

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
21 December 2007 (21.12.2007)

PCT

(10) International Publication Number
WO 2007/144838 A1

(51) International Patent Classification:

A61F 13/15 (2006.01)

(21) International Application Number:

PCT/IB2007/052246

(22) International Filing Date:

13 June 2007 (13.06.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/813,311 13 June 2006 (13.06.2006) US

(71) Applicant (for all designated States except US): THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, Ohio 45202 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): FUJIMOTO, Kenji [JP/JP]; 13-36-205 Koshiengoban-cho, Nishinomiya, Hyogo 658-8175 (JP). SATO, Haruko [JP/JP]; 4-8-25-4C Mikagenakamachi, Higashinada-ku, Kobe, Hyogo 658-8175 (JP). HIGAKI, Masato [JP/JP]; 5-5-532-807 Koyo-cho Naka, Higashinada-ku, Kobe, Hyogo 658-0032 (JP). MATSUDA, Toshiyuki [JP/JP]; 3-745-46 Sumiyoshi, Uozumi-cho, Akashi, Hyogo

674-0083 (JP). NAKAHATA, Hiroshi [JP/US]; 11301 Village Brook Drive #2416, Cincinnati, Ohio 45249 (US).

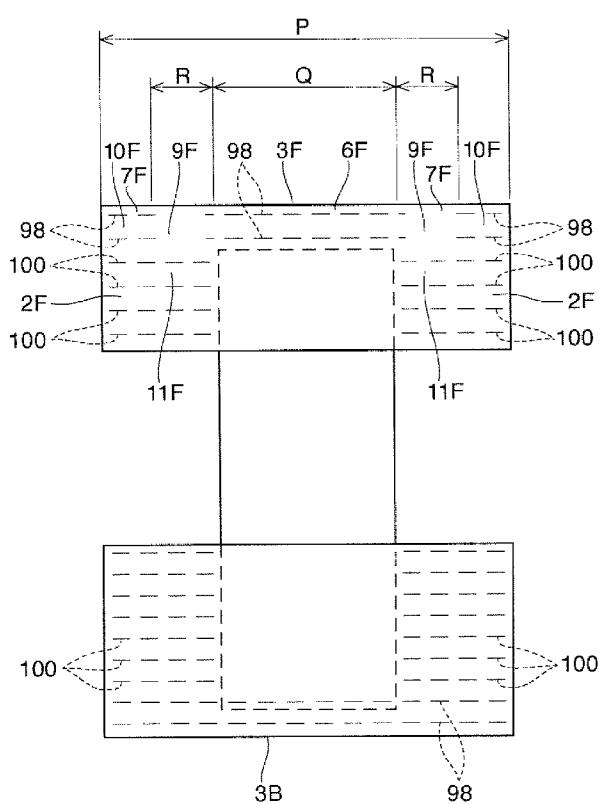
(74) Common Representative: THE PROCTER & GAMBLE COMPANY; c/o Eileen L. Huggett, The Procter & Gamble Company, Winton Hill Business Center, 6250 Center Hill Road, Cincinnati, Ohio 45224 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: DISPOSABLE PULL-ON GARMENT



(57) **Abstract:** The disposable pull-on garment has a longitudinal centerline, a front region, a crotch region, and a back region, the front region and the back region being joined at seams to form a waist opening and leg openings. The pull-on garment comprises a main portion, a side portion, and a waist portion. The side portion is disposed transversely outboard of the main portion. The waist portion comprises a center waist portion, an outer side waist portion, and an inner side waist portion. The center waist portion is disposed longitudinally outboard of the main portion. The outer side waist portion is disposed longitudinally outboard of the side portion, transversely outboard of the center waist portion, and contiguous with the seam. The inner side waist portion is disposed longitudinally outboard of the side portion, transversely inboard of the outer side waist portion, and transversely outboard of the center waist portion. The side portion is elasticized to provide elasticity and comprising a side elastic material to contract and gather at least a portion of the side portion. The waist portion is elasticized to provide elasticity and comprising a waist elastic material to contract and gather at least a portion of the waist portion. Contraction rate of the inner side waist portion is less than that of the center waist portion, and contraction rate of the side portion longitudinally inboard of the inner side waist portion is greater than that of the inner side waist portion.



FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DISPOSABLE PULL-ON GARMENT

FIELD OF THE INVENTION

The present invention relates to disposable pull-on garments which are donned by
5 inserting the wearer's legs into the leg openings and sliding the garment up into position about
the lower torso.

BACKGROUND OF THE INVENTION

Infants and other incontinent individuals wear disposable absorbent articles such as
10 diapers to receive and contain urine and other body exudates. Absorbent garments having fixed
sides (e.g., training pants or pull-on diapers) have become popular for use on children able to
walk and often who are toilet training. Many disposable pull-on garments use elastic elements
secured in an elastically contractible condition in the waist and/or leg openings. Typically, in
order to insure full elastic fit about the leg and the waist such as is provided with durable
15 undergarments, the leg openings and waist opening are encircled with elasticized bands of rubber
or other materials positioned along the curve of the entirety of the opening.

While it may be believed that the stretchable waist opening generating high contraction
force contributes to anchor the waist opening of the pull-on diapers to the wearer's body, such
high contraction force sometimes actually causes sagging of the waist opening of the pull-on
20 diaper. The front portion of the waist opening is positioned on stomach of the wearer which is
considered high motion zone repeating expansion and contraction when the wearer breathes.
When the stomach expands, the contraction force becomes high to generate high anchoring force.
However, as the contraction force increases, the component force of the contraction force toward
the crotch from the waist portion of the wearer along the surface of the wearer also increases.
25 When such high component force is exerted on the stomach of the wearer in which the waist
circumference decreases toward the crotch of the wearer, the waist portion of the pull-on diaper
could sag.

In order to reduce such sagging caused by high component force exerted on the stomach,
it is conceivable to remove elastic material in the front center waist portion. However, if the
30 elastic material is removed therefrom, another drawback occurs. Namely, the front center waist
portion having no contraction force can not counteract the movement of wearer. As a result, the

front waist portion flips over accidentally by the wearer's movement. Such flipping-over of the waist portion is also as problematic as sagging since it gives a poor impression of the pull-on diaper to the wearer or caregiver.

Based on the foregoing, there is a need for a disposable pull-on garment to provide an improved fit around the waist opening. There is also a need for a disposable pull-on garment to improve sagging problem around the waist portion. There is also a need for a disposable pull-on garment to improve flip-over problem in the waist portion.

SUMMARY OF THE INVENTION

The present invention is directed to a disposable pull-on garment. The disposable pull-on garment has a longitudinal centerline, a front region, a crotch region, and a back region, the front region and the back region being joined at seams to form a waist opening and leg openings. The pull-on garment comprises a main portion, a side portion, and a waist portion. The side portion is disposed transversely outboard of the main portion. The waist portion comprises a center waist portion, an outer side waist portion, and an inner side waist portion. The center waist portion is disposed longitudinally outboard of the main portion. The outer side waist portion is disposed longitudinally outboard of the side portion, transversely outboard of the center waist portion, and contiguous with the seam. The inner side waist portion is disposed longitudinally outboard of the side portion, transversely inboard of the outer side waist portion, and transversely outboard of the center waist portion. The side portion is elasticized to provide elasticity and comprising a side elastic material to contract and gather at least a portion of the side portion. The waist portion is elasticized to provide elasticity and comprising a waist elastic material to contract and gather at least a portion of the waist portion. Contraction rate of the inner side waist portion is less than that of the center waist portion, and contraction rate of the side portion longitudinally inboard of the inner side waist portion is greater than that of the inner side waist portion.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following description which is taken in

conjunction with the accompanying drawings in which like designations are used to designate substantially identical elements, and in which:

Figure 1 is a perspective view of the disposable pull-on garment of the present invention in a typical in-use configuration;

5 Figure 2 is a plan view of the pull-on garment in its flat uncontracted condition showing the inner surface;

Figure 3 is a schematic plan view of the pull-on garment in its flat uncontracted condition showing the main portion, the side portion, and the waist portion;

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

10 Figure 5 is a cross-sectional view of Figure 2 taken along the line V-V;

Figure 6 is a cross-sectional view showing a typical in-use configuration of the portion shown in Figure 4;

Figure 7 is a cross-sectional view of Figure 2 taken along the line VII-VII; and

15 Figure 8 is a schematic plan view of the garment of the present invention in its flat uncontracted condition showing the outer surface.

