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Polshikov et al.

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[54] **V-BELT**

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[51] **Int. Cl.** **F16g 5/00**

[58] **Field of Search** ..... 74/234, 231 R, 232, 74/237; 156/137, 138, 139, 140, 141

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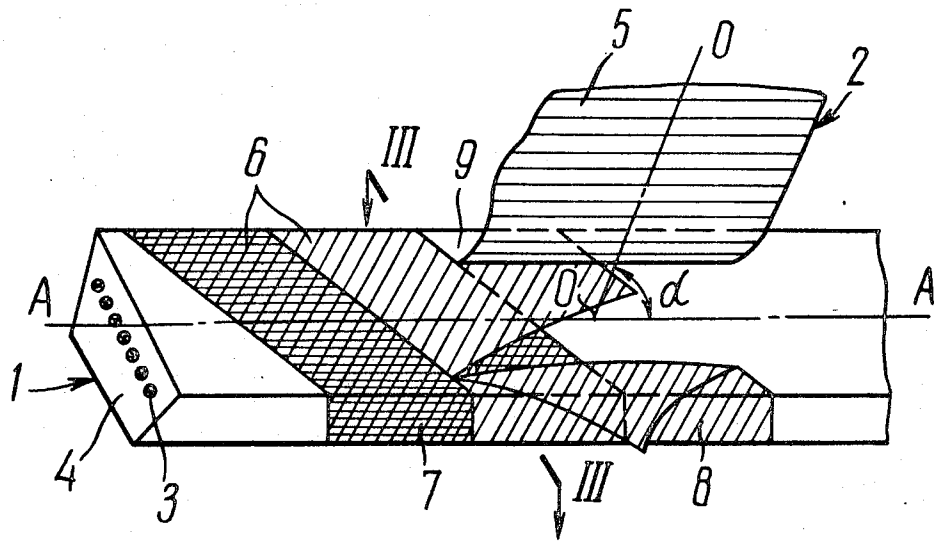
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[57] **ABSTRACT**

A V-belt, wound on whose core at an angle of 45° is a rubberized fabric strip produced by warpwise cutting of this fabric. The strip is helically lap-wound on the core to form belt covering layers, the number of which is obtained by the displacement of the strip convolutions, and depends on the strip width.

1 Claim, 4 Drawing Figures



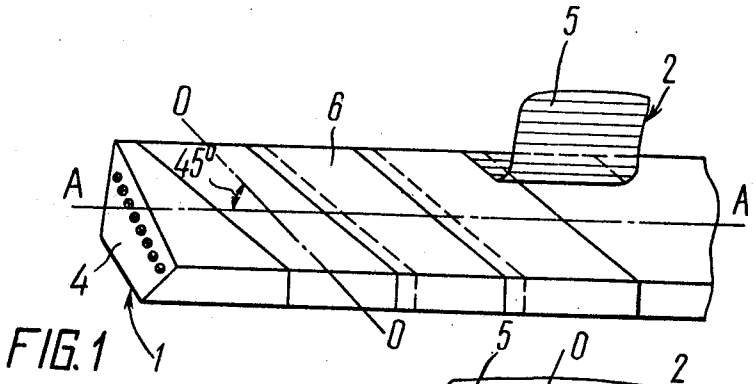


FIG. 1

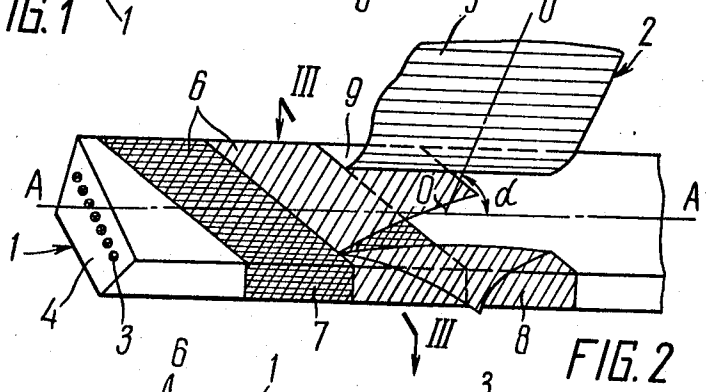


FIG. 2

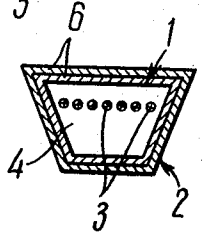


FIG. 3

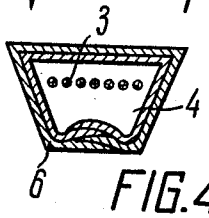


FIG. 4

V-BELT

The present invention relates to V-belts widely used in modern engineering industry to transmit power or rotative motion.

