

UNITED STATES PATENT OFFICE.

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STRAIN-RESISTING ELEMENT FOR RUBBER ARTICLES.

No Drawing.

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To all whom it may concern:

Be it known that I, ALFRED E. JURY, a citizen of the United States, residing at Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Strain-Resisting Elements for Rubber Articles, of which the following is a full, clear, and exact description.

This invention relates to threads or cords, generically termed "strain-resisting-elements," for incorporation with rubber into articles that are completed by vulcanization, such, for instance, and particularly, pneumatic tire casings. The elements may be incorporated either individually or collectively in the form of cord, woven, or web-less, fabric. The objects of the invention among others appearing later are to improve the structure of the strain-resisting-elements over what has heretofore been employed and to reduce the cost of their manufacture.

My invention is not restricted to any particular kind of fibre, but for the purpose of illustration it will be described in connection with threads, cords, and the like made from cotton. In the usual manufacture of cotton thread, cords, etc., the cotton from the bale is loosely opened out and subjected to a course of treatment directed to the removal of the shorter staple, leaf, and other foreign matter, and to the placing of the fibres into substantially parallel directions and to finally drawing out the fibres thus arranged into a uniform strand termed roving. The roving has a very slight twist imparted to it in order to make sure of its maintaining its uniformity and parallelism during the subsequent processes which it must be subjected to in order to produce the final cord.

The roving having no appreciable twist, the fibres composing it are in such loose contact there is little or no friction between them and consequently there is no appreciable tensile strength. In order to produce the required frictional contact and consequent tensile strength the usual practice is to draw the roving, which is of comparatively large cross-section, out into a fine filament and to spin it into what is termed a single yarn. A number of these yarns are then twisted together to form a plied yarn and finally a number of the plied yarns are twisted together to form the cord.

The forming of the single yarn required

much time and expensive machinery and is in fact the most costly operation in the manufacture of cord. For instance in the manufacture of cord fabric for forming the plies of pneumatic tires for motor vehicles the single yarn is usually formed by drawing out the roving about ten times its length and simultaneously giving this finely drawn filament a twist of between fifteen to twenty turns per inch of length. Five of these single yarns are then twisted together to form a plied yarn, and three of the plied yarns are finally twisted together to form the cord. These two twisting operations require much less time and expense than does the formation of the yarn, for the slow and delicate drawing operation is not present in the latter operations.

The cord thus formed has the cotton fibres very tightly spun together in the formation of the yarn and then further bound together by the two subsequent processes of twisting the single yarns. The fibres are thus self-retained together with a degree of permanency that well adapts the cords for the general wear and tear of service tending to loosen the fibres. This, however, involves the necessity, after having carefully formed the roving of uniform cross-section composing a relatively large number of parallel fibres, of then taking the backward steps of drawing the roving out until it is reduced in cross-section to a mere thread composed of a comparatively few fibres, and then combining a number (fifteen) of these yarns together until the cord is again enlarged in section to the desired size to give the required strength.

It will therefore be seen that if the roving can be used as originally formed, that is to say without resorting to the backward steps of drawing out and then plying up, a material saving will be attained in time and expensive apparatus employed. Moreover the tightly spun yarn and the plying of the same together by twisting, so tightly holds the fibres together that the cord is not of the desired degree of pliability to withstand the required flexing that is necessary for the many uses to which the cords are put and therefore the tightly held fibres are weakened by repeated flexing and prematurely break.

I have discovered that a cheaper and

resisting element for vulcanized rubber articles at less cost.

Having thus described my invention what I claim and desire to protect by Letters Patent is:

1. A fabric reinforcement for rubber tires having strain resisting elements consisting of a plurality of unspun rovings twisted loosely together.
2. A vulcanized rubber article the strain resisting elements of which consist of loosely twisted fibres.
3. A vulcanized rubber article the strain resisting elements of which consist of a plu-

rality of soft fibrous strands twisted loosely together.

4. A vulcanized rubber article the strain resisting elements of which consist of a plurality of substantially untwisted rovings.

5. A vulcanized rubber article the strain resisting elements of which consist of a plurality of unspun rovings twisted loosely together.

Signed at New York, county of New York, State of New York, this 11th day of October, 1918.

ALFRED E. JURY.