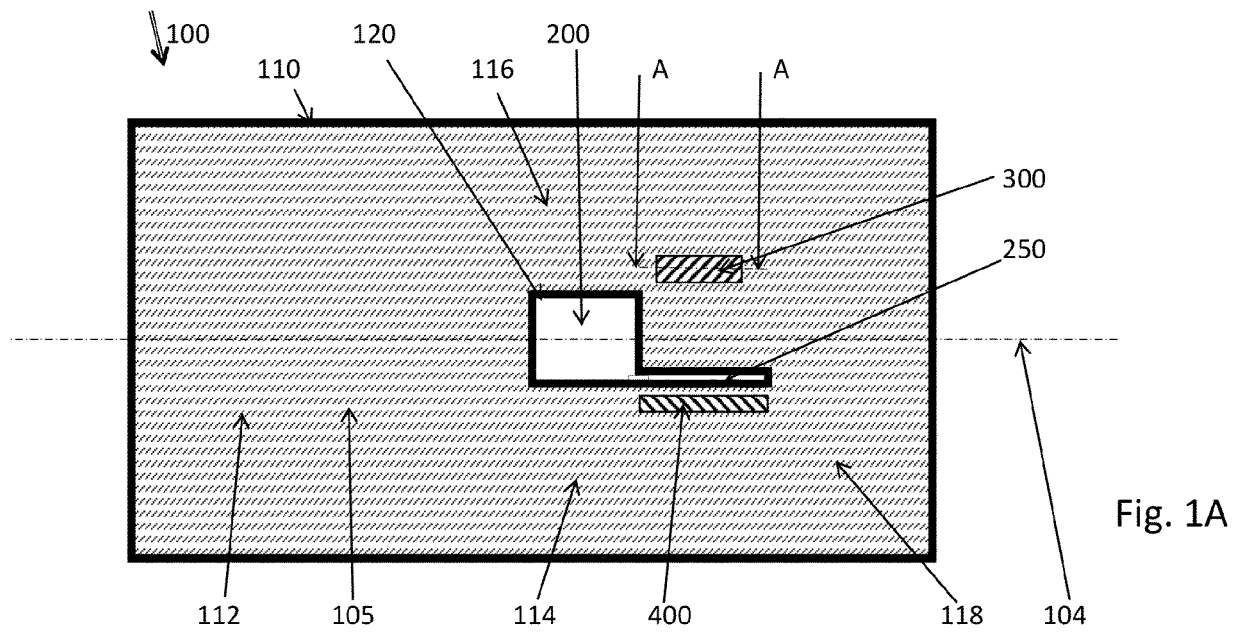
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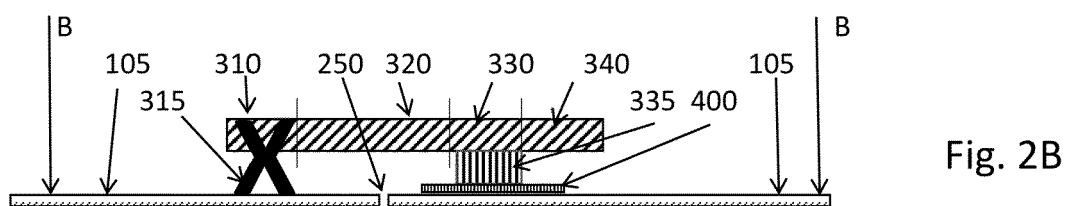
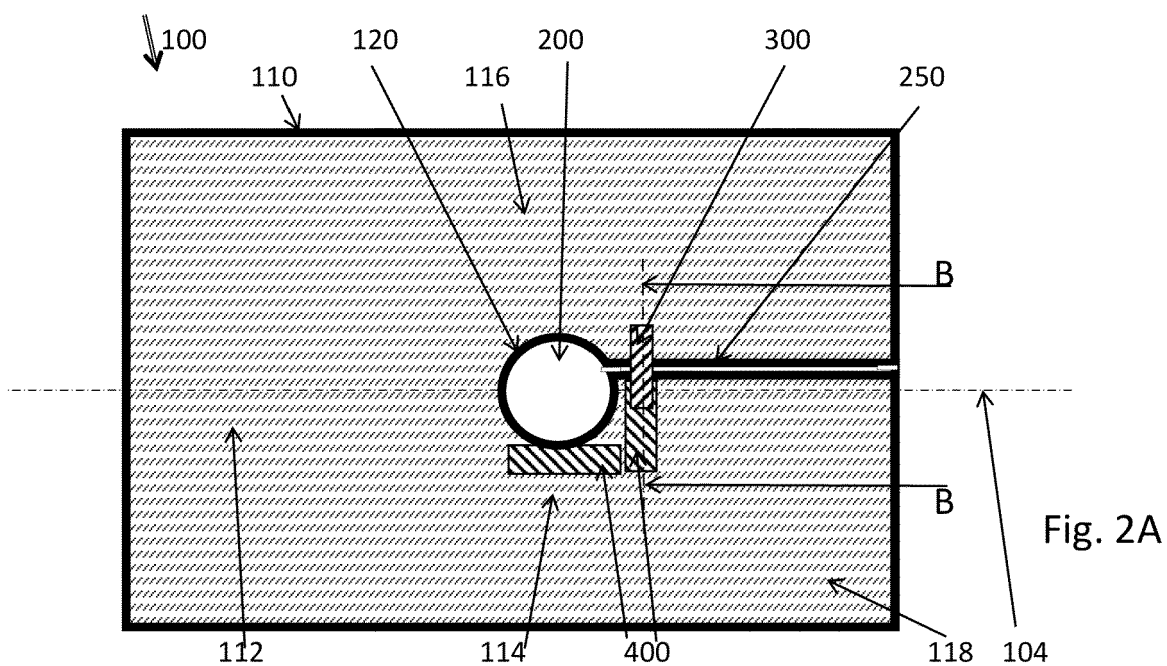
