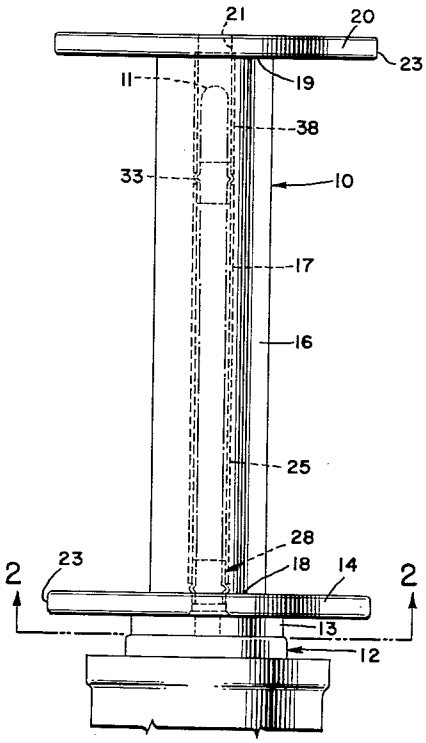
March 14, 1961 J. B. HAWLEY 2,974,896

SPOOL

Filed March 15, 1957

FIG. 1



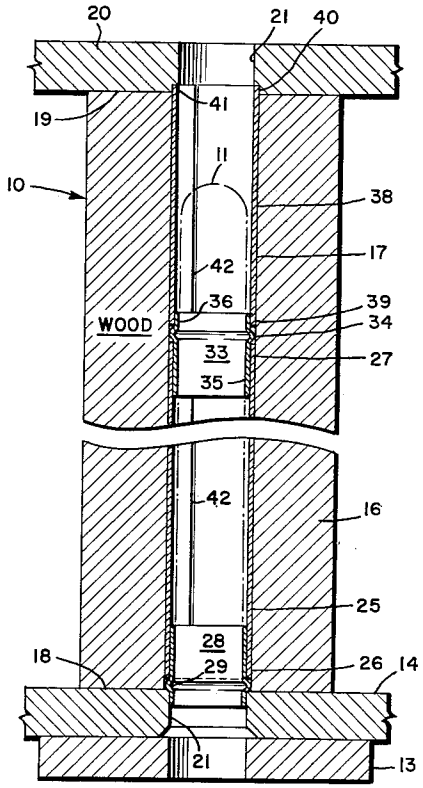


FIG. 3

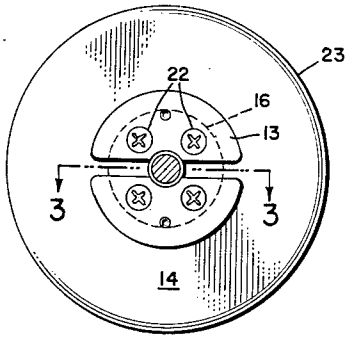


FIG. 2

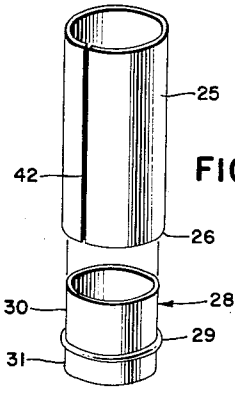


FIG. 4

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The present invention relates to a bobbin or the like having a fabricated barrel and relates more particularly to a bobbin in which a solid barrel for receiving convolutions of cord, yarn or wire is reinforced by means of an axial tubular member and wherein the tubular member is provided with axially spaced spindle-engaging bearing inserts separable from said members to facilitate assemblage.

Spools, bobbins and other winding or reeling devices employed in the forming of yarn packages in which nylon yarn, cord or monofilament is wound is subjected to the inherent characteristics of nylon wherein there is always the tendency for the nylon to attempt to recover its original status and length and to revert to a relaxed condition. In attempting to return to its original length after a continuous length of nylon yarn has been subjected to a substantially uniform tension during winding convolutions of yarn on a bobbin, there is created a radial compressive crushing action that is transmitted from the yarn convolutions to the bobbin barrel on which the yarn is retained. This crushing action results in inducing stresses within the barrel that tend to distort the barrel axially as well as to compress the barrel radially. Axial distortion of the barrel precludes facility of mounting and dismounting of a bobbin on a spindle. Barrel unbalance which produces objectionable vibration during high speed rotary operation, and the possibility of damaging the spindle is ever present. Radial distortion of the barrel prevents the proper introduction of a spindle axially into the spindle opening of the barrel. Particularly in those bobbins in which the barrel is made of wood or other non-homogeneous or non-isotropic material that may be readily compressible transverse to the bobbin axis, additional reinforcing strength is required to resist the compressive stresses exerted by the cumulative tensile stress of the yarn convolutions during relaxation of the tension and resultant contraction in the nylon yarn or cord. It has been found that a thin wall steel sleeve extending axially through an axial core of a wooden barrel will provide adequate resistance against the crushing radial forces induced by the nylon yarn convolutions attempting to return to its original condition of length.

