

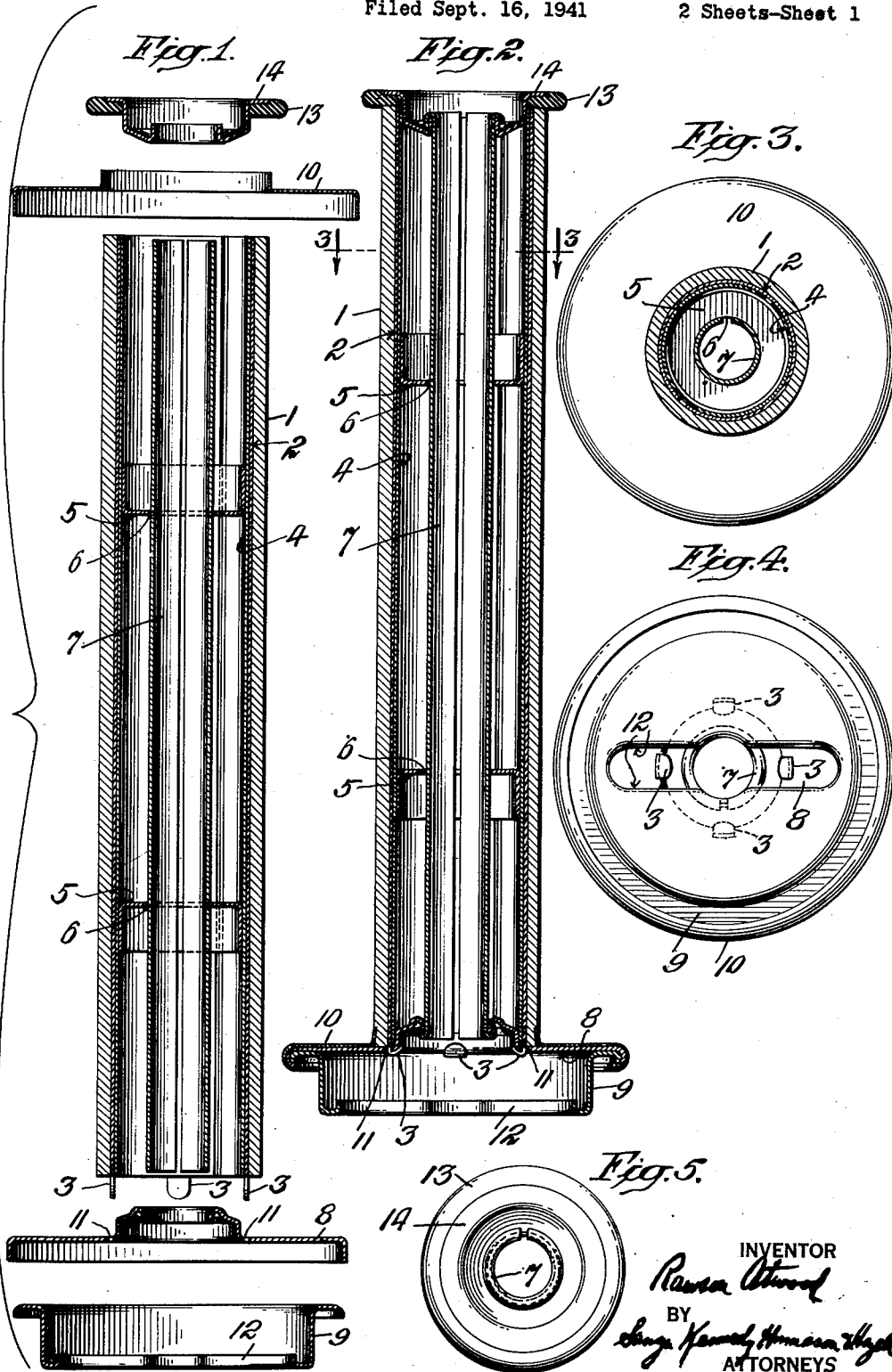
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TEXTILE SPOOL

