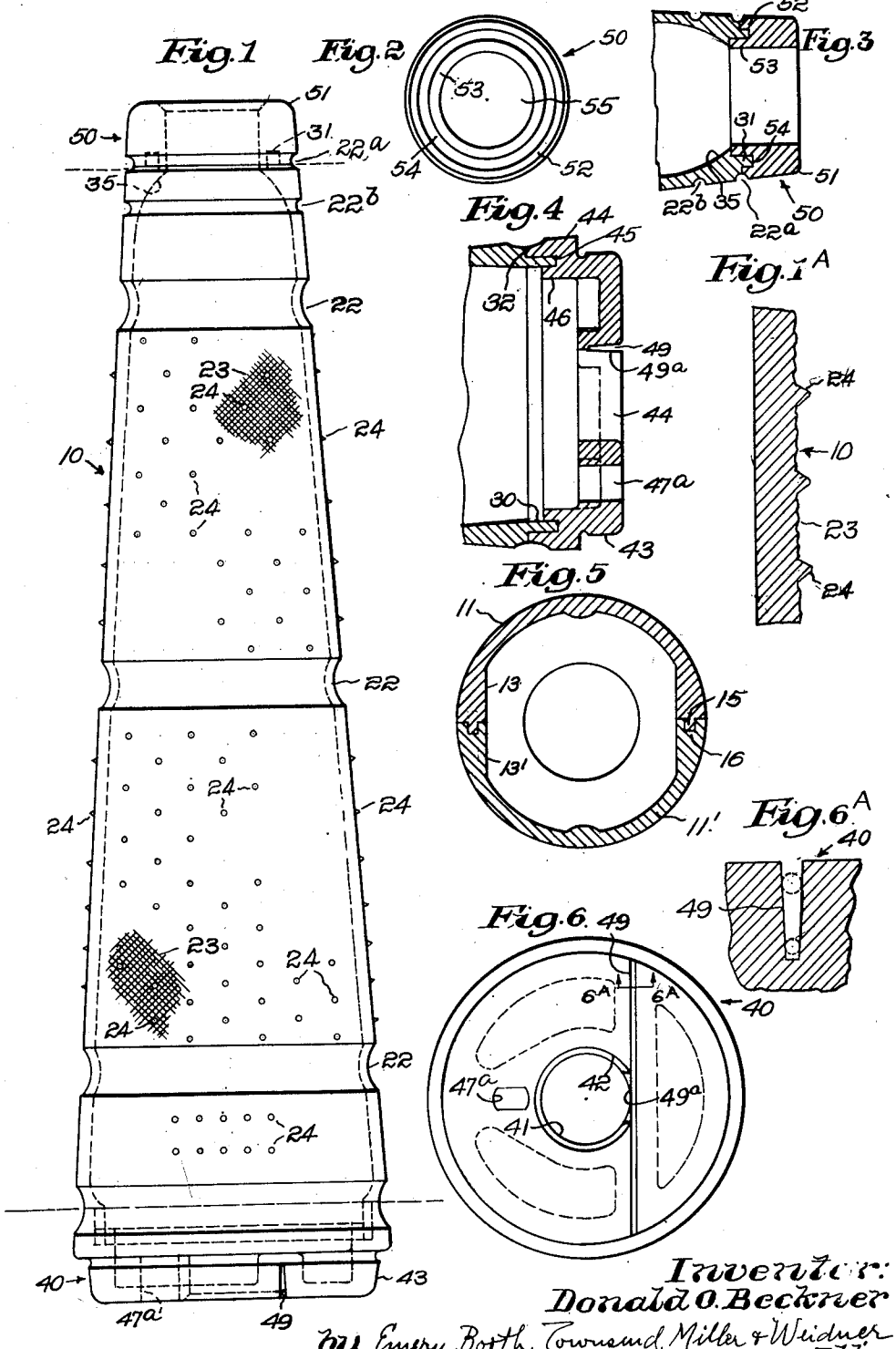
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TUBULAR WINDING CORE

