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STOCK ANCHOR OF THE WIND-ON TYPE

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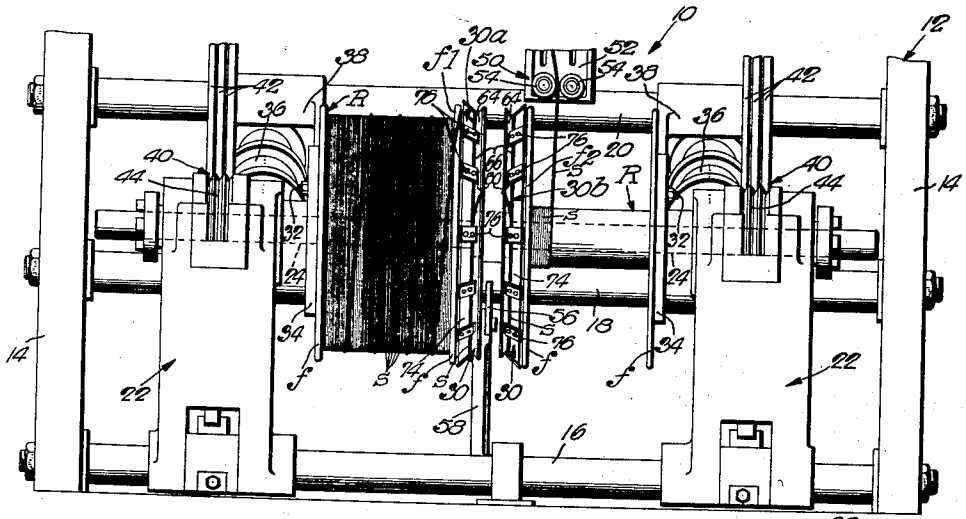


Fig. 1

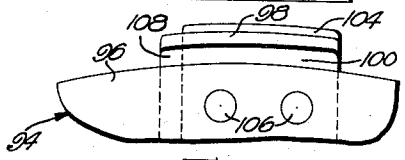


Fig. 5

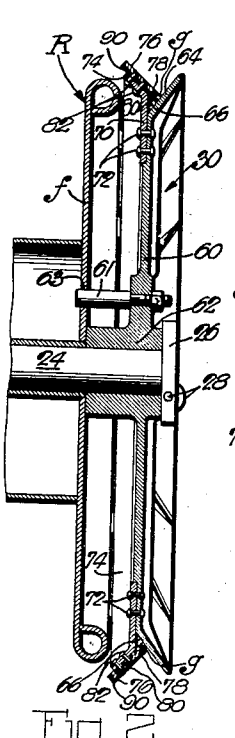


Fig. 2

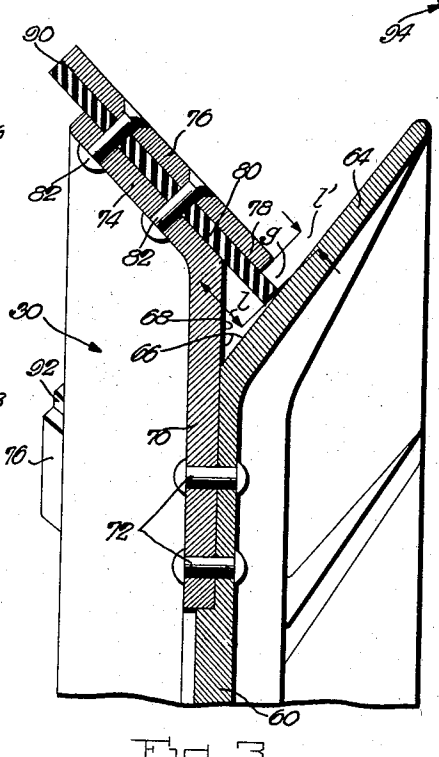


Fig. 3

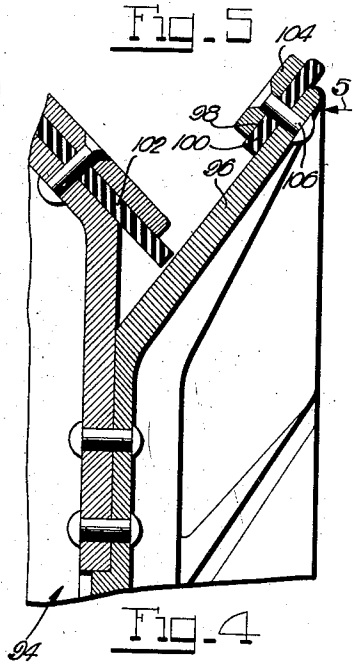


Fig. 4

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STOCK ANCHOR OF THE WIND-ON TYPE

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8 Claims. (Cl. 242—25)

This invention relates to continuous multi-reel winding apparatus in general, and to multi-reel apparatus of a continuous snagless stock-winding type in particular.