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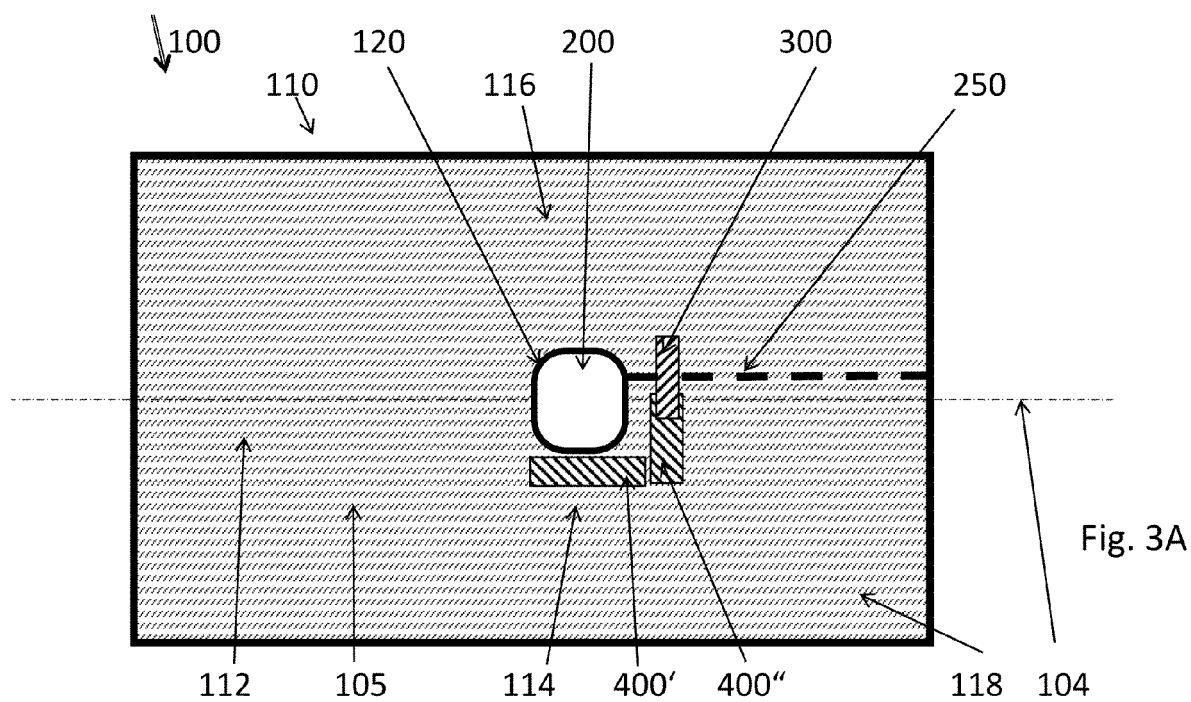
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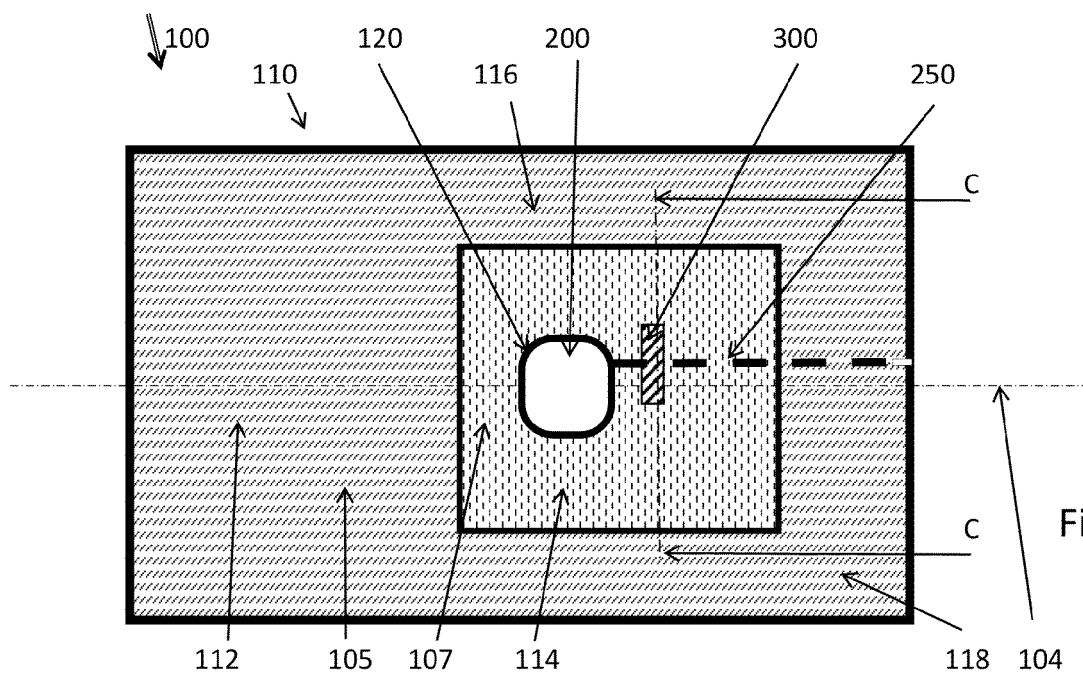


Fig. 4A