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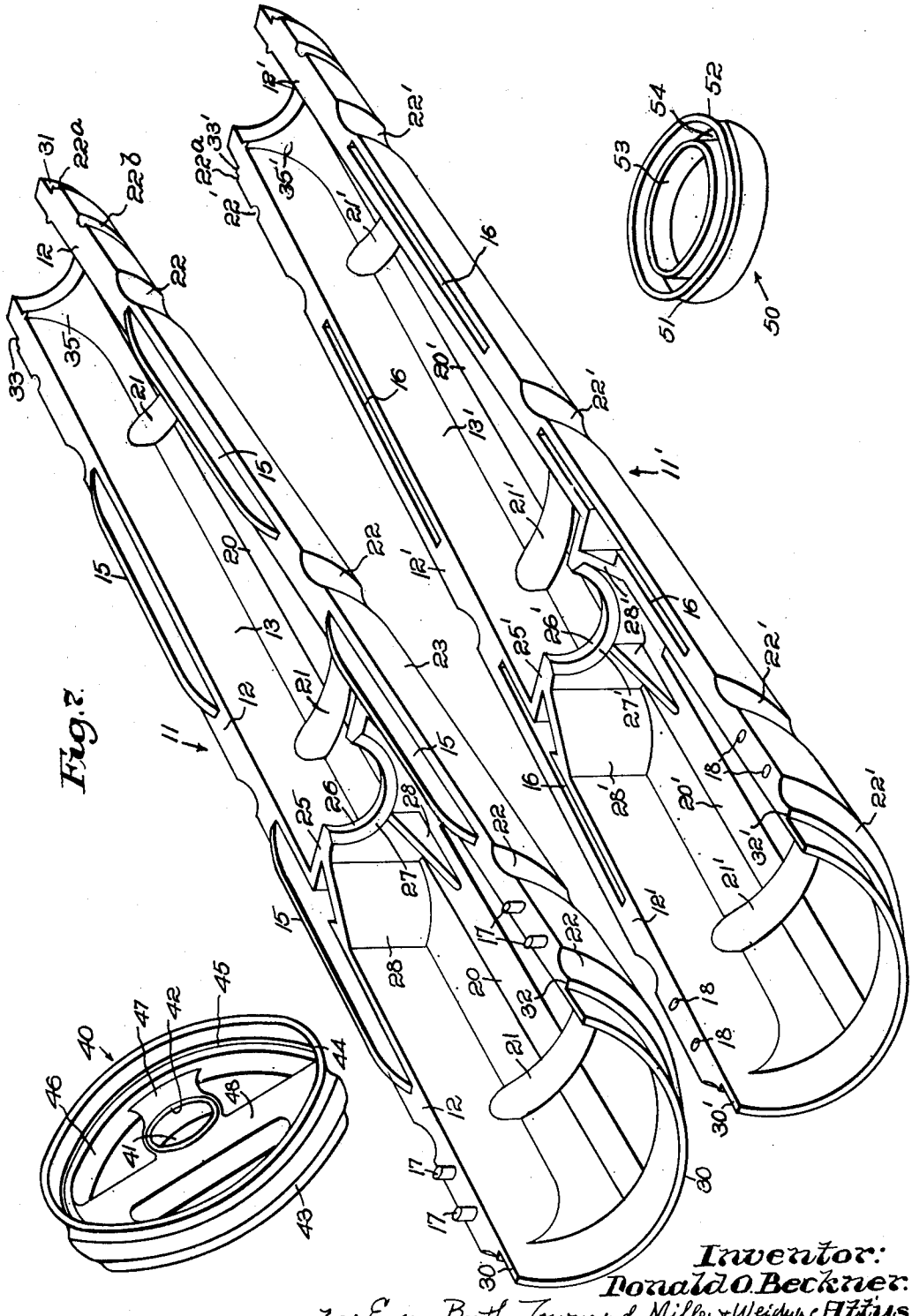


Fig. 2.

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2,535,188

TUBULAR WINDING CORE

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11 Claims. (Cl. 242—122)

1

This invention relates to tubular winding cores including bobbins, spools, cop tubes and the like employed in the textile and other industries in forming packages of yarn, thread, twine or other cordage. It aims to provide for such purpose a relatively light weight yet sturdy and otherwise improved device molded in whole or part of plastic material.