Reel-winding apparatus of the kind to which the present invention relates more particularly may be like that disclosed in the copending application of Benjamin H. Davis, Serial No. 575,909, filed April 3, 1956, now Patent No. 2,893,652. Thus, this prior apparatus holds two adjacent reels of which one reel is driven and fully wound with flexible stock from a continuous supply under the control of a guide which moves back and forth width-wise of the reel to lead the stock onto the latter in successive layers of orderly arranged turns, whereupon the winding of the stock is continued on the adjacent second reel by quickly shifting the guide into operative relation therewith to continue its back and forth motion for the same orderly deposit of stock on the second reel. However, while shifting the guide into operative relation with the adjacent empty reel, the stock will on the ensuing cross-over to the latter reel become secured to stock anchors on both reels, whereupon the thus anchored cross-over stock will be severed. In so doing, the severed trailing end of the stock on the full reel will remain secured to the stock anchor on the latter reel and thus be prevented from acting like a potentially hazardous or damaging whirling snag until the full reel comes to a stop, while the severed leading end of the supply stock is secured to the stock anchor on the adjacent empty reel for the wind of the stock onto the latter immediately when the stock guide has been shifted into operative relation with the empty reel. The drive of the full reel is thereupon discontinued and the latter is removed from the apparatus and replaced by an empty reel while the winding of stock on the second reel continues uninterruptedly. When the second reel has been fully wound with stock, the guide is quickly shifted into operative relation with the adjacent empty reel which at that time is also driven, with the result that the cross-over stock will be secured to the stock anchors on both reels, whereupon the crossover stock thus anchored is again severed for the aforementioned purposes and also to release the second, full reel for replacement in the apparatus by another empty reel. The stock-winding operation thus continues uninterruptedly and reels in the apparatus are successively wound with stock and replaced by empty reels to be wound with stock, in the foregoing fashion, until the apparatus is stopped or the continuous supply stock is exhausted.

The stock anchors in this prior apparatus are of the "wind-on" type, i.e., the stock will be wound thereon in sufficient number of turns to become firmly anchored thereto. In resorting to stock anchors of this wind-on type, leading and trailing ends of considerable lengths of the stock on the successively wound reels are also immediately available for certain tests of the stock while the same remains reeled. Thus, if the stock is insulated conductive wire, the same may be subjected to the well-known spark test to check it for a possible break while it is wound on a reel, the ready accessibility and considerable lengths of the opposite ends of the wound stock outside the reel being fully adequate for this purpose, as well as for other purposes, such as testing the wound wire for a break in its insulation by the equally well-known meter test, for instance. To the end of anchoring the cross-over stock by wind-on on the stock anchors, each stock anchor provides a wind-on rim and an overhanging obstruction which is so associated with the rim as to admit stock onto the latter for wind-on during the stock cross-ever, but to obstruct appreciable outward expansion and, hence, prevent unwinding of the wound stock thereon after severance of the crossover stock, thereby securely holding the stock on the anchor regardless of its more or less powerful unwinding tendencies and permitting its ready removal therefrom and transfer onto the associated reel after the removal of the latter from the apparatus. More particularly, each stock anchor has, in addition to its wind-on rim and overhanging obstruction, a peripheral wind-on track on one side of and leading to the wind-on rim. The overhanging obstruction is further arranged to deflect crossover stock led thereonto by the guide onto the wind-on track which, turn, leads or deflects this stock, as well as stock led directly thereonto by the guide, onto the wind-on rim, making it imperative to provide a gap between the overhanging obstruction and the wind-on track for the passage of the stock on the latter past the former and onto the wind-on rim.

While these prior stock anchors of the wind-on type perform quite satisfactorily, it does happen occasionally that a longer-than-normal length of severed stock finds its way outwardly through the gap between the overhanging obstruction and the wind-on track of an anchor and, in consequence, may form a potentially hazardous whirling trailing snag on a full reel or jeopardize the secure anchorage of the leading end of the supply stock to the stock anchor on an empty reel.

