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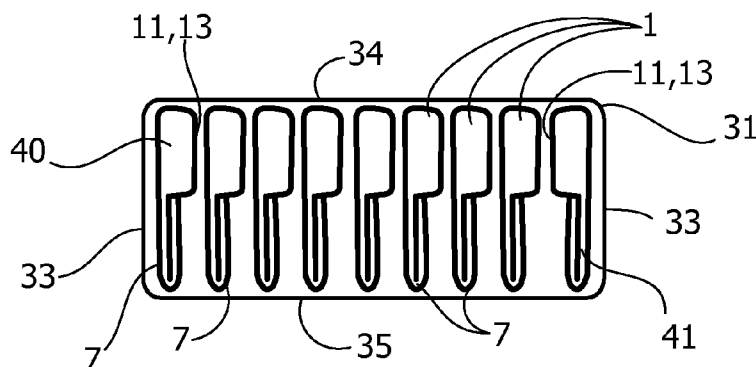
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(54) Title: PACKAGE OF PRE-CLOSED DISPOSABLE ABSORBENT SANITARY ARTICLES OF THE PANT TYPE, AND
CORRESPONDING MANUFACTURING DEVICE AND METHOD

FIG. 6



(57) Abstract: A package of pre-closed absorbent sanitary articles comprising a container of a generally parallelepipedal shape containing a plurality of sanitary articles grouped together in the folded configuration in an orderly pile. The pre-closed sanitary articles comprise front and rear side panels connected together along respective distal edges and folded against the outer surface of the sanitary article, and are arranged within the container so as not to turn the folded side panels towards the walls of the container.

"Package of pre-closed disposable absorbent sanitary articles of the pant type, and corresponding manufacturing device and method"

5

TEXT OF THE DESCRIPTION

Field of the invention

The present invention relates to packages of absorbent sanitary articles and has been developed with particular attention paid to its possible application to pre-closed absorbent sanitary articles that can be worn like pants.

A typical example of absorbent sanitary articles of this sort is represented by the nappies for babies commonly referred to as "training pants".

15

Description of the prior art

For many years now, the solution adopted in a practically uniform way by all manufacturers of the sector has been that of producing the above products in the form of elements having a generally hourglass shape, with a central body, in which there is a composite absorbent structure designed to absorb body fluids, which comprises a front region, a rear region, and a groin region comprised between them, and front and rear side panels, which extend laterally. The product is worn bestowing thereon a general U shape and bringing the median stretch of the central body as far as the area in which the legs of the user are inserted. The side panels are extended around the waist of the user connecting the mutually opposite distal side edges thereof via appropriate fastening means, which may even be repositionable so as to be able to close the product around the body of the user.

The above products have been traditionally produced and sold in the open condition, i.e., leaving it to the person who applies the product to arrange it

around the body of the user and close it according to a general pant-like conformation in the terms referred to previously.

Over the last few years there has emerged renewed
5 interest for nappies of the type commonly referred to as "training pants". These are nappies of the type illustrated, for example, in the document No. US-A-4 610 680, designed to be packaged and sold in the pre-closed condition. As taken out the package, the
10 product has a shape substantially resembling that of a pair of pants. This type of product has the front and rear side panels already joined together along the respective distal side edges by means of suitable connection means. The pre-closed product is worn by
15 sliding it over the legs of the user according to criteria basically similar to the ones adopted to put on a pair of pants. Taking into account the specific use for which the pre-closed product is designed, it is then envisaged that the product can be removed without
20 having to get it to slide again over the legs of the user.

For this purpose, the pre-closed product can be obtained in such a way as to be tearable (according to the criteria illustrated precisely in the document No.
25 US-A-4 610 680), or else enabling the pre-closed product to be opened along the sides of the waistline, i.e., in a position corresponding to what can be defined as "side flaps", or side panels, as mentioned previously, (as in the case of nappies of a traditional
30 type, packaged and sold in the open condition), and possibly also re-closed, for example envisaging the use of adhesive labels or stickers, of buttons, of sets of press-studs or, according to a particularly successful solution, envisaging the use of microhook fastening
35 structures (also referred to as "Velcro fasteners").

The use of the above fastening elements must be adapted to the need, already referred to previously, to enable the training pant to be produced and packaged in the closed condition so that it can be worn as a normal
5 pair of pants.

Generally, the aforesaid products are sold in packages that comprise a container of a typically parallelepipedal shape, made for example of flexible sheet material, such as paper or polymeric film. The
10 package typically contains a plurality of absorbent sanitary articles of the training-pant type, appropriately folded and arranged alongside one another in an orderly pile so that each article lies in a plane substantially parallel to two opposite walls of the
15 container. The articles can be arranged in the container in a generally compressed form. An important aspect in packaging of absorbent sanitary articles provided in the pre-closed condition, with particular reference to the introduction of the aforesaid articles
20 in an orderly pile inside the container, regards positioning of the pairs of front and rear side panels joined together along the respective distal side edges. According to a known technique, each pair of panels is folded in bellows fashion inside the nappy, in the case
25 in point inside the central body typically folded on itself.

However, said fold is more complex to perform on a production line for manufacturing said articles, in particular in view of the typical production rates at
30 an industrial level. Moreover, said operation of folding in bellows fashion is liable to subject the side panels that have been joined together to excessive stresses, which could lead to deformation of and damage to the connection between the aforesaid panels to the
35 point of weakening it and rendering it less resistant

to the normal stresses during use of the article, possibly causing, in the most serious cases, yielding of the connection itself. This undesirable effect may arise both in the case of permanent fastening means and
5 in the case where the fastening means can be opened and closed more than once. In particular, in the latter case, which is, for example, obtained by microhook-structure fastening means, the operation of folding in bellows fashion may cause a misalignment of the
10 respective side panels, with possible formation of undesirable creases through the above fastening structures, and consequent stressing and deformation of said structures, for example the microhooks, with corresponding weakening of the fastening system itself.

15 As an alternative, the pairs of side panels connected to one another along the respective distal edges can be folded against the outer surface of the article, typically both of the pairs against the outer surface of the rear region, or against the outer
20 surface of the front region. The articles are then typically gathered in an orderly pile, as described previously, possibly compressed, and inserted, with means in themselves known, in the container to form a package.

25 However, inevitably at least one article at one end of said pile turns its pairs of externally folded side panels towards the facing inner surface of the container. This may cause jamming upon introduction of the pile of articles into the container, given the
30 greater irregularity of the above surface of the article that is to come into contact with the respective facing inner surface of the package, or even misalignment in the configuration of the folded panels, and possible formation of undesirable creases through
35 the fastening structures, with an effect similar to

what has been described above with reference to folding in bellows fashion. The above misalignments and undesirable creases may even be visible through the wall of the container, which is typically made of flexible sheet material, such as for example a polymeric film.