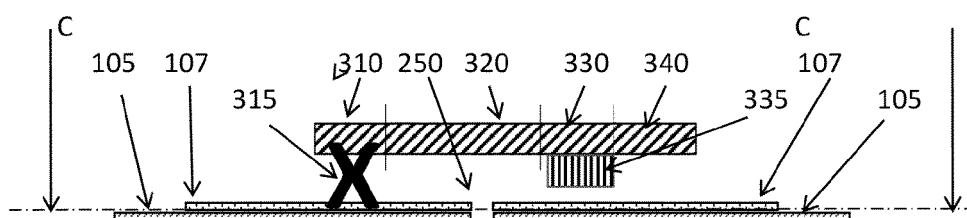
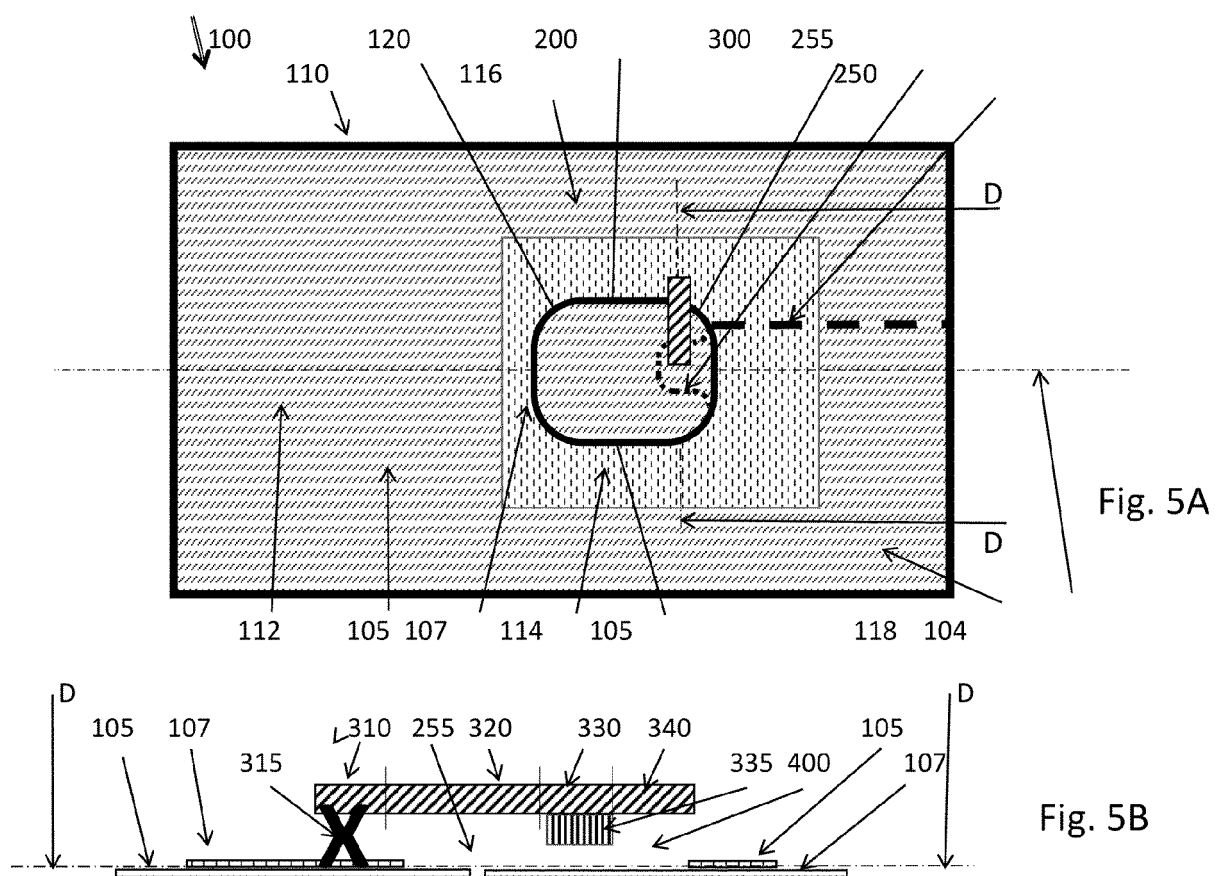


Fig. 4B





EUROPEAN SEARCH REPORT

Application Number
EP 16 18 6522

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			A41D A41B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 December 2016	Examiner van Voorst, Frank
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