In the drawings illustrating by way of example one embodiment of the invention:

Fig. 1 is a side elevation of an exemplary core, tube or winding unit completely assembled;

Fig. 1A is an enlarged fragmentary section taken lengthwise through the wall of the core body and through a number of the nubs or pimples at the outer face.

Fig. 2 is an inside plan of a cap or head of the tube;

Fig. 3 is a longitudinal section of the head end of the core;

Fig. 4 is a similar section of the base portion;

Fig. 5 is a cross-section at an intermediate portion of the core;

Fig. 6 is a bottom plan view;

Fig. 6A is an enlarged detail section on the line 6A—6A of Fig. 6; and

Fig. 7 is an exploded perspective view of the component parts of the device of Fig. 1.

In accordance with the invention the winding core, package tube or the like, is novelly designed for molding from a synthetic resin or other plastic material. To that end and also for the purposes of repair and replacement each tubular core is formed of a plurality of initially separate parts constructed and arranged for interfitting and mechanical interlocking as an integrated assembly unit such as that of Fig. 1. The several parts herein comprise the main tubular body, stem or shell 10 itself formed by a pair of substantially duplicate mating sections 11, 11', best seen in Fig. 7, also Fig. 5, together with a base or bottom disc 40 and a head, tip or cap 50.

The two body sections 11, 11' may be identically formed and when joined define a unitary symmetrical tubular element. Corresponding parts of the two sections accordingly are given the same reference numeral with the addition of a prime mark for one of them. These winding cores generally are conical, tapering upward, and the illustrative unit of the drawings is so shown. The invention is also applicable to tubular cores generally, including non-tapered and other forms.

The two sections 11, 11' each comprise a half-round shell with planar edge faces 12, 12' along the longitudinal side walls 13, 13' adapted to seat

2

flatwise against each other when the sections are interfitted, see Fig. 5. Th edge portions of the side walls are of a thickness, preferably somewhat greater than for the remaining wall portions, to afford substantial width for the edge faces 12, 12' and to insure firm abutted engagement for the two sections. For positively interlocking the two halves one has integrally formed along the side walls 13 and upstanding from the flat faces 12 thereof elongated fins 15 receivable with a tight fit in conformant recesses 16 in the opposite half section. Other interengageable aligning and retaining formations desirably are provided at other edge locations as for example near the base where I have shown on one half section a number of locating pins 17 upstanding from the side walls. Tthe other tube section is correspondingly formed with seating recesses 18, 18 for such pins. For molding purposes it is preferable that the protuberances such as the fins 15 and pins 17 be carried on one shell section, with the corresponding receiving recesses 16, 18 on the other section, but they may be otherwise disposed as between the two sections including arrangements in which the two are fully identical.

For minimum weight major wall areas of the shell body 10 may be of reduced thickness as compared with that of the side wall portions 13, 13'. Added strength and rigidity for such thinner wall portions may be had by internal reinforcing means. Accordingly the respective sections 11, 11' are shown formed internally with integral longitudinal ribs, corrugations or the like 20, and with a plurality of transverse or circumferential internal ribs or beads 21. Three of the latter are indicated respectively near the opposite ends and at an intermediate location along the tube. One or more of these internal circumferential formations 21 may be placed at the transverse plane of the external annular channels 22 which may optionally be provided at crossover and other circumferential zones of the package mass according to preferred winding practice.

As an important feature of the invention special structure externally of the core is provided for holding cooperation with the wound-on mass of yarn, thread and the like. The winding generally is done under controlled conditions of temperature and humidity. Unless the product packages comprising the cores and windings thereon are kept under similar conditions in storage, shipment and use the wound masses on becoming drier may tend to loosen on the cores, become displaced, slough at the ends in unwind-

ing and otherwise cause operational irregularity. This is true especially with wound materials which readily limpen, distend or the like on loss of moisture content, for example those with a jute, hemp and various other fibre contents.

