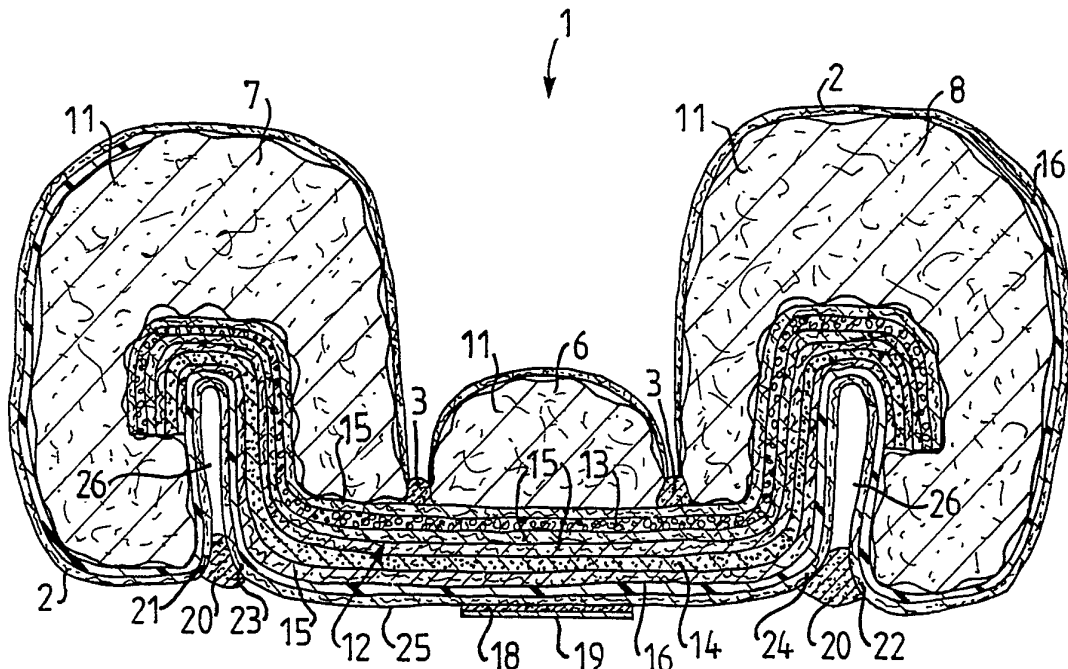




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : A61F 13/46	A1	(11) International Publication Number: WO 90/14814 (43) International Publication Date: 13 December 1990 (13.12.90)
<p>(21) International Application Number: PCT/SE90/00376</p> <p>(22) International Filing Date: 31 May 1990 (31.05.90)</p> <p>(30) Priority data: 8901965-7 31 May 1989 (31.05.89) SE</p> <p>(71) Applicant (for all designated States except US): MÖLN-LYCKE AB [SE/SE]; S-405 03 Göteborg (SE).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only) : ROOS, Anders [SE/SE]; Vidblicksgatan 13, S-412 57 Göteborg (SE). RÖNNBERG, Peter [SE/SE]; Glasbergsgatan 76, S-431 34 Mölndal (SE). EITERJORD, Bård [SE/SE]; Öjersbo 6843, S-434 96 Kungsbacka (SE). HERMANSSON, Jonas [SE/SE]; Formskäraregatan 2, S-412 61 Göteborg (SE).</p>	<p>(74) Agents: HJÄRNE, Per-Urban et al.; H. Albihns Patentbyrå AB, Box 3137, S-103 62 Stockholm (SE).</p> <p>(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent)*, DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.</p> <p>Published With international search report. In English translation (filed in Swedish).</p>	

(54) Title: DISPOSABLE ABSORBENT ARTICLES



(57) Abstract

The invention relates to an absorbent article (1, 1') for one time use only, such as a diaper, an incontinence guard or the like. The invention is characterized in that the article (1, 1') includes at least two permanent fold lines (3) which extend in the longitudinal direction of the article and which divide the article, over at least a part thereof, into a central, elongated part (6) and edge-parts (7, 8) located symmetrically on respective sides of the elongated part. The edge-parts (7, 8) exhibit at least one longitudinally extending fold (26) which places the edge-parts (7, 8) in an upwardly folded position along the fold lines (3) and relative to the central part (6), and in that joining means (20) are provided for folding the edge-parts (7, 8) permanently in this upwardly folded state.

