June 29, 1926. 1,590,371

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METHOD OF AND APPARATUS FOR EDGING FABRIC STRIPS WITH RUBBER

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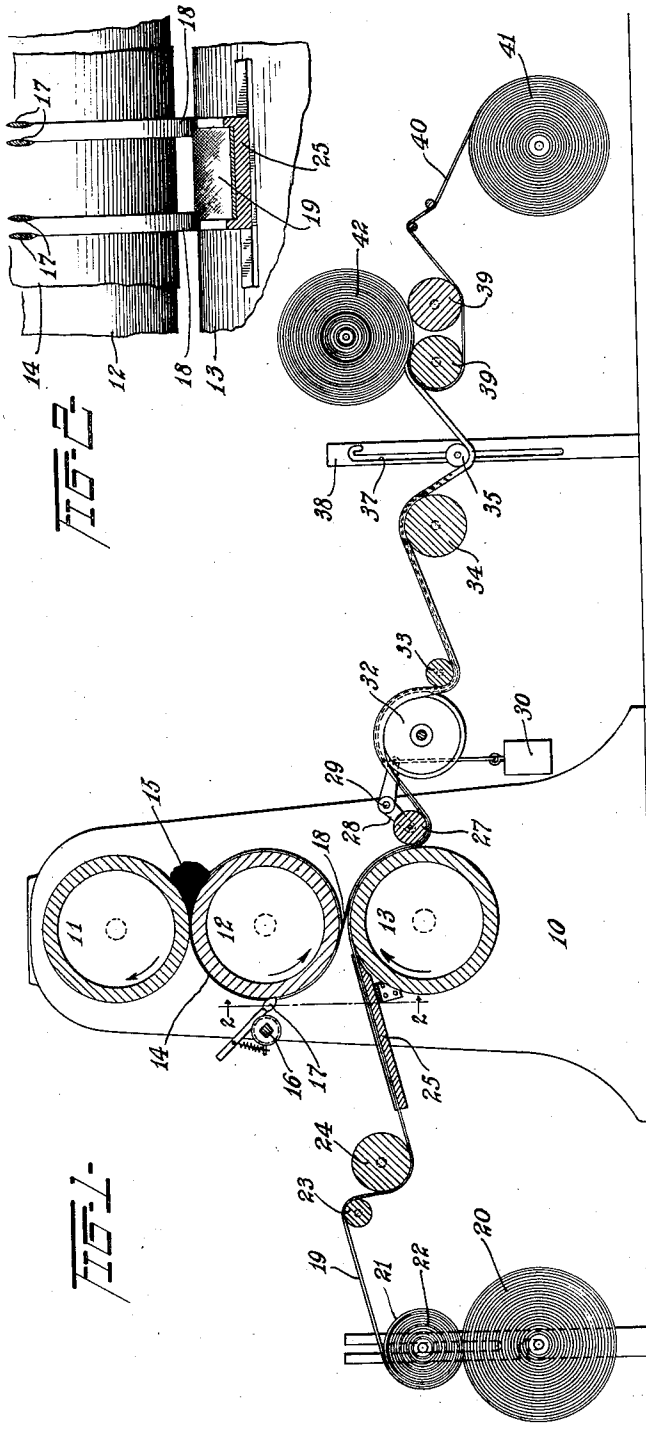


FIG. 1.

FIG. 2.

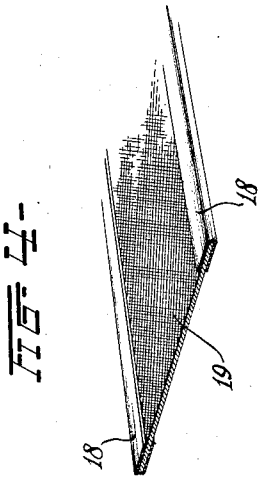


FIG. 4.

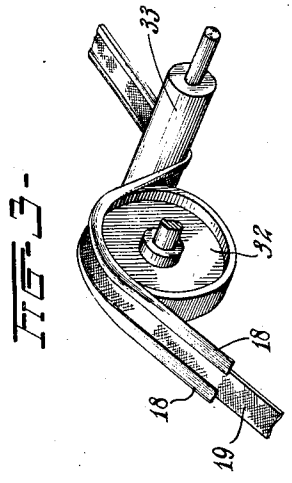


FIG. 3.

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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR EDGING FABRIC STRIPS WITH RUBBER.

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This invention relates to means for enclosing the edge of strip material in a narrow folded strip of rubber, and has for an object to provide an improved method for applying a thin strip of rubber to one, or both, of the lateral edges of strip material and for folding it thereabout. A further object is to provide an improved apparatus for carrying out the above indicated method.