Known at present is a V-belt comprising a rubber-fabric core with a covering material wound about it and forming the coating layers.

The covering material used to wrap the cores of V-belts consists of a strip of fabric of definite width, according to the belt thickness, which strip is produced by cutting the fabric in a bias-cutting machine at an angle of 45° (the direction of the warp threads in the the fabric makes an angle of 45° with the longitudinal axis of the strip). Then these bias-cut pieces of fabric are lap-pasted together in length and are wound on a bobbin. Thus obtained roll is cut into several sections to produce reels of fabric with a required width.

Secured to the core, stretched between two pulleys, is one end of the strip of covering fabric wound off the reel. In the course of the core movement on the pulleys, the strip of fabric is wrapped about the core by means of pressure rollers so that its edges overlap all along the core. Thus, one covering layer is laid about the pulleys within one complete movement of the core. To produce the next layer, an operation similar to that described is carried out.

In this case the lap value between the longitudinal edges of the strip is from 2 to 5 mm, the transversal lap being 5 to 15 mm.

However, in such belts the overlapping joints of the covering material increase the belt rigidity, and prove to concentrate the stresses developing during the belt operation, which involves cracks in both the covering layers and the core of the belt.

What is more, the succession of operations to lay the covering layers extends the time of the belt production process.

Also known is a V-belt, on whose core a cord is wound at an angle of 45°, which is thereafter coated with a binder, the cord being wound so that its convolutions tightly adhere to one another. To obtain several layers, each subsequent layer of the cord is wound on the previous one so that the convolutions of the subsequent layer are directed to the opposite side, and intersect with the convolutions of the previous layer at an angle of 90°.

However, the belt produced in such a way requires several successive assembly operations to obtain the necessary number of layers, which extends the time to make one belt.

Besides, when the belt is operated on pulleys of small diameters, and in mediums polluted with oil, benzine, dust, etc., it is severely flexed. This destroys the binder, and helps penetration of dust, oil, etc. inbetween the convolutions of the covering layers, thus causing early wear and failure of the belt.

It is an object of the present invention to provide a V-belt that is elastic, strong, and simple in production.

Another object of the present invention is to provide a V-belt that would be durable in varying operating conditions.

With these and other objects in view, in a V-belt comprising a rubber-textile core with a covering material wound thereon at an angle of 45°, and forming the belt covering layers, according to the invention, the covering material has the form of a strip which is produced from rubberized fabric by cutting it along its warp, and which is lap-wound helically about the core, the appropriate number of the covering layers being obtained by displacing the strip convolutions relative to each other, and depending on the strip width, which is determined by formula:

$$B = K \cdot P \cdot \sin\alpha,$$

where B is the width of the covering strip,

K is the number of the covering layers,

P is the perimeter of the V-belt cross section,

α is the angle at which the covering material is wound on the core.

Thus, the proposed belt is very simple in production since the required number of covering layers can be obtained within one complete revolution of the core about the pulleys.

Employment of warpwise-cut rubberized fabric strip as the covering material makes it possible to simplify the process of making the covering strip, i.e., to obviate the need for previously cutting the fabric in bias-cutting machines, and then pasting the bias-cut pieces together into one long strip. Helical lap-winding of the strip on the core, and displacement of the strip convolutions relative to each other, permits winding several covering layers at a time, which excludes the need for successive winding of these layers and, respectively, raises labor efficiency. Besides that, it enables avoiding overlapping the edges of the covering material along the core, and hence, eliminates the preconditions for increased belt rigidity and additional stress concentrations in the belt.

The invention is further explained by a description of particular illustrative embodiments of V-belts with references to the appended drawings, wherein:

FIG. I shows a V-belt with one covering layer according to the invention;

FIG. 2 shows a V-belt with two covering layers;

FIG. 3 is section along line III—III in FIG. 2; and

FIG. 4 shows the cross section of a V-belt produced by one of conventional methods.

The V-belt proposed herein consists of a rubber-textile core 1 (FIGS. I, 2) with a covering material 2 wound thereon and forming covering layers 6 of the belt.

