

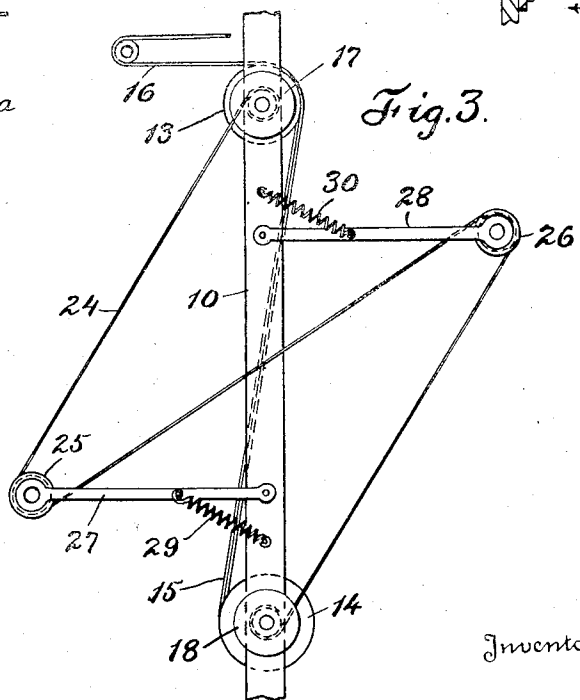
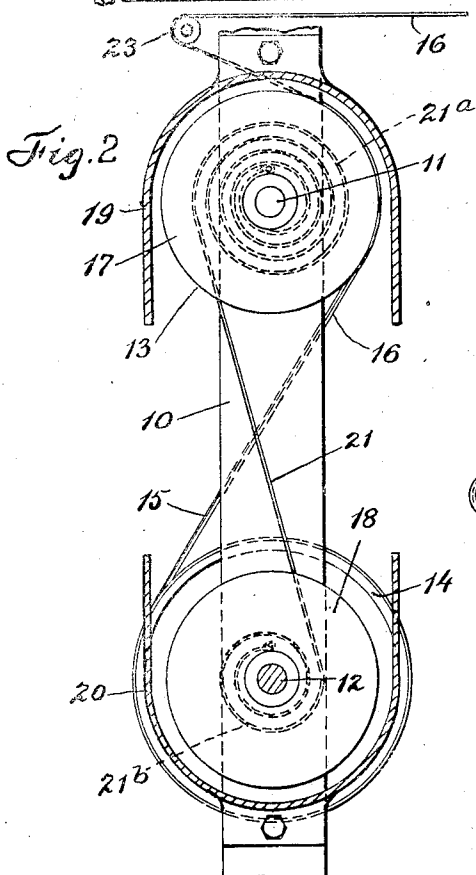
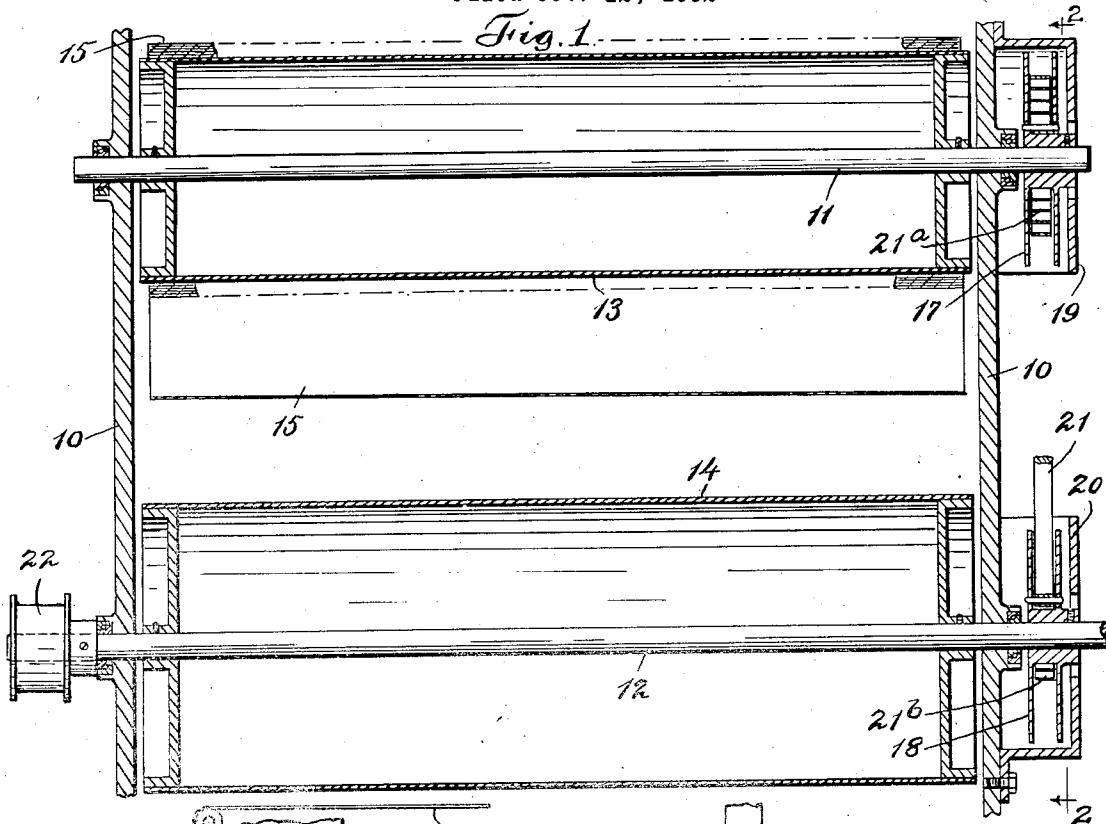
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REELING DEVICE

