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Disposable garment

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PCT WO 86/02530 A1

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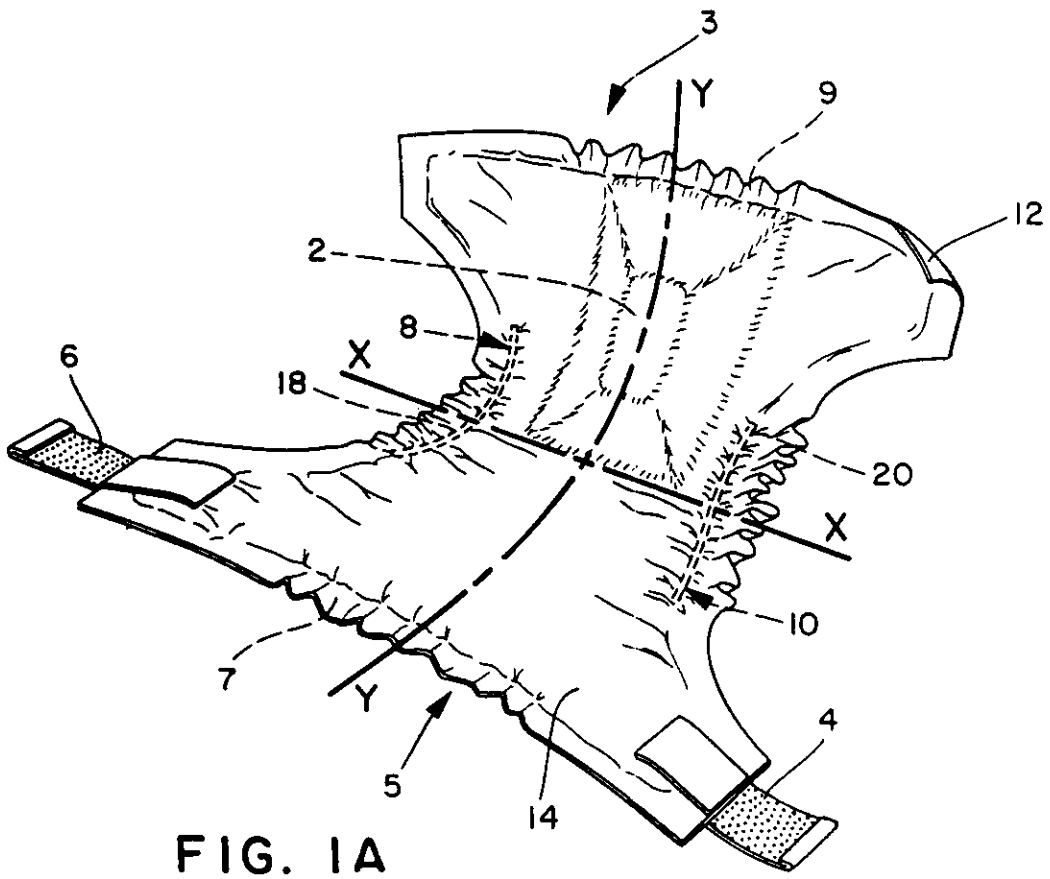
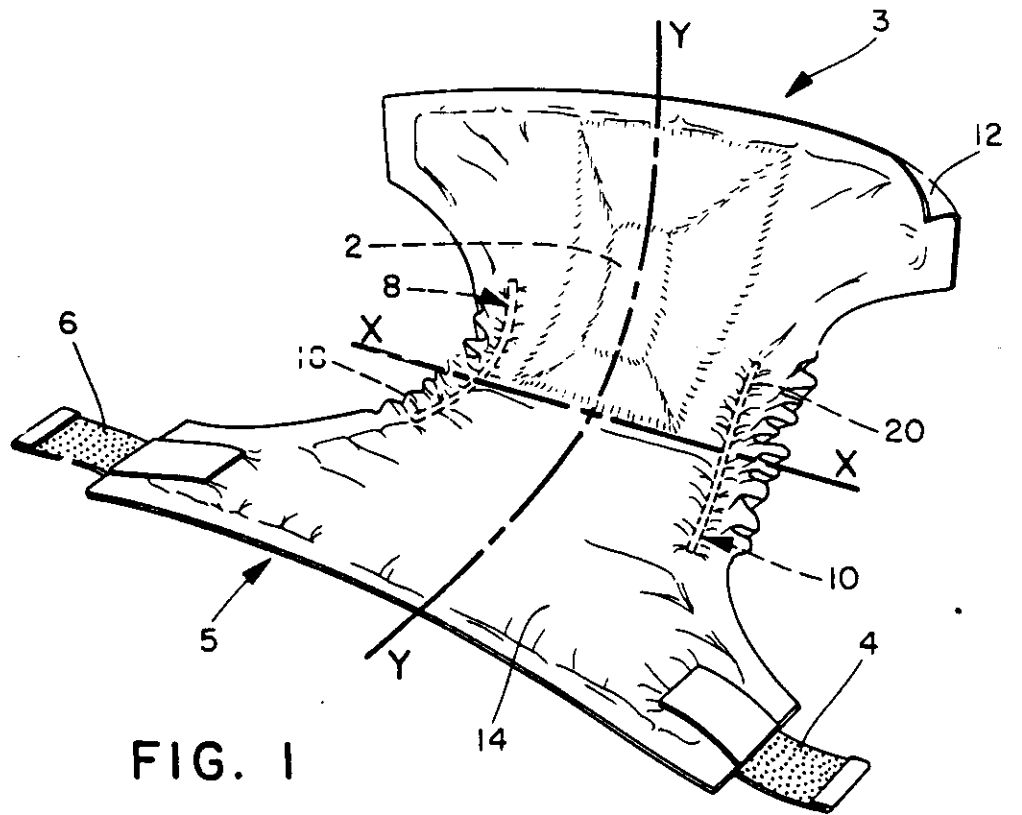
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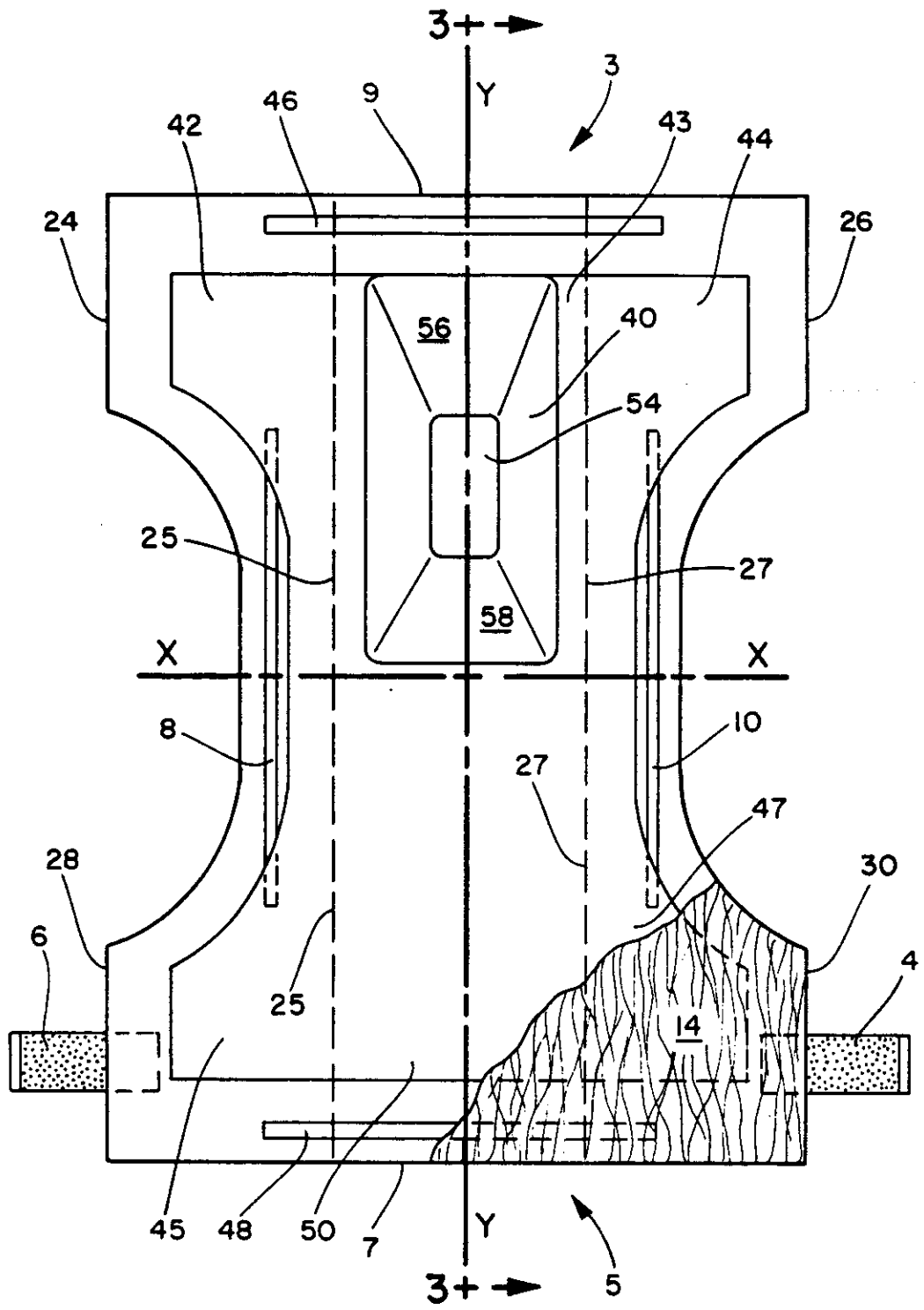


