NO-SEW, NO-FOLD DIAPER
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ABSTRACT OF DISCLOSURE

A woven diaper devoid of any stitching and woven of a size ready for use on a wearer without the necessity of folding, and wherein the diaper has a multi-layer, highly absorbent center panel extending filliswise, with the opposite ends thereof being defined by selvages, with the selvages at one end thereof defining an access opening into the center panel for facilitating laundering thereof and to permit the insertion of a pad thereon, if desired, for added absorbency, and wherein a pinning panel is connected to each side of the center panel and constructed to facilitate penetration of pins therethrough, and wherein pinning panels are in turn connected to the pinning panels along the sides thereof and constructed to resist unraveling.

The present invention relates to diapers and more particularly to diapers of the type which are constructed and arranged so as to be ready for use without folding by a person applying the diapers to a wearer.

Diapers of this type are primarily preferred by the commercial laundry or diaper service trade, but are becoming increasingly popular in the retail or home diaper market. Conventional diapers which, as finished and sold, are ready for use on a wearer without additional folding are available and are commonly referred to as "prefold diapers."

Such conventional diapers of this type usually are formed of gauge diaper fabric woven in juxtaposed sections of either single or multi-ply construction. This diaper fabric is cut transversely to the desired size, usually the desired length of the completed diaper, and the resulting blank is then folded one or more times to superpose sections of the blank and to form a generally rectangular pad. This pad is secured in the folded condition by stitching extending longitudinally of the pad at spaced apart points and frequently across the raw, cut ends thereof to provide a neat appearance and to prevent unraveling.

Conventional diapers of this type have been successful to a certain extent, but have several drawbacks or deficiencies which it is believed have limited the success thereof. One of these deficiencies resides in the stitching operation which has heretofore been required for conventional diapers of this type for securing such diapers in folded condition or for finishing the raw, cut edges thereof to prevent unraveling and to provide a neater appearance or both. Such a stitching operation requires a skilled operator to provide a finished diaper of a neat and pleasing appearance with the folded portions thereof in proper registration and with straight, neat lines of stitching. This skilled labor and other factors incident to the stitching operation substantially increase the cost of manufacture of these conventional diapers.

Another deficiency of such conventional diapers resides in undesirable wrinkling or puckering of the diaper fabric which occurs along the lines of stitching after only a few washings due to differential shrinkage between the diaper fabric and the thread forming the lines of stitching. Such wrinkling or puckering of the diaper shortens the effective life of the diaper since the crests or tops of the wrinkles or puckers are subject to excessive wear, and

is a source of irritation to the wearer. Also, such wrinkles or puckers provide an unsightly and hence undesirable appearance to the diapers.

With the foregoing in mind, it is an object of the present invention to provide a novel diaper which obviates the aforementioned deficiencies of conventional diapers.

Another object of the present invention is to provide a diaper which is woven of a size ready for use on a wearer without the necessity of folding and which is devoid of any stitching thereby obviating the above-noted undesirable wrinkling or puckering upon washing of the diaper, and which is constructed to provide the desirable characteristics of absorbency, easy cleanliness, easy pinability, anti-fraying and anti-raveling.

A more specific object is to provide a diaper of the type described wherein the ends of the diapers are defined by selvages and the sides by pinning panels for obtaining greater wear resistance on all edges of the diaper.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a plan view of a diaper embodying the features of the present invention with a portion broken away for clarity in viewing the structure therebeneath;

FIGURE 2 is a longitudinal sectional view taken substantially along line 2—2 in FIGURE 1;

FIGURE 3 is a longitudinal sectional view taken substantially along line 3—3 in FIGURE 1;

FIGURE 4 is a transverse sectional view taken substantially along line 4—4 in FIGURE 1; and

FIGURE 5 is a perspective view of the diaper shown in FIGURE 1 and looking toward the right-hand end of the diaper as shown in FIGURE 1.

Referring now more specifically to the drawings, an elongate multi-layer woven diaper generally indicated at 10 is shown and is woven of a size ready for use on a wearer without the necessity of folding and which is devoid of any stitching. Diaper 10 is formed of fabric comprising interwoven warp and filling yarns, which are preferably formed of absorbent material, such as cotton or rayon, and of sizes within the range of conventional yarn sizes for gauze diaper fabric. Such ranges are about 20s to 30s in the warp and about 25s to 40s in the filling. Also, such warp and filling yarns are preferably formed with a standard twist multiplier.

