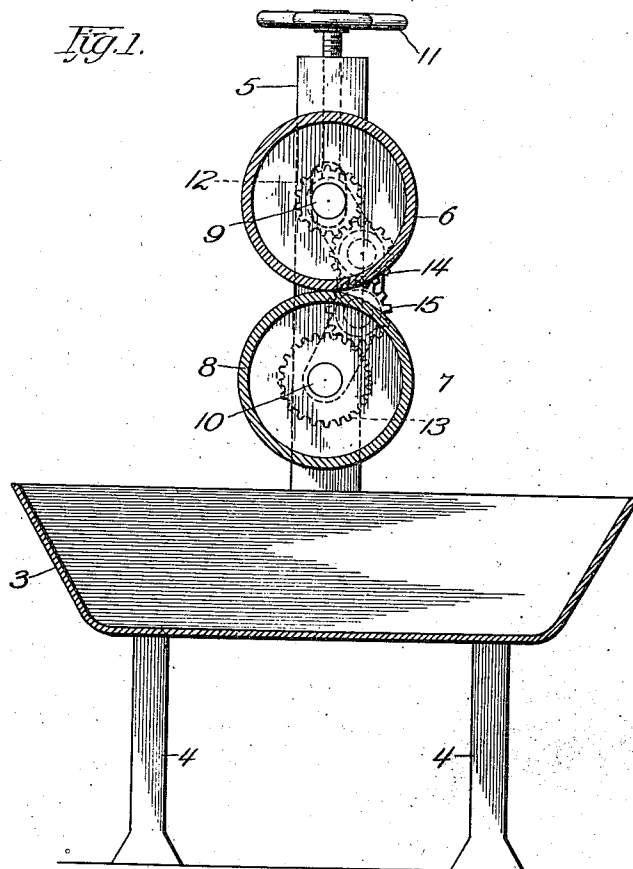
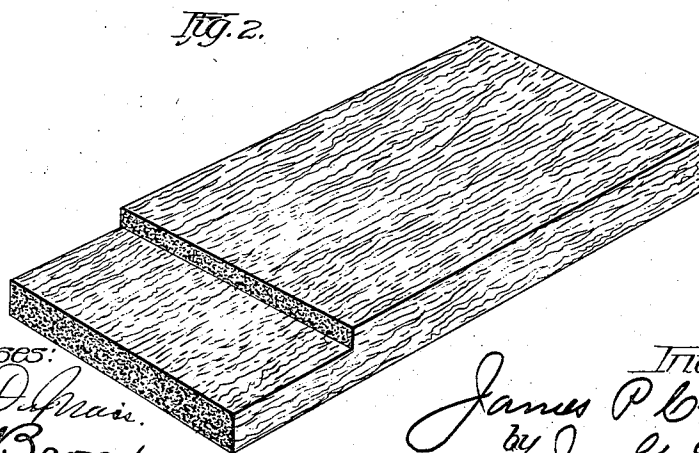


J. P. CRANE.
 PROCESS OF PRODUCING COMPOUNDS OF RUBBER AND STEEL WOOL.
 APPLICATION FILED MAR. 18, 1911.

1,152,935.

Patented Sept. 7, 1915.



Witnesses:
Leah D. Mason.
A. E. Brown

Inventor
James P. Crane
by J. H. Elliott
Att'y.

UNITED STATES PATENT OFFICE.

JAMES P. CRANE, OF CHICAGO, ILLINOIS.

PROCESS OF PRODUCING COMPOUNDS OF RUBBER AND STEEL-WOOL.

1,152,935.

Specification of Letters Patent.

Patented Sept. 7, 1915.

Application filed March 18, 1911. Serial No. 615,253.

To all whom it may concern:

Be it known that I, JAMES P. CRANE, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Process of Producing Compounds of Rubber and Steel-Wool, of which the following is a full, clear, and exact specification.

This invention relates to improvements in the process in reducing compounds composed generally of rubber and analogous gums and steel wool, but particularly of compounds consisting of resilient vulcanized rubber and steel wool, especially adapted to the construction of automobile and bicycle tires, shoe heels and soles, hoof pads and other articles wherein resiliency and durability of the rubber are essential and the non-slipping and non-skidding of their surfaces are desirable and important.