Object and summary of the invention

The object of the present invention is to provide an arrangement that will be able to ensure a truly satisfactory solution to the problems set forth previously.

According to the present invention, the above object is achieved thanks to a package of pre-closed absorbent sanitary articles, and to a method and an apparatus for obtaining the aforesaid package, which have the characteristics specified in the ensuing claims.

The claims form an integral part of the technical teaching provided herein in relation to the invention.

Brief description of the drawings

The invention will now be described, purely by way of non-limiting example, with reference to the annexed drawings, in which:

- Figure 1 is an overall perspective view of a package of absorbent sanitary articles as described herein;

- Figure 2 is a perspective view of an absorbent sanitary article as described herein;

- Figure 3 is a perspective view of the article of Figure 2, in a folded configuration, as contained in the package;

- Figure 4 is a cross-sectional view along the line I-I of Figure 2;

- Figure 5 is a side view of any absorbent sanitary article represented in Figures 1-3 and 6-8;

- Figure 6 is a cross-sectional view along the line II-II of Figure 1;

- Figure 7 is a view similar to that of Figure 5, illustrating an alternative embodiment of the arrangement of the absorbent sanitary articles in the package of Figure 1;

- Figure 8 is a view similar to that of Figure 4, illustrating another alternative embodiment of the arrangement of the sanitary articles;

- Figure 9 is an overall perspective view, similar to that of Figure 1, of an alternative embodiment of a package of absorbent sanitary articles;

- Figure 10 is an overall perspective view of a further alternative embodiment of a package of absorbent sanitary articles; and

- Figure 11 is a schematic side view of an apparatus for producing a package of sanitary articles as described herein.

Detailed description

Illustrated in the ensuing description are various specific details aimed at an in-depth understanding of the embodiments. The embodiments may be obtained without one or more of the specific details, or with other methods, components, materials, etc. In other cases, known structures, materials, or operations are not illustrated or described in detail so that various aspects of the embodiments will not be obscured.

Reference to "an embodiment" or "one embodiment" in the framework of the present description is intended to indicate that a particular configuration, structure, or characteristic described in relation to the embodiment is comprised in at least one embodiment. Hence, phrases such as "in an embodiment" or "in one embodiment" that may be present in various points of the present description do not necessarily refer to one

and the same embodiment. Moreover, particular conformations, structures, or characteristics may be adequately combined in one or more embodiments.

The references used herein are provided merely for
5 convenience and hence do not define the sphere of protection or the scope of the embodiments.

In Figures 1 to 10, the pre-closed absorbent sanitary articles of the type currently referred to as "training pants" are designated as a whole by the
10 reference number 1. In Figure 11, which illustrates the apparatus, the sanitary articles are designated by the reference number 1' in the splayed-out configuration, and by the reference number 1 in the folded configuration.

15 The article 1, as illustrated in Figures 2 and 3, is made up of a central body 2, provided in which is an absorbent structure designed to absorb the body fluids, which comprises a front region 3 that defines a front waist edge 4, a rear region 5 that defines a rear waist
20 edge 6, and a groin region 7 that connects said front and rear regions 3, 5. The article 1 has a general U-shaped or V-shaped configuration, as illustrated in Figure 2 when the groin region 7 of the central body 2 (also referred to as "crotch region" of the article) is
25 brought as far as the area in which the legs of the user will be inserted during use. The central body 2, and more precisely the front region 3, rear region 5, and groin region 7 of the central body 2, have respective longitudinal edges 8, an inner surface 9,
30 and an outer surface 10 opposite to the inner surface.

The article 1 further comprises front side panels
11 that extend outwards in a transverse direction, i.e., in a direction generally perpendicular to the longitudinal axis of the article 1, as far as
35 respective distal edges 12, from each longitudinal edge

8 of the front region 3. Likewise, the article 1 comprises rear side panels 13 that extend in a transverse direction as far as respective distal edges 14, from each longitudinal edge 8 of the rear region 5.

5 The front side panels 11 are each connected to the respective rear side panel 13 along the respective distal edges 12 and 14 to form a pre-closed sanitary article 1. As illustrated in Figure 1, the front side panel 11 and rear side panel 13 connected together form
10 a pre-closed, i.e., closed, annular waist portion so that the article 1 assumes a general shape that resembles the typical shape of normal pants. The article is in this way suited to being worn by a user, with the central body 2 that extends over and around
15 the crotch region, or groin region, of the user, whilst the waist portion formed by the front region 3, by the rear region 5, and by the front and rear side panels 11, 13 connected at their mutually opposite distal edges 12, 14 surrounds the waist of the user.

20 On the basis of production criteria that are well known to persons skilled in the sector, the sanitary article 1 may typically comprise:

- an inner sheet (namely, internal with respect to the normal conditions of use of the article 1)
25 permeable to liquids, usually referred to as "topsheet" (TS);

- an outer sheet or laminate (namely, external with respect to the normal conditions of use of the article 1) usually referred to as "backsheet" (BS); and

30 - an absorbent structure (AS) for absorbing the body fluids, enclosed, i.e., sandwiched, between the aforesaid topsheet and backsheet.

The sanitary article 1 may further comprise other characteristic elements that contribute to increasing
35 the features of wearability and absorbance of the

article itself, such as for example the elastic formations for the legs 20 that contribute to getting the article to adhere to the body of the user and also the cuffs or elasticated sides (not illustrated for
5 simplicity in Figure 1) arranged at the sides of the absorbent structures with the function of lateral containment of the body fluids.

For a more detailed description of the characteristic elements listed above and of other ones,
10 well known to persons skilled in the sector, the reader is referred to the extensive literature existing on the subject, such as for example the patent No. U.S. 4,704,116, granted on November 3, 1987 to Enloe.

Persons skilled in the sector know quite well that
15 the elements just described constitute a basic structure, to which other optional elements may be added according to design principles well known in the sector.

For example, the elastic or elasticized formations
20 (see point 21 in Figure 2) may be typically arranged centrally along the waist edges of the article, with the purpose of ensuring adherence of the waist portion of the article around the waist of the user.

In the finished pre-closed article 1, the front
25 side panel 11 and rear side panel 13 are connected at their respective mutually opposite distal edges to form a closed annular waist portion of the article 1, by connection/fastening means designated by 22. The aforesaid connection/fastening means may be permanent,
30 possibly being produced according to any one of the known techniques, such as, for example, using adhesives, heat-sealing, or thermomechanical or ultrasound welding. The connection/welding means may be obtained so as to be tearable so that it is possible to
35 open the article along the sides to facilitate removal

thereof.