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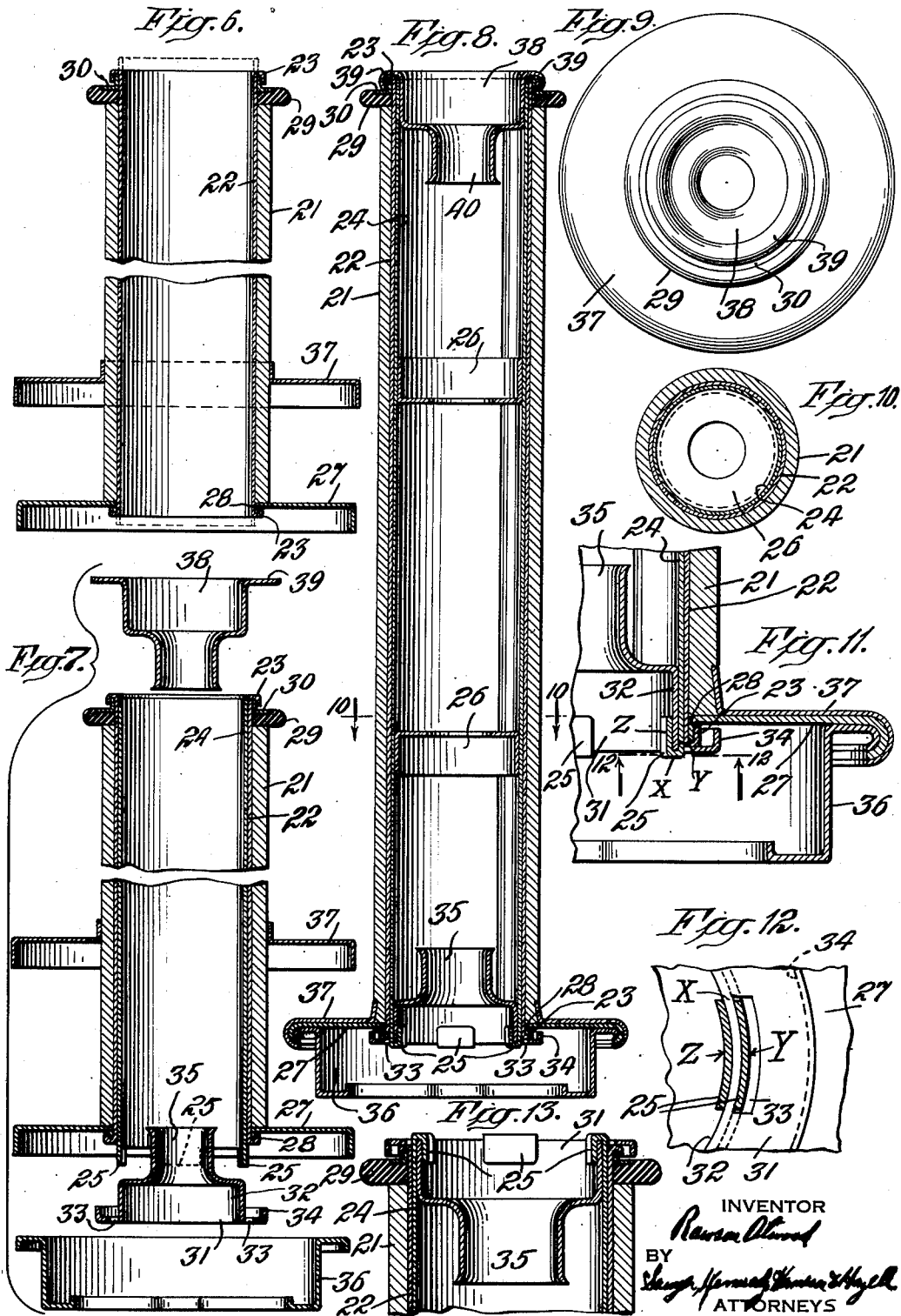
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TEXTILE SPOOL

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This invention relates to improvements in textile spools.

It is an object of the invention to provide a pirn, or single flanged spool of the type used for winding textile fibres produced by spinning machines, of low weight and cost, permitting it to be used as a shipping package if desired. Many features of the invention are applicable also to driven textile spools and to cops, tubes, bobbins and textile spools in general.

It is a further object of the invention to provide a composite spool structure, fabricated of sheet metal and cardboard parts and having characteristics of strength, accuracy and durability heretofore not obtainable with such methods of fabrication.

With these and other objects which will appear in the following full description in mind, the invention consists in the combinations and arrangements of parts and details of construction which will now first be fully described in connection with the accompanying drawings, and then pointed out more particularly in the appended claims.

