July 27, 1971 R. L. RICHARDSON, JR., ET AL 3,595,730

LENOWEAVE SUBSTRATE CONSTRUCTION

Filed Nov. 8, 1967

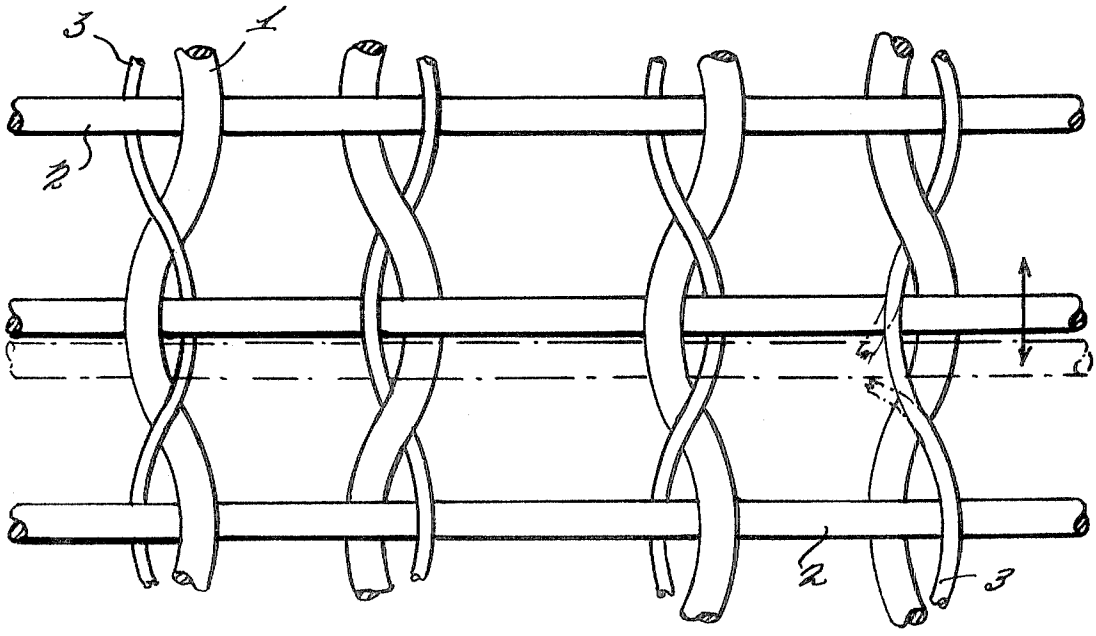


Fig. 1.

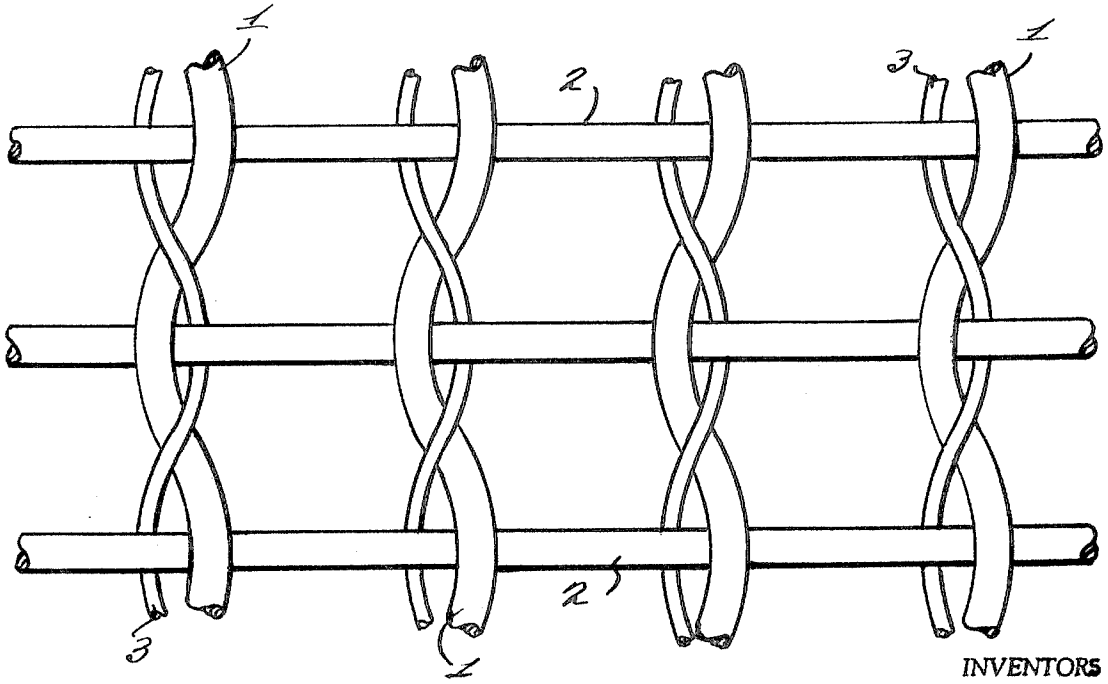


Fig. 2.