Frequently in the fabrication of bobbins a swaged spindle-receiving sleeve member is employed in which a tapered or step spindle may be received. The sleeve member must be swaged with graduated diameters in axial spaced positions to engage a tapered or step spindle either for driving bearing rotation of the bobbin on the spindle or when the bobbin rotates with the spindle. Swaging is not only a costly operation due to the deep drawing process and the machinery necessary to produce the swaging but also the attendant high cost of final component assembly and the additional operations that are needed in order to accommodate and support within a solid or fabricated bobbin barrel a plurality of varying

concentric diameters as the swaged sleeve is finally inserted into the barrel of the bobbin.

Therefore, one of the objectives of this invention is the provision of a bobbin in which the bobbin barrel is reinforced against radial distortion by means of an axial tubular sleeve member which will resist compressive stresses.

Another objective of this invention is to provide a bobbin having a solid non-metallic yarn-receiving barrel with a tubular reinforcing sleeve member for aligning the bobbin on a spindle and for balanced rotation of the bobbin and wherein axially spaced spindle bearing elements may be inserted within the sleeve members for engaging a spindle.

A further object of this invention is to provide a bobbin on which nylon cord or yarn may be wound and wherein a wooden bobbin barrel is protected against radial compression by means of a reinforcing tubular core which has in combination therewith axially spaced spindle bearing elements.

Still another object of this invention is the provision of a bobbin bearing housing within a solid bobbin barrel for insertion of a spindle wherein individual cylindrical sleeves are spaced axially from each other to receive spindle bearing inserts therebetween at selectively spaced positions in a bobbin core.

Yet another object is the provision of an elongated bobbin barrel that may be readily adaptable to a standard spindle length by providing spindle-engaging bearing elements within spindle length limits at predetermined positions within a tubular sleeve reinforced bobbin barrel.

Further objects of this invention are to provide a reinforced bobbin in which the spindle-receiving core is assembled in components that are readily replaceable, one that is simple and inexpensive to assemble, a bobbin in which a minimum of machining operations is necessary and one that is capable of prolonged use with a minimum of maintenance.

Other objects and many of the attendant advantages of this invention will become more readily apparent from the following detailed description taken in conjunction with the accompanying drawing in which like characters of reference designate corresponding parts throughout the several views, and wherein:

Fig. 1 is a vertical elevational view of a bobbin embodying the features of this inventive concept mounted on a bobbin-supporting spindle and driving whorl and illustrating in outline the bobbin interior construction for support on a relative short spindle;

Fig. 2 is a plan view of the bobbin of Fig. 1 taken substantially along the plane of section line **2—2** of Fig. 1;

Fig. 3 is a slightly enlarged partial longitudinal sectional view, with an intermediate portion removed, of the bobbin of Fig. 1 taken substantially along the plane of line **3—3** of Fig. 2; and

Fig. 4 is an exploded perspective view illustrating the relation of a tubular sleeve member and a bearing element.

Referring to the drawing and more particularly to Fig. 1 there is illustrated therein an elongated bobbin or spool **10** embodying the inventive concept with the bobbin **10** mounted for rotation on a conventional length spindle **11** that is supported on a bobbin-supporting driving whorl **12** with the segmental disks **13** mounted in spaced relation on the flange or bobbin head **14** at the base end of the bobbin **10** to receive a bobbin and spindle driving rod (not shown) therebetween when the bobbin is mounted in the operating position on the whorl, as shown.

Bobbin **10** has a solid cylindrical barrel **16** that is normally constructed of wood and is provided with a lon-

gitudinal hollow axial core 17 which core is larger in diameter than the diameter of the spindle 11 on which the bobbin is to be supported or rotatably mounted. The terminal ends 18 and 19 of the bobbin barrel have secured thereon flanges or bobbin heads 14 and 20, each of which flanges is provided with a spindle-receiving aperture 21 that is concentric with the barrel core 17. Although for the purposes of this specification a wooden barrel on which the yarn convolutions are wound or other material of comparable structural characteristics may be described, it is not intended in any limitative sense as the inventive concept is applicable to other materials and to other bobbin structural assemblages.

Flanges 14 and 20 and disk 13 are securely fastened to the ends of the barrel 16 by means of suitable screws 22 that are countersunk within the disk 13 and flange 20. The flanges may be formed of a fabricated resin, laminated wood, metal or other combinations of materials with the periphery 23 of each flange being rounded so as to present a smooth surface over which the yarn may be drawn during unwinding.

As noted above, when nylon cord or yarn particularly is wound on the barrel 16 in convolutions there is generated a very high compressive stress which tends to crush and displace the yarn convolutions thereby compressing the barrel radially. It has been found necessary due to the characteristics of nylon and other synthetic materials of continuous length to increase the radial compressive resistance of the bobbin barrel by providing a metallic liner in the form of a tubular sleeve member which extends through the hollow core of the barrel. However, it is also necessary to include a spindle-engaging bearing element that will permit free rotation of the bobbin on a spindle without disproportionately increasing the cost of the assembled bobbin. In those applications where the bobbin revolves with spindle the bearing element serves as a guide spacer.

