



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.10.2009 Bulletin 2009/41

(51) Int Cl.:
A41H 42/00 (2006.01) B65B 25/20 (2006.01)

(21) Application number: **09386007.0**

(22) Date of filing: **02.04.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

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(30) Priority: **02.04.2008 GR 20080100217**

(54) **Protective garment method and device for the production and packaging thereof**

(57) Method and device of rotational production of a disposable protective garment (1) made from a film of plastic or paper or other absorbent liquid-proof material comprising supply of a film web from a feed roller (5), passage of the film through a perforating device comprising a rotatable member (7,17) provided with an arrangement of perforating blades (11,12,13) and an associated member (8,18) that is adapted to contact the rotatable

member (7,17) and exert a predetermined pressure thereupon so as to effect predetermined perforations along a scoring end line (11') defining a line of separation of consecutive garment items and along scoring lines (12', 13') allowing formation of a central opening (4) for the insertion of the user's neck and formation of tie straps (3a, 3b) adapted to tie around the neck or waist of the user in the final protective garment product.

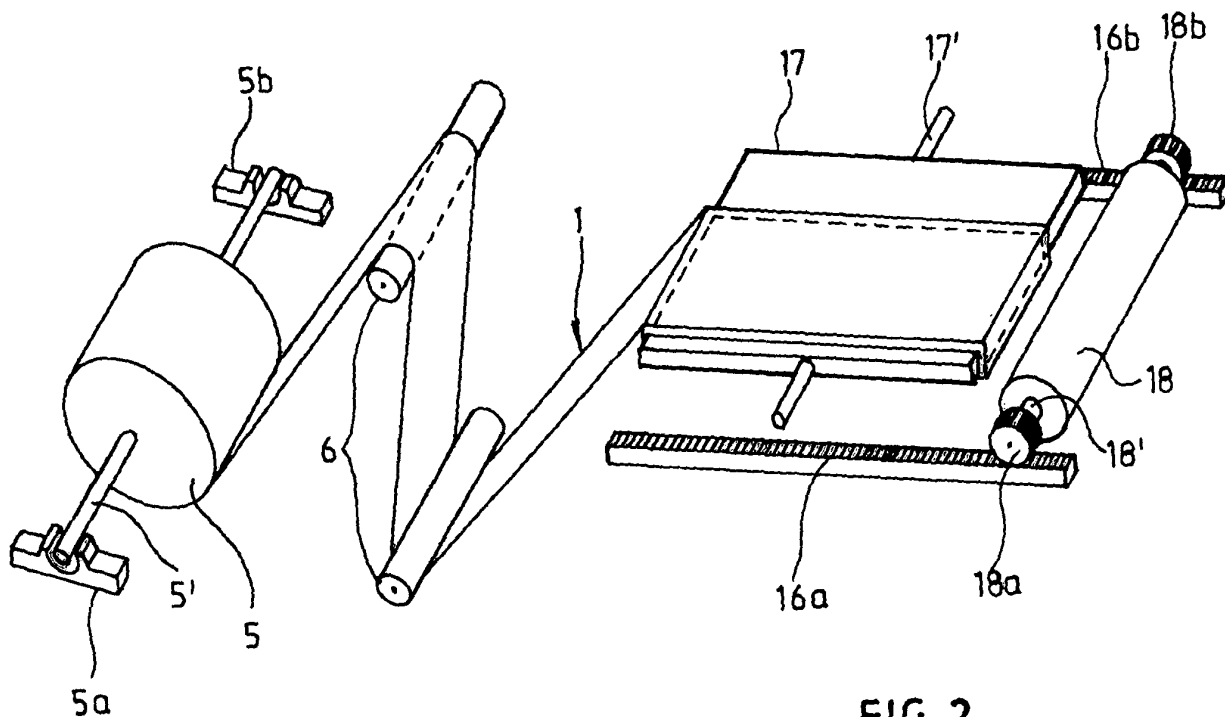


FIG. 2.

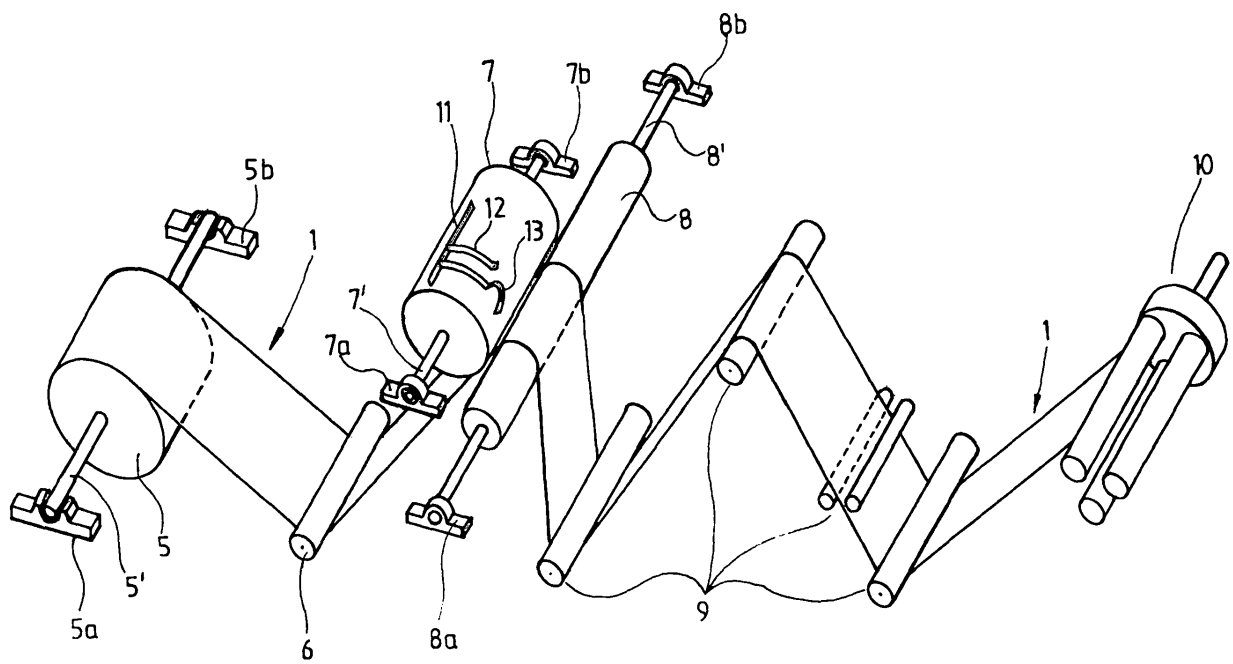


FIG.1.

Description

THE FIELD OF THE ART

[0001] The present invention relates to a disposable protective garment and in particular to a method of production and packaging thereof.

THE BACKGROUND OF THE INVENTION

[0002] In the Greek Patent 1002814 a disposable protective garment was revealed made from plastic material or from plasticized absorbent paper or from other liquid-proof material that is produced with the method of rotational production in a size such as to cover the chest and the shoulders of the user including a suitable cut section for the passage of the neck of the user and straps adapted to tie around the user's neck and/or waist. The garment is packaged in such a way so as to be handy to use and so as to be accommodated in a minimal space. The proposed protective garment is offered as a means of covering the human body to offer protection against dirt from substances that may damage clothsware or cause harm to the body, thereby ensuring the benefit of high quality services in working places.

[0003] An object of the present invention is to disclose alternative devices for the production of the protective garment by means of the method of rotational production, as well as alternative mechanisms of packaging of the disposable protective garment, such devices ensuring production of a wide variety of designs for the protective garment to be used in a variety of applications, providing optimal conditions of hygiene and safety for the employees and customers of enterprises, such as in hairdresser's or in other shops of hygienic interest (supermarkets, etc.).

[0004] A further object of the invention is the provision of alternative designs of the disposable protective garment that is being produced with the aforementioned method of rotational production and the alternative devices and mechanisms for production and packaging thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The present invention will be rendered clearly comprehensible to those skilled in the art by reference to the accompanying drawings, which depict illustrative, non restrictive embodiments thereof.

Fig. 1 shows a perspective view of the device employed in the production of the garment in accordance with a first preferred embodiment of the invention.

Fig. 1a shows a detail of the perforating unit employed in the device depicted in Fig. 1.

Fig. 2 shows a perspective view of the device employed in the production of the garment in accordance with a second preferred embodiment of the invention.

Fig. 2a shows a detail of the perforating unit employed in the device depicted in Fig. 2.

Fig. 3 presents a perspective view of an embodiment of packaging device for the items of protective garment following their discharge from the device of Fig. 2.

Fig. 3a presents a detail of the packaging device shown in Fig. 3.

Fig. 3b presents a perspective view of an individually rolled single item of protective garment as discharged from the packaging device shown in Fig. 3.

Fig. 4 presents a perspective view of a typical box used for packaging a plurality of protective garment items.

Fig. 5 presents a perspective view of a packaging mechanism employed in packaging a single rolled item of protective garment.

Figs. 5a, 5b, 5c present successive stages of operation of the packaging mechanism shown in Fig. 5.

Figs. 6a, 6b present two alternative solutions of packaging means for a single item of protective garment product as discharged from the packaging mechanism shown in Fig. 5.

Figs. 7a, 7b present a perspective view of two alternative solutions for packaging of the protective garment as discharged from the device of production thereof depicted in Fig. 1 in smaller or bigger rolls comprising a continuous web of protective garment items.

Figs. 8a and 8b present alternative packaging forms of a rolled and of a flat protective garment item respectively and Fig. 8c presents a perspective view of an alternative individual packaging of a single protective garment item.

Fig. 9 shows a plan view of the plastic film employed in the production of a protective garment with straps being adapted to tie around the neck of the user, whilst Figs. 9a, 9b show a frontal and a rear view respectively of this protective garment product.

Fig. 10 shows a plan view of the plastic film employed in the production of an alternative protective garment design with straps being adapted to tie around the

waist of the user, whilst Figs. 10a, 10b show a frontal and a rear view respectively of this protective garment product.