Alternatively, the connection/welding means may be provided, according to a known technique, so as to be openable and re-closeable, in order to enable, for example, their repositioning so as to improve the wearability of the article. According to a known embodiment, the aforesaid connection/fastening means may be formed by re-closeable sets of fasteners of the microhook (or hook-and-loop) type, of the sort commonly referred to as "Velcro fasteners", arranged accordingly along the distal edges 12, 14 of the front side panels 11 and rear side panels 13 of the article 1. Use of different types of re-openable connection/fastening means, for example of the adhesive type that serve the same purpose is, however, comprised within the scope of the invention.

The absorbent sanitary articles 1 are typically sold in a package, like the one illustrated by way of example in Figure 1 and designated by 30. The above package, according to a known technique, comprises a container 31 of a generally parallelepipedal shape, as illustrated, which may be made of a suitable material, for example a flexible sheet material such as paper or, in a preferred embodiment, a polymeric film. The container comprises two side walls 32, two end walls 33, a top wall 34, and a bottom wall 35, typically with the two side walls, the two end walls, the top and bottom walls, respectively, mutually parallel, as illustrated. The container 1 may moreover typically comprise a strap or handle 36 to facilitate carrying thereof.

The container 31 of the package 30 contains a plurality of pre-closed absorbent sanitary articles 1 in the folded configuration illustrated in Figures 3, 4, and 5, and arranged alongside one another in an

orderly pile. Each pre-closed absorbent sanitary article 1 is located in the container 1 in a folded configuration, where each front side panel 11 and respective rear side panel 13 connected thereto along the respective distal edges 12 and 14 are folded against the outer surface of the front region 3 or of the rear region 5 of the article 1. For example, as illustrated in Figures 3, 4, and 5, the front side panel 11 and rear side panel 13 can be folded against the outer surface of the front region 3 of the pre-closed absorbent sanitary article 1. The sanitary articles 1 may be typically arranged within the container 31 in the aforesaid orderly pile so that each article 1 lies in a plane substantially parallel to the plane of two mutually opposite walls of the container 31. In the example illustrated in Figure 1, the articles 1 in the orderly pile lie in a plane parallel to the plane of the end walls 33 of the container 31. The orderly pile of absorbent sanitary articles 1 contained in the container 31 comprises a first end article 40 and a second end article 41, which, as illustrated in Figure 1, and likewise, in Figures 6 to 8, are respectively adjacent to each end wall 33 of the container 31. As illustrated in Figures 6 to 8, each end absorbent sanitary article 40, 41 of said pile is oriented so as to turn the folded front and rear side panels 11, 13 towards the respective adjacent absorbent sanitary article. In this way, both of the end articles 40, 41 of the pile of sanitary articles 1 turn only the outer surface 10 of the central body 2 towards the respective inner facing surface of the container 31, namely, in the example illustrated in Figure 6, the inner surface of the two side walls 33.

Said arrangement facilitates formation of a package 30 of sanitary articles according to the

present invention in so far as, for example, it reduces any possibility of jamming and misalignment of the articles 1, or also formation of undesirable creases therein, in the step of filling of the container 31, typically obtained by means of methods known to persons skilled in the sector, in particular in the case where the sanitary articles 1 are introduced in compressed form in the container 31 in at least one orderly pile.

In one embodiment of the present invention (illustrated in Figure 6), all the absorbent sanitary articles 1 of the orderly pile may moreover be oriented in the same way as the first end absorbent sanitary article 40, i.e., in other words, with the front and rear side panels 11, 13 folded towards the right-hand side of the container 31 as viewed in Figure 6, with the exception of the second end article 41 oriented so as to present the front and rear panels 11, 13 folded towards the left-hand side of the container 31.

In a further embodiment of the present invention (illustrated in Figure 7), the package 30 of sanitary articles 1 comprises a number n of articles 1 arranged in at least one orderly pile, the plurality of articles 1 being set so as to form $n/2$ pairs of sanitary articles 1 immediately adjacent to one another, which turn the respective folded front and rear panels 11, 13 towards one another. This embodiment offers the further benefit of presenting a particularly orderly arrangement that can be applied to an even number of sanitary articles 1, in addition to the advantages already described previously with reference to the present invention.

The sanitary articles 1 of a package 30 according to the present invention can be arranged in one or more orderly piles so that the respective groin regions 7 of the individual sanitary articles 1 all face one and the

same wall of the container 31, for example the bottom wall 35, as illustrated in Figures 6 and 7. Alternatively, the groin regions 7 of the individual sanitary articles 1 can face mutually opposite walls of the container 31, for example typically the top wall 34 and bottom wall 35, as illustrated by way of example in Figure 8.

In one embodiment of the present invention, a package 30 may comprise a plurality of sanitary articles 1 arranged within a container 31 in at least one orderly pile so that the groin regions 7 of the articles 1 alternately face mutually opposite walls of said container 31, for example typically alternately the top wall 34 and the bottom wall 35 of the container 31, as illustrated in Figure 8. In this way, it is possible to obtain a more efficient and uniform arrangement of the articles 1 in the orderly pile, which is consequently more compact and stable, being able to occupy a smaller space in the direction perpendicular to the plane in which the sanitary articles 1 lie, and, in the embodiment illustrated in Figure 7, to the end walls 33 of the container 31.

Figure 8 shows a particularly preferred embodiment of the present invention, comprising a package 30 of sanitary articles 1 with a plurality of articles 1 constituted by a number n of articles 1, arranged in at least one orderly pile in such a way that in $n/2$ pairs of articles 1 immediately adjacent to one another said articles turn the respective folded front and rear panels 11, 13 towards one another. Moreover, the groin regions 7 of the articles 1 alternately face the top wall 34 and the bottom wall 35 of the container 31. This preferred embodiment moreover enables an optimal use of the space within the container 31 thanks to the arrangement illustrated of the sanitary articles in the

orderly pile, where each article 1 presents its respective portion of relatively greater thickness, due to the presence of the folded front and rear panels 11, 13, adjacent and opposed to the portion of relatively smaller thickness of the immediately contiguous article, as may be appreciated clearly from Figure 8.

The package 30 of the present invention may also comprise, in further embodiments, more than one orderly pile of sanitary articles within the container 31. For example, the plurality of sanitary articles 1 may be arranged in two mutually parallel orderly piles, for example set alongside one another in a direction perpendicular to the side walls 32 of the container 31, as illustrated in Figure 9, or else set alongside one another in a direction perpendicular to the top and bottom walls 34 and 35 of the container 31, in effect set on top of one another, as illustrated in Figure 10.

Figure 11 shows an apparatus 50 for the formation of a package 30 of pre-closed absorbent sanitary articles 1, of the type illustrated by way of example in Figure 1, and described previously, which typically comprises a container 31 of a parallelepipedal shape that contains a plurality of pre-closed absorbent sanitary articles 1 in the folded configuration, arranged alongside one another in an orderly pile.

