

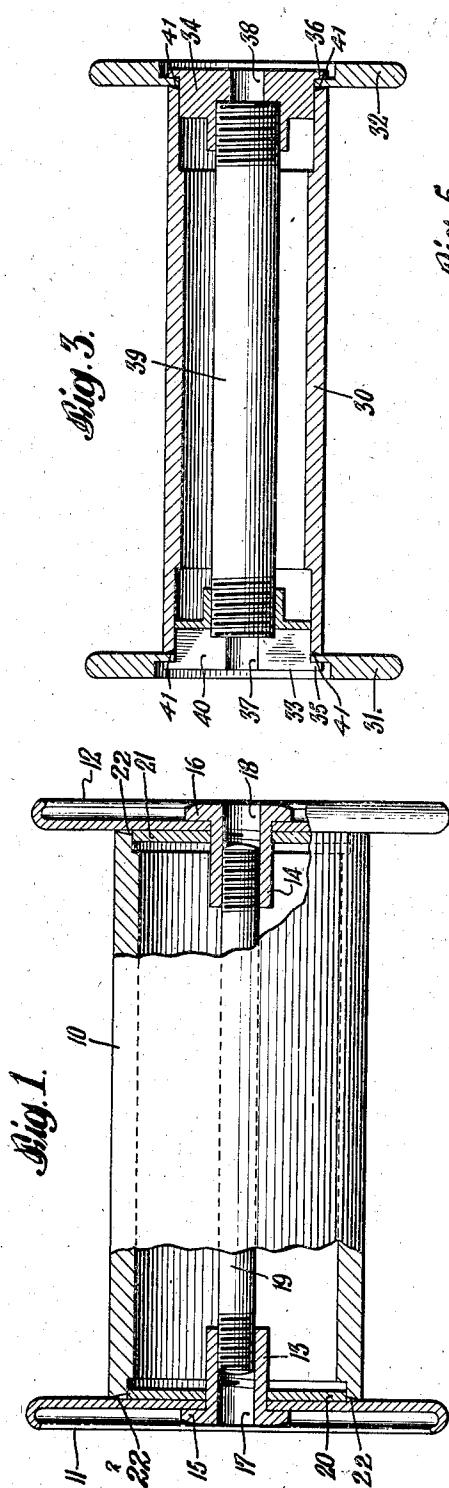
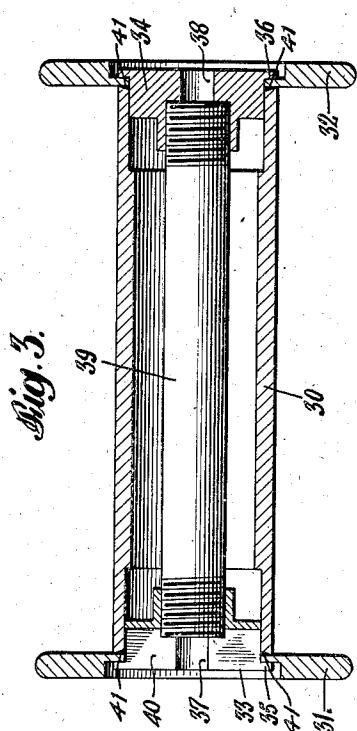
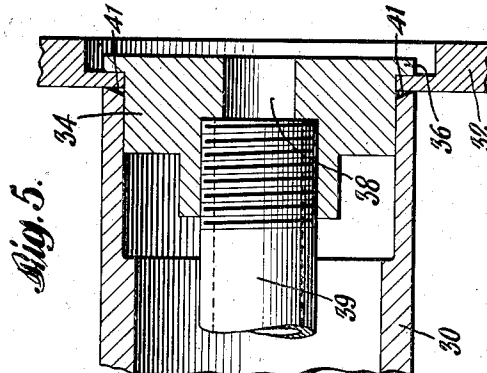
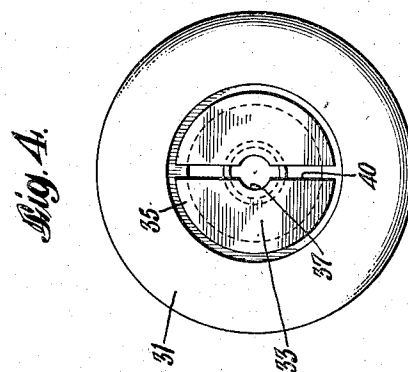
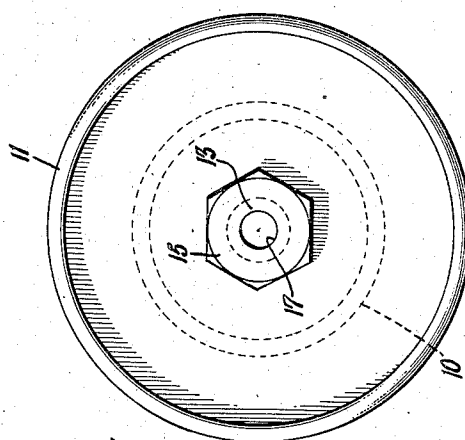
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TEXTILE BOBBIN

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TEXTILE BOBBIN

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1 Claim. (Cl. 242—124)

This invention relates to the art of treating textile fibers, and particularly to an improved bobbin or spool upon which the filaments or yarn may be wound.

