

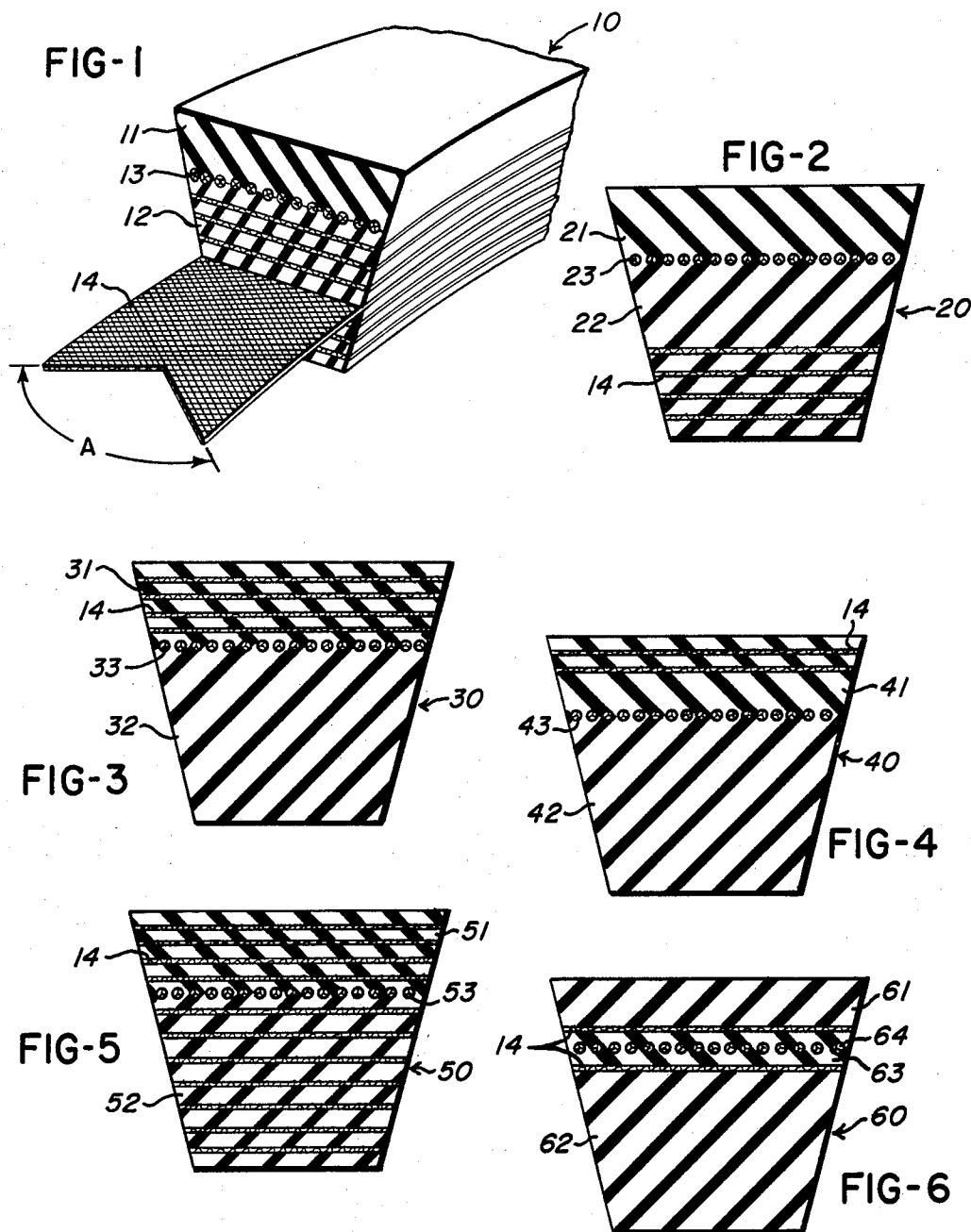
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V-BELTS

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V-BELTS

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9 Claims

ABSTRACT OF THE DISCLOSURE

A V-belt utilizing layers of stress-relief fabric in its body, in the compression and/or tension sections, or surrounding the strength cords. The stress-relief fabric has warp and weft threads at an angle of 95 to 155 degrees with each other.