In the drawings:

Fig. 1 is an exploded view in central longitudinal section, showing the parts for a pirn embodying the invention in a preferred form;

Fig. 2 is a central longitudinal section of the assembled pirn;

Fig. 3 is a transverse section, taken on the line 3—3 of Fig. 2;

Figs. 4 and 5 are, respectively, top and bottom end views of the pirn of Fig. 2;

Fig. 6 is a central longitudinal section of certain parts of a modified pirn also embodying the invention in preferred form and differing from the embodiment of Figs. 1 to 5 principally in the axial fastening of the members;

Fig. 7 is an exploded view showing the parts of Fig. 6 together with additional parts going to make up a completed pirn;

Fig. 8 is a central longitudinal section of a completely assembled pirn composed of the parts shown in Figs. 6 and 7;

Fig. 9 is a top view of the pirn of Fig. 8;

Fig. 10 is a horizontal cross section of the barrel of the pirn of Fig. 8 taken on the line 10—10;

Fig. 11 is an enlarged view of a portion of the lower part of Fig. 8;

Fig. 12 is a horizontal section taken on the line 12—12 of Fig. 11; and

Fig. 13 is a fragmentary view in central longitudinal section showing a modified form of upper

end construction which may be substituted for that shown in Fig. 8.

Referring now to Fig. 1, the pirn comprises an outer barrel 1 preferably made of pasteboard tubing, which may, if desired, be impregnated with phenolic resin and baked so as to harden it and improve its surface characteristics. Positioned within the outer barrel 1 is a sheet steel reinforcing torque tube 2 in the form of an open butt seam tube and carrying fastening tabs 3 at its lower end to permit fastening to the end flange assembly. A second sheet steel reinforcing tube 4 is provided and will preferably be positioned with its seam out of alignment with that of the tube 3, or opposite thereto, where accurate balancing is desired. A suitable number of cup shaped expanders or transverse braces 5 (here shown as two) is positioned within the tube 4 and these braces 5 are formed with central apertures 6 to accommodate a central eyelet or rivet 7 extending substantially the length of the barrel assembly. As will be understood, the apertures 6 will normally be large enough to provide clearance for the rivet 7, facilitating construction and assembly of parts.

The driving or flange end assembly of the pirn comprises the fastening cap member 8 and driving cap member 9, together with liner element 10. Both members 8 and 9 are formed of relatively heavy steel; the former is apertured, as at 11, to receive the tabs 3 of the torque tube 2; and the latter is formed with a key shaped driving recess or aperture 12 adapted to receive the key of a spinning machine spindle, the aperture 12, in this case, being shown as of such shape as to fit one of the usual forms of driving lug.

The upper end assembly comprises a washer 13, made of fibre or similar material, which forms a narrow flange for retaining the material upon the pirn and furnishes a smooth concentric surface for winding and unwinding, and a sheet metal fastening cap 14, as shown.

In assembling, the barrel assembly is built up as indicated, the inner and outer split metal tubes 2 and 4 being placed within the outer barrel 1 and the expanders 5 being driven in to force tubes 2 and 4 firmly against the barrel 1. This operation will expand the outer barrel 1 into suitable cylindrical form, removing any distortions which may be present. This result is preferably achieved by expanding tubes 2 and 4 into a closer than driving fit within barrel 1, forcing the latter to conform closely to the contour of the outer surface of tube 2. Member 8 is fastened to the barrel by means of tabs 3, and liner 10 is now placed in position,

the collar being rolled into barrel 1 flush therewith. Cap 14 and washer 13 are now positioned at the top of the barrel, rivet 7 is inserted and its ends turned over as shown. Assembly is completed by placing drive cap 9 within fastening cap 8 and turning over the rims of cap 8 and liner 10 as shown in Fig. 2. The cylindrical portions of members 8 and 14 serve as end braces, similarly to the intermediate braces 5.

As will be apparent from the foregoing description, the pirn of the present invention possesses a number of advantages over prior art constructions, and this is particularly true in connection with synthetic fibres such as rayon, "nylon" or the like. Important features are barrel strength, surface and concentricity and security of flange fastening both axially and angularly. In the present construction, the outer barrel, in addition to being fastened to the driving flange assembly by the center rivet 7, is also held axially by the outer split metal tube 2 and its lugs or tabs 3, due to the pressure of tube 2 against the outer barrel 1. Angular movement of the barrel with reference to the drive flange assembly is prevented by tube 2, providing a very solid construction.