FIG. 2

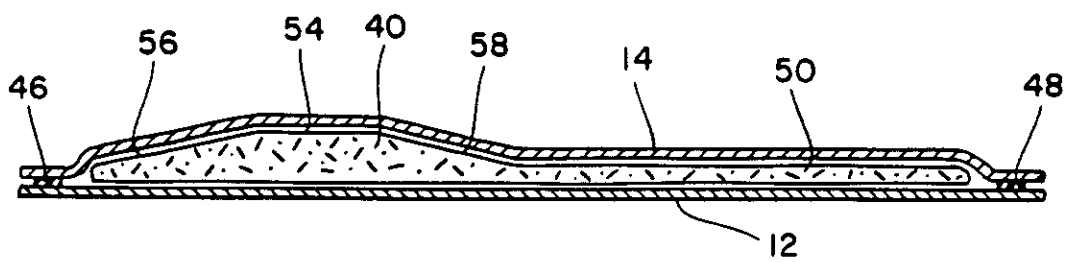


FIG. 3

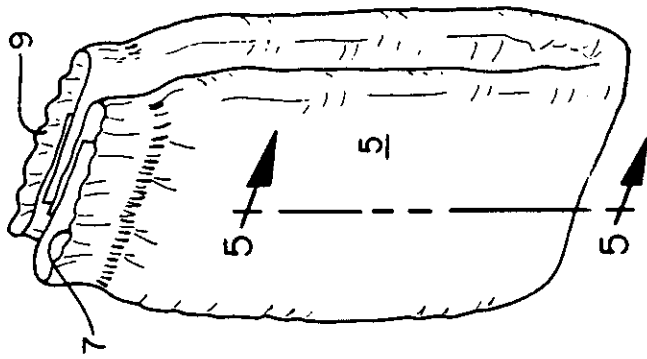


FIG. 4

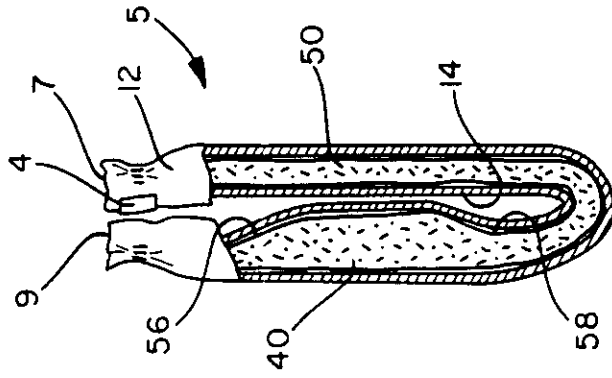


FIG. 5

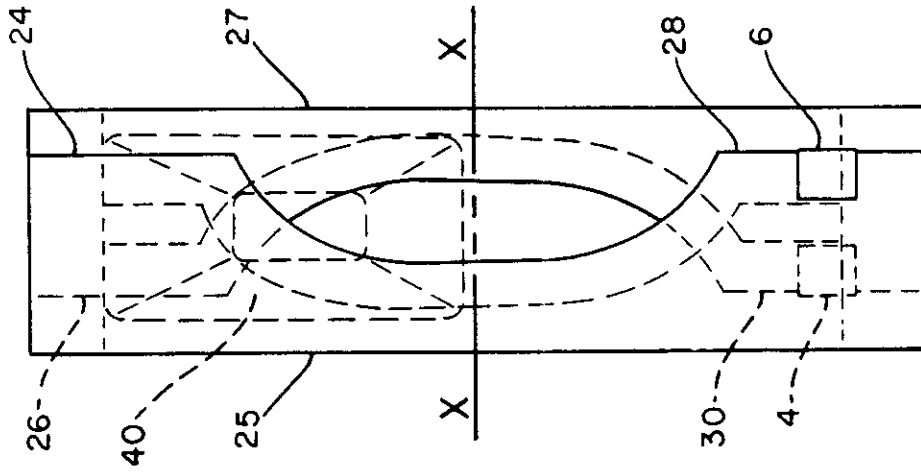


FIG. 6

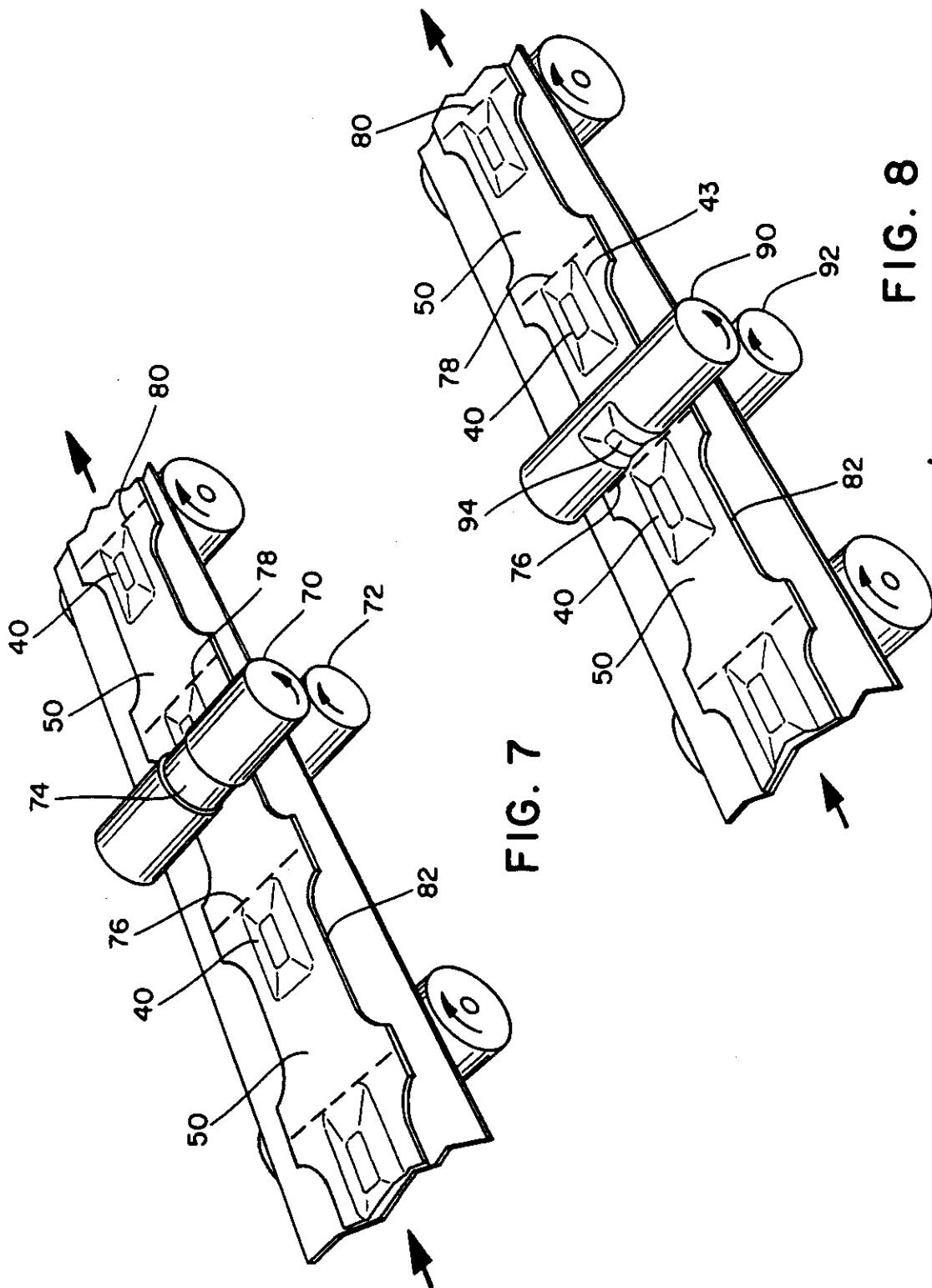
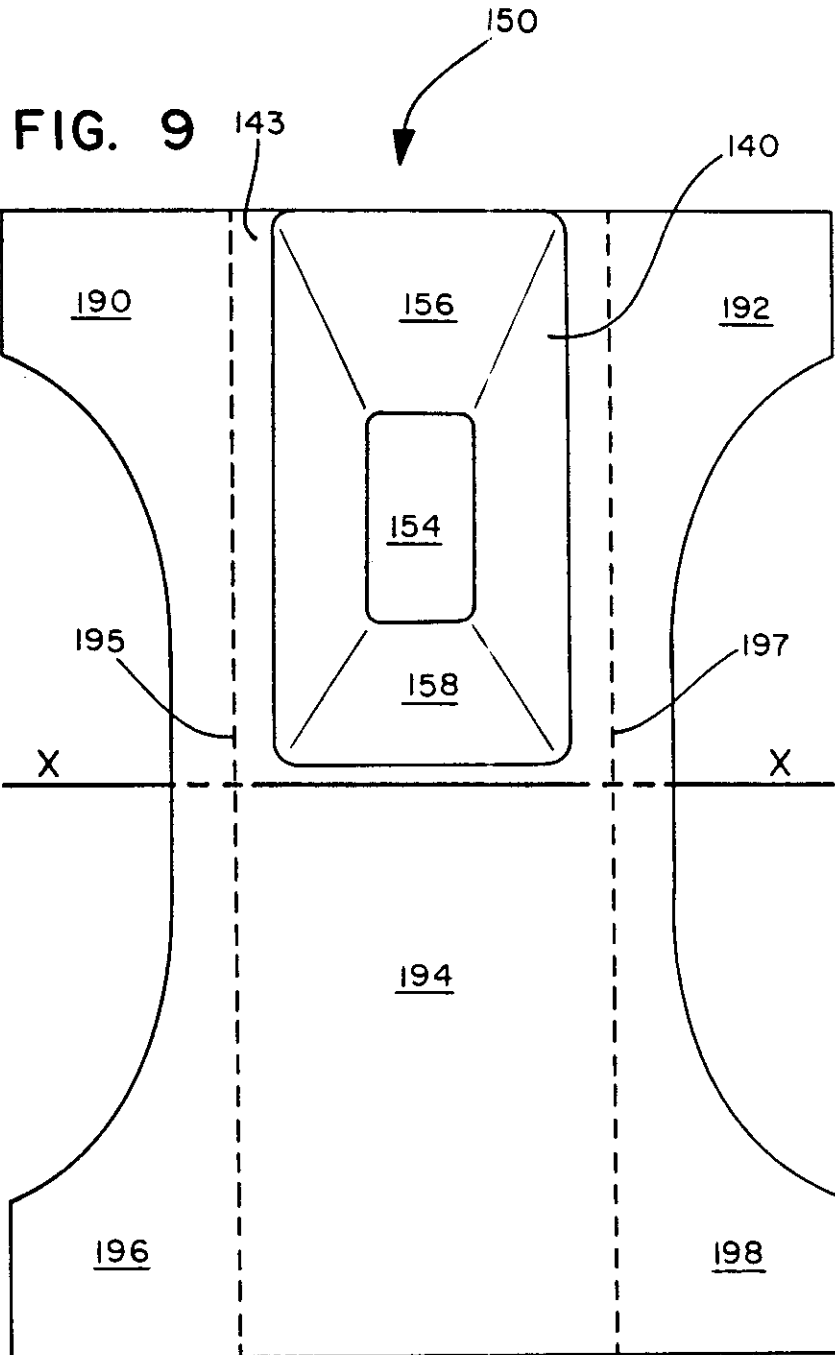


FIG. 7

FIG. 8



DISPOSABLE GARMENT

This disclosure relates to a disposable garment, such as a diaper, having absorbent material positioned to increase absorbent capacity and facilitate folding of the diaper. More particularly, the disclosure  
5 relates to the positioning of additional absorbent material in the front section of the diaper.

