July 10, 1951 S. CRANE 2,560,332

DIAPER

Filed Aug. 17, 1950

Fig. 1.

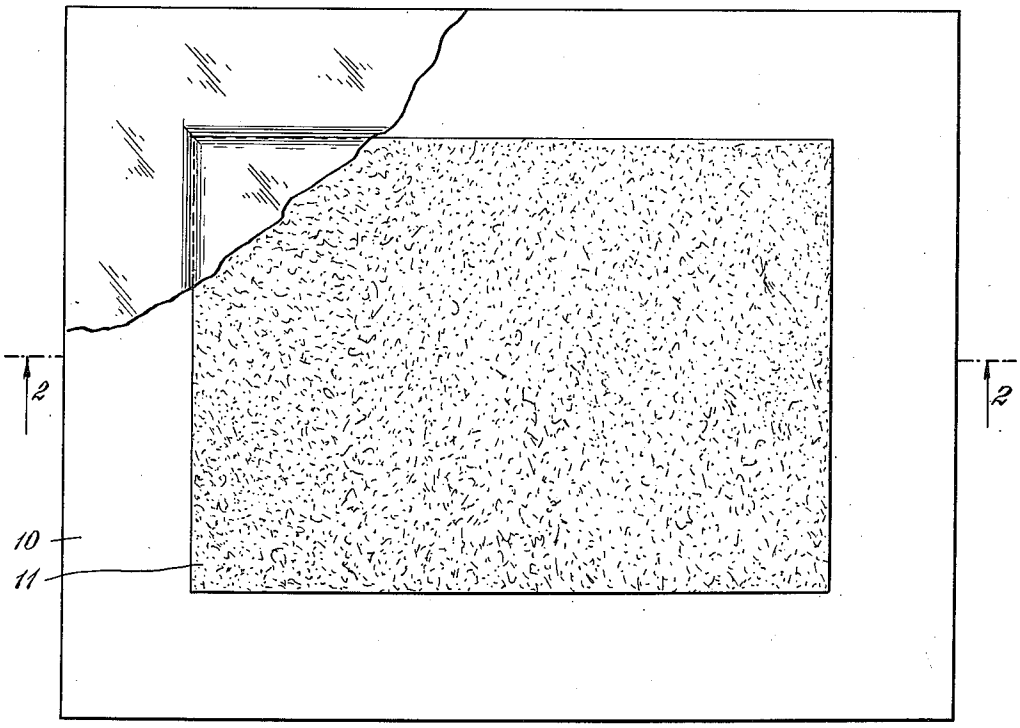



Fig. 2.

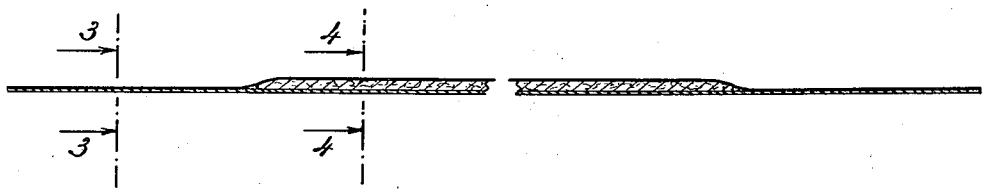
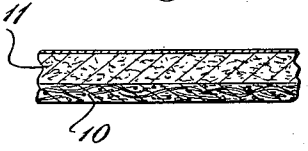



Fig. 3.




Fig. 4.




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## DIAPER

Sigmund Crane, New York, N. Y.

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6 Claims. (Cl. 128—287)

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This invention relates to diapers and is concerned more particularly with disposable diapers, which are to be used once and then thrown away.

At the present time, diapers are ordinarily made of pieces of cloth of suitable shape, which must be laundered after each use. As an infant requires several diapers a day, the storage and washing of used diapers is unpleasant and laborious, so that, in most cities, there are in operation diaper services, which provide their subscribers with supplies of fresh diapers periodically and collect and launder those used. While the cost to the subscriber of a diaper service is ordinarily a few cents per diaper and the subscriber does not have to buy any diapers initially, the use of such a service does not solve the problem of storing used diapers and there are many localities, in which diaper laundry services are not available.