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Disposable absorbent articles

The present invention relates to a disposable absorbent article, such as a diaper, an incontinence guard or
5 like article, which comprises a liquid-permeable casing layer, which when the article is worn lies nearest to the wearer's body, a liquid-impermeable casing sheet or backing sheet, and an absorbent pad enclosed between the two casing sheets.

10

Disposable absorbent articles, such as children's dia-
pers or diapers which are intended for use as incon-
tinance guards by adults, are normally constructed of a
nonwoven layer through which the urine excreted passes,
15 an absorbent layer of, for instance, cellulose fluff, optionally combined with so-called superabsorbents, and a liquid-impervious layer of polyethylene, for in-
stance. For reasons of a process-technical nature, such articles have most often a flat, rectangular configura-
20 ation, although such product configurations are not preferable in view of the fact that the body contours of the user are anything but flat.

In order to avoid lateral leakage through the sides of
25 the article when worn, it is important that the article does not become folded or wrinkled so that liquid is able to run out through the sides of the article. The problem associated with the formation of folds and wrinkles is, naturally, pronounced when the wearer
30 walks, sits down or moves in any other way, since the thighs of the wearer subject the article to external pressures sufficiently great to deform markedly the absorbent pad incorporated in the article, mainly in its transverse direction. It is thus important to con-
35 figure the article such that the crotch region thereof

will be relatively narrow. By crotch region is meant that region of the article which is intended to be located between the user's thighs when the article is worn. Since it is precisely the crotch region of the article which is responsible for receiving the largest amount of liquid excreted, it is extremely important that this crotch region, despite being narrow, is able to collect and absorb the liquid rapidly and effectively, while obtaining a good lateral seal at the same time.

The problem of lateral leakage cannot be solved solely by so shaping the article in manufacture that its crotch region will be narrower than its front and rear end respectively, since even in this case the article has a flat configuration and is consequently still wrinkled or folded in the crotch region when the absorbent pad is folded along the body of the person wearing the article. Although the liquid-permeable outer materials, essentially nonwoven materials, commercially available at present and used in sanitary products of the type diapers and incontinence guards, will allow a certain amount of liquid to pass rapidly therethrough, when the liquid is excreted quickly in large quantities, as is particularly the case with adult incontinence, part of this liquid will remain on top of the surface material and is therewith able to leak through any folds or wrinkles located between the absorbent pad and the user's body. This is because the absorbent material used predominantly in present day absorbent products, namely cellulose fluff, comprises fibres which are so fine that the cavities therebetween become quickly filled locally with liquid, with the result that liquid which remains unabsorbed cannot be absorbed by the material immediately but must remain on top of

the surface material.

A sanitary product must also be able to receive and retain a large quantity of liquid while subjected to external forces, both during the time taken for the liquid to penetrate the liquid-permeable outer material and subsequent to the liquid having been absorbed by the absorbent pad.

When manufacturing such articles, it is known to fold the outer, elongated parts of an initially flat and rectangular diaper in towards the central elongated part thereof. The intention is to obtain a crotch region which is narrower than the ends of the diaper. Such diapers are referred to generally as wing-folded diapers and an example of one such diaper is described and illustrated in the US Patent Specification 3,875,943. However, despite all, a wing-folded diaper is to be considered flat and can thus still be folded or wrinkled in the diaper crotch region, which can extend out as far as the side edges of the diaper and therewith cause leakage. Another drawback with wing-folded diapers is that it is necessary for the user to extend the inwardly folded side-parts at the diaper ends when wishing to use the diaper, which naturally complicates handling of the product.

Diapers which are cut to provide crotch regions narrower than the diaper end-parts are known, e.g., from US Patent Specification 2,627,868. Such diapers are referred to generally as hour-glass diapers. Other diaper configurations include the T-configuration known, for instance, from US Patent Specification 3,768,479. All of these diaper configurations are concerned with the body configuration of the wearer in the crotch region, but nevertheless present a flat shape

and, similarly to the wing-folded diapers, are there-
with poorly adapted to the shape of the wearer's body
in general and the flat absorbent body is liable to be
folded or wrinkled in its transverse direction when
5 folded upwards around the body of the wearer.