In the embodiment illustrated, the apparatus 50 comprises conveyor means 52, designed to convey along a path of feed A a continuous flow of pre-closed sanitary articles 1' in the splayed-out configuration, typically coming from a production line (not illustrated) and corresponding to the sanitary article 1 described previously and illustrated in Figure 2, and in Figures 3, 4, 5 in the folded configuration. The above articles, designated by the number 1' and illustrated separately in the insert I of Figure 11 for greater

clarity, are conveyed with the respective longitudinal axes parallel to the path of feed A, and typically coinciding therewith. The conveyor means 52 may typically comprise belt carriages, for example, as
5 illustrated in Figure 11, a top carriage and a bottom carriage equipped with appropriate motor means (not illustrated) capable of bestowing on the belt of the top carriage and the belt of the bottom carriage a linear speed of advance equal to that of the flow of
10 sanitary articles 1' in the path of feed A. The two, top and bottom, carriages of the conveyor means 52 may be typically provided with mechanical means, in themselves known, which are able to grip the conveyed sanitary articles 1' between them. In order to increase
15 the gripping capacity, one or both of the belts may be of the suction or vacuum type; i.e., they may have their surface permeable to air, which, being connected to a source of subatmospheric pressure, with means in themselves known, is able to increase the total
20 gripping force that can be applied to the sanitary articles 1' by the conveyor means 52.

As illustrated in detail in the insert I of Figure 11, each pre-closed sanitary article 1' conveyed in the splayed-out configuration comprises a front region 3, a
25 rear region 5, and a groin region 7 that connects the front and rear regions, said regions in turn presenting respective longitudinal edges 8. Each article 1' further comprises front side panels 11 that extend in a transverse direction, as far as respective distal
30 edges, from the respective longitudinal edges 8 of the front region 3, and rear side panels 13, which extend in a transverse direction, as far as respective distal edges, from the respective longitudinal edges 8 of the rear region 5. Each front side panel 11 is connected to
35 the respective rear side panel 13 along the respective

distal edges to form each individual pre-closed absorbent sanitary article 1'.

The apparatus 50 comprises a diverting mechanism 70, designed to receive said continuous flow of sanitary articles 1' from the conveyor means 52. In the embodiment illustrated, the diverting mechanism 70 comprises two suction belt conveyors 71, 72 facing one another, designed to pick up selectively, by suction, sanitary articles 1' from the continuous flow and to convey them on respective conveyor means 73 and 74 along alternative paths of feed A' and A", which in general may be typically parallel to the path of feed A. Each suction belt conveyor 71, 72 comprises respective vacuum systems 75, 76, designed to carry out said selective picking-up of articles 1' from the continuous flow fed by the conveyor means 52. The vacuum systems 75, 76 are typically associated to a control device (not illustrated in Figure 11 for simplicity of representation), which actuates them selectively according to information on the count of the sanitary articles 1 that are to be subsequently formed in an orderly pile comprising a predetermined number thereof, to be inserted in a container 31 to form a package 30 according to the present invention.

The apparatus 50 comprises a folding mechanism 77, 78 positioned along each conveyor means 73, 74, designed to fold the front side panels 11 and the respective rear side panels 13 connected thereto of each sanitary article 1'. As may be appreciated from Figure 11, the folding mechanism 77 is able to fold the front side panels 11 and the respective rear side panels 13 connected thereto against the outer surface 10 of the rear region 5 of a sanitary article 1' conveyed along the path of feed A" by the conveyor means 73, as illustrated schematically in the insert II

of Figure 11. Accordingly, the folding mechanism 78 is designed to fold the front side panels 11 and the respective rear side panels 13 connected thereto against the outer surface 10 of the front region 3 of a sanitary article 1' conveyed along the path of feed A' by the conveyor means 74, as illustrated schematically in the insert III of Figure 11. Said folding mechanisms 77, 78 are designed to form sanitary articles in the folded configuration 1, in the two configurations described.

The folding mechanisms 77, 78 may be obtained in a known way. For example, each mechanism 77, 78 may be typically constituted by two tunnels having a helical conformation, set at the outer sides along the respective conveyor means 73, 74 and designed to receive the front and rear side panels 11, 13 connected together as described, and to fold them, respectively, against the outer surface of the rear region 5 or against the outer surface of the front region 3 of each sanitary article 1'.

The sanitary articles in the folded configuration 1 coming from the conveyor means 73, 74, downstream of the respective folding mechanisms 77, 78, are received by means 80 designed to reunite them in a single continuous flow, and to convey them along a path of feed B, which can substantially constitute the ideal continuation of the original path of feed A, as illustrated by way of example in the embodiment represented in Figure 11. The means 80 may be constituted, in the embodiment illustrated in Figure 11, by two belt conveyors 81, 82 set facing one another, designed to take the sanitary articles in the folded configuration 1 once they have been released from the respective conveyor means 73, 74. According to a technique in itself known, one or both of the belt

conveyors 81, 82 may be of the suction type, connected to a source of subatmospheric pressure, with means in themselves known and not illustrated in Figure 11 in order to increase the overall gripping force exerted by the belt conveyors 81, 82 on the above articles 1.

Downstream of the means 80, the apparatus 50 further comprises means for the formation of an orderly pile of a predetermined number of sanitary articles in the folded configuration 1, and subsequently means for introduction of said orderly pile into a container of a generally parallelepipedal shape, for example as illustrated in Figure 1 and identified by the number 31, to form a package 30 of absorbent sanitary articles according to the present invention. The above means may be obtained using techniques in themselves known and are not illustrated in Figure 11 for simplicity of representation. All the conveyor means of the apparatus 50 of Figure 11 may be typically equipped with appropriate motor means (not illustrated), capable of bestowing on the sanitary articles 1', 1 conveyed a linear speed of advance in the respective paths of feed A, A', A'', B that typically may be constant and the same in said respective paths of feed.

As will be clear to a person skilled in the branch, the selective actuation of the vacuum systems 75, 76 of the diverting mechanism 70 may be typically obtained according to the total number of sanitary articles 1 that are to be formed in the orderly pile to be inserted into the container 31 to form the package 30 of the present invention, and according to the respective orientation that the articles 1 must present in said package. For example, selective actuation of the vacuum systems 75, 76 enables formation of orderly piles of sanitary articles 1 like the ones illustrated schematically in Figures 6 and 7, appropriately

combining together, to form respective orderly piles, sanitary articles 1 taken by means of the diverting mechanism 70 from the continuous incoming flow fed by the conveyor means 52 and processed selectively by the folding means 77 and 78 so as to obtain the desired orientation of said articles 1 in the resulting orderly pile.

