United States Patent

Torr

[15] **3,638,651**

[45] **Feb. 1, 1972**

[54] DIAPERS

[72] Inventor: **David Torr,** Oyster Bay, N.Y.

[73] Assignee: **Georgia-Pacific Corporation,** Stamford, Conn.

[22] Filed: **Oct. 8, 1969**

[21] Appl. No.: **864,836**

[52] **U.S. Cl.** **128/284,** 206/57

[51] **Int. Cl.** **A61f 13/16**

[58] **Field of Search** 206/57; 128/284, 286, 287

[56] **References Cited**

UNITED STATES PATENTS

2,649,858	8/1953	Le Bolt	128/284
2,714,889	8/1955	Chambers	128/284 X
3,049,228	8/1962	Burnett	128/284 X
3,180,335	4/1965	Duncan et al	128/287
3,196,874	7/1965	Hrubecky	128/287

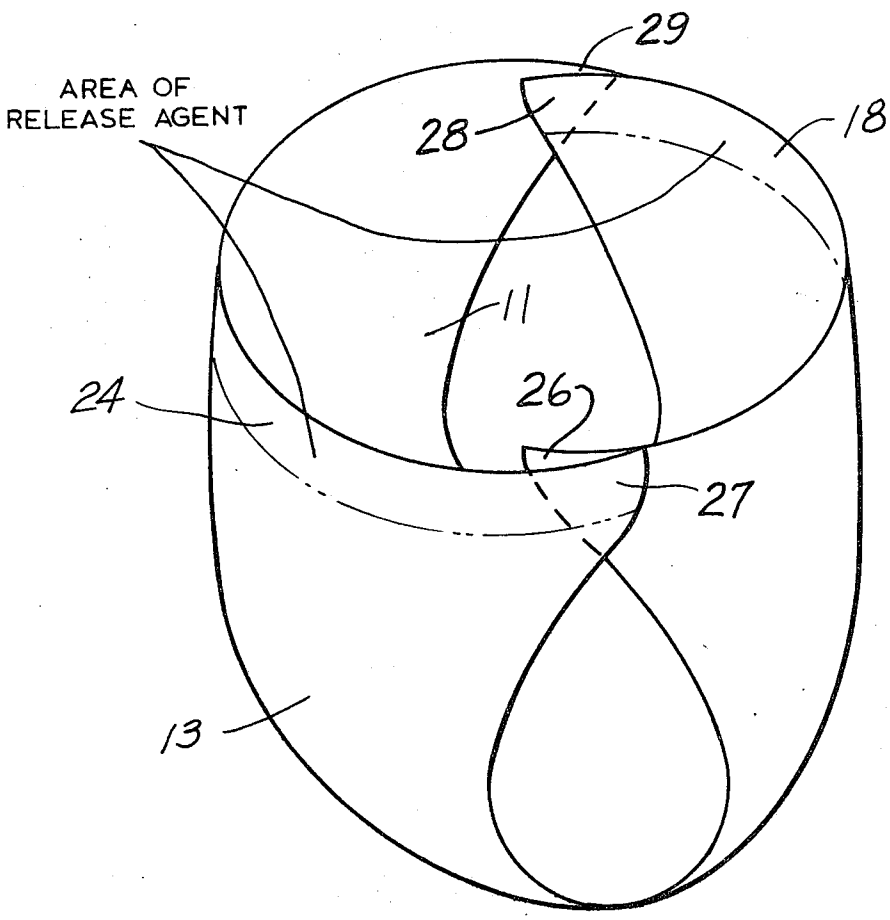
Primary Examiner—Charles F. Rosenbaum

Attorney—Harold J. Birch, John R. Swindler, Edward F. McKee, Jr., William W. Beckett, Dale H. Hoschert, George P. Edgell, Gene W. Stockman and Gerald L. Lett

[57] **ABSTRACT**

Disposable diapers, to be used without pins, which have a pressure-sensitive adhesive area at at least one corner at each side of the diaper and have surface layers of release agent which are in contact with the adhesive areas when the diapers are packed in a carton.