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United States Patent Office 3,595,730 Patented July 27, 1971

3,595,730

LENOWEAVE SUBSTRATE CONSTRUCTION

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Filed Nov. 8, 1967, Ser. No. 681,509
Int. Cl. D03d 13/00, 19/00
U.S. Cl. 161—89 5 Claims

ABSTRACT OF THE DISCLOSURE

A low-texture backing or support fabric such as scrim is woven by the lenoweave method. A system of pairs of different strength warp yarns are interlaced (i.e. crossed and twisted) at each point of contact with an interwoven system of filling yarn. The relatively strong or primary warp yarns and the filling yarns have identical tear or rupture strengths. When pressure causes the filling yarns to move or ride up and/or down the warp system, the relatively weak or secondary warp yarns rupture, while the relatively strong primary warp yarns remain intact, thus maintaining a balanced or uniform substrate construction prior to lamination. The lenoweave fabric may be employed as a chafer or finishing strip in the lamination of elastomeric material used for rubber tires. The foregoing abstract is not intended to define the scope of the invention and is only provided to permit a cursory review of the gist of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an enlarged diagrammatic representation of one embodiment of the invention; and

FIG. 2 is an enlarged diagrammatic representation of another embodiment of the invention.

BACKGROUND AND BRIEF DESCRIPTION OF THE INVENTION

This innovation pertains to a method of lenoweave substrate construction which enables a weaver to supply a balanced or unbalanced scrim fabric, as dictated by industrial requirements. The invention further relates to the lenoweave fabric which results from the practice of this method, as well as to laminated products containing the fabric, such as chafer fabrics which are usually laminated to rubber for use in tires.

In the past, a substantial amount of difficulty has been encountered where a balanced, uniform construction is required in a low-texture, loosely-woven fabric such as scrim. A balanced fabric structure would be one which possesses equal tear or rupture strength in both the warp and fill directions. During the weaving process on a loom, distortion of the fabric often occurs because of slippage of warp over filling, or vice-versa. This slippage causes uneven distribution and distortion of the pre-determined position of the warp and filling threads, resulting in an unacceptable product.

Prior attempts to minimize the problem of slippage have consisted basically of two diverse approaches. The first approach has been to employ a conventional lenoweave process to prevent distortion. This is satisfactory when a balanced fabric is not required. However, it is necessarily inadequate where a balanced, uniform fabric is desired since in a lenoweave construction the warp yarns are arranged in pairs so as to twist around one another between picks. This method of weaving affords firmness and strength to a plain weave fabric, but it is inherently unsuitable here because of the fact that there are two warp yarns to each filling yarn, thereby resulting in a fabric

which is twice as strong in one direction, compared to the other direction.

The second approach has been to employ adhesives to assist in maintaining uniform fabric structure prior to lamination with films, paper and so forth. However, the utilization of adhesives is not desirable because the prelamination procedure is unduly lengthened and complicated by incorporation of an adhesive during the weaving process. Moreover, the presence of the adhesive tends to adversely affect or interfere with the subsequent bonding step, resulting in an unacceptable laminate.

Therefore, it is apparent that where a balanced, low-texture woven fabric is desired, prior attempts to minimize distortion due to slippage of filling over warp and vice-versa have been less than satisfactory.

The present innovation satisfactorily resolves the problem by providing a woven fabric and a method of making the same which employs the basic principle of the lenoweave process, while obviating the inherent disadvantage of dissimilar, unbalanced rupture or tear strength between the warp and filling yarns.

The solution is effected by employing a system of pairs of warp yarns of dissimilar strength. The primary yarn in each pair of warp yarns possesses the same tear or rupture strength as each of the filling yarns. The secondary yarns in each pair of warp yarns however, are relatively weaker than either the primary warp yarns or the filling yarns. The secondary warp yarns are incorporated or interlaced with the primary yarns at spaced intervals throughout their respective lengths, preferably at the point of filling contact, in an otherwise conventional lenoweave pattern; that is, the warp yarns are twisted around one another in pairs at each filling yarn.