In an alternative embodiment, the apparatus 50 may moreover comprise means for varying further the orientation of the sanitary articles 1 in the resulting orderly pile, for example by rotation through 180° about an axis perpendicular to the plane of conveyance of the articles 1' in the splayed-out configuration or 1 in the folded configuration selected from the continuous flow, respectively, upstream of the diverting mechanism 70 or else downstream of the mechanism 80. In this way, in the resulting orderly pile contained within the package 30 the groin regions 7 of respective articles 1 face opposite walls of the container 31. In a preferred embodiment, for example, the means for further orientation of the sanitary articles are designed to act alternately on half of the articles 1' or 1 of the continuous flow, so that in the resulting orderly pile within the package 30 the groin regions 7 of the articles 1 are arranged alternately so as to face opposite walls of the container 31, typically for example the top wall 34 and the bottom wall 35, as illustrated in Figure 8. In a preferred embodiment of the apparatus 50, the means for further orienting the sanitary articles are designed to act on the continuous flow of sanitary articles 1 in the folded configuration, and are hence typically comprised in said apparatus 50 downstream of the means 80.

Of course, without prejudice to the principle of the invention, the details of construction and the

embodiments may vary widely with respect to what has been described and illustrated herein, without thereby departing from the scope of the invention as defined by the ensuing claims.

CLAIMS

1. A package (30) of pre-closed absorbent sanitary articles (1) comprising:

5 a container (31) of a generally parallelepipedal shape that encloses a plurality of pre-closed absorbent articles (1), said container (31) comprising two side walls (32), two end walls (33), a top wall (34), and a bottom wall (35),

10 wherein each article (1) of said plurality of pre-closed absorbent sanitary articles comprises:

a central body (2) comprising a front region (3) that defines a front waist edge (4), a rear region (5) that defines a rear waist edge (6), and a groin region (7) that connects said front region (3) to said rear region (5), said front region (3), groin region (7), and rear region (5) having respective longitudinal edges (8), an inner surface (9), and an outer surface (10) opposite to said inner surface (9);

20 front side panels (11), which extend in a transverse direction, as far as respective distal edges (12) from each longitudinal edge (8) of said front region (3); and

rear side panels (13), which extend in a transverse direction as far as respective distal edges (14) from each longitudinal edge (8) of said rear region (5);

30 wherein each front side panel (11) is connected to the respective rear side panel (13) along the respective distal edges (12, 14) to form said pre-closed absorbent sanitary article (1);

wherein each front side panel (11) and respective rear side panel (13) connected thereto are folded against the outer surface of said front region (3) or of said rear region (5);

35 said plurality of absorbent sanitary articles (1)

being set in at least one orderly pile so that each article of said plurality lies in a plane substantially parallel to the plane of two mutually opposite walls of said container (31), preferably of said end walls (33) of said container (31), said plurality comprising a first end absorbent sanitary article (40) and a second end absorbent sanitary article (41) of said pile,

wherein each end absorbent sanitary article (40, 41) of said plurality of absorbent sanitary articles (1) in said container (31) is oriented so as to turn said folded front and rear side panels (11, 13) towards the respective adjacent absorbent sanitary article (1).

2. The package (30) according to Claim 1, wherein said plurality of pre-closed absorbent sanitary articles (1) comprises a number n of articles, said plurality of articles being arranged so that in $n/2$ pairs of immediately adjacent articles (1) said articles turn the respective folded front and rear panels (11, 13) towards one another.

3. The package (30) according to any one of the preceding claims, wherein, in said plurality of articles (1), said groin regions (7) of said articles are arranged alternately facing opposite walls of said container (31).

4. The package (30) according to Claim 3, wherein said groin regions (7) of said articles (1) are arranged alternately facing said top wall (34) and said bottom wall (35) of said container (31).

5. The package (30) according to any one of the preceding claims, wherein said container (31) is made of a flexible sheet material, preferably a sheet of polymeric material.

6. The package (30) according to any one of the preceding claims, wherein said plurality of pre-closed absorbent sanitary articles (1) are arranged in two

mutually parallel orderly piles, preferably set
alongside one another in a direction perpendicular to
said side walls (32) or set alongside one another in a
direction perpendicular to said top and bottom walls
5 (34, 35) of said container (31).

7. The package (30) according to any one of the
preceding claims, wherein said front side panels (11)
are connected to the respective rear side panels (13)
by openable and re-closeable connection means (22) so
10 as to form openable and re-closeable pre-closed
absorbent sanitary articles (1).

8. An apparatus (50) for producing a package
(30) of pre-closed absorbent sanitary articles (1),
said apparatus (50) comprising:

15 conveyor means (52) for conveying along a path of
feed (A) a continuous flow of pre-closed sanitary
articles in the splayed-out configuration (1')
comprising a front region (3), a rear region (5), and a
groin region (7) that connects said front and rear
20 regions, said front, groin, and rear regions (3, 5, 7)
having respective longitudinal edges (8); front side
panels (11), which extend in a transverse direction, as
far as respective distal edges (12), from the
respective longitudinal edges (8) of said front region
25 (3); rear side panels (13), which extend in a
transverse direction, as far as respective distal edges
(14), from the respective longitudinal edges (8) of
said rear region (5); each front side panel (11) being
connected to the respective rear side panel (13) along
30 the respective distal edges (12, 14) to form said pre-
closed absorbent sanitary article (1);

a diverting mechanism (70) set straddling said
path of feed (A) of said articles (1'), comprising two
suction belt conveyors (71, 72) having respective
35 branches facing one another, designed to pick up

selectively by suction sanitary articles (1') from said continuous flow, and convey them on respective conveyor means (73, 74) along alternative paths of feed (A', A''), said suction belt conveyors (71, 72) comprising
5 vacuum systems (75, 76) associated to a control device designed to operate selectively said vacuum systems (75, 76) according to information on the count of said sanitary articles (1') to be inserted in said package (30);

10 a folding mechanism (77, 78) along each conveyor means (73, 74) designed to fold the front side panels (11) and the respective rear side panels (13) connected thereto of each said sanitary article (1'), respectively, against the outer surface of said rear
15 region (5) and the outer surface of said front region (3), in order to form sanitary articles (1) in the folded configuration;

means (80) designed to receive said articles (1) in the folded configuration from said conveyor means
20 (73, 74), to reunite them in a single continuous flow, and to convey them along a path of feed (B);

means for the formation of an orderly pile of a predetermined number of said sanitary articles (1) in the folded configuration, said orderly pile comprising
25 a first end absorbent sanitary article (40) and a second end absorbent sanitary article (41) of said pile;

means for introduction of said orderly pile into a container (31) of a generally parallelepipedal shape
30 comprising two side walls (32), two end walls (33), a top wall (34), and a bottom wall (35);

wherein each article (1) of said orderly pile lies in a plane substantially parallel to the plane of two mutually opposite walls of said container (31),
35 preferably of said end walls (33);

wherein each end absorbent sanitary article (40, 41) of said pile of absorbent sanitary articles (1) in said container (31) is oriented so as to turn said front and rear folded side panels (11, 13) towards the
5 respective adjacent absorbent sanitary article (1).

