June 13, 1933. G. B. MEAGHER 1,914,148

ELASTIC ARTICLES AND METHOD OF TREATING SAME

Filed Oct. 27, 1930

Fig-1

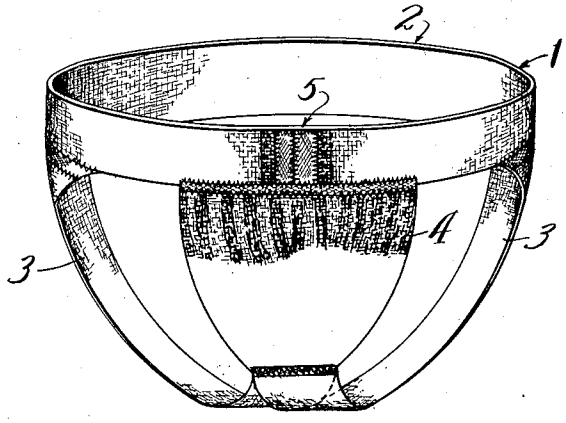


Fig-2

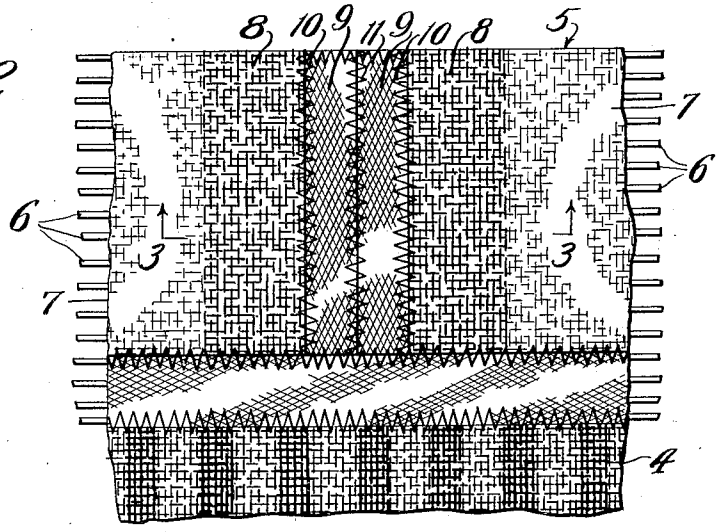


Fig-3



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UNITED STATES PATENT OFFICE

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ELASTIC ARTICLES AND METHOD OF TREATING SAME

Application filed October 27, 1930. Serial No. 491,474.

This invention relates to elastic fabric and a method of treating the same to prevent it from prematurely breaking down and losing its elasticity, the present application being a continuation in part of my application Serial No. 438,970, filed March 26, 1930.

In the manufacture of such articles as include in whole or in part, elastic fabric, stitching is employed to connect or attach an end of the fabric to an associated member or to other portions of the same piece, whether the same in itself be elastic or inelastic. While stitching is the best known means now extensively employed for this purpose, it is open to several objections, even when used in connection with textile tips and reinforcing tapes.

The elastic fabric with which my invention is particularly concerned is of the kind having elastic threads upon which are woven inelastic threads which in turn are interwoven with respect to each other. Such fabric is largely employed in the manufacture of athletic supporters, hose supporters, anklets, elastic bandages, corsets and allied articles.

Fabric of this kind is usually made in a web or strip form and is thereafter cut transversely or otherwise into the desired pieces, according to the character of the article to be made. When the severed end of such a piece of fabric is to be secured to another piece of fabric or to another end of the same piece, one or more lines of stitching is usually employed. In some instances each cut edge is bound or tipped with a reinforcing tape before it is connected to an associated part by stitching. The stitching, of course, is machine work and during the stitching operation the needle often severs certain of the elastic threads. Under such conditions it is apparent that when the finished article is being worn, and the fabric as a whole is stretched, the elastic threads are placed under greater tension with the result that the severed elastic threads recede because of the natural contractive action of these threads. Thus, all of the strain is imposed upon the remaining unsevered elastic threads which more readily yield or stretch so that the fabric becomes loose and wrinkles or puckers in those areas beyond said severed ends. The final result is that the fabric breaks down prematurely and loses its original elasticity and hence its ability properly to serve its intended purpose.

In addition to the danger of loss of elasticity arising from the cutting of the threads, there is a constant tendency for the elastic threads to come out of the joint even though they may not have been cut by the sewing needle. When the fabric is repeatedly stretched the rubber threads have a tendency to slide through the sewing. After the garment has been washed a few times the sewing has loosened considerably and the rubber threads are then likely to pull out quite easily.

I have found that by suitably incorporating a binder of vulcanized latex in the stitched sections of the elastic fabric, the elastic threads or strands are effectively anchored in the body of the fabric in such a manner as to avoid premature loss of the elasticity in the garment due to broken or severed threads and to the pulling out of the threads from the joint under repeated stretching. The invention will be understood from the following detailed description, which, taken in connection with the accompanying drawing, discloses a preferred embodiment thereof.