It is the primary object of the present invention to provide for winding apparatus of this kind a stock anchor of the aforementioned wind-on type in which only a short length, and in any event no more than a part of a single turn, of the wound stock thereon may harmlessly protrude through a gap between the overhanging obstruction and the associated wind-on track.

It is another object of the present invention to provide for winding apparatus of this kind a stock anchor of the wind-on type in which the gap between the overhanging obstruction and the adjacent wind-on track is normally blocked by a gate, and preferably by several gates at peripherally spaced intervals which will readily open or give way to stock being led by the wind-on track onto the wind-on rim and will remain closed and block the exit of wound stock by its own effort through this gap, but which will readily give way to intentional removal of the wound stock through this gap.

It is a further object of the present invention to provide for winding apparatus of this kind a stock anchor of the wind-on type in which the aforementioned gate or gates are in the form of flexible, and preferably more or less resiliently flexible, pads or fingers which at one end are firmly mounted cantilever-like and extend lengthwise, in spaced facing relation with the wind-on rim, substantially throughout the width of the overhanging obstruction and therebeyond to, or into close proximity to, the wind-on track, with each finger being rigidly backed lengthwise throughout the width of the overhanging obstruction so as to leave the remaining length thereof at its other, free end next to the wind-on track non-backed, wherefore the full length of each finger will readily be inwardly flexed by and thus moved out of the way of stock being led by the wind-on track onto the wind-on rim, while wound stock tending of its own accord to exit past these fingers is ineffectual to overcome their block since

even exceptional stock forces involved in this effort will fail to flex the shorter non-backed end lengths of the fingers outwardly sufficiently to force them out of the way. However, these shorter non-backed end lengths of the fingers are sufficiently long to flex outwardly quite readily and give way to the wound stock on intentionally removing the same from the stock anchor.

Other objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a fragmentary front elevation of reel-winding apparatus with reels carrying stock anchors which embody the present invention;

Fig. 2 is an enlarged fragmentary longitudinal section through a reel and associated stock anchor;

Fig. 3 is a further enlarged fragmentary section through a peripheral part of the stock anchor;

Fig. 4 is a section similar to Fig. 3 and showing a modified stock anchor; and

Fig. 5 is a fragmentary elevational view of the modified stock anchor as seen in the direction of the arrow 5 in Fig. 4.

Referring to the drawings, and more particularly to Fig. 1 thereof, the reference numeral 10 designates apparatus for winding flexible stock *s*, and more particularly insulated wire or cable, onto reels R in a continuous operation. The winding apparatus, which may in all essential respects be like that disclosed in the aforementioned copending Davis application, comprises a main frame 12 which presently includes opposite end sections or castings 14 and a plurality of tie bars 16, 18 and 20 between them. Pivoted on the lower frame bar 16 are spaced reel stands 22 which at their tops carry rotary cantilever spindles 24 for removable reception of reels R. Each reel stand 22 is swingable into the raised reel-winding position shown and into a lower reel-exchange position. For the exchange of an empty reel for a full reel on each stand 22 in its lower exchange position, a collar 26 is removed from the spindle 24 (Fig. 2), after first releasing the collar 26 from the spindle 24 by retracting a releasable lock pin 28. The full reel with its stock anchor 30 to-be-described is then axially removed from the reel spindle 24 and an empty reel with its stock anchor 30 placed thereon, whereupon the collar 26 is reapplied to the spindle 24 and locked thereto by the pin 28. In placing the empty reel on the spindle 24, a coupling pin 32 on a fixed arm 34 on the spindle (Fig. 1) is led into an aperture in the adjacent end flange *f* of the reel for releasable driving connection of the latter with the spindle 24. The reel stand is then swung into its raised winding position for the winding of stock onto the empty reel thereon. Suitable power means serve to swing each reel stand 22 into its winding and exchange positions. To this end, each stand 22 is at its top pivotally connected with the rod of a piston in a cylinder 36 which is pivotally mounted in a bracket 38 on the rear frame bars 18 and 20. Each cylinder 36 is under the control of a suitable manual valve (not shown) for swinging the associated stand 22 into its winding and exchange positions.

Each reel stand 22 is provided with a spindle drive 40 which presently comprises power-driven belts 42 and a multi-groove pulley 44 on the spindle 24. Thus, on swinging each reel stand 22 into its raised winding position, its pulley 44 is brought into driving engagement with the associated belts 42 and the spindle 24 with the reel thereon are driven. Conversely, on swinging each reel stand 22 from winding position into exchange position, its pulley 44 is retracted from the associated belts, with the result that the spindle 24 and reel thereon will no longer be driven, suitable brake means (not shown) being preferably provided to bring the spinning mass of the spindle and reel to a quick stop.

