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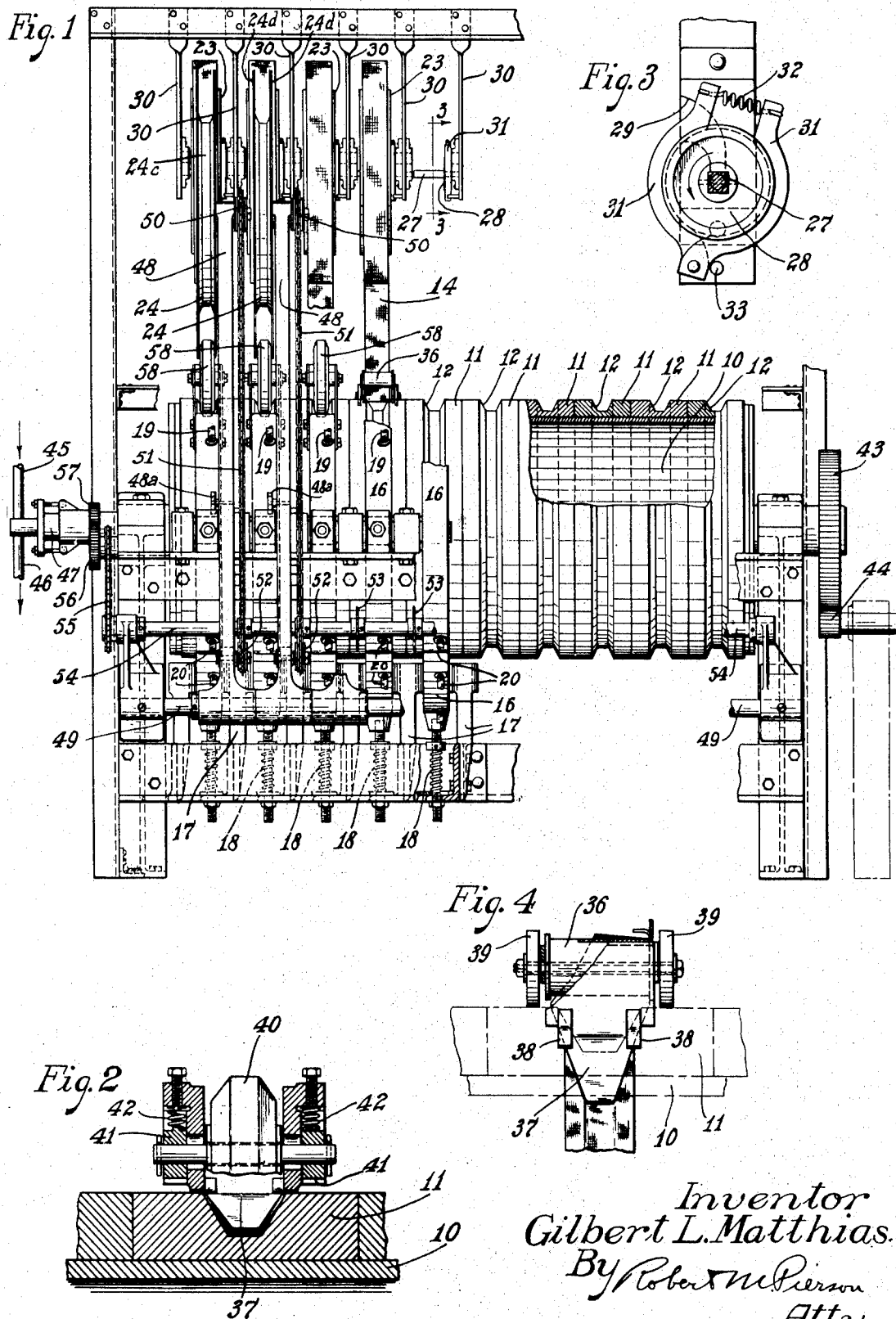
1,523,658