Fig. 11 shows a plan view of the plastic film employed in the production of still another alternative protective garment with straps being adapted to tie around the waist of the user, whilst Figs. 11a, 11b show a frontal and a rear view respectively of this protective garment product.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0006] By reference to the accompanying drawings we will hereinafter describe illustrative, non restrictive, preferred embodiments of the invention.

[0007] Fig. 9 shows a first preferred embodiment of a protective garment 1 produced in accordance with the present invention. The garment comprises a thin film of plastic or paper or plasticized paper or other suitable material, which is configured in the shape of an oblong rectangular parallelepiped with a length and width such as to appropriately fit with the ergonomic requirements of the intended use of the protective garment. The film is folded longitudinally at the middle of the film web along the dotted fold line 2 shown in Figs. 9, 10 or 11 and processing of the film is implemented with half the width of the eventually used garment product. A perforated section 4 is cut at the top of fold line 2 extending at equal parts symmetrically on the sides thereof. A neck opening is formed following removal of the cut section 4 along parallel perforation lines 3a", 3b" extending at symmetrically equal distances on the sides of fold line 2 respectively. Each one of the aforementioned parallel perforation lines 3a", 3b" extends at a curved end and the two curved ends form a circular section that defines the opening for the neck of the user following removal of cut section 4 to form the garment end product. Another pair of perforation lines 3a', 3b' extend parallel to the aforementioned lines 3a", 3b" respectively so that in between the pair of lines 3a', 3a" and the pair of lines 3b', 3b" there are being provided straps of equal width and length 3a and 3b respectively, that may be employed to tie the garment around the neck of the user following cutting of the plastic film along the aforementioned perforation lines 3a' and 3b'. A pair of equally sized film surfaces 2a, 2b is provided at the sides of dotted fold line 2 and similarly a pair of equally sized film surfaces 4a, 4b is provided at the sides of dotted fold line 2 on either side of the upper perforated section 4. Figs. 9a and 9b respectively show the frontal and rear view of the garment in use after the plan film view shown in Fig. 9 has been cut along perforation lines 3a' and 3b' thereby providing the straps 3a, 3b by means of which the garment is being tied up around the neck of user. Whilst equally sized film surfaces 2a, 2b are adapted to cover the chest of the user as shown in the frontal view of Fig. 9a, the equally sized film sur-

faces 4a, 4b are adapted to fall onto the back of the user as shown at the rear view of Fig. 9b and due to electrostatic properties they act so as to maintain the plastic film in firm contact with the back of the user.

[0008] A correspondingly sized film surface is employed for the production of the garment products with tie straps around the waist of the user as shown in Figs. 10 and 11. In this case neck opening 4 is a closed circle being formed at the middle, close to the top of the garment, and the two tie straps 3a, 3b extend at the perimeter of the waist of the user as shown in the rear garment views of Figs. 10b or 11b.

[0009] In the case of Figs. 10 and 11 perforation lines 3a', 3a" and 3b', 3b" that delimit and define tie straps 3a, 3b are located at the upper part of the rectangular parallelepipedal film forming the garment 1, whilst perforation lines 3a", 3b" coincide with the external longitudinally extending sides of the rectangular parallelepiped. Lines 3a', 3b' are merely straight scoring lines parallel to the end lines 3a", 3b" coinciding with the external sides of the parallelepiped in the case of the garment shown in Fig. 10, whilst in the case of Fig. 11 the same lines 3a', 3b' are shaped so as to define a cutting region and the removal of an entire section of the film on either side of the central circular opening 4.

[0010] Fig. 1 shows a first preferred embodiment of the device of rotational production of the protective garment of invention, which comprises a feed roller 5 supplying the film, with a shaft 5' based onto roller bearing supporting members 5a, 5b on either side thereof, an arrangement of film stretching and alignment rollers 6 downstream the feed roller 5, the film perforating arrangement and finally the film discharging arrangement 10 that may consist of a roller similar to the feed roller 5 or a plurality of rollers as illustratively depicted in Fig. 1 around which the continuous web of the perforated film is being wound. The device is provided with means of automatically checking the number of final garment items contained in each one of the aforementioned rollers of the film discharging arrangement 10.

[0011] The film supplied for the production of the garment of the invention is being folded along fold line 2 of Figs. 9-11 so that the film processing width is half of that of the finally developed garment product.

[0012] As shown in Fig. 1 the perforating arrangement comprises a pair of rotatable drums 7, 8. The film is being wound around drum 7 that is rotated around central shaft 7' based onto supporting roller bearings 7a, 7b on either side thereof. Drum 8 located at a marginal distance from drum 7 so as to marginally contact the same is rotatable around its central shaft 8' based onto supporting roller bearings 8a, 8b on either side thereof and whilst rotating also performs a reciprocating movement in the direction of shaft 8'. Drum 7 is provided with an arrangement of perforating blades 11, 12, 13. Perforating blade 11 extends longitudinally along drum 7 parallel to the shaft 7' thereof, whilst perforating blades 12, 13 extend parallel to each other, perpendicularly to the perforating blade

11. Perforating blade 13 extends at a curved nearly semicircular section that appropriately acts in forming the central neck opening 4 in the garment product of the invention, whilst the parallel linear portions of perforating blades 12, 13 act so as in combination to form the tie straps 3a, 3b, since in particular perforating blade 12 acts so as to form perforating lines 3a', 3b', whilst perforating blade 13 acts so as to form perforation lines 3a'', 3b''. Finally, linear perforating blade 11 acts so as to form a scoring end line transversally along the film web, such scoring end line defining a line of separation of consecutive garment items.

[0013] The depth of perforation effected with perforation blades 11, 12, 13 can be regulated as necessary for the achievement of a suitable perforation depth in the film by means of regulation of the marginal contacting distance of drums 7 and 8 through marginal displacement of the cylindrical drum 7. In order to provide protection of drum 8 against deterioration that might result from the permanent contact of perforation blades 11, 12, 13 at a certain region of the circumference thereof, according to a preferred embodiment of the invention, cylindrical drum 8 is adapted to perform a continuous reciprocating movement in the direction of shaft 8' thereof so that the perforation blades 11, 12, 13 might come each time in contact with a different region of the circumference of drum 8.

[0014] According to an illustrative, preferred embodiment of the invention the perimeter of the cylindrical drum 7 corresponds to the length of the final product of protective garment, so that the completion of one rotation of drum 7 corresponds to the production of a length of a single protective garment item. The perforating blades are limited at a certain length of the circumference of drum 7 so as to perform the required perforations as shown in Figs. 9, 10 or 11, i.e. they are limited at the top of the rectangular parallelepiped surface of the film employed in the production of a garment item 1.

[0015] Figs. 7a and 7b respectively show the running film web with the transversally extending scoring line 11' that is being produced by blade 11 and defines the straight line along which separation of consecutive protective garment items from the roll produced is effected and with the scoring lines 12' and 13' that respectively define the coinciding perforation lines 3a', 3b' and 3a'', 3b''. Following cutting along scoring lines 12', 13', the tie straps 3a, 3b for fastening the garment around the neck of the user are being formed, whilst as shown in Fig. 7a the cut section 13'' is being rejected to allow creation of the central opening 4 for insertion of the neck of the user (Fig. 9). Fig. 7b also shows a first film portion 14, which extends up to the first perforation 11', where such film portion is being rejected.

[0016] Fig. 2 shows an alternative device for the implementation of the method of the invention. According to this illustrative, alternative preferred embodiment of the invention the device producing the garment items comprises, similarly with the device of Fig. 1, a feed roller 5 supplying the film, roller 5 being rotatable around shaft

5' and based onto supporting bearings 5a, 5b and a film stretching and alignment roller arrangement 6. The film perforating means in this case comprises a plate 17 with a cross-section of an oblong rectangular parallelepiped, one side of plate 17 being provided with the arrangement of perforating blades 11, 12, 13, same as defined in the device of Fig. 1, for the production of the garment design depicted in Fig. 9. Plate 17 is rotatable around a central shaft 17' that is perpendicularly oriented with respect to the film web. The device shown in Figs. 2, 2a further comprises a cylindrical drum 18 rotatable around shaft 18'. Gears 18a, 18b are provided at the ends of shaft 18', such gears being rolled along appropriately configured racks 16a, 16b, located underneath plate 17.

[0017] The device depicted in Figs. 2, 2a operates in two phases: a) a first phase during which shaft 17' is rotated and the garment producing film is being wound around plate 17. A desirable, predetermined plurality of garment items is being produced in one batch depending on the rotations of shaft 17' that corresponds to an equivalent number of film lengths for the production of a single garment item, since the perimeter of plate 17 corresponds to the length of film required for one garment. b) a second phase during which, whilst plate 17 remains stationary and the side thereof provided with the arrangement of perforating blades 11, 12, 13 faces downwardly towards drum 18, rotation of the latter around shaft 18' is initiated and gears 18a, 18b slide along racks 16a, 16b respectively, whereby a predetermined pressure depending on the regulatable distance of cylindrical drum 18 from the surface of plate 17 is being exerted on the latter as drum 18 passes underneath plate 17, so as to cut the film wound around plate 17 along the perforation lines defined by perforating blades 11, 12, 13. Thereafter the cylindrical drum 18 returns at its initial position so as to allow performance of a new operation cycle with the loading of film onto plate 17 and the subsequent passage of drum 18 underneath the loaded plate 17 for the production of new batch of garment items. Whilst with the device of Fig. 1, the garments are supplied in the form of a continuous roll and the user has to cut off consecutive garment items along aforementioned scoring line 11' and thereafter form the ready to wear garment after cutting along scoring lines 12', 13' to create neck opening 4 and tie straps 3a, 3b, with the device of Fig. 2, the same cutting off is being realised during the phase of production, the outcome of this alternative device being consecutively piled ready to wear garment items.