This invention relates to V-belts, which is the term generally applied to power transmission belts having a trapezoidal cross section.

The present application is a continuation of Ser. No. 575,330, filed Aug. 26, 1966, now abandoned.

Among the many problems which arise in the design of such belts is the constant need to compromise between maximum wear which can be achieved by the use of stiffer materials, and a high degree of flexibility. This flexibility is particularly necessary in the modern types of transmission drives where small diameter pulleys tend to create cracking of the belt in the tension or outer section which flexes as the belt passes around the pulley. This cracking situation also arises in the compression or inner section which also undergoes a certain amount of stress during the passage of the belt around the pulley. Various designs have been created to achieve these compromises, and the present invention relates to one of these designs which has been found to be particularly noteworthy in providing a highly flexible belt that does not sacrifice too much of its strength.

The primary inventive concept described herein involves the use of fabric known in the industry as a "stress-relieved" fabric in various configurations within the belt. This is a woven fabric in which the warp and weft threads are arranged in a novel manner to provide the high degree of flexibility which has been found to be so important. In addition to the use of this fabric to improve the flexibility of the tension and compression sections, this fabric has also been found to have a beneficial effect when used above or below the neutral axis cord because it tends to prevent the cord from working its way through the belt. The concept of using a fabric generally for this purpose has been set forth in United States Patent No. 2,726,976, but the specific combination of the stress-relieved fabric in neutral axis retention has not heretofore been known.

It is a principal object of the present invention to provide an improved belt having a high degree of flexibility.

It is a further object to provide such a belt in which the flexibility is combined with improved support of the strength cords.

These and other objects of the invention will be more fully understood from the following specification and drawings, in which:

FIGURE 1 is a perspective view in partial cross section illustrating one form of the invention.

FIGURES 2-6 are cross-sectional views of similar belts illustrating further modifications of the invention.

The conventional V-belt, which is well known, is fabricated of an inner or compression section and an outer or tension section formed of elastomeric materials such as

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natural or synthetic rubbers of various formulations, some of which are set forth in the above-referenced patent. Embedded between these sections is a series of longitudinally extending cord windings which are in effect a portion of a single cord which was spun onto a belt sleeve during the belt building operation, after which the sleeve was cut into the individual belts so that the windings referred to remain as part of the finished belt. These cord windings are parallel to and slightly separated from each other and are located on the same plane, being, therefore, parallel to the planes of the compression and tension sections. The above form of the belt is a simple one and may be modified by incorporating within either or both of the compression and tension sections a plurality of fabric layers which have been coated on one or both sides with a similar elastomeric material and incorporated within these sections. If desired, the entire compression or tension section, or both, may be formed of a series of layers of these coated sections which provide a fully laminated section. Another form of belt which is common, and illustrated in the above-referenced patent, utilizes a separate cushion between the compression and tension sections, the longitudinal cords being embedded within this cushion.

While the above belt constructions are well known, it is contemplated that any or all of the above constructions may be improved by the use of the stress-relieved fabric referred to. This fabric, as is best shown in FIGURE 1 and designated by reference numeral 14, is formed by having its warp and weft threads disposed at an angle of between 95 and 155 degrees to each other. This means that the warp and weft threads are not disposed at 90 degrees to each other as in conventional fabrics, but instead are at an obtuse angle with respect to the longitudinal axis of the belt. It is this angular relationship which provides the fabric with its unusually high flexibility and assists in relieving the stresses and strains to which belts are subjected.

The configuration illustrated in FIGURE 1 provides for a V-belt 10 having a tension section 11 and a compression section 12, between which is embedded the cord windings 13. In this instance the entire compression section is formed of a plurality of rubber coated fabric layers 14 which thus provide a fully laminated compression section. As stated above, the warp and weft threads of this layer are disposed at an angle A which is between 95 and 155 degrees. The number of layers in this belt depends upon the thickness of the compression section and may range from approximately 10 to 15 layers.

A modified form of this invention is shown in FIGURE 2 in which a belt 20 is comprised of the tension section 21, compression section 22, and cord windings 23; in this instance, however, four fabric layers 14 are disposed in the innermost portion of the compression section. In this type of construction layers 14 may either be placed within the body without treatment, or they may be coated on one or both sides with rubber prior to this placement.