US Patent Specification 4,685,914 describes another
embodiment of a diaper or incontinence guard in which
an absorbent pad or body is applied in the form of a
10 boat-shaped foamed-polyethylene shell. The use of a
separate outer basin as a liquid-impervious casing is
both expensive and complicated, however.

The US Patent Specification 4,655,759 teaches a method
15 of providing sanitary towels with embossed channels
along which the longitudinally extending edge-parts of
the towel can be folded-up to form a kind of container,
therewith reducing the risk of leakage.

20 However, the fact is that wrinkling or folding of the
sanitary towel occurs solely as a result of the pres-
sure exerted by the wearer's thighs against the towel
in its transverse direction. Consequently, it is more
or less by chance that a truly leakage-proof region can
25 be formed between the embossed channels. The edge-parts
of the towel can, in principle, be curved or likewise
deformed in any manner whatsoever when subjected to the
force of the wearer's thighs and consequently there is
no guarantee whatsoever that a leakage-proof region
30 will be obtained. In comparison with an incontinence
guard and a diaper, a sanitary towel is intended to
absorb much less liquid and is subjected to much
smaller liquid flows.

The present invention relates to the provision of absorbent articles such as diapers, or incontinence guards, which are anatomically configured, which have a large liquid-collecting capacity both before and after absorption, which can absorb liquid rapidly, and which can be produced continuously at high production speeds and at low cost, with the aid of simple production means and without appreciable material wastage.

10 An inventive absorbent product is characterized mainly by at least two fold lines which extend permanently in the longitudinal direction of the article and which divide the article, over at least a part thereof, into a central longitudinally extending part and edge-parts
15 located symmetrically on respective sides of said central part.

With the aid of simple manufacturing methods, the invention enables a product to be produced which presents
20 a desired three-dimensional structure, starting from a flat blank comprising all materials incorporated in an absorbent article. Thus, it is not necessary to manufacture a separate, injection-moulded foamed-plastic shell, such manufacture requiring a plurality of additional process stages and renders manufacture more
25 expensive and more difficult to carry out.

Furthermore, upward-folding of the edge-parts results in the formation of liquid-enclosing embankments along
30 the fold lines, these embankments forming, at the same time, the main contact surface of the article with the body of the user in that region of the article in which the fold lines are located, such as to enable a large quantity of liquid excreted at one and the same time to
35 be collected in an elongated, dammed central part of

the inventive article.

The liquid is, in this way, held removed from the user at the same time as the dammed, central part of the article provides an effective barrier against leakage of liquid still not absorbed.

There are primarily two properties which are important to an absorbent article, namely that the article is able to absorb large quantities of liquid secreted momentarily, without liquid running over the edges of the article, and that the article will present a dry surface to the wearer subsequent to absorption. An article constructed in accordance with the invention contains both of these properties, in addition to several other properties desirable in the case of an absorbent article, such as comfort and discretion in wear.

An absorbent article constructed in accordance with the present invention will now be described in more detail with reference to an exemplifying embodiment thereof illustrated in the accompanying drawings.

Figure 1 is a view of an inventive absorbent article taken from above, with the side of the article intended to face towards the wearer facing towards the viewer.

Figure 2 is a sectional view of the absorbent article illustrated in Figure 1, taken on the line II-II of said Figure.

Figure 3 is a view of a further embodiment of an inventive article taken from above, with the side of the article intended to face the wearer facing towards the viewer.

Figure 1 illustrates an absorbent article 1. The article 1 comprises a liquid-permeable sheet 2, made of a nonwoven fibre material, attached as surface material nearest the body of the wearer.

5

The sheet 2 is joined with an underlying absorbent pad by means of two, longitudinally extending sinusoidal fold lines 3, e.g. weld joins or adhesive joins, said fold lines 3 functioning to divide the article 1 into a central part 6 and two edge-parts 7, 8. The parts 6, 7 and 8 are relatively elongated, i.e. their extension in the longitudinal direction of the article is greater than their extension in the transverse direction thereof. As will be seen from the Figure, the back and front end-parts 9, 10 are of mutually identical configuration and are provided with a plurality of discrete joins 4 and joins 5 which end-seal the end-parts 9, 10. The joins 4, 5 may be seam welds or adhesive bonds, for instance.

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15
20

When the fold lines are formed by seam welds, the seams can be produced by any conventional welding technique whatsoever, e.g. by ultrasonic welding, impulse welding or high frequency welding.