Accordingly, noting particularly Figs. 1 and 1A, major areas of the outer surface of the core or tube body 10 at the wind-receiving zone are knurled, milled, roughened or otherwise accorded a slip-resisting non-smooth formation 23, shown at typical locations on Fig. 1. Merely for drafting economy and general clarity the cross-lining indicative of the anti-slip formation 23 is in substantial part omitted on Fig. 1 and entirely so on other figures. This characteristic roughening 23 in practice is generally applied over all or a major portion of the wind-receiving zone.

In combination with the surface modification 23 or alternatively thereto the winding area or selected portions of it has formed thereon a multiplicity of small protuberances, nubbins, short prongs or pimple-like formations 24. Noting Fig. 1A, these projective members 24 are shown as pointed and substantially conical. They may be of any conformation, preferably of outwardly decreasing cross section, adapting them to be impressed into and between parts of the wound-on cordage, yarn, thread or the like without objectionably mutilating it. These protrusions 24 may be distributed more or less uniformly over the winding area or areas in any preferred pattern, desirably with offsetting in adjacent lines or rows axially, circumferentially or both. The pattern density may be varied axially of the core as for example sparser intermediately and more crowded toward the core ends. The individual nubbins or pimples 24 are integrally formed of the self-material of the core body 10 the plastic molding of which is found specially suited for the purpose, as contrasted with previous wooden cores on which any such integral pointed small projections are impractical from a manufacturing standpoint; metal inserts such as pin points also are regarded as unfeasible and would tend unduly to increase the weight as well as manufacturing cost. In performance of firm retention of the wound-on mass the cores or tubes having the novel combined surface structure of the invention have proven highly successful. What is said above with regard to the distribution of the knurling or roughening 23 applies also to the pimpling 24.

The core or tube 10 of the invention is adapted for mounting on a spindle or like rotary support having one or more step bearings. Accordingly it is formed with bearing or guide means including a main support at the lower end, herein on the bottom disc 40 to be described, and an upper guide or bearing formation provided partly by the head 50. Usually also, particularly for the longer bobbins and tubes the mounting spindle has an intermediate radial or step bearing.

Accordingly as here each tube section 11, 11' is integrally molded with a transverse web 25 in a plane perpendicular to the tube axis. Each web 25 has a central half-round aperture 26 the wall of which is downwardly flared at 27 adapting the mated web sections to seat on the conformantly tapered step bearing of the spindle. The webs 25 themselves serve as cross reinforcements for the tube as a whole. Further strengthening and rigidity for the webs and for the tube body desirably is provided as by a plurality of angular bracket-like struts 28 integrally molded with the respective half sections and angularly joining the under face of the corresponding cross web 25 and the main body wall below it. For different spindles one or more additional intermediate bearings such as 25 may be provided.

For cooperation with the base 40 and head 50 the tube body sections 11, 11' terminate at the opposite ends in a bottom rim 30 and a top rim 31. The basal rim or flange 30 extends up to a shoulder 32 the under face of which is adapted to abut the base 40 when installed. Above the shoulder 32 the outer wall of the tube has an approximately quarter round annular concavity for junction with a similar formation at the top of the base 40, the two annular groove portions together defining a channel similar to the circumferential channels 22 previously mentioned.

Similarly at the head end of the tube sections the top rim 31 extends down to a horizontal shoulder 33 for abutment with the under edge portion of the head 50, the adjacent portions of the head and of the tube body being grooved to present a relatively narrow annular channel 22a between them, see Fig. 1. A similar channel 22b may be formed at the outer surface of the tube sections below the head juncture channel 22a.

The base or bottom disc 40, seen in section in Fig. 4, in bottom plan in Fig. 6 and interiorly in Fig. 7, is an integrally molded element of generally cup-like form. It has a central vertical aperture 41 the wall of which is upwardly flared at the upper end as at 42 for end thrust engagement with a corresponding formation on the bearing spindle; see Fig. 7. This base or bottom disc 40 includes a lower end portion 43 of reduced diameter and preferably rounded at the peripheral edge, for accurate seating in a corresponding vertical recess on the bottom flange or step bearing of the spindle. Above the reduced end part 43 is a rim member 44 of a diameter to telescope over and lock together the mated bottom rims 30, 30' of the tube halves and having within the outer wall a circumferential channel 45 with a horizontal bottom wall and an inner annular wall 46 concentric with the outer wall. As best seen in Fig. 4 this channel 45 is dimensioned to receive the mated lower rims 30, 30' of the tube sections 11, 11' and securely lock them together in abutted position.

