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A. L. BEST

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DIAPER

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Fig. 1.

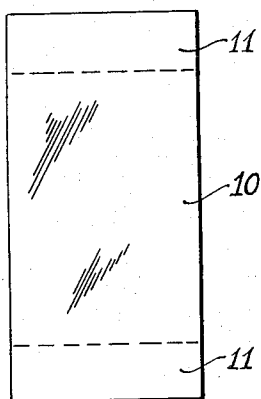


Fig. 2.

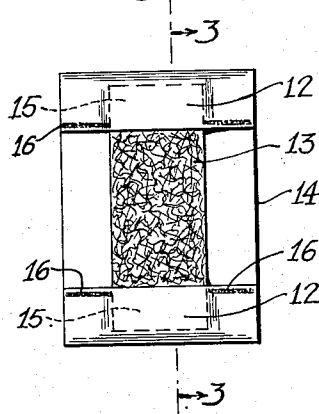


Fig. 3

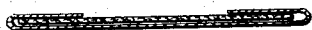


Fig. 4.

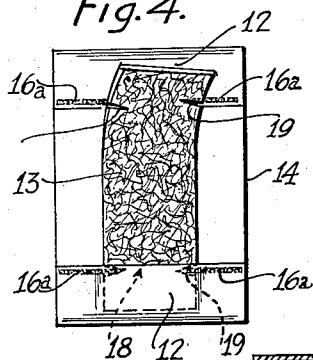


Fig. 5.

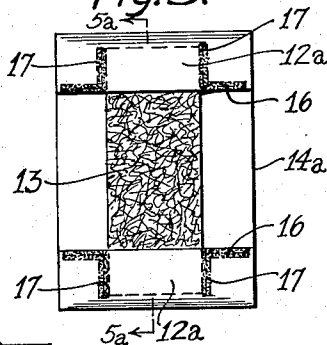


Fig. 5a

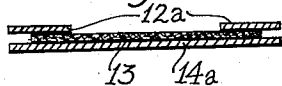


Fig. 6.

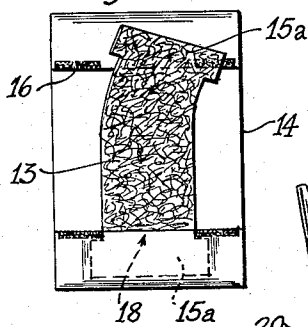


Fig. 7.

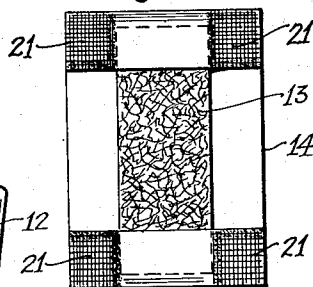
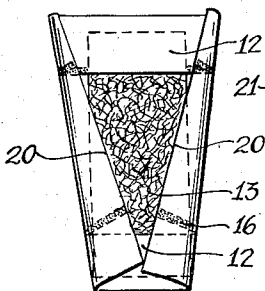


Fig. 8.



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1 Claim. (Cl. 128—284)

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This invention relates in general to diapers and more particularly to diapers of the type having an outer relatively permanent waterproof backing sheet and an inner disposable absorbent pad and to correlated improvements designed to enhance the use of the same. It has already been proposed to produce diapers of the particular type above mentioned in one of the prior embodiments.

In one embodiment of such prior articles the outer waterproof sheeting comprises a layer of fabric coated on one of its surfaces with a waterproof composition, the sheet material being cut in a substantially dumbbell shape and provided with pockets at each end adapted to receive the ends of a rectangular disposable absorbent pad. Diapers of this type have many disadvantages. In the first place, the coating of this material stiffens the fabric to an undesirable extent. The sharp edges of the stiffened fabric cause such chafing of the child that the edges must be covered by a strip of softer material or folded into a hem. Furthermore, because of its stiffness, the fabric does not drape and stretch sufficiently to enable it to be constricted between the child's legs as is necessary for a proper fit. In view of this, it is necessary with such coated materials to cut away the center and give the outer sheeting a dumbbell shape. Such shape, however, does not afford complete protection against leakage. Finally, such prior diapers are not provided with a simple and efficient means for holding the absorbent pad in proper position in the pockets so that the pad has a tendency to shift, or for one end to become disengaged.

Accordingly, it is an object of the present invention to provide a diaper having a waterproof outermost non-fibrous backing sheet and a disposable absorbent pad temporarily held on its inner surface, which backing sheet is flexible and substantially elastic to permit proper shaping of the diaper to the body of the child without chafing and which will afford complete protection and insure proper positioning of the absorbent pad.

Another object of the invention is to provide a waterproof diaper having a disposable pad which will be economical to produce, efficient in use, and free of the objectionable features of prior articles of this type.

Other objects of the invention will, in part, be obvious and will in part appear hereinafter.

According to the present invention, there is provided a diaper comprising an outermost rectangular backing sheet of thermoplastic non-

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fibrous material having the ends turned back upon the body to form pockets, and a disposable absorbent pad adapted to have its ends disposed in the pockets, the pockets being seated at points adjacent the edges of the pad to maintain said pad in proper position with respect to the waterproof backing sheet.