Concentricity and dynamic balance are insured by the construction as described, as follows: cap 13, due to its cylindrical portion which extends within tube 2 as indicated is positioned accurately with reference to the barrel assembly, and, in turn, positions the upper end of rivet 7 so that barrel 1 will be concentric about a spindle extending through this rivet; flange 13 is likewise positioned concentrically by cap 14 fitting within an annular groove therein, as shown; at the drive end, the parts are positioned in a similar way by fastening cap 8, and, with particular reference to drive cap 9, it may be noted that this member is positioned by means of its outer edge and as a result of a turning or stamping operation, but that concentricity and balance are readily obtained without sacrificing simplicity and economy of manufacture. Thus, positioning of the members for concentricity is obtained with reference to tubes 2 and 4 by forming parts 13, 14, 8 and 9 symmetrically or concentrically, part 9 being positioned only with reference to the concentric rim of the flange member 8. As a result, it is found that the pirn of the invention, when placed upon a whorl with the usual spindle extending through aperture 12 and rivet 7 and the drive key or lugs engaged in aperture 12, will operate satisfactorily without objectionable vibration or winding difficulties at speeds of about 8000 R. P. M., even with modern synthetic fibres. For use with whorls having the general form of the aperture 12 as shown in the drawing, the circular central portion of the aperture will preferably be larger than the whorl so that aperture 12 engages only the lugs of the whorl. Also, as will be understood, the lower surface of plate 9, rather than plate 8, serves to support the pirn. For use with whorls of different forms, the aperture 12 may be modified in shape so as to conform thereto.

The embodiment illustrated in Figs. 6 to 12 differs from that of Figs. 1 to 5, previously discussed, in the elimination of a central eyelet or other central fastening member, and the substitution thereof of an improved fastening means in alignment with the inner surface of the hollow barrel.

There is provided, as before, a hollow outer barrel 21, similar to the barrel 1 previously re-

ferred to, and within which is positioned a split metal tube 22. This tube is turned over at its ends 23, however, instead of being formed with tabs. Positioned within tube 22 is a split tube 24 having tabs 25 at its lower end and which is expanded by the annular or cup shaped braces 26.

The drive end assembly includes a fastening plate 27 similar to the plate 8 previously described except that its central portion consists merely of an upturned rim 28 surrounding a circular aperture which receives the tube 22 and to which the tube 22 is secured by turning over its end 23. The small end assembly includes a washer 29, as before, but which accommodates a ring 30, which is angular in cross section and over which the other end 23 of the tube 22 is turned. A cap member 31 is provided at the lower end and comprises a cylindrical body portion 32 adapted to be driven into the tube 24, and apertures 33 receiving the tabs 25. The periphery of the cap 31 is formed with a skirt or flange 34 to cover the end 23 of the tube 22, and which may be in abutting relation thereto, and the central portion is formed with an aperture 35 forming a spindle bearing. The drive end assembly is completed by a drive plate 36 and liner 37, which parts are similar to corresponding parts 9 and 10 previously described and are related to fastening plate 27 in the same way as the parts 9 and 10 are related to fastening plate 8, and hence require no further description.

At the upper end, a cap member 38 is provided, fitting within tube 24 and having its rim 39 turned over the upper end 23 of tube 22. This cap member is provided with a spindle bearing 40 similar to that of cap member 31.

The assembly of this modified form of pirn includes the formation of the sub-assembly of Fig. 6 by placing the parts shown in the figure together and turning over the ends 23 of tube 22, as described, the position of these ends before turning being indicated in the figure by dotted lines. Tube 24 is now inserted, expanders 26 are driven into place and cap members 31 and 38 are fastened on by means of tabs 25 and rim 39. The remainder of the assembly, resulting in the completed pirn of Fig. 8, is the same as previously described in connection with the pirn of Figs. 1 to 5.

An important feature of the invention according to this embodiment of Figs. 6 to 12 inclusive consists in the form of fastening tab employed. As best seen from Figs. 8, 11 and 12, the tabs 25 are relatively broad: in the example illustrated, in which the spool barrel may be about one and one half inches in outside diameter, these tabs are about five sixteenths of an inch in width and each tab accordingly occupies about 30° of arc. Instead of merely being turned over in the customary way the tabs are bent flat as they pass over the adjacent edges of apertures 33 so that at the location indicated by the letter X in Figs. 11 and 12 the bent portion lies substantially in a plane at right angles to the cylindrical elements of the tube 24. Putting this differently, the section of Fig. 11 may be considered as a typical section taken anywhere across the entire width of the tab in contradistinction to usual tab constructions in which the tab, if it is in contact, or substantially in contact, with an edge over which it is bent at one point, will typically be bulged away from it at others. At the location indicated by the letter Y in Figs. 11 and 12, the base portion of the tab and the underlying body of the tube 24 are cylindrical. The tip or end Z of the tab