The interior of the base 40 may be hollow or cup formed save for a generally radial rib formation 47 and a transverse or chordal rib 48 at approximately right angles to each other. The radial rib 47 provides reinforcement and also a solid portion into which there is extended from the bottom face of the base 40 a recess 47a preferably of non-round section, see Fig. 6, adapted to receive a conformant vertical pin on the spindle, for preventing relative turning between the latter and the bobbin or core 10 as a whole. The chordal rib 48 in addition to reinforcing the base 40 provides a carrier wall for the thread holding formation or so-called tag-end slot 49, Figs. 1, 4 and 6.

This tag-end holder comprises a chordal slot extending fully across the basal part 43 and having a substantially uniform depth throughout. Centrally it opens as at 49a, Figs. 4 and 6, into the bottom aperture 41 so that a portion of the inserted tag-end is there exposed and accessible to the operator's finger, insuring that the proper end is selected in subsequently preparing the package for use. In accordance with the invention this tag-end slot 49 is novelly formed with an inward taper or wedge formation, best

seen in Fig. 6A, also Figs. 1 and 4. By thus relatively inclining the side walls of the slot it is given capacity for firm frictional gripping with different sizes of threads, yarns and strands over a considerable range, as indicated by the dotted circles in Fig. 6A. Thus any size of strand within the range may have the tag end laid along and drawn down snugly into the wedging slot 49 where it will be firmly engaged between the appropriate portions of the inclined side walls of the slot. Such simplified wedge or clamping formation would be extremely difficult if not commercially impossible to produce in a wooden core base since the requisite narrowness of the slot substantially prohibits angular sawing. The use of a molded plastic composition under the invention now for the first time makes feasible such taper formation for this tag-end slot 49.

The head or cap 50 seen in Figs. 1, 2, 3 and 7 comprises an integrally molded annular element with somewhat rounded upper margin as at 51 and having an outer skirt 52 adapted to fit over and interlock the laterally abutted upper ends of the two core sections 11, 11'. The head further has an inner skirt or vertical flange 53 defining between it and the inner wall of the skirt 52 a channel 54 in which the tube sections are received and further securely interlocked. The inner wall of the inside skirt 53 defines a circumferential bearing aperture 55 for the upper end of the longer spindles. It is particularly noted that the inner wall of each main tube section 11, 11' is formed at the upper end just below the rim 31, 31' with an internal shoulder or arcuate flange 35, 35' which together provide a partispherical bearing surface adapted to seat on any like bearing member at or near the tip of the spindle. Thus end thrust at the head of the tube or core is received directly by the tube body itself rather than by the head piece 50.

From the foregoing description of the component parts the manner of assembly will be readily understood, noting particularly Figs. 1 and 7 and comparing the other views. The two halves 11, 11' for the body 10 are set together, in which operation they are easily guided into accurate mating relation both by the longitudinal fins 15 and corresponding recesses 16 and by the locating pins 17 and pin seats 18. These locating pins avoid any radial or other displacement of the wider end portions of the tube sections where any tendency to spring is more likely to be found than at the narrower and accordingly more rigid end. Additional locating pins may be supplied wherever found expedient. Upon assembly of the body sections the base 40 and head 50 are readily applied over the bottom and top rim portions 30, 30' and 31, 31' respectively, and pushed home. The rims enter the corresponding annular channels 45 and 54, and the inner edges of the base 40 and the head 50 abut the corresponding body shoulders 32, 32' and 33, 33', respectively.