[0018] With regard to the packaging of the commercially available protective garment of the invention, one mode of packaging is that of the roll 10 with a continuous processed film web as it results from the device of Fig. 1 and is depicted in Figs. 7a, 7b and in Fig. 8a. Another mode of packaging is that of consecutively piled garment items as illustratively shown in Fig. 8b or of such garment items being loaded in a box 30 as shown in Fig. 4. Individual packaging of a single garment item in a planar form is possible as illustratively depicted in Fig. 8c or

individual packaging of a single garment item in a rolled form as illustratively depicted in Fig. 6a and Fig. 6b.

[0019] According to an indicative, preferred embodiment of the invention, Figs. 3, 3a present a packaging device adapted to effect packaging of a predetermined number of garment items as they are being supplied in independent, already cut and ready to wear items, from the productive device of Fig. 2, 2a. The packaging device of Fig. 3 comprises a plate 20 with a rectangular parallelepipedal cross-section and with a length that corresponds to the intended length of the garment being produced. A rubber linear bar 24 is provided longitudinally along one side of plate 20 and a series of cylindrical rollers 21 are adapted to rotationally contact such rubber linear bar 24. The shafts 21' of rollers 21 are fixedly mounted onto a conveyor belt 23 that is rotated around pulleys 22. A predetermined number of independent garment items produced by the device of Fig. 2 is being loaded onto plate 20 and the first garment is wound around the first one of the series of rollers 21, the second garment being wound around the second roller 21. As conveyor belt 23 is being rotated the garment is being wound around the roller 21 due to the frictional contact of the latter with the rubber linear bar 24 until the roller arrives at the end of plate 20 and its contact with bar 24 is terminated, whereby its rotation ceases and the operator removes from the roller 21 the readily rolled garment item. A typically rolled garment item is illustratively depicted in Fig. 3b. As the operator places consecutively discharged rolled garment items one on top of the other, a pile of garments of planar form is produced due to gravity and a box 30 as typically shown in Fig. 4 may be employed for their final packaging. The amount of garments packed in each box 30 is predetermined and they might be removed from the box either through a side opening or an opening 30a at the top of the box 30.

[0020] Another embodiment of packaging form for the garment of the invention rolled in the form depicted in Fig. 3b is the individual packaging of a single final product item of protective garment. An illustrative mechanism for effecting such individual packaging of an item of protective garment is shown in Fig. 5, such mechanism comprising a hollow cylindrical member 25 within which reciprocatingly moves a piston member 25a that extends to a pair of linear members 26, 27, such members 26, 27 being divergent when piston 25a is wholly inserted into the cylindrical member 25. With the piston in this position (Fig. 5) the operator inserts the rolled single piece of garment having a form as depicted in Fig. 3b transversally within the gap in between the aforementioned divergent members 26, 27, whereby as piston 25a is pulled and members 26, 27 are being inserted within cylindrical member 25, members 26, 27 become parallel and tightly hold the rolled piece of garment (Fig. 5a). Whilst in such position the cylindrical member 25 is rotated and the rolled piece of garment 1 is rolled once again around an axis that is perpendicular to the axis of its previous rolling operation in which it attained the form depicted in Fig.

3b, thereby producing a finally rolled garment item as shown in Fig. 5b. This individual roll of protective garment 1 is covered with a cylindrical cap member 28 as shown in Fig. 5c and thereby a form of individual single piece garment packaging within the cylindrical cap member 28 removed from the cylindrical member 25 is obtained. Fig. 6b shows this form of packaging within a cylindrical cap member 28 covered with a plug member 28a. Alternatively as shown in Fig. 6a a strip of paper or relevant selected material 29 that is provided with an end self-adhesive surface 29a might be used wrapped around the individually rolled single piece of garment 1, the self-adhesive surface 29a being used for sticking together the two ends of the paper strip 29.

Claims

1. Device used in the rotational production of a disposable protective garment (1) made from a film of plastic or paper or other absorbent liquid-proof material, comprising a feed roller (5) supplying a continuous web of said film, an arrangement of film stretching and alignment rollers (6) downstream said feed roller (5), a film perforating arrangement downstream said film stretching and alignment rollers (6) and a processed film discharging and packaging arrangement (10) providing a plurality of protective garment products downstream said film perforating arrangement, **characterised in that** said film perforating arrangement comprises a rotatable member (7, 17) provided with an arrangement of perforating blades (11, 12, 13) and an associated member (8, 18) that is adapted to contact said rotatable member (7, 17) and exert a predetermined pressure onto said arrangement of perforating blades (11, 12, 13), said arrangement of perforating blades (11, 12, 13) being constituted by perforating blade (11) that extends in a direction parallel to the shaft (7', 17') of rotation of said rotatable member (7, 17), said perforating blade (11) acting so as to form a scoring end line (11') transversally along the film web, said scoring end line (11') defining a line of separation of consecutive garment items and by perforating blades (12, 13) extending parallel to each other, perpendicularly oriented with respect to said perforating blade (11), where perforating blade (13) extends at a curved nearly semicircular section that acts in forming a central opening (4) for the insertion of the user's neck in the final protective garment product, whilst the parallel portions of said perforating blades (12, 13) act so as in combination to form tie straps (3a, 3b) adapted to tie around the neck or waist of the user in the final protective garment product, said packaging arrangement (10) being selectively adapted to alternatively provide a continuous roll of the protective garment product or a pile of flat shaped protective garment items or individually rolled and packed single protective garment

items.

2. Device used in the rotational production of a disposable protective garment (1) as claimed in the above claim 1, **characterized in that** said film used in the production of the protective garment is folded along a centrally located, longitudinally extending fold line (2) oriented perpendicularly to said scoring line (11') defining a line of separation of consecutive garment items, and **in that** said central opening (4) and said tie straps (3a, 3b) formed by means of said perforating blades (12, 13) are symmetrically oriented with respect to said fold line (2), whereby said film is being processed following folding thereof along said fold line (2) and thereby the film width being processed is half the width of the final protective garment product.
3. Device used in the rotational production of a disposable protective garment (1) as claimed in above claims 1 and 2, **characterized in that** said film perforating arrangement comprises a pair of rotatable drums (7, 8), said drum (7) being rotated around a central shaft (7') and being adapted to receive the film, said drum (8) marginally contacting said drum (7) and performing a simultaneous rotational motion around a central shaft (8') and a reciprocating movement in the direction of said shaft (8'), said drum (7) being provided with said arrangement of perforating blades (11, 12, 13) along a portion of the circumference thereof, the reciprocating movement of said drum (8) being adapted to offer protection of the same against deterioration that might result from a permanent contact of said perforating blades (11, 12, 13) with a certain region of the circumference thereof as such reciprocating movement in the direction of said shaft (8') results in the perforating blades (11, 12, 13) each time coming in contact with a different region of the circumference of said drum (8), wherein the perimeter of said drum (7) corresponds to the length of the final product of protective garment so that the completion of one rotation of said drum (7) corresponds to the production of a length of a single protective garment item, and wherein said packaging arrangement (10) comprises one or more rollers (10) of a selected diameter receiving the appropriately perforated continuous film web and an accordingly selected number of protective garment items.
4. Device used in the rotational production of a disposable protective garment (1) as claimed in above claims 1 and 2, **characterized in that** said film perforating arrangement comprises a rotatable plate (17) with a cross-section of an oblong rectangular parallelepiped, the oblong sides of the parallelepiped being oriented in the direction of the film, one side of said plate (17) being provided with said arrange-

ment of perforating blades (11, 12, 13), said plate (17) being rotatable around a central shaft (17') that is perpendicularly oriented with respect to the film web, and a cylindrical drum (18) rotatable around a shaft (18') being provided underneath said plate (17) and comprising gears (18a, 18b) at the two ends of said shaft (18'), said gears (18a, 18b) being rolled along racks (16a, 16b), whereby said plate (17) the perimeter of which corresponds to the length of a single protective garment item is loaded with the film web having a total length corresponding to the intended number of protective garment items and thereafter, whilst said plate (17) remains stationary with the side thereof provided with the arrangement of perforating blades (11, 12, 13) facing downwardly towards said drum (18), said cylindrical drum (18) is rotated around said shaft (18') and said gears (18a, 18b) slide along said racks (16a, 16b) respectively, whereby a predetermined pressure is being exerted onto said plate (17) as drum (18) passes underneath the same so as to cut the film wound around plate (17) along the scoring lines defined by said perforating blades (11, 12, 13), wherein said packaging arrangement (10) comprises a plate (20) with a rectangular parallelepipedal cross-section and with a length that corresponds to the intended length of the garment being produced, a rubber linear bar (24) being provided longitudinally along one side of said plate (20), a series of cylindrical rollers (21) being adapted to rotationally contact said rubber linear bar (24), wherein shafts (21') of said rollers (21) are fixedly mounted onto a conveyor belt (23) that is rotated around pulleys (22), a predetermined number of independent garment items produced being loaded onto said plate (20), each garment being wound around one of said rollers (21), said garments being provided in a rolled form following frictional contact of said rollers (21) with said rubber linear bar (24) as said conveyor belt (23) is being rotated.

5. Device used in the rotational production of a disposable protective garment (1) as claimed in above claim 4, **characterized in that** said packaging arrangement is adapted to effect individual packaging of a single final product item of protective garment and comprises a mechanism consisting of a hollow cylindrical member (25) within which reciprocatingly moves a piston member (25a) that extends to a pair of linear members (26, 27), said members (26, 27) being divergent when piston (25a) is wholly inserted into said cylindrical member (25) and receiving a rolled single piece of garment transversally within the gap in between them, whereby as said piston (25a) is pulled and said members (26, 27) are being inserted within said cylindrical member (25), said members (26, 27) become parallel and tightly hold the rolled piece of garment, whilst subsequent rotation of said cylindrical member (25) provides a piece

of garment (1) rolled once again around an axis that is perpendicular to the axis of its previous rolling operation, said piece of garment being provided within a cylindrical cap member 28 closed with a plug means (28a).

