

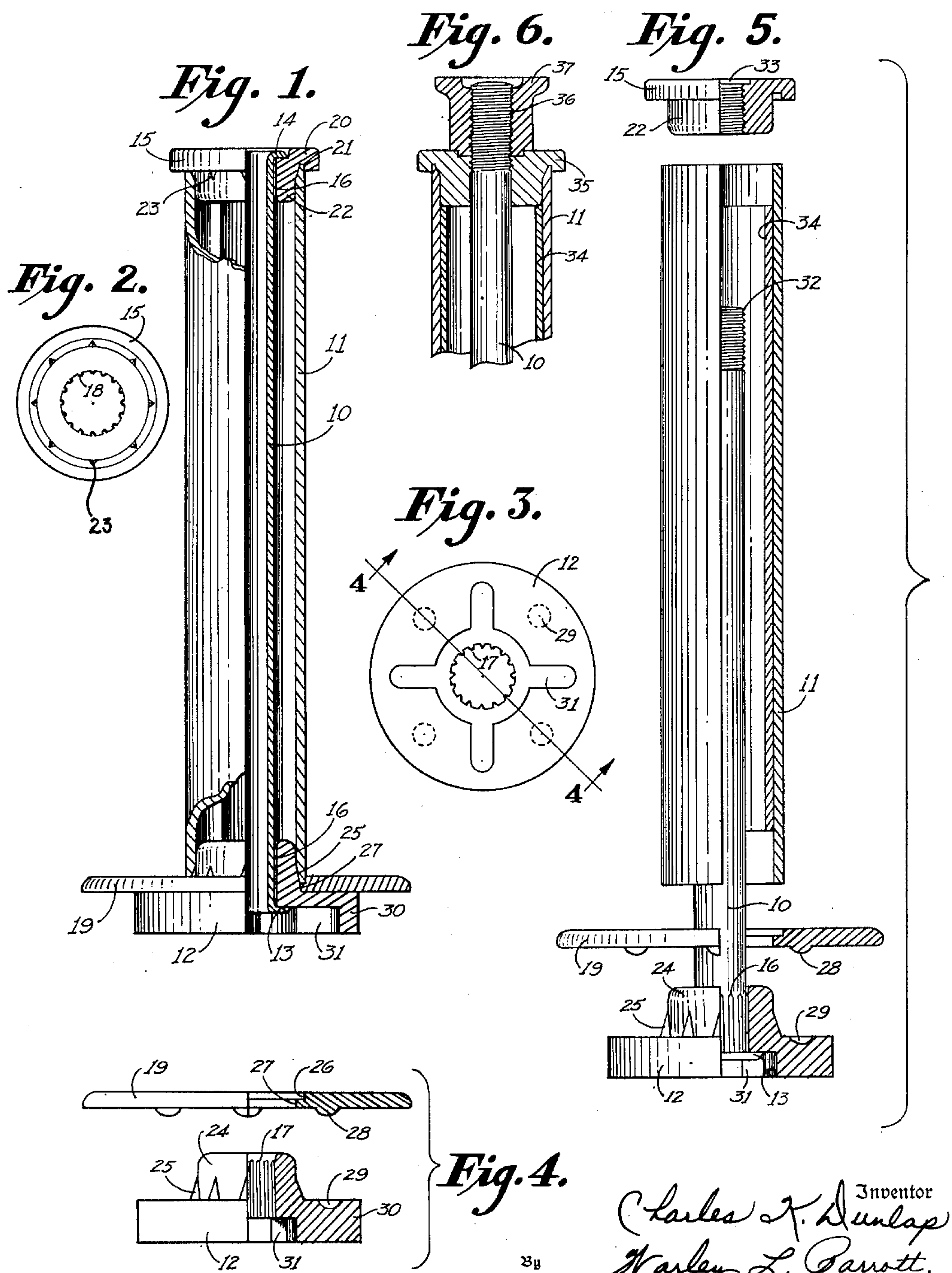
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TEXTILE BOBBIN

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## UNITED STATES PATENT OFFICE

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## TEXTILE BOBBIN

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This invention relates to textile bobbins such as are used for supporting yarn or thread packages, and has particular application to supporting bobbins or carriers for synthetic fibers such as rayon and "nylon."