is bent down against the inner cylindrical surface 32 of the cap 31 and forced into the cylindrical shape shown in the figures. As will be observed, when one surface (say the outside) of the tab is considered, the portion Y is cylindrical and convex, the portion X lies substantially in a plane at right angles to the cylindrical elements and the portion Z is cylindrical and parallel to the portion Y but is concave. The base and tip portions of the tabs, accordingly, conform closely to the opposite surfaces of cylindrical portion 32, while the intermediate portions X of the tab conform closely to a plane including the edge of aperture 33. It is of course impossible to bend a tab into the form shown without very considerable deformation and flowing of the metal and this fact is utilized to obtain a security of fastening not achieved by prior art tab constructions, due to the fact that it is not possible to separate the parts by simply unbending the tabs, so that the construction can be pulled apart only by reversing the deformation of the metal involved in the original stamping operation. In prior art tab constructions, having in mind the width of the tab and thickness of metal in comparison with the radius of the edge around which it is bent and the bending methods employed, the deformation of the tab is very slight so that the tab can be restored approximately to its original condition prior to bending over by what is substantially a mere bending operation. In the tab of the invention, however, this condition no longer obtains and the tab must be twisted very considerably or actually torn in order to straighten it out so as to permit separation of the parts fastened by it.

The pirn of Fig. 6 and following has considerable advantages in certain fields of use over the pirn of Fig. 5. In the first place, the spindle will be engaged in the barrel of the pirn only by the end cap bearing 35, which permits easier and more accurate centering than is possible with a center eyelet. As will be understood, the transverse cup shaped braces 26 have openings sufficiently large so that they do not engage the spindle. A second advantage of this pirn construction consists in its greater strength due to the fastening of the drive end to the barrel in alignment with tubes 22 and 24, which eliminates the unfavorable leverage of the end flanges under pressure, which is encountered with a central eyelet construction. Greater strength is also obtained by reason of the fact that the ends are fastened to the barrel around the entire periphery of tube 22 by means of its overturned ends 23 acting directly on fastening plate 27 and ring 30 and the drive end is also fastened on by the tabs 25 on tube 24 acting through the cap 31. The tubes 22 and 24 are forced against the barrel as before by the intermediate braces 26 and also by the end caps 31 and 38. The parts are fastened together angularly, as distinguished from axially, both by means of the turned over ends 23 and the tabs 25, and the tight frictional fit of the outer surface of tube 22 within the outer barrel 21 which effectively prevents any turning.

The construction of Figs. 6 to 12 will ordinarily be found to fasten the drive end to the barrel with sufficient security, despite the lack of any fastening of the upper end of tube 24, due to the great holding power of the friction between the split metal tubes and outer barrel. The upper end construction is desirable in that it involves no roughness or projecting parts. Where, however, even greater strength is required the upper end construction may be modified, as shown in

Fig. 13, in which case the upper end of tube 24 is also provided with tabs 25 and a cap 31 similar to that employed at the lower end is used. Inasmuch as the modification of the cap member and of the upper end of tube 24 results in a construction which is the same as that of the lower end, previously described, no further explanation of the modification of Fig. 13 is necessary.

As will be understood, many of the features of constructions which have been described are applicable to textile spools or the like having pool ends or flanges at both ends of the barrel or to flangeless pirns or tubes. My application filed of even date herewith and disclosing flangeless tube constructions involves a number of features which are in common with the disclosure of the present application and contains claims to features of barrel construction and reinforcement which are applicable generally to flanged or flangeless constructions.

What is claimed is:

1. In a textile spool, and in combination, a tubular outer barrel, a reinforcement assembly within said barrel, the said assembly comprising inner and outer split metal tubes positioned with the splits thereof opposite each other and means within said inner split metal tube for expanding said tubes against the inner surface of said outer barrel, a drive end for said spool, and fastening means for attaching said drive end to said reinforcement assembly.

2. A textile spool according to claim 1, in which said fastening means comprises end members fitting within said inner split metal tube, means fastening said end members together in abutting relation to said inner split metal tube and means fastening one of said end members to said drive end and to said outer split metal tube against relative rotation.