6. Method of rotational production of a disposable protective garment (1) made from a film of plastic or paper or other absorbent liquid-proof material, **characterised in that** it comprises the steps of:

folding said film of plastic or paper or other absorbent liquid-proof material along a longitudinally extending central axis (2) thereof and loading the folded film into a feed roller (5) so that the film web supplied from said feed roller (5) has half the width of the disposable protective garment (1) being produced;

supplying said film web in a film perforating arrangement comprising a rotatable member (7, 17) provided with an arrangement of perforating blades (11, 12, 13) and an associated member (8, 18) that is adapted to contact said rotatable member (7, 17) and exert a predetermined pressure thereupon, said arrangement of perforating blades (11, 12, 13) thereby producing an arrangement of predetermined scoring lines (11', 12', 13') onto said film web and in particular said perforating blade (11) extending in a direction parallel to the shaft (7', 17') producing said scoring line (11') transversally along the film web, said scoring end line (11') defining a line of separation of consecutive protective garment items, whilst said perforating blades (12, 13) extending parallel to each other, perpendicularly oriented with respect to said perforating blade (11) with said perforating blade (13) extending at a curved end section, producing said scoring lines (12', 13') longitudinally along the film web, said scoring lines (12', 13') defining a central opening (4) for the insertion of the user's neck and tie straps (3a, 3b) adapted to tie around the neck or waist of the user in the final protective garment product;

performing a packaging process for the film discharged from said film perforating arrangement, said packaging process alternatively providing a roll or a box containing a predetermined number of protective garment items or individually packaged single protective garment items packaged in a rolled or flat form.

7. Method of rotational production of a disposable protective garment (1) made from a film of plastic or paper or other absorbent liquid-proof material, according to the above claim 6, **characterised in that** production of said disposable protective garment (1) is a continuous flow production with said prede-

mined scoring lines (11', 12', 13') produced onto said film web by means of an arrangement of rotatable drums (7, 8) defining perforations, whereby the user has to cut the film web supplied in a rolled form first along said scoring line (11') in order to obtain one individual protective garment item and thereafter cut the film web along said scoring lines (12', 13') thereby creating said central opening (4) for the insertion of the user's neck and tie straps (3a, 3b) adapted to tie around the neck or waist of the user in said one individual protective garment item.

8. Method of rotational production of a disposable protective garment (1) made from a film of plastic or paper or other absorbent liquid-proof material, according to the above claim 6, **characterised in that** production of said disposable protective garment (1) is a batch production with said predetermined scoring lines (11', 12', 13') produced onto said film web by means of an arrangement of a rotatable plate (17) and a cylindrical drum (18) performing straight cuttings onto said film web wound around said rotatable plate (17), whereby a plurality of ready to wear individual protective garment items is being produced through the simultaneous cutting along said scoring line (11') of said film web wound around said rotatable drum (17) and simultaneous cutting along said scoring lines (12', 13') thereby creating said central opening (4) for the insertion of the user's neck and tie straps (3a, 3b) adapted to tie around the neck or waist of the user in each one of said individual protective garment items that may subsequently be packaged in either a rolled or a flat form.

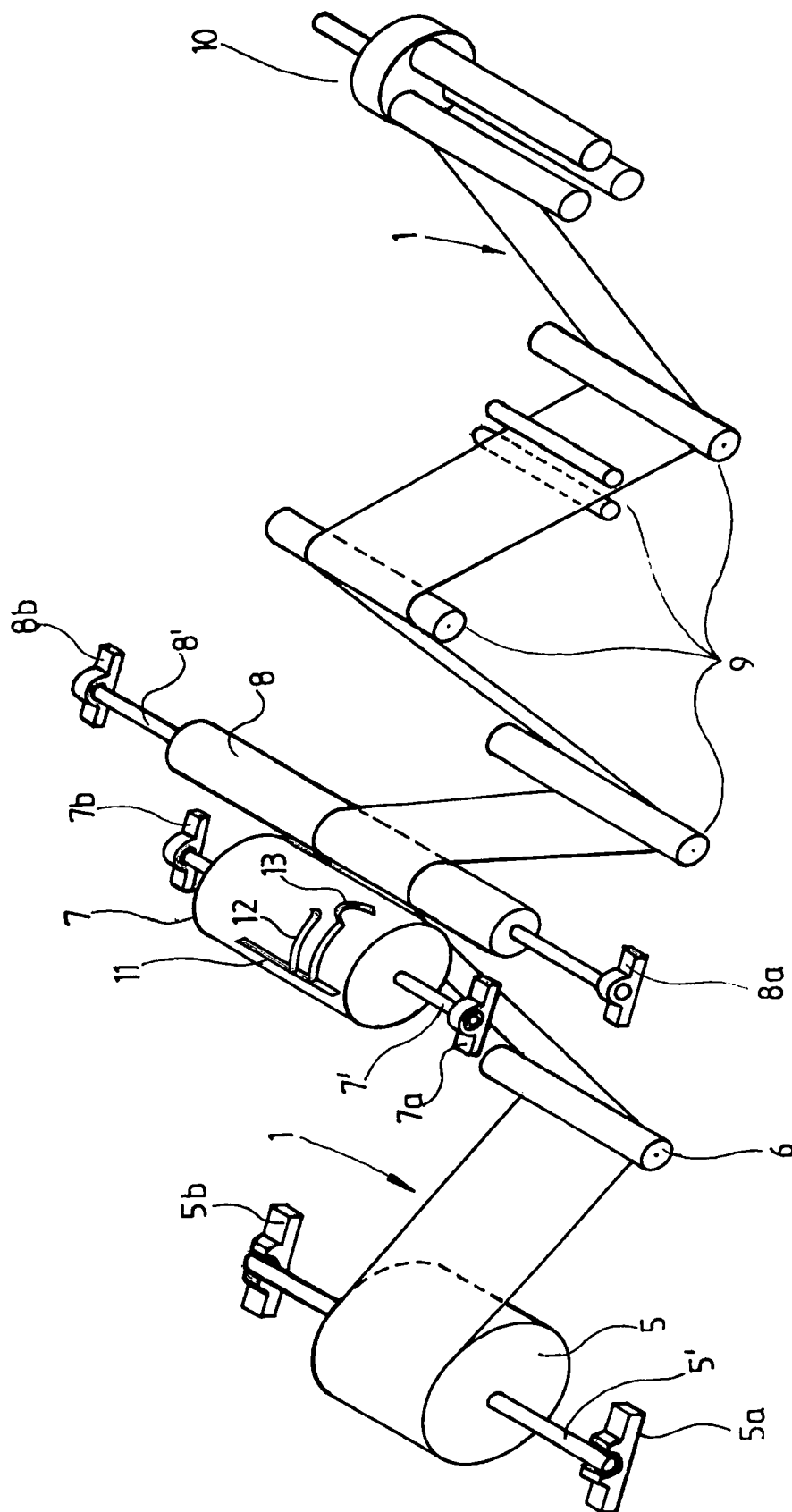


FIG.1.