Referring to the drawing:

Fig. 1 is a perspective view illustrating the invention as embodied in an athletic supporter;

Fig. 2 is a fragmentary view in elevation on an enlarged scale, illustrating the manner of connecting pieces or ends of elastic fabric together in accordance with my invention to provide a waist band for the athletic supporter shown in Fig. 1; and

Fig. 3 is a longitudinal sectional view through a portion of the article shown in Fig. 2 as taken on the line 3—3 thereof.

Referring in detail to the drawing, 1 indicates as a whole an athletic supporter comprising a waist band 2, leg bands 3 and a sack or pouch 4. The waist band 2 is made from a suitable length of elastic fabric or webbing, the ends of which are connected together at the front as at 5, as will be later described in

further detail. The leg bands which are also made of elastic fabric or webbing are each connected at the top end to the desired portions of the waist band while the bottom ends of both leg bands are connected to the gathered bottom end of the sack or pouch, the top end of the same, in turn, being attached to the bottom marginal portion of the waist band in the vicinity of the connection 5.

The fabric or webbing from which the waist and leg bands are made is elastic and usually differs in width. It consists of longitudinally extending, elastic covered rubber threads 6 upon which are woven the fibrous warps and wefts to provide the textile portion of the fabric 7 enclosing said threads. Preferably the warps and wefts of the fabric are woven upon the elastic threads and are interwoven with respect to each other while said threads are in a stretched condition and under tension so that the textile portion of the fabric will have an elastic character to accommodate said threads.

In accordance with one embodiment of my invention, in making up the waist band of the supporter, the ends which are to be stitched together are impregnated with rubber latex which binds the threads of the warps and wefts to each other and to the elastic threads to form an elastic homogeneous body. It is preferred to use latex which has been preliminarily vulcanized since the unvulcanized latex must be subjected to a vulcanizing operation after the fabric has been treated, to remove the tacky or sticky character of the rubber. In doing this there is danger of injuring the fine rubber threads of the fabric in the areas adjacent the impregnated areas, the heat of vulcanization traveling into these areas and weakening the elastic strands. However, when vulcanized latex is used it is merely necessary to dry the impregnated fabric to give a finished product.

Ordinarily it is difficult to effectively seal the rubber threads in the elastic webbing by merely dipping the fabric into a quantity of the latex. The consistency of latex is about that of cream, and the unbleached character of the yarn used in the webbing appears to prevent sufficient penetration to effect an anchorage by merely dipping.

Rapid and effective penetration of the latex into the interstices of the fabric may be effected by diluting the latex with certain wetting or penetrating substances which act as carriers for dispersing the rubber globules of the latex through the body of the webbing.

Organic solvents, other than those which act as rubber solvents, may be used as diluents for the latex. Alcohol and acetone are examples of solvents of this class which may be used. The solvent is preferably used in the proportion by volume of about one part of solvent to nine parts of latex. These proportions, however, may be widely varied depending upon the texture of the fabric to be treated. When the ends of the fabric are dipped into such a mixture, the latex is rapidly taken up and dispersed into the body of the fabric. Upon subsequent drying the coagulated rubber globules form a firm binder for the rubber strands of the fabric. In using the organic solvents it is usually necessary to stretch the webbing before treating it with the diluted latex.

Certain coagulating substances may be used to promote coagulation of the rubber after the latex has penetrated the fabric. A satisfactory mixture of a coagulant with an organic solvent, which may be used for this purpose, consists of about ten parts of ammonium acetate in forty parts of ethyl alcohol. The solution of the coagulant may be applied either by dipping or spraying. The coagulant tends to shorten the time required for the treatment by accelerating the coagulation of the rubber.

I have found that certain oils of vegetable origin are particularly useful as wetting agents. A mixture of pine oil with a sulphonated vegetable oil has been found very good for this purpose. The sulphonated castor oils also may be used in this connection. Such oil or mixture of oils, when mixed with a latex solution in the proportion by volume about one part of oil to thirty-two parts of latex gives a very satisfactory penetrant mixture. This proportion of oil is a preferred minimum and larger percentages may be used as may be required by the texture of the fabric being treated. When the ends of the unstretched fabric were dipped in this solution and then dried, a perfect seal of the rubber threads in the fabric was obtained. The penetration was rapid and no stretching of the fabric was necessary. If desired, the fabric may be treated with a suitable coagulant, as previously explained to hasten the coagulation or precipitation of the rubber.

In Fig. 2 the end portions of the waist band thus treated are indicated at 8 and appear as a somewhat dense homogeneous mass wherein the threads and elastic strands are bound to one another so that there can be no fraying of the textile threads and no receding of the elastic strands. After thus treating the end sections the binders 9 are applied thereto by zigzag stitching as indicated at 10. The abutting ends of the binders are then secured together by stitching 11. The zigzag type of stitching is preferable, inasmuch as it gives greater flexibility.