Disposable diapers have been proposed many times heretofore and such diapers have in some cases included a fabric holder, on which a disposable moisture-absorbent pad is mounted, while, in others, the diapers are of unitary construction. None of the proposed disposable diapers has, so far as I am aware, enjoyed any considerable commercial distribution and the lack of success of such diapers may be ascribed either to their cost or to their being unsatisfactory in use, because of breaking down when worn, being harsh so that they cause chafing, etc.

The present invention is, accordingly, directed to the provision of a novel disposable diaper, which can be made to sell at so low a price that it is competitive with diaper services and is not subject to the objections to the prior diapers of the disposable type. The new diaper is soft, supple, and of light weight and of satisfactory tensile strength. The surface of the diaper, which comes into contact with the skin, is resistant, when either dry or wet, to abrasion to such an extent that particles of the material do not rub off and adhere to the wearer. Also, the diaper has a large capacity for absorbing moisture and the outer surface of the diaper is substantially impervious to moisture.

For a better understanding of the invention, reference may be made to the accompanying drawing, in which

Fig. 1 is a plan view, with parts broken away, of one form of the new diaper;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1; and

Figs. 3 and 4 are sectional views on an enlarged scale on the lines 3—3 and 4—4, respectively, of Fig. 2.

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The new diaper comprises a sheet 10 of thin, flexible, moisture-absorbent, abrasion-resistant fabric, which may be a thin woven fabric, but is preferably made of unwoven fibres with the fibres at the surface of the sheet bonded together. Such a sheet may be made of the moisture-transmitting unwoven material disclosed in the patents to Seymour and Schroder, Nos. 2,486,805 and 2,486,806, issued November 1, 1949. A sheet of unwoven fibres of the kind disclosed in the patents is soft, smooth, and flexible and resists abrasion, so that, when in contact with the body, particles thereof are not freed from the sheet, regardless of whether the sheet is moist or dry. The sheet 10, when made of unwoven fibres, preferably has a weight of from 1 to 1.5 oz. per square yard and is made of cellulosic fibres. The sheet 10 has the same shape and dimensions as the diaper, which may be of various shapes and sizes. A satisfactory diaper for most purposes is rectangular in shape and is 11" x 14" in size.

The major portion of the moisture absorbing capacity of the new diaper is provided by a pad 11 of fibrous material, which is of the same shape as the sheet 10 but of less size and lies in contact with one face of the sheet with its edges spaced inward from the corresponding edges of the sheet. The pad is preferably made of cellulosic fibres and of sheet material, which is principally alpha cellulose and has been disintegrated or fluffed to separate the individual fibres. Cellulosic pulp in sheet form, such as bleached sulphite pulp, and various other fibrous moisture-absorbent materials, such as bleached cotton linters and various grades of cotton waste produced by garnetting, etc., may also be used for the pad but the fluffed pulp is preferred because a pad made of it is soft and flexible. In the case of a diaper of a size of 11" x 14", the pad preferably has a size of 7" x 10" and is centered on the sheet, so that margins of the sheet 2" in width are exposed all around the pad. A pad of the size described weighs about 8 to 10 grams with a weight of 9 grams preferred and it is able to hold about 10 times its weight of moisture. In the completed diaper, the pad has been compressed, so that it has a thickness of about $\frac{1}{16}$" to about $\frac{1}{8}$".

The outer face of the diaper is formed by a thin film of waterproof material, which is flexible and not subject to cracking in use and may be applied to the face of the pad and the margins of the sheet exposed around the pad in such manner as to adhere to the fibrous material of the pad and to the sheet. There are numerous

materials, which may be used for the film, as, for example, polyethylene, vinyl plastics, latex, etc. Such materials may be applied in fluent form to produce a film, which is preferably of a thickness of .001" or less. Polyethylene may be employed in molten form and a film of this material of a thickness of .00075" is satisfactory. The material in the film does not penetrate the pad or sheet to such an extent as to stiffen them and the adhesion of the film to the pad and to the margins of the sheet around the pad tends to anchor the pad in place and prevent the fibres therein from shifting to make the pad lumpy.

In the use of the new diaper, it is applied with the sheet in contact with the body and the waterproof film forming the outer facing. The diaper is so soft and supple, that it drapes well and does not tend to crease, and the sheet does not chafe the skin and may be medicated, if desired. The diaper may be held in place by safety pins in the usual way and it has the necessary tensile strength for the purpose.

