

[54] **PRESSURE-SENSITIVE TAPE FASTENER
FOR DISPOSABLE DIAPERS**
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[58] **Field of Search** **128/287, 284, 286, 156**

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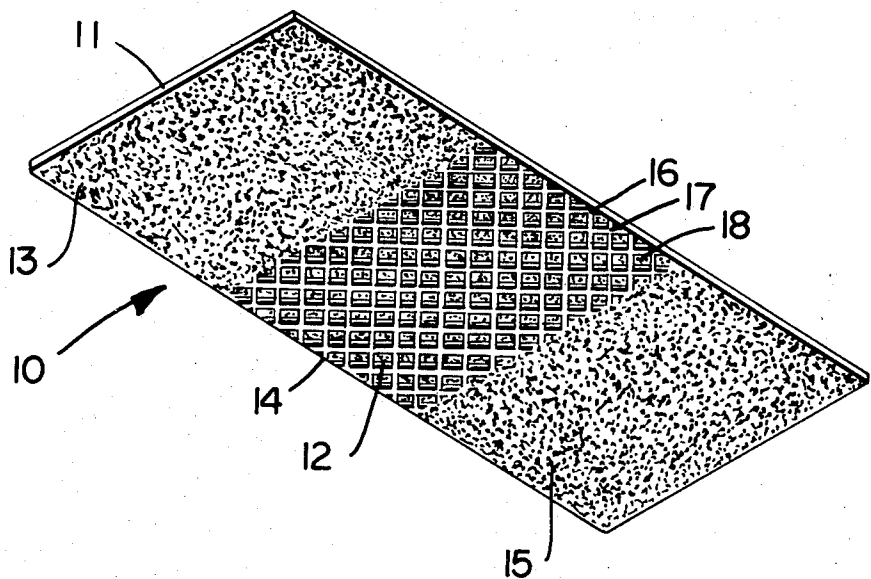
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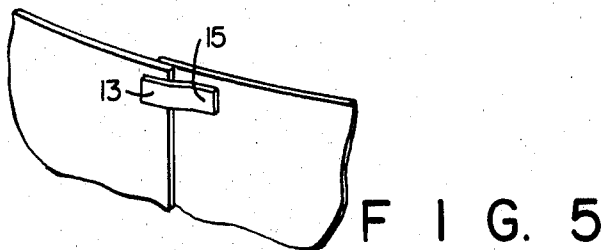
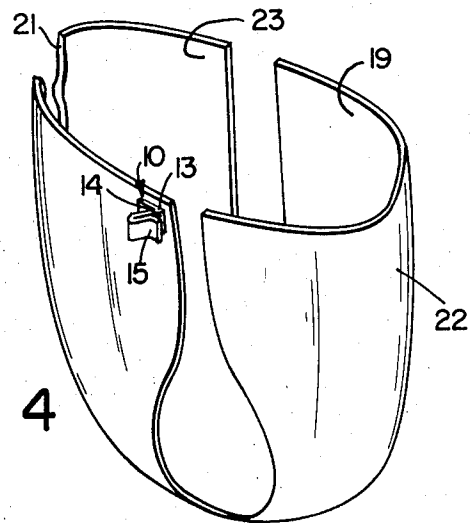
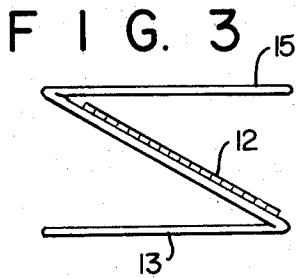
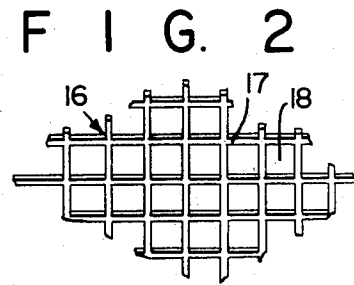
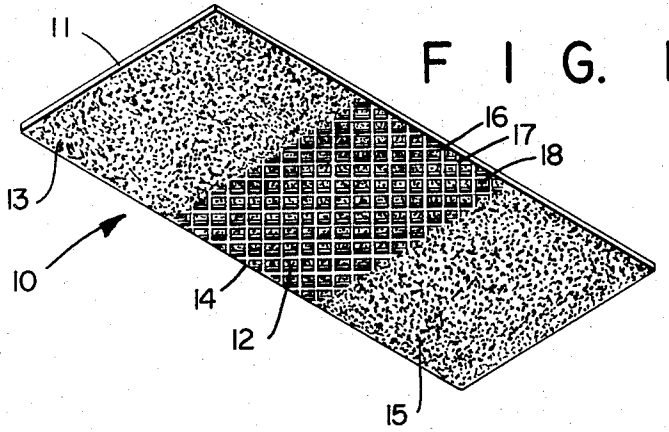
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[57] **ABSTRACT**

A disposable diaper having a topsheet, a backing sheet and an absorbent core interposed therebetween and a pressure-sensitive tape fastener having a fixed end segment, a middle segment having a plastic material with a retiform surface defining hill portions and valley portions, and a releasable end segment which is folded in a manner such that the releasable end segment and the middle segment are superimposed over the fixed end segment with the lower surface of the releasable end segment being in contacting relation and releasably secured to the hill portions of the plastic material.

