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L. E. RICHTER
WOVEN BELTING

2,864,409

Filed July 6, 1956

2 Sheets-Sheet 1

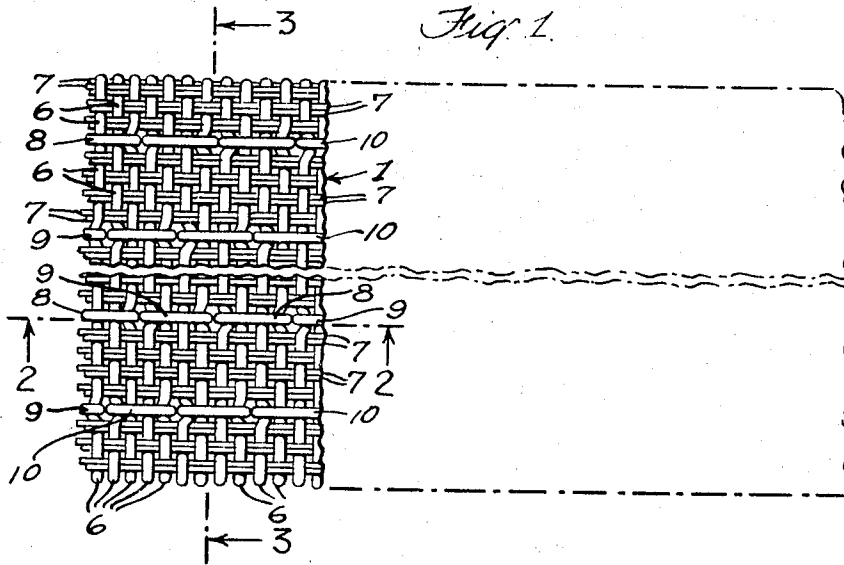


Fig. 2.

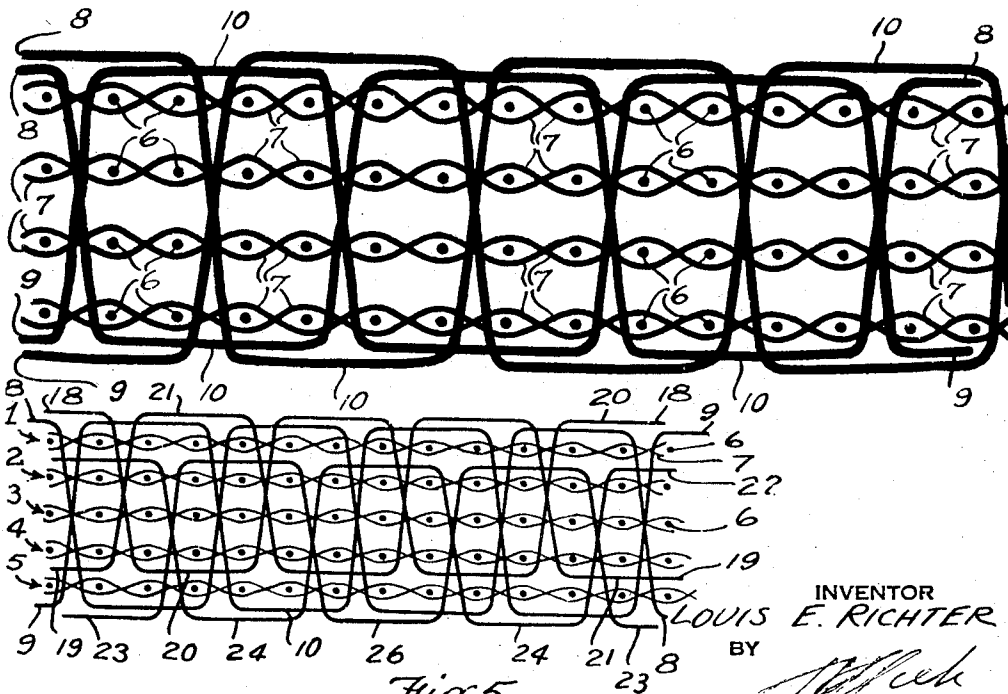


Fig. 5.

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Fig. 3.