25

The illustrated fold lines 3, are not restricted to the sinusoidal curve pattern illustrated in Figure 1, but may be linear or arcuate in configuration. Preferably, two fold lines 3 are provided, although it is also conceivable to provide solely one fold line or a number of fold lines greater than three.

30

According to one embodiment of the invention (not shown) in order to increase the flexibility of the article, the fold lines may be formed by two punctiform

35

seams disposed along a continuous curve and forming a pattern similar to that formed by the fold lines in Figure 1, or any other desired pattern whatsoever. Neither is the scope of the invention restricted by the lengths of said fold lines. However, the fold lines shall be positioned so that the liquid-receiving part of the article, the so-called wetting location, is framed by the edge-parts 7, 8 and therewith constitutes a region of the central part 6. It should be mentioned in this connection that the distance between the fold lines 3 may have any desired value and does not therefore limit the scope of the invention.

The seams or joins 4 in respective end-parts 9, 10 may be smaller or greater than three in number and may also be excluded totally. Similar to the fold lines 3, the seams 4 may have the form of discrete punctiform weld-bonds or may comprise continuous, curved seams where the shape of the curve is optional. The seams 4 result in a smaller article contact-surface with the body of the wearer, therewith enhancing the comfort of the article when worn.

Figure 2 illustrates an example of upward-folding of the edge-parts 7, 8 in accordance with the invention. The expression "upward-folding" as used here includes all manner of folding or bending of the edge-parts which will cause the edge-parts located externally of the fold-lines, when viewed as a whole, to form upstanding embankments or like walls in relation to the central part, seen in a direction towards the wearer. For instance, as illustrated in Figure 2, the edge-part can be folded double in its longitudinal direction, where-with the outer longitudinally extending part will be folded in a direction away from the wearer. Appropriate

fixation of the fold will result in a reduction in the transverse extension of the edge-parts, causing an increase in the vertical extension or height extension of said edge-parts, such that the edge-parts form up-
5 standing embankment walls.

Located immediately beneath the liquid-permeable sheet 2 is fibre wadding body 11. This wadding forms part of an absorbent pad, generally shown at 12, and functions
10 to receive the liquid excreted and to permit the liquid to pass rapidly therethrough. The wadding is preferably loosely packed and is resilient in both its dry and its wet state. The fibre wadding 11 may comprise, for in-
15 stance, thermoplastic, weldable fibres, such as polyester, polypropylene or polyethylene fibres or mixtures thereof. So-called bicomponent fibres are suitable materials in this regard, by which is meant fibres
which comprise two kinds of polymer, for instance polypropylene/polyethylene, polyester/polyester or poly-
20 ester/polyethylene. The fibre wadding 11 may be either a woven or non-woven structure, without departing from the inventive concept. Heat and binding agents are examples of the means by which a fibre wadding struc-
ture can be bound. The adhesive bonding agent may, for
25 instance, be latex. The wadding may also be hydrophobic or hydrophilic. It will be understood that natural fibres which exhibit the aforesaid properties can also be used.

30 That part of the absorbent pad 12 located beneath the wadding comprises two layers of superabsorbent material 13, 14 which is placed in powder form between a plurality of tissue layers 15. The superabsorbent material may have a form other than powder, e.g. may have the
35 form of fibres. By superabsorbent material is meant a

material which can absorb a liquid quantity corresponding to several times its own weight. The superabsorbents in respective layers differ essentially with regard to absorption properties, absorption rates and liquid-retention abilities when subjected to pressure. The superabsorbent in layer 14 has a very high absorption rate, whereas the superabsorbent in layer 13 has a very pronounced ability to retain liquid when subjected to pressure. Each of the tissue layer 15 may comprise one or more layers of tissue. It is also conceivable to use other types of carrier material than tissue, for instance nonwoven material.

Placed beneath the absorbent pad 12 and between said pad and the liquid-permeable sheet 2 extending peripherally around the whole of the article is a liquid-impermeable sheet 16 made, for instance, of polyethylene or polypropylene. The liquid-permeable sheet 2 is joined to the liquid-impermeable sheet 16, e.g., with the aid of an adhesive binder, whereas the fibre wadding 11 is neither connected to the liquid-permeable sheet 2 nor to the liquid-impermeable sheet 16, with the exception of the seam or join locations 3, 4 and 5. The liquid-impermeable sheet 16 extends upwards to some extent along the upwardly raised edge-part 7, 8 which provides additional protection against leakage from the sides of the article. The layer 16 extends around the margins of the end-parts 9, 10 and slightly inwardly thereof, as indicated by a broken line 17 in Figure 1.