DETAILED DESCRIPTION OF THE INVENTION

As used herein, the term "pull-on garment" refers to articles of wear which have a defined waist opening and a pair of leg openings and which are pulled onto the body of the wearer by 20 inserting the legs into the leg openings and pulling the article up over the waist. The term "disposable" is used herein to describe garments which are not intended to be laundered or otherwise restored or reused as a garment (i.e., they are intended to be discarded after a single use and, preferably, to be recycled, composted or otherwise disposed of in an environmentally compatible manner). The pull-on garment is also preferably "absorbent" to absorb and contain 25 the various exudates discharged from the body. A preferred embodiment of the pull-on garment of the present invention is the disposable absorbent pull-on garment, pull-on diaper 20, shown in Figure 1. As used herein, the term "pull-on diaper" refers to pull-on garments generally worn by infants and other incontinent individuals to absorb and contain urine and feces. It should be understood, however, that the present invention is also applicable to other pull-on garments such 30 as training pants, incontinent briefs, feminine hygiene garments or panties, and the like. As used herein, the term "joined" encompasses configurations whereby an element is directly

secured to another element by affixing the element directly to the other element, and configurations whereby an element is indirectly secured to another element by affixing the element to intermediate member(s) which in turn are affixed to the other element.)

Figure 1 is a perspective view of the pull-on diaper 20 of the present invention. The 5 pull-on diaper 20 has a longitudinal centerline L1 and a transverse centerline T1 (refer to Figure 2 as well). The pull-on diaper 20 has an outer surface 22, an inner surface 24 opposed to the outer surface 22, a front region 26, a back region 28, a crotch region 30, and seams 32 which join the front region 26 and the back region 28 to form two leg openings 34 and a waist opening 36. Also referring to Figure 3, the diaper 20 comprises a main portion 1, a side portion 2, and a waist 10 portion 3.

In the embodiment shown in Figures 1 and 2, the diaper 20 comprises an absorbent main body 38 (hereinafter may be referred to as “main body”) to cover the crotch region of the wearer and a belt 40 extending transversely about the waist opening 36. The diaper 20 may also comprise an outer cover layer 42 to cover the main body 38. The belt 40 defines the waist 15 opening 36. The belt 40 and the main body 38 and/or the outer cover layer 42 jointly define the leg opening 34. Alternatively, the belt 40 and the outer cover layer 42 may jointly define the leg opening 34. The pull-on diaper 20 also has a patch sheet 44 printed with a graphic 46 thereon which may be disposed in the front region 26 and/or the back region 28.

The absorbent main body 38 absorbs and contains body exudates disposed on the main 20 body 38. In the embodiment shown in Figure 2, the main body 38 has a generally rectangular shape having a longitudinal centerline L2, a transverse centerline T2, left and right longitudinally extending side edges 48 (hereinafter may be referred to as “longitudinal side edge”) and front and back transversely extending end edges 50 (hereinafter may be referred to as “transverse end edge”). The main body 38 also has waist panels (i.e., a front waist panel 52 positioned in the 25 front waist region 26 of the diaper 20 and a back waist panel 54 positioned in the back waist region 28) and a crotch panel 56 in the crotch region 30 between the front and back waist panels 52, 54.

The belt 40 comprises a front belt 84 and a back belt 86 (hereinafter may be referred to as 30 “front and back belt 84, 86) and has a ring-like configuration by connecting the front belt 84 and the back belt 86 at the seams 32. Each of the front belt 84 and the back belt 86 has a central panel 80F, 80B and side panels 82F, 82B contiguous with the central panel 80F, 80B and

extending transversely outwardly from the central panel 80F, 80B. Thus, the belt 40 comprises a central panel 80F, 80B and the side panels 82F, 82B. Herein, a portion of a front member and a portion of a back member may be indicated by a reference number with "F" suffix and "B" suffix, respectively, as necessary. Therefore, the "central panel 80F, 80B" for example indicates the "front central panel 80F" and the "back central panel 80B". The "central panel 80" also 5 may mean the "front central panel 80F" and the "back central panel 80B".

Each of the front belt 84 and the back belt 86 has a transversely extending distal edge 88F, 88B, a transversely extending proximal edge 90F, 90B, and longitudinally extending left and right side edges 89F, 89B. Herein, the term "proximal" is used to indicate the position of a 10 "proximal" portion being closer relative to the crotch panel of the main body than the position of a "distal" portion. Therefore, the proximal edge 90F, 90B is located closer than the distal edge 88F, 88B relative to the crotch panel 56 of the main body 38. The front and back belts 84, 86 are joined at or adjacent to the side edges 89F, 89B at the seams 32 to form a pull-on diaper 15 having a waist opening 36 and two leg openings 34. The front central panel 80F may partly or entirely overlap with the front waist panel 52 of the main body 38. The back central panel 80B may partly or entirely overlap with the back waist panel 54 of the main body 38. However, the central panel 80F, 80B does not extend into the crotch panel 56 of the main body 38 and is not disposed in the crotch panel 56. In the embodiment shown in Figure 2, the central panel 80F, 80B partly overlaps with and is joined to the front waist panel 52 and the back waist panel 54, 20 respectively.

The main body 38 comprises a liquid pervious topsheet 58, a liquid impervious backsheets 60 and an absorbent core 62 disposed therebetween. The main body 38 may additionally comprise a barrier leg cuff 64 disposed along the longitudinal side edge 48. The barrier leg cuff 64 provides improved containment of liquids and other body exudates in the crotch region 30. 25 The barrier leg cuff 64 shown in Figure 4 comprises a single layer of material which is folded into two layers. The barrier leg cuff 64 extends from the longitudinal side edge 48 toward the longitudinal centerline L2 and then is folded along the folding line 66 back toward the longitudinal side edge 48. The barrier leg cuff 64 has two barrier cuff elastic materials 72 adjacent to the distal portion 68 and one barrier cuff elastic material 73 adjacent to the proximal portion 70 of the barrier leg cuff 64. The proximal portion 70 of the barrier leg cuff 64 is joined 30 to the backsheets 60 adjacent to the longitudinal side edge 48. The portion of the barrier leg cuff

64 along the folding line 66 and the distal portion 68 are free from attachment to any portion of the main body 38 in the crotch panel 56 such that the barrier leg cuff 64 stands up toward the wearer's body as shown in Figure 6 when the diaper 20 is used. The transverse end 74 of the barrier leg cuff 64 is joined to the topsheet 58 adjacent to the folding line 66 by an attachment means 76 which may be any known means such as an adhesive and is joined onto the barrier leg cuff 64 itself along the distal portion 68 by an attachment means 78 which may be any known means such as an adhesive as shown in Figure 5.

The liquid pervious topsheet 58 is preferably positioned adjacently the body-facing surface of the absorbent core 62 and may be joined thereto and/or to the backsheet 60 by any attachment means known in the art. The liquid impervious backsheet 60 is generally that portion of the diaper 20 positioned adjacently the garment-facing surface of the absorbent core 62 and prevents the exudates absorbed and contained therein from soiling articles that may contact the diaper 20. The absorbent core is positioned between the topsheet 58 and the backsheet 60 and absorbs and retains liquids such as urine and other certain body exudates. The topsheet 58, the backsheet 60 and the absorbent core may be manufactured any known materials. Suitable topsheet materials may include porous foams; reticulated foams; apertured plastic films; or woven or nonwoven webs of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polyester or polypropylene fibers), or a combination of natural and synthetic fibers. Suitable backsheet materials may include breathable materials that permit vapors to escape from the diaper while still preventing exudates from passing through the backsheet. Suitable absorbent core materials may include creped cellulose wadding; meltblown polymers, including coform; chemically stiffened, modified or cross-linked cellulosic fibers; tissue, including tissue wraps and tissue laminates; absorbent foams; absorbent sponges; superabsorbent polymers; absorbent gelling materials; or any other known absorbent material or combinations of materials.