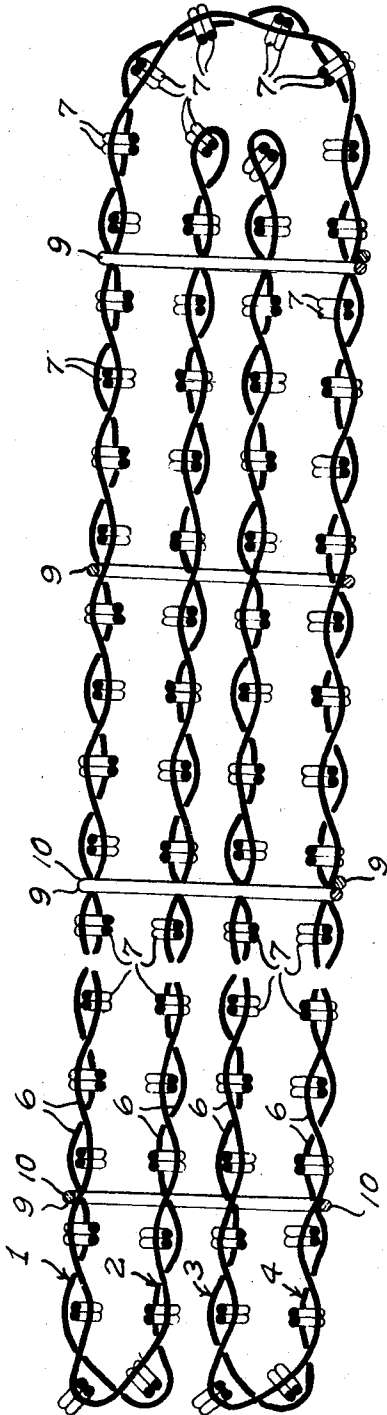
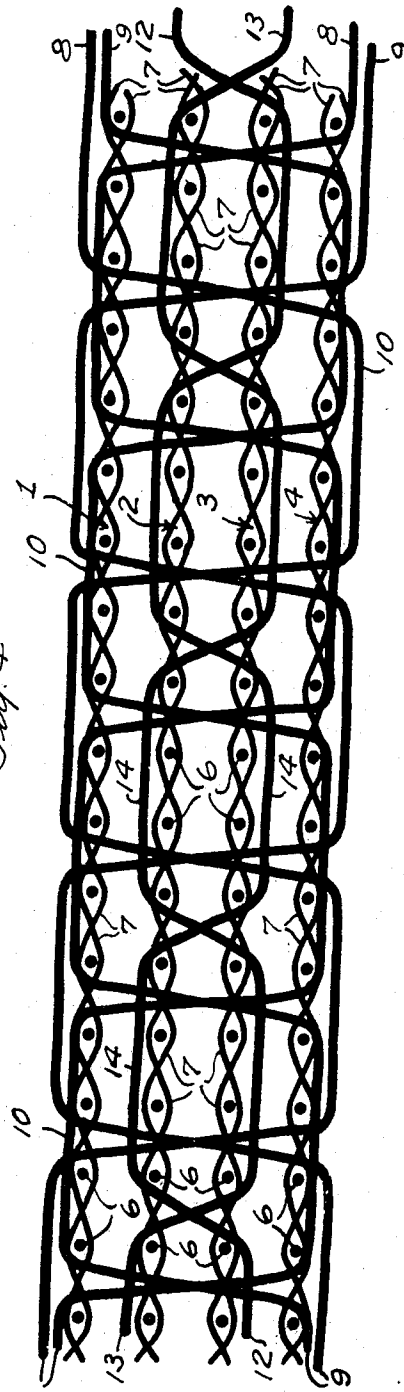


Fig. 4



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4 Claims. (Cl. 139—408)

This invention relates to woven belting of the type used for power transmission and conveyors and has for an object to provide a multi-ply belting in which the plies are bound together by binder yarns which are woven into the belting.

Another object is to provide a belting of the above type in which the plies and binder yarn are woven as a unit.

Another object is to provide an all-woven multi-ply belting having characteristics similar to belting which were heretofore formed by plying and stitching.

Another object is to provide a woven multi-ply belt webbing of the above type having novel and improved characteristics.

Another object is to provide a multi-ply webbing of the above type which may be woven on a loom having a standard Knowles head motion.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

The invention will be better understood from the following description and the accompanying drawings, in which specific embodiments have been set forth for purposes of illustration.

In the drawings:

Fig. 1 is a plan view of a portion of a belt webbing embodying the invention;

Fig. 2 is a longitudinal section on a larger scale taken on the line 2—2 of Fig. 1;

Fig. 3 is a broken transverse section on a larger scale with a portion of the belt broken away taken on the line 3—3 of Fig. 1;

Fig. 4 is a longitudinal section similar to Fig. 2 illustrating a further embodiment of the invention; and

Fig. 5 is a similar longitudinal section illustrating the invention embodied in a five-ply fabric.

Referring to the drawings more in detail the webbing is shown as comprising four plies 1, 2, 3 and 4 each composed of filler yarns 6 and warp yarns 7 woven together in the usual manner. The filler yarns 6 are continuous for the four plies. As shown in Fig. 3, the fillers 6 extend between plies 1 and 4 on the right hand side and between plies 1 and 2 and plies 3 and 4 on the left hand side to produce an effect similar to a folded plied fabric.

This is accomplished on a standard loom by suitable adjustment of the heddle controls.

The four plies are bound together by rows of binder warps consisting of a pair of yarns 8 and 9 which are woven into the webbing to extend through the four plies between successive filler shots and over the surface of the outer plies 1 and 4 in loops 10 which resemble stitching. The binders 8 and 9 are crossed as a double chain, both binders passing between the same pair of filler shots in the four plies.

A succession of rows of binders 8 and 9 is spaced across the width of the webbing to resemble rows of stitching. The binders of the various rows are offset to pass between different pairs of fillers so that the loops 10 of the various rows are correspondingly offset.

The spacing of the plies is greatly exaggerated in Figs.

