

May 5, 1964

D. J. GRAY ETAL
FLUSHABLE DIAPER

3,131,693

Filed Nov. 27, 1961

2 Sheets-Sheet 1

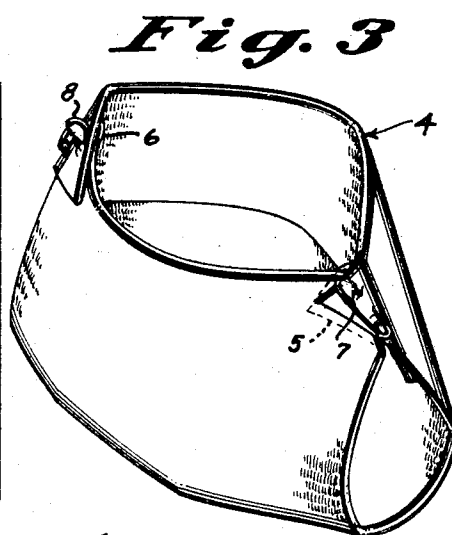
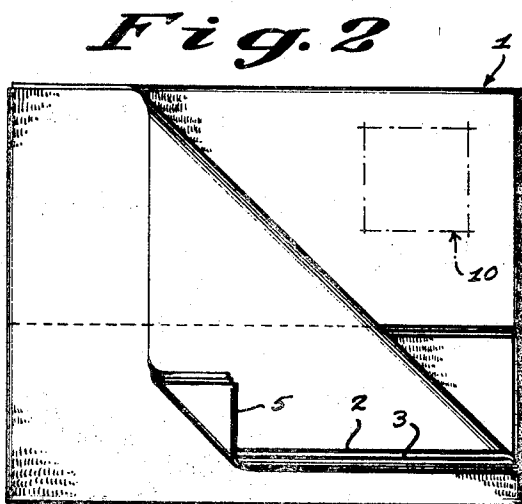
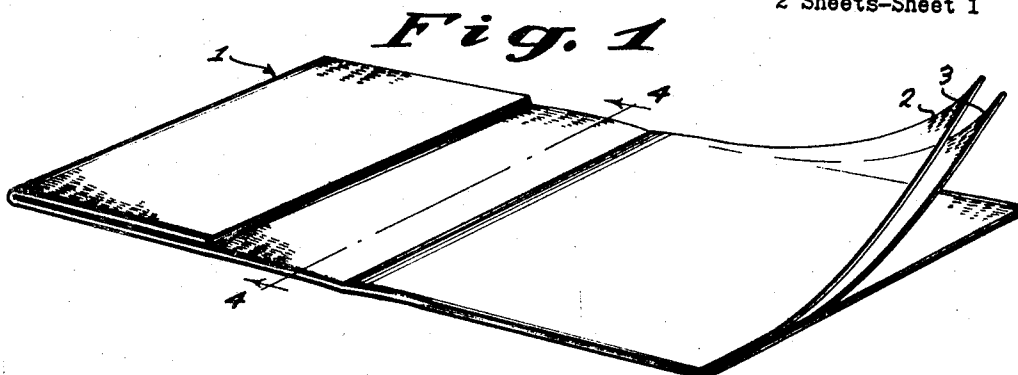
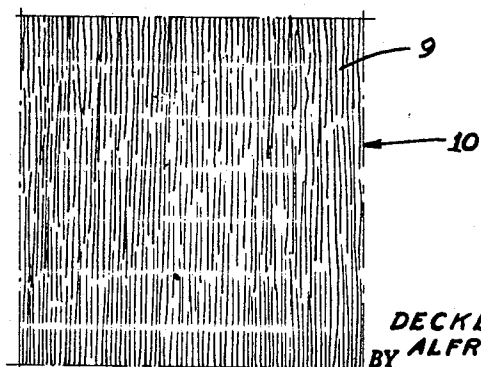


