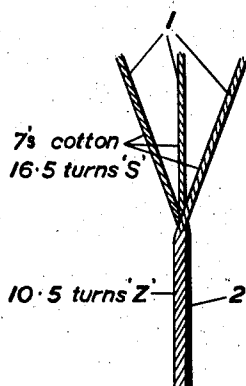


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CORD FOR USE IN THE COVERS OF PNEUMATIC TIRES AND OTHER
REINFORCED ARTICLES OF RUBBER AND SIMILAR MATERIALS
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CORD FOR USE IN THE COVERS OF PNEUMATIC TIRES AND OTHER REINFORCED ARTICLES OF RUBBER AND SIMILAR MATERIALS

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This invention relates to "cords" of the type used in the covers of pneumatic tires and in other reinforced articles of rubber and similar materials. The invention is especially concerned with cords made from cellulosic fibres.

According to the invention, a cord for the above mentioned purposes comprises a cabled assembly of a number of heavy singles yarns of cellulosic fibres with one direction of twist cabled together with opposite twist. Thus, the singles yarns may be 3, 3½, 4, 5, 6, 7, 8 or 10's counts, and relatively few, say 3, 4, or 5, of these may be plied or cabled to give a cord of the required size. Both the singles twist and the cabling twist are preferably of moderate amount, the cabling twist being appropriately less than the singles twist to allow for the greater diameter of the final cord.

By the use of heavy singles as the basic yarns, instead of the relatively fine yarns of about 20-23's counts ordinarily used, the whole manufacturing operation is simplified. With care in selecting a roving of uniform character, a uniform heavy singles yarn can be made at far less cost than the several fine yarns normally used to build up the ends required in the final plying, and the careful winding and doubling operation is eliminated. More important, however, the quality of the final product is much improved, especially with regard to its ability to withstand the repeated flexing to which it is subjected when serving as the reinforcement of the rubber article. Cotton cords constructed from fine singles yarns are very poor in this respect, and the invention therefore enables cotton to be used to much better advantage.

Similar advantages are obtained from the application of the invention to staple fibres other than those of natural origin, and to mixtures of different kinds of cellulosic fibres. Thus, staple fibre of the viscose, "strong" viscose, cuprammonium and nitrate regenerated cellulose class may be employed, alone or in admixture with each other or with cotton. Again, singles yarns of different fibres or fibre mixtures may be plied together to make the final cord. Artificial fibres may have a length similar to that of cotton fibres (say 1½ inches); longer fibres, e. g. 2½, 3, 5 or 10 inches may, however, be used.

It is sometimes convenient to refer to the "counts" of staple fibre yarns incorporating artificial cellulosic fibres in terms of the "denier" unit of weight employed for artificial filaments, and the range of counts already mentioned for the singles yarns corresponds to the range of deniers from upwards of 1500, downward to 1300, 1100,

880, 660 and 500 approximately. The denier of the final cord is usually of the order of 3000, 3500, 4000 or 4500, being built up of 3, 4, or 5 singles yarns of appropriate denier.

To enable the cords to have a suitable combination of flexing life, tensile strength and extension, a balance is necessary between the singles twist and the doubling twist. Thus, for example, singles cords of 3½, 5 or 7's cotton counts may be twisted to say 15-20 turns per inch in one direction, and the plying or cabling may then be effected with say 5 to 10 or 12 turns per inch in the opposite direction. Higher twists tend to increase the flexing life, and for any given singles twist, an increase in the plying or cabling twist shows this same tendency. Some modification of tensile strength and/or extension may be made to benefit flexing life, and the possibility is afforded of adjusting the two properties—flexing life and tensile strength—in accordance with particular requirements. Thus, a combination of 16.5 turns "Z" and 10.5 turns "S" on 7's cotton singles cabled threefold gives a flexing life of over 1,000,000, a tenacity of 1.34 grams per denier, and an extension of 19.5%. A similar cord with only 5 turns of cabling twist has a flexing life of about 400,000, a tenacity of 1.38 grams per denier, and a stiffer construction represented by a reduction of the extension to 14.5%.

The above yarns were lubricated during twisting by passage over a wick supplying a 2-2½% solution of coconut oil in kerosene, together with 1% tricresyl phosphate, to the extent of 3% residual lubricant on the yarns. Such a lubricant is generally advantageous in the production of cords from the other types of cellulosic fibres with which the invention is concerned. Petrol may be used instead of the kerosene as the solvent for the oil.

The drawing shows diagrammatically a construction of cord according to the invention.

Three ends 1 of 7's cotton, 1½-inch staple, with 16.5 turns "S" twist are cabled with 10.5 turns "Z" twist to form the cord 2. Good quality cotton, e. g. Sea Island or Egyptian, is preferred.

Having described our invention, what we desire to secure by Letters Patent is:

1. Cords for pneumatic tires and other reinforced articles of rubber or similar materials, said cord comprising a cabled assembly of a number of heavy singles yarns of cellulosic staple fibers with 15 to 20 turns per inch of twist in one direction cabled together with 5 to 12 turns per inch of opposite twist.

2. Cords for pneumatic tires and other rein-

forced articles of rubber or similar materials, said cord comprising a cabled assembly of a number of heavy singles yarns of cotton with 15 to 20 turns per inch of twist in one direction cabled together with 5 to 12 turns per inch of opposite twist.

3. Cords for pneumatic tires and other reinforced articles of rubber or similar materials,

said cord comprising a cabled assembly of a number of heavy singles yarns of regenerated cellulose staple fibers with 15 to 20 turns per inch of twist in one direction cabled together with 5 to 12 turns per inch of opposite twist.

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