9. The apparatus (50) according to Claim 8, wherein said apparatus comprises means for orienting said sanitary articles (1) so that said groin regions (7) of said articles (1) in said orderly pile are
10 arranged alternately facing opposite walls of said container (31).

10. The apparatus (50) according to Claim 9, wherein said means for orienting said sanitary articles comprise means for orienting said sanitary articles
15 (1') in the splayed-out configuration in said continuous flow downstream of said means (80).

11. A method for producing a package (30) of pre-closed absorbent sanitary articles (1) according to any one of Claims 1 to 7, comprising the steps of:

20 - conveying along a path of feed (A) a continuous flow of pre-closed sanitary articles (1) in the splayed-out configuration, said articles comprising a front region (3), a rear region (5), and a groin region (7) that connects said front and rear regions, said
25 front, groin, and rear regions (3, 7, 5) having respective longitudinal edges (8); front side panels (11), which extend in a transverse direction, as far as respective distal edges (12), from the respective longitudinal edges (8) of said front region (3); and
30 rear side panels (13), which extend in a transverse direction, as far as respective distal edges (14), from the respective longitudinal edges (8) of said rear region (5); each front side panel (1') being connected to the respective rear side panel (5) along the
35 respective distal edges (12, 14) to form said pre-

closed absorbent sanitary article (1);

- taking selectively, from said continuous flow, sanitary articles (1) and conveying them on alternative paths of feed (A', A''), according to information on the
5 count of said sanitary articles to be inserted in said package (30);

- folding said front side panels (11) and respective rear side panels (13) connected thereto of each of said sanitary article (1') on said alternative
10 paths of feed (A', A''), respectively, against the outer surface of said front region (3) and the outer surface of said rear region (5), in order to form sanitary articles (1) in the folded configuration;

- reuniting said articles (1) in the folded
15 configuration from said paths of feed (A', A'') in a single continuous flow along a path of feed (B);

- forming an orderly pile of a predetermined number of sanitary articles (1) in the folded configuration, said pile comprising a first end
20 sanitary article (40) and a second end sanitary article (41);

- introducing said orderly pile into a container (31) of a generally parallelepipedal shape comprising two side walls (32), two end walls (33), a top wall
25 (34), and a bottom wall (35), where each article (1) of said orderly pile lies in a plane substantially parallel to the plane of two mutually opposite walls of said container (31), preferably of said end walls (33), to form said package (30);

30 wherein each end absorbent sanitary article (40, 41) of said pile of absorbent sanitary articles (1) in said container (31) is oriented so as to turn said front and rear folded side panels (11, 13) towards the respective adjacent absorbent sanitary article (1).

35 **12.** The method for producing a package of pre-

closed absorbent sanitary articles according to Claim 11, comprising the step of further orienting selected sanitary articles (1) so that said groin regions (7) of said articles (1) in said orderly pile are arranged
5 alternately facing opposite walls of said container (31), preferably said top wall (34) and said bottom wall (35).