G. L. MATTHIAS

METHOD AND APPARATUS FOR VULCANIZING CONTINUOUS STRIP MATERIALS

Filed April 11, 1922

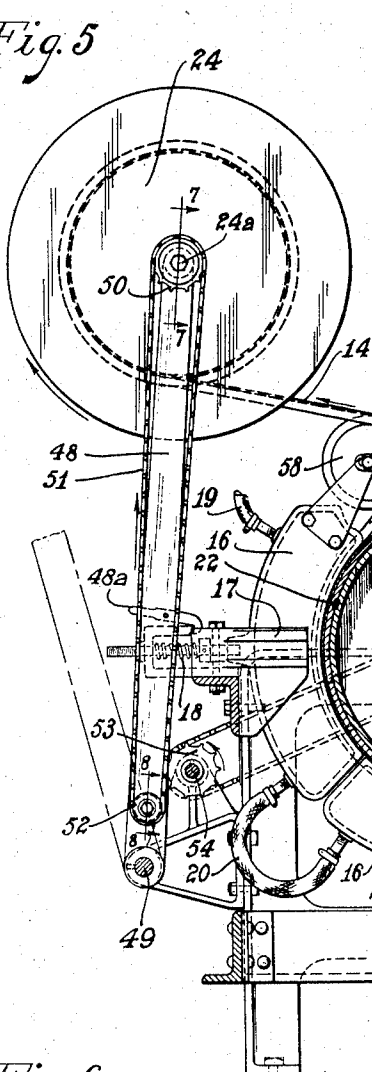
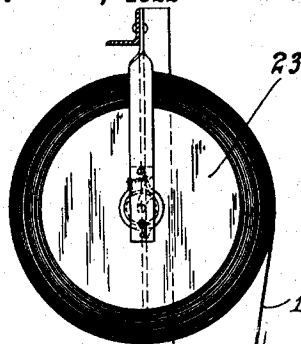
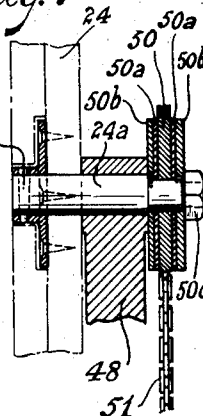
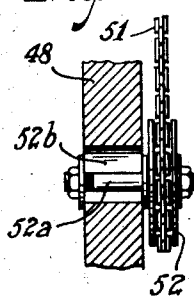
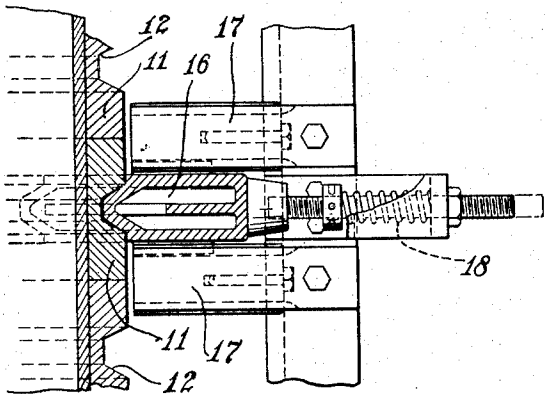
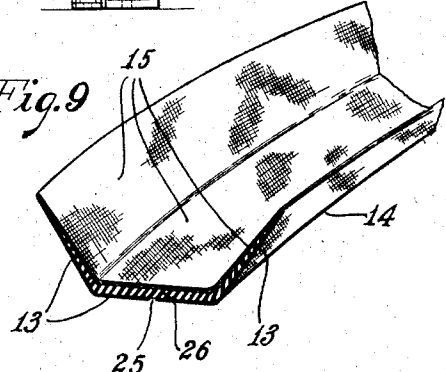
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METHOD AND APPARATUS FOR VULCANIZING CONTINUOUS STRIP MATERIALS

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR VULCANIZING CONTINUOUS-STRIP MATERIALS.

Application filed April 11, 1922. Serial No. 551,560.

To all whom it may concern:

Be it known that I, GILBERT L. MATTHIAS, a citizen of the United States, residing at Cuyahoga Falls, in the county of Summit and State of Ohio, have invented a certain new and useful Method and Apparatus for Vulcanizing Continuous-Strip Materials, of which the following is a specification.

10 This invention relates to the art of vulcanizing continuous-strip material, such, for example, as tire-flap material.

My object is to provide an improved method and improved apparatus for vulcanizing such material whereby an improved product may be had and time and labor may be saved.

Of the accompanying drawings:

Fig. 1 is a side elevation, with parts broken away, of apparatus embodying and adapted to carry out a preferred form of my invention.

Fig. 2 is a section on line 2—2 of Fig. 5.

Fig. 3 is a section on line 3—3 of Fig. 1.

25 Fig. 4 is a section on line 4—4 of Fig. 5.

Fig. 5 is a transverse, vertical, sectional view of said apparatus, with parts broken away.

Fig. 6 is a horizontal section on line 30 6—6 of Fig. 5.

Fig. 7 is a section on line 7—7 of Fig. 5.