The outer cover layer 42 is disposed on the outer surface 22 of the diaper 20 and covers the crotch panel 56 of the absorbent main body 38. The outer cover layer 42 may extend into and cover the front waist panel 52 and the back waist panel 54 of the main body 38. The outer cover layer 42 is directly joined to and covers the liquid impervious backsheet 60 of the main body 38. The central panel 80 of the front and back belt 84, 86 portion is joined to the front waist panel 52 and the back waist panel 54 of the main body 38 through the outer cover layer 42. Thus, the outer cover layer 42 is sandwiched between the front and back belt 84, 86 and the

liquid impervious backsheet 60 of the main body 38. In the embodiment shown in Figures 2 and 4, the outer cover layer 42 is coextensive with the liquid impervious backsheet 60. The leg elastic material 118 is disposed so as to extend generally longitudinally along the longitudinal side edge 48 of the main body 38. The leg elastic material 118 may be disposed at least in the 5 crotch region 30 of the diaper 20 or may be disposed along the entirety of the longitudinal side edge 48.

The outer cover layer 42 comprises a material separate from the material of the inner layer 94 and the outer layer 92 constituting the belt 40. The outer cover layer 42 may comprise two or more layers of materials. The outer cover layer 42 may comprise any known materials 10 and may comprise materials as used for the front and back belt 84, 86 as explained above. Preferably the outer cover layer 42 comprises a single layer of nonwoven web of synthetic fibers. More preferably, the outer cover layer 42 comprises a single layer of hydrophobic, non-stretchable nonwoven material.

The belt 40 may be ring-like and elastic. The ring-like elastic belt 40 extends 15 transversely about the waist opening 36 of the diaper 20 and acts to dynamically create fitment forces and to distribute the forces dynamically generated during wear. The ring-like elastic belt 40 comprises a belt layer 91 including an outer layer 92. The belt layer 91 may further comprise an inner layer 94. A belt elastic material 96 is interposed between the outer layer 92 and the inner layer 94. The front belt 84 and the back belt 86 may comprise the same materials and/or 20 may have the same structure. Alternatively, the front belt 84 and the back belt 86 may comprise different materials and/or may have different structures. In the embodiment of Figure 2, the front belt 84 and the back belt 86 generally have the same layer structure. Referring to Figure 7, the inner layer 94 has a transversely extending distal end 104 and a transversely extending proximal end 106. The outer layer 92 has a transversely extending distal end edge 108 and a 25 transversely extending proximal end edge 110. The inner layer 94 is almost coextensive with the contour of the front and back belt 84, 86. Alternatively, the inner layer 94 may be smaller than the size of the front and back belt 84, 86. The outer layer 92 of the belt layer 91 is longer than the size of the inner layer 94 in the longitudinal direction and an end flap 112 of the outer layer 92 is folded to cover the distal end 104 of the inner layer 94 at the waist opening 36 and to 30 form a distal end edge 108 of the outer layer 92. The inner layer 94 of the belt layer 91 may also have an end flap which may be folded together with the end flap 112 of the outer layer 92.

The end flap of the inner layer 94 may be longer or shorter than or equal to the end flap of the outer layer 92. Alternatively, the end flap 112 may be eliminated such that the outer layer 92 terminates at the waist opening 36 to form the distal end edge 108. In the embodiment shown in Figures 2 and 7, the distal end edge 108 and the proximal end edge 110 of the outer layer 92 correspond to the distal edge 88 and the proximal edge 90 of the front and back belt 84, 86, respectively. The outer layer 92 surrounded by the distal end edge 108 and the proximal end edge 110 define the shape of the front and back belt 84, 86 in the embodiment shown in Figures 2 and 7.

The front and back belt 84, 86 may comprise any known materials. Suitable material for the front and back belt 84, 86 can be manufactured from a wide range of materials such as plastic films; apertured plastic films; woven or nonwoven webs of natural materials (e.g., wood or cotton fibers), synthetic fibers (e.g., polyolefins, polyamides, polyester, polyethylene, or polypropylene fibers), or a combination of natural and/or synthetic fibers; or coated woven or nonwoven webs. Preferably the belt comprises a nonwoven web of synthetic fibers. The belt may comprise a stretchable nonwoven. More preferably, the belt comprises an inner hydrophobic, non-stretchable nonwoven material and an outer hydrophobic, non-stretchable nonwoven material.

The belt elastic material 96 comprises a waist elastic material 98 and a side elastic material 100. The waist elastic material 98 may comprise one or more of elastic elements such as strands or panels extending in the transverse direction. The side elastic material 100 also may comprise one or more of elastic elements such as strands or panels extending in the transverse direction. In the embodiment shown in Figure 2, the waist elastic material 98 and the side elastic material 100 comprise a plurality of elastic strands which are disposed at a constant interval in the longitudinal direction. Alternatively, the waist elastic material 98 and the side elastic material 100 may be disposed at a different interval in the longitudinal direction. The waist elastic material 98 is disposed along the distal edge 88 of the front and back belt 84, 86. The side elastic material 100 is disposed in the side panel 82 of the front and back belt 84, 86. No elastic material may be provided in a portion of the central panel 80 of the front and back belt 84, 86 which overlaps with the absorbent core 62, preferably with the front and back waist panel 52, 54 of the main body 38.

Referring to Figure 3, the main portion 1 extends longitudinally along the longitudinal centerline L1 (shown in Figure 2) from the front region 26 through the crotch region 30 to the back region 28. The main portion 1 comprises a front waist main portion 4F, a back waist main portion 4B, and a crotch main portion 8 therebetween. The side portion 2 comprises a front side portion 5F and a back side portion 5B. The side portion 2 is disposed transversely outboard of the main portion 1. More specifically the front side portion 5F is disposed transversely outboard of the front waist main portion 4F, and the back side portion 5B is disposed transversely outboard of the back waist main portion 4B. The waist portion 3 comprises a front center waist portion 6F, a back center waist portion 6B, a front side waist portion 7F, and a back side waist portion 7B. The center waist portion 6 is disposed longitudinally outboard of the waist main portion 4. The side waist portion 7 is disposed longitudinally outboard of the side portion 5 and disposed transversely outboard of the center waist portion 6. The side waist portion 7 further comprises a front outer side waist portion 10F, a back outer side waist portion 10B, a front inner side waist portion 9F, and a back inner side waist portion 9B. The outer side waist portion 10 is disposed contiguous with the seam 32 (refer to Figure 1). The inner side waist portion 9 is disposed transversely inboard of the outer side waist portion 10 and transversely outboard of the center waist portion 6. Herein, the term “longitudinally outboard of” or “longitudinally inboard of” means that an object portion is disposed further or closer, respectively, with respect to the transverse centerline T1 than a fiducial portion. Herein, the term “transversely outboard of” or “transversely inboard of” means that an object portion is disposed further or closer, respectively, with respect to the longitudinal centerline L1 than a fiducial portion. By way of example, the side portion 2 disposed transversely outboard of the main portion 1 means the side portion 2 disposed further than the main portion 1 with respect to the longitudinal centerline L1.

The main portion 1, the side portion 2, and the waist portion 3 may be formed with separate elements. For example, separate elements of the main portion 1, the side portion 2 and the waist portion 3 may be joined by any known means to each other, e.g., along the dotted line shown in Figure 3. Alternatively, at least two of or all of the main portion 1, the side portion 2 and the waist portion 3 may be formed with a single piece of material. For example, the diaper 20 may comprise a single piece of chassis layer such as a nonwoven backsheet layer extending into the main portion 1, the side portion 2 and the waist portion 3 to provide a uni-body of the diaper 20. In the embodiment shown in Figures 1, 2 and 3, the main portion 1 comprises the

waist panels 52, 54 of the main body 38, the crotch panel 56 of the main body 38, and a portion of the central panel 80F, 80B of the belt 40. The main portion 1 may further comprise a portion of the outer cover layer 42. The side portion 2 comprises a portion of the side panel 82 of the belt 40. The center waist portion 6 comprises a portion of the central panel 80 of the belt 40. 5 The side waist portion 7 comprises a portion of the side panel 82 of the belt. Alternatively, the side portion 2 may comprise a portion of the main body 38. Further, the center waist portion 6 and/or the side waist portion 7 may comprise a portion of the main body 38.