In binding strip material, such as fabric strip employed in the building of tire casings, with a folded edging of thin, sheeted, unvulcanized rubber stock, it has heretofore been the practice to apply the rubber in ribbons of short lengths by hand, for the reason that the character of the rubber edging, which is thin, tacky, and hard to handle, does not lend itself to manipulation in the ordinary folding machines. Manual application of the rubber edging is slow and laborious, and usually lacks uniformity in the width of the folded edging, and also in thickness by reason of the numerous lap joints of the short strips employed.

The purpose of the present invention is to provide an improved means for binding a strip of fabric, or other material, with a thin, folded rubber ribbon, rapidly and economically and with uniformity as to the width and thickness of the rubber edging. This I accomplish without the use of folding guides by progressively applying one marginal portion of the rubber ribbon under tension to an edge portion of fabric and utilizing the tension of the rubber to fold the other margin of the ribbon around the edge of the fabric, which is suitably deflected for that purpose.

Of the accompanying drawings, Fig. 1 is a longitudinal sectional view of a preferred form of apparatus embodying and adapted to carry out my invention; Fig. 2 is a fragmentary view in section one line 2—2 of Fig. 1; Fig. 3 is a detail view in perspective of the strip deflecting rolls of the apparatus of Fig 1; and Fig. 4 is a perspective view of the finished rubber edged strip.

Referring to the drawings, 10 is one of the end frames of a calender, and 11, 12 and 13 are respectively the upper, middle and lower calender rolls journaled in the end frames and adapted to be positively driven at suitable speeds in the directions indicated by the arrows. The two upper rolls 11 and 12 are adapted to form a thin sheet of rubber 14 from a bank of unvulcanized rubber stock 15 thereon. A rod 16, supported between the end frames 10 opposite to the middle roll 12, carries knives 17, the cutting edges of which are held in contact with the surface of the roll 12. The arrangement is such that the knives cut from the sheet 14 two ribbons 18 (Fig. 2), the ribbons being spaced sufficiently to permit their inner halves to overlie the marginal portions of a strip 19, presently to be described.

The strip 19, which is to be bound with the folded rubber edging, may be of any desired flexible material such as rubberized, bias-cut fabric. Said strip is supplied from a stock roll 20, the fabric being interwound with a liner 21, which is rewound on the roll 22, as is the common practice. The strip 19 passes between two smoothing and tensioning rolls 23 and 24 onto a guideway 25 which directs it onto the lower calender roll 13 in lapped relation to the rubber ribbons 18.

The strip 19, together with the ribbons 18, which are applied to said strip as it passes onto the lower calender roll, is carried downwardly on the latter to about its middle, where a floating presser roll 27 presses the strip and ribbons against the roll 13, effecting by reason of the tackiness of the rubberized strip 19 and of the ribbons 18 a firm union therebetween.

The presser roll 27, as shown, is carried at the inner extremities of bell-crank arms 28 (one only being shown), which are pivotally secured to the calender end frames 10 at 29, weights 30 being suspended from the other extremities of said arms. The arrangement is such that the roll 27 presses upwardly against the roll 13, and may be readily depressed for the insertion of the strip 19 upon putting the apparatus into operation.

The rubber ribbons 18, when applied to the fabric strip 19, should preferably be under a slightly greater tension than the fabric. It is well known that a calendered rubber sheet on the calender roll is under a circumferential tension. I find that the inherent tension of the calendered rubber is sufficient to effect the folding action hereinafter described. It is to be understood, however, that the tension may be augmented by rotating the lower calender roll 13 at a

slightly greater speed than the middle roll 12, or where a readily stretchable, bias-cut fabric is to be bound, the necessary tension may be given to the ribbons 18 by stretching the assembled strip after it leaves the roller 27.

The assembled strip upon passing beneath the presser roll 27 is drawn centrally over an idler roll 32 of somewhat less width than the fabric strip 19, the fabric traversing a substantial part of the periphery of the roll 32 in order to effect a material deflection of said fabric. During the deflection of the strip 19 around the roller 32, the tension of the rubber ribbons 18 causes them to draw over the edges of the idler roll 32 so as to be disposed substantially radial with relation thereto, as best shown in Fig. 3. The strip 19 is next deflected in a reverse curve under an idler roll 33, preferably of greater width than the strip 19, which flattens out the fabric strip 19, and the tension of the rubber draws the overhanging portions of the ribbons 18 onto the opposite face of the strip 19 as it passes beneath the roll 33, thus completing the fold.

