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DISPOSABLE ELASTIC BANDAGE

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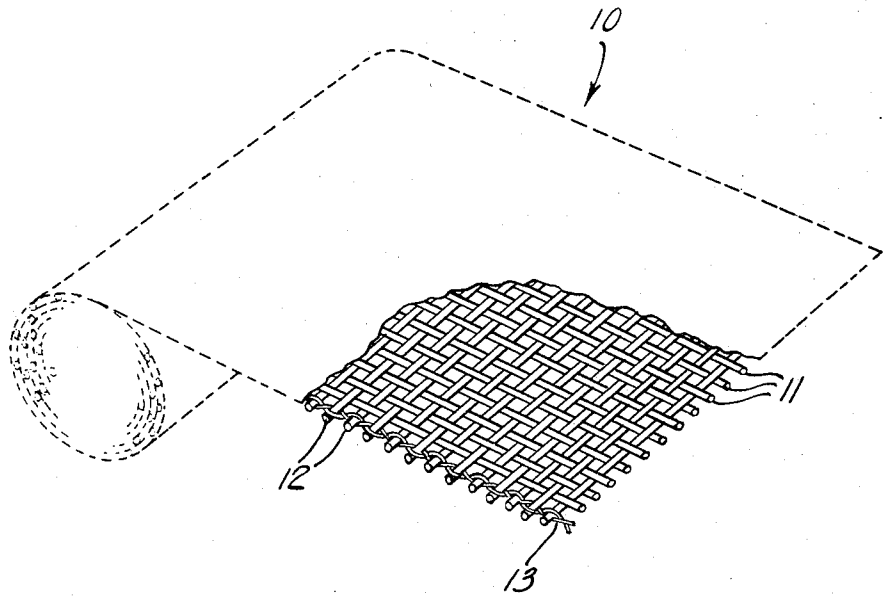

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DISPOSABLE ELASTIC BANDAGE

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This invention relates to woven elastic fabrics. More particularly, it relates to open woven, disposable elastic fabrics having stiffness in the filling direction and which are suitable for use as elastic bandages.

Elastic bandages are primarily used for wrapping injuries, such as sprains, strains, twists, etc. When so used, it is desirable that they meet certain prerequisites, such as adequately covering the area wrapped with the bandage, yet allowing penetration of air; providing support for the injured area while being conformable especially when used to wrap ankles, elbows, etc.; and in many instances the bandage must not prevent the wearing of apparel over the bandage, such as a shirt over a wrapped elbow or a shoe and sock over a wrapped ankle.

In some instances such bandages are used over and over again; however, there are times when the bandage must be considered to be disposable, such as when placed on a patient by a hospital or doctor as the patient is being discharged.

The bandages of the present invention are both elastic and disposable. Furthermore, they have good stiffness in the nonstretch direction (width) and provide excellent support. They are comfortable and will support elbows, ankles, etc. Furthermore, the bandages allow for the passage of air, providing a cool, comfortable bandage, and provide suitable coverage of the area wrapped. They are also neat enough to conform to the body area in such a manner that shoes, shirts or other apparel may be easily worn over the bandage.

The disposable elastic bandage of the present invention has from about 15 to 25 warp yarns per inch running in the direction of the length of the bandage and from about 5 to 15 filling yarns per inch running in the direction of the width of the bandage. The warp and filling yarns are woven together in a balanced weave, preferably a plain weave, and even more preferably a 1/1 weave, though any balanced weave, such as a basket weave, leno weave, etc., may also be used provided there are an equal number of yarn ends up as there are yarn ends down in the final woven fabric. The longitudinal edges of the bandage are sealed, such as by adhesive or by a leno weave or similar techniques, to prevent raveling of the bandage. The warp yarns are stretch yarns selected from the group comprising core spun yarns and wrapped yarns. The outer covering of the yarns is preferably cotton, and the final yarn has a size of from about 10's to 30's. The stretch warp yarn should have an elongation of at least 110 percent. The warp yarns will usually have an elongation of from about 110 percent to 250 percent and preferably from about 150 percent to 190 percent. The filling yarns are nonstretch yarns, preferably of spun staple fiber. The filling yarns have a twist multiplier of from about 2.8 to 4.5 with the fiber having a denier of from about 5.5 to 15 and a staple length of at least 2.5 inches.

By controlling the denier and staple length of the fiber used in the filling yarns and the twist of the filling yarns, in conjunction with the type of warp yarns used, the bandage may be made economically enough so that it is disposable and unexpectedly have filling stiffness and support suitable for elastic bandage purposes along with the other desirable properties of such a bandage.

