

May 5, 1970

H. L. MARDER ETAL

3,510,587

DISPOSABLE DIAPER

Filed March 8, 1966

FIG. 1

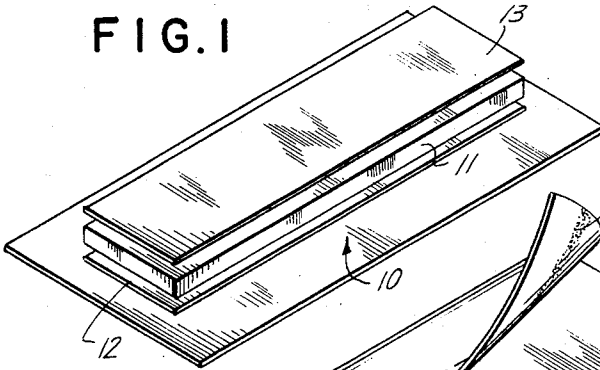


FIG. 2

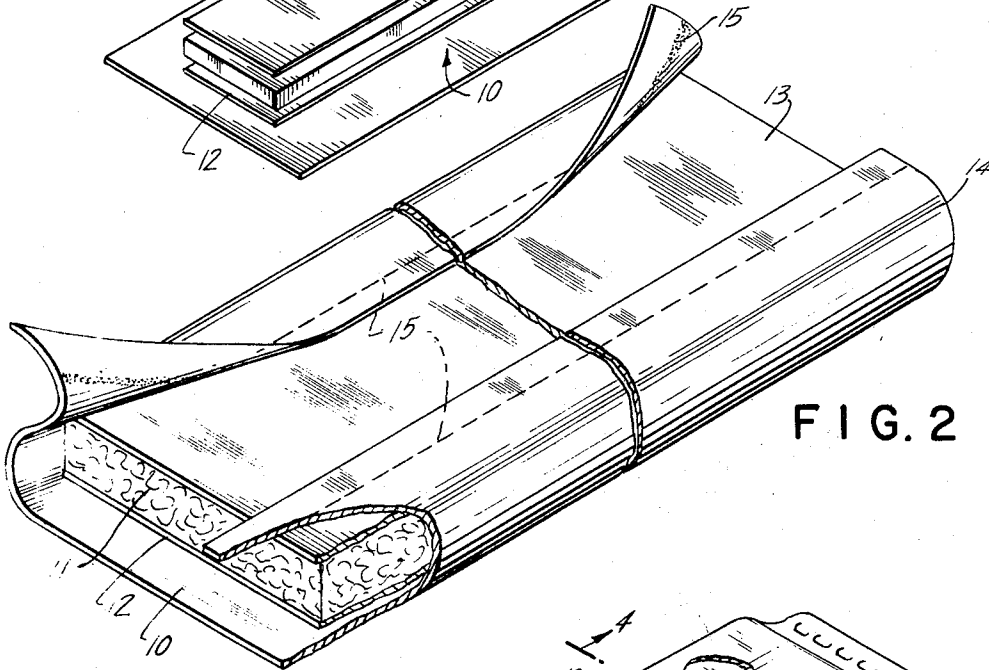


FIG. 3

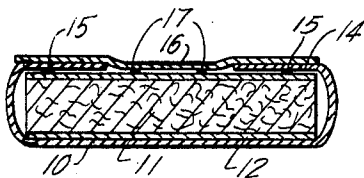
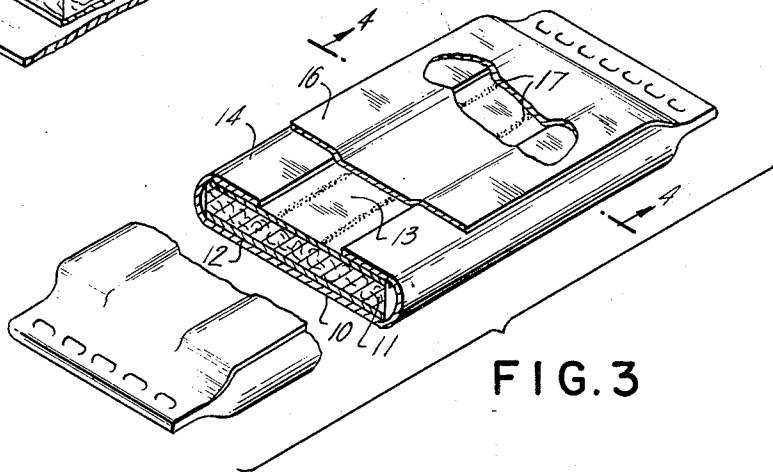


