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BELT

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Fig. 1

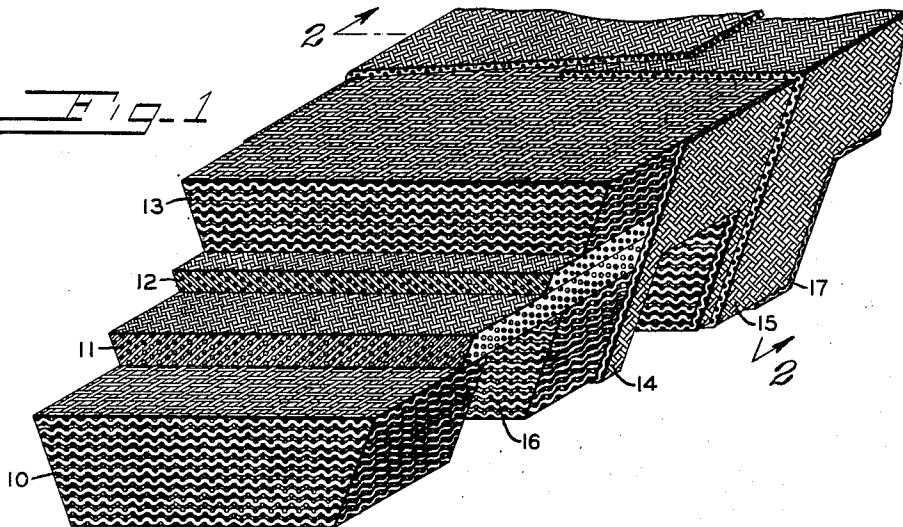


Fig. 2

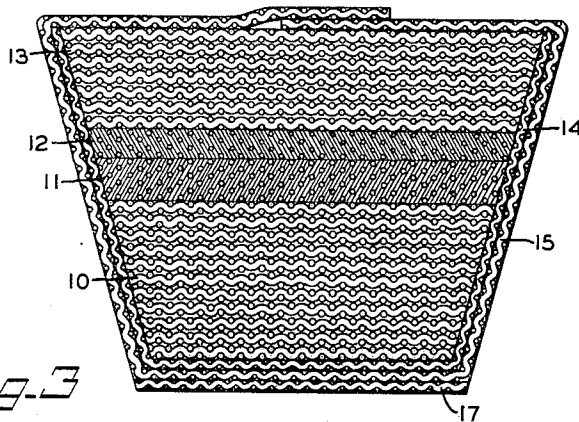
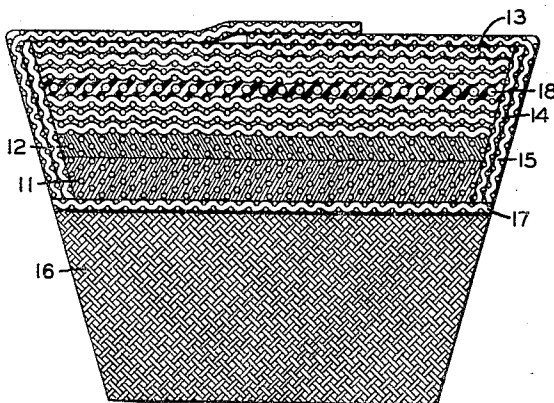


Fig. 3



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BELT

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The present invention relates to belts, and more particularly to V type belts having teeth formed in the compression section and composed of a plurality of fabric layers.

Belts of this type which are particularly adapted for use in driving generators, blowers or other equipment on railroad cars are frequently of the connector type rather than endless as in the case of belts for other applications. It has been found that in order for the connectors to be firmly anchored in the belt in a manner which will withstand long periods of use, it is necessary that these belts be composed substantially entirely of alternate layers of rubberized fabric. Preferably, the belt is provided with a square-woven straight-laid rubberized fabric compression section, a bias-laid fabric intermediate section and a square-woven straight-laid rubberized fabric tension section. Teeth are formed in the compression section and a bias fabric wrapper encloses the entire belt. Such a belt is described in the patent to Freedlander, #2,065,180, patented December 22, 1936.