With the progressive and wide increase in uses of synthetic fibers, the requirements for satisfactory bobbins for winding of these fibers have become more and more strict. Rayon yarns, for example, which vary all the way from hard-twisted slick finish yarns to very soft yarns of practically no twist, require surface characteristics for winding on the bobbins quite different and varied from those used in prior years. Also, the winding of nylon has given rise to the problem of providing great strength in the bobbin so as to resist the tremendous contracting forces exerted by nylon when it is wound on a bobbin and subjected to varying moisture conditions.

To meet these varied and increasingly strict requirements on bobbins and at the same time keep down the cost to a reasonably low level has presented a major commercial problem. I have now met this problem both from a technical and economic standpoint by providing new bobbin constructions.

According to the present invention this problem is met by a reuseable, knock-down type of bobbin having replaceable parts. Certain parts which are most commonly damaged in handling and shipping of the bobbins and which have heretofore required discarding of the entire bobbin, can be replaced by new parts with a large saving in expense. One of the outstanding and commercially valuable features of my knock-down bobbin is its simplicity of construction and manufacture. These factors render this bobbin practical for commercial use in large quantities at relatively low cost.

Non limiting embodiments of my new bobbin constructions are illustrated in the accompanying drawing in which:

Fig. 1 is an elevation, partly in section and partly cut away, of a bobbin constructed in accordance with my invention;

Fig. 2 is a bottom plan view of the upper spacer member;

Fig. 3 is a bottom plan view of the disk adapted for engagement with the driving lugs of a spindle whorl;

Fig. 4 is an elevation, partly in section, further illustrating the relation of the disk member and lower flange member, and oriented substantially on the line 4—4 of Fig. 3;

Fig. 5 is an expanded assembly view, partly in section, showing a modification in accordance with the present invention of the bobbin illustrated in Fig. 1; and,

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Fig. 6 is a fragmentary detail of a modified top end assembly for the bobbin illustrated in Fig. 5.

Generally described, the bobbins of my invention comprise an inner tubular member forming a spindle bushing, an outer tubular member forming a bobbin barrel, a disk member adapted for engagement with the driving lugs of a spindle whorl, and means for assembling these elements to constitute a bobbin in which all of the elements are locked against relative turning with respect to each other. As illustrated in Fig. 1, the inner tubular member is indicated at 10, the outer tubular member at 11 and the disk member at 12.

As the inner tubular member 10 serves as a spindle bushing, it is in the usual instance most suitably formed of metal, although paper, plastics or other materials might be used if desired. This inner tubular member 10 extends in sufficient length to allow it to be crimped as at 13 and 14 for engagement with the disk member 12 and an upper spacer member 15. The inner tubular member is further provided at its end portions with short ribs set up as indicated at 16 in Fig. 1. The disk member 12 and upper spacer member 15 are formed with apertures for assembly on the inner tubular member 10 and these apertures are worked with corresponding serrations as at 17 and 18 which fit the above mentioned ribs 16 set up on the inner tubular member 10, and serve to lock the disk member 12 and upper spacer member 15 against turning on the inner tubular member.

The outer tubular member 11 forming the bobbin barrel is assembled between the upper spacer member 15 and a lower flange member 19 associated with disk member 12. The upper spacer member 15 is formed with a flange portion 20 in which an annular channel or recess 21 is formed in relation to a plug-like portion 22. This plug-like portion 22 is adapted to be received inside the outer tubular member 11 and center it with respect to the inner tubular member 10. The annular channel 21 provides a seat for the end of the outer tubular member 11 which supports it against possible spreading action of embossed ribs 23 formed on the plug-like portion 22 of spacer member 15. As described more in detail below, the outer tubular member 11 is formed of paper, and these ribs 23 bite into the outer tubular member 11 as it is assembled on the spacer member 15 and secure it at this point against turning.