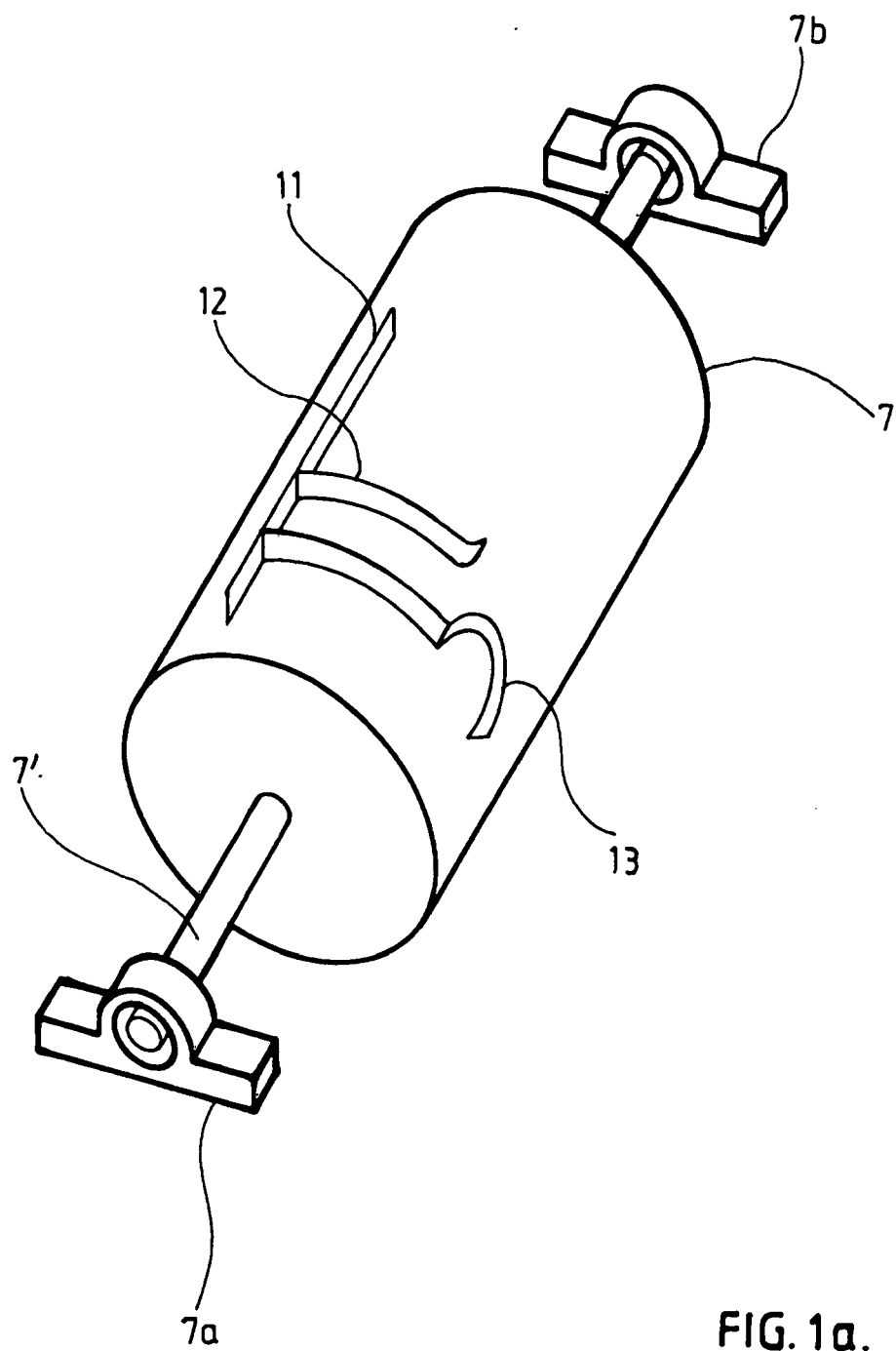
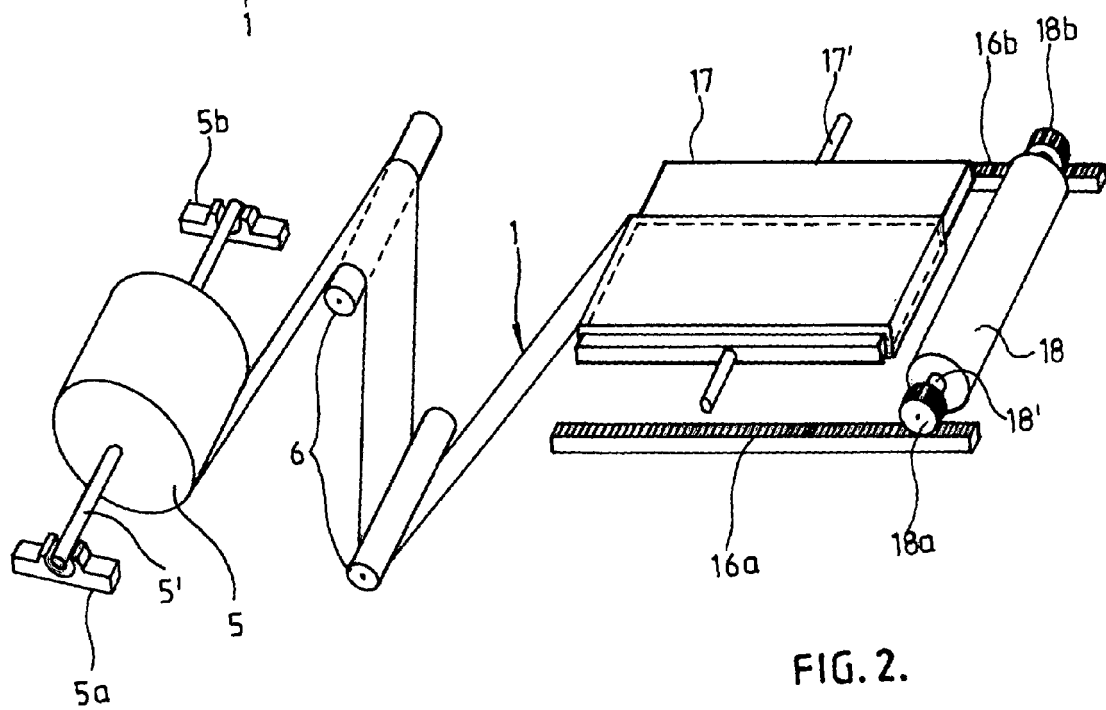
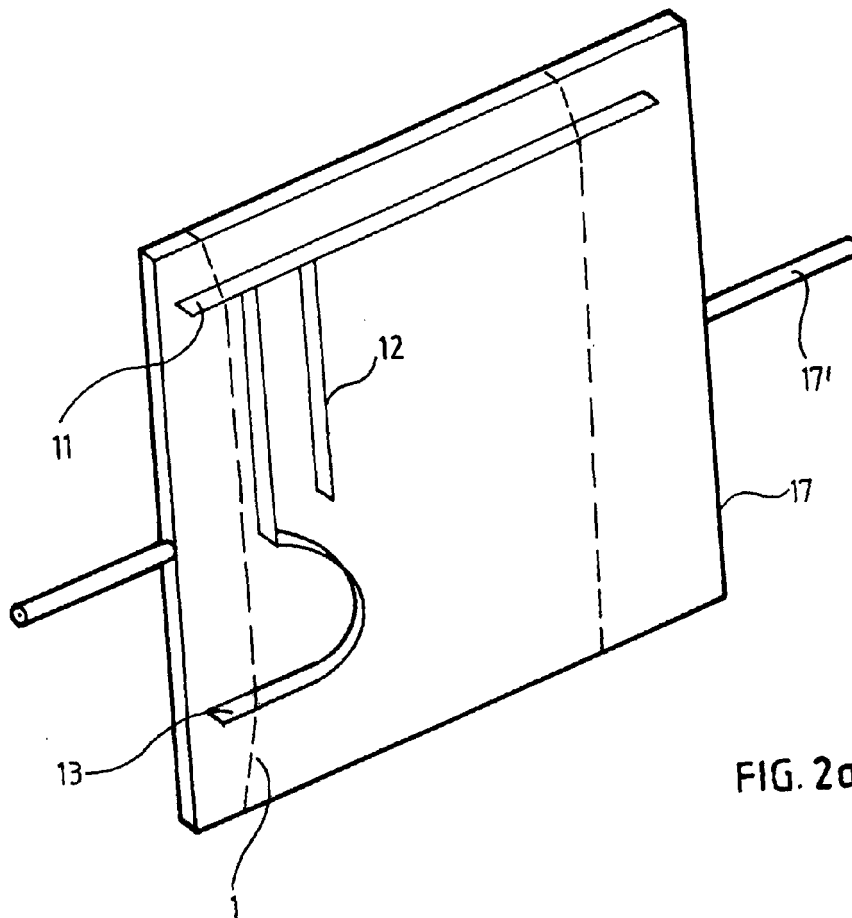
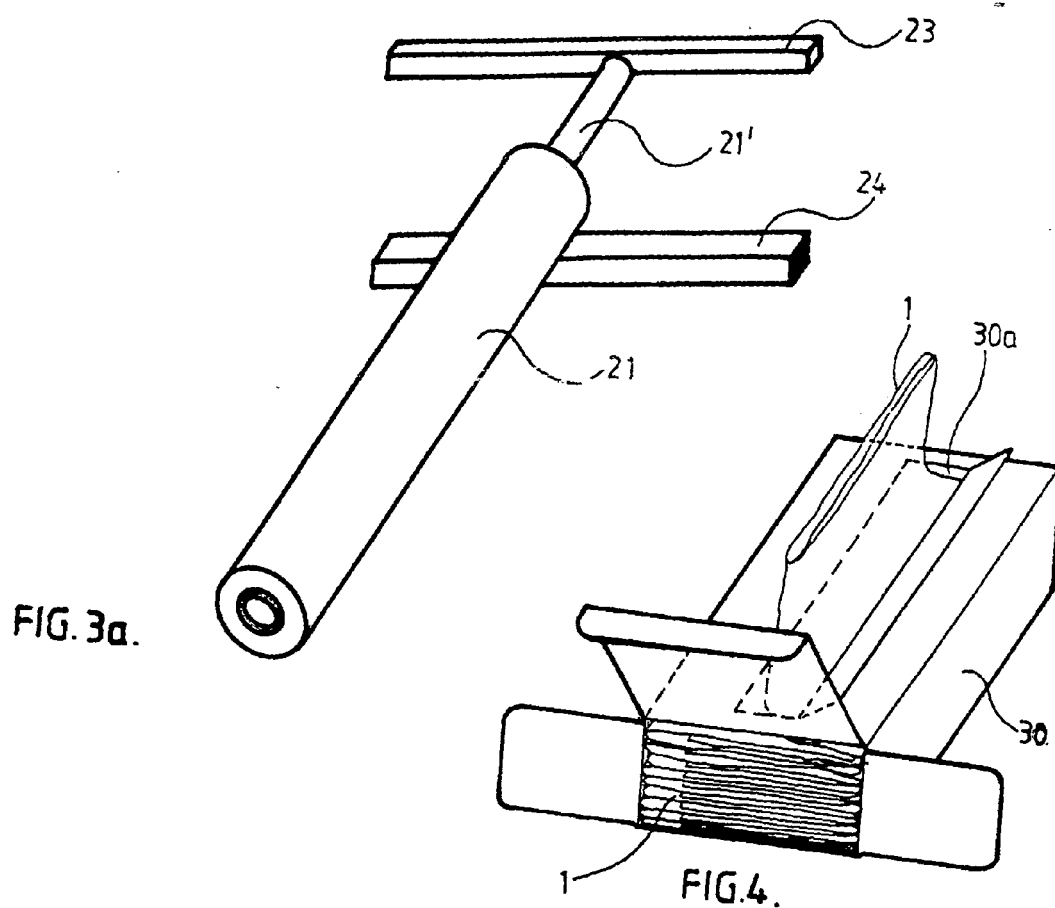
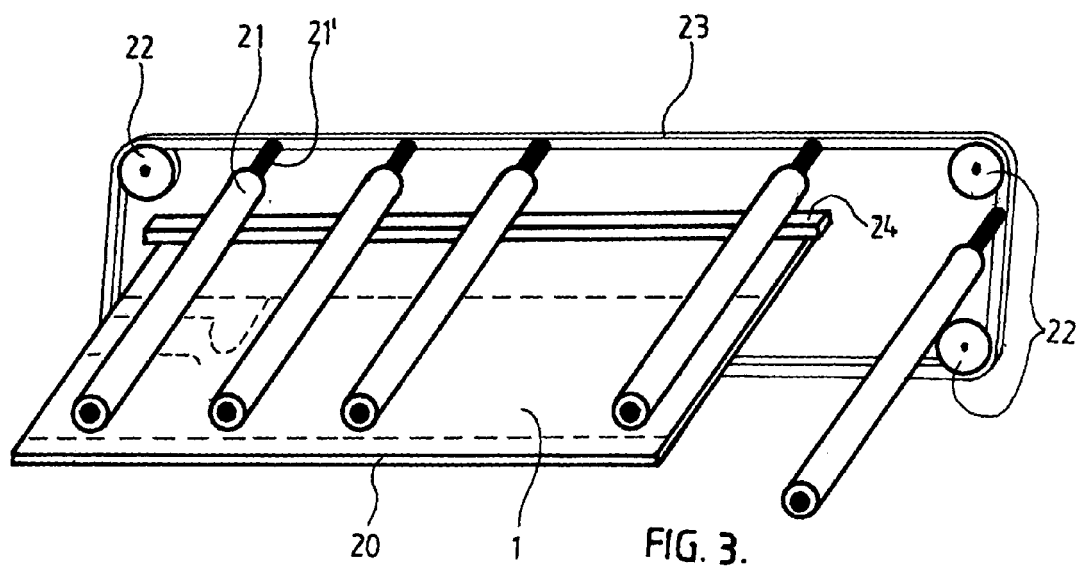


FIG. 1a.





