

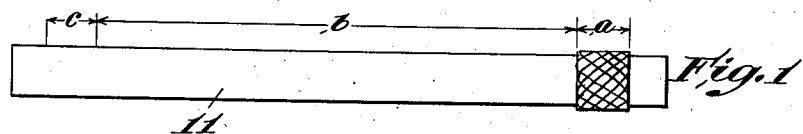
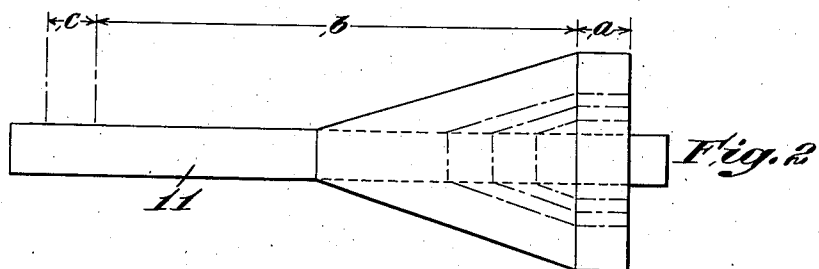
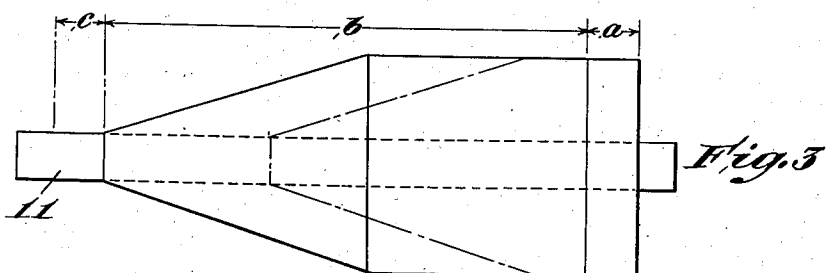
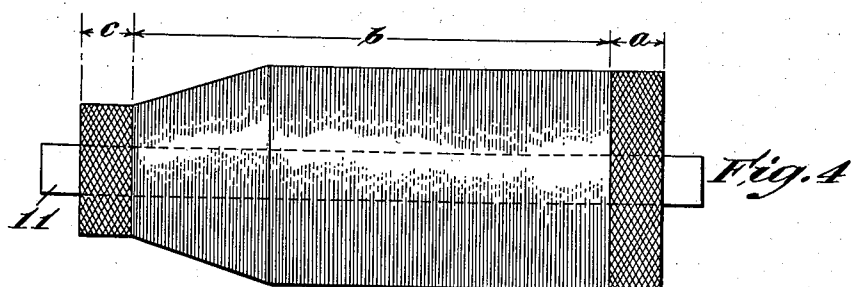
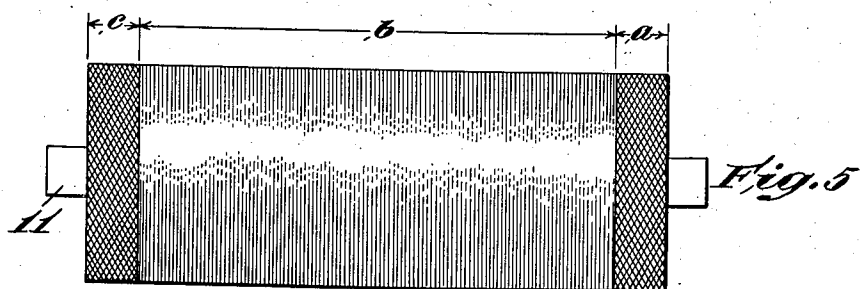
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WINDING

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WINDING

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This invention relates to wound packages of yarn and to a method of winding, and has for one of its principal objects to provide for a winding a supply package which will present a tapered or conical nose during the major portion of the time it is being unwound but which is more economical of space than prior packages of this type. It is a further object of the invention to provide a package of this type which will utilize substantially all of a cylindrical space represented by the length of the yarn-receiving portion of a core.