While the belts described in the above-mentioned patent are satisfactory for commercial applications as railroad belts or the like, it has been found that eventually these belts tend to fail due to the formation of cracks in the bias section just above the teeth. This section is designed to give the belt greater flexibility and also serves as a hinge between the teeth. Consequently, it must be extremely flexible and capable of withstanding severe and prolonged flexing. Although this bias section is protected to some extent by the impregnating rubber, it appears to break down by cracking under severe flexing in the presence of dust, grit, rain, snow, heat and cold to which it is subjected while in use.

Applicant has now discovered, in accordance with the present invention, that by making all or a portion of the bias section of square-woven nylon fabric which is bias laid, that the appearance and growth of these between the tooth cracks can be eliminated or materially retarded thus substantially increasing the life of the belt. The nylon fabric may be of 100% nylon or may be made of a blend of nylon and cotton in which the nylon in the blend is not less than 25%. The preferred blend is one consisting of 75% nylon staple filament and 25% of cotton staple. In the preparation of these blends the interweaving of cotton and nylon yarns is not satisfactory but the cotton and nylon filaments must be combined to form a yarn which is then woven into the so-called blended fabric. The nylon used

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may be in the form of continuous or staple filaments. The fabric may preferably weigh between 5 ozs. and 17 ozs. per square yard, and, in general, an 8 oz. fabric is satisfactory. The count, or ends per inch, may be that which is considered good practice depending on the yarn size and construction.

It has been found that natural fibers, such as cotton as well as other synthetic fibers, such as the various types of rayon, will not be operative to perform the desired function in the bias section and that nylon is the only textile material which applicant has found to function satisfactorily in this respect.

Referring to the drawings, Fig. 1 is a perspective view which is partially in cross section to describe the belt construction. Fig. 2 is a transverse cross section along lines 2-2 of Fig. 1. Fig. 3 illustrates in cross section a belt similar to that shown in Figs. 1 and 2 but containing a row of reinforcing cords in the tension section. The section shown is taken between teeth.

Referring to the drawings in detail, in Figs. 1 and 2 the compression section is formed of a plurality of layers of square-woven straight-laid fabric impregnated with rubber designated at 10. Superimposed upon this compression section is the bias section which consists of fabric layers 11 and 12. Layers 11 are shown as three plies of the nylon fabric referred to which are square-woven and bias laid. The number of nylon plies may be varied to suit the particular requirements and generally will be from one to six plies. Layers 12 consist of a plurality of layers of bias cotton fabric. As illustrated, the bias section actually consists of two portions, the hinge section 11 comprising, for example, the layers of rubberized nylon bias fabric and an intermediate section superposed thereon comprising layers of bias-laid cotton fabric. If desired, the entire bias section designated by 11 and 12 may be composed of layers of the nylon material but generally it is satisfactory if only the lower portion of the plies in this section, or those adjacent to the compression section, are composed of nylon. Mounted upon the bias section 12 is the tension section 13 which is composed of a plurality of layers of square-woven straight-laid rubberized cotton fabric. A U-shaped rubber impregnated bias fabric layer 14 embraces the sides and the bottom of the belt. Superimposed is a cover layer of rubberized bias fabric 15 which extends around the four sides of the belt overlapping at the top. Teeth 16 are formed in the compression section by shearing.

An additional layer of bias fabric 17 is applied to the bottom of the belt and inside the teeth to cover the cut out portions.

Fig. 3 illustrates in cross section a modification of the construction illustrated in Figs. 1 and 2 in which a single row of rayon or nylon cord 18 replaces one of the layers of cotton fabric in the tension section. It has been found that ordinary cord reinforcements in the tension section of this type of belt are unsatisfactory since they require the replacement of a plurality of layers of square-woven fabric. This deprives the belt of the requisite strength for proper anchoring of the belt fasteners. In this particular type of belt in conjunction with the use of nylon fabric in the base section, it has been found that increased longitudinal strength may be imparted to the belt without depriving it of the necessary strength for anchoring belt fasteners by replacing one of the fabric plies in the tension section with a row of rayon or nylon cord having the proper dimensions. Other materials are not suitable for this purpose. The diameter of the cord used should not exceed the thickness of the space between fabric plies created by the elimination of a single ply of fabric. In general the diameter of the cord used will range between 0.030 in. and 0.080 in. The cords may be spaced in the row or may be contiguous.