A similar method of assembly is employed at the lower end of the bobbin. The disk member 12 is formed with a plug-like portion 24 having embossed ribs 25. In this case, however, the annular channel forming a seat for the end of the



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outer tubular member 11 is worked into the lower flange member 19 as at 26. The lower flange member 19 has a central aperture 27 adapted to fit over the plug portion 24 of disk member 12, and when assembled in this manner the configuration 26 in lower flange member 19 is completed by the plug portion 24 of disk member 12 to form an annularly recessed seat for the lower end of outer tubular member 11, as at 27 in Fig. 1. Accordingly, the embossed ribs 25 on disk member 12 will grip and engage the outer tubular member 11 against turning just as described above in connection with the assembly at the upper spacer member 15.

These ribs 25 will also engage the lower flange member 19 with consequent locking effect but further provision is preferably made for keying the lower flange member 19 to disk member 12 through the arrangement of bosses 28 and recesses 29 which is best shown in Fig. 4. The bosses 28 are equally spaced in an annular series on the bottom of lower flange member 19. About four of the bosses 28 are usually sufficient. The recesses 29 are correspondingly located in the top surface of the flange like body portion 30 of disk member 12. Upon assembly of lower flange member 19 on disk member 12 the bosses 28 can accordingly be interfitted in the recesses 29 to provide an effective keyed engagement of these two elements.

The fully assembled bobbin illustrated in Fig. 1 accordingly consists of the outer tubular member or bobbin barrel 11 engaged and spaced between upper spacer member 15 and the disk member 12 and associated lower flange member 19, the disk member 12 and upper spacer member 15 being held on the inner tubular member 10 by the crimp formed as previously mentioned at 13 and 14. As assembled all of the elements are locked with respect to each other; the disk member 12 and upper spacer member on the inner tubular member 10 by the ribs 16 and corresponding serrations 17 and 18, the outer tubular member by the embossed ribs 23 and 25 formed on the upper spacer member 15 and disk member 12 respectively, and the lower flange member 19 with respect to the disk member 12 by means of the bosses 28 and recesses 29. This arrangement provides a sturdy and solid construction for the bobbin which is adapted to stand up well during use and which adequately resists the forces encountered particularly during winding operations which have the tendency to cause the elements of the assembly to turn with respect to each other and thus render the bobbin useless. The disk member 12 is adapted for engagement with the driving lugs of a spindle whorl through slots 31 formed in its bottom surface in the usual manner.

The outer tubular member or bobbin barrel 11, as previously mentioned, is formed of paper, usually a hard calendered paper; and preferably comprises a convolutely wound, tubular paper body made up from a suitable paper stock, such as kraft stock. One difficulty that has been encountered in forming the bobbin barrels 11 is the matter of providing an adequate surface finish which will render the outer surface of the bobbin barrel smooth and slick. The hard calendered paper used in forming the bobbin barrels 11, however, resists surface finishing treatment, and satisfactory surface finishing is not obtained by treating the outer surfaces of the tubular body directly with a finishing material. Under these conditions the finishing material will not adhere properly and the required smooth slick surface for the bobbin barrel 11 cannot be obtained.

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According to the present invention this difficulty is obviated by napping the outer surface of the tubular body forming the bobbin barrel 11, and then applying the finishing material to this napped surface. The results obtained in this manner are unique in that when the outer surface of the bobbin barrel 11 is conditioned in this manner it receives the finishing treatment exceptionally well and may be finished to form a strikingly smooth, slick and attractive surface.