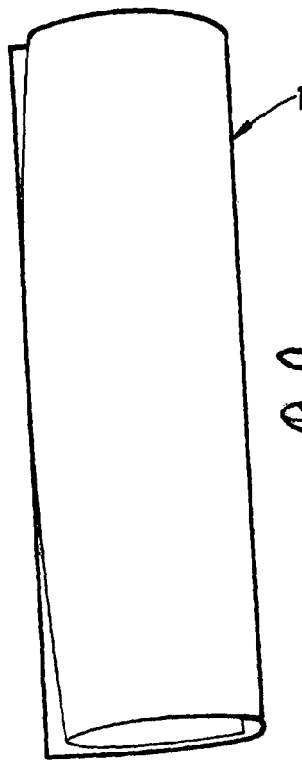


FIG. 3b.

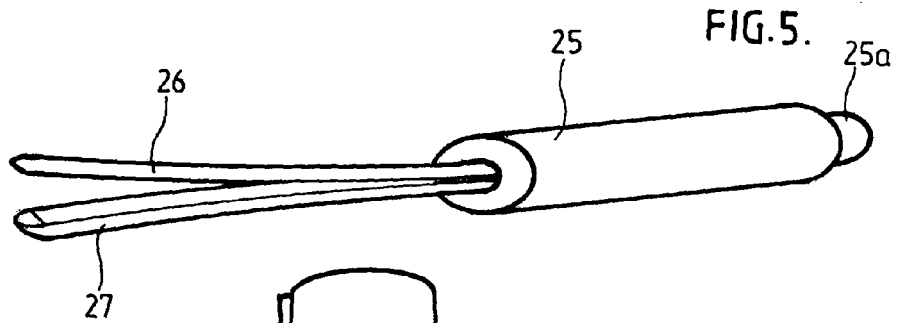


FIG. 5.

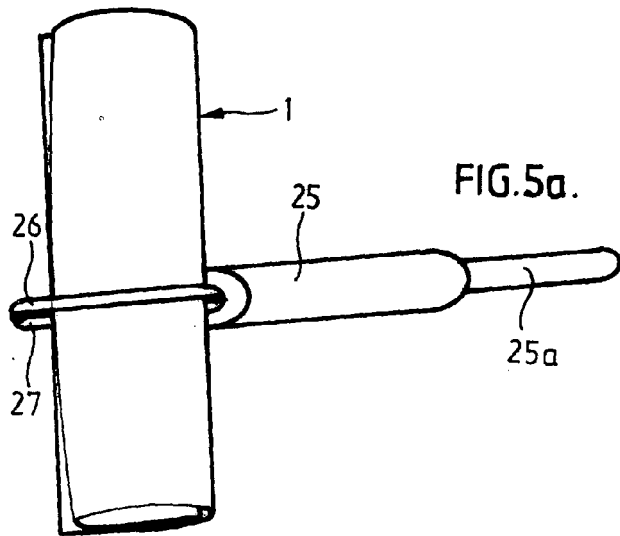


FIG. 5a.

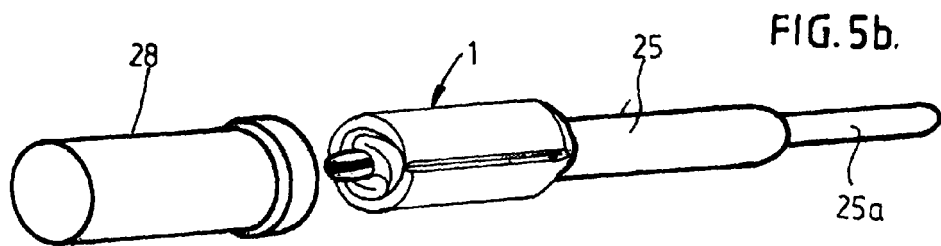


FIG. 5b.

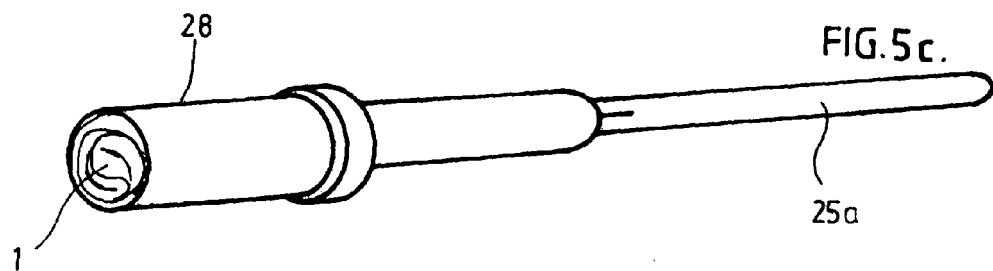
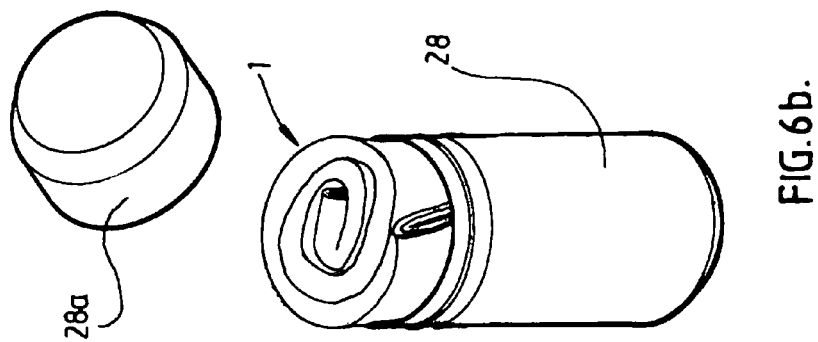
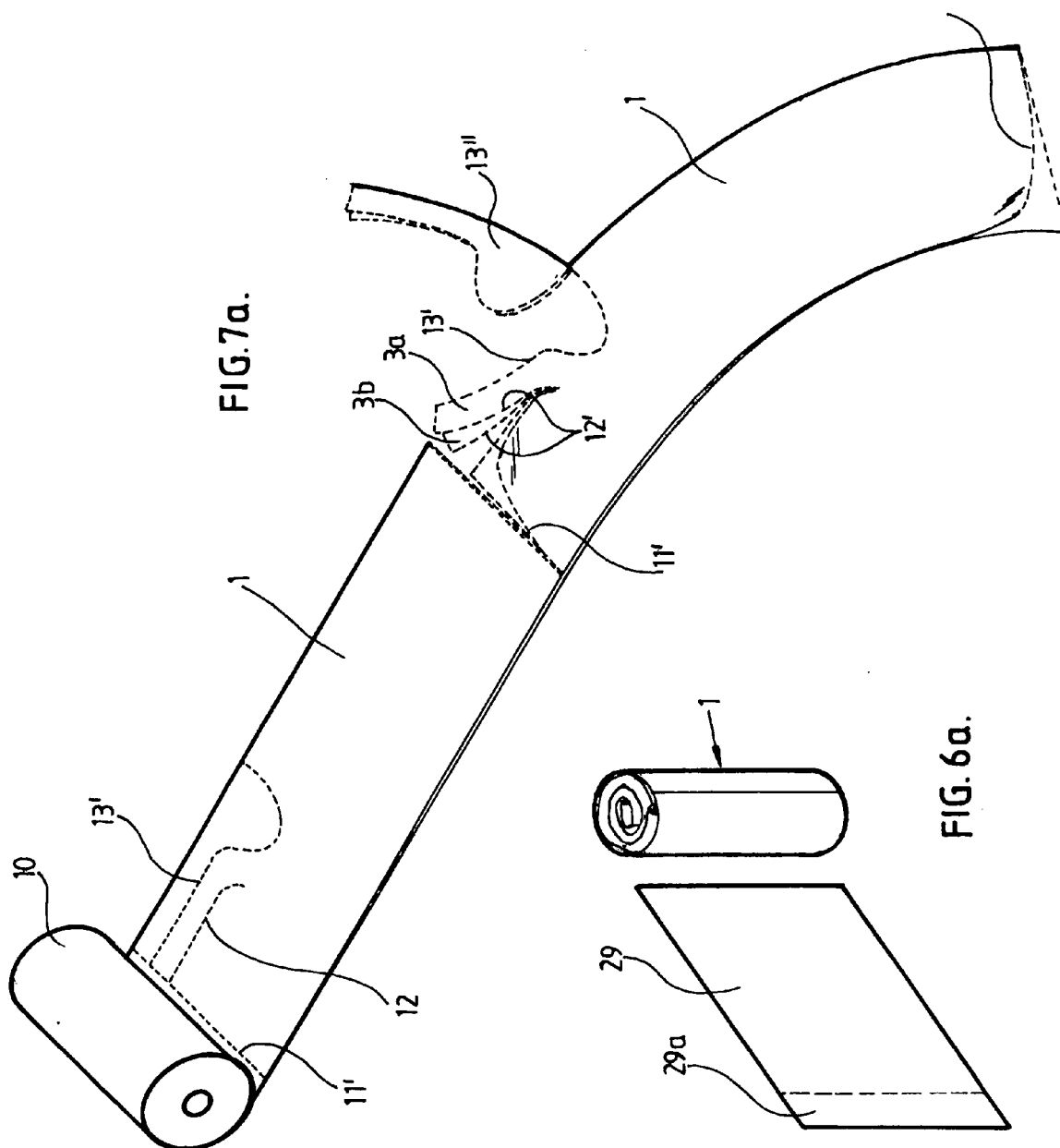


FIG. 5c.