In the embodiment illustrated in the drawing, diaper 10 is formed by cutting the same from a fabric which is woven in web form with the warp yarns extending longitudinally thereof and the filling yarn extending transversely thereof and with selvages 11 and 12 defining opposite sides thereof. In diaper 10, selvages 11 and 12 preferably define opposite ends of the diaper and the cut edges define opposite sides thereof. In this respect, the fabric is preferably woven of a width between selvages 11 and 12 corresponding to the desired length of the finished diaper 10 with suitable allowance for shrinkage during fabric finishing processes so that there is no necessity for folding the diaper before applying the same to a wearer.

Diaper 10 is woven to include in juxtaposed relation an elongate central panel 13, a pair of pinning panels 14, 15 disposed on opposite sides of central panel 13 and connected thereto along the adjacent side edges thereof, and a pair of pinning panels 16, 17 disposed on opposite sides of the pinning panels 14, 15 and connected to the outer side edges thereof. All of these panels extend longitudinally in a fillwise direction between selvages 11 and 12 defining opposite ends of diaper 10.

Pinning panels 16 and 17 are preferably of single-layer construction and have the outer side edges thereof pinned to provide anti-ravel characteristics, which pinned edges
are formed during the transverse severing of the fabric web to form diaper 10. Pinking panels 16 and 17 may be of any desired fabric construction and weave design sufficient to provide the anti-velveting characteristics while still offering sufficient softness to prevent irritation to the skin of a wearer, and one example of such a fabric construction is about 160 warp yarns per inch and about 90 filling picks per inch interwoven in a plain weave design. Pinking panels 14 and 15 are preferably of multi-layer construction and, in the embodiment illustrated in the drawings, the pinning panels 14 and 15 comprise respective pairs of fabric layers 20, 21 and 22, 23. These fabric layers 20, 21 and 22, 23 are preferably interwoven at opposite ends thereof along selvages 11 and 12 and along opposite sides thereof where the same are joined to center panel 13 and pinking panels 16 and 17. Also, each fabric layer of pinking panels 14 and 15 is preferably of a more open weave construction than pinking panels 16 and 17, but of sufficient warp and filling yarns per inch and of a weave design of sufficient interfacing to securely hold diaper pins and to minimize fraying of the yarns by such pins, while still being of sufficient looseness to permit easy insertion of pins therethrough and of a soft and yielding nature on the body of the wearer. While these layers of fabric may be of any construction and design to provide these desirable characteristics, one example thereof is a fabric construction of a warp end count of about 30 ends per inch and a filling pick count of about 25 picks per inch interwoven in a 1/2 warp float twill weave design.

Center panel 13 is of multi-layer construction and preferably has a greater number of layers therein than pinning panels 14 and 15. Also, center panel 13 preferably has greater absorbency than pinning panels 14 and 15 to provide the greatest absorbency in diaper 10 where it is needed most.

These layers of center panel 13 are arranged in upper and lower sections 24 and 25 (FIGURE 5), each of which preferably includes a plurality of fabric layers therein to provide the above-noted greater number of layers and greater absorbency in center panel 13 than in pinning panels 14 and 15. In the embodiment illustrated in the drawings, sections 24 and 25 each includes a pair of fabric layers 26, 27 and 30, 31, respectively. Preferably, each of the layers of center panel 13 are of a more open weave construction than the layers of pinning panels 14 and 15, and consequently of pinning panels 16 and 17 for greater absorbency, ease of cleaning and faster drying. However, each of these layers have a fabric construction sufficient to provide good wear characteristics and preferably, this fabric construction has a warp end count and filling pick count within the range of conventional gauze diaper fabric. Such ranges are a warp end count of about 30 to 40 and a filling pick count of about 30 to 40. One example of a fabric construction of this type is one having a warp end count of about 40 and a filling pick count of about 50 in each layer of center panel 13. The warp and filling yarns in these layers may be woven in any desired weave design to provide good wear resistance, softness and absorbency, one example of which is a 2/1 warp float twill.

Sections 24 and 25 of center panel 13 are woven with independent superposed selvages 32 and 33 (FIGURE 5) at one end of the diaper, which selvages form a portion of selvage 11. Selvages 32 and 33 define an access opening into the interior of the diaper. The layers 26 and 27 of upper section 24 are interwoven along selvage 32 at the foresaid one end of center panel 13, but are preferably separate and independent of each other at the other end of center panel 13. Likewise, layers 30 and 31 of lower section 25 are interwoven along selvage 33, but are preferably separate and independent of each other at the other end of center panel 13. At this other end, outer layer 26 of upper section 24 and outer layer 30 of lower section 25 are preferably interwoven and the respective inner layers 27 and 31 of these sections are also preferably interwoven to form a closed end for center panel 13 while permitting at least limited movement between the outer and inner layers for increased wearability and to prevent the formation of a bulky selvage or seam.