FIGURE 3 illustrates a form of the invention in which the belt 30 has a tension section 31, compression section 32, and cord windings 33. In this form of the invention the entire tension section, which may consist of about three to six layers, is composed of the fabric layers 14 which have been preferably coated.

FIGURE 4 illustrates a modification of FIGURE 3 in which the belt 40 has a tension section 41, compression section 42, and cord windings 43, and in which two fabric layers 14 are located at the outermost portion of the tension section.

FIGURE 5 illustrates still another form of the invention in which the belt 50 comprises tension section 51, compression section 52, and cord windings 53. In this form of the invention the entire tension and compression sections are formed of fabric layers 14 which have been

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previously coated on one or both sides and used to form a fully laminated belt.

FIGURE 6 is a form of the invention somewhat similar to that of the above-referenced patent, in which belt 60 has a tension section 61 and a compression section 62. In this instance, however, the intermediate load-carrying portion consists of an elastomeric cushion 63 and longitudinal cord windings 64 which are embedded therein. Adjacent and contiguous to the upper and lower surfaces of this cushion are two fabric layers 14 which tend to retain the cord windings in their aligned position and prevent flow of the cushioning material in either direction. The cushioning member is formed of an elastomeric material which is somewhat different from that of the rest of the belt, the compound of which is discussed more fully in the above-referenced patent.

In all of the configurations described above and illustrated in the drawings, the stress-relieved fabric layers 14 have been used in different arrangements but all with the purpose of creating a more flexible belt that will still retain high strength characteristics. The manner in which these layers are used depends on the end use to which each belt is to be put, and may also depend on the manner in which the belt itself is built as, for instance, by the type of mold used, whether the belt is built right-side out or inside out, etc. In addition, the number of layers utilized is somewhat of a compromise since, generally speaking, a greater flexibility is achieved with more layers of fabric, but at a tendency to sacrifice the life of the belt. By flexibility we are really speaking of the resistance of the belt to failure as a result of the flexing action which takes place over the pulley. The choice of whether to use the fabric layers without treatment, with one, or with both sides coated is a matter of expediency which is again related to the method of belt building employed. Whichever of the above methods or constructions is used, a novel and vastly improved transmission belt has been developed for the first time.

It should also be noted that the broad concept of forming a fabric with warp and weft threads at an obtuse angle is set forth in United States Patent No. 2,519,590, in which such fabric is utilized as a cover for V-belts. The present invention, however, utilizes such a fabric in an entirely different manner, as a part of the belt structure, and thereby provides entirely new combinations. It should also be noted that although "raw edge" (unwrapped) belts are illustrated, the present invention applies equally to belts having an outer cover, also known as "wrapped molded belts."

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Although the present description has been limited to certain specific embodiments, these are not intended to limit the scope of the present invention.

We claim:

1. A V-belt having a body principally composed of elastomeric material and having an inner compression section, an outer tension section, and a layer of longitudinally extending cord windings located between said sections; at least one layer of fabric embedded within the interior of said body and extending parallel to said layer of cord windings, said fabric having warp and weft threads disposed at an angle of between 95 and 155 degrees with each other.
2. A belt according to claim 1 in which said fabric layers are located in the compression section.
3. A belt according to claim 1 in which said fabric layers are located in the tension section.
4. A belt according to claim 1 in which said fabric layers are rubber coated.
5. A belt according to claim 4 in which said compression section is composed entirely of said coated layers.
6. A belt according to claim 4 in which said tension section is composed entirely of said coated layers.
7. A belt according to claim 4 in which said compression section and said tension section are composed entirely of said coated layers.
8. A belt according to claim 1 in which some of said fabric layers are located in the tension section and some in the compression section.
9. A V-belt having an inner compression section and an outer tension section principally composed of elastomeric material, an intermediate load-carrying portion between said compression and tension sections comprising an elastomeric cushion having longitudinally extending cord windings embedded therein, and fabric layers embedded within said belt and contiguous with the upper and lower surfaces of said cushion, the fabric having warp and weft threads disposed at an angle of between 95 and 155 degrees with each other.

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