May 21, 1957 M. ARNETT 2,793,151

FABRIC-REINFORCED FLEXIBLE ELASTOMERIC ARTICLE

Filed June 15, 1955

Fig. 1.

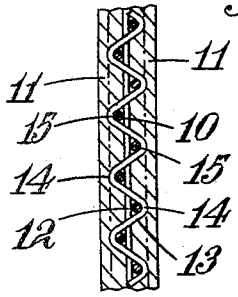


Fig. 2.

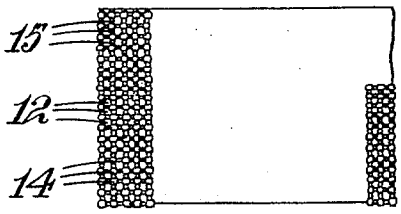


Fig. 3.

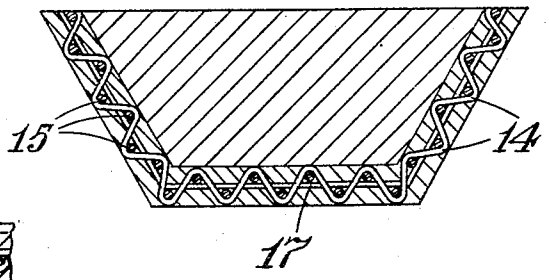


Fig. 4.

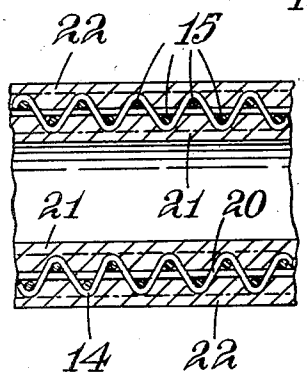
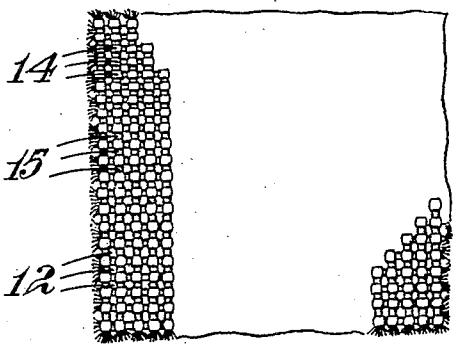


Fig. 5.



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2,793,151

FABRIC-REINFORCED FLEXIBLE ELASTOMERIC ARTICLE

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7 Claims. (Cl. 154—52.1)

The invention relates to fabric reinforced wear resisting materials which are especially suitable for use in the construction of belting, hose and other flexible members which are subject to wear and tension in use (e. g. belting for the transmission of power or for use in a conveyor belt). The materials may however be used for other purposes.

The invention provides wear resisting material comprising a ribbed fabric covered at least to the extent of filling the grooves between the ribs, with an elastomeric material such as natural or synthetic rubber, polyvinyl chloride or like plastic.

More specifically the invention provides a belt, hose or other flexible member having substantial tensile strength in one direction and of the kind comprising rubber, polyvinyl chloride or like material and a fabric reinforcement therefor, in which the fabric has the warp threads extending in the said direction, some of the warp threads have little crimp and are adapted to provide the tensile strength and others of the warp threads have substantial crimp thereby forming a ribbed structure of which the ribs afford a cover for the strength-providing threads.

The invention has the advantages that the cover threads may protect the strength-providing threads against wear either initially or after an outer cover layer (e. g. of natural or synthetic rubber or polyvinyl chloride) has been worn off, that the grooves between the ribs of the cover provide an effective key by which such an outer cover layer which is itself wear resisting, may be secured and that when the fabric is at the surface of a belt (e. g. in a V driving belt) the ribbed formation provides an effective friction surface. In the case of a hose, the cover threads protect the strength-providing threads against wear due, for example, to abrasion by being dragged along the ground.

The fabric may be of metal but is preferably of textile material formed, for example, of the normal yarn used in the production of belting or hose reinforcement. In one example of a material used in the invention, the strength-giving warp threads are of staple nylon and the remaining warp threads and the weft are of cotton yarn.

The preferred structure of the fabric is that alternate warp threads or ends have little and substantial crimp respectively but other arrangements are within the invention. For example there may be two warp ends woven with little crimp to each one with substantial crimp or one end with little crimp to each two with substantial crimp.

In the fabric employed in the invention the weft threads or picks lie on opposite sides, preferably alternately, of the strength-giving warp threads which have little or no crimp.

It is preferred that the crimp of the strength-giving warp threads or ends is in the region of nil to 2.5% and about 100% to 160% for the cover warp ends. The crimp of the weft threads is preferably in the region of

0.5% to 2.5%. The crimp is considered as being the increase in length of a thread which has been removed from the fabric and straightened (with stretch), over the length of that thread when in the fabric, expressed as a percentage of the length in the fabric.