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REELING DEVICE

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9 Claims. (Cl. 242—75)

This invention relates to apparatus for receiving in a roll and delivering therefrom sheet material having a tacky surface, such as rubberized fabric for use in pneumatic tire manufacture, or any analogous sheet material which has to be interwound with a backing sheet or liner to keep the convolutions apart.

The problem of properly rewinding the liner or backing sheet has presented difficulties well known to those skilled in the art. It has been proposed to connect a liner permanently with a pair of winding reels or drums, which are turned in one direction to feed the tacky fabric and interwind it with the liner in a roll on one of the drums, and are turned in the opposite direction when the fabric is fed out to a tire-building machine or the like, but during the latter operation, if the liner is rewound on its storage roll by a push exerted thereon by means of the tacky fabric in passing over said roll and leaving the liner, the liner will rewind in a loose or baggy fashion, and such arrangements have proved unsatisfactory.

The principal object of my invention is to provide a reeling or winding device for the purpose mentioned, in which a tension is maintained at all times on both ends of the liner so that the latter will rewind smoothly and tightly, and a further object is to maintain this tension substantially uniform to avoid stretching of the fabric in some part of the operation.

Of the accompanying drawing, Fig. 1 is a vertical sectional view, partly broken away, showing a reeling apparatus embodying my invention in a preferred form.

Fig. 2 is a side elevation, partly in section on the line 2—2 of Fig. 1, showing said apparatus together with the fabric.

Fig. 3 is a side elevation showing a modification. Referring at first to Figs. 1 and 2, 10, 10 are a pair of side standards forming part of a supporting frame on which are journaled, in suitable bearings, a pair of parallel shafts 11, 12 carrying respective drums or reels 13, 14, of which the upper one receives and stores the cloth liner or backing sheet 15 which has its ends attached to the respective drums and winds in the same direction about the two, that is, outwardly from each drum in a clockwise spiral as viewed in Fig. 2, while the lower drum receives the sheet material 16, such as tacky rubberized fabric, which is interwound thereon with the liner. These drums may be of the same or different diameters, the upper one being here shown as the smaller.