The invention will be more fully described in conjunction with the accompanying figure which is a view in perspective of one form of the disposable elastic bandage of this invention.

Referring to the figure there is shown a disposable elastic bandage **10** comprising stretch warp yarns **11** and nonstretch filling yarns **12** woven in a balanced 1/1 weave with the edge **13** sealed against raveling by the warp and filling yarns on the edges being woven in a leno weave.

To provide suitable stretch along the length of the bandage the warp yarns must have high power, high elongation and high recovery. Suitable yarns having these properties are either core spun yarns or the wrapped yarns. Yarns such as Helanca yarns or the various texturized type of stretch yarns do not have sufficient elasticity, power and recovery for use as elastic bandages. Though an uncovered yarn may be used, it is preferred that it be covered to give the final bandage an acceptable hand and to aid in the weaving of the fabric. The preferable warp yarn contains a spandex core covered with cotton fiber. Another suitable core material would be rubber. Though cotton is preferred as the covering fiber, other fibers, such as rayon, nylon, etc., may also be used, but for economical reasons, the cotton covering is preferred.

The number of yarns in the warp direction may vary from about 15 yarns per inch to about 25 yarns per inch, and preferably is in the range of from about 17 to 20 yarns per inch. The size of the warp yarns may vary from about 30's down to 10's. The stretch portion of the warp yarns should be about 20 percent by weight if a 30's yarn is used. The total denier of the stretch portion of the stretched fabric should be from about 495 denier per inch to 825 denier per inch and preferably from about 560 denier per inch to 660 denier per inch.

It is important that both the size and the count of the warp yarns be in the ranges given above in order to provide adequate power, stretch and recovery properties and make the fabric economically disposable. If more yarns are used or finer yarns are used, the cost of the product becomes excessive, whereas if heavier yarns or fewer yarns are used, the product will not have the desirable power or cover properties for an elastic bandage.

A suitable warp yarn would be a 140 denier spandex core stretched 4 times and spun into a 30's cotton yarn so that the final core spun yarn had the equivalent count of a 30's cotton.

Whether core spun or wrapped yarns are used, they should have an elongation of at least 110 percent. Stretch yarns having elongations of from 110 percent to about 250 percent have been found suitable for use in the elastic bandages of the present invention, and it is preferred that the stretch yarn have an elongation of from about 150 percent to 190 percent.

When using core spun yarns, the twist multiplier of the stretch warp yarn should be from about 3.5 to 5.0, and preferably from about 4 to 4.5. If the twist multiplier is increased from this range, the strength of the yarn is not satisfactory, and the bandage will roll or curl upon itself along its length, whereas if the twist multiplier is too low, the tensile strength of the yarn is unsatisfactory.

It is preferred that the filling yarns be spun fiber yarns. The preferred fibers are rayon fibers although nylon, polyester, or other suitable fibers may also be used. The filling yarns should have a size equivalent to about a 2's to 8's cotton yarn, and preferably from about 3's to 6's cotton yarn. The number of yarns in the filling direction may vary from about 5 to 15 yarns per inch, preferably from about 8 to 10 yarns per inch. There must be a sufficient number of filling yarns to provide good cover and support, but the number of filling yarns must be kept to a minimum to make a disposable bandage. When using so few filling yarns, the denier of the fiber must be from about 5.5 to about 15, and preferably from about 8 to 15 denier, and the length of the fiber must be a minimum

of 2.5 inches. The combination of the denier and staple length is extremely important to provide stiffness in the filling direction and support to the bandage without providing a fuzzy bandage.

When using yarns of the denier and staple length given above, it is desirable that the twist multiplier be in the range of from about 3.5 to 4.0. If a twist multiplier greater than 4.5 is used, the final bandage will curl and roll upon itself along its longitudinal edges, whereas if a twist multiplier lower than 2.8 is used, the bandage will not have sufficient support and stiffness for an elastic bandage.

The warp and filling yarns are woven together in a balanced type weave, such as a 1/1 weave, basket weave, leno weave or similar weave so that there are equal number of yarn ends up as there are down, that is, there are an equal number of yarns brought to one surface of the fabric as there are yarns brought to the other surface of the fabric. This is desired in order that the final bandage will have uniform support and cover and will also have a reduced tendency to curl. Furthermore, because of the few number of yarns per inch in each direction, which is generally considered an open woven fabric, the balance weave is desired in order to produce good cover of the yarns while still maintaining suitable air and moisture permeability.