For the winding of stock onto the reels on the stands 22, there is provided a stock guide 50 which presently comprises a guide bracket slidable on a top frame bar (neither shown). Vertically adjustable on the guide bracket is a carrier 52 for a pair of forwardly projecting rotary guide rolls 54, preferably of antifriction type, between which passes the stock *s* from the usual accumulator (not shown) to either reel. The stock guide 50 is reciprocable axially of the reel spindles 24, and has a suitable drive (not shown) for its relatively slow back-and-forth or traverse movement between the end flanges *f* of either reel to guide the stock *s* in successive layers of orderly turns onto the latter until fully wound, whereupon the drive quickly shifts the guide 50 from wind-on relation with the full reel over into wind-on relation with the empty reel. The drive of the stock guide 50 may in all essential respects be like that shown in the aforementioned copending Davis application, and may be under suitable control for automatic operation.

As already mentioned, each reel R releasably carries a stock anchor 30 which is of the wind-on type. More particularly, the stock anchors 30 on the adjacent reels on the stands 22 are adapted to receive each a number of turns of stock *s* on the quick-shift of the guide 50 from the driven full reel to the driven empty reel and ensuing crossover of stock from the former to the latter, whereupon the crossover stock between the stock anchors 30 is severed on projecting into its path a normally retracted knife 56. The knife 56 is presently carried by a swingable arm 58 which by a connected plunger and cylinder under the control of a manual valve (neither shown) is swung to project the knife into the path of the crossover stock and retract it therefrom.

Each stock anchor 30 presently comprises a web or disc 60 (Fig. 2) having a hub 62 for its releasable reception on the free end of a reel spindle 24. Each stock anchor is also provided with a coupling pin 61 for its driving connection with a reel R in an aperture 63 in an end flange *f* thereof. The disc 60 is provided with a peripheral stock wind-on track 64, presently in the form of an outwardly tapering peripheral flange thereon, and a stock wind-on rim 66 which is presently V-shaped and formed by the inner end of the tapering flange 64 and an adjacent peripheral shoulder 68 on a ring member 70 which is suitably secured, as by rivets 72, to the disc 60 (see also Fig. 3). The wind-on track 64 is thus continuous with the wind-on rim 66 and serves to deflect or cam crossover stock led thereto onto the latter. The ring member 70 is presently provided with a peripheral flange 74 which is tapered oppositely to the track flange 64 and serves as a support for retaining means 76. A plurality of peripherally spaced retainer plates 76 having shoulders 78 overhanging the wind-on rim 66 and spaced from the wind-on track 64 by gaps *g* are provided.

In accordance with one aspect of the present invention, there is interposed between the tapering flange 74 on the ring member 70 and each retainer plate 76 a longitudinal stock-restricting flap or finger 80 which is of flexible material, and more particularly of resiliently flexible material, and extends throughout the width of the track flange 74 and therebeyond to, or into close proximity to, the wind-on track 64. Thus, the fingers may be of rubber or any other suitable material having the required resilient flexibility for their intended function to-be-described. Each retainer plate 76 and interposed finger 80 is secured to the flange 74, as by rivets 82. As will be seen most clearly in Figs. 2 and 3, a free end length of each finger 80 overhangs the wind-on rim 66 and is rigidly backed in part by the associated retainer plate 76. Hence, the full free length *l* of each finger 80 (Fig. 3) may flex inwardly and thus give way to stock *s* being cammed by the track 64 onto the wind-on rim 66. However, only a fraction of the full free length of each finger 80, namely, the finger length *l'* projecting across the gap *g*, may be flexed outwardly by stock tending to leave the wind-on

track 66 through the gap *g*. The resiliency and the free length of each finger 80 are such that stock being cammed by the wind-on track 64 onto the wind-on rim 66 will readily flex the finger 80 inwardly out of the way, whereupon the latter will by its resiliency return to its gap-closing position (Fig. 3). On the other hand, the gap *g* is so selected that wound stock on the rim 66 will by its own effort fail to flex the non-backed free length *l'* of each finger 80 outwardly sufficiently to permit outward passage of the stock, regardless of the unwinding tendencies of the wound stock and, hence, the power with which it will tend to escape through the gap *g* if directed toward the latter. However, the non-backed free length *l'* of each finger 80 will readily flex outwardly sufficiently to give clearance to the wound stock on its intentional removal from the wind-on rim 66, and hence from the stock anchor 30, without undue effort on the part of an operator, the removal of the wound stock from the wind-on rim being otherwise facilitated on first loosening the wound stock if the same has not of its own accord already unwound against the fingers 80.