FIG. 4

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DISPOSABLE DIAPER

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Continuation-in-part of application Ser. No. 298,904, July 31, 1963. This application Mar. 8, 1966, Ser. No. 532,636

The portion of the term of the patent subsequent to Feb. 28, 1984, has been disclaimed
Int. Cl. A61f 13/00

U.S. Cl. 128—284

9 Claims

ABSTRACT OF THE DISCLOSURE

A diaper comprising an absorbent core contained in a porous envelope comprising two high wet-strength members which form a substantially flattened tube and which are secured to the core but are not secured to each other except when said diaper is wet.

The present invention is a continuation-in-part of co-pending application Ser. No. 298,904, filed July 31, 1963, now U.S. Pat. 3,306,293.

The present invention relates to disposable diaper pads as well as to disposable diapers in general.

Although there are a number of disposable-type diapers known in the art, heretofore such diapers have not met with general consumer acceptance. It is apparent that a great need exists for disposable diapers which do not have the handicaps of those heretofore available. It appears that the major factors limiting the use of disposable diapers are their high relative cost as well as the fact that the soiled articles do not lend themselves to convenient and sanitary disposal in quantity. Although the diapers in the prior art have had disposability in mind as an objective, they have not been entirely satisfactory in that, either they do not have good mechanical strength in use, or they do not have the characteristic of rapid disintegrability and flushability in toilets.

It is an object of this invention to provide a simple, inexpensive, entirely flushable, diaper which is adaptable for use with a plastic panty.

Another object is the provision of a novel, flushable diaper embodying a two piece envelope which is so constructed that, when wetted by the child's waste, surface tension of the liquid film therebetween will cause the overlapped marginal edges of the envelope to stick together and preserve the structural integrity of the diaper until deposited in the toilet, even when subjected to the shear stress created by movement of the child's body.

Other objects and advantages of the invention will be manifest from a consideration of the following specification and its accompanying drawings, wherein:

FIG. 1 is a perspective view of one embodiment of the invention, in one stage of its assembly;

FIG. 2 is a view similar to FIG. 1 in which another step in the assembly of the article is illustrated;

FIG. 3 is a view similar to FIGS. 1 and 2 showing the diaper in its final assembled condition;

FIG. 4 is a sectional view, partly broken away, taken substantially along line 4—4 of FIG. 3.

FIG. 5 is a sectional view of a further embodiment of the invention wherein the envelope parts are folded differently.

Referring more particularly to the drawings wherein similar reference characters designate like parts throughout the several views, FIGS. 1 to 4, inclusive, illustrate a disposable diaper comprising a rectangular envelope member 10 which is thin and limp so that it may pass

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through the small orifice of the toilet bowl when suspended in water. While the diaper shown is in substantially rectangular form, it will be obvious that other suitable geometric configurations may also be employed. The diaper envelope 10 is constructed of a high wet strength material which is permeable to liquids, soft, smooth and non-abrasive so that it will not irritate a child's skin. An example of such a material from which the envelope member 10 may be formed is a high wet strength, plasticized, biodegradable and bacteriostat impregnated paper. Typical of the plasticized or softened papers preferred for use in the present invention are those softened with blends of lithium chloride and sorbitol or hydroxyalkyl ethers of sorbitol or softened with a polyethylene glycol in an amount sufficient to reduce the hand of the paper to less than 30 and provide substantially zero plasticizer migration time at 120° F. of at least 3 days. Such papers will also preferably have a wet strength of at least 1½ pounds per inch and a porosity such that 100 c.c. of air passes through in less than 2 seconds. Although plasticized or softened papers are presently preferred, other materials such as lightweight, non-woven fabrics, or knitted meshes may be used if it is not desired to provide ready biodegradability such as is required for safe disposal in home septic systems.

