Nov. 18, 1958 P. STAMBERGER 2,860,637

DIAPERS

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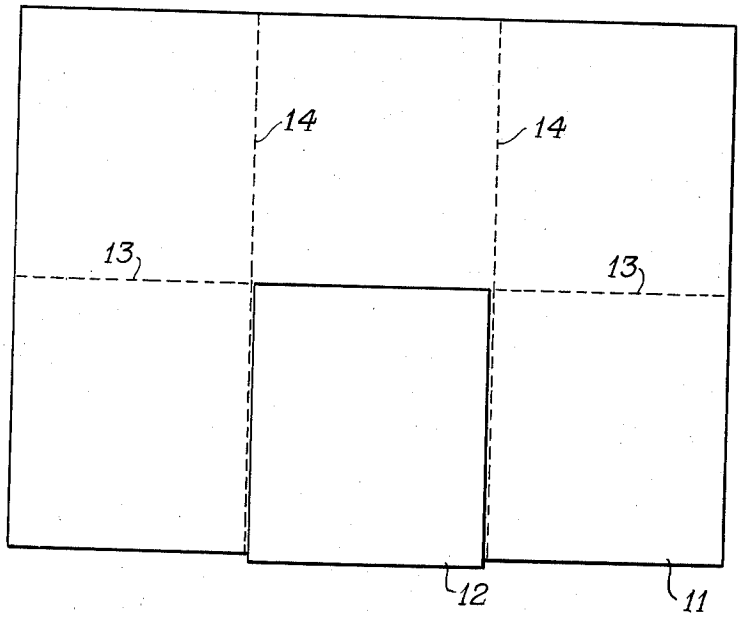


Fig. 1.

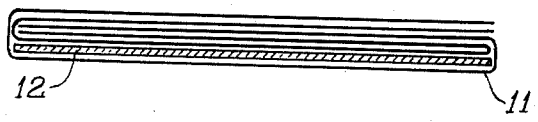


Fig. 2.

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DIAPERS

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6 Claims. (Cl. 128—284)

This invention relates to diapers. Its principal object is to provide a low cost disposable insert for conventional cotton diapers, designed to prevent urine etc. from passing through the diapers and soiling bed clothes, outer garments and the like. The use of the inserts of this invention will sharply reduce diaper rash, as compared with the conventional rubber pants used for the purpose.

The problem of diapers has intrigued countless generations of investigators—how to prevent wet and dirty diapers from wetting and soiling bed clothes, or outer garments worn during the day. To date, the best answer seems to have been rubber pants—this is the only commonly used device. But rubber pants produce diaper rash in very young infants; and some youngsters remain susceptible to diaper rash throughout the diaper period. Furthermore, rubber pants are a chore to wash, and are difficult to keep clean and free of odor.

Many sorts of diaper inserts have been suggested in an attempt to solve the problem; but none of them have been successful.

Inserts of paper have been interposed between the diaper and the skin, to prevent soiling of the diapers. These sheets are sometimes plain absorbent paper; such sheets do not prevent the diaper from becoming saturated with urine, and wetting the bed clothes. Water-repellant papers have also been suggested; but the liquid urine invariably escapes past such a barrier, to wet both diaper and bed clothes. Furthermore, allergic reactions are often encountered.

Multiple layered affairs of cloth and/or paper have been inserted at various places in the diaper, to absorb the urine the diaper itself will not absorb. But capillarity causes wetting of the complete diaper, and of the bed clothes. Furthermore, such diapers are too bulky for comfort, too costly, and the sodden insert is difficult to dispose of—it is much too bulky to flush down the conventional toilet drain.

Another method of attack makes a portion of the diaper structure water repellant. A pocket may be built into the diaper to receive a rubber sheet; or the diaper may be coated with a water repellant film, as in my U. S. Patent 2,570,011, issued October 2, 1951. Such inserts present laundering difficulties. If the water repellant film is not removable or removed during laundering, it is impossible to get effective laundering rapidly, and there is progressive deterioration of the film, while the removal of rubber sheets from pockets of soiled diapers is a disagreeable and difficult chore.

I have discovered how to produce a diaper which can be used without rubber pants, which can be used without danger of soiling bed clothes and the like, is inexpensive, and presents no disposal or extra laundering problem.

According to my invention, I use an ordinary cotton diaper which can be folded in any conventional manner into a plurality of layers—for example, in the conventional six thickness oblong pattern. I insert into the diaper, a sheet of thin material capable of preventing the passage of water, at such a position between the folds

that a majority of the folds of the diaper are between the skin and the insert—most preferably, as in the case of the conventional six thickness oblong pattern, just above the outside fold. In this position, the diaper absorbs most of the urine before it hits the insert, which consequently needs to act only as a barrier to capillary action. In cases where multiple urinations are expected before a change of diapers, a second diaper can be inserted (as is generally done with rubber pants) to produce the same effect.