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2 and 3. In practice the plies are pulled tightly together by the binders 8 and 9 and are bound thereby as a compact, tightly woven unit corresponding to a plied and stitched canvas or duck webbing.

This webbing has been found to have stretch and shrinkage characteristics and a break strength equal to that of a webbing of corresponding weight and texture made by folding and stitching and superior to that of the usual woven webbing as normally produced on a belting loom. The present webbing is distinguishable from a plied and stitched webbing by the fact that the binder yarn loops span a predetermined uniform number of fillers and the binder passes through the plies between fillers without piercing or damaging any of the fillers or warps as would be the case when the binding stitches are inserted by needles after the fabric is woven.

The above described webbing is adapted to be used as a power transmission belting or for conveyor belts.

In the embodiment of Fig. 4 the webbing is composed of four plies 1 to 4 as in Figs. 1—3 and the parts have been given the same reference number. In Fig. 4, in addition to the binder warps 8 and 9, a pair of binders 12 and 13 are disposed to extend through the two inner plies 2 and 3 only. Then binder warps 12 and 13 pass as a double chain between successive filler shots of the plies 2 and 3 and pass between the inner and outer plies in loops 14 which span a plurality of filler shots 6 and are concealed by the outer plies. These binders 12 and 13 may be formed in spaced rows similarly to the binders 8 and 9 or the rows may be offset from the binder rows 8 and 9. Also, the binders 12 and 13 in successive rows may be woven in offset manner with respect to the filler shots 6.

The embodiment of Fig. 4 has improved wearing qualities because the binders 12 and 13 hold the plies 2 and 3 together after the outer plies 1 and 4 have been worn through.

The embodiment of Fig. 5 shows the invention applied to a five-ply webbing composed of plies 1 to 5 which are individually composed of filler yarn 6 and warp yarns 7 woven together as indicated in Figs. 1 to 4, and bound together by rows of binder warps consisting of binder yarns 8 and 9 which extend through all five plies in the form of a double sheet and form loops 10 on the outer surface of plies 1 and 5 which resemble stitching.

In Fig. 5, in addition to the binder yarns 8 and 9 a pair of binder warps 18 and 19 are woven as a double chain which extends through plies 1, 2, 3 and 4 formed in loops 20 on the outer surface of ply 1 and loops 21 which extend between plies 4 and 5. A third pair of binder warps 22 and 23 are woven to extend through plies 2, 3, 4 and 5 forming loops 24 between plies 1 and 2 and loops 26 which extend over the outer surface of ply 5.

In this embodiment the binder warps 18 and 19 and 22 and 23 provide an auxiliary binding for the various plies which holds the plies together even though one or both of the outer plies may be worn off, thereby increasing the life of the belt. In addition, the binder warps 18, 19, 22 and 23 which extend through less than all of the plies add a certain amount of resilience to the belting when the belting flexes as in passing around a small pulley at which time the outer plies are stretched and the inner plies are compacted and considerable strain is placed upon the binders which extend through the entire thickness of the belting. It is to be understood, of course, that other sets of binder warps may be provided which extend through only a portion of the plies and that the same type of weave may be used for webbing which consists of various numbers of plies such as three plies or more than five plies. The invention has been shown for convenience as applied to a four-ply and a five-ply webbing.

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The usual straight stuffers may be included between plies to improve the stiffness and strength. Metal threads or steel stranded wire with non-abrasive coatings of nylon or Teflon or any of the non-stretchable synthetic continuous filament Hi-strength yarns such as "Fortesan" may be used for the binders or stuffers as desired for increased strength.

What is claimed is:

1. A woven multi-ply belting comprising a plurality of plies of woven webbing, each ply comprising interwoven warp and filler yarns, the filler yarns being continuous throughout all of said plies to join the plies at at least one edge, and a series of rows of binder yarns spaced across said webbing each row comprising a pair of binder yarns interwoven as a double chain extending through all of said plies between spaced pairs of filler yarns and forming loops on the outer surfaces of the outer plies, the loops formed by the binder yarns in one row being offset from the loops formed by the binder yarns in the next adjacent row and all of which loops span the same number of filler yarns.

2. A woven multi-ply belting in accordance with claim 1 wherein the binder yarns comprise metal threads.

3. A woven multi-ply belting comprising a plurality of plies of woven webbing, each ply comprising interwoven warp and filler yarns, the filler yarns being continuous

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throughout all of said plies to join the plies at at least one edge, and a series of rows of binder yarns spaced across said webbing each row comprising a pair of binder yarns interwoven as a double chain extending through all of said plies between spaced pairs of filler yarns and forming loops on the outer surfaces of the outer plies, the loops formed by the binder yarns in one row being offset from the loops formed by the binder yarns in the next adjacent row and all of which loops span the same number of filler yarns, and a second series of pairs of binder yarns forming chains, said last binder yarns extending through the inner plies only between spaced pairs of filler yarns and forming loops beneath the outer plies which loops span the same predetermined number of filler yarns.

4. A woven multi-ply belting in accordance with claim 3 wherein the binder yarns comprise metal threads.

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