Steel wool is a well recognized article of commerce, every fiber of which is thread-like and has an irregular and triangular shape, giving steel wool a peculiar quality for rubbing and other purposes, and requiring for its production specially manufactured and prepared wire and expensive special machinery, tools and skilled labor, and is so different in the material of which it is composed, manner of its production, form and appearance to the eye and touch, and in its characteristics and uses for which it is adapted from lead wool or other fibers or turnings, that it is clearly distinguishable from and is not to be confused with same.

Heretofore such compounds have been formed of rubber and steel wool, mixed together by vulcanizing under pressure, or by repeatedly passing the steel wool, together with raw rubber compound in dough-like form, between the pressure rollers of machines commonly and generally employed for mixing raw rubber compound with its fluxes and its compounds until the fibers of the steel wool are thoroughly incorporated with and uniformly distributed throughout the mass of rubber as nearly as may be without regard to the direction of the fibers therein or the form they may have, with the result that in the finished product of the compound, after it has been vulcanized, the fibers frequently present themselves in the form of many loops through the wearing away of the rubber, which loops in present-

ing their side surfaces are practically useless for non-slipping and non-skidding purposes, and are soon broken off and wasted.

An end presentation of the fibers of steel wool to an opposing frictional surface is obviously the very best for durability, reducing slipping, skidding and the frictional wear of a compound of rubber and steel wool fibers in automobile and bicycle tires, shoe heels, etc., and it is to the securing of these results that my invention is directed.

The object of my invention is a process by which it is possible and practical to produce a compound of rubber, and especially resilient vulcanized rubber and steel wool, in which compound the fibers of the steel wool shall be disposed generally in a longitudinal direction so that the ends of the fibers shall receive and resist frictional wear of an opposing surface, and at the same time operate as a binder preventing the mass from undue lateral expansion from forces opposing its wearing surface, and whereby the wear of the rubber is reduced and its liability to being cut or punctured correspondingly reduced.

With these ends in view, my invention finds embodiment in certain features of novelty in the construction, combination and arrangement of parts by which the said objects and certain other objects are herein-after attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In said drawing:—Figure 1 illustrates, in vertical section, a machine such as is commonly used for mixing rubber and its compounds with fluxes therefor; and, Fig. 2 illustrates a perspective view of a block or sheet of rubber compound embodying my invention.

The mixing machine above referred to consists of a pan 3, supported upon legs 4, and opposing standards 5, in and between which are suitable journaled rollers 6 and 7, which are hollow, as indicated at 8, heated by steam supplied through their hollow journals 9 and 10 respectively, the upper roller being vertically adjustable by means of the hand wheel 11 for varying the thickness of the sheet or slab of the rubber compound passed between them, said upper roller being provided with a gear 12, and the lower roller by a larger gear 13, connected by means of pinions 14 and 15, where-

by one roller revolves somewhat faster than the other roller, and the two rollers are connected by differential gears providing for their continuous rotations in different adjustments.

In carrying out my invention, steel wool in a bunched or massed condition may be reduced to a sheet-like form, subsequently interposed between raw or semi-cured rubber until the fibers are disposed longitudinally and generally in parallelism with each other and still retain a more or less kinked form and curled condition.

As the cheapest, quickest and most satisfactory means, however, I have found that after mixing and uniformly distributing the fibers of the steel wool with raw rubber in mixing machines commonly and generally employed for mixing raw rubber with its fluxes and its compounds, and then passing the mixed mass between the pressure rollers thereof a number of times in the same direction, and until the mass is reduced to a slab or sheet-like form for subsequent use, the fibers of the steel wool are disposed generally in a longitudinal direction without destroying their curled and kinked form to a degree reducing their effectiveness as a binder for and preventing the rubber of the finished vulcanizing compound from objectionably spreading when used for the purposes above described.