The longitudinal edges of the fabric must be sealed against raveling. This may be done by a chemical bonding treatment, or if fabric is woven on a full width loom, then every few inches across the width of the loom, the fabric may be woven in a leno weave and slit along this weave into narrow fabrics so that the narrow fabric will not ravel along its edges. If the fabric is woven on narrow looms, such as tape looms, the yarns edges may be tucked, etc., to prevent raveling as is common practice on these looms.

The disposable elastic bandage of the present invention is considered an open woven fabric which gives a very low warp cover and has very little filling support from the warp yarns. The low yarn count and the types of yarns used make this fabric extremely economical. Unexpectedly when the filling yarns are spun fiber yarns using high denier fiber combined with a desired staple length, the fabric has excellent filling support. Also the spun yarns provide adequate bulk and cover in the final fabric which is generally lacking because of the low end construction. By the use of the construction described above, a very comfortable and cool fabric is produced which conforms extremely well to even the most difficult areas of the anatomy, such as elbows and ankles. Furthermore, the fabric is thin enough and neat enough and provides suitable support so that few layers are required in a bandage wrap increasing the comfort and allowing apparel to be worn over the wrap.

One technique for controlling the fuzziness of the filling yarns is to singe the short ends of fibers which stick out from the yarn; however, this is an expensive process, and in order to make a disposable product, it is important that suitable staple length and fiber denier be used to avoid this singeing process. It is also important that disposable elastic bandages be made from materials which are not chemically treated. Chemical treatments may produce stiffness and other desirable properties of a bandage; however, chemical treatments are not desirable because of the medical end uses. The bandages of the present invention have no chemical treatments which might cause contamination and toxicity in the end product.

As many widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is understood that this invention is not to be limited by the specific embodiments thereof except as defined in the appended claims.

What is claimed is:

1. A disposable elastic bandage comprising: from about 15 to 25 warp yarns per inch running the length of said bandage, from about 5 to 15 filling yarns per inch running the width of said bandage, said warp and filling yarns being woven in a balanced weave with substantially equal number of ends up as there are ends down, the longitudinal edges of said bandage being sealed to prevent raveling, said warp yarns being stretch yarns selected from the group consisting of core spun yarns and wrapped yarns, and said warp yarns having a yarn size of from about 10's to 30's and an elongation of at least 110%, and said filling yarns being nonstretch yarns of spun staple fiber, said fiber having a denier of from about 5.5 to 15 and a staple length of at least 2.5 inches, and said yarn having a twist multiplier from about 2.8 to 4.5, whereby said bandage has bulkiness, smoothness, good cover factor, conformability and substantially no tendency to curl along its edges.

2. The disposable elastic bandage of claim **1** having from about 17 to 20 warp yarns per inch and from about 8 to 10 filling yarns per inch.

3. The disposable elastic bandage of claim **1** wherein the balanced weave is a 1/1 weave.

4. The disposable elastic bandage of claim **1** wherein the balanced weave is a leno weave.

5. The disposable elastic bandage of claim **1** wherein the longitudinal edges of said bandage are woven in a leno weave to prevent raveling.

6. The disposable elastic bandage of claim **1** wherein the warp yarns are core spun yarns having a cotton cover.

7. The disposable elastic bandage of claim **1** wherein the warp yarns are core spun yarns of a spandex core and

8. The disposable elastic bandage of claim **1** wherein the warp yarns are core spun yarns of a spandex core and a cotton cover, said yarns having a twist multiplier of from about 3.5 to 5.0.

9. The disposable elastic bandage of claim **1** wherein the filling yarns are of spun rayon fiber.

10. The disposable elastic bandage of claim **1** wherein the filling yarns have a twist multiplier of from about 3.2 to 3.8.

11. A disposable elastic bandage comprising: from about 17 to 20 warp yarns per inch running the length of said bandage, from about 8 to 10 filling yarns per inch running the width of said bandage, said warp and filling yarns being woven in a 1/1 weave, the longitudinal edges of said bandage being woven in a leno weave to prevent raveling, said warp yarns being stretch core spun yarns having a spandex core and a cotton cover, and said warp yarns having a yarn size of from about 10's to 30's and a twist multiplier of from about 4.0 to 4.5, and said filling yarns being nonstretch yarns of spun rayon fiber, said fiber having a denier of from about 8 to 15 and a staple length of at least 3 inches, and said yarn having a twist multiplier from about 3.2 to 3.8, whereby said bandage has bulkiness, smoothness, good cover factor, conformability and substantially no tendency to curl along its edges.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,409,008 November 5, 1968

John A. Mortensen et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 32, "comfortable" should read -- comformable --. Column 4, line 33, "of" should read -- having --; same line 33, cancel "and".

Signed and sealed this 3rd day of March 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

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Commissioner of Patents