Disposable diapers typically have a substantially rectangular absorbent pad and side portions that are folded toward each other; that is, toward the  
10 longitudinal center-line of the diaper and against the pad. However, the fold portions are usually positioned such that the opposing edges of the fold portions do not reach each other, but are spaced apart. Where the fold portions include  
15 pad material, a space between the folded edges having a thickness approximately equal to the thickness of the pad material in the fold portions is formed between the fold portions. In those types of diapers in which the pad is shaped or contoured to form  
20 a narrower central portion to allow space for the wearer's legs, the volume of the void space between the opposite edges of the fold portions increases substantially. In addition to the longitudinal side portions being folded toward each other and  
25 against the central portion of the diaper, for purposes of packaging, the front and rear sections of the diaper are folded into engagement with each other along a transverse line dividing the diaper into front and rear sections. The void spaces  
30 between the longitudinal fold portions in the front section and in the rear section of the diaper are thus combined to form a single larger void space in the fully folded diaper which, to the extent that it is retained after the diaper is placed

in a package, is wasted space. To the extent that the folded diaper is compressed to eliminate the void space, the diaper is distorted to decrease absorbent capacity, to detract from the appearance  
5 of the diaper and create packaging problems when using automatic high-speed packaging equipment. A related folding problem involves the folding of the side portions, including the absorbent material they contain, consistently along a longitudinal  
10 fold line, to provide a uniform width diaper when fully folded. Similar to folding of the front and rear sections of the diaper together, uniform folding of the diaper side portions enhances the appearance of the diaper and minimizes packaging  
15 problems.

Another problem which is common to disposable diapers is the need for increased fluid absorbent capacity. One of the areas of the diaper at which it is particularly important to have a large amount  
20 of absorbent capacity is in the front portion of the diaper because this is the area normally directly wetted by infants and because of the tendency of urine to flow to this area of the diaper when the baby is crawling or sleeping. There have been  
25 a wide variety of suggested solutions for increasing the absorbent capacity of the diaper in general and increasing the absorbent capacity of the diaper in the frontal region in particular. Typical of these is the arrangement illustrated in U.S. Patent  
30 3,926,189. This patent discloses a main pad having an auxiliary portion extending from the main pad at approximately the transverse centerline of the diaper. The auxiliary pad portion may be folded forward to the front area of the diaper when the  
35 baby is in a sleeping position or the diaper is to be worn by a baby boy to thereby gain the increased front absorbent capacity.

It has been disclosed in G.B. 2,127,674A, that a particularly desirable diaper can be formed by placing one or two auxiliary pad(s) into the front of the diaper such that the diaper may be  
5 formed with increased absorbency but nevertheless be still folded in about the same thickness for packaging. However, there remains a need for a diaper with increased absorbency in the front portion that is particularly convenient and low cost to  
10 commercially manufacture.

G.B. 2,127,674A, incorporated by reference herein, discloses a diaper that uses one or two auxiliary pads to make an area of high absorbency in the front of the diaper. It is disclosed therein  
15 that the auxiliary pad(s) is generally a separate piece(s) of absorbent that is placed onto an underlying layer of absorbent to increase the absorbency in the front area while still allowing folding and compact stacking of the diaper. It is also disclosed  
20 therein that the auxiliary pads may be formed as an integral unit. It has now been found that a novel and particularly preferred method of forming a diaper with an entire integral pad is possible with, at least in preferred embodiments, careful  
25 control of the amount of absorbency of the front half of the diaper and particularly the amount of absorbent in the high-absorbency area of the center front panel between the diaper's folds. There is further provided a diaper having a middle  
30 back panel of higher absorbency than the wings (outer thirds) of either the back or front of the diaper. Further, it has been found that the high-absorbency area is suitable for use with an elastic waist diaper for improved performance.

35 Viewed from one broad aspect the present invention provides a disposable garment comprising an impervious backing material, a pervious body side liner, and a one piece absorbent, wherein said absorbent is

provided with a high-absorbency region in a centre front portion of said garment and between 55 and 75 percent of the absorbent capacity of the garment is in a front half thereof.

5 Some embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a perspective view of an embodiment of a disposable diaper,

10 Figure 1A is a perspective view of a diaper having an elastic waist.

Figure 2 is a plan view of a disposable diaper according to an embodiment,

15 Figure 3 is a cross-section along line 3-3 of Figure 2,

Figure 4 is a perspective view of a folded diaper,

20 Figure 5 is a side elevational view of a partial and cross-section on line 5-5 of the diaper in Figure 4,

Figure 6 is a plan view of a diaper after the sides are folded,

25 Figure 7 is a perspective view of a portion of a debulking line for the absorbent pads of an embodiment,

Figure 8 is a perspective view of a portion of apparatus for debulking pads in which the debulking rolls are indented in the area of greater absorbency,

30 Figure 9 is a plan view of the absorbent with panels of absorbency indicated.

With reference to the drawings, the disposable diaper shown in Figures 1 and 1A is in an unfolded condition ready to be fitted to the wearer. The disposable diaper is shown as having a main pad assembly 2 and a pair or waist fastening tapes 4 and 6. As shown in the embodiments of Figures 1 and 1A, the diaper also has leg elastic means 8 and 10 as well as waist elastic 7 and 9 in Figure 1A.

