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MECHANICAL BELTING

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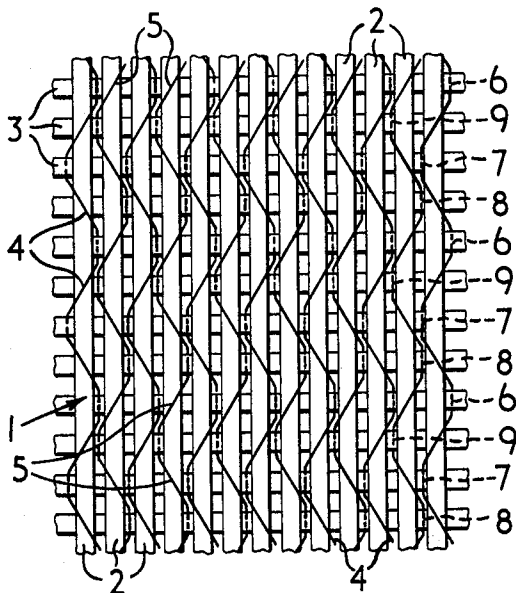


FIG. 1

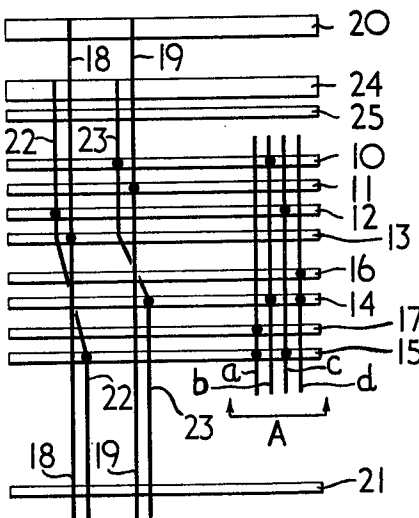


FIG. 2

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MECHANICAL BELTING

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6 Claims. (Cl. 139—419)

This invention relates to mechanical belting for the conveyance of materials and the transmission of power.

Space for taking up increased length, due to stretching in use, of belting required to convey materials over long distances is limited and expensive; in addition, shortening of the belting involves stoppage of the belting and consequent loss of production of the conveyed material. It is also desirable that power transmission belting should not stretch unduly in use.

The object of the invention is to provide a coherent fabric reinforcement for mechanical belting which does not stretch unduly when subjected to working loads in use.

According to the invention a fabric for use as a reinforcement in mechanical belting comprises a layer of substantially straight, parallel warp strength yarns superimposed on a layer of substantially straight parallel weft yarns, said layers being unwoven and being bound together by leno warp threads each of which passes over weft yarns in the back surface of the fabric and over one or more warp yarns in the face surface of the fabric.

The provision of the substantially straight warp and weft yarns obviates stretching due to the partial straightening under tension of yarns crimped by being woven, and the weft and leno warp threads, apart from binding the warp yarns together, provide an outer protective layer which reduces damage to the strength warp yarns as a result of impact, pressure or scoring.

In the fabric according to the invention the warp yarns can lie closely together, since they are not interwoven with the weft threads, thus giving a high strength per unit width of fabric and of belting reinforced with the fabric. The warp yarns are usually of high tenacity synthetic material and may be of thermoplastic material such as nylon, polypropylene or polyethylene terephthalate. The warp yarns may be subjected to a heat-stretching process prior to incorporation into the fabric in order to reduce their elongation under load.

The weft yarns may be of filamentary or fibrous man-made or natural material such as cotton, rayon or polyamide fibres, or mixtures thereof, and the leno warp threads are usually of fibrous natural or man-made material such as cotton and spun staple rayon. The fibrous leno warp threads provide assistance in adhering the elastomeric material which is applied to the fabric in the production of belting.

The fabric may be woven using needle bars, a gauze reed or a doup heald. The use of a bottom doup heald is preferred in order to provide a close setting of the straight warp yarns and the use of bottom douns is preferred to top douns in order to minimize movement of the warp yarns during weaving. Usually the leno warp binding threads are interlaced between the closely set warp yarns in staggered relationship by the use of two doup healds.

The invention will now be described by way of example only with reference to the accompanying drawings, in which:

FIGURE 1 shows a face view of a fabric according to the invention, and

FIGURE 2 shows a diagram illustrating the method of weaving the fabric shown in FIGURE 1.

With reference to FIGURE 1 a fabric 1 comprises a

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layer of warp threads 2 and a superposed layer of weft threads 3. The warp threads 2 and the weft threads 3 are bound together by leno warp threads 4 and 5. Each leno warp thread 4 binds an odd warp thread 2 to each odd weft thread 3, and each leno warp thread 5 binds an even warp thread 2 to each even weft thread 3. Each leno warp thread 4 passes under a weft thread 3 as shown at 6, over a warp thread 2, and under a weft thread 3 as shown at 7. The leno-warp thread then passes over a warp thread 2 and again under a weft thread 3 as shown at 6. Each leno warp thread 5 has a similar path to a leno warp thread 4 but is staggered with respect to the thread 4, as shown at 8 and 9.

