

ALIEN PROPERTY CUSTODIAN

METHOD OF RECOVERING RUBBER AND RESULTING PRODUCT

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The present invention relates to a new rubber composition and method of manufacturing the same, and embodies, more specifically, a new method of recovering rubber from articles which contain rubber but which, for certain reasons, are no longer serviceable for the uses for which they were originally produced.

The recovery of rubber from used articles such, for example, as old automobile tires and the like, is now accomplished generally in either one of two ways. On the one hand, the recovery is accomplished mechanically by crushing or tearing the old article into small particles in apparatus such as hammer mills and the like. The cotton fibers are separated from the rubber particles pneumatically and the resulting product is in the form of a fine powder or shoddy and shredded pieces. If the recovery is effected chemically, the fine particles produced as above mentioned are treated with a compound that will dissolve or destroy the cotton fibers.

The rubber obtained by either of the above existing processes is agglomerated under the action of heat, with perhaps the use of a solvent to produce a pasty mass which is then used in a homogeneous mixture with fresh rubber. This mixture is provided with the necessary ingredients to accomplish the vulcanization in any known fashion.

It appears that the violent working and heating of the rubber, or perhaps the action of oxygen on the finely divided particles under the heated conditions produced by grinding, alter the rubber chemically and/or physically and thus destroy its resiliency and wear-resisting qualities. Similarly, the action of the solvent on the vulcanized rubber may be such as to alter the rubber chemically and/or physically.

The product resulting from the processes heretofore used, as above described, therefore, is of inferior quality. Its elasticity is considerably below that of originally produced rubber and the resistance of such product to wear and cuts is materially impaired.

Inasmuch as the reclaimed vulcanized rubber cannot be converted to an unvulcanized state by any known treatment, it retains its impaired physical characteristics even when mixed with unvulcanized rubber. The reclaimed rubber thus imparts its altered and undesirable qualities to the mixture of reclaimed and new unvulcanized rubber. Subsequent vulcanization of the new rubber does nothing to improve the characteristics of the reclaimed rubber and, in fact, may further reduce its resiliency and wear-resistance.

The impairment of the desirable qualities in the final produce is generally proportional to the content of recovered rubber of such product and, as a result, rubber containing recovered rubber has heretofore been used only where first class or a prime quality of rubber is not essential.

An object of the present invention, therefore, is to provide an improved method for recovering such rubber and making it available for further use without impairment to the qualities thereof.

A further object of the invention is to provide a new product or composition of matter in which recovered rubber is utilized without impairing the properties of the composition or product.

In accordance with the present invention, rubber is recovered from used products in such fashion that it retains all of the desirable qualities which it secured upon its original vulcanization, and the resulting product formed of such recovered rubber and fresh rubber is found to have all of the desirable properties of originally vulcanized rubber.

More particularly, the recovery of the rubber is accomplished by cutting the rubber from the used articles, the cutting being accomplished in such fashion that the rubber is formed into small pieces or grains. In such operation, care is exercised not to crush or tear the rubber inasmuch as it appears that such operations cause the degradation previously referred to.

An alternative method of removing the rubber from the products from which it is to be recovered is by chilling the rubber sufficiently to make it hard and brittle and then subjecting it to a crushing operation to form small polyhedral grains of rubber.

The stresses utilized by these methods of subdividing the rubber into polyhedral particles without degradation are referred to hereinafter as "shearing" in order to distinguish from the hammering, tearing and grinding operations upon flexible rubber which occur in hammer mills and the like, heretofore used in mechanically reclaiming rubber, and which subject the particles to the hereinabove mentioned stresses that result in the degradation thereof.

The particles or grains obtained in either of the two ways above mentioned are then incorporated directly into a fresh rubber mixture which is vulcanized in any desired fashion to produce the desired result. In producing the final product, it is preferable that the particles of recovered rubber that are used in the mixture have the properties that are to be obtained in the final product.

This will insure a homogeneous product of greatest serviceability.

It is preferable in introducing the recovered rubber into the mixture of fresh rubber that the recovered rubber be introduced at the end of the mixing or milling operation and in such fashion that the grains of recovered rubber are not subjected to crushing and such other forces as may tend to impair the quality of the rubber. As above stated, the method of vulcanizing the mixture of fresh rubber and recovered rubber may be any of the methods now commonly in use, and, if the grains of recovered rubber are formed in the manner hereinabove described, they will be found to possess all of the desirable properties of the rubber in its originally vulcanized condition. The fresh rubber and recovered rubber may be mixed in various proportions or, if desired, the fresh mixture may be used merely as an agglomerating agent for the recovered grains. The final product, accordingly, consists of a mixture containing grains of rubber that have been recovered in the manner above described and possess the characteristic features of the vulcanized rubber in the product from which the grains were recovered. These grains of rubber having unimpaired qualities are formed, with the fresh rubber, into a homogeneous mass by the vulcanization of the

fresh rubber in the mixture and, by properly selecting recovered grains having desired characteristics, these characteristics are formed in the freshly vulcanized rubber in order to provide a product having the desired homogeneity.

The size of the particles of rubber may be varied considerably, but it is preferable to shear the rubber into relatively small pieces, the practical lower limit being determined by the cost of shearing the rubber. On the other hand, the upper limit of the particles is restricted for the reason that excessively large particles cannot be molded uniformly with the fresh rubber and will not penetrate properly into the design, for example, of a tire mold. Therefore, for practical purposes the longest dimensions of the rubber particles should be between about 0.02 and 0.4 of an inch.

While the recovery of rubber has been described, for purposes of illustration, as being effected from used automobile tires, it will be apparent that the invention is applicable to the recovery of rubber from any source and to its mixture and subsequent treatment in such fashion as to produce a final product having desired properties.

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