The napping of the outer surface of the tubular body forming the bobbin barrel 11 may be accomplished by a suitable abrading treatment such as is described in my prior United States Patent 2,219,836. The surface finishing treatment may be carried out with any of the usual materials used for this purpose. I have obtained very satisfactory results with Bakelite type of resins. After the surface finishing material has been applied a polishing operation may be employed if desired to augment the surface characteristics obtained.

A unique feature of the surface finishing treatment just described is that while the napping of the outer surface of the bobbin barrel 11 provides the necessary affinity for the surface finishing material to be used, this affinity is present only in the outer lamination of the convolutely wound tubular body forming the bobbin barrel 11. As a result, penetration of the surface finishing material is obtained only in this outer lamination, and the repelling characteristics encountered in the outer surface before napping are still present in the next inner lamination so that a barrier is provided against the surface finishing material which restricts it to the outer lamination. Accordingly, the outer surface of the bobbin barrel 11 may be treated adequately with the surface finishing material without encountering any problem of bleeding into the inner laminations and without excessive use of surface finishing materials. The surface finishing treatment consequently is limited to the outer surface of the bobbin barrel 11 where it is needed, with resulting economies in obtaining the desired surface finish which will be obvious.

The disk member 12, the upper spacer member 15, and the lower flange member 19 are also serviceably incorporated in the bobbins constructed according to the present invention as fiber elements. These elements may be formed by any of the usual methods of preparing fiber inserts and the like. For example, paper laminations of suitable size and form to provide the configuration of the elements desired may be treated with a suitable bonding resin, and then compressed in a die to the desired final shape and finished by applying heat to set the resin. These elements may otherwise be formed by any of the well known pulp molding processes, or by the process described in my copending application Serial No. 738,052, filed March 29, 1947.

A further feature of the bobbins constructed according to the present invention is that although the various elements are effectively locked against turning during use they are nevertheless demountable for replacement when necessary. In the embodiment illustrated in Fig. 1 the elements are demountable through removal of one of the crimps 13 or 14 of the inner tubular member 10. This removal may be accomplished readily by spinning one of these crimps so that it is straightened to the diameter of the inner tubular member 10. This straightening of one of the crimps 13 and 14 allows some or all of



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the elements of the bobbin to be removed from the inner tubular member 10 and replaced with new elements just as the original assembly was carried out.

In the embodiment illustrated in Fig. 5 a modified form of bobbin is shown in which the demountable feature is further accommodated by an arrangement for screw thread engagement between the inner tubular member 10 and the upper spacer member 15. The bobbin illustrated in Fig. 5 is in all essential respects identical with the bobbin described above and shown in Fig. 1. The bobbin barrel 11 is assembled as before on the inner tubular member 10 between the upper spacer member 15 and the lower flange member 19 and associated disk member 12. The ribs 16 are set up at the lower end of the inner tubular member 10 for locking engagement with the corresponding serrations 17 formed in the disk member 12, and lower flange member 19 and disk member 12 are keyed together through the bosses 23 and recesses 29 as previously described. Also, the embossed ribs 25 are provided on the disk member 12 to secure the lower end of bobbin barrel 11 against turning when the bobbin is assembled.

The upper end of inner tubular member 10 is changed in this instance, however, in that a threaded portion is provided as indicated at 32, and the aperture in the upper spacer member 15 is correspondingly internally threaded as at 33. It will accordingly be recognized that the bobbin shown in Fig. 5 may be assembled by securing the inner tubular member 10 in disk member 12 against the crimp 13 by means of the ribs 16 and corresponding serrations 17, and then after fitting the lower flange member 19 and bobbin barrel 11 in place, screwing the upper spacer member 15 on to inner tubular member 10 to complete the assembly. With this arrangement the bobbin barrel 11 is secured against turning with respect to inner tubular member 10 through engagement with embossed ribs 25 on disk member 12, and lower flange member 19 is keyed to disk member 12 which is in turn locked on inner tubular member 10 through the ribs 16 and serrations 17.