To the outer ends of the respective drum shafts 11 and 12 at the same end of the machine are fixed respective deep-flanged pulleys 17, 18, which may be covered by detachable guard casings 19, 20, and at or near the hubs of these pulleys are affixed the ends of a spring steel tape 21 which winds in the same direction about the two pul-

leys, oppositely to the direction of winding on each of the drums of the liner 15. This tape acts both as a volute spring 21^a or 21^b at each end after the fashion of a clock spring, but with a varying number of coils according to the degree in which said tape is unwound from or wound upon either pulley, and also as a tension equalizer or distributor and tractor member connecting the outer ends of the two springs and there-through connecting the two pulleys and drums.

22 is a small brake drum fixed on one end of the shaft 12 of the lower winding drum 16 to which a brake band may be applied for imposing a light retarding friction either constantly or at desired times upon said winding drum. The shaft 12 may further be connected with a hand or other power device for turning it to wind up the liner and tacky fabric thereon. 23 is a guide pulley over which the fabric 16 may be led in feeding it into or out of the apparatus, to or from the outer face of the liner on the periphery of the drum 13.

In the operation of this form of my invention, when the sheet or strip 16 of tacky fabric or equivalent material is to be fed into the apparatus, the liner strip 15 will have been accumulated mostly on the upper drum 13 by a previous out-feeding operation and the steel spring tape 21 will have been largely unwound from the upper pulley 17 and wound up in open coils about the hub of the lower pulley 18. The leading end of the strip 16 is then applied over the liner on the drum 13, the lower drum 14 is rotated counter-clockwise as viewed in Fig. 2 by power applied to its shaft 12, and the strip 16 is progressively interwound with the liner strip upon the lower drum. During this operation as well as during the outfeed, the tape 21, by pulling on the respective drums in the opposite direction to the manual or power draw upon the liner 15, maintains the tension on said liner at all times so that the latter wraps or unwraps smoothly and winds in close convolutions.

Because of the fact that the ratio of diameters of the rolls of liner and of combined liner and tacky strip upon the two drums varies during the winding and unwinding, the angular speed of each drum with relation to the longitudinal speed of the strips also varies, and this is compensated in the volute springs formed at the two ends of the tape 21 by a narrower or wider spacing of their coils permitting the tape to feed into or out of a spring at a different rate from the feeding of the strip from or onto the corresponding drum. The differential accumulation and disbursal of the spring volutes around the respective pulleys also tends to equalize the tension upon the liner 15 at the various stages of the winding and unwinding operation, and thus to avoid a differential stretching action upon the fabric strip 16 which would

tend to change the relation of its length and breadth in different portions and vary the angle of the bias threads in tire fabric, for example.

During out-feed of the fabric strip 16, said strip and the adjacent liner 15 unwind from the lower drum 14 and the liner rewinds upon the upper drum 13 while the strip 16 separates from the outer face of the liner and passes off around the guide roller 23. At such times the spring tape 21, tending to rotate the upper drum in the same direction as the travel of the liner and the fabric strip, relieves said strip of the usual function of propelling the liner, and consequently said liner is rewound upon the upper drum tightly, smoothly and without bagginess. The strip 16 is drawn off without substantial stretching tension thereon, because the spring tension on the upper drum assists and that on the lower drum resists the drawing action at a net rate which remains approximately uniform because of the differential uncoiling and coiling action of the two springs 21^a 21^b established through their connecting portion of the tape 21.

It may be here observed that while I have sometimes employed a modified arrangement in which independent springs, applied to the respective drums after the fashion of spring shade rollers, are opposed to the peripheral pull of the liner or fabric and oppose each other's action, for maintaining a rewinding tension on the liner storage drum, such an arrangement requires a greater pull on the fabric in completing than in starting its out-feed, because the unwinding of the liner and fabric from the lower roller has then relaxed the spring tension on the upper drum and brought that upon the lower drum toward its maximum. The herein-described arrangement is superior in that it equalizes the two spring tensions.