15 Claims, 37 Drawing Figures



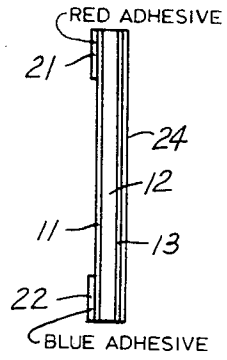


FIG. 3

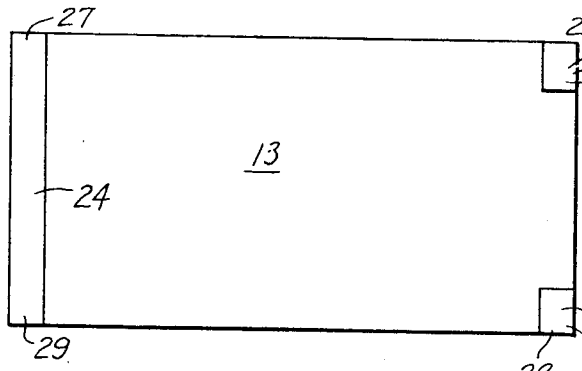


FIG. 1

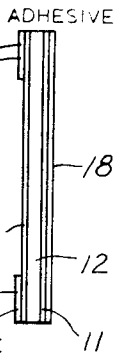


FIG. 2

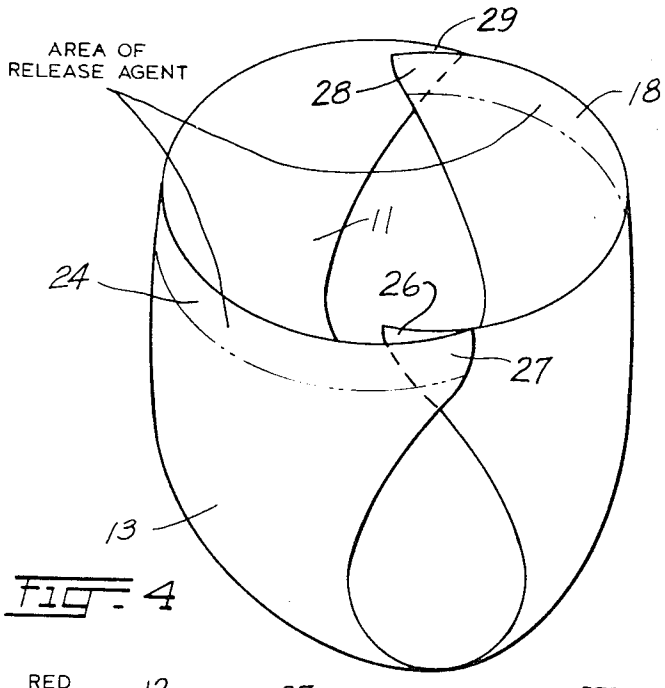


FIG. 4

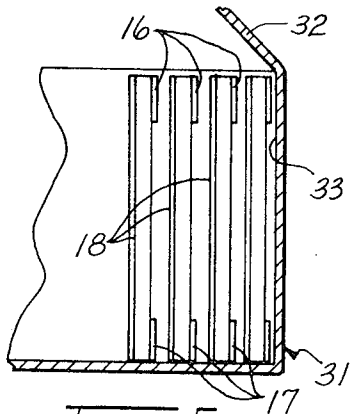


FIG. 5

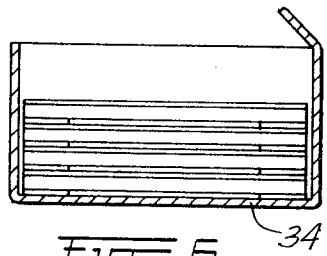


FIG. 6

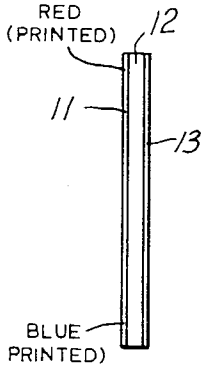


FIG. 9

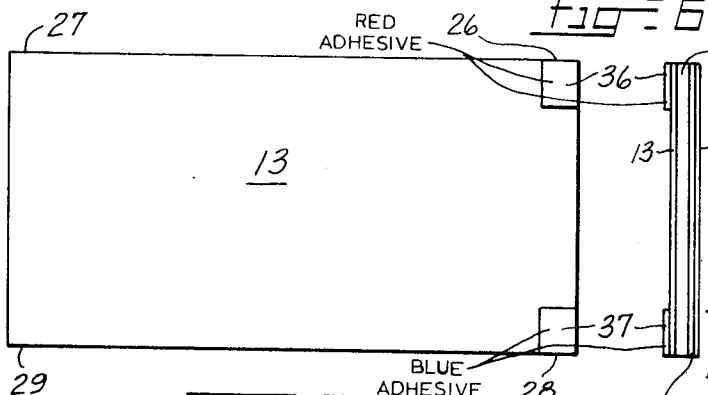


FIG. 7

FIG. 8

INVENTOR.
DAVID TORR
BY
Abner Shaffer

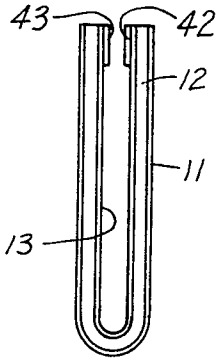


FIG. 10

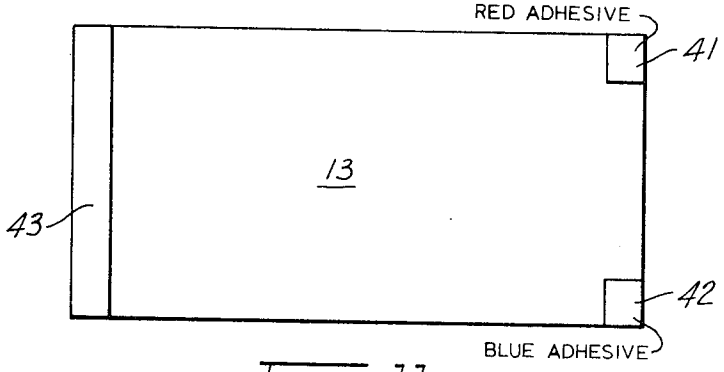


FIG. 11

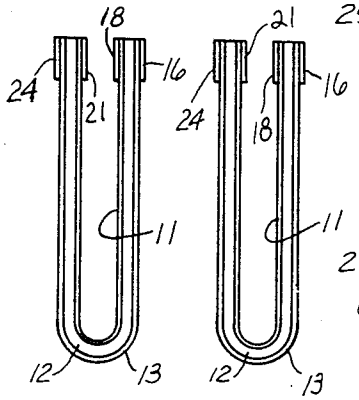


FIG. 13

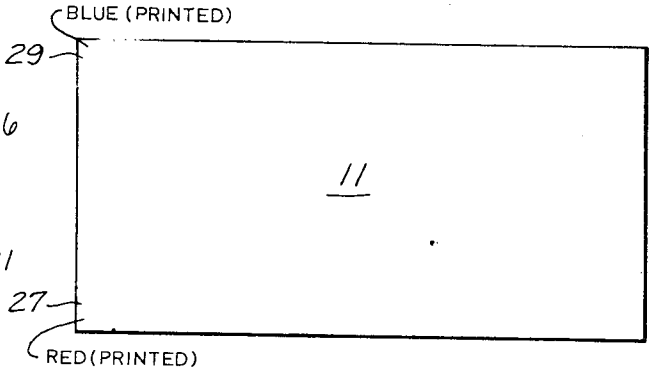


FIG. 12

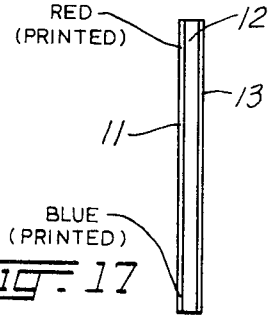


FIG. 17

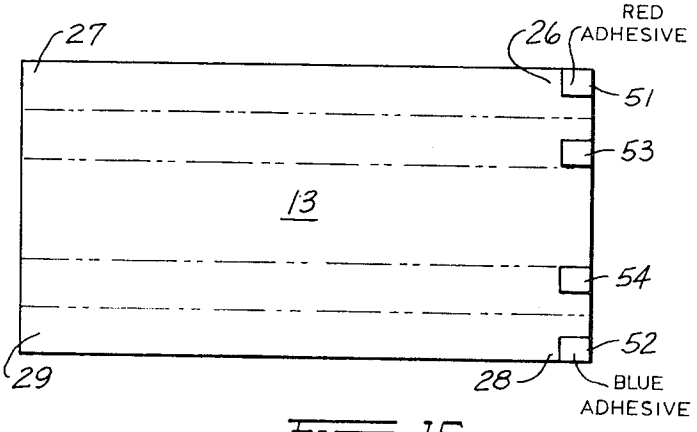


FIG. 16

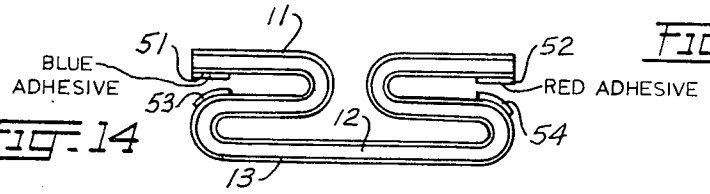


FIG. 14

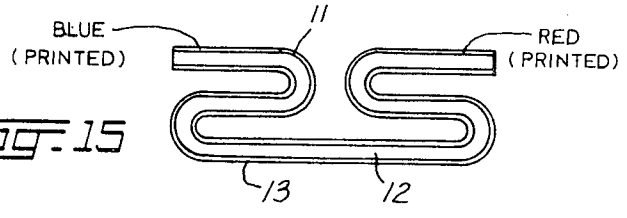


FIG. 15

INVENTOR.
DAVID TORR
BY
Abner & Shaffer

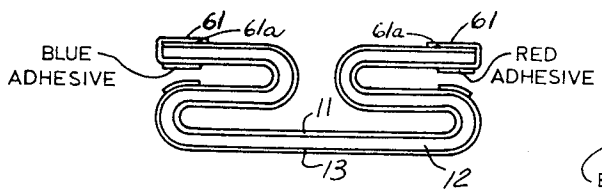


Fig. 18

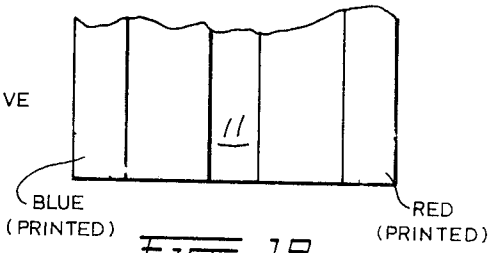


Fig. 19

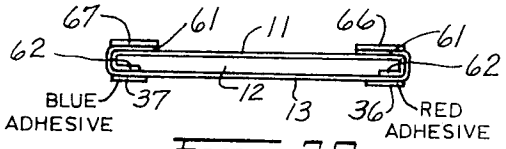


Fig. 20

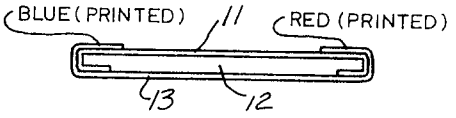


Fig. 21