The edge-parts 7, 8 are joined in a double-fold, by means of a bonding means 20, for instance by means of an adhesive binding agent or a punctiform weld, a region 21, 22 of the liquid-permeable sheet 2 being joined with another region 23, 24 of said sheet within

the same respective edge-parts 7, 8 on the side surface of the article 1 facing away from the user, i.e. the underside 25 of said article. The binding agent is, for instance, applied in the form of one or more glue
5 points. The punctiform weld-joints may be one or more in number.

When the edge-parts 7, 8 are folded in this manner and fixated to the underside 25 of the article, the edge-
10 parts 7, 8 of the article impart to said article, as seen in its cross-direction, a convex shape towards the central part 6, at the same time as said edge-parts 7, 8 are erected to a raised position in relation to the central part 6 as seen in the height extension of the
15 article. When the article is in use, the wearer's thighs will press the edge-parts 7, 8 towards the central part 6, but because the edge-parts 7, 8 in their upwardly raised positions curve inwardly towards the central part 6, the occurring pressure forces will
20 accentuate still further the damming effect of the central part 6 and counteract the tendency of the edge-parts 7, 8 to gape. Thus, in accordance with the present invention, the apparently disadvantageous fact
25 that the thighs of the wearer will deform the article in its transverse direction is utilized in a beneficial manner to provide a considerably improved absorbent product or article, both from the aspect of liquid collection and leakage. The edge-parts 7, 8 can be folded and fixated in a number of ways within the scope
30 of the following claims.

By constructing the inventive article from materials other than those conventionally used, it is not only possible to obtain a three-dimensional article by fold-
35 ing up the edge-parts of the article along said fold

lines, but also to obtain considerably improved liquid-retention and a drier abutment surface against the wearer's skin than in the case of traditionally constructed absorbent pads in which the absorption material is mainly cellulose fluff. The fibres of cellulose fluff normally have the drawback of discharging absorbed liquid when subjected to pressure, causing the surface material closest to the wearer's body to become moist or wet, and therewith resulting in increased discomfort for the wearer. As a result of placing fibre wadding immediately beneath the liquid-impermeable surface material, the article will obtain a dry surface while, at the same time, the wadding will provide a soft and comfortable layer of material against the wearer's skin. The structure of the fibre wadding includes very coarse capillaries in comparison with the cellulose fluff, and consequently liquid will be transported very rapidly in the fibre wadding.

Furthermore, the fibre wadding alienates the liquid absorbed in the absorbent pad from the body of the wearer, wherein the surface of the absorbent article will be felt to be dry and comfortable, even when the article has been in use for some time. The fibre wadding also contributes towards configuring the article.

By choosing suitable material, it is possible to produce in the voluminous bulky wadding layer a durable bond between surface material, fibre wadding and absorbent pad, or, as seen from the side of the article remote from the wearer, between surface material, plastic-barrier layer and absorbent pad, e.g. by gluing or welding. Because the fibre wadding comprises thermoplastic fibres and is also highly voluminous, the application of joins or seams therein will form in the

bulky wadding deep, distinctive fold lines, outside of which the edge-parts of the article are folded-up so as to dam-in the central part of the article located between said edge-parts, said edge-parts being fixated in their upwardly raised positions in relation to said central part.

Attached to the underside of the article is an adhesive layer or strip 18, by means of which the article can be removably fastened to the user's underclothes when wearing said article. Prior to use, this adhesive layer 18 is protected by a protective strip 19, which is preferably treated with a release agent on the side thereof facing the adhesive layer 18 and which can be readily removed when the article 1 is to be worn, so as to expose the adhesive layer 18 for active use.

Figure 3 illustrates another embodiment of an absorbent article, here referenced 1'. Similar to the article 1, the article 1' incorporates a liquid-permeable sheet 2, which is located nearest the wearer, two longitudinally extending fold lines 3, a central part 6, two end-parts 7, 8, and end-seals 5 which seal-off the end-parts 9', 10' of said article, the rear end-part 9' is much larger than the front end-part 10', so as to be able to receive faeces. Because of its enlarged end-part 9', the article 1' is able to enclose a larger absorbent pad than the article 1 of the embodiment before described, thereby enabling the article 1' to absorb much larger quantities of liquid than those for which the article 1 is intended, for instance adult incontinence.