Fig. 8 is a section on line 8—8 of Fig. 5.

Fig. 9 is a perspective view of a part of the finished tire-flap strip.

35 The preferred form of my apparatus shown in the accompanying drawings comprises a hollow, steam-heated, power driven drum 10 having slidably mounted thereon in abutted relation a plurality of molding rings 11, 11, each formed on its outer periphery with a circumferential groove 12, adapted to mold to U-shape the longitudinally-concave side 13 (Fig. 9) of a strip of tire-flap material 14 pressed therein. For pressing said material into the groove of each of the several molding rings, and molding the opposite side, 15, of said material (Fig. 9), I provide a plurality of arcuate, hollow, steam heated shoes 16, 16, preferably three of them, as shown, for each of said molding rings 11, said shoes being slidably mounted between brackets 17, 17, at the sides of and below the drum 10, and yieldingly urged into the groove 12 by 55 compression springs 18, 18 associated with

said brackets. Said shoes are positioned end-to-end, so that together they substantially encircle each molding ring 11 upon the drum 10, except that an open space is left at the top for the ingress and egress 60 of the work between the respective molding rings and their shoes.

The two uppermost hollow shoes 16 are provided at their higher ends with steam supply pipes 19, 19, and at their lower ends 65 are connected with the middle or lower shoe by pipes 20, 20, and 21 is an outlet or drain pipe from the lowest part of the lowest shoe of each set, said shoes thus being adapted to be heated by the circulation 70 of steam therethrough.

The molding rings 11 are secured upon the drum 10 by a key 22, being thus adapted to be driven, with said drum, and to carry the work in sliding contact with the shoes 16 while it is progressively vulcanized by the heat from said shoes and said drum, each strip of material being drawn from a supply reel 23 and delivered to a re-winding reel 24. The face 15 of the 80 strip, which contacts the shoes, 16, is usually of soft textured fabric adapted to slide easily upon said shoes, while the opposite side, 13, may be faced with a different kind of fabric or the fabric facing may be omitted along the middle of the strip, as indicated at 25, (Fig. 9) permitting the tacky rubber of the core, 26, to come in contact with the molding ring 11, and thus obtain the necessary driving adhesion between said 90 ring and the work.

Each of the supply reels 23 is secured upon a common shaft 27 with a brake-drum 28, the projecting ends of said shaft being adapted to drop into bearing grooves, such as the one shown at 29 (Fig. 3), formed in adjacent faces of reel-supporting brackets 30, 30, depending from the frame of the apparatus. 31, 31, are a hinged pair of grippers upon the brake-drum 28, urged 95 together upon said drum by a tension spring 32 connecting their ends opposite their hinge, and 33 is a stop pin projecting from the adjacent bracket 30, and adapted to engage the hinge portion of said grippers to prevent their turning and thereby cause them to tension the reel 23. Said reel is thus adapted to be quickly mounted in or removed from the brackets 30, together with its brake-drum 28 and grippers 31, 110

by simply lifting its shaft 27 out of the grooves 29, without uncoupling of parts.

For guiding each of the tire-flap strips 14, from the reel 23 into the groove 12, I provide a guide trough 34 aligned with the corresponding molding ring 11 and secured to the frame of the machine, a flanged guide roller 35 journaled on said trough and adapted to guide the strip thereinto, and a flanged guide roller 36 journaled on the opposite or delivery end of said trough and adapted to guide the strip 14 to a folding plate 37 secured to the delivery end of said guide trough and extending into the groove 12 of the molding ring 11, said plate being adapted to drag upon the strip as the latter is drawn past it, thereby pressing said strip into the groove, and giving it approximately its final U-form. 38, 38 (Fig. 4), are small runners secured to the plate 27 and adapted to slide upon the surface of the molding ring 11, overhanging respective sides of the groove 12, to center the strip 14 in said groove. For rigidly supporting the delivery end of the folding trough 34, rollers 39, 39, adapted to run upon the ring 11, on respective sides of the groove 12, are loosely journaled upon projecting ends of the shaft of the roller 36 (Fig. 4).

For pressing the strip 14 still further into the groove 12 before it reaches the first shoe 16, a beveled forming roller 40 is loosely journaled in blocks 41, 41, said blocks being slidably mounted upon the upper end of said shoe and backed by springs 42, 42, said springs being adapted to urge the forming roller 40 into the groove 12.