FIG. 1

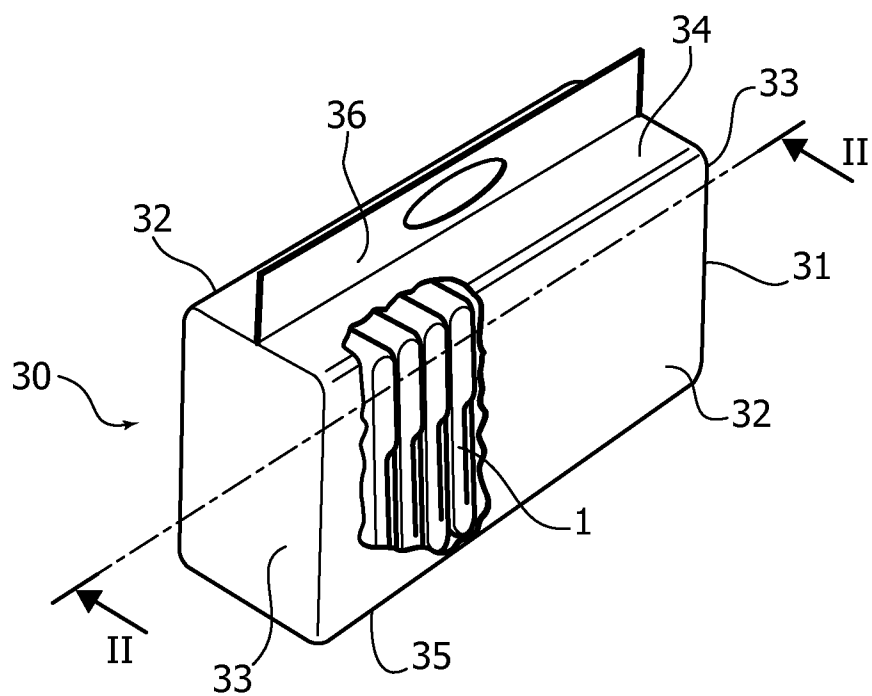


FIG. 2

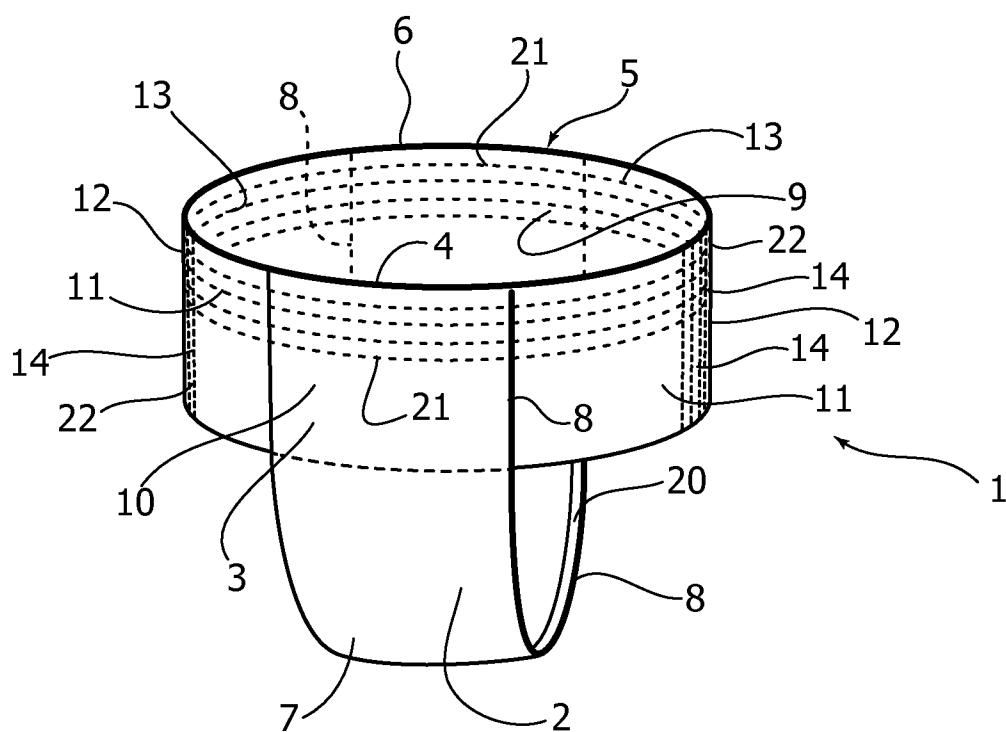


FIG. 3

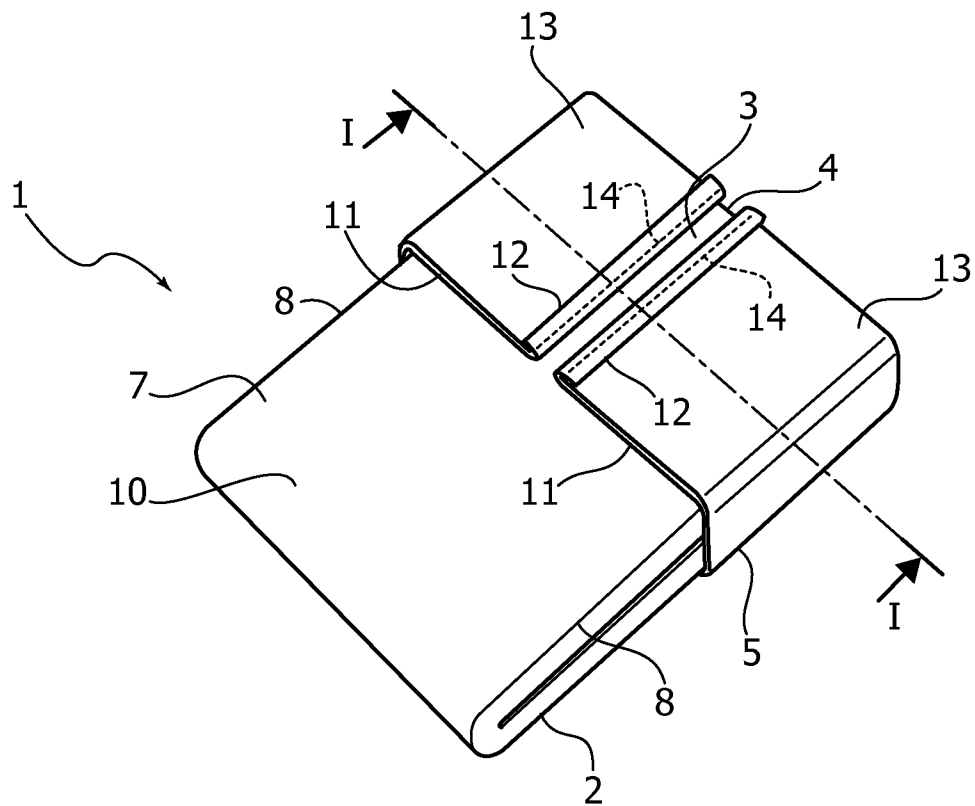


FIG. 4

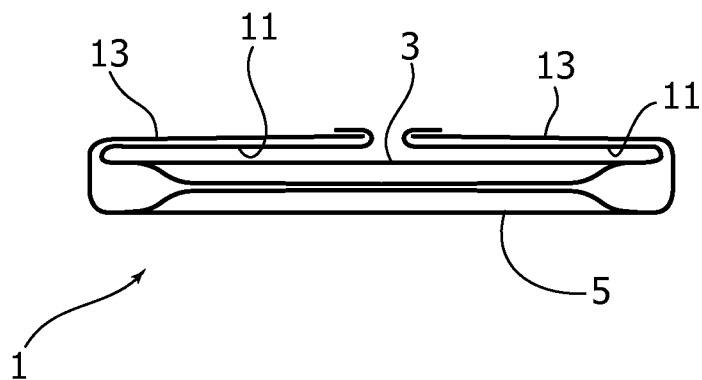


FIG. 5

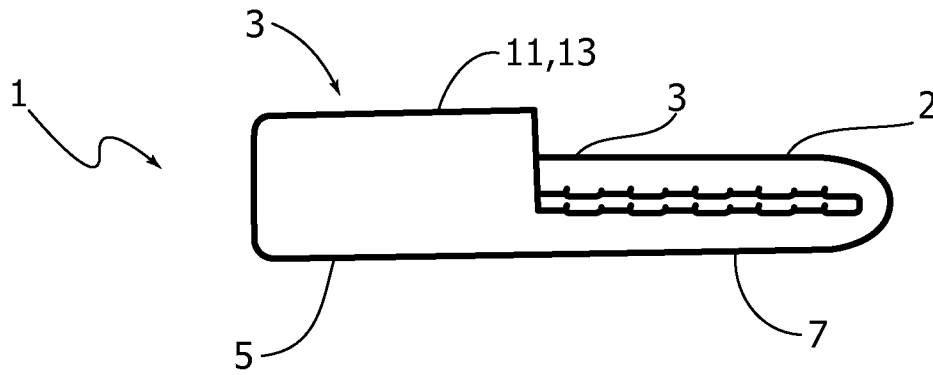


FIG. 6