For numerous uses, especially in bobbins used in loom shuttles, it is desirable that during unwinding of the major portion of the wound yarn, the remaining yarn on the bobbin will present a pointed nose from which the yarn is unwound. For this reason the typical filling bobbin for use in looms has been wound in successive axially-advancing conical layers which when they stop at the tip of the bobbin form a pointed end. This typical wind has given the desired pointed nose during the unwinding of the bobbin in the shuttle but has the disadvantage that it fails to fill out about 30% of the space theoretically available for the reception of the yarn.

The present invention provides in its preferred embodiment for winding a yarn package on a core such as a bobbin, with self-sustaining ends formed by the yarn alone, of cylindrical outer shape and of cylindrical inner shape, if wound on a cylindrical tube, and having the property of presenting a conical nose toward the tip of the package as the unwinding of the package progresses. Thus about 30% more yarn can be contained in this package than in the typical filling wound package, and the necessity for bobbins or cores of complicated shape is avoided.

Other objects of invention and features of advantage and novelty will be apparent from this specification and its drawing.

In the drawing:

Fig. 1 is a side elevation of a core having the first few turns of winding on it in the production of a package according to this invention;

Fig. 2 is a diagrammatic sectional view showing the shape of the partially wound package at the time its base portion has attained its full diameter, and showing in dotted lines preceding forms of the partially wound package;

Fig. 3 is a similar view showing the shape of the partially wound package at the time the winding of its main body portion has progressed to the point where the winding of the head end of the package is about to be begun;

Fig. 4 is a side elevation showing the package at the time the head end portion is partially wound and the main body portion not yet completed; and

Fig. 5 is a similar view of the completed package.

It will be understood that the package consists of a continuous yarn or continuous parallel yarns of which the winding is preferably begun on a simple bare core and continued until the completed package of Fig. 5 is produced.

Referring to Fig. 1, the winding is preferably begun by winding a few turns (for example about ten or fifteen) in quick-traversed cross-wound formation in zone *a* about $\frac{1}{2}$ inch wide near the base end of a preferably cylindrical core 11. The yarn is then traversed with a slow traverse from the boundary between the zones *a* and *b* for a short distance into the right-hand portion of the middle or main body zone *b*, for example $\frac{1}{8}$ inch, and then is slowly traversed back to the zone *a*. Another ten or fifteen turns of cross winding are then wound in the zone *a*. The yarn is then slowly traversed from the boundary between zones *a* and *b* slightly farther toward the left of zone *b* than on the previous entry into zone *b*, and then is slowly traversed back to zone *a*. This sequence of a number of turns of quick traverse winding in zone *a* followed by slow traversing of the yarn into zone *b* for an increasing distance each time and a return to zone *a*, is continued until the yarn in zone *a* is built up to the desired full diameter of the package as indicated in full lines in Fig. 2. In Fig. 2 the several dotted lines indicate successive shapes of the developing package before the base portion in zone *a* has reached its full size.

The winding up to the point shown in full lines in Fig. 2 has thus resulted in forming a conical base upon which successive conical layers can be laid in filling the main body portion of the package. In some cases for instance if the yarn is to be wound on bobbins having butt ends shaped to provide a conical base of the approximate shape of the wound yarn of Fig. 2, the winding up to the point shown in Fig. 2 could be omitted.

Following the attainment of the partially wound package of Fig. 2, the yarn is then slowly traversed back and forth across the conical nose presented by the partially wound middle zone *b*, and as successive layers are wound the range of traverse is shifted to the left so that the package in growing passes through the dotted line shape of Fig. 3 to the full line shape of Fig. 3 and the

most advanced part of the conical nose reaches the boundary between zones b and c.

Certain advantages of the invention can be attained if the package is not carried beyond the form of Fig. 3, but it is preferred to complete the package as now to be explained.

In the next stage of production of the package the yarn is traversed in a cross wound formation through about 10 or 15 turns within the zone c, at the conclusion of which the yarn is slowly traversed again on the conical nose of the partially wound portion in zone b, and slowly traversed back to the zone c. Successive series of 10 or 15 turns of the cross wound yarn are then built up in zone c between the winding of successive slowly traversed layers of yarn on the conical nose of the partially wound zone b, the length of traverse of the slowly traversed portion being diminished each time at its right-hand end until reaching approximately zero, so as to keep the portion b within the confines of a cylindrical shape. In this procedure the growing package passes through the shape shown in Fig. 4 until finally the cylindrical body of cross wound yarn in zone c has reached the full diameter of the previously formed part of the package as shown in Fig. 5, and the main body portion b has been completely filled.