A portion of or the entirety of the waist portion 3 is elasticized to provide elasticity along the waist opening 36 in the transverse direction of the diaper 20. The waist portion 3 comprises 10 the waist elastic material 98 to provide contraction force to contract and gather at least a portion of the waist portion 3. A portion of or the entirety of the side portion 2 is elasticized to provide elasticity in the transverse direction of the diaper 20. The side portion 2 comprises the side elastic material 100 to provide contraction force to contraction and gather at least a portion of the side portion 2.

15 In the present invention, the waist portion 3 is rendered to have different contraction rate along the waist opening 36 of the diaper 20. More specifically, the contraction rate of the inner side waist portion 9 is less than that of the center waist portion 6. The contraction rate of the outer side waist portion 10 may be greater than that of the inner side waist portion 9. Alternatively, the contraction rate of the outer side waist portion 10 may be the substantially 20 same as that of the inner side waist portion 9. Further, the contraction rate of the outer side waist portion 10 may be the substantially same as that of the center waist portion 6, may be greater than that of the center waist portion 6, or may be less than that of the center waist portion 6.

Herein, contraction rate is determined by the ratio of a shortened length of a portion to a 25 stretched length of a portion. For example, the center waist portion 6 has a stretched center waist length and a contracted center waist length. The stretched center waist length is the length of the center waist portion 6 measured when the center waist portion 6 is fully stretched out against the contraction force of the waist elastic material 98. The contracted center waist length is the length measured when the center waist portion 6 is contracted by the contraction force of 30 the waist elastic material 98. Therefore, the center waist portion 6 is typically stretchable from the contracted center waist length up to the stretched center waist length. When the center waist

portion 6 is elasticized by joining the pre-stretched waist elastic material 98 thereto, the stretched center waist length is normally the stretched length of the materials such as a nonwoven or a polyfilm constituting the center waist portion 6, and the contracted center waist length is normally the length of the center waist portion 6 gathered by relaxing the waist elastic material 98. The shortened length of the center waist portion 6 is obtained by the formula; (shortened center waist length) = (stretched center waist length) – (contracted center waist length). The contraction rate of the center waist portion 6 is obtained by the formula; (contraction rate) = (shortened center waist length) / (stretched center waist length). By way of example, when the center waist portion 6 has a stretched center waist length of 10 cm and a contracted center waist length of 6 cm, the shortened center waist length is 4 cm and the contraction rate of the center waist portion 6 is 0.4 (i.e., 40 %). Likewise, the inner side waist portion 9 has a stretched inner side waist length and a contracted inner side waist length, and the contraction rate of the inner side waist portion 9 is obtained by the formula; (contraction rate) = (shortened inner side waist length) / (stretched inner side waist length). The outer side waist portion 10 has a stretched outer side waist length and a contracted outer side waist length, and the contraction rate of the outer side waist portion 10 is obtained by the formula; (contraction rate) = (shortened outer side waist length) / (stretched outer side waist length).

The side portion 2 is also rendered to have different contraction rate from a portion of the waist portion 3. The contraction rate of the side portion 2 longitudinally inboard of the inner side waist portion 9 is greater than the inner side waist portion 9. The side portion 2 longitudinally inboard of the inner side waist portion 9 has a stretched side length and a contracted side length, and the contraction rate of the side portion 2 is obtained by the formula; (contraction rate) = (shortened side length) / (stretched side length). The entirety of the side portion 2 may have greater contraction rate than the inner side waist portion 9.

In the embodiment shown in Figures 1, 2 and 3, the waist portion 3 is elasticized in a portion thereof by selectively providing the waist elastic material 98. Referring to Figure 8 as well, the waist elastic material 98 is provided in the entirety of the front center waist portion 6F and in a portion of the front side waist portion 7F. In the front side waist portion 7F, the waist elastic material 98 is provided in the entirety of or the majority portion of the front outer side waist portion 10F, but not provided in the entirety of or the majority portion of the front inner side waist portion 9F. The waist elastic material 98 is also provided in the entirety of the back

waist portion 3B. In the embodiment, the waist elastic material 98 of the front center waist portion 6F, the front outer side waist portion 10F and the back waist portion 3B is pre-stretched up to the same extensibility rate to provide the substantially same contraction rate. For example, the waist elastic material 98 may be pre-stretched up to between about 130% and about 5 400% of its relaxed, untensioned length (When the elastic material is stretched to, e.g., 150 %, the elastic material having a relaxed, untensioned length of 10 cm is stretched to 15 cm.). Since no elastic material is joined in the front inner side waist portion 9F, the contraction rate in the front inner side portion 9F is rendered substantially zero such that the contraction of the front inner side waist portion 9F is substantially zero. Thus, the contraction rate of each portion can 10 be adjusted by selectively providing the elastic material to each portion.

In the embodiment shown in Figures 1, 2 and 3, the entirety of the front side portion 2F is elasticized by providing the side elastic material 100. As the result, a portion 11F (refer to Figure 8) of the side portion 2F which is longitudinally inboard of the front inner side waist portion 9F is contracted by the side elastic material 100.

15 The contraction rate of each portion can be adjusted by any alternative methods. Selectively providing the elastic material for the portion which requires contraction while providing no elastic material for the portion which requires no contraction is one method to adjust the contraction rate for each portion. Instead, the elastic material such as the waist elastic material 98 may be provided along the entirety of the waist opening 36 and may be subsequently 20 cut to eliminate or reduce the contraction force of the elastic material. To adjust the contraction rate, it is also possible to adjust the rate of pre-stretch of the elastic material when the elastic material is joined to each portion. Further, it is possible to change the properties of elastic material, such as material, number, width, or caliper of the elastic material.

25 While the contraction rate of each portion in the front region 26 is adjusted in the embodiment shown in Figures 1, 2 and 3, the contraction rate of each portion in the back region 28 may be also adjusted if so desired.

As explained above, the contraction rate of the inner side waist portion 9 is less than that 30 of the center waist portion 6. Since the contraction rate of the center waist portion 6 is relatively high, the center waist portion 6 provides stretchability to the waist portion 3. In contrast, since the contraction rate of the inner side waist portion 9 is relatively low, the contracted inner side waist length is close to or the almost same as the stretched inner side waist

length. It preliminarily increases the waist circumference of the diaper 20. Therefore, the center waist portion 6 does not need to be stretched excessively in use. As the result, the contraction force of the center waist portion 6 decreases and the component force toward the crotch from the waist portion also decreases. It helps to improve the sagging problem of the diaper and the flipping-over problem of the center waist portion 6. Further, the contraction rate of the side portion 2 (which corresponds to the low motion zone of wearer's body) longitudinally inboard of the inner side waist portion 9 is greater than that of the inner side waist portion 9. Since the contraction rate of the side portion 2 longitudinally inboard of the inner side waist portion 9 is relatively high, the contraction force in the side portion 2 increases to support the waist portion 3, specifically to support the inner side waist portion 9 in which the contraction force is relatively low. It improves fit performance of the diaper 20. Additionally, when the contraction rate of the outer side waist portion 10 is greater than that of the inner side waist portion 9, the outer side waist portion 10 counteracts the stretching force and prevents the stretching force being directly transmitted to the side seam 32. It prevents the side seam from tearing when the waist portion 3 is extended for application of the diaper 20 to the wearer.

In order to enhance the benefits of the present invention, the contraction rate of the inner side waist portion 9 is less than about 10 %. It may be less than about 5 %, or may be less than about 3 %. The contraction rate of the center waist portion 6 is more than about 40%. It may be more than about 60 %, or may be more than about 80 %. The contraction rate of the side portion 2 longitudinally inboard of the inner side waist portion 9 is more than about 40 %. It may be more than about 60 %, or may be more than about 80 %. The waist portion 3 has a stretched waist length P between the left and right seams 32, and the center waist portion 6 has a stretched center waist length Q. The stretched center waist length Q may be between about 45 % and about 85 % of the stretched waist length P. Each of the left and right inner side waist portion 9 oppositely disposed transversely outboard of the center waist portion 6 has a stretched inner side waist length R. Each of the left and right stretched inner side waist length R may be between 5 % and about 25 % of the stretched waist length P.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numeral values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range

surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm”.