A number of modifications are conceivable within the scope of the claims.

For instance, fold lines may also be provided on the underside of the article, with the intention of further amplifying the fold lines produced on the upper side thereof. Naturally, a layer of fibre wadding can also
5 be positioned between the absorbent pad and the liquid-impermeable sheet in this case. Thus, all of the material incorporated in the article can be joined together along the fold lines in conjunction therewith.

10 The methods by which the fold lines, for instance, seaming, glueing, welding, can also be combined. For instance, the liquid-permeable sheet can be welded to the fibre wadding while glueing the wadding to the absorbent pad along the fold lines.

15

In addition to the absorbent pad described with reference to the illustrated exemplifying embodiments, a number of other absorbent pad constructions known to the person skilled in this art may be incorporated in
20 the inventive article. For instance, the absorbent pad described with reference to Figure 2 may be supplemented with a number of layers of tissue or the like placed on one or both sides of the absorbent body. It is also possible to use an absorbent pad made of cellulose fluff, optionally with superabsorbents mixed
25 therein. The absorbent pad may also have admixed therein material which has no absorbing function, but which serves to improve binding to the surrounding thermoplastic sheets. Such material may, for instance, comprise melt fibres. As will be understood, the fibre
30 wadding may be totally excluded if so desired, in which case the article will solely include an absorbent body comprising cellulose fluff, with or without superabsorbents or other absorbent material.

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CLAIMS

1. An absorbent article (1, 1') intended for one time
5 use only, such as a diaper, an incontinence guard or
the like, comprising a liquid-permeable casing sheet
(2), which when the article is worn lies nearest the
body of the wearer, a liquid-impermeable casing sheet
(16), and an absorbent pad (12) enclosed between the
10 two casing sheets, c h a r a c t e r i z e d in that
the article has provided in the longitudinal direction
thereof at least two permanently formed fold lines (3)
which divide the article, over at least a part thereof,
into a central elongated part (6) and two edge-parts
15 (7, 8) located symmetrically on a respective side of
said elongated part; in that a longitudinally extending
part (21, 22) of the outer casing-sheet of each edge-
part (7, 8), as seen in relation to a user, is joined
to a further longitudinally extending part (23, 24) of
20 said outer casing sheet, such as to curve intermediate
parts of respective edge-parts (7, 8); and in that
joining means (20) are provided for permanently fixat-
ing these parts in a mutually joined state, whereby the
curved parts of said edge-parts externally of the cent-
25 ral part (6) form inwardly upstanding embankment
walls.

2. An article (1, 1') according to Claim 1,
c h a r a c t e r i z e d in that the edge-parts (7,
30 8) are folded double; and in that the joining means
(20) function to join the outer marginal-regions (21,
22) of said edge-parts with the outer surface of the
article on the side thereof distal from the wearer when
the article is worn.

3. An article (1, 1') according to Claim 1 or 2,
c h a r a c t e r i z e d in that the joining means
(20) function to join the outer marginal regions (21,
22) with the regions (23, 24) externally of the central
5 part (6) as seen in the transverse direction of the
article.
4. An article (1, 1') according to Claim 1 or 2,
c h a r a c t e r i z e d in that the joining means
10 (20) function to join the outer marginal regions (21,
22) with the central part (6).
5. An article (1, 1') according to any one of the pre-
ceding claims, c h a r a c t e r i z e d in that the
15 absorbent pad (12) incorporates a layer of loosely
packed fibre wadding (11) at a location nearest the
liquid-permeable sheet (2), said fibre wadding having
spring-back properties.
- 20 6. An article (1, 1') according to Claim 5,
c h a r a c t e r i z e d in that the fibres of the
fibre wadding (11) are polyester, polypropylene, poly-
ethylene fibres or mixtures thereof.
- 25 7. An article (1, 1') according to any one of the pre-
ceding claims, c h a r a c t e r i z e d in that the
fold lines (3) comprise seam welds.
- 30 8. An article (1, 1') according to any one of the pre-
ceding claims, c h a r a c t e r i z e d in that the
folding lines (3) comprise adhesive bonds.