The outer end face of the cross-wound head end portion c is shown as perpendicular to the axis of the package, although the angle of this face can be varied if desired to suit special requirements such for example as a slightly retracted or "dished" end face. There is no abrupt change in diameter as between the head end portion c and the main body portion b, and the head end portion and adjacent part of the main body portion have substantially the outward form of a figure of revolution of a straight line, preferably that of a cylinder as shown in Fig. 3.

The package so formed is self-sustaining because of its cross wound base and head portions a and c which as indicated have end faces approximately perpendicular to the core, and has a maximum capacity since the main body portion b is completely filled with yarn wound with a slow pitch of traverse.

Moreover, the cross-wound end portion in zone c effectively prevents the yarn from sloughing off the conically-wound middle portion in handling and shipment of the package.

The invention is readily adaptable to winding packages having a somewhat conical shape, which can be most easily accomplished by substituting a conical core for the cylindrical core of the drawing, whereupon the outward shape of the resulting package will change accordingly.

In unwinding the package there is no quick variation in the distance from the nose of the package at which the unwinding yarn is pulled off from the surface. Further the package presents a generally pointed nose, conical except for the partially unwound cross-wound head from which the yarn is unwound in the zone c and the partially unwound cross-wound base from which yarn subsequently unwinds in the zone a.

In the specification and claims, the term "cross-wound" is intended to mean that the yarn is wound on the package with sufficient angle of traverse (not necessarily constant) to form a self-sustaining body, not requiring a spool-head to support its exposed side face, and the term "close-wound" is intended to mean that the yarn is wound in a layer along which the yarn is traversed relatively slowly so that the turns of yarn

are nearly at right angles to the axis of the package.

I claim:

1. A wound textile strand package having a main body portion of strand wound in generally conical layers advancing in overlapped relation axially along the package, and a cross-wound end portion formed of the same strand wound in approximately cylindrical layers.

2. A wound textile strand package having a main body portion of strand close wound in generally conical layers advancing in overlapped relation axially along the package, and a cross-wound end portion formed of the same strand and having a self-sustaining outer face approximately perpendicular to the axis of the package.

3. A wound textile strand package having a main body portion of strand wound in generally conical layers advancing in overlapped relation axially along the package, and a cross-wound head portion formed of the same strand, the conical layers adjacent to the said head portion being of progressively shorter length from the interior of the package outwardly, the head portion and the adjacent part of the main body portion having substantially the outward form of a figure of revolution of a straight line about the axis of the package.

4. A wound textile strand package having a base portion of strand wound in cross-wound layers and a main body portion formed of the same strand wound in generally conical layers advancing in overlapped relation axially along the package, the conical layers adjacent to the base portion being of progressively longer length from the interior of the package outwardly until reaching the exterior periphery of the package, the base portion and the adjacent part of the main body portion having substantially the outward form of a figure of revolution of a straight line about the axis of the package.

5. A wound textile strand package having base and head portions each in the form of superposed cross-wound layers of the same strand and a main body portion of the same strand lying in conical close wound layers advancing in overlapped relation axially from the base to the head portion and substantially filling the space between said base and head portions.

6. A wound textile strand package having base and head portions each in the form of superposed cross-wound layers of the same strand and a main body portion of the same strand lying in conical layers advancing in overlapped relation axially from the base to the head portion and substantially filling the space between said base and head portions, the package having substantially the outward form of a figure of revolution of a straight line about the axis of the package.

7. A wound textile strand package having a core, a main body portion of strand wound in close-wound formation in generally conical layers each substantially inclined to the surface of the core, and a cross-wound end portion formed of the same strand in layers approximately parallel to the surface of the core.

8. A wound textile strand package having a core, a main body portion of strand wound in close-wound formation in generally conical layers each substantially inclined to the surface of the core, and a cross-wound end portion formed of the same strand in layers approximately parallel to the surface of the core, and having a self-sustaining outer face approximately perpendicular to the axis of the package.