Assuming now that the winding apparatus is in operation and that the stock guide 50 is presently completing the winding of the left reel R (Fig. 1), the aforementioned drive of the stock guide will quick-shift the latter for its relatively fast crossover from wind-on relation with the full left reel to the empty right reel. On the ensuing crossover of the stock, the same will first cross the confronting end flange *f1* of the driven full left reel and, in consequence, be taken around therewith, bringing the stock into wind-on relation with the associated stock anchor 30*a*, and more particularly with successive retainer plates 76 thereon which, being inclined to the reel axes, cam the stock against the track 64 thereof which, in turn, cams the stock past the fingers 80 and onto the wind-on rim 66 thereof. In view of the relatively quick crossover shift of the guide 50, only a relatively short length of the crossover stock will be deflected by the retainer plates 76 onto the wind-on track 64, while a greater length of the stock will by the guide 50 be directly led to the wind-on track 64 owing to the outward taper of the latter in the present quick-shift direction of the stock guide to the right (Fig. 1). Thus, a greater or lesser number of stock turns will be wound on the stock anchor 30*a*, depending on the present drive speed of the full reel and the quick-shift speed of the stock guide, as will be readily understood. As the stock, on its crossover from the full left reel toward the empty right reel, crosses the outer periphery of the wind-on track 64 of the stock anchor 30*a* at an increasing deflection angle, it is taken around with the latter and thereby immediately brought to intersection with the outer periphery of the wind-on track 64 of the stock anchor 30*b* on the driven empty left reel and taken around thereby, so that the stock may now be for a very brief period in wind-on relation with the track 64 on the anchor 30*b*, but will most likely come into immediate wind-on relation with the retainer plates 76 thereon which will cam the stock onto the wind-on track 64 thereof to be cammed by the latter, in turn, past the confronting fingers 80 and onto the wind-on rim 66 thereof. A number of turns of crossover stock will thus be wound on the anchor 30*b* until the crossover stock crosses the confronting end flange *f2* of the driven empty right reel and is taken around thereby for the start of its wind onto the latter at restored proper wind-on speed of the stock guide 50. As soon as sufficient stock has been wound on the anchor 30*b* to assure its retention by wind-on thereon, the knife 56 is projected into the path of the crossover stock between the stock anchors 30 to sever the same, and is then retracted. The severed stock in the anchor 30*a* on the full reel constitutes a trailing end length of the stock on the latter, and this trailing stock length is superposed or intermingled with a leading stock length deposited therein on the preceding quick-shift of the stock guide from a full right reel to the present left reel just prior to the winding of stock onto the latter. The severed stock in the anchor 30*b* constitutes a leading end length of the stock wound onto the presently empty right reel, and this leading stock length in the anchor 30*b* will be augmented by a trailing stock length on the following quick shift of the stock guide 50 from the right reel to the left reel when the former is fully wound with stock. These leading and trailing stock lengths, on their removal from the stock anchors, are of adequate lengths and readily accessible for the aforementioned tests of the stock on full reels. Thus, as the right reel is presently wound with stock (Fig. 1), the left reel stand 22 is swung into its lower exchange position and the full reel thereon with its stock anchor exchanged for an empty reel with a stock anchor, whereupon the stand is swung back into its winding position. The wound stock in the anchor 30*a* on the full reel is then removed therefrom and the anchor itself removed with its coupling pin or pins 61 (Fig. 2) from the reel for replacement on an empty reel to-be-wound. The winding of stock on successive reels may thus proceed until the winding apparatus is stopped or the continuous supply stock exhausted.

As best shown in Figs. 2 and 3, the fingers 80 and associated retainer plates 76 project beyond the outer periphery of the flange 74 of the ring member 70 to form shoulders or snaggers 90 any one of which will engage and take around stock crossing over the adjacent end flange of the associated reel considerably before this end flange would take it around, thereby assuring the winding of adequate stock into the anchor on the quick crossover of the stock guide from one reel to the other. To protect the crossover stock from possible damage on impact with any snagger 90, each finger 80 of the described resiliently flexible material preferably projects somewhat beyond its retainer plate 76, as at 92 (Fig. 3), to cushion the impact between it and the stock.