In one embodiment the pockets are sealed on each side so as to leave an unsealed space which is narrower than the width of the disposable pad, and the longitudinal edges of the pad are cut to accommodate the sealed areas whereby the pad is locked within the pocket.

In another embodiment of this invention a layer of fibrous sheet material is sealed within a portion of the pockets of the outer backing sheet to provide areas of greater strength for pinning the diaper.

For a more complete understanding of the nature and objects of the invention, reference should be had to the accompanying drawing, in which:

Figure 1 is a top plan view of one embodiment of the blank used in forming the outer backing sheet.

Figure 2 is a top plan view of one embodiment of the diaper of the invention formed from the blank of Figure 1.

Figure 3 is a cross-section of the diaper of Figure 2 taken along the line 3—3 thereof.

Figures 4, 5, and 6 are three additional top plan views of three additional embodiments of the diaper of the invention.

Figure 5a is a cross-section of the article shown in Figure 5 taken along the line 5a—5a thereof. Figure 8 is a top-hand view of the article shown in Figure 2 with the longitudinal sides folded inwardly.

Figure 7 is a top plan view of one embodiment of the outer backing sheet showing corner reinforcements.

Instead of using a coated woven fabric as the backing sheet, the diaper of the present invention is characterized by employing an outer backing sheet of a non-fibrous relatively elastic thermoplastic film. This film may be formed of inherently thermoplastic material, such for example as: hydrophobic film-forming synthetic resins as a class, preferably thermoplastic and heat-sealable, such for example as nylon resins, polyvinyl resins, styrene resins, and the like; also hydrophobic film-forming organic solvent soluble cellulose esters and cellulose ethers as a class, such for example as cellulose acetate, cellulose butyrate, cellulose propionate, ethyl cellu-

lose, benzyl cellulose, and cellulose ethyl acetate, and the like; and films formed from mixtures of such resins and cellulose compounds. Further, the outer backing sheet may be formed of non-fibrous pellicles which are hydrophilic but are coated with a hydrophobic, preferably thermoplastic, material of the classes above described, such for example as sheets and films of regenerated cellulose, gelatin, casein, and the like, coated on both sides with a thermoplastic waterproof coating comprising a hydrophobic synthetic resin or cellulose compound, or mixture thereof, of the classes above mentioned, with or without wax and plasticizers.

It is characteristic of all of the non-fibrous materials used in the present invention, whether formed in whole or coated with a thermoplastic material that their contiguous surfaces may be sealed together by heat and pressure. This unique property is utilized in forming the present article.

For the disposable pad there may be employed any of the common types of pads formed of relatively soft water-absorbent materials, such for example as wood fibre cellulose tissues, cotton batting, soft woven or knitted fabrics formed of water absorbent fibres such as cotton, viscose rayon, and the like. If a non-woven pad is employed it may be reinforced by an inner or an outer layer of a thin woven fabric such as scrim, netting, and so forth, to prevent disintegration upon wetting. In particular, there may be employed for the absorbent pad layers of carded fibres bonded together by an adhesive applied in pre-determined areas or internally bonded by means of potentially adhesive binder fibres.

Again referring to the drawings, one embodiment of the present diaper is formed by cutting the transparent film into a substantially rectangular blank 10 as shown in Figure 1. The ends 11 are folded over upon the face of the blank as shown in Figure 2, the resulting article being hereinafter designated "backing sheet" 14. The length of the blank and the depth of the folded ends are so adjusted that when the disposable pad 13 is placed upon the blank 10, the ends 15 of the pad extend for a substantial depth under the folded ends.

The contiguous surfaces of the pockets 12 are sealed together by the use of a solvent, adhesive, or by heat sealing in spaced horizontal areas 16 disposed at or adjacent the top edge of each of the folded ends 15 to form pockets 12. The space occupied by the pad is left unsealed. Thus, the top edge of the pocket is constricted in width and closely confines the pad 13 therein, preventing shifting of the pad.

In Figure 5 there is shown a variation of the embodiment illustrated in Figure 2, in which the pockets 12 are not only sealed in the horizontal areas 16 adjacent the top of the pockets 12, but the pockets are also sealed in the vertical areas 17 which are positioned along the edge of the ends 15 of the pad 13 and are disposed within the pockets 12. Thus, the width of the pocket is reduced so that the space between the sealed areas 17 is just sufficient to accommodate the ends 15 of the pad. In this way the pad is held tightly within the pocket and prevented from shifting.

It is not necessary that the pockets be integral with the backing. For example, in Figure 5a there is shown an embodiment in which the backing 14a is a sheet material extending only the length of the finished article, and there is superimposed at each end of the backing two strips

12a of the same or different material which are sealed to the backing at suitable points on opposite sides of the pad. These strips may be formed of fibrous or nonfibrous material and may advantageously be longer than the width of the backing and/or of the pad, the extensions being used for pinning.