6 Claims, 5 Drawing Figures





PRESSURE-SENSITIVE TAPE FASTENER FOR DISPOSABLE DIAPERS

The present invention relates to disposable diapers and more particularly to an improved pressure-sensitive tape fastener for disposable diapers.

Disposable diapers are presently enjoying increasingly widespread commercial acceptance due primarily to the ease of simplicity of application to the diaper. At present, there are several devices known to the art for securing the diaper on an infant. Widely used devices are pressure-sensitive tape fasteners which are preferred over conventional safety pins because of the elimination of the well-known danger incident to the use of safety pins.

Unfortunately, however, the known pressure-sensitive tape fasteners for diaper use are not entirely satisfactory from a practical standpoint. For example, in general, some types of pressure-sensitive tape fasteners utilize a throw-away release paper which is normally adhered to a portion of the tape tab. When it is desired to secure the diaper on an infant, the operator removes the release paper from the tab exposing an adhesively treated surface which is, thereafter, fixed in adhesive relation on the desired surface of the diaper. Since this operation is conducted while the diaper is on the infant, it is difficult for the operator to both apply the diaper to the infant while at the same time releasing the release paper from the tape fastener.

It is therefore an object of the present invention to provide an improved pressure-sensitive tape fastener for a disposable diaper which does not utilize a disposable throw-away release material, such as a release paper, with the pressure-sensitive tape fastener.

Another object of the present invention is the provision of an improved pressure-sensitive tape fastener for a disposable diaper which is easily manufactured, and is simple to apply to an infant.

A further object of the present invention is to provide an improved pressure-sensitive tape fastener for a disposable diaper which does not utilize a throw-away release material, and which provides a great degree of holding power when in closed position on the diaper.

These and other objects will become apparent from the following description of the invention taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view looking upwardly at the bottom of the improved pressure-sensitive tape fastener of the present invention showing the location of the adhesive surfaces and the release surface of the fastener.

FIG. 2 is an enlarged partial view of the release surface of the fastener depicted in FIG. 1.

FIG. 3 is a side view showing the pressure-sensitive tape fastener indicating the location of the folds of the fastener.

FIG. 4 is a fragmentary perspective view of a disposable diaper showing the position of the tape fastener in non-operating position, i.e., only one end affixed to a corner of the diaper.

FIG. 5 is a view showing the tape fastener in operating position, i.e., both ends and the middle segment affixed to adjoining corners of a diaper in securing position.

Broadly contemplated, the present invention provides an improvement in a disposable diaper having a

topsheet, a backing sheet and an absorbent core interposed therebetween, the improvement comprising a pressure sensitive tape fastener having an upper surface and a lower surface, said lower surface being divided widthwise into two end segments at least one of which is adhesively treated, and an adhesively treated middle segment, one of said end segments being a fixed end segment which is secured to said backsheet, the other of said end segments being a releasable end segment, said middle segment being covered on the lower surface of said pressure sensitive fastener with a plastic material having a retiform surface defining a system of hill portions and valley portions, said hill portions covering said adhesively treated lower surface of said middle segment, and said valley portions exposing said adhesively treated lower surface; said fastener when in non-operating position being folded in a manner such that said releasable end segment and said middle segment are superimposed over said fixed end segment with the lower surface of said releasable end segment being in contacting relation and releasably secured to the hill portions of said middle segment.

Referring to FIG. 1 of the drawings, it will be seen that the pressure-sensitive tape fastener of the present invention, generally indicated by reference numeral 10 has an upper surface 11 and a lower surface 12. The lower surface is divided widthwise into three segments, including two end segments or ends 13 and 15 and a middle segment 14. Depending upon the positioning of the tape fastener on the diaper, either end 13 or 15 can be termed a fixed or attached end in which case the other end would be termed a free or releasable end. The pressure-sensitive tape is preferably a paperbacked tape but it can also be any of several well-known commercial types including the type having a polyethylene backing. In either case, it can be used with or without reinforcing. At least one of the end segments 13 and 15 on the lower surface 12 are coated with a pressure-sensitive adhesive which can be any of the conventional types well known in the art. The middle segment 14 has a plastic material 16 covering the lower surface of the middle segment. The plastic material has a retiform surface defining a system of hill portions 17 and valley portions 18, so that when the releasable end is adhered to the hill portions of the plastic material, as will hereafter be described, there is a minimal adhesive attachment therewith. Thus, according to the invention, the adhesive portions and the release portion are all disposed on the same side of the pressure-sensitive tape, i.e., the lower surface 12 of the tape. When the pressure-sensitive tape fastener is in non-operating position, i.e., prior to securing the diaper on an infant, the pressure-sensitive tape has a system of folds as indicated in FIG. 3.