The affixing of the film of the new diaper to the sheet and pad laminates the three elements of the diaper together, so that they become bonded into an integral unit, which functions as the diaper. The sheet and pad give the diaper a capacity for absorbing and holding moisture much greater than that of ordinary fabric diapers and the capacity of the new diaper may be varied, as desired, by varying the thickness of the pad and sheet. The film prevents the absorbed moisture from coming in contact with and soiling clothing and bedding and eliminates the need for protective clothing, so that the diaper is cooler and more comfortable than other diapers.

While I have described the invention as embodied in a diaper for infant's wear, the unit comprising the sheet, pad, and film may be employed in an appropriate large size as a protective bed sheet for invalids. I, accordingly, intend the term "diaper" as used in the appended claims to include units suitable both for wear and for use as bed sheets.

I claim:

1. A disposable diaper, which comprises a sheet of thin, flexible, moisture-absorbent, abrasion-resistant fabric, a pad of moisture-absorbent fibrous material, the pad being of substantially the same shape as the sheet but of smaller dimensions and lying in contact with one face of the sheet and with its edges spaced inward from corresponding edges of the sheet to expose margins of the sheet beyond all edges of the pad, and a thin flexible film of material impervious to moisture of larger dimensions than the pad and covering the pad and having at least lateral margins exposed beyond the side edges of the pad, the film being affixed to the outer face of the pad and to all margins of the sheet exposed beyond the edges of the pad.

2. A disposable diaper, which comprises a thin flexible, moisture-absorbent, abrasion-resistant sheet of unwoven fibres having its surface fibres bonded together, a pad of moisture-absorbent fibrous material, the pad being of substantially the same shape as the sheet but of smaller dimensions and lying in contact with one face of the sheet and with its edges spaced inward from corresponding edges of the sheet to expose margins of the sheet around the pad, and a thin film of flexible material impervious to moisture and covering and affixed to the outer face of the pad and the margins of the sheet exposed beyond the edges of the pad.



3. A disposable diaper, which comprises a thin flexible, moisture-absorbent, abrasion-resistant sheet of unwoven fibres having its surface fibres bonded together, a pad of fluffed cellulose fibres, the pad being of substantially the same shape as the sheet but of smaller dimensions and lying in contact with one face of the sheet and with its edges spaced inward from corresponding edges of the sheet to expose margins of the sheet around the pad, and a thin film of flexible material impervious to moisture and covering and affixed to the outer face of the pad and the margins of the sheet exposed beyond the edges of the pad.

4. A disposable diaper, which comprises a sheet of thin, flexible, moisture-absorbent, abrasion-resistant fabric, a pad of moisture-absorbent fibrous material, the pad lying in contact with one face of the sheet with all edges of the pad spaced inward from adjacent edges of the sheet to expose margins of the sheet beyond the edges of the pad throughout the periphery of the pad, and a thin layer of flexible material impervious to moisture in contact with the outer face of the pad and wholly covering the pad, the layer projecting beyond the edges of the pad throughout the periphery thereof and having its projecting portions in contact with all margins of the sheet exposed beyond the periphery of the pad and affixed to said margins.

5. A disposable diaper, which comprises a sheet of thin, flexible, moisture-absorbent, abrasion-resistant fabric, a thin layer of flexible material impervious to moisture, the layer being of approximately the same size and shape as the sheet and the layer and sheet lying in registry and having areas extending inward from their margins lying in face to face contact and adhesively secured together, said areas being of substantial width and extending throughout the peripheries of the sheet and layer, the opposed central areas of the sheet and layer within said marginal areas being free of one another, and a pad of moisture-absorbent fibrous material between and in contact with said central areas of the sheet and layer and held in place by the connected margins of the sheet and layer.

6. A disposable diaper, which comprises a sheet of thin, flexible, moisture-absorbent, abrasion-resistant fabric, a pad of moisture-absorbent fibrous material, the pad lying in contact with one face of the sheet with all edges of the pad spaced inward from adjacent edges of the sheet to expose margins of the sheet beyond the edges of the pad throughout the periphery of the pad, and a thin layer of flexible material impervious to moisture in contact with the outer surface of the pad and wholly covering the pad and projecting beyond all edges thereof, the marginal portions of the layer beyond the edges of the pad being adhesively secured in face to face relationship to said margins of the sheet.

SIGMUND CRANE.


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