All documents cited in the Detailed Description of the Invention are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

CLAIMS

What is claimed is:

1. A disposable pull-on garment having a longitudinal centerline, a front region, a crotch region, and a back region, the front region and the back region being joined at seams to form a waist opening and leg openings,

the pull-on garment comprising a main portion, a side portion, and a waist portion; the side portion disposed transversely outboard of the main portion; the waist portion comprising a center waist portion, an outer side waist portion, and an inner side waist portion; the center waist portion disposed longitudinally outboard of the main portion; the outer side waist portion disposed longitudinally outboard of the side portion, transversely outboard of the center waist portion, and contiguous with the seam; and the inner side waist portion disposed longitudinally outboard of the side portion, transversely inboard of the outer side waist portion, and transversely outboard of the center waist portion,

the side portion being elasticized to provide elasticity and comprising a side elastic material to contract and gather at least a portion of the side portion,

the waist portion being elasticized to provide elasticity and comprising a waist elastic material to contract and gather at least a portion of the waist portion, wherein

contraction rate of the inner side waist portion is less than that of the center waist portion, and contraction rate of the side portion longitudinally inboard of the inner side waist portion is greater than that of the inner side waist portion.

2. The disposable pull-on garment of Claim 1 wherein the contraction rate of the inner side waist portion is less than about 10 %.
3. The disposable pull-on garment of Claim 2 wherein the contraction rate of the center waist portion is more than about 40 %.

4. The disposable pull-on garment of Claim 3 wherein the contraction rate of the side portion is more than about 40 %.
5. The disposable pull-on garment of Claim 1 wherein the contraction rate of the inner side waist portion is substantially zero.
6. The disposable pull-on garment of Claim 1 wherein the contraction rate of the outer side waist portion is greater than that of the inner side waist portion.
7. The disposable pull-on garment of Claim 1 wherein the waist portion has a stretched waist length between the seams and the center waist portion has a stretched center waist length, and the stretched center waist length is between about 45 % and about 85 % of the stretched waist length.
8. The disposable pull-on garment of Claim 7 wherein the inner side waist portion has a stretched inner side waist length, and the stretched inner side waist length is between about 5 % and about 25 % of the stretched waist length.
9. The disposable pull-on garment of Claim 1 wherein the pull-on garment comprises an absorbent main body and a belt, the absorbent main body comprises waist panels and a crotch panel between the waist panels, the belt comprises a central panel and side panels extending transversely outwardly from the central panel, wherein the main portion comprises the waist panel, the crotch panel, and the central panel; the side portion comprises the side panel; the center waist portion comprises the central panel; and the side waist portion comprises the side panel.