By reason of the disclosed mechanically interlocking relation of the body, base and head parts they become in effect a structural unit, particularly with reference to the major lines of force to which the core is subject in use, namely centrifugal force attendant on the winding or unwinding operations. The annular end members and the interlocking thereof to the body sections adequately resists such forces. Therefore it is unnecessary to rely on cement or other joining

agent to do mechanical holding against operating stresses. In actual practice the abutting surfaces of the component parts are momentarily dipped in or brushed with a solvent of the constituent plastic material, e. g. acetone in the case of a cellulose acetate composition. The parts then being immediately assembled become self-united or joint-fused into a substantially homogeneous whole upon which juncture lines are scarcely discernible if at all. Usually little or no buffing or other finishing is needed.

It will be noted that the internally projective ribs, webs, struts, flanges, pins and the like stand in planes substantially perpendicular to a plane tangential to the outer surface of the respective tube section 11, 11' along the longitudinal center line thereof, so enabling the parts readily to be ejected from the mold rectilinearly in the direction of said perpendicular planes. This applies also to any desired additional lengthwise, crosswise or intermediate reinforcing flanges, webs and like elements of the grid-like structure at the inner walls of the tube sections.

An important advantage of the molded plastic tubular core of the invention is the marked reduction in over-all weight as compared with prior wooden and other like devices of similar size. Due in part to the selected material itself but more especially to the substantial reduction in mass and the enlarged cavities and free spaces within the core in accordance with the invention, the total weight of the core is reduced by about half, as contrasted with corresponding turned wood devices. For example a typical 10 in. conical tubular bobbin of about 2⅝ in. and 1½ in. outer diameter at the large and small ends respectively weighs but about 8 oz. as against about 16 oz. for the usual wooden bobbin of the same size. The value in this connection will be appreciated when it is considered that a winding mill ships out bobbins and cores in the yarn, thread or like packages and subsequently receives back the empty bobbins, generally at the mill's expense, for re-use. Many thousands of these devices are shipped and re-shipped in the course of a year. One winding mill estimates that its annual freight poundage for packages and bobbins will be reduced by at least one-million pounds through adoption of plastic molded bobbins of the present invention.

My invention is not limited to the particular embodiment thereof illustrated and described herein, and I set forth its scope in my following claims.

1. A tubular winding core for packaging textile strands, cordage and the like comprising a plurality of component parts individually integrally molded of plastic material and including two semi-round trough-like half sections defining in mated opposition a conical tubular shell having reduced longitudinal terminal rims at the opposite ends, and annular base and head members of outer diameter respectively conforming them to the shell outer circumference at the corresponding ends, each of said members having a centrally apertured transverse portion providing an outer end wall for the corresponding end of the core, a sleeve marginal to the central aperture and extending inwardly from the end wall to define with the aperture a circumferential bearing for a spindle, and at the inner face of the transverse portion an annular channel with parallel cylindrical lateral walls of a diameter and radial spacing for direct telescoping enclosure and rigid interlocking reception of the corre-

sponding shell terminal rims abuttively inserted therein.

2. In a molded tubular core for wound textile, cordage and like packages, a pair of opposed half-round hollow shell sections having thickened longitudinal edge portions with planar transverse faces mating to form a tubular body, reinforcing ribs extending lengthwise and transversely at the inner faces of the body sections, semi-circular longitudinal terminal flanges on each section, annular disk-like base and head wall members formed with central coaxial terminal sleeve bearings for the core and having at the inner transverse faces between the bearings and the outer circumference of said members annular U-section channels for interlocking reception of the terminal flanges of the mated shell sections in intimate bonding contact with the inner, outer and end faces of said flanges, and interengaging projections and recesses distributed along said transverse faces of the longitudinal edge portions of the body sections for mutually locating and retaining them against displacement in the plane of juncture of the sections.

3. A tubular winding core molded of plastic material and comprising a main body and centrally apertured base and head portions formed with central axially aligned tubular bearing surfaces for a spindle, major areas of the wind-receiving outer face of the core body having an overall roughening for primary direct external engagement with the innermost turns of a winding mass and said roughened areas having distributed in patterned density thereover a multiplicity of point formations projecting radially substantially beyond the roughening and adapted to penetrate into and between such innermost winding turns for secondary anti-slip holding engagement with other winding turns.