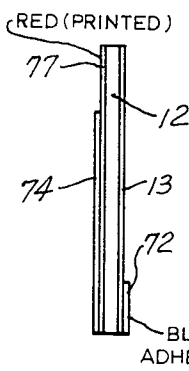


Fig. 24

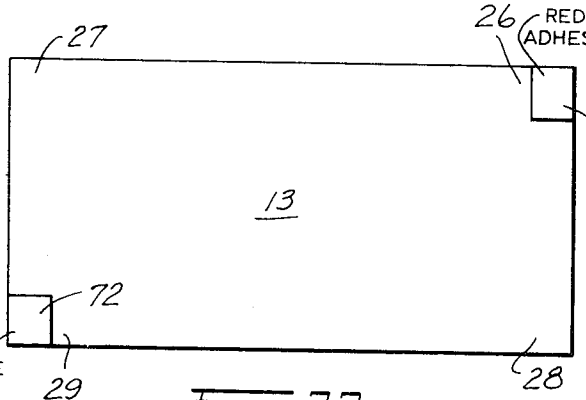


Fig. 22

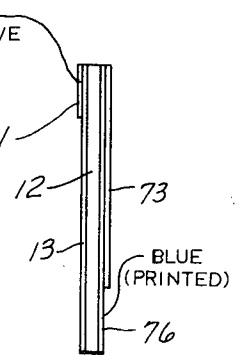


Fig. 23

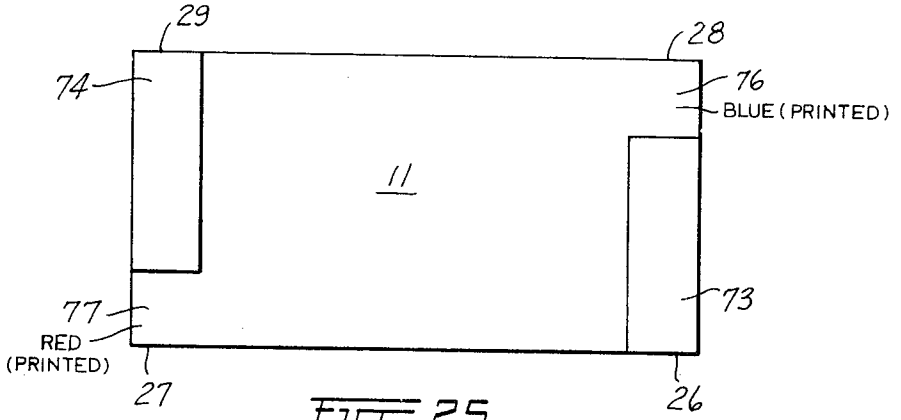


Fig. 25

INVENTOR.
DAVID TORR

BY

Albert Shaffer

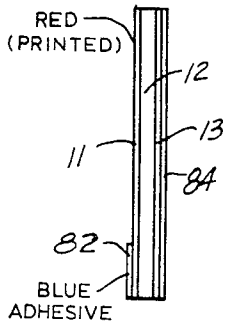


FIG. 28

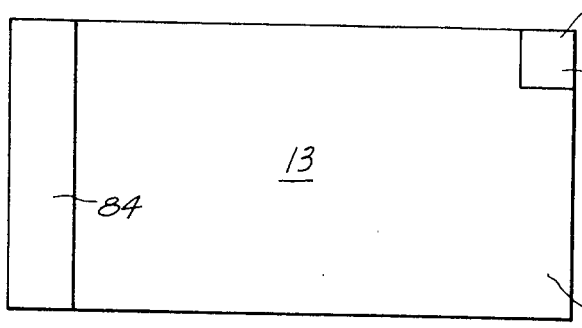


FIG. 26

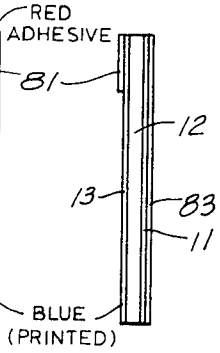


FIG. 27

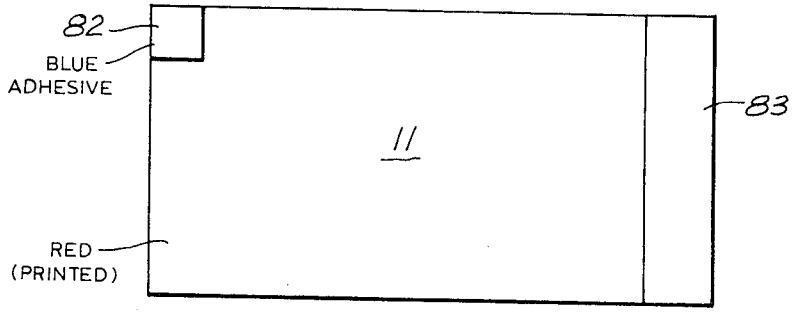


FIG. 29

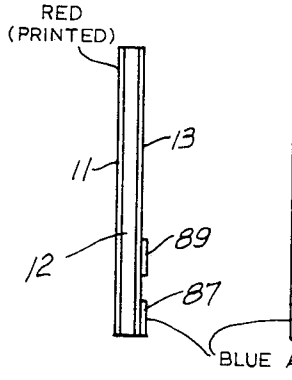


FIG. 32

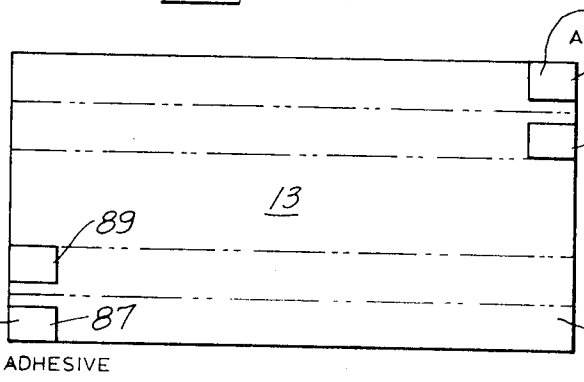


FIG. 30

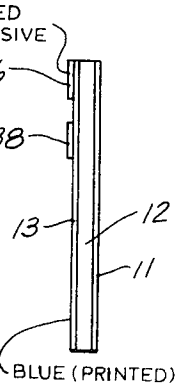


FIG. 31

INVENTOR.
DAVID TORR
BY
Abner Sheffer

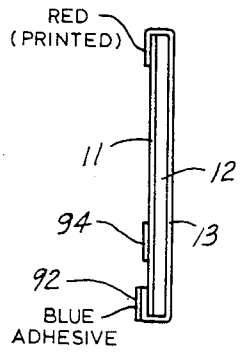


Fig. 34

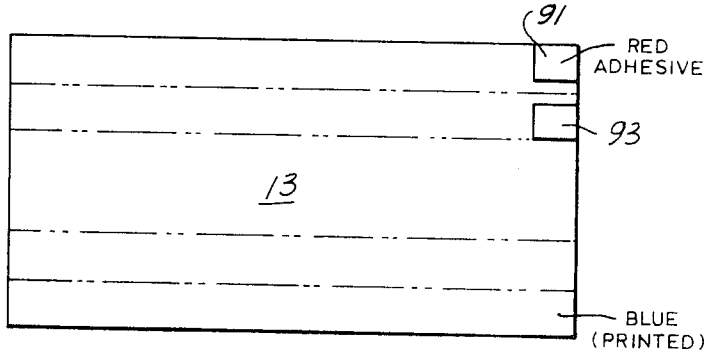


Fig. 33

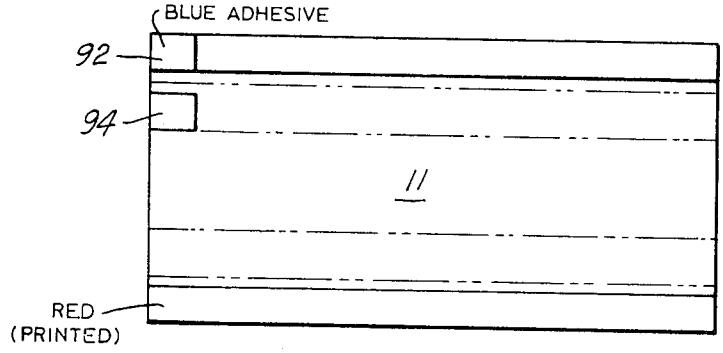


Fig. 35

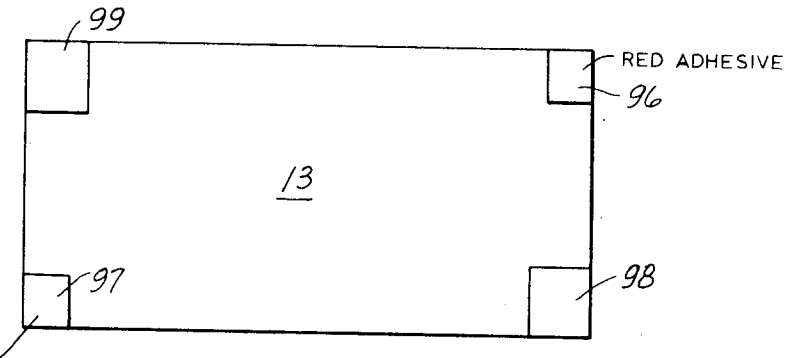


Fig. 36

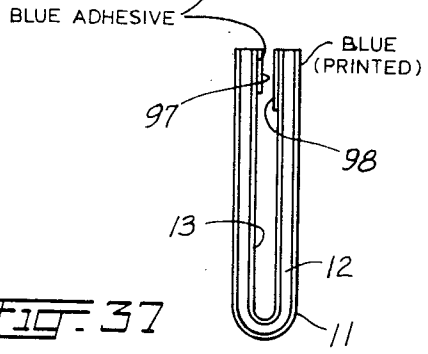


Fig. 37

INVENTOR.
DAVID TORR

BY Abner Shaffer

DIAPERS

This invention relates to disposable baby diapers.