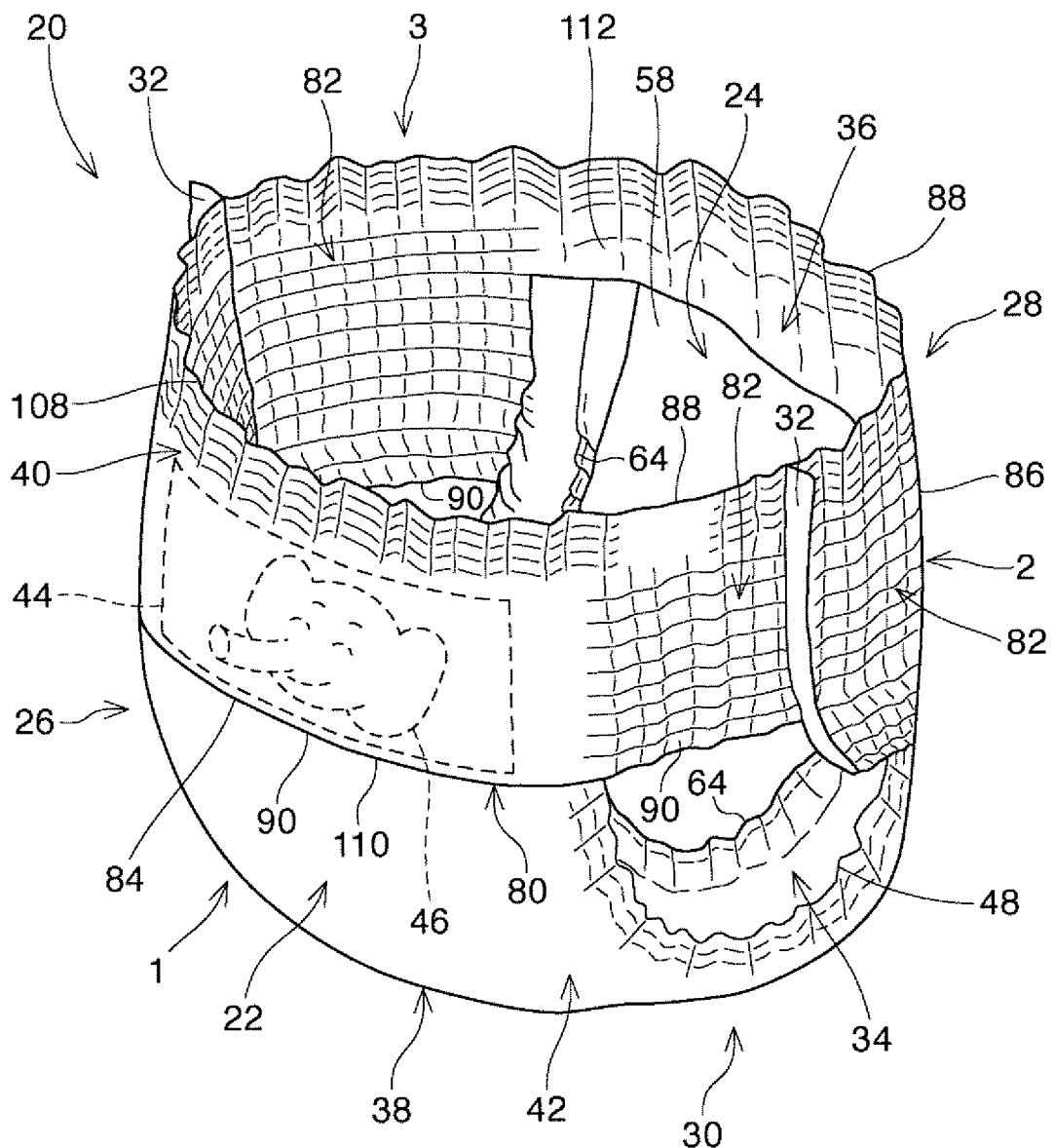


Fig. 1

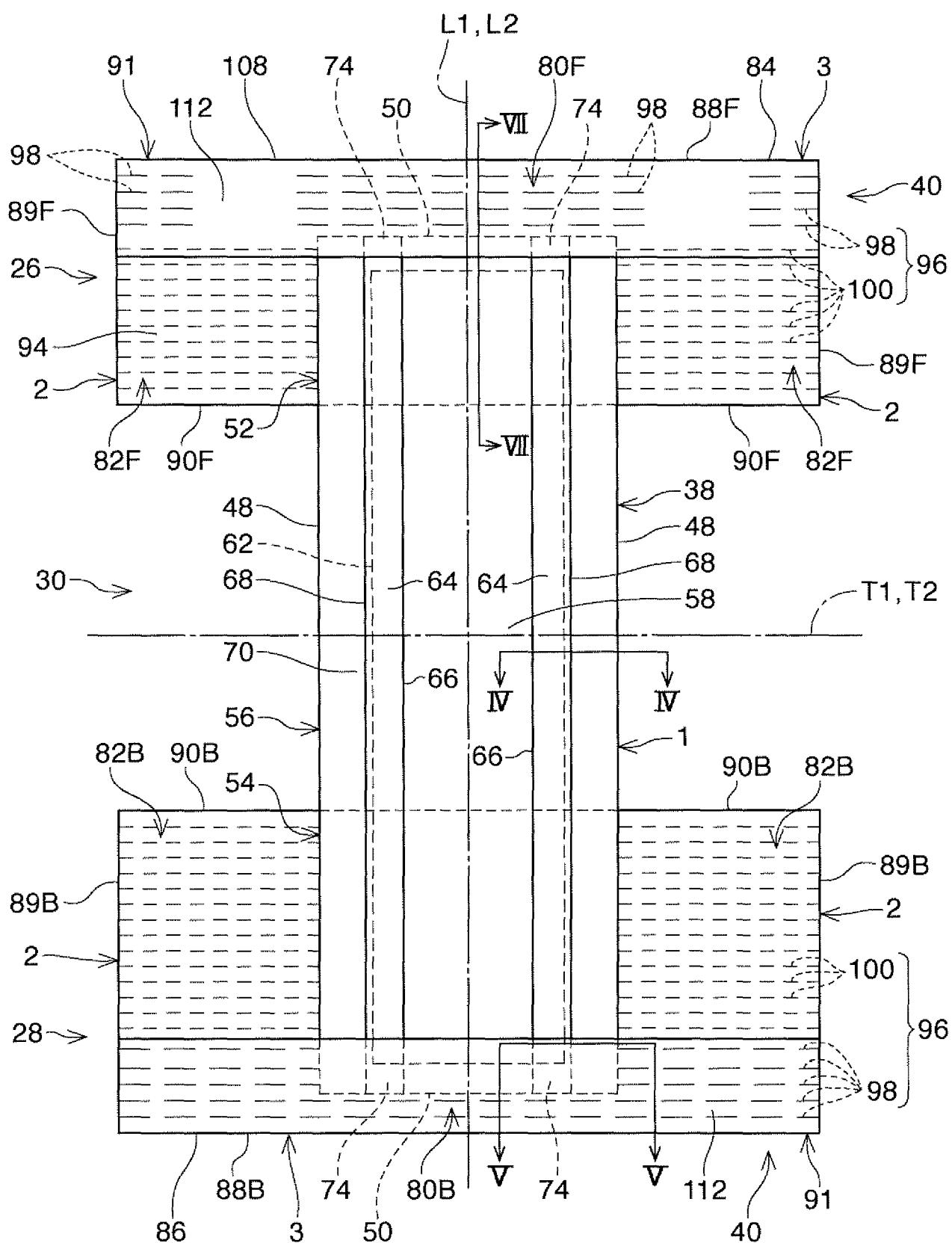


Fig. 2

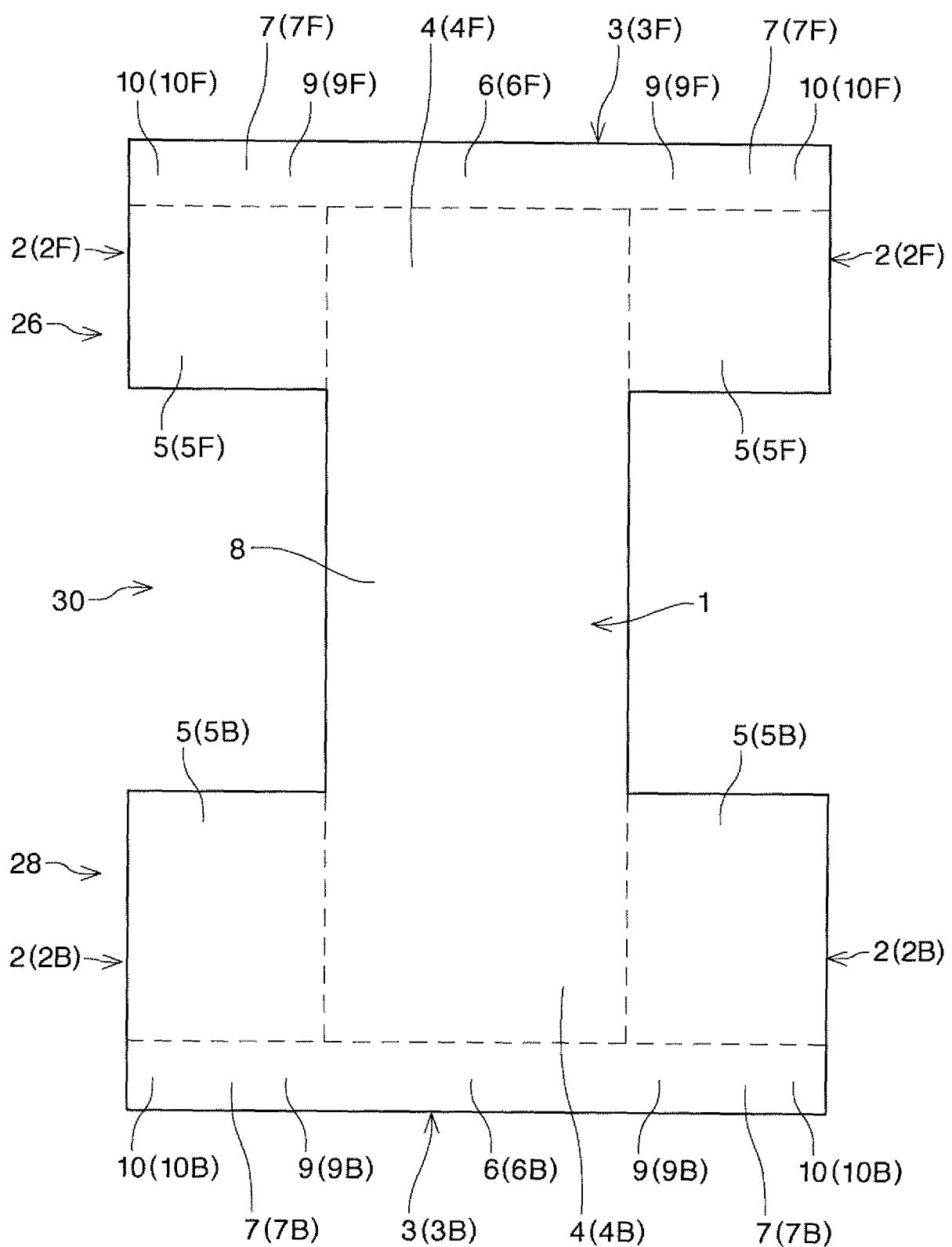


Fig. 3

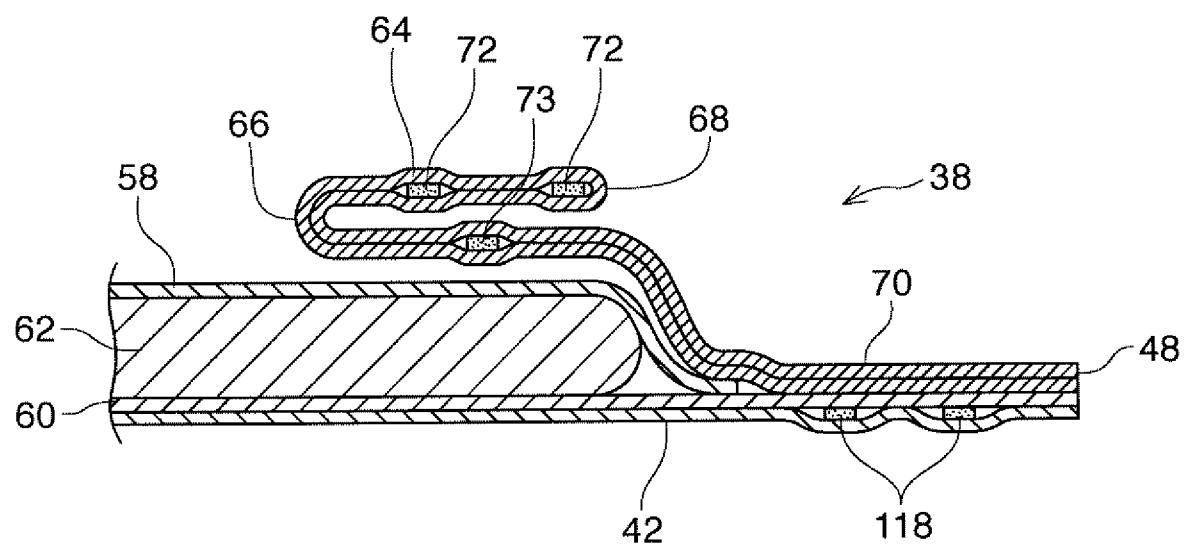


Fig. 4

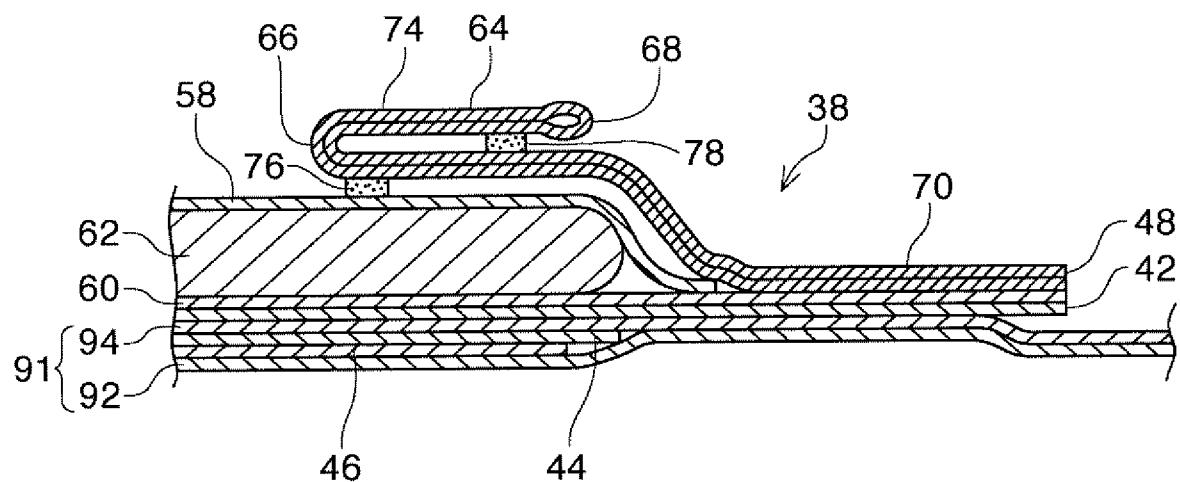


Fig. 5

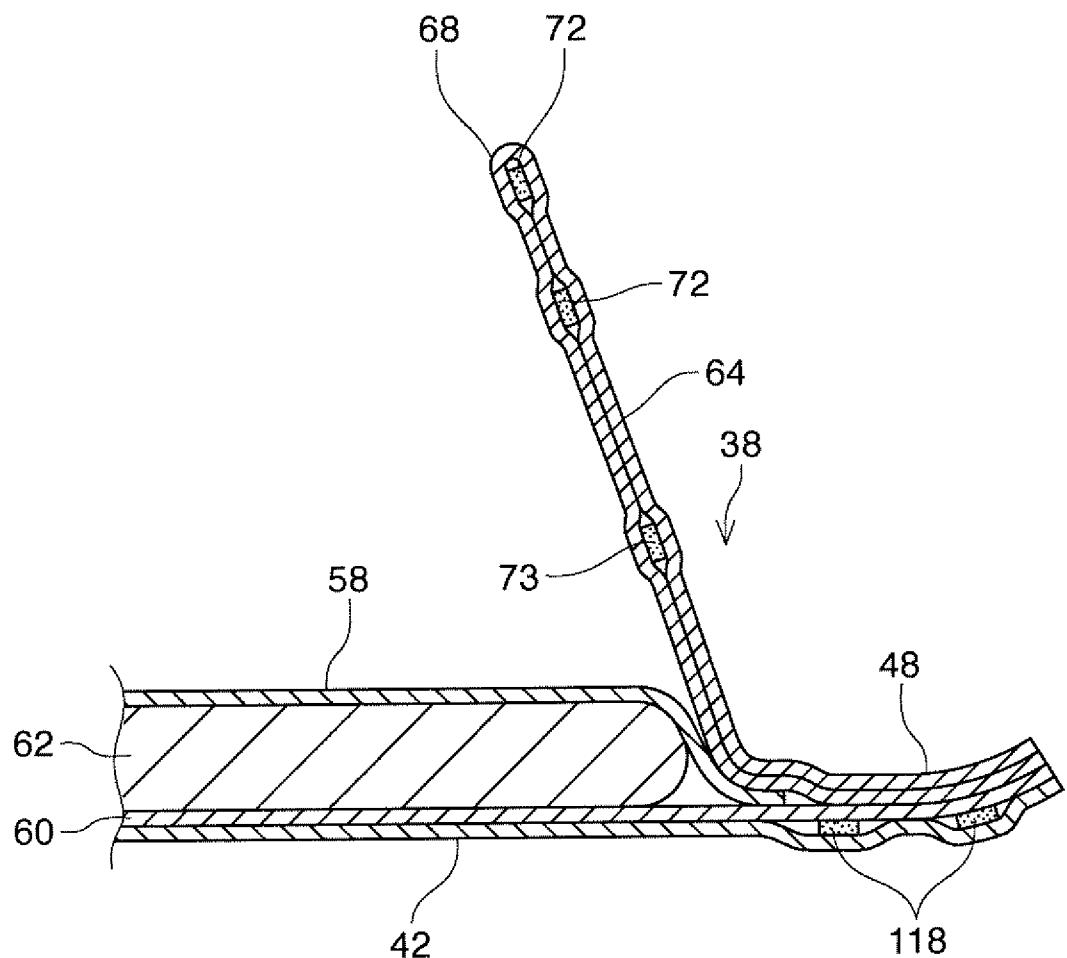


Fig. 6

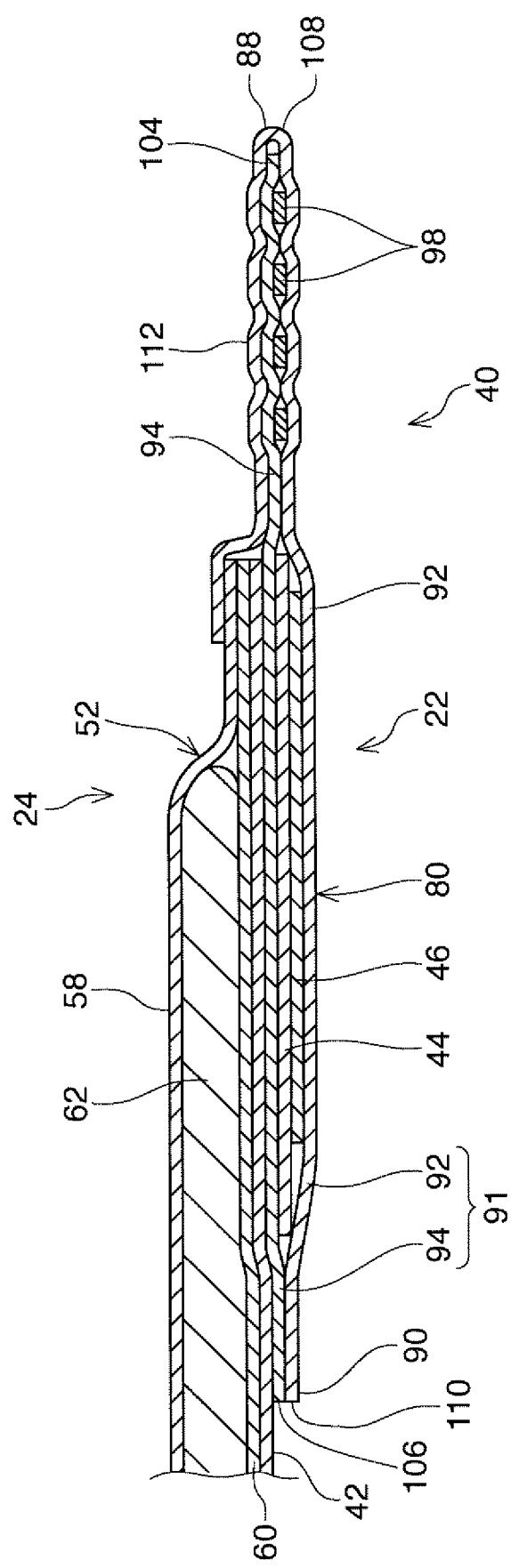


Fig. 7

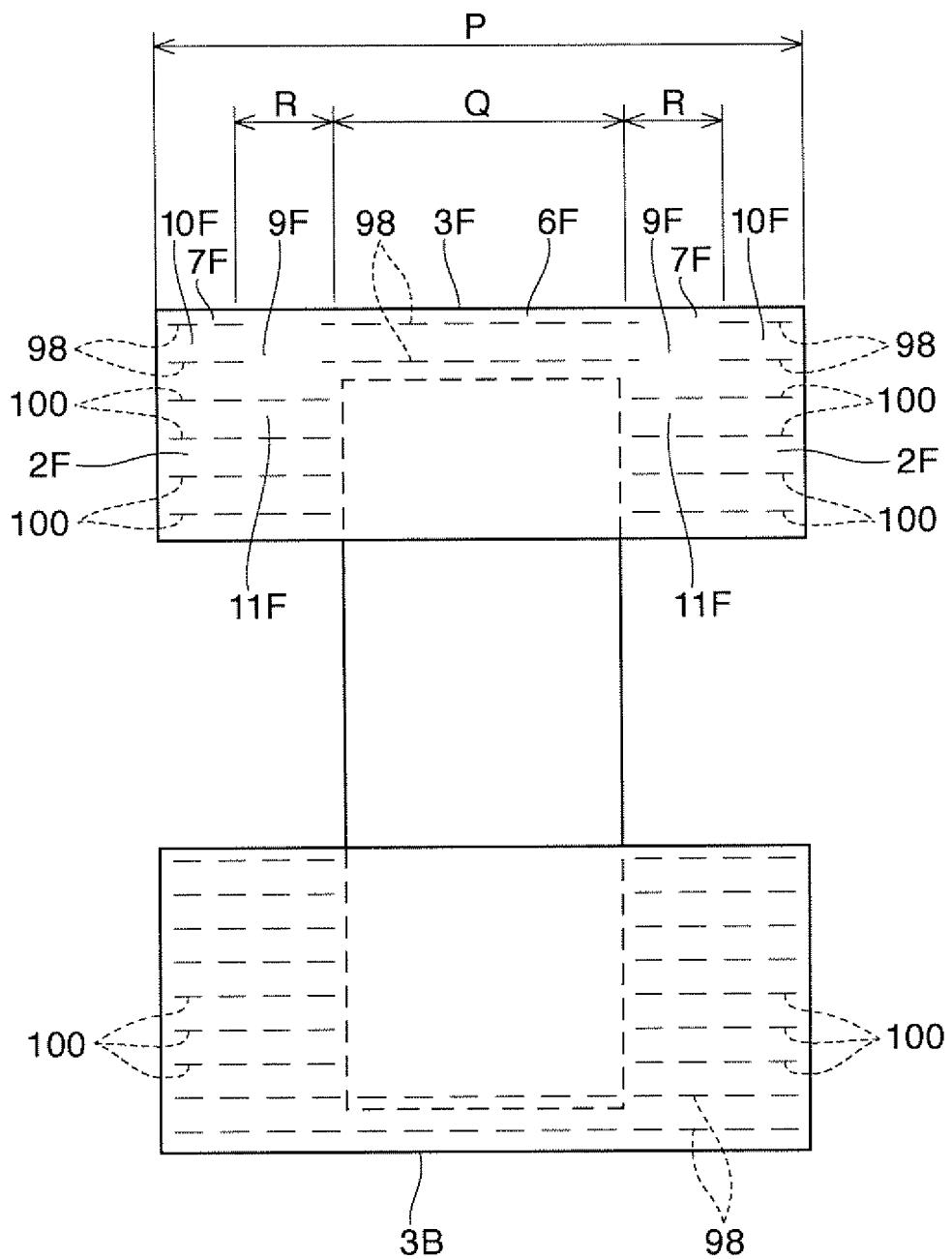


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2007/052246

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61F13/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 688 550 A1 (KIMBERLY CLARK CO [US]) 27 December 1995 (1995-12-27) page 2, line 1 - line 6 page 2, line 20 - line 23 page 3, line 45 - line 57 page 4, line 18 - line 19 page 5, line 15 - line 24 page 5, line 43 - line 47 page 5, line 55 - line 57 ----- US 2005/131373 A1 (WRIGHT ANDREW C [GB] ET AL) 16 June 2005 (2005-06-16) page 1, paragraph 1 page 1, paragraph 11 - page 2 page 2, paragraph 12 page 3, paragraph 29 - paragraph 30 ----- -/--	1-9
X		1-9

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "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)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "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
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "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.
- "&" document member of the same patent family

Date of the actual completion of the international search

19 October 2007

Date of mailing of the international search report