4. A molded plastic annular end member for a tubular winding core, comprising a centrally apertured circular body defining a transverse end wall and integral radially spaced vertical outer and inner flanges in planes paralleling the core axis and presenting between them an annular channel seat providing end positioning and lateral abutment internally and externally for the terminal rim of a conformant tubular core body, said inner flange being substantially spaced radially from the margin of the central aperture and said body having formed therewith a coaxial bearing sleeve in prolongation of the cylindrical wall of said central aperture.

5. A molded plastic winding core including a tubular body and centrally apertured base member defining a transverse bottom wall for the core, the base member having a tag-end holding formation comprising a chordal slot extending up from the outer face of the bottom wall and fully across the latter, the slot being tangential to the central aperture and laterally open thereto and the side walls of the slot having a relative taper from a major width at the outer face of the bottom wall for operative holding engagement with tag-ends of wound-on material of different diameters.

6. An assembled tubular winding core tapering from end to end and comprising mated half-round hollow body sections, a base at the larger end and a head at the smaller end, said sections, base and head each integrally molded of plastic material, the base and the head having internal inwardly opening concentric annular channels with radially opposed cylindrical lateral walls and the shell sections having longitudinal terminal flanges respectively seating in the channels in contactive engagement with both lateral walls thereof whereby the core body is mechanically interlocked and held against winding operational stresses, spindle-receiving sleeve bearings coaxially formed on the base and the head in radially inwardly spaced relation to said channels, and each shell section having at the head end an internal circumferential and partispherical shoulder merging inwardly and upwardly toward the inner end of the sleeve bearing surface for end-thrust receiving and spindle guiding purposes.

7. An assembled tubular conical winding core wholly formed of parts individually molded of a plastic composition and interlocked and solvently fused together into an integral structural unit, said parts consisting of two mating half-round elongated trough-like body sections, a cap piece at the smaller end and a base piece at the larger end, said end pieces having central axially aligned bearing formations for a spindle and internal concentric grooves adjacent the peripheries for insertive seating over the ends of the mated body sections, the latter each having in laterally opposed relation at an intermediate zone an internal transverse wall abutting each other in the diametral plane of juncture of the body sections and each having a semi-circular recess together defining an intermediate ring bearing formation for a spindle.

8. An assembled plastic molded winding core according to claim 7 wherein the intermediate bearing-forming wall of each body section has at each lateral portion a bracket-like strut angular to the core axis and inclining inwardly and upwardly toward the bearing formation in spindle-entering relation thereto, said struts providing further lateral abuttive engagement in the juncture plane of the body sections.

9. In a winding core for textile, cordage and like wound strand packages, a tubular body onto which the package of strands is to be wound, said body being of molded plastic composition, axially spaced external circumferential channels on the core body opposing bodily axial shifting of the package mass, a non-smooth slip-resisting surface formation at major areas of the wind-receiving outer face of the core body between said circumferential channels, and a multiplicity of strand-engaging pimples distributed in patterned density over substantial portions of said non-smooth-surfaced areas.

10. In a winding core for textile, cordage and like wound strand packages, a tubular body onto which the package of strands is to be wound, said body being of molded plastic composition, axially spaced external circumferential channels on the core body opposing bodily axial shifting of the package mass, and a multiplicity of strand-engaging pimples distributed in patterned density over selected substantial areas of the outer face of the core body between said circumferential channels.

11. A tubular conical winding core molded of a plastic composition, comprising a tubular body tapering between a relatively small head and a relatively large base, external circumferential channels at axially spaced levels along the body and corresponding circumferential annular inward projections internally of the body, a spindle bearing centrally disposed at the head end of the body, a transverse web at an intermediate position within the body and centrally apertured for reception on a spindle step bearing, and a separately molded base piece providing a bottom

end wall generally conformant to the base of the core body, said base piece being centrally apertured and having at the inner face of the end wall and around said aperture a spindle-receiving sleeve bearing coaxial with said head and intermediate bearings, and said base piece further having a circumferential vertical flange for telescoping assembly of the base piece with the adjacent end of the core body.

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