The rubber-textile core comprises a tension layer 3 which is formed of cords, ropes, or several layers of cotton, synthetic, or some other fabric, and which is pressed into a layer of rubber 4.

The covering material 2 consists of a strip 5 of rubberized fabric produced by cutting the fabric along its warp. For this purpose an appropriate amount of the rubberized fabric is wound on a bobbin which is subsequently cut into reels of the required width.

The width of strip 5 should be calculated in advance since it affects the number of the required covering layers 6. The strip width is determined by the formula

$$B = K \cdot P \cdot \sin\alpha,$$

where B is the width of the covering strip 5;

K is the number of the covering layers 6;

P is the perimeter of the V-belt cross section;

α is the angle at which the covering material 2 is wound on the core 1.

Strip 5 of appropriate width (FIGS. 1, 2) is helically lap-wound at an angle of 45° about core 1, the belt covering layers 6 being formed by displacement of the convolutions of strip 5.

To produce the belt, core 1 is stretched on two pulleys (not shown in the drawings), and the strip reel of required width is placed on a holder (not shown) which moves the strip reel in the vertical plane along a circle concentric with one of the sides of the stretched core. The end of strip 5 is secured to core 1 so that its longitudinal axis 0—0 makes an angle of 45° with the longitudinal axis A—A of the core.

With the pulleys and the holder in rotation, core 1 moves, strip 5 unwinds from the reel, and winds helically on the core with an overlap. Due to the strip winding on the core at an angle of 45° to the longitudinal axis A—A of the latter, the convolutions of strip 5 are displaced, and the belt covering layers 6 are formed.

To produce a V-belt with one covering layer, as is shown in FIG. 1, and with a perimeter of the belt cross section equaling P = 9I mm, a strip 5 is taken whose width B is calculated by the earlier indicated formula. Substituting the respective values:

K = 1 — the number of covering layers 6,

P = 9I — the perimeter of the belt cross section,

$\alpha = 45°$ — the angle at which the covering material 2 is wound on the core 1,

we obtain the strip width B = I·9I·0.7 = 64 mm.

The end of this strip 5 is secured by the above-described method to core 1, and with rotation of the pulleys and the holder strip 5 winds helically on core 1 with a lap of 2 to 5 mm for complete closure of the surface of the belt core 1. This lap does not cause any additional belt rigidity and cannot serve as a stress concentrator since the thickness of the covering strip is small.

To produce a V-belt with a cross-sectional perimeter equaling P = 9I mm and with two covering layers (as is shown in FIG. 2), the strip used has a width of I28 mm, which is calculated by said formula

$$B = 2 \cdot 9I \cdot 0.7,$$

where 2 is the number of the covering layers 6. They are differently hatched.

The covering layers 6 are obtained by a displacement of the convolutions of strip 5; thus, after laying the first convolution 7 (FIG. 2) the second convolution 8 is shifted to half the width of strip 5, and overlaps the first convolution 7 by half the strip width. The third convolution 9 is laid over the second convolution 8 in a similar way. Thus, the required number of the covering layers is laid on core 1 within one complete revolution thereof due to the displacement of the strip convolutions.

Belts with three, four and more covering layers are produced in the same way.

Comparison of the cross-sections of the two V-belts shown in FIGS. 3 and 4 proves the advantage of the V-belt proposed herein and illustrated in FIG. 3.

After laying a required number of covering layers on the core, the V-belt is cured in an autoclave, press or other curing equipment.

Bench tests have proved that in the process of the belts operation the covering layers do not split or open.

Besides that, the proposed V-belts are elastic, strong, and durable. Maximum effect is achieved when using endless belts of large lengths having the proposed design, as well as in belts having large cross sections and several covering layers.

What we claim is:

1. A V-belt comprising: a rubber-fabric core; covering material wound on said core with its fibers at an angle of 45° to the longitudinal direction of the V-belt, and forming covering layers; said material having the form of a covering strip produced from rubberized fabric cut along its warp, said strip being helically lap-wound on said core, a predetermined number of said layers being displaced relative to one another in the convolutions of said strip; wherein the width of said strip is determined by the formula:

$$B = K P \sin \alpha,$$

wherein B is said width of the strip,

K is said number of the layers,

P is the perimeter of the V-belt cross section, and

α is the angle at which said material is wound on said core.

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