A further modification illustrated in Fig. 5 which may be incorporated in the bobbins constructed according to my invention if desired is a reinforcing sleeve 34 for the bobbin barrel 11. As previously indicated bobbins designed for use with nylon are required to have greater strength in order to resist the tremendous contracting forces exerted by nylon when it is wound on a bobbin and subjected to varying moisture conditions. The bobbins of the present invention may be adapted readily to meet this problem through use of the reinforcing sleeve 34. The sleeve 34 is preferably a tubular metal body or the like, adapted to the inside diameter of the bobbin barrel 11, and assembled inside the bobbin barrel 11 with a pressed fit so that it is located securely in place. As shown, the reinforcing sleeve 34 terminates short of each end of the bobbin barrel 11 so as to provide clearance for the plug portions 22 and 24 of the upper spacer member 15 and the disk member 12 upon assembly.

In Fig. 6, an alternative top end assembly is shown for use when it is desired to provide a handle means for the bobbin. For this purpose, the upper spacer member 15 is replaced by a spacer member of the type indicated at 35 in Fig. 6. This spacer member has an aperture which fits

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over the inner tube member 10 and spaces the bobbin barrel 11 as previously described. The inner tube member 10 is provided in a sufficiently increased length to expose a screw threaded portion 36 beyond spacer member 35 to engage a handle member 37 as illustrated. The handle member 37 serves as a securing means in assembling the bobbin, and also provides a handle or manipulating extension by which the bobbin may be picked up or removed from a spindle after a thread package has been wound on it. This construction is particularly advantageous where, due to the fragile nature of the thread or yarn being processed or for other reasons, it is desired to avoid entirely any direct handling of the yarn package wound on the bobbins. It will be apparent that a similar construction might be adapted for use with the bobbins illustrated in Fig. 1 if desired.

Bobbins constructed in accordance with my invention, as described above, have proven fully adequate in actual use under commercial conditions, and their simplicity of construction and manufacture provide substantial advantage from the standpoint of cost.

I claim:

1. A textile bobbin assembly comprising an inner tubular member forming a spindle bushing, an outer tubular member forming a bobbin barrel, a disk member adapted for engagement with the driving lugs of a spindle whorl, said inner tubular member having external ribs set up adjacent an end and said disk member having corresponding serrations formed in a central aperture thereof, said ribs and serrations releasably interlocking to secure said disk member against turning when assembled on said inner tubular member, and means for demountably assembling said disk member and said outer tubular member on said inner tubular member.

2. A textile bobbin assembly comprising an inner tubular member forming a spindle bushing, an outer tubular member forming a bobbin barrel, said inner tubular member extending for the entire length of said outer tubular member, a disk member adapted for engagement with the driving lugs of a spindle whorl, and an upper spacer member, said inner tubular member having external ribs set up adjacent an end and said disk member having corresponding serrations formed in a central aperture thereof, said ribs and serrations releasably interlocking to secure said disk member against turning when assembled on said inner tubular member, and said inner tubular member having an external threaded portion at its other end and said upper spacer member having a central aperture internally threaded to fit said threaded portion whereby said outer tubular member may be demountably assembled concentrically on said inner tubular member between said upper spacer member and said disk member.

3. A textile bobbin assembly comprising an inner tubular member forming a spindle bushing, an outer tubular member forming a bobbin barrel, said inner tubular member extending for the entire length of said outer tubular member, a disk member adapted for engagement with the driving lugs of a spindle whorl and formed with a plug-like portion fitting said outer tubular member internally, said plug-like portion having embossed ribs disposed for engaging and gripping the interior surface of said outer tubular member adjacent its bottom end, a lower flange member carried by said disk member and inter-



locked therewith; an upper spacer member formed with a plug-like portion fitting said outer tubular barrel internally and having embossed ribs disposed for engaging and gripping the interior surface of said outer tubular member adjacent its top end, said lower flange member and said upper spacer member both being further formed with an annular recess for receiving the respective ends of said outer tubular member and thereby supporting said ends against spreading by said embossed ribs, and means for demountably assembling all of said members with said disk member locked against turning on said inner tubular member and said outer tubular member positioned between said lower flange member and upper spacer member concentrically with respect to said inner tubular member.