Superposed on the envelope member 10 and centrally and longitudinally arranged thereon is a core generally indicated at 11. This core is formed of a fibrous material having high absorbency and no wet strength. For example, water leaf multiply crepe wadding or sulfite cellulose fluff, or a defibered flock of bleached, softwood kraft fibers, or degreased cotton linters, or combinations thereof or tissue paper may be used. When the core is formed of cellulose fluff, a solid core structure may be utilized as shown in FIG. 1. It is preferred, if the core material is of the fluff type, to place the core between two sheets of porous tissue 12 and 13 having no wet strength. Preferably, the top tissue 13 which is the tissue farthest removed from the child's skin in use, is a water repellent sheet which due to its properties retards the migration of moisture through the pad, but still permits the use of double diapers if desired with no loss of moisture absorbency. Typical of such water repellent, no-wet strength tissues are those treated with a hydrophobic material such as oil, wax and resin. When using the fluff type core, the core ends may be non-permanently secured within the envelope members by crimping, embossing, gluing or other similar non-permanent means to prevent dusting of the fibrous core material at the core ends and to permit easier handling during manufacture. Such non-permanent sealing facilitates ready separation of the envelope members and facilitates flushing of the diaper. When the core is composed of crepe wadding or tissue paper, in order to assist in the disintegration thereof upon being immersed in water, the core 11 may be subdivided into a plurality of lower sections and a plurality of overlying upper sections. The sections are positioned in edge-to-edge relationship and extend transversely across the envelope member 10, and the upper sections may be spaced inwardly of the ends of and may overlie the abutting edges of the lower sections in an obvious manner, not shown.

As used in the present invention, the term "no wet strength" refers to cores or tissue having a wet tensile strength of less than 10% of its dry tensile strength and preferably less than 0.1 lb./in. as measured by procedure T456m49 of the Technical Association of the Pulp and Paper Industry ("Pulp and Paper," Casey, J. P., Interscience Publishers, Inc., New York, N.Y., 1960, vol. II, p. 1155). Most preferably, such tissues or cores will have a dry tensile strength of about 0.5 lb./in. and a wet tensile

strength too low to be measured by the above procedure when using a Model X-5 Scott Tester (Scott Testers, Inc., Providence, R.I.) with a scale reading of 0.02 lb.

It will be noted that the ends of core 11 are spaced from the adjacent end and side edges of the envelope member 10, as shown in FIG. 1, and that the marginal portions 14 of the envelope member 10 are folded inwardly and over the core 11, as indicated in the overlapped position of FIG. 2. The marginal portions 14 are then secured, as at lines 15, to core tissue 13. Any type of securing means may be employed since when wetted due to the no wet strength nature of the core, the two will be readily separated. The device is completed by positioning thereover a top envelope member 16, made of a material not necessarily the same as that of the envelope member 10, which sheet is of about the same length and width as the envelope member 10 after it is folded. Envelope member 16 is fastened to the exposed surfaces of the tissue 13 by securing means along lines 17 as hereinbefore described with respect to securing means along lines 15. If glue is used at lines 15 and 17 it may be either of the water resistant or water-soluble variety. In addition to securing the envelope members along lines 15 and 17 by use of a continuous glue line, suitable variations such as an intermittent glue line, spot gluing or embossing may also be employed. It is not necessary to glue or otherwise secure envelope member 16 to envelope member 10 along the longitudinal overlap as surface tension will be sufficient to hold the two members together when wet even when subjected to the disruptive forces exerted by the body of the wearer. However, because of the novel manner in which the various components are secured, easy separation of the diaper upon disposal and easy flushability is provided. It will be apparent therefore that the diapers of the present invention have good mechanical strength in use and have rapid disintegrability and flushability in toilets.

In the use of the aforesaid preferred form of the invention, it will be apparent that the diaper may be placed in customary position upon the body of a child with the absorbent core centered between the child's legs with the outer surface of envelope member 10 in contact with the skin and the entire device held in position by plastic pants or the like. It will be apparent that the composite envelope will act to retain the mechanical integrity of the diaper when dry, when soiled, when wet and while being subjected to the disruptive action of the child's body movement.