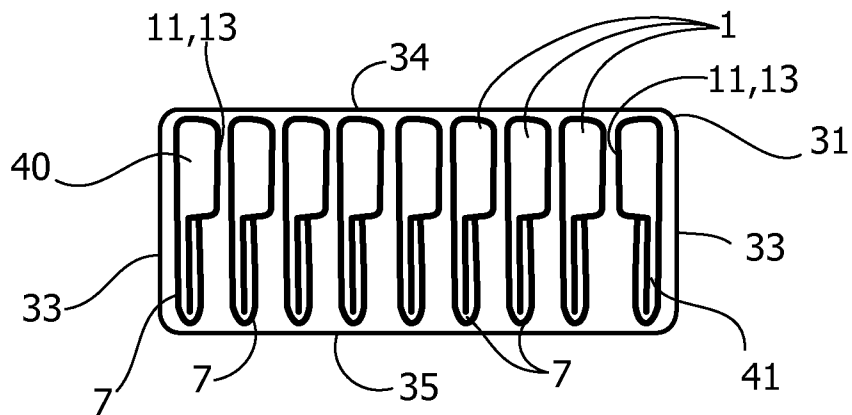


FIG. 7

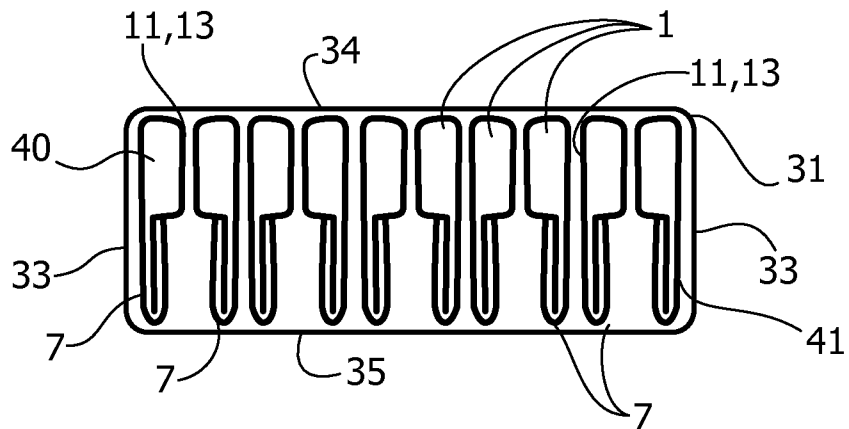


FIG. 8

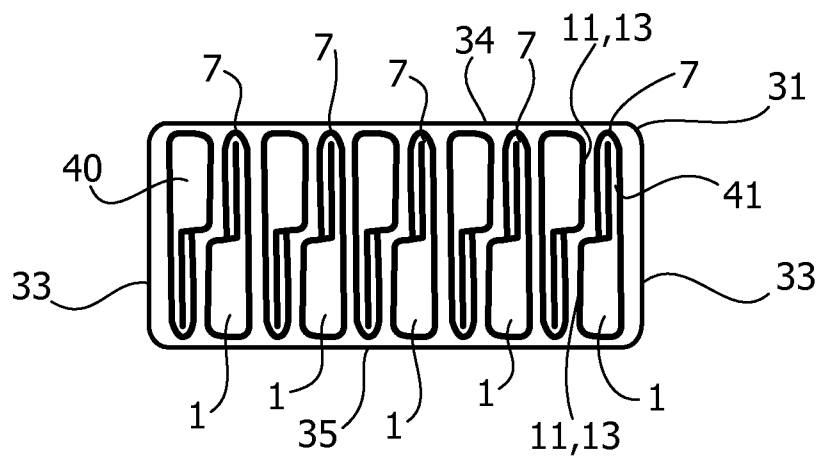


FIG. 9

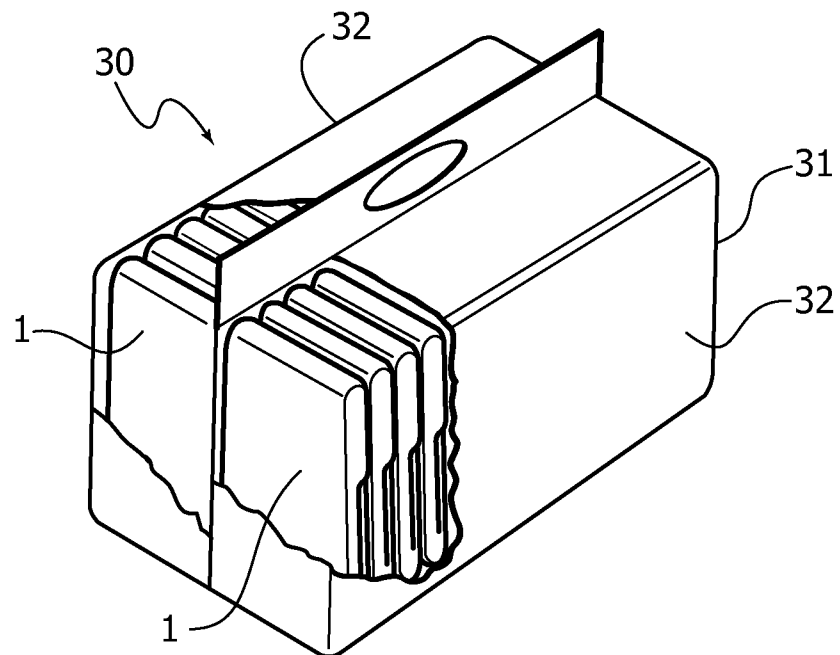


FIG. 10

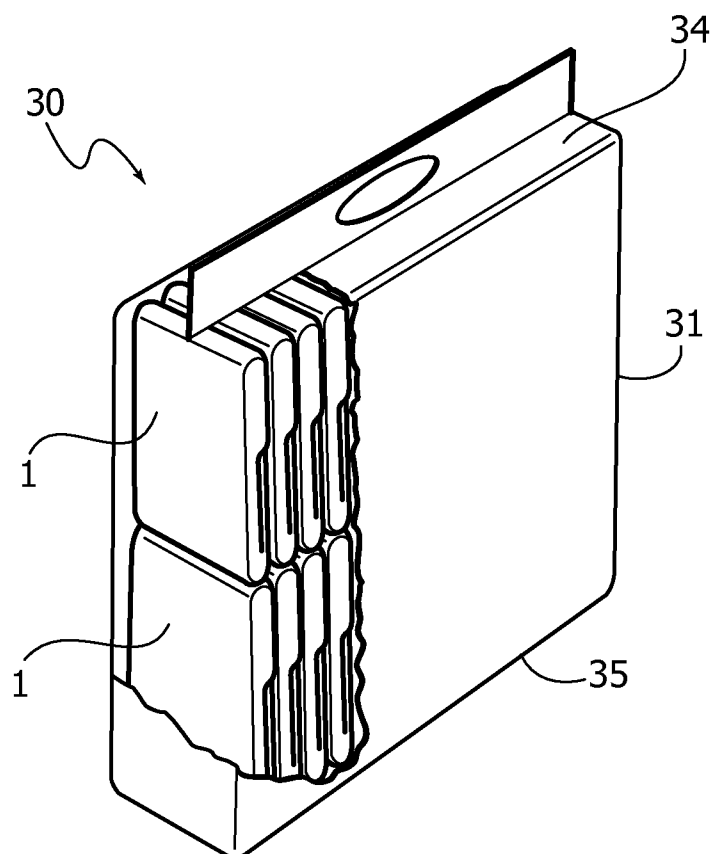


FIG. 11