Such diapers generally comprise a plurality of layers including a water-absorbent layer, adapted to absorb and hold the urine, and a body-contacting layer which is water permeable and permits the urine to pass through it and be absorbed in the absorbent layer. The absorbent layer may be, for example, a single relatively thick layer such as a layer of wood pulp cellulose about one-eighth inch thick, or a plurality of thin sheets such as a number of plies (e.g., seven plies) of creped cellulose wadding as illustrated, for instance, in U.S. Pat. No. Re. 26,151. The body-contacting layer is often of porous nonwoven fibrous construction and its fiber surfaces may be hydrophobic so as to reduce spreading of aqueous liquids such as urine in its major plane; for example, rayon fibers having a hydrophobic finish may be used. The disposable diaper often has an outer barrier layer which is substantially impermeable to the passage of urine or other aqueous liquids; this layer may be, for instance, a sheet of plastic such as low density polyethylene or a sheet of plastic-coated fibrous (e.g., nonwoven) material. The various layers may be bonded together in any suitable manner, as by adhesive bonding along lines parallel to, and adjacent to, their edges.

For shipping and storage, the disposable diapers may be packed flat, one on top of another, or they may be individually folded, as in U.S. Pat. No. Re. 26,151, before packing.

Disposable baby diapers, of substantially rectangular shape, having adhesive areas at their corners for use without pins, buttons or other metal fasteners have been previously described, as in U.S. Pat. No. 2,649,858 of Aug. 25, 1953, and a similar arrangement for baby pants has been described in U.S. Pat. No. 3,049,228. In these constructions there is employed an adhesive of the "self-sealing" type which will not adhere to other surfaces or objects but which will adhere only to the same type of adhesive on another surface brought into contact therewith. The patents state that the use of this type of adhesive enables the diaper to be packed, shipped and handled without the adhesive areas becoming stuck to other surfaces or objects.

One aspect of this invention relates to a disposable diaper which may be employed without the use of pins and without the use of the self-sealing type of adhesive and which can employ the well-known types of pressure-sensitive adhesives which, on contact, will bond to ordinary surfaces.