Fig. 4



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Fig. 6

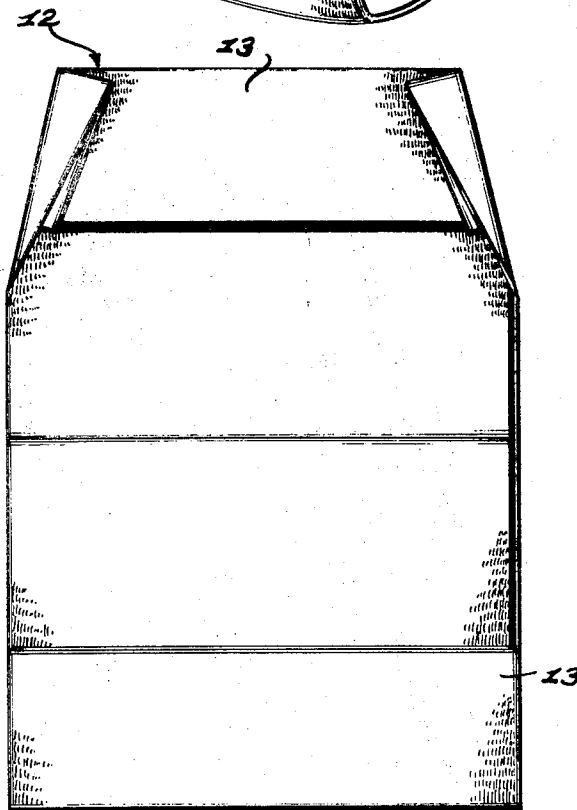
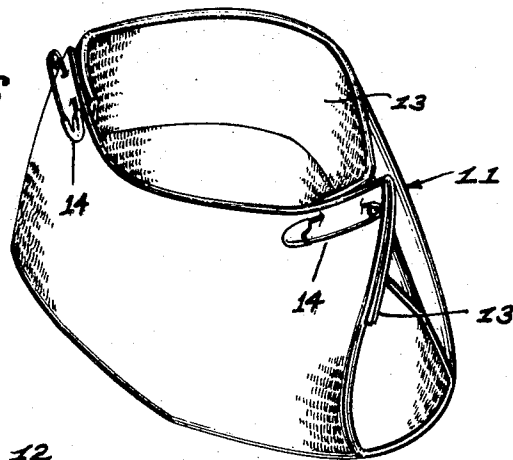


Fig. 7

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FLUSHABLE DIAPER

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Filed Nov. 27, 1961, Ser. No. 155,022

4 Claims. (Cl. 128—284)

This invention relates to a disposable diaper and more particularly to a prefolded, multiple thin-ply, lightweight, paper-like diaper that is adapted for use in conventional manner and can be disposed of safely and reliably by flushing in the ordinary water closet.

Notwithstanding the thinness of the plies, and lightweight, e.g. about 15 grams, of this new diaper, it will function in a manner similar to the substantially thicker, heavier and much more expensive cloth diapers of the same size. One of the remarkable properties of this diaper is that it will absorb and hold as much as six times, 600%, or more of its dry weight, of water or urine. For example this diaper weighing 15 grams dry can be used satisfactorily on a baby over night during which time it will absorb, in a typical case, approximately 90 grams of urine without disintegration of the diaper. The dry weight of this new diaper, about 15 grams, is only about 25% of the dry weight of the usual woven cotton gauze or Birdseye diapers, which weigh about 55 to 65 grams per diaper. Despite the fact that this new diaper is approximately 400% lighter than the usual cloth diaper of good quality, it will function in a similar manner and after use may be disposed of without any handling other than dropping it in a conventional commode or water closet and flushing the fixture.

In view of the thinness of the paper plies and the remarkably light weight of the complete folded diaper, as compared with conventional cloth diapers, it would be expected that this diaper could not be used satisfactorily without being reinforced with scrim or similar woven textile fabric to hold the diaper together when soaking wet. This had been true of prior disposable diapers because of the fact that the paper or similar cellulosic material of which the diaper was made, would not hang together when wet, and therefore required the textile fabric reinforcement. The latter prevented the diaper from being flushed in a water closet because the textile fabric would not dissolve or disintegrate when deposited in a water closet and would clog the fixture.

The requirements of the diaper hanging together in use after absorbing six times or more of its dry weight and without textile fabric reinforcement, and then becoming easily disintegrated and flushable when agitated in a water closet, have been satisfactorily met in the diaper of the present invention. The first requirement of hanging together when wet in use, is met by the exceptionally high "wet hang" characteristics of the fibrous material of which the diaper is composed. The requirement of quick disintegration of the diaper when agitated in a large excess of water, thereby rendering the diaper flushable in a water closet, is met by the high dispersibility of the diaper material. In addition to the critical high "wet hang" and high dispersibility of the diaper material, it must also possess good "dry strength" so that handling, folding, packaging and pinning of the diaper will not tear or puncture the thin paper-like plies.