Sections 24 and 25 are preferably interwoven along opposite sides of center panel 13 but inner layers 27 and 31 are independent of each other, except at the side edges and at the closed end of center panel 13 whereby center panel 13 is of tubular form which is open at one end and closed at the other end. This construction of center panel 13 materially aids in the laundering of diaper 10 since cleaning fluids may more readily penetrate therethrough and the drying rate of center panel 13 is enhanced thereby. Also, this construction permits the insertion of a liner or pad into center panel 13 if desired for added absorbency, which added absorbency might be desired where the diaper is to be worn for an extended period of time, such as at night.

Further, this tubular construction of center panel 13 makes diaper 10 eversible and, when diaper 10 is everted, pinning panels 14, 15 and pinning panels 16, 17 are positioned within center panel 13 to form an absorbent interliner therebetween. In addition to this integral absorbent interliner feature, this everted diaper also provides a protector fit for small or new-born infants since the width of the everted diaper is the same as the width of center panel 13 and, hence, considerably less than the width of non-everted diaper 10. In this respect, diaper 10 should be woven in such a manner that the combined width of pinning panels 14, 15 and pinning panels 16, 17 is such that an interliner of substantial absorbency will be formed when diaper 10 is everted. Preferably, these pinning and pinning panels have a combined width of at least about one-half of the width of diaper 10.

The eversibility of diaper 10 also provides greater wearability therein since the normally internal layers 27 and 31 of center panel 13 are positioned on the exterior of the everted diaper for a first wear period and then layers 26 and 30 are positioned on the exterior of the diaper when the same is everted back to its original condition.

It is therefore believed to be apparent that a novel diaper is provided which is woven of a size ready for use on a wearer without the necessity of folding and which is devoid of any stitching and therefore obviates the deficiencies of conventional diapers. Further, a diaper is provided which has novel structural features providing ease of cleaning, greater wear resistance on the surfaces and along the edges, and improved appearance.

In the drawings and specification, there has been set forth a preferred embodiment of the invention and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

We claim:
1. An elongate, woven diaper characterized by being devoid of any stitching and by being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides thereof on the center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels connected along outer side edges of said pinning panels, all of said panels being visually separately distinct and extending longitudinally of the diaper in the direction of said filling yarns, said center panel being of multi-layer construction and having the layers thereof arranged in upper and lower sections, and said upper and lower sections being woven at one end thereof with superposed independent selvages separated from each other and defining an access opening there-
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between at one end of said center panel for access to the interior thereof.

2. An elongate, woven diaper characterized by being devoid of any stitching and by being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels connected along outer side edges of said pinning panels, all of said panels being visually separately distinct and extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels extending along outer side edges of said pinning panels, all of said panels being visually separately distinct and extending longitudinally of the diaper in the direction of said filling yarns, said center panel being of multi-layer construction and having greater absorbency than said pinning and pinching panels, the layers of said center panel being arranged in upper and lower sections, said upper and lower sections being woven at one end thereof with superposed independent selvages separated from each other and defining an opening therebetween at one end of said center panel for access to the interior thereof.

3. An elongate, woven diaper characterized by being devoid of any stitching and by being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels extending along outer side edges of said pinning panels, all of said panels being visually separately distinct and extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels extending along outer side edges of said pinning panels, all of said panels being of multi-layer construction and having greater absorbency than said pinning and pinching panels, the layers of said center panel being arranged in upper and lower sections, said upper and lower sections being woven at one end thereof with superposed independent selvages separated from each other and defining an opening therebetween at one end of said center panel for access to the interior thereof.

4. An elongate, woven, multi-layer diaper characterized by being devoid of any stitching and by being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels extending along outer side edges of said pinning panels, all of said panels being visually separately distinct and extending longitudinally of the diaper in the direction of said filling yarns, said pinning panels being of multi-layer construction, said center panel also being of multi-layer construction and having greater absorbency than said pinning panels, said center panel including upper and lower sections woven at one end thereof with superposed independent selvages separated from each other and defining an opening therebetween at one end of said center panel for access to the interior thereof, each of said upper and lower sections having a plurality of layers with the layers of said upper section being interwoven with corresponding layers of said lower section at the other end of said center panel to form a closed end for the center panel.

5. An elongate, woven, multi-layer diaper characterized by being devoid of any stitching and by being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels connected along outer side edges of said pinning panels, all of said panels being of multi-layer construction and having greater absorbency than said pinning and pinching panels, the layers of said center panel being arranged in upper and lower sections, said upper and lower sections being woven at one end thereof with superposed independent selvages separated from each other and defining an opening therebetween at one end of said center panel for access to the interior thereof.