Certain embodiments of the invention are illustrated schematically in the accompanying drawings in which

FIG. 1 is a plan view of one embodiment,

FIGS. 2 and 3 are end views of the diaper shown in FIG. 1, taken from the right end and left end, respectively.

FIG. 4 is a perspective view showing how the corners of the diaper are brought together in use.

FIGS. 5 and 6 are end views illustrating how the diapers of FIGS. 1–3 or of FIGS. 7–9 can be arranged in a carton, portions of the walls of the carbon being shown in cross section.

FIG. 7 is a plan view of another embodiment.

FIGS. 8 and 9 are end views of the embodiment shown in FIG. 7, taken from the right end and left end, respectively.

FIG. 10 is an end view, of another embodiment, showing the diaper in folded condition.

FIGS. 11 and 12 are plan views of opposite faces of the diaper of FIG. 10, prior to folding.

FIG. 13 is an end view of a pair of diapers of the construction shown in FIG. 1, with each diaper having been folded in half, illustrating the relative positions the folded diapers would have in a carton.

FIGS. 14 and 15 are end views, taken at opposite ends, of another embodiment in which the diaper is folded in a box pleat configuration.

FIG. 16 is a plan view of the diaper of FIGS. 14 and 15, prior to folding, with dotted lines showing where the diaper is to be folded.

FIG. 17 is an end view of the diaper of FIG. 16, taken from the end which is remote from portions of the diaper which carry the adhesive areas.

FIG. 18 is an end view of a modification of the diaper of FIGS. 14–17, in which a portion of the barrier layer is carried over onto the opposite face of the diaper, the diaper being shown in folded condition.

FIG. 19 is a plan view of a portion of the folded diaper of FIG. 18, taken at the end thereof which is remote from the adhesive areas.

FIGS 20 and 21 are end views, taken at opposite ends of a modification in which the barrier layer and body-contacting layer overlap, the particular form which is illustrated being a modification of the diaper shown in FIGS. 7 to 9.

FIGS. 22 to 37 illustrate embodiments in which areas of pressure-sensitive adhesive are at diagonally opposite corners.

FIG. 22 is a plan view of one embodiment;

FIGS. 23 and 24 are end views thereof, taken from the right end and left end, respectively; and

FIG. 25 is a plan view of the other face of the same diaper.

FIG. 26 is a plan view of another embodiment;

FIGS. 27 and 28 are end views thereof, taken from the right end and left end, respectively; and

FIG. 29 is a plan view of the other face of the same diaper.

FIG. 30 is a plan view of an embodiment which is to be box pleated and

FIGS. 31 and 32 are end views thereof, taken from the right end and left end, respectively.

FIG. 33 is a plan view of another embodiment which is to be box pleated;

FIG. 34 is an end view thereof, from the left; and

FIG. 35 is a plan view of the other face of the same diaper.

FIG. 36 is a plan view of an embodiment in which the diaper is to be folded in half for packing, and

FIG. 37 is an end view of the same diaper, as folded.

Referring now to FIGS. 1–3, reference numeral 11 indicates the body-contacting layer of a disposable diaper, having an absorbent layer 12 and a barrier layer 13. At each of the corners at one end of the diaper an area of pressure sensitive adhesive 16 and 17 is coated onto the barrier layer. At the same end of the diaper an area of adhesive release agent 18, to which the pressure-sensitive adhesive will not adhere, is coated onto the body-contacting layer. At the opposite end of the diaper, there are similar areas of pressure-sensitive adhesive and release agent but their positions are reversed; that is, at that end the areas of adhesive 21, 22 are carried by the body-contacting layer 11 while the area 24 of release agent is carried by the barrier layer 13. In use the diaper is draped (see FIG. 4) about the baby in such a manner that adhesive area 16 (on the barrier layer) overlaps adhesive area 21 (on the body-contacting layer) thus securing the corners 26 and 27 together by an adhesive bond; correspondingly the corners 28 and 29 are brought together so that adhesive area 17 (on the barrier layer) overlaps adhesive area 22 (on the body-contacting layer) so that these corners are also secured together by an adhesive bond.

As an aid in applying the diaper, the corners may be color coded. Thus the two areas of pressure-sensitive adhesive which are on the same face of the diaper may be of different colors. For example, in FIGS. 1 to 3 areas 16 and 21 may be red and areas 17 and 22 may be blue. When the diaper is applied to the baby, the red areas are brought together at one side of the baby and the blue areas are brought together at the other side of the baby.

For shipping, the diapers may be stacked in a carton 31 (FIG. 5) having a lid 32, in such a manner that each pressure-sensitive adhesive area, (such as areas 16, 17 shown in FIG. 5), is pressed against the area of release agent (such as area 18 shown in FIGS. 2 and 5) of its neighbor. At one end of the carton (which may be of the usual cardboard construction) all or part of the end wall 33 may carry a coating of a release agent, or there may be a strip or sheet of release paper, to prevent the pressure-sensitive adhesive areas from sticking to that end wall. In the carton shown in FIG. 6 the diapers are stacked horizontally in the same relationship to each other as in FIG. 5; it will be understood that the bottom wall 34 of the carton may carry an area of release agent or may be covered with

release paper. In either case the diapers may be packed tightly together in the carton but will be readily removable, individually, from that carton.

