

# UNITED STATES PATENT OFFICE.

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## PRODUCTION OF WASTE RUBBER GOODS.

SPECIFICATION forming part of Letters Patent No. 454,442, dated June 16, 1891.

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### *To all whom it may concern:*

Be it known that I, NATHANIEL C. MITCHELL, a citizen of the United States, and a resident of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in the Production of Waste Rubber Goods, which improvement is fully set forth in the following specification.

10 This invention has reference to the production from waste rubber goods—such as old boots and shoes—of a devulcanized rubber product suitable for reuse in the manufacture of various articles made wholly or in part of  
15 india-rubber.

The invention may be regarded as an improvement upon that described in Letters Patent No. 418,044 granted to me December 24, 1889, which may be referred to for a description of the method of reclaiming rubber most  
20 nearly resembling that forming the subject of the present application for patent. The main feature of the former method was the rolling of the devulcanized stock into sheets while permeated with a certain quantity of  
25 moisture, the moisture being preferably that residing in the stock after devulcanization with live steam under pressure. In practicing said method the best result was obtained  
30 by rolling the stock until quite dry.

The present invention is based upon the discovery that a notable improvement in the quality of the product is effected by keeping the stock wet with continued showers or  
35 sprays of liquid, as water, while applying the pressure by which the devulcanized mass is rolled into sheets. The pressure is most conveniently applied by means of rolls, (though other equivalent devices may be used,) and  
40 in carrying on the operation the water may be applied by means of a perforated pipe arranged over the rollers. It is found also that there is advantage in using hot water, and I therefore utilize the condensations from the  
45 boilers and other apparatus where steam is employed. The mere washing of the devulcanized rubber is not the only effect of this process, although the removal of impurities as fast as they are pressed out by the rolls,  
50 preventing them from again being squeezed back into the mass, is an important result.

The operation imparts distinct properties to the product, as hereinafter pointed out. The rubber coming from the vulcanizer contains various compounds—such as carbonates  
55 of lime, sulphates, oxide of lead, lamp-black, &c.—the last particularly being supposed to be so intimately associated with the rubber as to be inseparable by any known means. It is believed that the combined action of the  
60 rolls and water upon the mass, in the peculiar condition in which it is found after devulcanization by means of live steam under pressure, has the effect of liberating and removing some of the lamp-black as well as  
65 other associated compounds. This is indicated by the fact that when the resulting sheet is stretched until quite thin and held to the light it shows distinctly a brownish color, a characteristic which distinguishes it clearly  
70 from any other reclaimed rubber product with which I am acquainted.

This new product possesses tenacity and elasticity in a much higher degree than other reclaimed rubber sheets. It is furthermore  
75 to be distinguished by the appearance of the edge when cut, which exhibits an iridescent surface, refracting the light in various colors, in marked contrast to the dull lusterless surface of the other high-grade restored rubbers.  
80 The surface of the sheet, while smooth and velvety like that described in the aforesaid patent—that is to say, uniform in texture and free from grit—is not flat and even, but, on the contrary, presents irregular ridges or ribs,  
85 which are more marked as the thickness of the sheet increases. Of course the sheet having been formed, as herein described, may be dry-rolled between smooth rollers, thus producing an even surface, but without affecting  
90 the properties of the product. Not only is the new product thus distinguished by peculiar physical characteristics, but it is capable of more general use and is a more valuable product commercially than other products  
95 heretofore made.

In practicing the invention it is preferred to roll the stock after removal from the devulcanizer between rolls set very close together until it begins to assume the sheet  
100 form, and then to set the rolls farther apart, thus producing a sheet of considerable thick-

ness and shortening somewhat the rolling process.

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

1. That improvement in the art of reclaiming rubber which consists in subjecting a batch of rubber stock impregnated with moisture, as specified, to mechanical pressure and  
10 keeping it wet by repeated application of liquid during the pressing operation, substantially as described.

2. The described improvement in the art of reclaiming rubber, consisting in rolling or  
15 pressing into sheets a batch of devulcanized stock impregnated with moisture and keeping the said stock wet during the rolling or

pressing operation by means of hot water or other liquid, as set forth.

3. As an article of manufacture, the product of the above process, the same being a sheet of reclaimed or restored rubber having the properties herein described, and distinguished by a brown color when stretched to a thin sheet and by showing a refracting and  
25 iridescent surface when cut, as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

NATHANIEL C. MITCHELL.

Witnesses:

E. M. MUNDY,

ROBERT A. BROWN.