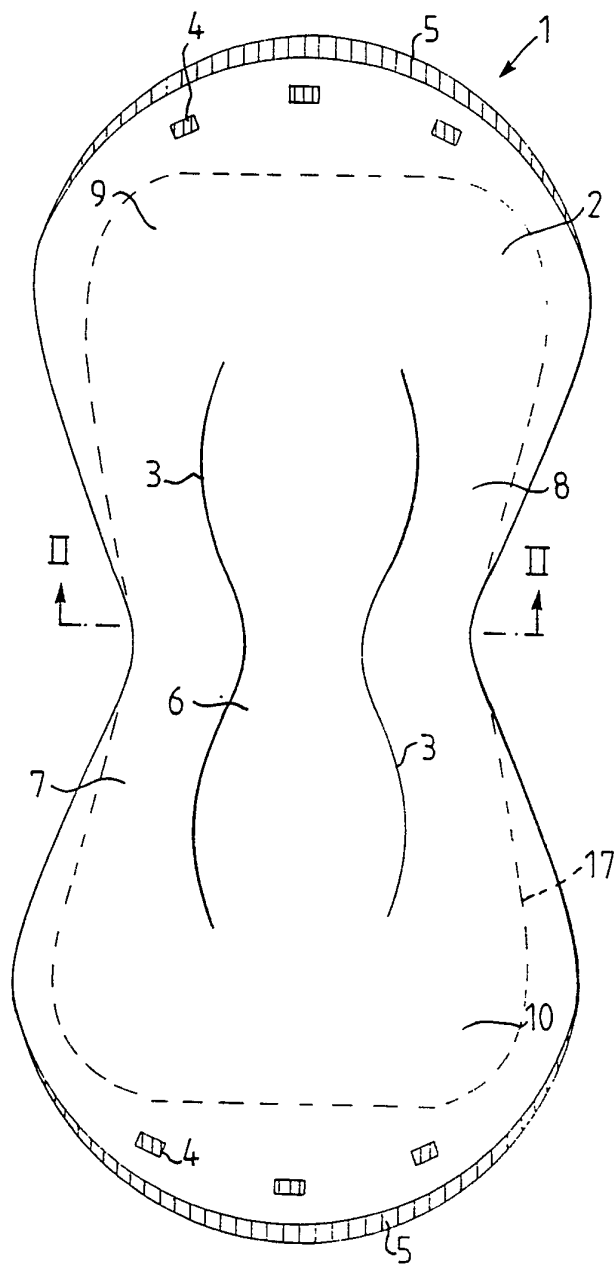


FIG.1

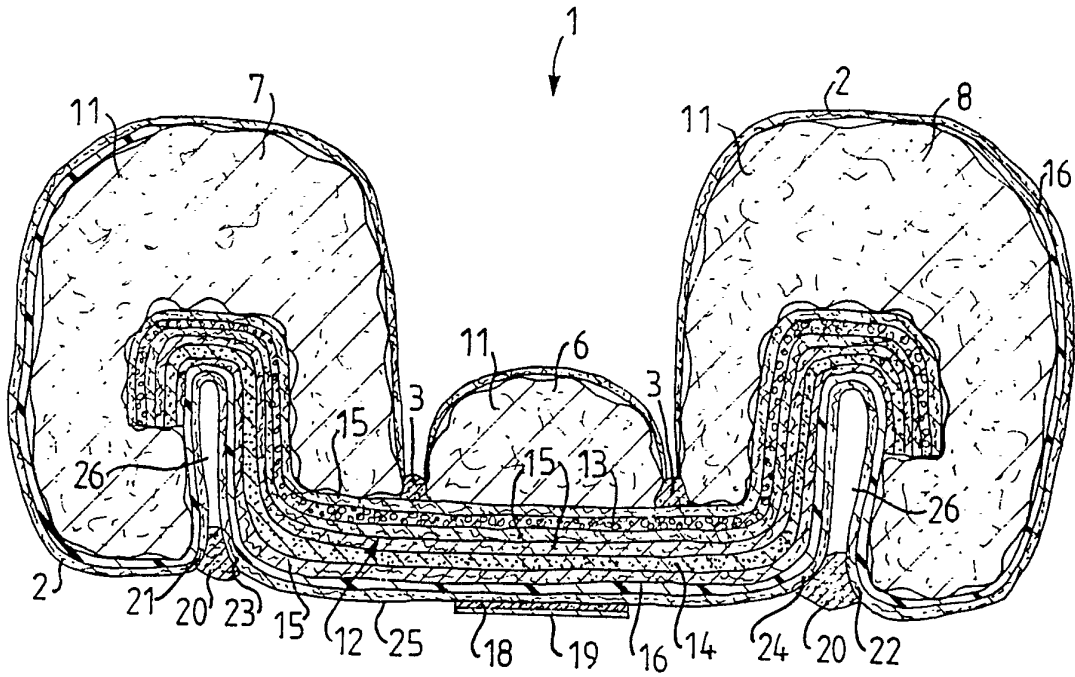


FIG. 2

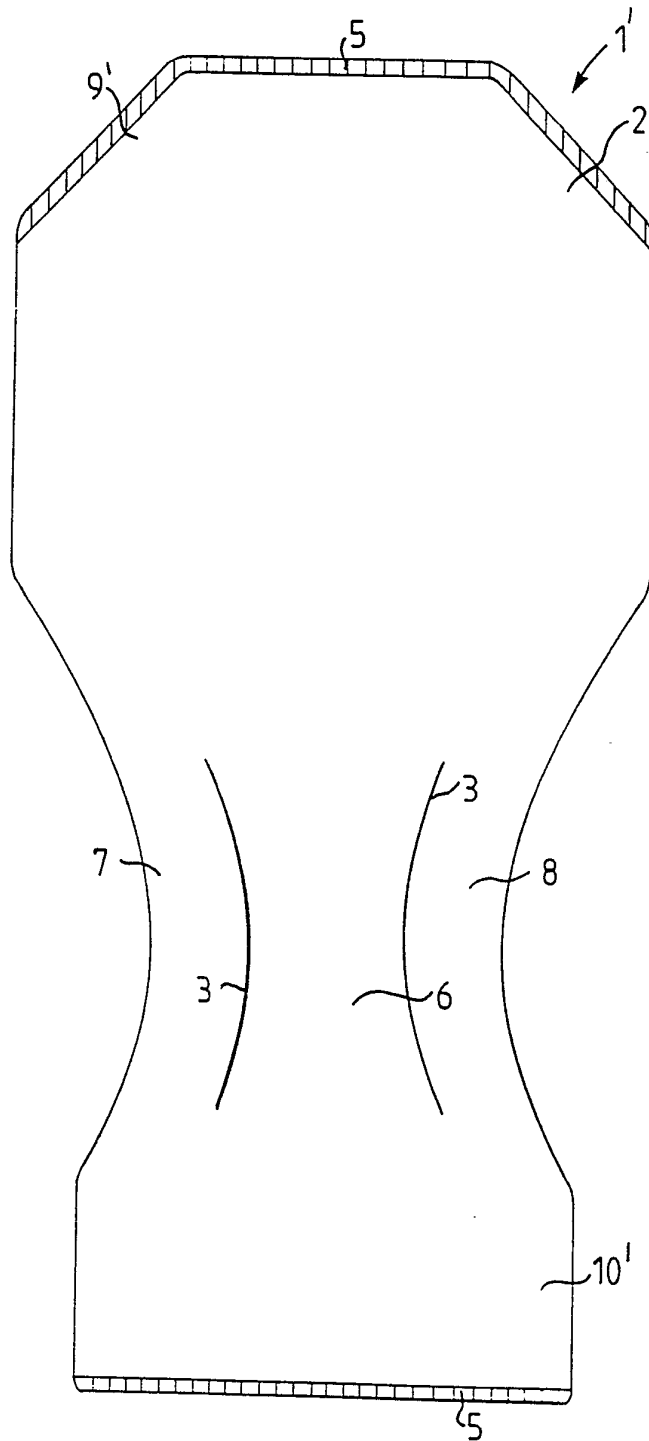


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 90/00376

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC5: A 61 F 13/46		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	A 61 F	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched ⁸		
SE,DK,FI,NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	US, A, 4655759 (ALICE Y. ROMANS-HESS ET AL.) 7 April 1987, see the whole document -- -----	1-8
<p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
4th September 1990	1990-09-04	
International Searching Authority	Signature of Authorized Officer	
SWEDISH PATENT OFFICE	Jack Hedlund <i>Jack Hedlund</i>	

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 90/00376

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on 90-08-02
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4655759	87-04-07	NONE	