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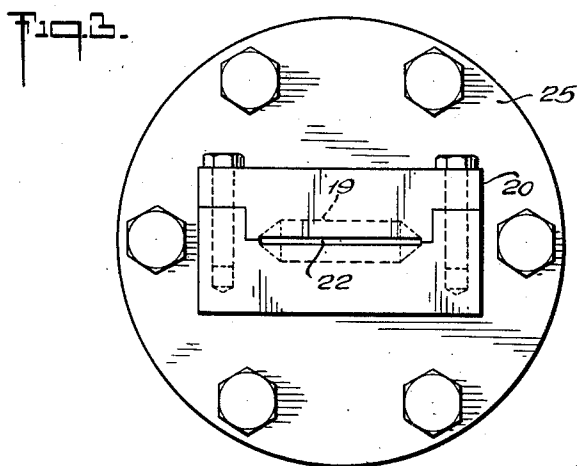
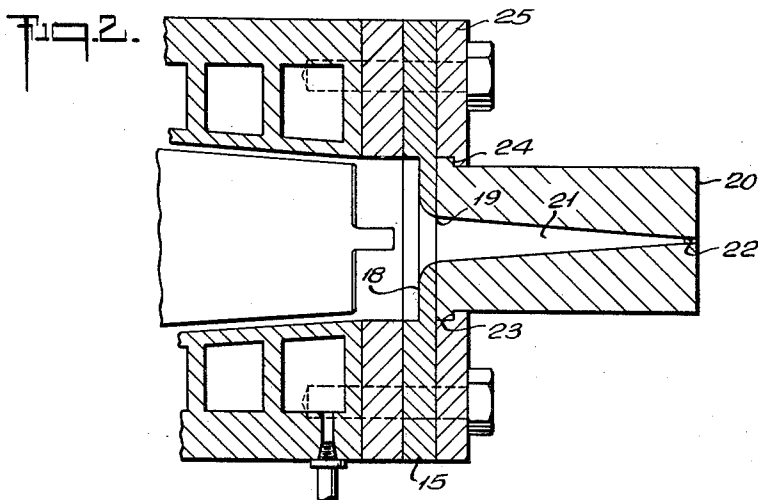
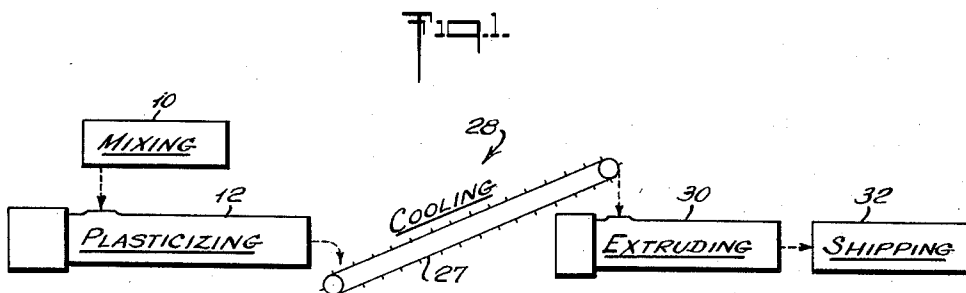
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METHODS OF PROVIDING RECLAIMED RUBBER

Filed Nov. 9, 1953

2 Sheets-Sheet 1



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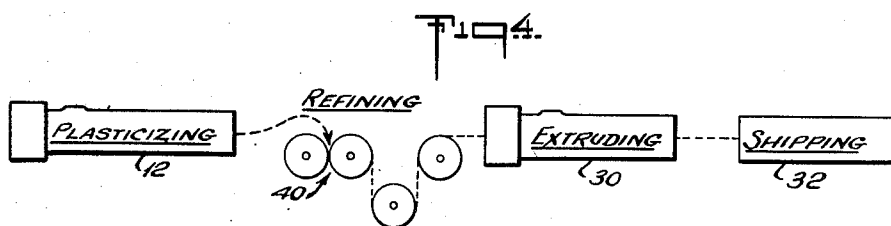
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METHODS OF PROVIDING RECLAIMED RUBBER

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5 Claims. (Cl. 18—48)

This invention relates to methods for providing reclaimed rubber. In particular, it is directed to economical and effective methods adapted for the production of an improved reclaimed rubber product. To this end, the invention contemplates the provision of a method wherein the reclaim is extruded at a relatively low temperature and under relatively low pressure after the completion of the reclaiming operation. This is both more effective and more economical than a "refining" operation (e. g., by forming into a thin sheet between rolls) and sometimes than several sheeting operations; but it can be combined with a sheeting operation to provide an especially useful product.