As shown in Figures 1 and 1A, the diaper has a longitudinal centerline Y-Y. The transverse centerline X-X running through the crotch section delineates the front section 3 from the rear section 5 of the diaper. Both fastening tapes 4 and 6 are shown in Figures 1 and 1A in extended condition ready to be attached to the front section 3 of the diaper when it is placed on the wearer. Leg elastic means 8 and 10 comprise lengths of elastic material 18 and 20 attached to the outer cover sheet 12 or the liner sheet 14 or both, and positioned between the cover sheet and the liner sheet substantially parallel to the longitudinal centerline Y-Y of the diaper.

With reference to Figures 2 and 3, the front of the diaper has a thicker high absorbency area 40 centered in the front 3 and extending from the center crotch fold shown by X-X to almost the edge of the front portion of the absorbent pad. The front portion has high basis weight and high-absorbency area 40 in the front center panel 43 of the diaper and lower basis weight hence lower-absorbency areas 42 and 44, forming the less absorbent-containing ears of the diaper which are lapped around the sides of the wearer in use. The diaper as shown has waist elastic 46 in the front of the diaper 3, forming elasticized area 9. The back of the garment has elastic 48 forming elasticized areas 7 when the diaper elastic is in relaxed condition. It is noted that in Figure 2 the diaper is in extended condition. The absorbency of the center panel of the back of the diaper 50 is preferably generally higher than the wings or ears 28 and 30.

The wings or ear portions 42 and 44 in the front and 45 and 47 in the back of the diaper have less absorbency than the center back panel or the center front panel. The center back panel 50 preferably

has less absorbency than the front center panel 43. The fold lines 25 and 27 are the dividing lines for the center panels and ear panels. The center panels 43 and 50 are slightly wider than  
5 a third the width of the diaper. However, the proportion of absorbent is greater in the center panels 43 and 50, both because the absorbent is preferably thicker there and because the width  
10 of the absorbent in the ears 42, 44, 45 and 47 is much less than that in the middle section of the diaper as the absorbent does not extend to the edge of the diaper. The diaper may be considered as having six sections or panels. The front of the garment or diaper 3 has a center high absorbency  
15 panel 43, and two wings or ears 24 and 26. The garment back 5 has center back panel 50 of greater absorbency than the wings 28 and 30. As used herein, the back of the garment is the portion that is worn on the back of the wearer and the front of  
20 the garment is the portion worn on the front of the wearer. It is noted that the high-absorbency area 40 of front panel 43 has a centered portion 54 of greatest thickness with gradually raising areas 56 and 58. The illustration of Figure 2  
25 further shows the fold lines 25 and 27 that are utilized to fold the ear portions of the diaper 24 and 26 over the less thick portions of the high-absorbency area 40. The back ear portions 28 and 30 also are folded simultaneously at this time  
30 along the fold lines 25 and 27.

Figure 6 illustrates the diaper after the ears 24, 26, 28 and 30 have been folded. It is noted that the diaper tapes 4 and 6 are in their closed portions when the diaper is folded. Also  
35 shown is the outline of the higher absorbent portion 40 of the diaper.

Figures 4 and 5 illustrate the completely folded garment as it would be folded for packaging. In the cross-sectional view of Figure 5 it is seen that the high-absorbency area 40 is adapted to be placed between the folded absorbent portions of ears 26 and 24 so as to form a compact package.

As is illustrated in Figures 7 and 8 the absorbent member 50 is formed on an air-former that has an indentation allowing the build up of a larger portion of fluff in the area 40 of the front panel 43 where the high-absorbent area is to be formed. The center back panel is preferably formed with a higher absorbency than the wings. The absorbent 50 after leaving the former (not shown) is passed onto a belt where debulking compression rolls 70 and 72 compress the material to provide it with more strength and to debulk it for easier handling in the diaper. The formation of air formed fibrous panels of varying thickness are known in the art. Typical of such formation techniques are those of U.S. 4,005,957, U.S. 4,016,628 and U.S. 4,388,056. The formation may be carried out by any desired technique. It is noted that the roll 70 has an area 74 that is slightly indented in the area where the high-absorbency material is located. This offset or indentation is a relatively small deviation from the surface level of the roll generally being only 0.1 inch (0.25cm). The pile of fluff from the high-absorbency area is 2 inches (5.08cm) prior to compression. Distance between the debulking rolls 70 and 72 is 0.15 inches (0.38cm) in the offset areas and 0.05 inches (0.13cm) in the remainder of the rolls. After compression the connected pieces of absorbent are severed at lines 76, 78, and 80, and assembled into the diaper in a conventional manner. It is

noted that the leg cutouts 82 may be formed either prior to compression or they may be cut out after compression if the pad is not formed initially in the shape of the absorbent pad desired. In Figure 5 8 a similar system is illustrated except that the debulking rolls 90 and 92 are provided with a cavity 94 that corresponds to the high-absorbency areas. The use of the roll that has the indentations is preferred for diaper optimum performance. The depth 10 of the indentations or cavities below the roll surface is preferred to be 0.1 inch (0.25cm) for the best combination of compact folded diaper and good absorbency. The distance between the rolls 90 and 92 in other areas is 0.05 inches (0.13cm). However, the performance 15 with the uniform centered roll has been found to be almost as good and the processing is much simpler as the roll does not need to be calibrated closely with the fluff being carried beneath it.