05/11/2007

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Gennari, Silvia

INTERNATIONAL SEARCH REPORT

 International application No
 PCT/IB2007/052246

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/107763 A1 (MATSDA TOSHIYUKI [JP] ET AL) 19 May 2005 (2005-05-19) page 1, paragraph 2 page 1, paragraph 6 page 3, paragraph 32 – paragraph 34 figures 1,2 -----	1-9
X	WO 2004/006817 A (KIMBERLY CLARK CO [US]) 22 January 2004 (2004-01-22) page 1, line 2 – line 5 page 1, line 25 – line 29 page 2, line 3 – line 11 page 7, line 1 – line 5 figures 1-4; table 1 -----	1-9
X	US 5 685 874 A (BUELL KENNETH B [US] ET AL) 11 November 1997 (1997-11-11) column 1, line 4 – line 5 column 5, line 35 – line 40 column 6, line 61 – line 67 column 11, line 34 – line 50 column 12, line 22 – line 43 column 15, line 10 – line 38 -----	1-5,9
A	EP 0 526 868 A (KIMBERLY CLARK CO [US]) 10 February 1993 (1993-02-10) column 1, line 1 – line 20 column 1, line 40 – line 47 column 2, line 55 – line 57 -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

 International application No
PCT/IB2007/052246

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0688550	A1	27-12-1995	AU	686366 B2	05-02-1998
			AU	2184695 A	11-01-1996
			BR	9502927 A	30-01-1996
			CA	2136577 A1	24-12-1995
			DE	69509005 D1	20-05-1999
			DE	69509005 T2	30-09-1999
			ES	2129707 T3	16-06-1999
			FR	2721504 A1	29-12-1995
			GB	2290456 A	03-01-1996
			HK	1014489 A1	20-04-2000
			JP	8000665 A	09-01-1996
			PH	31537 A	03-11-1998