The drum 10 is hollow, formed at its ends with trunnions journaled in the frame of the apparatus, and adapted to be slowly driven by means of gears 43, 44, at one end (Fig. 1). At the opposite end it is provided with a steam-inlet pipe 45, and an outlet pipe 46, said pipes passing axially through the trunnion of said drum and being provided with a common form of stuffing box, 47. The outlet pipe 46 leads off from a point near the bottom of the drum's cavity, as shown in Fig. 5, in order that, as the drum revolves, the water of condensation may be driven out through said pipe ahead of the steam.

Each of the re-winding reels 24 is mounted at the free upper end of a long arm 48, and the lower ends of the several arms are pivoted side by side on a horizontal shaft 49, each arm being so positioned on said shaft as to hold its re-winding reel 24 in alinement with a molding ring 11 and a supply reel 23, and each arm being adapted to be turned on the shaft 49, as indicated by the dot-and-dash lines in Fig. 5, to lower its free end and permit the removal

or replacement of the re-winding reel 24. 48^a is a latch pivoted on the arm 48 and adapted to engage a part of the frame of the apparatus, for holding the arm in upright position, with its reel 24 in position to receive the finished strip 14.

Each of the re-winding reels is formed with a U-shaped channel or waist 24^c, from the sides of which large end flanges 24^a, 24^a extend outwardly, the reel thus being adapted to receive the work in nested convolutions of U-shape in cross-section, and so to hold the work while it cools and sets in substantially the shape in which it is to be used in the tire.

For frictionally driving each of the re-winding reels 24, a sprocket 50 is mounted on the shaft 24^a of the reel between leather friction washers 50^a, 50^a, said washers being embraced by a pair of metal washers 50^b, 50^b, slidably and non-rotatably mounted on said shaft and adapted to press said leather washers against said sprocket under pressure of a nut 50^c on said shaft. The reel 24 is detachably secured upon the shaft 24^a by a pin 24^b (Fig. 7). The sprocket 50 is connected by a sprocket-chain 51 with an idler pulley 52 mounted on the arm 48 near the lower end of the latter, said chain being adapted to be engaged and driven by a sprocket 53 when the arm 48 is in its upright position. The pulley 52 is loosely journaled on an axle bolt 52^a (Fig. 8), clamped in a slot 52^b, formed in the arm 48, to permit adjustment of said pulley to tighten the sprocket chain 51. The several sprockets 53, of which there is one for each of the arms 48, are secured to a horizontal shaft 54, the latter being adapted to be driven by a sprocket chain 55 and gears 56, 57 from a journal of the drum 10.

For guiding the work from the vulcanizing drum 10 to the reels 24, beveled guide rollers 58, 58 are loosely journaled on the upper ends of the adjacent shoes 16, their beveled peripheries being adapted to fit within and guide the U-shaped finished tire-flap material, as is shown clearly in Fig. 5. 59 is a flap guide or plow mounted upon the brackets of the guide roller 58 and having a part extending into the groove 12 of the molding ring 11, said plow being adapted to insure the separation of the work from said molding ring.

In the preferred operation of the apparatus, the unvulcanized strips of tire-flap material 14, wound in a flat condition upon the reels 23, are led therefrom and threaded through the apparatus as clearly shown in Fig. 5, and started upon the respective re-winding reels 24. The drum 10 and the molding rings 11 thereon are heated by steam applied to said drum through the pipe 45, water of condensation being driven off through the pipe 46, and the shoes 16

are heated by steam admitted to their hollow interiors through the pipes 19, the water of condensation being driven off through the pipe 21 leading from the lowermost part of the series of shoes. Meanwhile the drum 10, with the molding rings 11 thereon, is driven, clockwise as viewed in Fig. 5, through the gears 43, 44 (Fig. 1), progressively drawing the strips 14 from the reels 23, past the folding plates 37 and forming rolls 40, which press them to the desired U-shaped cross-sectional form as they pass into the molding spaces between the rings 11 and the shoes 16. The strips are progressively vulcanized, in said U-form, as they move in sliding contact with the shoes 16, by heat from said shoes and from the drum 10. I do not wholly limit my claims, however, to continuous movement of the strip.

Meanwhile the vulcanized strips, as they emerge from between the drum 10 and shoes 16, are rewound upon the reels 24, which reels, being frictionally driven, as described, rewind the vulcanized strips at the same rate at which they are given off by the drum 10, notwithstanding the changing size of the bodies of said stock wound on said reels.