In the modification represented in Fig. 3, tension is maintained upon the liner 15, which winds oppositely about the respective drums 13 and 14 as before, by means of a flexible tape 24 which may be of relatively limber material such as soft steel, wound in tight coils oppositely about the pulleys 17 and 18, in combination with pressure rollers 25, 26 over which said tape passes in bights or loops, said rollers being supported on arms 27, 28 pivoted to the side frames 10 and provided with springs 29, 30 respectively supplementing and opposing the action of gravity upon the rollers and arms to furnish a tension upon the tape. As the winding and unwinding of the liner and fabric progress during in-feed, the relatively-increasing angular speed of the upper drum 13 and decreasing angular speed of the lower drum 14 result in the winding up of the upper end of the tape upon the pulley 17 at a faster rate than its lower end unwinds from the lower pulley 18, the free length of the tape between the pulleys shortens and the pressure roller 25 rises while the other one 26 falls, thereby compensating for the differential between the pulley speeds; whereas, during the out-feed the opposite action takes place. Thus the tension upon the liner 15 is maintained substantially constant at all times.

Various other modifications could be made within the scope of my invention as defined in the claims.

I claim:

1. In reeling apparatus for tacky strips, the

combination of a pair of drums, a liner permanently connecting and wound in the same direction upon the two, and an equalizing connection between the drums, acting oppositely to the direction of winding of the liner and having yielding means for maintaining a tension on the liner. 80

2. In reeling apparatus for tacky strips, the combination of a pair of drums each having a pulley, a liner connecting the drums and wound in the same direction thereon, and a tractor member connecting the pulleys and wound thereon oppositely to the direction of winding of the liner for imposing a tension upon the liner. 85

3. In reeling apparatus for tacky strips, the combination of a pair of drums, a liner connecting the drums, a tape connecting the drums and acting thereon oppositely to the direction of winding of the liner, said tape having means for imparting a yielding tension thereto for maintaining a tension upon the liner. 90 95

4. In reeling apparatus for tacky strips, the combination of a pair of drums, a liner connecting the drums and wound in the same direction thereon, springs acting upon said drums oppositely to the direction of winding of the liner for maintaining a tension on the liner, and a compensating connection between the springs. 100

5. In reeling apparatus for tacky strips, the combination of a pair of drums, a liner connecting the two, and a spring tape connecting the drums and having end portions similarly coiled as a pair of volute springs about the drum axes for maintaining a tension upon the liner. 105

6. Reeling apparatus comprising a pair of oppositely rotatable rollers, a permanent strip which wraps in similar directions about the respective rollers, and a tense tractor member which wraps about the axes of the respective rollers oppositely to said strip for tensioning the latter. 110 115

7. Reeling apparatus comprising a liner strip, a liner rewinding drum attached to one end of said strip, an oppositely rotatable liner-and-tacky-strip interwinding drum attached to the other end of said strip and having means for the application thereto of power to effect the interwinding, and a spring tape having end portions coiled as springs of variable length about the axes of the respective rollers oppositely to the direction of winding of the liner strip thereon for tensioning said liner strip. 120 125

8. Reeling apparatus comprising a pair of oppositely rotatable winding drums having coaxial pulleys rotatable therewith, a liner strip connecting said drums, a flexible, liner-tensioning tractor member winding on the respective pulleys oppositely to the direction of winding of the liner strip and having an intermediate pulley-free portion of variable length formed in a bight, and a floating pressure roller in said bight for tensioning said member. 130 135

9. In reeling apparatus for tacky strips, the combination of a pair of drums respectively for storing a liner and for interwinding the same with the tacky strip, a liner connecting said drums and winding in the same direction upon the respective drums, and tension means acting in the same direction upon the respective drums, oppositely to the direction of winding of the liner thereon. 140 145

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