When the dry diaper is worn and supported by the panty and thereby pressed against the wearer's body, the structural integrity is preserved by the hereinbefore described securing means. When wet, the securing means which are nonpermanent no longer function to retain the structural integrity and the diaper in such case is held together by surface tension of the liquid between the envelope members. If only a portion of the diaper is wet, then both of the above securing means act to maintain the structural integrity. When it is desired to dispose of the used diaper, it is only necessary to separate the two envelope members at one end and place the diaper within the confines of a toilet bowl. Before flushing, the diaper is dipped in the water in the manner commonly used to remove the bulk soil from cloth diapers. When the envelope members are respectively secured to the core section only, the action of the water, the pulling apart movement exerted by the user and the weight of the wet core, causes envelope member 16 to separate from the envelope member 10. As a result, the core 11 will be washed into the bowl and be disintegrated into a slurry of fibers or small segments. Thereupon, the envelope members 10 and 16 are dropped into the bowl and the entire diaper may be flushed therethrough without formation of an occlusive plug in the sewer lines. Thus, the diaper and its contents is completely disposed of.

An alternate embodiment (not shown) of the diaper

illustrated in FIGS. 1 to 4 is that wherein the envelope member corresponding to 16 in FIG. 3 is wider than the other envelope member and its returned marginal portions. In this case, a better retention of solid waste is provided by virtue of the increased width without any increase in the bulk of the diaper in the crotch area. It will be apparent that the use and disposal of this form of diaper will be identical with the previously described preferred form.

In another embodiment of the diaper (not shown), one envelope member may be substantially longer than the core and the other envelope member may be the same length as the first envelope member or of a length intermediate that of the core and first envelope member. The extended ends of the envelope members may be secured to the adjacent clothing of a child or function as tabs which act to retain the diaper in position when plastic pants are used.

It should be noted that the diaper may embody an hour glass shaped core to provide a more comfortable fit. In such case, the core is made to effect such configurations such as a generally hour glass or T-shaped configuration. Other modified forms of the diaper structure are those wherein a multiple thickness of core is employed, or where the core may be compressed in part so as to provide better absorbency and wicking, or where the core is composed of tissue and sub-divided into a plurality of lower sections and overlapping upper sections.

A modified form of envelope is illustrated in FIG. 5 wherein the envelope member 10A has only one marginal edge portion folded upwardly and inwardly as at 14A and the opposing marginal edge portion of envelope member 16A is folded inwardly so as to overlie the other or unfolded side edge of member 10A as at 16B. The envelope members 10A and 16A are respectively glued as at 17A to the core sections and the core sections 11 are arranged within the tube formed by members 10A and 16A. Thus the diaper has one envelope member with one marginal edge folded around and under said core and the other envelope member having one marginal edge folded over and inwardly of said core.

While several embodiments and several modifications thereof have been illustrated and described, it is to be understood that various other modifications and improvements may be made without departing from the scope and spirit of the appended claims.

What is claimed is:

1. A flushable diaper including a non-wet strength absorbent core, a porous envelope comprising a pair of high wet strength members, said members encasing said core to form a substantially flattened tube substantially the same length as said core, the corresponding longitudinal marginal edges of said envelope being in substantially overlapped relationship so that when wet, the envelope members are held together at the marginal edges by the surface tension of the liquid therebetween, said envelope members being secured to said core, but unsecured to each other so that they are easily separated from each other and the core when dipped in a toilet bowl.

2. A flushable diaper according to claim 1 wherein the core is defibered flock cellulose material positioned between at least two sheets of liquid-porous, no-wet strength tissues.

3. A flushable diaper according to claim 2 wherein one of said porous tissues is water repellent.

4. A flushable diaper as defined in claim 1 wherein said core is formed of a plurality of sections, said sections being of multiply tissue paper.

5. A flushable diaper according to claim 1 wherein said substantially flattened tube is secured transversely along its ends by embossing means.

6. A flushable diaper according to claim 5 wherein the core is a defibered flock cellulose material positioned between at least two sheets of liquid-porous, no-wet strength tissues, one of said sheets being water repellent.

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7. A flushable diaper according to claim 6 where the envelope members are secured to the core by water permanent glue.

8. A flushable diaper according to claim 6 where the envelope members are secured to the core by water-soluble glue. 5

9. A flushable diaper according to claim 6 where the envelope members are secured to the core by embossing.

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