The invention accordingly comprises the several steps and the relation and order of one or more of such steps with respect to each of the others, as exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a diagrammatic showing of one form of the invention;

Fig. 2 is a vertical sectional view of the discharge end of the plasticator;

Fig. 3 is a front view thereof; and

Fig. 4 is a diagrammatic showing of a modification.

In the embodiment of the invention exemplified in Fig. 1, vulcanized rubber crumb is mixed with reclaiming agents at 10 and passed into and subjected to a plasticizing reclaiming operation as by being passed thru a screw plasticator at 12 where it is reclaimed. The plasticator may be one of the types exemplified in the Elgin et al. Patent 2,653,348. An outlet head portion, as exemplified in Figs. 2 and 3 hereof, provides a clear, open channel which is free of internal obstructions and whence the reclaim will issue in strip ("slab" or "sheet") form.

As exemplified, the head comprises a half-inch plate 15 which is reduced to 1/4" at an inner circular portion 18 which has a diameter of 2 1/2" and the central portion of which is formed with a tapering portion ending in an opening 19 which is 0.65" in height and 1.9" in horizontal extent. Beyond this opening is a nose 20 which in the present instance is 4" in length and provides a channel 21 which conforms to the opening 19 and then tapers in the thickness dimension to 0.05" and expands in width to 2.5" to provide an opening 22. The nose 20 is held in place by cooperating shoulders 23 and 24 on the nose and on a plate 25 which lies against and is secured to the plate 15. Pressures of over 800 p. s. i., and desirably 900 to 2500 p. s. i., are developed therein, and temperatures from 325° F. to 500° F.

From the opening 22, the reclaimed material passes, as on a conveyor 27, thru a zone 28 wherein it is cooled, as by the surrounding atmosphere, and then is subjected to an extrusion step, as by being passed thru an extruder at 30, whence it issues in condition to be stored or to

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be shipped as indicated at 32. The extruder in the present instance is a screw of the extruder type shown on page 261 of Extrusion of Plastics, Rubber, and Metals, by Simmons, Weith and Schack (Reinhold), but is water-cooled rather than heated. Temperatures in the extruder run about 250° F. and may run from 175° to 275° F.

The product has higher tensile strength and 300% modulus, and a higher Mooney than reclaims subjected to the usual "refining" operations, as well as improved working and handling properties. A stock treated as above had a tensile of 1665 lbs. as compared with 1560 lbs. for a similar stock treated similarly except that, after reclaiming, it was sheeted instead of extruded; a 300% modulus of 755 as compared with 610, and a Mooney (ML/212/1-5) of thirty as compared with twenty-five.

An average of random runs of truck and bus tire reclaim showed a decrease of twelve Mooney units (ML/212/1-5) during extruding, whereas a greater average decrease—fifteen Mooney units—took place during refining in random runs of truck and bus tire reclaim. The average decrease during extruding in random runs of passenger tire reclaim was six Mooney units as against sixteen Mooney units during refining in random runs.

It is possible, moreover, in accordance with the present invention, to obtain the advantages of the extrusion operation by subjecting thereto sheeted stock. As shown in Fig. 4, reclaim from the plasticating step 12 may be subjected to a sheeting step as by a sheeter at 40 prior to the extrusion step at 30 and the shipping step at 32.

While there are given above certain specific examples of this invention and its application in practical use and also certain modifications and alternatives, it should be understood that these are not intended to be exhaustive or to be limiting of the invention. On the contrary, these illustrations and the explanations herein are given in order to acquaint others skilled in the art with this invention and the principles thereof and a suitable manner of its application in practical use, so that others skilled in the art may be enabled to modify the invention and to adapt it and apply it in numerous forms, each as may be best suited to the requirement of a particular use.

I claim:

1. The process of providing reclaimed rubber of improved tensile strength, viscosity, and modulus, which comprises working comminuted vulcanized rubber while progressively forcing it forward thru an elongated chamber and out of a restricted orifice in a hot plastic condition and in a continuous mass, conducting the mass thru the atmosphere to cool the mass and delivering it to a second elongated chamber, forcing it thru the second chamber while working it, and extruding it from the second chamber thru a restricted orifice.

2. A process as in claim 1 wherein the rubber is extruded from both chambers in continuous strip form.

3. A process as in claim 1 wherein the rubber is conducted upwardly from the first-mentioned chamber to said second chamber on a conveyor.

4. A process as in claim 1 wherein the rubber is conducted over and between rolls from the first-mentioned chamber to said second chamber.

5. A process as in claim 1 wherein the rubber is forced thru said chambers by screws and wherein the pressure generated in the first-mentioned chamber is over 800 pounds per square inch.

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