This combination of high dry strength before use, high wet hang in use, and ease of dispersibility in a water closet after use, is obtained in the diaper of the present invention by a combination of short cellulosic fibers and relatively long, very wide and flat regenerated cellulose fibers. The ribbon like structure of the regenerated cellulose fibers provides large surface area contact between

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the individual regenerated cellulose fibers, and between those fibers and the cellulosic fibers. An illustrative example of the regenerated cellulose fibers is a product manufactured by American Viscose Corporation under the name of "Fiber RD-101" which is a multi-cellular fiber having very thin walls, in the order of 1 to 3 microns, a denier of 1.5, a staple length of about ¼ inch, and a width of about 0.120 mm.

Further details of the present invention will be understood from the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is an elevational view of the flushable diaper in partially folded form with one corner turned up to show the multiple plies;

FIG. 2 is an elevational view of the diaper of FIG. 1 in completely folded form and with one corner folded over to show the folded portion underneath;

FIG. 3 is a perspective view of the complete folded diaper and pinned at two corners to illustrate the form in which it may be worn by a baby;

FIG. 4 is an edge view of the folded diaper taken along line 4—4 of FIG. 1;

FIG. 5 is a plan view of a small portion of one ply of the diaper material illustrating the creped surface;

FIG. 6 is a perspective view of a completely folded and pinned diaper similar to the diaper in FIGURE 3 but using a different folded arrangement; and

FIG. 7 is an elevational view of the partially folded diaper blank used for forming the diaper illustrated in FIGURE 6.

The folded diaper 1 as illustrated best in FIGS. 1 and 2 of the drawing, is composed of a plurality of plies, 2, 3, etc. and is obtained by folding one or more thin sheets of suitable size, e.g. 20" x 40", a sufficient number of times, to provide the proper completely folded size such as 10" x 20", depending upon the size of the baby.

The pinned form of the diaper 4 illustrated in FIG. 3, has the corners 5 and 6 doubled over to assure safe pinning with safety pins 7 and 8. Additional pinning of other parts of the diaper may be effected where desired, depending upon the age and size of the baby.

The creped or crimped surface of the diaper sheet is illustrated at 9 in the small sample 10 of FIG. 5, this sample representing a small cut-out portion 10 of one of the plies shown by the broken line rectangle in FIG. 2. Various other forms of surface deformation, or producing the sheet in the first instance in a softened form like cleansing tissues, for example, may be employed in accordance with the present invention.

The diaper illustrated in FIGURE 6 is formed from the same type of flushable multi-ply paper-like material described above and is substantially the same as the diaper illustrated in FIGURE 3 except for the type of fold used at the corners of the diaper where it is pinned. The diaper shown at 11 in FIGURE 6 and the blank therefor shown at 12 in FIGURE 7 has the ends 13 folded back to provide the proper size of diaper for a young baby. The extent of this folded portion will vary with the varying age and size of the baby. In any event the folded over portion, whether small or large, provides the necessary thickness at the corners of the diaper for safe pinning as illustrated at 14.

The scope of this invention is indicated in the appended claims.

We claim:

1. A lightweight, paper-like baby diaper having the front portion, rear portion, leg apertures and crotch portion when pinned in position on the wearer adapted for use in conventional manner and disposable by flushing in an ordinary water closet, comprising a plurality of thin, paper-like plies which are capable of absorbing at least

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600% of their dry weight of moisture without disintegration, will remain intact when saturated with such amount of moisture and will disperse easily and rapidly when flushed in a water closet, said paper-like plies being composed of a mixture of cellulosic fibers and hydrophilic ribbon like regenerated cellulose fibers having wide flat contacting surfaces to provide strong interbonding between the fibers to give the plies and diaper a relatively high dry strength sufficient for handling, folding and pinning of the diaper and which also give the multiple plies and diaper a sufficiently high wet hang characteristic to prevent disintegration of the product when soaking wet, said diaper having sufficiently high dry strength and wet hang to be used without textile fabric reinforcement.

2. A flushable diaper as defined in claim 1 and in which the corners of the folded diaper are doubled before pin-

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ning to provide sufficient strength for safe pinning and holding of the diaper together during use.

3. A flushable diaper as defined in claim 1 and in which the regenerated cellulose fibers and cellulosic fibers are present in approximately equal proportions.

4. A flushable diaper as defined in claim 1 and in which the cellulosic fiber component consists of cotton linters of relatively short fiber length.

References Cited in the file of this patent

UNITED STATES PATENTS

2,696,819	Lovekin	Dec. 14, 1954
2,788,003	Morin	Apr. 9, 1957
2,890,700	Lonberg-Holm	June 16, 1959