With the apparatus described, I am able to obtain tire-flap material of definitely molded, sharply defined, cross-sectional form, such that it fits well within the tire, seating firmly and resisting displacement, and my method and apparatus are adapted for rapid production. The construction described is economical of floor space, several molding and reeling units being associated, in close relation, with the single drum, and the supply and rewinding reels being positioned out of the way, over the other parts of the apparatus, and yet the reels may be quickly mounted and removed. The rewinding reels are adapted to receive the work while it is hot and hold it in U-shape in cross-section and in arcuate form longitudinally while it cools and sets, and I do not wholly limit my claims to the final shaping of the work before it reaches said reels. The rings 11, being non-integral with the drum, may be economically made, and are interchangeable.

Modifications may be resorted to within the scope of my invention, and I do not wholly limit my invention to the exact construction and course of procedure shown and described.

I claim:

1. The method of vulcanizing continuous-strip material which comprises drawing said material past a heating and pressing member in sliding contact therewith.

2. The method of vulcanizing continuous-strip material containing a vulcanizable plastic which comprises moving the same

past a pressing member in sliding contact therewith while progressively heating it as it passes said pressing member.

3. The method of laterally shaping and vulcanizing a strip of tire-flap material which comprises progressively bending said strip to U-shape in cross-section and applying vulcanizing heat and molding pressure to said bent strip.

4. The method of laterally shaping and vulcanizing a strip of tire-flap material which comprises progressively bending said strip to U-shape in cross-section and drawing said bent strip past a pressing member in sliding contact therewith while progressively heating the strip as it passes said pressing member.

5. The method of shaping and vulcanizing a strip of rubberized material which comprises progressively bending said strip to U-shape in cross-section, applying vulcanizing heat and molding pressure to said bent strip, and thereafter winding it in nested convolutions and permitting it to cool and become set while so held in volute form.

6. The method of making tire-flap material which comprises vulcanizing said material and while it is still hot bending it about a form, and permitting it to cool and set while positively holding it in volute form longitudinally and U-shape laterally.

7. The method of vulcanizing continuous-strip material which comprises progressively bending the same to trough-shape in cross-section and to longitudinally curved form and progressively vulcanizing it as it is thus shaped.

8. Apparatus for vulcanizing continuous-strip material, said apparatus comprising a heating and pressing member, and means for drawing said material past said member in sliding contact therewith.

9. Apparatus for vulcanizing continuous-strip material, said apparatus comprising a pressing member, means for moving the strip past said member in sliding contact therewith, and means for progressively heating the strip as it is so moved.

10. Apparatus for vulcanizing continuous-strip material, said apparatus comprising a rotatable drum having a molding groove on its outer periphery, means for so guiding a strip of material as to cause it to pass partly around said drum, lying in said groove, means for pressing said strip in said groove by progression lengthwise of the strip, and means for heating said strip as it passes between said drum and said pressing means.

11. Apparatus for shaping and vulcanizing continuous-strip material, said apparatus comprising means for imparting a trough shape to the strip by progression lengthwise thereof and means, adapted continuously to receive the shaped strip from said shaping means, for progressively apply-

ing vulcanizing heat and molding pressure to the shaped strip.

12. Apparatus for laterally shaping and vulcanizing a strip of tire-flap material, said apparatus comprising means for progressively bending said strip to U-shape in cross-section, and means for applying vulcanizing heat and molding pressure to said bent strip.

13. Apparatus for laterally shaping and vulcanizing a strip of tire-flap material, said apparatus comprising means for progressively bending said strip to U-shape in cross-section, a heating and pressing member, and means for drawing said bent strip past said member in sliding contact therewith.

14. Apparatus for laterally shaping and vulcanizing a strip of rubberized material, said apparatus comprising a pair of pressing members adapted progressively to press said strip to U-shape in cross-section, and means for progressively heating said material as it is progressively pressed by said members.

15. In apparatus for vulcanizing continuous-strip material, the combination of a rotatably mounted drum provided with an outer, circumferential molding surface, a fixed member formed with an arcuate molding surface on its inner periphery substantially concentric with said drum and adapted with the molding surface of the latter to define an arcuate molding space, means for rotating said drum past said fixed member, and means for applying heat to an article within said molding space.

16. In apparatus for vulcanizing continuous-strip material, the combination of a rotatably mounted drum provided with an outer circumferential molding surface, a member at a fixed station adapted to press against said material on said drum to cause said material to conform to said molding surface, means for rotating said drum past said pressing member, and means for applying heat to the material on said molding surface.