As will be seen from FIGS. 1 and 2, the plastic material 16 covers the lower surface of the middle segment 14 and is characterized by a retiform surface. Thus, the plastic material has a system of hill portions 17 and valley portions 18, the latter exposing the adhesively treated lower surface of the middle segment. The plastic material contemplated for use in the present invention is one having a lesser degree of flexibility than the material constituting the backing sheet of the diaper. The degree of rigidity of the plastic material should be sufficient to enable the operator, when applying the diaper to the infant, to urge the surface of the backing sheet into the valley portions 18 of the plastic material

16 in contact with the adhesive on the lower surface of the middle segment. Thus, since the backing sheet of the diaper is more flexible than the plastic material on the middle segment, the film of backing sheet can conform to the contours of the valley portions 18 and portions of the backing sheet adhered to the adhesive surface of the middle segment providing additional holding power for the pressure-sensitive tape fastener when it is in operating position on the diaper.

The materials used in the fabrication of the plastic material of the present invention are not limited to any particular chemical composition since it is their physical properties rather than their chemical properties which are important according to the invention. These materials should, of course, be less flexible than the materials of the backing sheet and self-supporting.

The plastic material can be an olefinic or vinyl material. Polyethylenè is an example of a suitable material. The plastic material of choice is one which is available commercially from Hercules Corporation under the trademark "Delnet." The height of the plastic material is determined by the height of the hill portions 17. The appropriate height would, of course, depend upon the rigidity of the plastic material as compared to the rigidity of the backing sheet, the selection being determined by the requirement that the backing sheet must not contact the exposed adhesive portion of the middle segment when the tape fastener is in non-operating position. On the other hand, the backing sheet must contact the adhesive portion of the middle segment, when the operator compresses the backing sheet against the middle segment of the tape fastener. As a general rule, the height of the plastic material, as determined by the height of the hill portions, should be from about 1 to 5 mils depending upon, as stated previously, the choice of materials and degree of rigidity of the plastic material. The size of the valley portions 18 exposing the adhesive surface of the middle segment are determined among other things by the frequency of the valley portions. As a general rule, there can be from 40 to 80 percent exposed adhesive areas in the lower surface of the middle segment. The configuration of the exposed areas are not critical, and they can be diamond shaped, square shaped, circular and the like.

Referring specifically to FIG. 3, it will be seen that the folds occur at the inward ends of the segments 13 and 15 with the releasable end 15 being superimposed and in contact with the hill portions 17 of the plastic material situated on the middle segment 14. The resultant configuration depends upon which end is the fixed end. When segment 13 is the fixed end, i.e., the end permanently secured to the diaper, the resultant configuration has an "S" shape, whereas if the fixed end is segment 15, then the resultant configuration is "Z" shaped.

The pressure-sensitive tape fastener can be employed with any conventional disposable diaper particularly of the kind that has a plastic backing sheet. Merely as illustrative, of the kind of diaper to which the invention is readily adapted, reference is made to the diaper described in my copending application Ser. No. 312,131 filed on Dec. 4, 1972.

It will be obvious that the tape fastener illustrated and described herein may be applied to the corner of a diaper of that particular design and configuration. On the other hand, it will be understood that the invention is not limited to any specific diaper structure or config-

uration and the disclosure of the above co-pending application is incorporated herein by reference merely for the sake of illustrating a typical example of the kind of diaper to which the present invention can be usefully applied.

Referring to FIG. 4 which illustrates the location of the tape fastener 10 in non-operating position, on a corner of a disposable diaper, the diaper generally designated by reference numeral 19 contains an absorbent core 21. The core can be formed from any well-known material having good fluid-absorbing characteristics such as absorbent wadding, cellulosic fluff and the like. Preferably, however, the absorbent core is in the form of an absorbent pad which is substantially centrally located and sandwiched between the thin flexible backing sheet 22 of liquid impermeable material such as polyethylene film, and the thin flexible topsheet 23 also of a normally liquid impermeable material which has been treated such as by providing openings or slits therein so as to permit the passage of liquid through. It will be understood however, that both the topsheet 23 and backing sheet 22 may be any suitable material and need not be plastic, particularly when the diaper is to be covered with plastic panties or the like. In its preferred form, backing sheet 22 and topsheet 23 are of approximately equal size and are of a length and width slightly greater than the corresponding dimensions of the absorbent core 21. The edges of backing sheet 22 and topsheet 23 are sealed to each other (if plastic) around the entire periphery of the diaper and just outside the outermost edges of absorbent core (pad) 21.