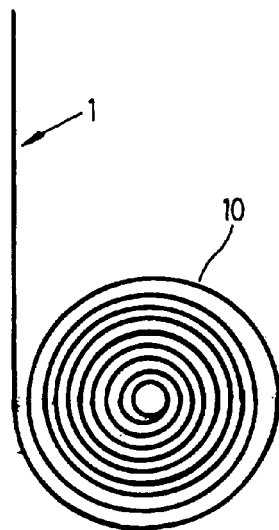
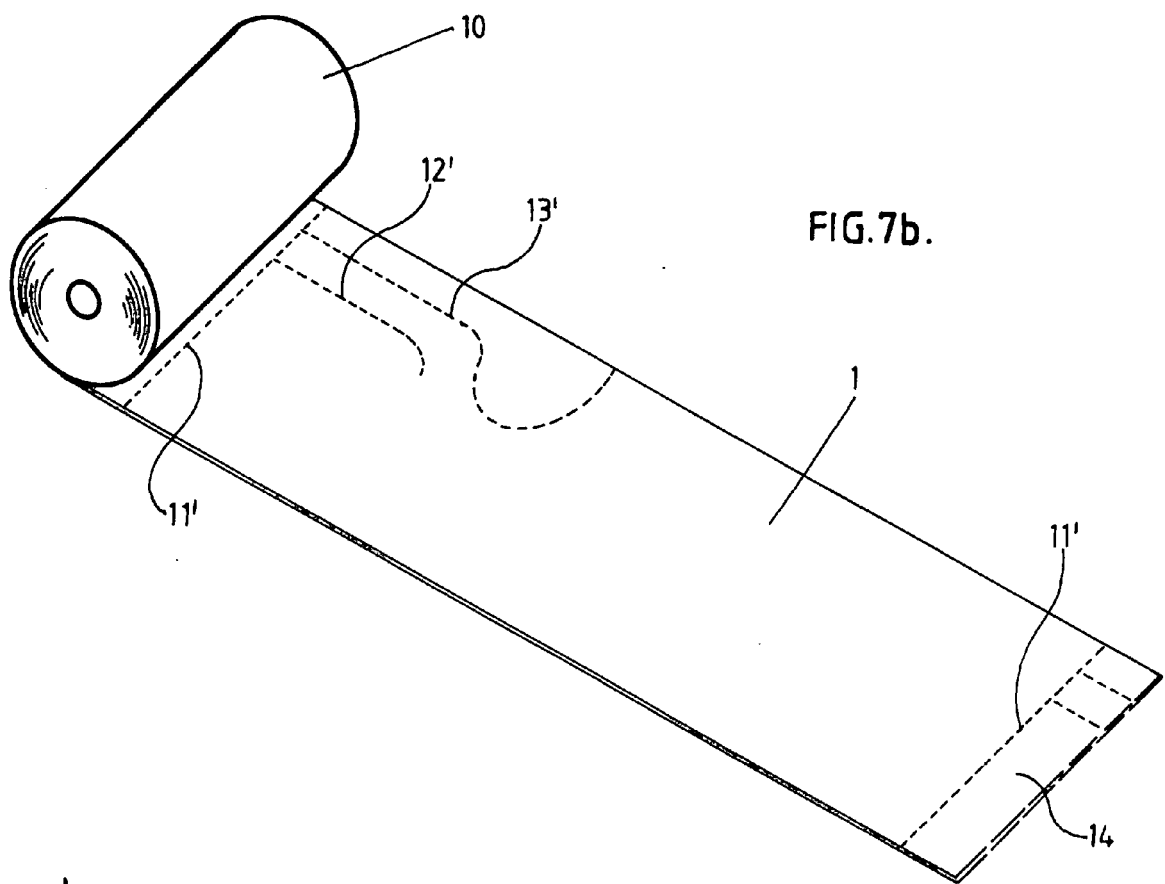


FIG. 8a.

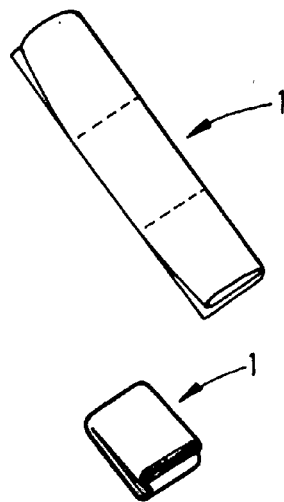


FIG. 8c.



FIG. 8b

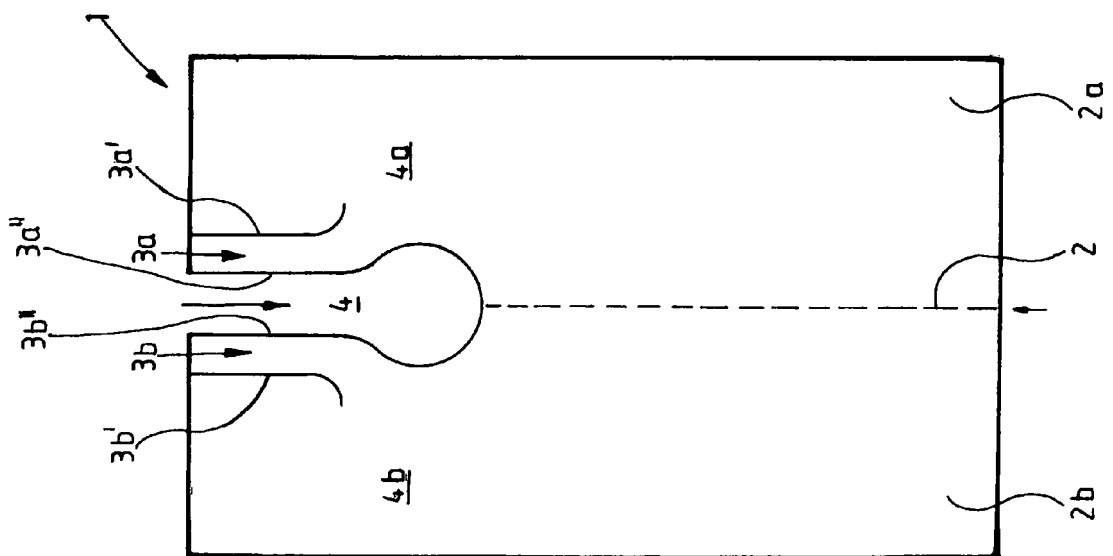


FIG. 9.

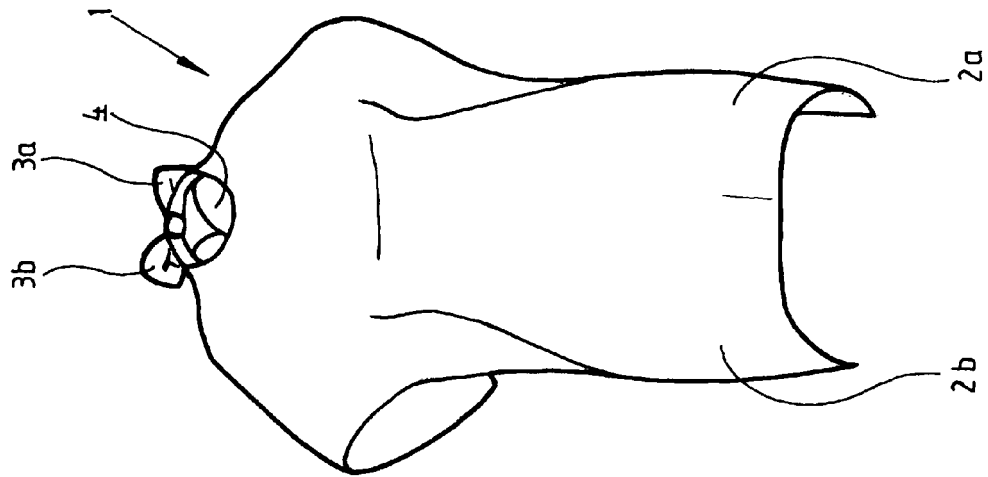


FIG. 9a.