17. In apparatus for vulcanizing continuous-strip material the combination of a rotatably mounted drum provided with an outer, circumferential molding surface, a fixed member formed with an arcuate molding surface on its inner periphery substantially concentric with said drum and adapted with the molding surface of the latter to define an arcuate molding space, means for rotating said drum past said fixed member, and means for internally heating said drum or said member.

18. In apparatus for vulcanizing continuous-strip material, the combination of a rotatably mounted drum provided with an outer, circumferential molding surface, a member formed with an arcuate molding surface on its inner periphery substantially

concentric with said drum and adapted with the molding surface of the latter to define an arcuate molding space, means for rotating said drum, means for internally heating said drum or said member, and means for yieldingly urging said member toward said drum.

19. In apparatus for vulcanizing continuous-strip material, the combination of a hollow, rotatably mounted drum provided with an outer, circumferential, molding surface, means for driving said drum, means for supplying steam to the interior of said drum while it is driven, a set of hollow, yieldingly mounted shoes having arcuate molding surfaces on their inner peripheries substantially concentric with said drum and adapted with said molding surface of the latter to define an arcuate molding space, and means for supplying steam to the interiors of said shoes.

20. In apparatus for vulcanizing continuous-strip material, the combination of a rotatably mounted drum, a set of molding rings formed with molding surfaces on their outer peripheries, said rings being mounted upon said drum, means for rotating said drum and means for applying heat to strip material on said rings through the outer face of said material.

21. In apparatus for vulcanizing continuous-strip material, the combination of means for supporting a supply of said material, a rotatably mounted drum provided with a circumferential molding groove on its outer periphery, means for driving said drum, said drum being adapted to draw said material from said supporting means, and a folding device adapted to fold said material to conform substantially to the molding surface of said groove.

22. In apparatus for vulcanizing continuous-strip material, the combination of means for supporting a supply of said material, a rotatably mounted drum provided with a circumferential molding groove on its outer periphery, said drum being adapted to draw said material from said supporting means, guiding means for said material adapted to engage the edges thereof to center it with respect to said groove as it passes onto said drum, and means for pressing said material progressively into said groove.

23. In apparatus for vulcanizing continuous-strip material, the combination of a source of supply for said material, a rotatably mounted drum adapted to draw material from said source of supply, means for so guiding said material as to cause it to pass partly around said drum, pressing means adapted to coact with said drum, to press the work, means for heating said material while on said drum, and a frictionally driven rewinding reel adapted to receive material from said drum.

24. In apparatus for vulcanizing continuous-strip material, the combination of a source of supply for said material, heated means for pressing and vulcanizing said material, and a receiving member having a formed channel to receive the hot vulcanized strip and hold it in U-shape transversely and arcuate shape longitudinally while cooling.

25. In apparatus for vulcanizing continuous-strip material, the combination of a source of supply for said material, a rotatably mounted drum adapted to receive material from said source of supply, means for so guiding said material as to cause it to pass partly around said drum, pressing means adapted to coact with said drum to press the work, means for heating said material while on said drum, and a take off device having a channel adapted to hold said strip, while cooling, in nested convolutions of U-shape in cross-section.

26. In apparatus for vulcanizing continuous-strip material, the combination of a source of supply for said material, a rotatably mounted drum adapted to receive material from said source of supply, means to cause said material to pass partly around said drum, pressing means adapted to coact with said drum to press the work, means for heating the material while on the drum, a take-off reel adapted to receive the material from said drum, and means for driving said reel.

27. In apparatus for vulcanizing continuous-strip material, the combination of an internally heated, driven, vulcanizing drum, a pivoted arm, a shaft journaled on the free end of said arm, a re-winding reel mounted on said shaft, a sprocket mounted on said shaft, a sprocket chain mounted on said sprocket, a rotatable support for the opposite end of said chain, means for driving said drum, and a sprocket adapted to be driven by said driving means, the last said sprocket being adapted to engage and drive said sprocket chain when said arm is turned about its pivot to bring said chain against the last said sprocket, and a friction-drive device positioned operatively between said driving means and said re-winding reel.

28. Apparatus for making long lengths of tire-flap material comprising means for heating said material, and means for progressively pressing said material to U-shape in cross-section.

29. Apparatus for making long lengths of tire-flap material comprising means for heating said material, means for progressively pressing said material to U-shape in cross-section, and means for holding said material in U-shape laterally and arcuate shape longitudinally while it cools.

In witness whereof I have hereunto set my hand this 6 day of April, 1922.

GILBERT L. MATTHIAS.