If desired, the binders or strips 9 may be first stitched to the ends of the band and then brought into abutting relation and stitched together to form the waist band before the latex is applied. The sewed end sections are then treated with the diluted latex solution to form a rubber binder for the ends of

the elastic threads. By this method the stitching together of the webbing is made easier, inasmuch as the needle does not have to penetrate an impregnated mass. As in the previous method after the complete treatment, the threads are effectively anchored in the body of the fabric to prevent premature loss of elasticity.

While it is preferred to stitch the fabrics together first and then impregnate the sewed portions of the elastic fabric the impregnating may be done before the fabrics are stitched without departing from the invention.

Latex has proven to be an unusually effective agent for thus anchoring the elastic rubber threads in the body of a piece of elastic webbing. It may be used in the form of a penetrating fluid, as explained, to form a rubber binder without injuring the rubber threads of the fabric. This is an important feature of the invention. Binding agents, such as rubber cement, tend to injure the elastic threads of the fabric, because the solvents which have to be used with them will dissolve the rubber threads causing them to end short of the rubber mass formed by the cement. The rubber threads are so fine that the solvent acts on them long before the cement can set, leaving the ends of the threads free near the edge of the area treated. This, in effect, nullifies the very object of the treatment. Latex, on the other hand, may be diluted with a wetting or penetrating agent which has no effect on the rubber threads of the fabric. The fluid constituents of the latex itself do not injuriously affect the rubber strands.

When latex, or the like, is used as the anchoring agent it adheres to the rubber threads of the fabric and effectively anchors said threads in the fabric, but does not coalesce with the threads or in any way disintegrate or impair the structure thereof.

While I have particularly emphasized the use of latex in solution with a penetrating ingredient, such as an organic solvent or an oil, I do not wish to have the invention understood as limited to such use of latex. Effective penetration of the fabric by latex alone, without a diluent, may be obtained by the use of mechanical means; for example, the latex may be worked into the webbing by friction and drying under pressure either with or without heat. A good seal can be obtained in this manner. Such processes, however, do not appear to have the commercial possibilities of the methods involving the use of latex in conjunction with a penetrating agent.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible in view of the prior art.

What I regard as new and desire to secure by Letters Patent is:

1. The method of treating an elastic fabric having rubber threads to anchor said threads, which consists in impregnating a portion of the fabric with a binder of latex.

2. The method of joining a piece of elastic fabric having rubber threads to an adjacent piece of fabric, which consists in stitching together the adjacent edge portions of said pieces of fabric and impregnating the elastic fabric with latex to anchor the threads thereof along the line of stitching.

3. The method of joining a piece of elastic fabric having rubber threads to an adjacent piece of fabric, which consists in impregnating an edge of said elastic fabric with latex and attaching said elastic fabric to the other piece of fabric by stitches passing through said impregnated portion.

4. The method of treating an elastic fabric having rubber threads to anchor said threads, which consists in impregnating a portion of the fabric with a binder of vulcanized latex.

5. The method of joining a piece of elastic fabric having rubber threads to an adjacent piece of fabric, which consists in stitching together the adjacent edge portions of said pieces of fabric and impregnating the elastic fabric with vulcanized latex to anchor the threads thereof along the line of stitching.

6. The method of joining a piece of elastic fabric having rubber threads to an adjacent piece of fabric which consists in impregnating an edge portion of the elastic fabric with a binder of vulcanized latex, drying the impregnated area, and stitching said impregnated portion to an edge of the adjacent fabric.

7. The method of anchoring the elastic threads in the body of a piece of elastic fabric, which consists in impregnating an edge portion of the webbing with a solution comprising a mixture of vulcanized latex and a penetrating agent, and thereafter drying the impregnated area.

8. The method of anchoring the elastic threads in a piece of elastic fabric which consists in impregnating an edge portion of the fabric with a solution comprising a mixture of vulcanized latex and a penetrating agent, thereafter treating said portion with a coagulating agent, and finally drying the impregnated area.

9. The method of anchoring the elastic threads in a piece of elastic fabric, which consists in impregnating an edge portion of the fabric with a solution comprising a mixture of vulcanized latex and a vegetable oil, and thereafter drying the impregnated area.

10. The method of anchoring the elastic threads in a piece of elastic fabric, which consists in impregnating an edge portion of the

fabric with a solution comprising a mixture of vulcanized latex and a sulphonated vegetable oil, and thereafter drying the impregnated area.

11. A stitched fabric having elastic threads therein, the stitched portion of the fabric having a coagulum of vulcanized latex incorporated therein to anchor the elastic threads and prevent the same from receding from the stitching as a result of repeated stretching.

12. An elastic fabric incuding rubber threads, a portion of said fabric being impregnated with a latex binder to anchor the threads in said fabric and prevent the same from receding with consequent loss of elasticity of the fabric, said binder adhering to the elastic threads of said fabric without coalescing therewith.

In witness whereof, I hereunto subscribe my name to this specification.

GLENN B. MEAGHER.