In the modification shown in FIGS. 7–9 the areas of pressure-sensitive adhesive 36, 37, and the area of release agent 38 are at only one end of the diaper. The pressure-sensitive adhesive areas may be printed onto the barrier layer (as shown in FIGS. 7 to 9) or onto the body-contacting layer. In either case when the adhesive-carrying corners 26, 28 are overlapped on the opposite corners 27, 29, in the same way as illustrated in FIG. 4, the corners will become bonded together. The corners 27, 29 of layer 11 which carry no adhesive may be locally dyed or printed in the same color as the adhesive areas to which they are to be bonded. The diaper shown in FIGS. 7 to 9 may be packaged in the same way as the diaper of FIGS. 1 to 3 and the area 38 of release agent may (as in FIGS. 1–3) be a strip extending across the diaper at one end.

FIGS. 10 to 12 show construction for use when the diapers are to be packed in folded condition. Here one layer (say the barrier layer) carries two areas 41, 42 of pressure-sensitive adhesive, at the corners at one end and carries an area 43 of release agent at its opposite end. As shown in FIG. 10, when the diaper is folded in half, for packing in a carton, the pressure-sensitive adhesive areas at one end are brought into contact with the release area at the other end, the fold being along a line parallel to the end edges of the diaper. On the opposite side of the diaper (FIG. 12), at the end carrying the area of release agent, the corners 27, 29 carry neither adhesive nor release agent but may be locally dyed or printed in the same color as the adhesive areas to which they are to be bonded in use. The construction shown in FIGS. 1 to 3 (using four adhesive areas) may also be packed in folded condition as shown in FIG. 13.

When the diaper, as packaged, is folded to form box pleats an arrangement such as is illustrated in FIGS. 14 to 17 may be used. In FIG. 16, a plan view of the diaper, the folds which are to be made are indicated by dotted lines, the fold lines being substantially parallel to the side edges of the diaper. At one end of the diaper one layer (say the barrier layer 13) carries areas 51, 52 (see FIG. 16) of pressure-sensitive adhesive at the corners 26, 28 and carries adjacent areas 53, 54 of release agent so that when the diaper is folded in a box pleat (as shown in FIGS. 14 and 15) the adhesive areas are in contact with the areas of release agent. At the other end of the diaper the layer on its opposite face (say the body-contacting layer 11) is locally color printed at the corners 27, 29 in colors corresponding to those of the areas of pressure-sensitive adhesive which are to be bonded thereto in use.

The diaper may also be of the type as shown in FIGS. 18 to 21 which portions 61 of the barrier layer 13 extend around the edges of the diaper and over a narrow strip (say an inch wide) of the body-contacting layer, being bonded to the latter in any suitable manner, as by spots 61*a* of permanent adhesive. In this case it will be understood that when the diaper is arranged on the baby the pressure-sensitive adhesive areas will form a bond between the overlying barrier layer portion 61 at one end of the diaper and the barrier layer at the other end. In FIGS. 18 and 19 a diaper of this type is folded to form box pleats; FIG. 18 is an end view of the folded diaper taken from one end while FIG. 19 is a top view of the other end of the same folded diaper. In FIGS. 20 and 21 the diaper is similar to that of FIGS. 7–9, for packing in flat condition, but differs from the latter in that an edge portion 62 of the body-contacting layer 11 is bent around the edge of the absorbent layer 12 and under the barrier layer 13, while the edge portion 61 of the barrier layer is bent around the edge of the diaper and over the body-contacting layer 11; it will be understood that this edge construction may also be used in the other embodiments. The release agent may be coated as two separate areas 66, 67 on the edge portions 61 at one end of the diaper.

While the drawings illustrate the use of rectangular or square areas of pressure-sensitive adhesive, it will be understood that these areas may have other shapes, e.g., circular, triangular, etc. Furthermore, each area of pressure-sensitive adhesive need not be covered solidly by such adhesive; thus, the adhesive may be deposited as a cluster (whose overall outline is rectangular, square, circular, etc.) of separate adhesive spots or of separate, but closely spaced parallel lines. With respect to the areas of release agent, they may be long, extending substantially the whole width of the diaper as shown in FIGS. 1–3, or they may be short as shown in FIGS. 14–21; it is desirable, however, that each such area be larger than the corresponding area of pressure-sensitive adhesive with which it is to come into contact, so as to make sure that the adhesive areas come into contact, during shipping and storage, only with portions of the diaper which are protected by release agent.

Both areas of pressure-sensitive adhesive need not be at the same end of the diaper. In the embodiments shown in FIGS. 22–36 the areas of adhesive are at the diagonally opposite corners of the diaper. The diaper of FIGS. 22–25 (which is to be packed flat as in FIGS. 6 and 7) has areas 71, 72 of adhesive on one face of the diaper and areas 73, 74 of release agent on its other face; the areas 73, 74 of release agent do not, however, extend the full width of the diaper, there being uncoated surfaces 76, 77 (at opposite corners of the diaper) which are capable of adhering strongly to the pressure-sensitive adhesive on contact. The diaper of FIGS. 26–29 (which is also to be packed flat as in FIGS. 6 and 7) has areas 81, 82, of adhesive on opposite faces; its areas 83, 84 of release agent are likewise on opposite faces of the diaper. The diaper of FIGS. 30–32 (which is to be box pleated as in FIGS. 14, 15, 18 and 19) has areas 86, 87, of adhesive on one face of the diaper at diagonally opposite corners and has an area of release agent 88, 89 adjacent each adhesive area. The diaper of FIGS. 33–35 (which is also to be box pleated as in FIGS. 14, 15, 18 and 19 and which, incidentally, is also shown with a portion of the barrier layer turned over the edge, as in FIGS. 18–21) has its areas 91, 92 of adhesive on opposite faces of the diaper, again at diagonally opposite corners; here too there is an area of release agent 93, 94 adjacent each area of adhesive. The diaper of FIGS. 36 and 37 (which is to be folded in half as in FIGS. 10 and 37) has areas 96, 97 of pressure-sensitive adhesive on one face of the diaper at diagonally opposite corners and has areas 98, 99 of release agent at the other two corners, all on the same face of the diaper.