3. A textile spool according to claim 1, in which said fastening means comprises end members surrounding and fastened to said outer split metal tube and further end members fastened to said inner split metal tube in abutting relation to said first mentioned end members and to said outer split metal tube.

4. In a textile spool, and in combination, a barrel, an end for said barrel, and fastening means for attaching said end to said barrel, the said fastening means comprising a plurality of relatively wide metal tabs attached to said barrel, a metal portion of said end having a cylindrical portion and substantially coplanar apertures disposed adjacent to said cylindrical portion, the said tabs passing through said apertures, the bases thereof conforming closely to one surface of said cylindrical portion, the tips thereof conforming closely to the other surface of said cylindrical portion, and the intermediate portions thereof being substantially coplanar and conforming closely to the edges of said apertures.

5. A textile spool according to claim 4, in which the said barrel comprises a tubular outer barrel of pasteboard or similarly deformable material and a tubular metallic reinforcement for and extending through said outer barrel, and the said tabs are formed upon said tubular metallic reinforcement.

6. A textile spool according to claim 4, in which the said barrel comprises a tubular outer barrel of pasteboard or similarly deformable material, an expansible tubular metallic reinforcement for and extending through said outer barrel, the said tabs being formed upon said tubular metallic reinforcement and comprising also means spaced

along said barrel for expanding said tubular metallic reinforcement against the inner surface of said outer barrel and including the said cylindrical portion.

7. In a textile spool, and in combination, a tubular barrel; spindle bearings within said barrel adjacent its ends, an end member fitting within said barrel, concentric with and carrying one of said spindle bearings, an end flange surrounding said end member and having a rim concentric therewith, a drive member having a rim fastened to said end flange rim and having means for seating upon and engaging the lugs of a whorl, and an anti-thread-trapping liner extending along said barrel from said flange and covering the inner surface of said flange, the said liner and flange rim and drive member rim being turned over together to fasten the same together.

8. In a textile spool, and in combination, a tubular outer barrel, a reinforcement assembly within said barrel, the said assembly comprising inner and outer split metal tubes and means within said inner split metal tube for expanding said tubes against the inner surface of said outer barrel, a drive end for said barrel, means fastening said drive end to said barrel against axial separation, and means fastening said drive end to one of said split metal tubes against relative rotation.

9. In a textile spool, and in combination, a tubular outer barrel, a reinforcement assembly within said barrel, the said assembly comprising inner and outer split metal tubes and means within said inner split metal tube for expanding said tubes against the inner surface of said outer barrel, a drive end for said barrel, a central rivet fastening said drive end to said barrel against axial separation and adapted to seat upon a spindle, and means comprising tabs upon said outer split metal tube and corresponding apertures upon said drive end for fastening said drive end to said outer split metal tube against relative rotation.

10. In a textile spool, and in combination, a tubular outer barrel, inner and outer metal tubes fitting within said barrel and extending beyond the same, an annular spool flange member sur-

rounding said tubes and seated upon said outer barrel, the said outer tube having an end turned over outwardly over said flange member to fasten the same to said outer barrel, an end cap abutting against the said turned over end, fitting within said inner tube and having apertures in alignment therewith, and said inner tube having tabs passing through said apertures to fasten said cap member to said inner tube.

11. A textile spool according to claim 10, in which said cap member is formed with a spindle bearing.

12. A textile spool according to claim 10, in which said flange member comprises a rim concentric about said outer metal tube, and comprising also a drive end member having means for engaging the lugs of a spindle and means fastening said drive end member to the rim of said flange member.

13. A textile spool according to claim 10, in which said cap member is formed with a spindle bearing and said flange member comprises a rim concentric about said outer metal tube, and comprising also a drive end member having means for engaging the lugs of a spindle and means fastening said drive end member to the rim of said flange member.

14. In a textile spool and in combination, a tubular outer barrel of pasteboard or similarly deformable material, a tubular metallic reinforcement fitting therein under pressure sufficient to compel said outer barrel to conform closely to the outer surface of said tubular metallic reinforcement, spindle bearings and means for fastening said bearings to said outer barrel concentrically to said tubular metallic reinforcement, a drive end, and means fastening said drive end concentrically to said tubular metallic reinforcement.

15. A textile spool according to claim 14, in which the said tubular metallic reinforcement comprises an outwardly expansible assembly confined throughout the length of said outer barrel only by said outer barrel.

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