In a preferred construction of the bobbin shown in Fig. 3, the core in the solid barrel 16 is axially lined with a first reinforcing tubular sleeve member 25 which member 25 extends from one terminal end 26 from a position adjacent to one end of the barrel to the terminal end 27 that is located intermediate the barrel length within the core. The overall length of the sleeve member 25 will be determined frequently by the length of the spindle on which the bobbin is mounted. A concentric ring or sleeve bearing 28 having a circumferential outwardly projecting shoulder 29, intermediate the bearing length, is seated with the shoulder 29 against the terminal end 26 of the sleeve member 25. One portion 30 of the bearing 28 is insertable into the terminal end 26 of the tubular sleeve member with the portion 31 extending into the opening or aperture 21 in the flange head 14. A snug fit is provided between the outer diameter of the bearing 28 and the inside diameter of the tubular sleeve member 25.

Spaced axially from the first bearing 28, a suitable distance to be determined by the length of the spindle 11 on which the bobbin barrel 16 is to be received, is a second bearing 33 substantially identical to the said first bearing 28, the bearing 33 also being provided with a circumferential shoulder 34 thereon. The second sleeve bearing 33 is inserted into the other terminal end 27 of the tubular sleeve member 25 and the shoulder 34 is seated against the end thereof. The portion 35 of the bearing 33 extends into the end 27 of sleeve 25 to make bearing contact with a spindle on which the bobbin is mounted. A portion 36 of the sleeve bearing 33 extends axially to receive about its outside tubular surface a second reinforcing tubular sleeve member 38. Terminal end 39 of the second tubular sleeve member is seated against the circumferential shoulder 34 of the bearing 33. Tubular sleeve member 38 extends axially at least to the other end 19 of the barrel 16 and preferably into a circular recess 40 that is provided in the flange 20 which recess 40 will receive the extending terminal end 41 of the second tubular sleeve member. It will be readily apparent that by preparing the tubular sleeve lengths of predetermined extent and inserting them sequentially with the bearings into the barrel core the barrel may be mounted on an arbor and the cylindrical surface of the barrel turned down so as to be concentric with the barrel axis.

Although various constructions for the tubular sleeve members may be utilized, seamless or butted steel tubing, as illustrated by the butted cylindrical element 42, has been found adequate to resist the normal crushing action of the barrel. However, it is contemplated that other materials and constructions may be utilized. Furthermore, although bearing sleeves made of brass have been found entirely suitable for bearing engagement with a spindle, other bearing materials such as nylon or babbitt and others may be utilized.

In the embodiment illustrated sleeve members and bearings of substantially similar design and diameters have been employed, however, it is contemplated that these elements may be dissimilar in design and the diameters of each may vary to accommodate the contour of a tapered or step spindle. Also, while a flanged bobbin has been described and illustrated, the construction disclosed may be equally applicable to a headless bobbin or pirn.

It will be readily apparent to those skilled in this art that the tubular sleeve member for reinforcing the bobbin barrel may be continuous with the bearing inserts spaced axially from each other. However, where the tubular sleeves are discontinuous with the bearing inserts mounted between the sleeve ends there is provided adequate resistance against radial compression.

Obviously, many modifications and variations may be made in the construction and arrangement of tubular sleeve members and the location of the sleeve bearings as well as modifications made in the assemblage for mounting the bobbin on a spindle without departing from the real purpose and spirit of this invention. It is, therefore, to be understood that within the scope of the appended claims many modified forms of the present inventive concept as well as the use of an alternative and mechanical equivalents may be reasonably included and modifications are contemplated.

What is claimed is:

1. A bobbin of the character described comprising a solid wooden barrel having a longitudinal axial core for receiving a spindle therein, apertured heads mounted on the barrel ends in registry with said core, an articulated tubular reinforcing core and bearing assembly including a first reinforcing tubular member reaching axially from adjacent to one end of said barrel to a length intermediate the length of the barrel, a spindle-receiving cylindrical sleeve bearing insertable into and concentric with said member adjacent to said end, said sleeve bearing having a circumferential shoulder thereon for resisting axial displacement, a second spindle sleeve bearing in axial spaced relation to said first bearing and intermediate the barrel length and cylindrically insertable into and extending for a short axial length of the other end of said first reinforcing tubular member, and a second tubular reinforcing member in abutting juxtaposition to said second sleeve bearing and said first reinforcing member, said second tubular member reaching to at least the other end of the barrel.

2. A bobbin or the like comprising a cylindrical barrel of wood having a spindle-receiving axial core, apertured flanges mounted at the ends of said barrel, a barrel reinforcing tubular member extending axially and concentrcially in said core, said tubular member terminating intermediate the barrel length from a position adjacent to one of said flanges, a first spindle sleeve bearing slid-

ably insertable into said member at one terminal end thereof adjacent to a flange, said bearing having a circumferential shoulder extending therefrom, said shoulder being seated against the terminal end of said tubular member to limit bearing axial movement, a second spindle sleeve bearing slidably insertable into the other end of said tubular member and having a circumferential shoulder intermediate its length seated against said other end of said member, and means for retaining the second sleeve bearing seated against said other end of the tubular member.

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