4. A textile bobbin assembly comprising an inner tubular member forming a spindle bushing, an outer tubular member forming a bobbin barrel, said inner tubular member extending for the entire length of said outer tubular member, a disk member adapted for engagement with the driving lugs of a spindle whorl and formed with a plug-like portion fitting said outer tubular member internally, said plug-like portion having embossed ribs disposed for engaging and gripping the interior surface of said outer tubular member adjacent its bottom end, a lower flange member carried by said disk member and formed with an annular recess for receiving and supporting said outer tubular member externally adjacent said bottom end against spreading upon engagement with said embossed ribs, and means associated with and located at the respective ends of said inner tubular member for demountably assembling said outer tubular member and said disk member on said inner tubular member whereby said outer tubular member is spaced concentrically by the plug-like portion of said disk member and, together with said disk member, is locked against turning with respect to said inner tubular member.

5. A textile bobbin assembly comprising an inner tubular member forming a spindle bushing, an outer tubular member forming a bobbin barrel, said inner tubular member extending for the entire length of said outer tubular member, a disk member adapted for engagement with the driving lugs of a spindle whorl and formed with a plug-like portion fitting said outer tubular member internally, a lower flange member carried by said disk member, an upper spacer member formed with a plug-like portion fitting said outer tubular member internally, said lower flange member and upper spacer member being formed with annular recesses for receiving and externally supporting said outer tubular member adjacent the respective ends thereof, means for releasably interlocking said disk member and said lower flange member, and means for demountably assembling all of said members, with said outer tubular member and said disk member locked against turning on said inner tubular member, and said outer tubular member positioned between said lower flange member and upper spacer member and spaced by said plug-like portions concentrically with respect to said inner tubular member.

6. A textile bobbin assembly comprising an inner tubular member forming a spindle bushing, an outer tubular member forming a bobbin barrel, said inner tubular member extending for the entire length of said outer tubular member, a disk member adapted for engagement with the

driving lugs of a spindle whorl and formed with a plug-like portion fitting said outer tubular member internally, a lower flange member, an upper spacer member formed with a plug-like portion fitting said outer tubular member internally, means for releasably keying said lower flange member to said disk member, said lower flange member and upper spacer member being formed with annular recesses for receiving and externally supporting said outer tubular member adjacent the respective ends thereof, means for demountably securing said disk member against turning when assembled on said inner tubular member, and means for demountably assembling said outer tubular member spaced concentrically with respect to said inner tubular member by the plug-like portions of said disk member and said upper spacer member and locked against turning between said upper spacer member and said disk member, said last mentioned means including a handle member secured on said inner tubular member and providing a manipulating extension for the bobbin.

7. A textile bobbin assembly comprising an inner tubular member forming a spindle bushing, an outer tubular member forming a bobbin barrel, said inner tubular member extending for the entire length of said outer tubular member, a disk member adapted for engagement with the driving lugs of a spindle whorl and formed with a plug-like portion fitting said outer tubular member internally, a lower flange member carried by said disk member, an upper spacer member formed with a plug-like portion fitting said outer tubular member internally, said lower flange member and upper spacer member being formed with annular recesses for receiving and supporting said outer tubular member externally adjacent the respective ends thereof against spreading by said internally fitting plug-like portions, a reinforcing sleeve disposed interiorly of said outer tubular member but terminating sufficiently short of the ends thereof to allow clearance for the insertion of the plug-like portions of said disk member and upper spacer member, and means for demountably assembling said outer tubular member on said inner tubular member between said upper spacer member and said disk member and concentrically spaced by the plug-like portions thereof and reinforced throughout its entire length by said plug-like portions and said reinforcing sleeve.

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