As is illustrated in Figure 9 the absorbent 20 pad 150 having the highest-absorbency area 140 in front center panel 143 is composed of the area of greater absorbency 154 with gradient areas 156 and 158 blending into the lower-absorbent areas that will be the ears 190 and 192 of the front, and also 25 blending into the lesser absorbency back portions 194, 196 and 198. The fold lines will be at areas 195 and 197, with the crotch fold along line X-X. The back of pad 150 is made up of a higher absorbency center panel area 194 and lower absorbency areas 30 196 and 198.

The amount of the diaper absorbent in the front half of the garment is between 55 and 75 percent. It is generally preferred that the high-absorbency area, i.e. the front centre panel, has between 30 35 percent and 50 percent of the total absorbency of the diaper. It is particularly preferred that the

amount of absorbent in the high-absorbency area be about 40 for best performance, particularly in a diaper intended for nighttime use. The preferred amount of absorbent in the center back panel is between 20 and 5 30 percent of the diaper's total for best absorbency and folding. The garment's ears each have between 5 and 10 percent of the total wood fluff for good fit and folding.

The preferred amount of extra absorbency gives 10 an amount of 35 percent of the total absorbent in the back of the diaper, and 65 percent of the total absorbent in the front, with the absorbent in the front preferably divided such that of the 65 percent in the front, 50 percent is in the center front panel extra-absorbency 15 area and 15 percent as the combined total of the front wings.

The integral pad with extra-absorbency area is suitable for use as the absorbent in a diaper that has no elastic, a diaper that has elastic legs, or 20 a diaper that has elastic legs and also an elasticized waist. It is particularly suitable for a diaper with an elasticized waist and legs as it offers absorbency in the front area for absorption of liquid that is contained by the elastic waist when the wearers are 25 sleeping on their stomachs.

The preferred material for the absorbent of the garment is fluff that is divellicated wood pulp. Generally it is preferred that the height or thickness of the area of high absorbency be between .5 (1.27cm) and 30 .8 inch (2.03cm) after debulking, with the ears of the front of the diaper and the back of the diaper having a height of .2 to .5 inch. (0.51 to 1.27cm). It is quite surprising that the extra absorbency can be so effective with only the small .3 to .6 inch (0.76

to 1.52cm) difference in height between the lesser absorbent wings and the extra absorbent front center panel areas after debulking. The larger size differences would be in the large toddler size diapers.

5           The length of the higher absorbency area within the center front panel is generally between 9 and 5.5 inches (22.86 to 13.97cm), with the larger length being in the toddler size diaper and the small in the newborn diaper. The preferred width of the  
10 extra absorbency area with the center front panel is 2.5 to 4.5 inches (6.35 to 11.43cm). However, it should be noted that the width of the extra absorbency area is dependent on the fold lines of the particular diaper. The high absorbency area preferably is  
15 less than the width between the fold lines in order to result in a compact folded diaper. The width of the center panel is generally between 4 and 5 inches (10.16 and 12.7 cm). The total weight of absorbent devalicated cellulose fluff in a newborn  
20 size diaper generally is 30 grams dry weight. The weight of wood fluff absorbent in a medium diaper typically is 45 grams dry weight and the dry weight in a toddler is typically 57 grams. As discussed below, an equivalent amount of absorptive capacity  
25 could be achieved using other materials that would have a different dry weight of absorptive material.

          The wood fluff may be formed by a vacuum on a forming drum with vacuum of about 25 inches (63.5cm) of water. The screen on the forming drum is indented  
30 to form the thicker areas where desired. Depth of fluff in the extra absorbency area is generally between 1 1/2 and 2 1/2 inches (3.81 and 6.35cm) prior to compaction. The depth in the other areas prior to compression by the debulking rolls is between

1/2 and 3/4 inch (1.27 and 1.9cm). It is preferred that the height of fluff in the extra absorbency area be between 1 3/4 and 2 inches (4.44cm and 5.08cm) prior to debulking for best high absorbency and  
5 good fit.

While the highest absorption area in the center front has been described as thicker and containing more absorbent wood fiber, it is possible that the higher zones of absorbency could also alternatively  
10 be formed by use of zoned superabsorbent materials. Such a diaper could have a proportionally thinner pad and a lower weight of wood pulp fluff or could have a single thickness pad but be provided in the front center panel and to a lesser degree in the  
15 rear center panel with superabsorbent material to increase the absorbency in those areas without the absorbent being significantly thicker. Typical of superabsorbent materials are water insoluble hydrocolloidal particles derived from starches that  
20 will swell but not dissolve when exposed to water. Other superabsorbents are formed from hydrolyzed cross-linked polyacrylates, polyacrylamides, polymers of acrylic polymers and salts and copolymers thereof. While the term "weight of absorbent" and "amount  
25 of absorbency" may be used as equivalents for the wood fiber absorbent, this is not true for superabsorbent containing articles. The dry weight, and liquid holding ability for superabsorbent containing materials are not equivalents when part of the  
30 absorbency of the garment is the result of the superabsorbent that absorbs a greater amount of liquid for the same dry weight than does wood fluff.