In the method of weaving the fabric shown in FIGURE 1, two pairs of standard heald frames 10, 11, 12 and 13 as shown in FIGURE 2 are employed. Two bottom doup healds 14 and 15, used in conjunction with standard heald frames 16 and 17 respectively, are also provided. The bottom doup healds are half healds and their wires and eyes are passed over and through the eyes of the corresponding standard heald frames.

Warp yarns 18 and 19 of 6 ply, 840 denier nylon are taken from a warp beam 20 at a density of 20 yarns per inch. Odd warp yarns 18 are passed through the eyes of the standard heald frame 13 and through alternate dents in the reed 21, and even warp yarns 19 are passed through the eyes of the standard heald frame 11 and through dents in the reed 21 adjacent to the dents through which the odd warp yarns 18 are passed.

Leno warp threads 22 and 23 of 4 folds 7's count cotton yarn are taken from a warp beam 24 over a movable bar 25. The leno warp threads 22 and 23 are arranged one between each of the warp threads 18 and the adjacent warp threads 19. Odd leno warp threads 22 are passed through the eyes of the standard heald frame 12, across under the adjacent odd warp yarn 18 and through the eyes of the bottom doup heald frame 15. The leno warp threads 22 do not pass through the eyes of the standard heald frame 17. Each leno warp thread 22 is then passed through the same dent in the reed 21 as the adjacent warp yarn 18. Even leno warp threads 23 are passed through the eyes of the standard heald frame 10, between the wires of the standard heald frames 11, 12 and 13, across under the adjacent even warp yarn 19 and through the eyes of the bottom doup heald 14. The leno warp threads 23 do not pass through the eyes of the standard heald frame 16. Each leno warp thread 23 is then passed through the same dent in the reed 21 as the adjacent warp yarn 19.

The fabric is woven using a four pick cycle and 10 weft threads per inch are inserted. Each weft thread consists of three ends of 840 denier nylon yarn doubled with seven ends of 7's count cotton yarn. The order of lifting the heald frames for the four pick cycle is shown in Section A of FIGURE 2.

For the insertion of the first pick of the four pick cycle, a cross shed is formed by lifting the bottom doup heald frame 15 and the corresponding standard heald frame 17, as shown by the dots on the line *a* of Section A of FIGURE 2. The odd leno warp threads 22 are thus lifted, the movable bar 25 being moved towards the heald frames to prevent undue strain on the leno threads 22. The adjacent warp threads 18 are held down by the standard heald frame 13. A pick is inserted and the heald frames 15 and 17 are lowered.

For the second pick, an open shed is formed by lifting the standard heald frame 10, thus lifting the leno warp threads 23. Lifting of the leno warp threads 23 is allowed by lifting the bottom doup heald frame 14, but not the standard heald frame 16. This lifting plan is shown by the dots on the line *b* of Section A. The warp yarns 19 are held down by the standard heald frame 11.

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A pick is inserted and the heald frames 10 and 14 are lowered.

For the third pick, an open shed is formed by lifting the standard heald frame 12, thus lifting the leno warp thread 22. The doup heald frame 15, but not the corresponding standard heald frame 17, is lifted to allow lifting of the leno warp thread 22 as shown by the dots on the line *c* of Section A. The warp yarns 18 are held down by the standard heald frame 13. A pick is inserted and the heald frames 12 and 15 are lowered.

For the fourth pick a cross shed is formed by lifting the bottom doup heald frame 14 and the corresponding standard heald frame 16, as shown by the dots on the line *d* of Section A. The leno warp threads 23 are thus lifted, the warp yarns 19 being held down by the standard heald frame 11. The movable bar 25 is moved towards the heald frames to prevent undue strain on the leno warp threads 23. A pick is inserted and the heald frames 14 and 16 are lowered.

The four pick weaving cycle is repeated to produce a fabric having substantially straight, parallel warp yarns covered by a layer of substantially straight parallel weft threads, the unwoven layers being bound together by leno warp threads.

In manufacturing a mechanical belt, two superposed plies of the fabric are covered with a vulcanizable rubber composition and assembled face to face with the weft thread outermost. The assembly is then subjected to heat and pressure to vulcanize the rubber composition to produce a belt.

Having now described my invention, what I claim is:

1. A fabric for use as reinforcement for mechanical belting, comprising a single layer of substantially straight parallel weft yarns, a single layer of substantially straight parallel warp yarns superimposed on said layer of weft

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yarns without being woven with same, and a plurality of leno-warp threads, every other leno-warp thread passing over alternate single weft yarns and under intermediate weft yarns with intervening leno-warp threads passing under said alternate single weft yarns and over said intermediate weft yarns, said leno-warp threads crossing said substantially straight parallel warp yarns at a point substantially above a weft yarn to bind said substantially straight parallel warp yarns to said weft yarns.

2. The fabric of claim 1 wherein said leno-warp threads are finer than said warp yarns.

3. A fabric according to claim 1 in which said warp yarns are made of a high tenacity synthetic textile material.

4. A fabric according to claim 3 in which the high tenacity synthetic textile material comprises a thermoplastic material.

5. A fabric according to claim 1 in which said weft yarns comprise natural fibers.

6. A fabric according to claim 1 in which the leno warp threads are made of a fibrous material.

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