In the embodiment shown in Figure 4 the pockets are sealed in horizontal areas 16a at or adjacent the top edge of the pockets 12, the sealed areas being so positioned that the unsealed space 18 between these areas is narrower than the width of the pad 13. The horizontal edges of the pad which coincide with the sealed areas 16a are cut away; for example, by slitting the pad at right angles to the edge along the lines 19. When the end 15 of the pad is pushed into the pocket 12, the slit 19 accommodates the sealed area 16a. This effectively locks the end of the pad in the pocket because the enlarged end 15 cannot be withdrawn from the constricted mouth of the pocket without excessive tension being applied.

In that embodiment shown in Figure 6, the backing sheet is formed as in the embodiment shown in Figure 2, but the pad 13 is cut so as to provide end sections 15a which are wider than the unsealed space 18 between the sealed areas 16 of the pockets. The enlarged tongues 15a thus effectively prevent the shifting or removal of the pad during use.

As some of the nonfibrous sheet materials employed for the backing sheet 14 are subject to tearing when punctured with a pin, the corners of the backing sheet 14 as shown in Figure 7 are reinforced by disposition within the pockets 12 and adjacent each corner of a fibrous insert 21. The fibrous insert may be a sheet of fibrous material, such for example, as a sheet of fibrous paper, textile fabric, felt, and so forth. The insert is sealed within the pocket by adhesive, solvent, or heat and pressure.

For purposes of economy and to prevent stiffening it is preferable to employ a piece of open mesh light weight fabric such as scrim, mosquito netting, cheese cloth, and the like for the insert.

It is to be understood that various changes may be made in the shape and configuration of the backing sheet and in the shape and configuration of the pad without transcending the scope of the present invention. In particular, the backing sheet 14 may be impregnated or coated with an opaquing material, if desired, and decorated or printed in any desired manner. The fibrous inserts 21, in particular, may incorporate identifying indicia such as a letter 22 by which the backing sheet may be identified and its use restricted to a particular infant.

It is characteristic of the backing sheets employed in the present diaper that since they are non-fibrous they are capable of stretching to a substantial extent before tearing. Accordingly, it is not necessary to cut away the center edges of the blank 10 to constrict the center and accommodate it to the legs of the child. In use, the present backing sheet will stretch around the legs of the child and form a close and conforming fit.

Preferably, the backing sheet utilized in the present diaper has a thickness of less than .01 inch and an elongation of more than 25 percent. A preferred sheeting is thermoplastic highly plasticized film formed from a copolymer of vinyl chloride and vinyl acetate because this material is tough, elastic, and inherently waterproof and heat sealable.

In one embodiment it is contemplated that a retail package would be prepared comprising a multiplicity of diapers; for example, from 100 to 200 absorbent pads with a single, preferably disposable, backing sheet provided with pockets in accordance with the present invention. Where the backing sheet is not to be used permanently it is preferred to employ a cheaper material, such for example as a film of regenerated cellulose coated with a waterproof coating, such for example as a coating of vinylidene chloride resin and a suitable plasticizer therefor. The vinylidene chloride coating is preferably anchored to the regenerated cellulose by an intermediate coating of a hydrophobic water-resistant thermosetting resin, such for example as urea-formaldehyde resins, phenol-formaldehyde resins, and melamine-formaldehyde resins.

When the diaper of the present invention is to be applied to an infant the longitudinal side edges 20 are folded over the pad as shown in Figure 8. Preferably, the amount folded over is greater toward the bottom of the diaper—that is, toward the feet of the infant—and the narrow end of the diaper is brought up between the legs of the child and thereafter the inwardly folded sides at this end are spread out and fastened, as by pinning, to the top edges of the diaper upon which the child's back is resting. This will cause the pins to be positioned at the sides of the baby rather than on its stomach.

It will be noted from Figure 8 that by inwardly folding the longitudinal edges the relatively rough edges of the pad are covered, which not only reduces chafing but also effectively seals the pad against leakage. Unlike the backing sheets of the prior art, the present backing sheet being very flexible, thin, and substantially elastic permits this folding over in the center while allowing both ends to be spread apart.

It is understood that the edges 20 stretch to a substantial extent during the fitting of the diaper to the child. It is for this reason that it is not essential to cut the backing sheet into a substantial dumbbell shape. However, the present invention is not limited to the use of a backing sheet which has parallel edges since the backing sheet may be cut out to some extent in the central portion to facilitate proper draping and configuration on the child.

It is also within the scope of the invention to make one end of the backing sheet wider than the other end. Therefore, the expression "substantially rectangular" as used in the appended claims is intended to include this shape embodiments.

I claim:

A diaper comprising a backing sheet formed of a rectangular flexible waterproof film of non-fibrous organic plastic material having pockets at two opposing ends, said pockets opening toward the center of the backing, a disposable absorbent pad having its ends disposed within said pockets, the mouth of each of said pockets having a width less than the width of said pad and the longitudinal edges of said pad being cut so that said pad can be accommodated in said constricted pocket openings.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,009,310	Dendoff	July 23, 1935
2,017,050	Kennard	Oct. 15, 1935
2,069,092	Jackson	Jan. 26, 1937
2,273,906	Spanel	Feb. 24, 1942