In the manufacture of this belt a building drum is selected having the desired diameter. Layers of square-woven rubberized fabric forming the compression section are then wound concentrically upon one another around the drum by rotating the drum. The compression section may be composed, for example, of rubberized cotton duck which is frictioned and skimmed with a layer of vulcanizable rubber composition. Of course, each layer will have the desired gauge depending upon the final size of the desired belt. The desired number of layers of square-woven nylon fabric which are frictioned and skim coated with rubber compound are then wound around the compression section. The desired number of layers of bias fabric necessary to make the bias section are then superimposed upon the nylon layers. Thereafter, the tension section is applied. This fabric may be the same as that of which the compression section is composed and is applied in the necessary number of layers. The rubber compositions which may be used will include the natural and synthetic rubber materials well known to the art, including the conjugated diolefin polymers and copolymers with styrene or acrylic nitrile, such as the buna rubbers, the polychloroprene polymers, such as neoprene, and other vulcanizable resilient elastic rubber-like materials commonly classified as synthetic rubbers. Of course, these compositions contain vulcanizing agents, accelerators, fillers, etc. as well known to the prior art. One type of belt commonly constructed contains 11 plies of fabric in the compression section, 3 plies of nylon and 2 plies of cotton fabric in the bias section, and 7 plies of cotton fabric in the tension section. These layers are skim coated with natural rubber compositions before application to the drum. Where a cord layer is used as shown in Fig. 3, the winding of fabric in the tension section is carried out in two steps with a layer of rayon cord being wound at or near the neutral axis of the belt. At this point, the various layers which form the core of the belt have been applied and the individual belt cores are cut from the drum in the manner known to the art.

These cores may be cut either as continuous rings by means of parallel knife cuts or may be cut in long strips by moving a knife horizontally across the drum to cut a long spiral core from the drum. The cores are then covered with cement and wrapped. In the form shown the core has two covers, the inside of which is applied in U shape and the outer cover applied entirely around the belt with a lap at the top. The covers are applied mechanically by means of a covering machine. The covered belts still in an uncured condition are then frozen by means of dry ice while in a stretched condition and are then removed and teeth punched from the compression section while in a frozen condition. The punched belts are then thawed. At this point the belts are cemented between the teeth and a bias strip laid over the tooth profile. The belts are then cured in long molds in accordance with the practice known to the art. After curing any overflow stock is trimmed and the belts are cut into the required lengths.

The same type of construction may be utilized in the manufacture of endless belts where such construction is desired.

I claim:

1. In a belt, a compression section consisting essentially of a plurality of rubberized fabric layers, teeth formed in said compression section, an intermediate section consisting essentially of a plurality of layers of rubberized fabric comprising at least one layer of bias-laid fabric having at least 25% of nylon in the yarn from which the fabric is woven positioned adjacent the compression section and over the toothed portions thereof to serve as a hinge section between the teeth, and a tension section comprising a plurality of layers of rubberized fabric.

2. In a belt according to claim 1 wherein the tension section includes a layer of rayon cord positioned at an intermediate point therein between layers of rubberized fabric.

3. In a belt having superposed compression, intermediate, and tension sections, and having teeth formed in said compression section; wherein said intermediate section comprises a plurality of layers of bias-laid square-woven rubberized fabric at least one of which layers is composed of fabric having at least 25% of nylon in the yarn from which the fabric is woven and being positioned adjacent the compression section.

4. A V type power belt of the connector type having a compression section consisting of a plurality of layers of square-woven, straight-laid rubberized cotton fabric, a hinge section consisting of at least one layer of bias-laid square-woven rubberized fabric containing at least 25% of nylon in the yarn from which the fabric is woven superposed upon and adjacent to said compression section, an intermediate section consisting of a plurality of layers of rubberized, square-woven, bias-laid cotton fabric, a tension section comprising a plurality of layers of rubberized, square-woven straight-laid cotton fabric, teeth formed in said compression section, and an enclosing cover of rubberized fabric surrounding said sections.

5. A belt according to claim 4 wherein the hinge section consists of a plurality of layers of bias-laid square-woven rubberized nylon fabric.

6. A belt according to claim 4 wherein the tension section comprises a layer of nylon cords positioned at an intermediate point therein between layers of rubberized square-woven straight-laid cotton fabric.

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7. A belt according to claim 4 wherein the tension section comprises a layer of rayon cords positioned at an intermediate point therein between layers of rubberized square-woven straight-laid cotton fabric.

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