9. Method of winding a textile strand package comprising winding conical layers of the strand in close wound formation in a main body zone alternately with a plurality of turns of the same strand in cross-wound formation in a base end zone, and thereafter winding further conical layers consecutively in the main body zone.

10. Method of winding a textile strand package comprising winding conical layers of the strand in close-wound formation in a main body zone alternately with a plurality of turns of the same strand in cross-wound formation in a base end zone while increasing the length of the conical layers progressively until the cross wound yarn of the base end zone attains its full diameter, then stopping the winding in the base end zone and winding conical layers consecutively in the main body zone.

11. Method of winding a textile strand package comprising winding a plurality of conical layers of the strand in close wound formation consecutively in a main body zone, then winding conical layers in the main body zone alternately with a plurality of turns of the same strand in cross wound formation in a head end zone.

12. Method of winding a textile strand package comprising winding a plurality of conical layers of the strand in close-wound formation consecutively in a main body zone, then winding conical layers in the main body zone alternately with a plurality of turns of the same strand in cross-wound formation in a head end zone while decreasing the length of the conical layers progressively until the cross-wound yarn of the head end zone attains its full diameter.

13. Method of winding a textile strand package comprising winding conical layers of the strand in close-wound formation in a main body zone alternately with a plurality of turns of the same strand in cross-wound formation in a base end zone, then winding other conical layers consecutively in the main body zone, and thereafter winding conical layers in the main body zone alternately with a plurality of turns of the same strand in cross-wound formation in a head end zone.

14. Method of winding a textile strand package comprising winding conical layers of the strand in close-wound formation in a main body zone alternately with a plurality of turns of the same strand in cross-wound formation in a base end zone while increasing the length of the conical layers progressively until the cross-wound yarn of the base end zone attains its full diameter, then stopping the winding in the base end zone and winding conical layers consecutively in the main body zone, then winding conical layers in the main body zone alternately with a plurality of turns of the same strand in cross-wound formation in a head end zone while decreasing the length of the conical layers progressively until the cross-wound yarn of the head end zone attains its full diameter.

15. A wound textile strand package comprising the same strand wound in close-wound formation

in conical layers in a main body zone alternately with a plurality of turns of the strand in cross-wound formation in a base end zone, and in further conical layers of close-wound formation consecutively wound in said main body zone.

16. A wound textile strand package comprising the same strand wound in close-wound formation in conical layers in a main body zone alternately with a plurality of turns of the strand in cross-wound formation in a base end zone, the length of the said conical layers progressively increasing from the core outwardly to that of a conical layer having a diameter corresponding to the diameter of the package at the base end zone, and in further conical layers of close-wound formation consecutively wound in said main body zone.

17. A wound textile strand package comprising the same strand wound in consecutive conical layers of close-wound formation in a main body zone, and in further conical layers of close-wound formation in said main body zone wound alternately with a plurality of turns of the strand in cross-wound formation in a head end zone.

18. A wound textile strand package comprising the same strand wound in consecutive conical layers of close-wound formation in a main body zone, and in further conical layers of close-wound formation in said main body zone wound alternately with a plurality of turns of the strand in cross-wound formation in a head end zone, the length of said further conical layers decreasing progressively so as to approach approximately to zero adjacent to the full diameter of the package at the head end zone.

19. A wound textile strand package comprising the same strand wound in close-wound formation in conical layers in a main body zone alternately with a plurality of turns of the strand in cross-wound formation in a base end zone, other conical layers of close-wound formation consecutively wound in said main body zone, and in further conical layers of close-wound formation in said main body zone wound alternately with a plurality of turns of the strand in cross-wound formation in a head end zone.

20. A wound textile strand package comprising the same strand wound in close-wound formation in conical layers in a main body zone alternately with a plurality of turns of the strand in cross-wound formation in a base end zone, the length of the said conical layers progressively increasing from the core outwardly to that of a conical layer having a diameter corresponding to the diameter of the package at the base end zone, in other conical layers of close-wound formation consecutively wound in said main body zone, and in further conical layers of close-wound formation in said main body zone wound alternately with a plurality of turns of the strand in cross-wound formation in a head end zone, the length of said last-named conical layers decreasing progressively so as to approach approximately to zero adjacent to the full diameter of the package at the head end zone.

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