The sealing can be accomplished by any convenient means, such as by the use of an adhesive, however, heat sealing around the periphery of the diaper is preferred.

The pressure-sensitive tape fastener 10 has one end, e.g., the fixed end 13 which is strongly adhered and permanently secured to the backing sheet 22 as shown in FIG. 4 (for simplicity of illustration, only one tape 10 is shown but it will be understood that normally two tapes are provided on two diaper corners in a complete diaper structure). When the pressure-sensitive tape fastener is fabricated from a thermoplastic material for application to a backsheet also of thermoplastic material, then the securing of the fixed end can be effected by heat sealing. However, when heat sealing is not possible, then the fixed end segment can be coated on the lower surface with an adhesive material so that both end segments would be adhesively treated. The other end of the tape, i.e., the releasable end 15 when in non-operating position, is superimposed over the middle segment 14, and in contact with the hill portions 17 of the plastic material 16, and is adhesively, albeit minimally, secured thereto.

FIG. 5 illustrates the tape fastener 10 after the operator has released the releasable end 15 and positioned the middle segment and releasable end on the adjacent corner of a diaper in securing engagement therewith. Advantageously, the operator can utilize the lower surface of the middle segment by positioning the middle segment as well as the releasable end over the backing sheet. Thus additional holding power can be obtained by compressing the upper surface of the fastener 10 against the backing sheet with enough pressure so that the backing sheet contacts the exposed adhesive areas of the middle section.

In a typical mode of operation, the operator unfolds the diaper and wraps it around the infant in the usual manner. The pressure-sensitive tape fastener 10 is in the non-operating position as shown in FIG. 4. The operator thereafter grasps the releasable end and releases it from the hill portions 17 of the plastic material 16 situated on the middle segment 14. The adjacent corners of the diaper are urged towards each other and the operator positions and with sufficient pressure secures the releasable end as well as the middle segment on the backing sheet of the adjacent corner of the diaper as shown in FIG. 5. The operation is repeated on the other adjacent corners with sufficient force being exerted so as to provide a tight, comfortable fitting diaper.

As mentioned previously, the end segments 13 and 15 of the tape fastener 10 can be treated on the lower surface 12 with a conventional adhesive material. The adhesive material should be of sufficient bond strength to adhere to the backing sheet 22 under normal stress and strain during movement of the infant. The middle segment 14 of the tape fastener 10 is likewise treated on the lower surface with an adhesive agent so as to provide minimal adhesive attachment with the releasable end through the valley portions 18 exposing the adhesively treated lower surface.

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

What is claimed is:

1. In a disposable diaper having a topsheet, a backing sheet and an absorbent core interposed therebetween, the improvement comprising a pressure-sensitive tape fastener having an upper surface and a lower surface, said lower surface being divided widthwise into two end segments at least one of which is adhesively treated,

and an adhesively treated middle segment, one of said end segments being a fixed end segment which is secured to said backsheet, the other of said end segments being a releasable end segment, said middle segment being covered on the lower surface of said pressure sensitive fastener with a plastic material having a retiform surface defining a system of hill portions and valley portions, said hill portions covering said adhesively treated lower surface of said middle segment, and said valley portions exposing said adhesively treated lower surface; said fastener when in non-operating position being folded in a manner such that said releasable end segment and said middle segment are superimposed over said fixed end segment with the lower surface of said releasable end segment being in contacting relation and releasably secured to the hill portions of said middle segment.

2. A disposable diaper as claimed in claim 1 wherein said fixed end segment is secured to said backing sheet by adhering said fixed end segment to said backing sheet.

3. A disposable diaper as claimed in claim 1 wherein said backing sheet and said pressure-sensitive tape fastener are fabricated from a thermoplastic material and wherein said fixed end segment is secured to said backing sheet by heat sealing.

4. A disposable diaper according to claim 3 wherein said backing sheet and said pressure-sensitive tape fastener are fabricated from polyethylene.

5. A disposable diaper according to claim 1 wherein said valley portions expose 40 to 80 percent of adhesive are in the lower surface of said middle segment.

6. A disposable diaper according to claim 1 characterized in that when said diaper is in operating position, said backing sheet is adhered to said pressure-sensitive tape fastener by the adhesive disposed on said releasable end segment and by the adhesive exposed through the valley portions of said plastic material.

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