The accompanying drawings are useful in understanding the invention. In the drawings,

Fig. 1 is a plan view of a diaper with an insert in place, with dotted lines to show how the diaper is to be folded,

Fig. 2 is an elevation of the folded diaper.

On the diaper **11** is laid the water repellant insert **12**; the diaper is folded forward along the fold line **13**, and sideward over the fold lines **14**, to produce a finished folded diaper with the insert **12** separated from the baby's skin by five folds of cloth, and held in place by the outside fold.

In one preferred form of my invention, I select the barrier sheeting so that it can be flushed down a toilet drain, without any danger of clogging the drain. I have found that even highly water repellant sheets can be flushed if they are sufficiently small and thin. Since the size of the insert must be at least just large enough to cover one layer of diaper (100 to 200 square inches) the critical dimension is thickness. The barrier sheets used should in no event be as thick as .002 inch, and preferably are .001 inch or less in thickness.

In this preferred form of the invention, the insert may be any thin flexible sheet material sufficiently resistant to the passage of water to prevent the soaked diaper folds above it from wetting the outside fold. I have used thin lightly waxed paper, for example; paper treated with other water repellants such as silicones and oils; various plastic films such as cellophane, polyethylene, cellulose acetate, polyvinyl chloride and polyvinylidene choride.

In this preferred form of the invention, the inserts can be disposed of by simply dropping the diaper into a toilet bowl, and shaking out the insert while rinsing the diaper out. The insert is then flushed down the drain. The operation adds nothing to what is conventionally done with soiled diapers.

In the most preferred form of my invention, I use as the insert a sheet of thin flexible organic high molecular weight material (high polymer) which will prevent the passage of the relatively cool urine from the diaper—i. e. is resistant to cool neutral to acid aqueous liquids—but which is readily soluble in hot water or in an alkaline aqueous medium such as is used for laundering. Such inserts are unique in that they will act as barriers to the passage of urine in the diaper, but will wash out of the diaper completely on normal laundering. Moreover, the high polymer used for the insert has a detergent effect in water dispersion, acting as a suspending agent for dirt.

The high polymer materials used for these inserts can be either of natural or of synthetic origin. Natural products of this type are for example, films of gelatin coated with a thin waxy layer, or carboxy-methyl cellulose films; synthetic films are for example, made of polyvinyl esters largely saponified to the alcohol, which are soluble in hot but insoluble in cold water, or in synthetic polymers which are either soluble in soap or dilute alkali, such as copolymers of vinyl acetate, or styrene, with maleic or crotonic acids. Commercial products which are useful include the polyvinyl alcohol (partially saponified polyvinyl acetate) sold under the trade name of Elvanol by du Pont, the vinyl acetate-maleic acid copolymers (Polymer C–3) and styrene-maleic acid co-

polymers (Lustrex 810 and 820) sold by Monsanto Chemical.

These films have the advantage that they provide protection, without any necessity for handling soiled diapers beyond ordinary laundering techniques. In both the home and in commercial launderies, they have the further advantage that they provide detergency at the point needed. Aqueous dispersions of these high molecular weight materials act as suspension agents for dirt. As they are attacked by the hot and/or alkaline liquid of the laundering batch, they first form rather concentrated dispersions at the very point where the dirt is concentrated, and help to remove it most effectively, rinsing out with the suspended dirt.

In all the forms of my invention, a diaper is provided with the absorbency of an ordinary diaper, with no substance other than the cotton of the diaper in contact with the skin of the baby, with substantially no added bulk, with almost the full absorbency of the diaper available, with little to no disposal problem—and yet with the advantage that up to the absorbency limit of the diaper, bed clothes and outer garments are protected against becoming wet with urine, without extra exposure of the infant to the possibilities of diaper rash.

I claim:

1. A diaper consisting of a sheet of a textile material folded in a plurality of folds, and a flexible insert sheet lying between the folds, the insert sheet being impervious to the passage of urine from the upper folds of the diaper, and being formed of a high polymer which is soluble in either hot or alkaline aqueous liquids.

2. The diaper of claim 1, in which the high polymer is a synthetic high polymer.

3. The diaper of claim 1, in which the high polymer is a polyvinyl alcohol which is soluble in hot water and insoluble in cold water.

4. The diaper of claim 1, in which the high polymer is an alkali soluble copolymer of vinyl acetate and maleic acid.

5. The diaper of claim 1, in which the high polymer is an alkali soluble copolymer of styrene and maleic acid.

6. An insert sheet for diapers capable of acting both as a layer resistant to the passage of urine and as a detergency aid in laundering the diaper, consisting of a thin sheet of approximately the shape and size of a folded diaper, the sheet being made of a high polymer which is insoluble in cool urine but is soluble in a hot laundering bath.

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