The rubber-edged strip may now pass over the roll 34 to press the under margin of the edging more firmly to the strip 19, and under the floating roll 35, supported in vertical slots 37 in vertical standards 38, to the power-actuated rolls 39, where the strip is wound in a liner 40, supplied from the roll 41, onto the stock roll 42, in the ordinary manner. The floating roll 35 serves to keep the strip 19 taught as it passes over the series of rollers, the tension produced by this roll 35 being sustained largely by the rubber ribbons 18. It is desirable that the weight of the roller 35 be such that a substantial equalization of the tension of the strip 19 and the rubber edging ribbons 18 shall have been obtained in the finished strip, when wound on the stock roll 42.

In the preferred embodiment hereinabove described, the calender rolls 11, 12 and 13 and the rolls 39 are all driven at the same peripheral speed. Upon starting, a thin sheet of rubber is first established on the calender roll 12. Then the strip 19 is threaded by hand over and under the tensioning rolls 23 and 24, onto the guideway 25 and the lower calender roll 13, where the ribbons 18 are applied to the strip 19 with the desired tension. The assembled strip is then passed under the presser roll 27, over the deflecting idler roll 32 and under the reversely deflecting roll 33, care being taken to have the ribbons fold correctly about the edges of the fabric 19. The rubber-edged strip is then carried over the roller 34, under the floating roller 35 and over the driven rolls 39 to the stock roll 42 supported thereon. After the initial, manual guiding of the material through the machine, the operation is continuous, operators being necessary only to supply the materials and to remove the finished product.

It will be seen that I have provided an improved means for binding the raw edge of a fabric strip with a folded, thin-rubber edging in which it is unnecessary to guide the thin, tacky rubber either by hand or by folder fingers, and in which the tension in the rubber edge is employed to effect the folding operation.

My invention is subject to modification within its scope and I do not wholly limit my claims to the specific embodiment herein described.

I claim:

1. The method of binding the edge of strip material with sheet rubber which comprises applying a thin rubber ribbon to one side of the material in lapped relation to its edge in such manner as to place the rubber of the ribbon under tension, and thereafter utilizing the tension in the rubber to cause the over-extending portions of the ribbon to fold around the edge of the material.

2. The method of binding the edge of strip material with sheet rubber which comprises progressively applying a thin rubber ribbon under tension to one side of the material, in lapped relation to its edge, initially folding the over-extending portion of the rubber ribbon around the edge of the material at one point, and utilizing the tension in the rubber thereafter to cause the progressive folding of the over-extending portion of the rubber ribbon about the edge of material.

3. The method of binding the edge of strip material with sheet rubber which consists in progressively moving a strip of fabric, and while so moving it applying a thin rubber ribbon under tension to one side of the fabric in lapped relation to its edge, deflecting the fabric by pressure acting upon the other side of the fabric but leaving the overhanging edge of rubber free from the deflecting pressure, and then deflecting the fabric in a reverse direction, whereby the rubber ribbon of its own tension folds around the edge of the fabric.

4. In an apparatus for binding the edge of strip material with rubber, the combination of means for applying a ribbon of thin rubber under tension, in lapped relation to the edge of the strip material, means for progressively turning the course of the strip material in the direction of its uncovered side to cause a partial folding of the rubber ribbon around the edge of said strip material due to the tension of the rubber, and means to complete the folding of the ribbon around said edge.

5. In an apparatus for binding the edge of strip material a sheeting calendar having means for separating a ribbon of rub-

ber from the main sheet, means for leading a strip of fabric into lapped relation with said ribbon, a roller for initiating the folding of said ribbon, said roller underlying the fabric strip and adapted to turn its course in the direction of its uncovered side while leaving the unattached margin of the ribbon free to turn across the edge of the fabric, and means for thereafter reversely turning said fabric to complete the fold around the edge of the material.

6. In an apparatus for binding the two edges of strip material with rubber, the combination of a sheeting calendar having means for separating two spaced ribbons of rubber from the main sheet, means for leading a strip of fabric under said ribbons in lapped relation thereto, an initial folding roller shorter than the space between the outer edges of the ribbons, adapted to turn the course of the fabric in the direction of its uncovered side, and a final folding roller adapted reversely to turn the course of the fabric.

7. In an apparatus for binding the edge of strip material, means for moving longitudinally the strip material, means for applying to one side of the material a thin ribbon of rubber in overlapped relation to its edge, means for subsequently turning the course of the strip material in the direction of its uncovered side while leaving the unattached margin of the ribbon free to bend about the edge of the fabric, and means for thereafter reversely turning said fabric to complete the fold around the edge of the strip material.

In witness whereof I have hereunto set my hand this 3rd day of October, 1924.

URBAN HAREN.