Suitable pressure-sensitive adhesives are well known in the adhesive art and may be of various types, such as those made from natural rubber synthetic butadiene and isoprene polymers and copolymers (e.g., butadiene-styrene copolymers), butyl rubber, polyisobutylene, polyvinyl ethers (e.g., polyvinyl isobutyl ether), polyesters, polyacrylates (e.g., polymers of 2-ethylhexyl acrylate or copolymers thereof with vinyl acetate maleic or fumaric dialkyl esters or other comonomers that have an effect of hardening the polymer). Descriptions of various classes of pressure-sensitive adhesives and specific examples thereof are contained in U.S. Pat. Nos. 2,532,011; 2,607,711, 3,307,544 and 3,236,677.

The adhesive release agents may also be of a well-known type, including such materials as polyvinyl-N-octadecyl carbamate (or other hydrophobic polyvinyl carbamate having nitrogen-bonded hydrocarbon side chains which provide terminal alkyl groups of more than 5, and preferably at least 14, carbon atoms in length, as described in U.S. Pat. No. 2,532,011), a copolymer of 40–80 percent (preferably 40–70 percent) of a higher alkyl acrylate or methacrylate with 60–70 percent of acrylic acid or methacrylic acid (as described in U.S. Pat. No. 2,607,711); higher acyl polyalkylenepolyamines, such as tristearoyl tetraethylenepentamine; and stearato chromic chloride, alone or in combination with an initially water soluble phenolic resin (e.g., phenol-formaldehyde resin) which is cured in place, as described in U.S. Pat. No. 3,236,677. The release agent may be applied as a very thin coating, e.g., having a thickness as little as 0.0001 inch or less, from a suitable volatile solvent or dispersing agent.

The presence of the layer of release agent not only makes it possible to pack the diapers relatively tightly into a carton but by being in close nonadhesive contact with the pressure-sensitive adhesive it helps to preserve the adhesion against deterioration (e.g., against degradation of the adhesive by atmospheric oxygen or other influences).

It is understood that the foregoing detailed description is given merely by way of illustration and that variations may be made therein without departing from the spirit of the invention. The "Abstract" given above is merely for the convenience of technical searchers and is not to be given any weight with respect to the scope of the invention.

I claim:

1. In a disposable baby diaper having a body-contacting face and an outer face, and having corner portions which, in use, are overlapped and fastened together in such manner that two of said corner portions at one side of said diaper are overlapped and fastened at one side of the baby and two of said corner portions at the other side of said diaper are overlapped and fastened at the other side of the baby, an area of pressure-sensitive adhesive on a corner portion at said one side of said diaper and adapted to bond to the corresponding overlapped corner portion at said one side on being pressed thereagainst, an area of pressure-sensitive adhesive on a corner portion at said other side of said diaper and adapted to bond to the corresponding overlapped corner portion at said other side on being pressed thereagainst, said diaper adapted to be folded and packed with other identical diapers in a carton whereby said areas of pressure-sensitive adhesive come into contact with contacting ares of the same diaper, each of said contacting areas having a localized surface layer of release agent, in contact with, and protecting, said adhesive during shipment and storage of the folded diaper and automatically uncovering said adhesive when the diaper is unfolded for fastening to the baby, said adhesive having the property of adhering to said faces of said diaper when pressed thereagainst.

2. A diaper as in claim 1, folded as described in claim 1, said diaper being folded along at least one straight fold line with each of the two said areas of pressure-sensitive adhesive being in contact with a surface layer of said release agent situated on the same face of said diaper as the contacting adhesive area.

3. A diaper as in claim 2 in which the contacting adhesive area and surface layer are at opposite ends of the diaper when in unfolded condition.

4. A folded diaper as in claim 2 in which said areas of pressure-sensitive adhesive are colored to clearly indicate, to the user, which corner portions carry the adhesive.

5. A carton packed with a plurality of the folded diapers of claim 2.

6. A carton packed with a plurality of the folded diapers of claim 3, said folded diapers being folded substantially in half.

7. A diaper as in claim 2 folded along a plurality of straight parallel fold lines which are substantially parallel to an edge of the diaper.

8. A diaper as in claim 7 in which said fold lines are substantially parallel to two edges of the diaper and in which each of the two said adhesive areas is adjacent to one of said edges and each of the corresponding contacting areas, carrying a surface layer of said release agent, is situated at a position which, when the diaper is in unfolded condition, is remote from said edges.

9. A diaper as in claim 8 which is folded in a box pleat configuration.

10. A carton packed with a plurality of the folded diapers of claim 9.

11. A carton packed with a plurality of the diapers of claim 1, folded as described in claim 1, with said areas of pressure-sensitive adhesive in contact with release agent.

12. A diaper as in claim 1 in which both of the two said areas of pressure-sensitive adhesive are situated at the same end of the diaper.

13. A diaper as in claim 1 in which both of the two said areas of pressure-sensitive adhesive are situated at opposite ends of the diaper, at diagonally opposite corners.

14. A diaper as in claim 1 in which said corresponding corner portions carry indicia to indicate, to the user, which corner portions are to be overlapped.

15. A diaper in claim 1 in which the said corresponding corner portions at one side of the diaper are colored in one hue, and said corresponding corner portions at the other side of the diaper are colored in a different hue.

* * * * *