The fibers of the steel wool, being cut as they are from a steel wire, in order to produce long fine fibers of curled and kinked form, are, by reason of the cutting process, unavoidably so brittle, that they break into a number of pieces when subjected to the pressure of a vulcanizing mold and to the pressure of rollers of mixing machines used in combining them with the rubber and distributing their fibers throughout a slab or sheet by the repeated roller pressure before described, with the result that the fibers of the steel wool are not nearly so effective either as a binder, as regards durability, the reduction of the frictional wear of the rubber, or for reducing the slipping and skidding of automobile and bicycle tires, shoe heels, etc.

In carrying out my invention I, therefore, in practice preferably draw the temper from the fibers of the steel wool, as may be, by any well-known process of annealing until sufficient brittleness is removed from the fibers to enable them to substantially retain the desired length of the fibers throughout the pressure, during the process of vulcanization and the roller pressure above referred to with whatever repetition may be necessary to produce a disposal of the fibers in a general longitudinal direction, and yet have them retain the sufficiently curled and kinked form for constituting a binder for the rubber for all the practical purposes and re-

sults before specified. After the fibers have been so annealed they may be reduced to a sheet-like form and a general longitudinal disposition by combing or other means, but in practice it is preferred to pass them, with rubber compound in a dough-like state, between the rollers of an ordinary commonly used rubber mixing machine, and after being thoroughly incorporated with the rubber, and the fibers distributed therethrough as uniformly as may be, the mixed mass is then repeatedly passed between the rollers in the same direction until the fibers extend in a general longitudinal direction substantially parallel with each other, until there is finally produced a slab or sheet in which the fibers are so disposed and remain throughout the subsequent vulcanizing process.

The longitudinal disposal of the fibers of steel wool in a rubber compound, such as above described, provide a means by which the steel wool in articles made therefrom may receive frictional wear upon its ends, and, therefore, on the surface of steel wool best resisting frictional wear, reducing the wear of the rubber, maintaining the rubber from slipping and skidding on opposing surfaces, and preventing any undue protrusion of the fibers from the surface of the rubber, whereby the breaking off of the fibers is prevented, and also the rubber surface wearing away from friction substantially faster than the wearing off of the fibers.

Having described my invention, what I claim and desire to secure by Letters Patent is:—

1. The herein described method of producing a compound composed of resilient vulcanized rubber and steel wool, the same consisting in first mixing rubber and steel wool in the usual manner, and then subjecting the compound to a force moving the fibers of the steel wool to substantially longitudinal parallelism to each other, and finally vulcanizing the compound with the fibers of steel wool in said position, substantially as described.

2. The herein described method of producing a compound composed of resilient vulcanized rubber and steel wool, the same consisting in mixing rubber and steel wool until the steel wool is distributed throughout the mass, and then subjecting the mixed mass to a force moving the fibers of the steel wool to substantially longitudinal parallelism with each other throughout the mass and finally vulcanizing the mass with the fibers of the steel wool in said position, substantially as described.

3. The herein described method of producing a compound composed of resilient vulcanized rubber and steel wool, the same consisting in first passing the mass between heated rollers in the usual manner for mix-

ing rubber and its compound until the steel wool is distributed throughout the mass of rubber, then subjecting the mixed mass to a force moving the fibers of the steel wool so distributed to substantial longitudinal parallelism with each other, and finally vulcanizing the mass with the fibers of steel wool in said position, substantially as described.

4. The herein described process for producing a compound composed of rubber and steel wool fibers, which consists in drawing the temper of the fibers of steel wool to a degree preventing their undue breaking under the pressure of their incorporation with rubber, then disposing of such fibers in a general longitudinal direction, subsequently incorporating them so disposed with and throughout a mass of rubber, and finally vulcanizing such mass.

5. The herein described method of produc-

ing compounds of resilient vulcanized rubber and steel wool, the same consisting in drawing the temper of the fibers thereof until an undue breaking brittleness under pressure is removed therefrom, then mixing said fibers with rubber in dough-like form until distributed through a given mass of rubber as uniformly as may be, and then repeatedly drawing said mixed mass between pressure rollers a sufficient number of times in the same direction to produce the disposal of the metal fibers in the same general longitudinal parallel direction throughout the mass.

In witness whereof, I have hereunto set my hand and affixed my seal, this 3rd day of March, A. D. 1911.

JAMES P. CRANE. [L.S.]

Witnesses:

F. E. BROM,

JOHN G. ELLIOTT.