6. An elongate, woven, multi-layer diaper characterized by being devoid of any stitching and by being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels extending along outer side edges of said pinning panels, all of said panels being of multi-layer construction and having greater absorbency than said pinning and pinching panels, the layers of said center panel being arranged in upper and lower sections, said upper and lower sections being woven at one end thereof with superposed independent selvages separated from each other and defining an opening therebetween at one end of said center panel for access to the interior thereof, each of said upper and lower sections having a plurality of layers with the layers of said upper section being interwoven with corresponding layers of said lower section at the other end of said center panel to form a closed end for the center panel.

7. A diaper according to claim 3 wherein said upper and lower sections of said center panel are interwoven along their side edges, and the layers of said pinning panels are interwoven at opposite ends thereof.

8. An elongate, woven, multi-layer diaper characterized by being devoid of any stitching and by being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels connected along outer side edges of said pinning panels, all of said panels being of multi-layer construction and having greater absorbency than said pinning and pinching panels, the layers of said center panel being arranged in upper and lower sections, said upper and lower sections being woven at one end thereof with superposed independent selvages separated from each other and defining an opening therebetween at one end of said center panel for access to the interior thereof, each of said upper and lower sections having a plurality of layers with the layers of said upper section being interwoven with corresponding layers of said lower section at the other end of said center panel to form a closed end for the center panel.
of folding, said diaper being formed of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper and with selvages defining opposite ends of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels connected along outer side edges of said pinning panels, all of said panels extending longitudinally of the diaper in the direction of said filling yarns, said pinning panels being of single-layer construction, said pinning panels being of multi-layer construction, said center panel also being of multi-layer construction and having a greater number of layers than said pinning panels, said center panel including upper and lower sections wove at one end thereof with superposed independent selvages separated from each other and defining an access opening therebetween at one end of said center panel for access to the interior thereof, and each of the layers of said center panel being of a more open weave construction than the layers of said pinning panels and each of the layers of said pinning panels being of a more open weave than said pinning panels to provide the greatest absorbency and easy cleanability in the center panel where the same are needed most while providing added strength and resistance to fraying in the pinning panels and anti-ravel characteristics in the pinning panels.

An elongate, woven, multi-layer diaper characterized by being devoid of any stitching and being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of fabric layers of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper and with selvages defining opposite ends of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels connected along outer side edges of said pinning panels, all of said panels extending longitudinally of the diaper in the direction of said filling yarns, said pinning panels being of single-layer construction and having the outer edges thereof pined to provide anti-ravel characteristics, said pinning panels comprising a pair of layers interwoven along opposite sides and ends thereof, said center panel comprising upper and lower sections wove at one end with superposed independent selvages separated from each other and defining an access opening therebetween at one end of said center panel to form a closed end for said center panel, and each of the layers of said center panel being of a more open weave construction than the layers of said pinning panels and each of the layers of said pinning panels being of a more open weave construction than said pinning panels to provide the greatest absorbency and easy cleanability in the center panel where the same are needed most while providing easy pinability and anti-fray characteristics in the pinning panels and anti-ravel characteristics in the pinning panels.

An elongate woven diaper characterized by being devoid of any stitching and being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of interwoven warp and filling yarns, with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel and at least one pair of elongate panels extending along opposite sides of said center panel in juxtaposed relation thereto, all of said panels extending longitudinally of the diaper in the direction of said filling yarns, said center panel being woven to provide greater absorbency and easy cleanability in the center panel where the same are needed most while providing added strength and resistance to fraying in the pinning panels and anti-ravel characteristics in the pinning panels.

A diaper according to claim 11, wherein the layers of said center panel are more than two in number.

A diaper according to claim 11, wherein said pair of panels defines opposite side edges of the diaper and is constructed to resist raveling along the side edges of the diaper.

An elongate, woven diaper characterized by being devoid of any stitching and being woven of a size ready for use on a wearer without the necessity of folding, said diaper being formed of fabric layers of interwoven warp and filling yarns with the filling yarns extending longitudinally of the diaper, said diaper comprising an elongate center panel, a pair of elongate pinning panels extending along opposite sides of said center panel in juxtaposed relation thereto and being connected therealong, and a pair of elongate pinning panels connected along outer side edges of said pinning panels and defining the side edges of the diaper and constructed to resist side edge raveling of the diaper, all of said panels being visually separately distinct and extending longitudinally of the diaper in the direction of said filling yarns, said center panel being of multi-layer construction and having the layers thereof arranged in upper and lower sections, and said upper and lower sections being wove at one end thereof with superposed independent selvages separated from each other and defining an access opening therebetween at one end of said center panel for access to the interior thereof.

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