Consequently, when pressure causes the filling yarn to move or ride up and/or down the warp system, the secondary or weaker warp yarns rupture or break at the point of interlacing, thereby allowing the primary or stronger warp thread to remain intact and perform its function. Thus, the user of the afore-described leonweave substrate construction is able to supply a balanced scrim fabric, while also minimizing distortion caused by slippage of filling over warp or vice-versa.

The fabric such as scrim which results from the aforementioned process is capable of employment as a backing fabric in general, for example in carpets, paper or the like. The lenoweave fabric may also be used as a chafer for rubber tires, that is, it may be calendered or otherwise laminated with unvulcanized compounded elastomeric material on both sides so that during curing of a rubber tire the chafer fabric or strips would bond to the inner layer or liner and the outer covering or sidewall of a rubber tire.

In addition to the aforementioned features, other features of this innovation will become apparent in the detailed description which follows. In the detailed description of the invention, reference will be made to the accompanying drawing in which the structure of the fabric is shown, including the lenoweave pattern and the interlacing of the primary and secondary warp yarns.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing, the lenoweave substrate fabric is manufactured by the following method:

A first system of warp yarns is formed by employing a conventional loom arrangement to lay a plurality of pairs of warp ends of dissimilar strength, each pair being parallel to, and suitably spaced from, one another. Each pair of warp yarns is comprised of a relatively strong primary yarn 1 and a comparatively weak secondary yarn 3. A plurality of filling yarns 2 are interwoven with

the warp yarn pairs in a conventional manner. Filling yarns **2** are of identical tear or rupture strength as primary warp yarns **1**, in order to ensure that the final configuration of the fabric is of equal rupture strength in both the warp and filling directions, that is, a balanced, uniform fabric. The secondary warp yarns **3** are incorporated or interlaced with the primary yarns **1** at spaced intervals throughout their respective lengths, preferably at the point of filling contact, in an otherwise conventional lenoweave pattern; in other words, referring to each pair of warp yarns, the primary and secondary yarns **1** and **3** respectively, are crossed over and twisted around one another at each filling yarn, as depicted in the drawing.

As mentioned previously, the lenoweave fabric is of a low-texture such as 8 ends by 4 picks. Consequently, it is quite apparent that slippage of filling over warp or vice-versa will readily occur unless effectively neutralized.

Accordingly, if pressure is applied to the warp system by the relative movement of the filling yarns **2** in the warp direction, as indicated by the arrow and broken lines in the drawing, the relatively weak secondary yarns **3** rupture or break at the point of interlacing, but the primary yarns **1** remain intact. Thus, the balanced, uniform construction of the fabric is maintained for subsequent lamination, while simultaneously minimizing distortion caused by slippage of filling over warp or vice-versa.

While the lenoweave substrate fabric is intended to be employed as a backing or supporting fabric such as scrim, it may also be used as a chafer fabric in rubber tires. Reference is made herein to U.S. Pats. 3,240,251 and 3,282,724, in which a detailed disclosure of the use of chafer fabric in a rubber tire is set forth. The chafer strips are usually, but not necessarily, calendered or otherwise laminated with unvulcanized compounded elastomeric material on both sides so that during curing of the tire they bond to the inner layer or liner and the outer covering or side wall of the rubber tire. The lenoweave fabric may also be bonded to films, paper and similar materials in order to form laminates as desired.

Although the lenoweave substrate fabric and method of manufacture have been described with reference to a particular embodiment, it will become apparent to those skilled in the art that variations could be made in the invention. All such variations as would be obvious to those skilled in this art are intended to be included within the scope of this invention.

What is claimed is:

1. In a lenoweave fabric including first and second warp yarns and filling yarns forming an open mesh wherein said first and second warp yarns are interlaced by being crossed over and twisted around one another in a lenoweave pattern at the points of contact with said filling yarns to insure dimensional stability, the improvement comprising that the tensile strength of said primary warp yarns substantially equals that of said filling yarns and exceeds the tensile strength of said secondary warp yarns whereby said fabric has essentially identical tear strength in the warp and fill directions.

2. The fabric of claim **1** in which:
said balanced lenoweave substrate fabric is scrim.

3. The fabric of claim **1** in which:
said balanced lenoweave substrate fabric is used as a chafer.

4. A laminated product in which:
the woven fabric of claim **1** is bonded to a layer of an elastomeric material in order to form a chafer or finishing strip for a rubber tire.

5. A woven fabric as in claim **1** wherein adjacent ones of said primary warp yarns are interlaced on opposite sides of respective ones of said filling yarns and wherein adjacent ones of said secondary warp yarns are interlaced on opposite sides of respective ones of said filling yarns.

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U.S. Cl. X.R.

139—419; 152—358; 156—148; 161—89, 91