			US	5545158 A	13-08-1996
			ZA	9504886 A	30-01-1996
US 2005131373	A1	16-06-2005	AR	048482 A1	03-05-2006
			AU	2004305438 A1	07-07-2005
			BR	PI0417512 A	06-03-2007
			CA	2550196 A1	07-07-2005
			CN	1905850 A	31-01-2007
			EP	1691752 A1	23-08-2006
			US	2007016155 A1	18-01-2007
			WO	2005060910 A1	07-07-2005
US 2005107763	A1	19-05-2005	NONE		
WO 2004006817	A	22-01-2004	AU	2003248643 A1	02-02-2004
			BR	0312423 A	28-06-2005
			CA	2491309 A1	22-01-2004
			EP	1521563 A1	13-04-2005
			MX	PA05000107 A	08-04-2005
			US	2004010241 A1	15-01-2004
US 5685874	A	11-11-1997	AU	2129497 A	10-09-1997
			BR	9708154 A	27-07-1999
			CA	2247027 A1	28-08-1997
			CN	1216458 A	12-05-1999
			CZ	9802641 A3	17-03-1999
			DE	69709547 D1	14-02-2002
			DE	69709547 T2	14-08-2002
			EP	0886509 A2	30-12-1998
			ES	2167713 T3	16-05-2002
			HK	1016464 A1	08-11-2002
			HU	9901017 A2	28-07-1999
			ID	15981 A	21-08-1997
			JP	3336014 B2	21-10-2002
			JP	11504553 T	27-04-1999
			JP	3507479 B2	15-03-2004
			JP	2002369842 A	24-12-2002
			JP	2003033394 A	04-02-2003
			JP	2004305767 A	04-11-2004
			NO	983836 A	20-10-1998
			TR	9801638 T2	21-12-1998
			WO	9730671 A2	28-08-1997
			US	5931827 A	03-08-1999
			ZA	9701481 A	28-08-1997
EP 0526868	A	10-02-1993	AU	2084292 A	11-02-1993

INTERNATIONAL SEARCH REPORT**Information on patent family members**

International application No PCT/IB2007/052246

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0526868	A	CA 2053105 A1 MX 9204293 A1 ZA 9205016 A	08-02-1993 01-02-1993 28-04-1993