Reference is now had to Fig. 4 which shows a modified stock anchor 94 that may in all respects be like the described stock anchor 30, except that the present stock anchor is provided on its wind-on track 96 with one or more peripheral snaggers 98 that take stock around before the same would be taken around by the wind-on track 96 itself. To cushion the impact of each snagger 98 with the stock, the former is preferably in the form of a pad 100 of the same or a similar material as each flexible finger 102, and is secured to the track 96 by a retainer plate 104 which is riveted at 106 to the track. A leading margin 108 of the pad 100 projects beyond the retainer plate 104 (Fig. 5) to assure that the former, rather than the latter, will impact with the stock.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

What is claimed is:

1. In a stock anchor having a member with a rotary axis, the combination with a wind-on rim on said member about said axis, a shoulder on said member outwardly spaced from and extending over said rim widthwise thereof, and a peripheral track on said member spaced from said shoulder and arranged to deflect flexible stock led thereto transversely of said axis past said shoulder and onto said rim, of a resiliently flexible finger cantileverally mounted at one end on said member and extending lengthwise, in spaced facing relation with said rim and in backing relation with said shoulder, substantially throughout the length of the latter and therebeyond in nonbacked fashion toward, and with its other, free end in close proximity to, said track, so that said

finger will be flexed inwardly out of the way by stock being deflected by said track toward said rim and will resist such outward flexing by wound stock itself on said rim as would permit its outward passage, but will flex outwardly for passage of wound stock on its intentional removal from said rim.

2. The combination in a stock anchor as set forth in claim 1, in which said shoulder is externally inclined to said track to deflect stock led thereto onto said track.

3. The combination in a stock anchor as set forth in claim 1, in which a plurality of said fingers and associated backing shoulders are arranged in peripherally spaced relation on said member.

4. The combination in a stock anchor as set forth in claim 1, in which a plurality of said fingers and associated backing shoulders are arranged in peripherally spaced relation on said member, and said shoulders are externally inclined to said track to deflect stock led thereto onto said track.

5. In a stock anchor having a member with a rotary axis, the combination with a wind-on rim on said member about said axis, a flange on said member tapering outwardly from one end of said rim and adapted to cam flexible stock led thereto transversely of said axis onto said rim for its wind thereon, and a shoulder on said member outwardly spaced from said rim and also spaced from said flange and extending over said rim widthwise thereof and substantially at right angles to said flange, of a resiliently flexible finger cantileverally mounted at one end on said member and extending lengthwise, in spaced facing relation with said rim and in backing relation with said shoulder, substantially throughout the length of the latter and therebeyond in non-backed fashion toward, and with its other, free end in close proximity to, said flange, so that said finger will be flexed inwardly out of the way by stock being cammed by said flange toward said rim and will resist such outward flexing by wound stock itself on said rim as would permit its outward passage, but will flex outwardly for passage of wound stock on its intentional removal from said rim.

6. In a stock anchor having a member with a rotary axis and a ring-shaped surface about and perpendicular to said axis, the combination with a first flange on said member about said axis tapering from the outer peripheral margin of said surface outwardly and to one side of said surface opposite to that faced by said surface, and another flange on said member about said axis tapering from the inner peripheral margin of said surface outwardly and to said opposite side of said surface and extending substantially at right angles to said first flange, said other flange being adapted to cam stock led thereto transversely of said axis for its wind on an inner wind-on part of said other flange adjacent said inner peripheral surface margin, of a rigid longitudinal element outwardly spaced from and secured to said first flange and extending widthwise of the latter, and a resiliently flexible longitudinal finger securely interposed between said element and first flange and extending on the latter widthwise thereof and with an end length therebeyond into close proximity to said other flange, said element extending with its inner end beyond said first flange toward but spaced from said other flange to back part of said end length of said finger against outward flexing, so that said finger will be flexed inwardly out of the way of stock being cammed by said other flange toward said inner wind-on part thereof and will resist such outward flexing by wound stock itself on said inner flange wind-on part as would permit its outward passage, but will flex outwardly for passage of wound stock on its intentional removal from said inner flange wind-on part, and said element extending with its outer end beyond said first flange so that stock crossing the outer periphery of the latter will be in the path of said element.

7. The combination in a stock anchor as set forth in claim 6, in which a plurality of said fingers and associated elements are arranged in peripherally spaced relation on said member.

8. The combination in a stock anchor as set forth in claim 6, further comprising a shoulder on said other flange so arranged thereon that stock crossing the outer periphery of the latter will be in the path of said shoulder.

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