As illustrated above, the embodiments described provide a desirable diaper with a high-absorbency  
35 area that has an ease of formation, good appearance, and folding properties. While specific embodiments

have been described, it is evident that many alternatives, modifications in variations should be apparent to those skilled in the art in light of the foregoing description. For instance while infant diapers  
5 have been described the disclosure relates generally to incontinent garments.

The diaper disclosed has numerous advantages over prior diapers. The embodiments described allow the formation of a diaper having an area  
10 of high absorbency that to the casual observer or user does not appear to be undesirably thick and heavy in one area. The diaper may be folded flat for convenient packaging and storage without wasting large volumes of space. The diaper is  
15 less subject to leakage than previous diapers. The diaper is low in cost to form as the absorbent may be formed in a single step much as previous absorbent pads of diapers without high-absorption areas were formed.

20 Thus, at least in preferred forms there is provided an optimum distribution of absorbent in a disposable garment such that the absorbent will be utilized effectively by the wearer but not provide a bulky garment. Furthermore there is provided  
25 a low cost method of forming a disposable garment having a high absorbency region, and an absorbent disposable garment that has minimum leakage and maximum use of absorbent.

CLAIMS:

1. A disposable garment comprising an impervious backing material, a pervious body side liner, and a one piece absorbent, wherein said absorbent is provided with a high-absorbency region in a centre front portion of said garment and between 55 and 75 percent of the absorbent capacity of the garment is in a front half thereof.
2. A garment according to claim 1 wherein 65 percent of the absorbent capacity is in the front half.
3. A garment according to claim 1 or 2 wherein said garment is divided into six panels by folds, the front of the garment being divided into a front center panel and two side ears, the back being divided into a back center panel and two side ears.
4. A garment according to claim 3, wherein said absorbent is arranged such that 30 to 50 percent of the absorbency of said absorbent is in the front center panel of the garment.
5. A garment according to claim 3 or 4 wherein between 10 percent and 20 percent of total absorbency is in the front ears of said garment either side of said center front panel.
6. A garment according to claim 5 wherein each of the four ears of the garment has between 5 and up to 10 percent of the absorbency of said garment.
7. A garment according to any of claims 3 to 6 wherein between 20 and 30% of said absorbent is in the center panel of the back of said garment.

8. A garment according to any preceding claim, wherein said absorbent is wood fluff having a thickness between 1.27cm and 2.03cm in said high absorbency region.

5

9. A garment according to claim 8 wherein said absorbent has a thickness between 0.51cm and 1.27cm thick in the remainder of said garment with a height difference between the ears of said garment and said center front panel of between 0.76cm and 1.52 cm.

10. A garment according to claim 9 wherein said absorbent is formed as an integral layer of devalicated wood fluff that is compressed to between 1.27cm and 2.03cm thick along the centerline and between 0.51cm and 1.27cm thick along the edges.

11. A garment according to any preceding claim wherein said high-absorbency region is formed by compression of a pile of vacuum formed fluff 5.08cm in height prior to compression.

12. A garment according to any preceding claim wherein said high absorbency region is created utilizing superabsorbents.

13. A garment according to any preceding claim wherein said high-absorbency region has a length of between 22.86cm and 13.97cm and a width of between 10.16cm and 12.7cm.

14. An absorbent garment comprising an impervious backing, a permeable body side lining and an absorbent between said impervious backing and said body side lining, said garment being divided into six panels

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by folds, the front of the garment being divided into a front center panel and two side ears and the back of the garment being divided into a back center panel and two side ears, the absorbent being  
5 arranged such that between 55 and 75% of the total absorbent capacity of the absorbent is in said front of the garment.

15. A garment according to claim 14, wherein  
10 65 percent of the total absorbent capacity of the garment is in said front and 35 percent in said back.

16. An absorbent garment comprising an impervious backing, a permeable body side lining and an absorbent  
15 between said impervious backing and said body side lining, said garment being divided into six panels by folds, the front of the garment being divided into a front center panel and two side ears, and the back of the garment being divided into a back  
20 center panel and two side ears, wherein said back and front ears have between 20 and 40 percent of the absorbency of said garment, said front center panel has between 30 and 50 percent of said absorbency of said garment and said back center panel has between  
25 20 and 30 percent of said absorbency, wherein between 55 percent and 75 percent of the total absorbency is in the front of the diaper.

17. A garment according to claim 16 wherein between  
30 10 percent and 20 percent of total absorbency is in the ears on the front of said garment outside of said center front panel high-absorbency region.

18. A garment according to any claims 14 to 17 wherein said absorbent is wood fluff between 1.27cm and 2.03cm thick in said center front panel and between 0.51cm and 1.27cm thick in the remainder  
5 of said garment with a height difference between the fluff in the ears of said garment and said center front panel of between 0.76cm and 1.52cm.
19. A garment according to any of claims 14 to  
10 18 wherein said front center panel has a length of between 22.86cm and 13.97cm and a width of between 10.16cm and 12.7cm.
20. A garment according to any of claims 14 to  
15 19 wherein said center front panel comprises super-absorbent.
21. A garment according to any preceding claim wherein said garment further comprises an elasticized  
20 waist.
22. A garment according to any preceding claim wherein said garment is a diaper.
- 25 23. A garment substantially as hereinbefore described with reference to the accompanying drawings.
-

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Title DISPOSABLE GARMENT

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\*\*\*\* END OF REGISTER ENTRY \*\*\*\*

RENEWAL DETAILS

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