The following are examples of fabrics suitable for use as reinforcement in conveyor belts:

	I	II
Wt./sq. yd. (ozs.)	32.0	30.8.
Ends×picks	24 x 16	24 x 15.
Warp Strength giving ends	7/7s	7/7s (cotton counts).
Warp Cover ends	6/7s	7/7s (cotton counts).
Weft yarn	5/6.5s	6/7s (cotton counts).
Warp, tensile/in. (breaking)	320-lb	250-lb. (Ravel).
Weft, tensile/in. (breaking)	210-lb	270-lb. (Ravel).
Gauge of the cloth	0.120"	0.135".
Crimp:		
Warp—		
Strength giving ends	2%-2¼%	1.75%.
Cover ends	120%	150%.
Weft	0.7%-1.8%	2.0%.

In each of the above fabrics the warp threads are arranged with strength-giving and cover ends alternately.

In the accompanying drawings which are diagrammatic and show the fabric on an exaggerated scale:

Figure 1 shows a longitudinal section through a portion of a conveyor belt,

Figure 2 is a side view of a portion of a V belt,

Figure 3 is a section through the V belt,

Figure 4 is a longitudinal section through a length of hose, and

Figure 5 is a view showing a portion of fabric used in the examples.

In the belt shown in Figure 1 the reinforcement **10** is covered on each side with layers **11** of polyvinyl chloride. The fabric is impregnated with polyvinyl chloride and the polyvinyl chloride layers are secured to the fabric by bonding with the impregnation. The reinforcement employed is in accordance with the first of the above examples and is shown in Figure 5. The fabric is arranged with the warp threads extending lengthwise of the belt. In the production of the fabric the warp threads **12** are woven under substantial tension and, as stated above, have little crimp. The alternate warp threads **13** are woven under substantially less tension and accordingly have substantial crimp thereby providing, on each side of the fabric, ribs **14** which extend cross-wise of the belt. The weft threads, which also extend cross-wise and from the cores of the ribs, are shown at **15**.

Figures 2 and 3 show the application of the invention to a V belt. In this application the fabric is around the surface of the belt as shown at **17**. The ribs **14** and weft threads extend around the belt. The fabric is of much finer structure than that employed in the previous example. The construction has the advantage that the ribs provide a good gripping surface.

Figure 4 illustrates a hose incorporating a fabric reinforcement **20** which is according to either of the foregoing examples. The fabric is covered by an inner lining tube **21** and an outer cover tube **22**, both bonded to the fabric by impregnation of the fabric.

In an alternative form of hose the fabric constitutes an outer cover layer for a hose, the grooves between the ribs being filled with rubber or plastic material. The warp threads extend axially. The fabric may be woven in tubular form and may be lighter than those employed for belts (e. g. between 5 oz. and 22 oz. per square yard).

The fabric used in carrying out the invention may be wholly or partly of rayon, Terylene, nylon, glass, wire and like materials.

I claim:

1. A flexible elastomeric article comprising a woven reinforcing fabric having contoured opposing surfaces of alternating parallel ribs and grooves and including parallel substantially uncrimped tension-resistant internal strength warp members disposed transversely to said ribs and grooves, and a flexible elastomeric cover material impregnated into and adhered to said opposing surfaces of the fabric and filling said grooves.

2. A flexible reinforced elastomeric article comprising a fabric having parallel substantially uncrimped tension-resistant strength warp members, substantially uncrimped weft members arranged on opposite sides of said strength warp members, and highly crimped cover warp members interlaced with said weft members intermediate said strength warp members, said cover warp members providing a surface contour for opposing sides of the fabric of alternating ribs and grooves transverse to said strength warp members, and a flexible elastomeric cover material adhered to said opposing surfaces of the fabric and filling said grooves.

3. A flat flexible belt having a reinforced carcass comprising the structure defined in claim 2, said strength warp members of said structure extending longitudinally of the belt.

4. A flexible hose having a reinforced wall comprising the structure defined in claim 2, said strength warp members of said structure extending longitudinally of the hose.

5. A side driving belt having an external wrapper on the side-driving faces thereof formed as structurally defined in claim 2.

6. A flexible elastomeric article comprising a reinforcing fabric having parallel tension-resistant nylon warp threads having a crimp of less than about 2.5%, weft threads alternatingly arranged on opposite sides of said strength warp threads and having a crimp of less than about 2.5%, and cotton cover warp threads parallel said nylon warp threads and interlaced with said weft threads intermediate said strength warp threads with a crimp in the range of about 100% to 160% to provide a fabric surface contour of alternating ribs and grooves transverse to said strength warp threads, and a flexible elastomeric cover material adhered to said opposing surfaces of the fabric and filling said grooves, said material in said grooves serving as keying members to interlock said cover material with said fabric.

7. A flexible elastomeric article comprising a fabric having parallel substantially uncrimped tension-resistant nylon warp members, substantially uncrimped weft members arranged on opposite sides of said nylon warp members, and highly crimped cotton cover warp members interlaced with said weft members intermediate said nylon warp members, said cover warp members providing a surface contour for opposing sides of the fabric of alternating ribs and grooves transverse to said nylon warp members, and flexible elastomeric material adhered to said opposing surfaces of the fabric and filling said grooves.

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