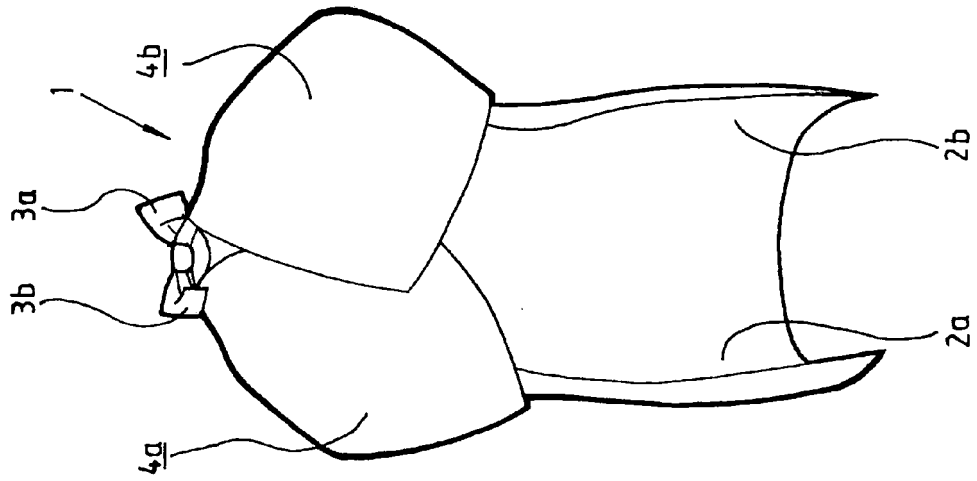
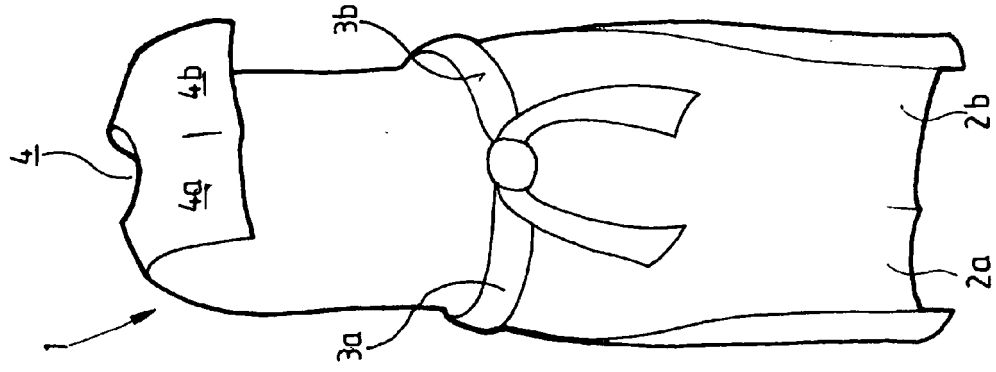
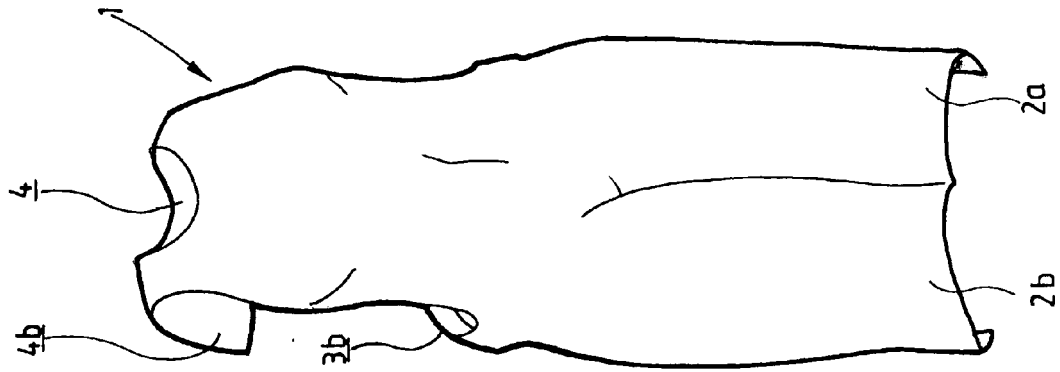
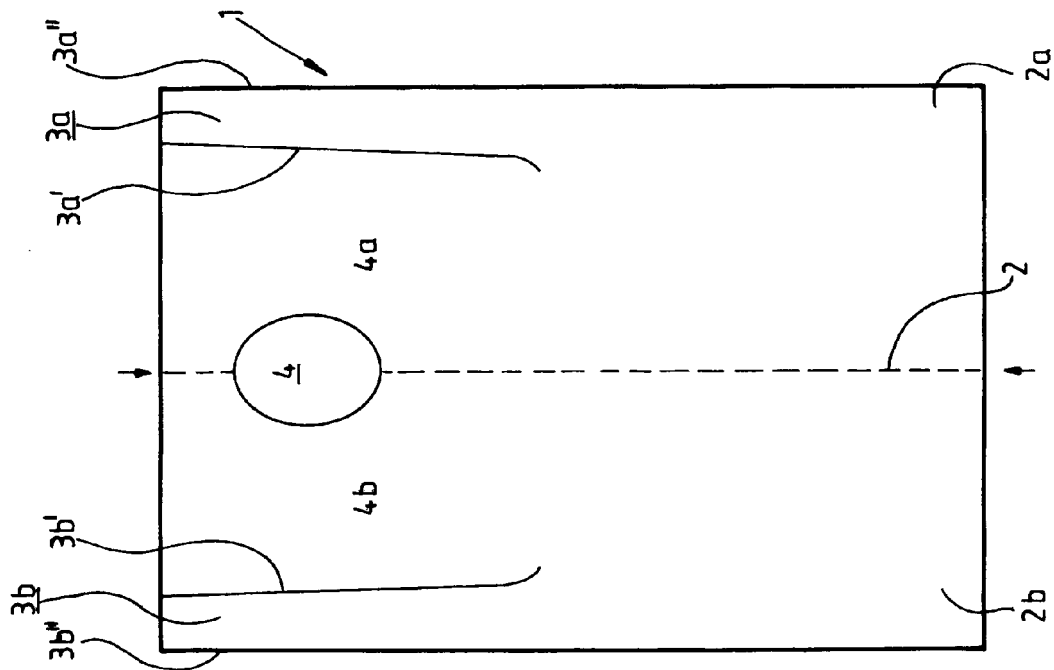


FIG. 9b.



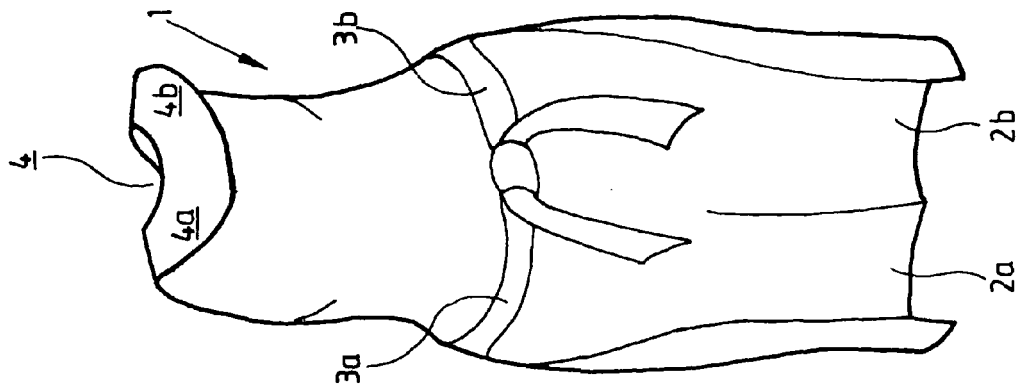


FIG. 11b.

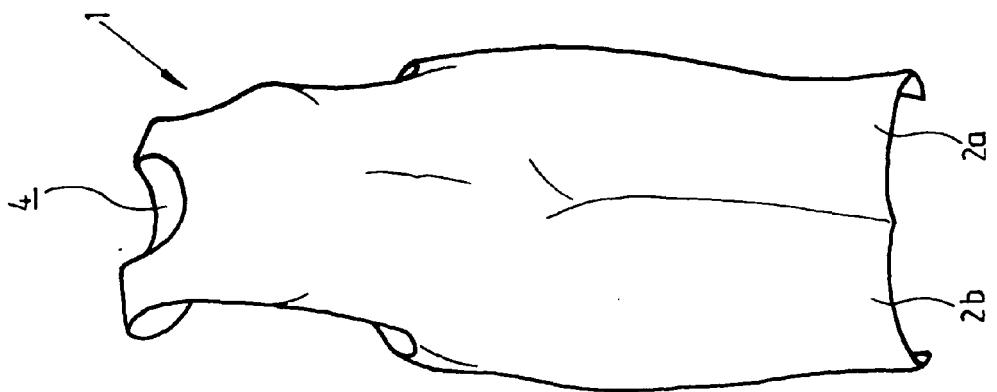


FIG. 11b.

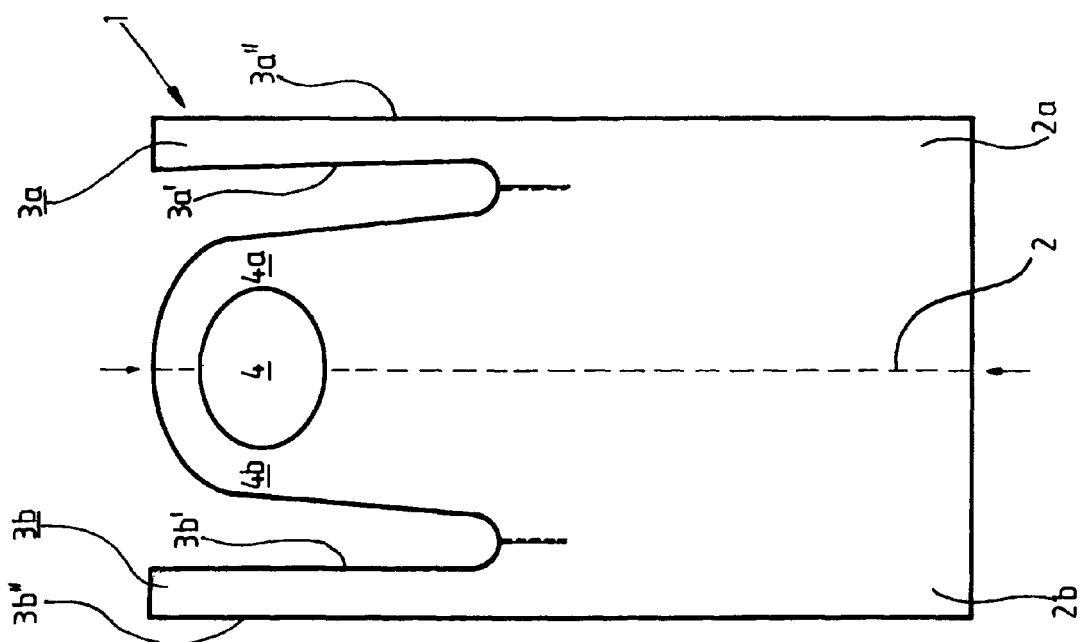


FIG. 11.



EUROPEAN SEARCH REPORT

Application Number
EP 09 38 6007

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