Ordinarily, bobbins consist of a cylinder with flanged ends, or heads, and bearings enabling them to be rotated about their axes, the complete bobbins being constructed in one piece or consisting of an assembly of several parts. Where the bobbin is an integral unit, repairs to damaged or worn parts, particularly bearing surfaces which are subject to the greatest wear, are difficult and relatively expensive. In the case of bobbins composed of an assembly of many pieces, all designs heretofore have been such that disassembling the bobbin and repairing the damaged parts have necessitated rather tedious work. With any type of construction, however, the greatest difficulty has been to design a bobbin which can be manufactured at low cost, which can be repaired easily and in which worn parts can be readily replaced while at the same time maintaining, or quickly obtaining, the concentricity or exact centering of the bobbin with relation to its bearings.

An object of the invention is to provide a bobbin so constructed that it can be manufactured at relatively low cost and can be assembled or disassembled readily without injury to its parts, and without loss of concentricity, when parts are interchanged for repair or other reasons. Another object is to provide a bobbin having parts of dissimilar materials and a simple construction permitting low cost for its maintenance in good repair.

These and other objects will be evident from the following description, having reference to the annexed drawing, in which

Fig. 1 represents a side view, partly cut away, of a typical bobbin made in accordance with the invention;

Fig. 2 is an end view of the bobbin shown in Fig. 1;

Fig. 3 is a longitudinal cross-sectional view of a bobbin similar to the one shown in Fig. 1, but of slightly simpler construction;

Fig. 4 is an end view of the bobbin as viewed from the left in Fig. 3; and

Fig. 5 is an enlarged longitudinal cross-sectional view of one end of the bobbin of Fig. 3.

Referring to Figs. 1 and 2 of the drawing, a thin-walled cylindrical barrel 10 which carries the yarn is held between two heads 11 and 12 which serve to keep the yarn confined to the bobbin. In the center of each of the heads 11

and 12 is a hole into which are inserted clamp nuts 13 and 14. The clamp nut 13 has a shoulder 15 at one end which engages the head 11 and urges it against the barrel 10, and the clamp nut 14 likewise has a shoulder 16 which engages the head 12 and urges it against the barrel 10. Through the centers of the clamp nuts 13 and 14 pass holes 17 and 18, respectively, each of which forms a bearing for the bobbin toward the shoulder end of the clamp nuts 13 and 14, respectively. The opposite ends of the holes 17 and 18 may be threaded or otherwise adapted adjustably to engage a tie rod 19. Mounted on the clamp nuts 13 and 14 inwardly of the heads 11 and 12, respectively, are centering discs 20 and 21 which fit frictionally within the barrel 10 adjacent to each of its ends and hold it in concentric alignment with the holes 17 and 18. In other words, the centering discs 20 and 21, which are removable and replaceable through the ends of the barrel, serve the purpose of centering the barrel 10 with respect to the axis of rotation. In addition, the centering discs 20 and 21 increase the strength of the barrel 10 on each end to aid in preventing distortion or collapse thereof when the barrel 10 is subjected to the extreme pressures incident to tight winding of the yarn. The entire assembly is held together by the tie rod 19 which is threaded at both ends or otherwise adapted to engage the clamp nuts 13 and 14.

The barrel 10 may be constructed of any suitable material, such as metal, glass, artificial resin and the like, or it may be a combination of a metal covered with a non-metallic material. However, it has been found that a phenol-formaldehyde resin surface is most satisfactory for bobbin barrels which come in contact with corrosive liquids, inasmuch as this resin is not attacked by, nor does it warp or swell appreciably in, the various solutions employed in the processing of artificial textile yarns. It is additionally lightweight, relatively inexpensive and has a surface of a texture which is non-injurious to the yarn. In particular, it has been found that barrels made of a phenol-formaldehyde resin bonded with a base of paper, canvas or linen are particularly adapted for use in the bobbins of this invention. The long life of this material without distortion or change in size insures that the bobbin will be true-running throughout its useful life.

Although it is not essential, it is preferable to design the centering discs 20 and 21 slightly greater in diameter than the inside diameter of

the barrel 10, and to increase the inside diameter of the latter at the ends sufficiently to accommodate snugly the centering discs 20 and 21, as shown in the drawing. This prevents the discs 20 and 21 from working toward the center of the bobbin, and thus failing to engage the clamp nuts 13 and 14. If desired, the ends of the barrel 10 may be tapered on the inside to accommodate tapered centering discs, but this requires such close machining of the parts involved in order to secure a snug or firm fit without permitting a space between the heads 11 and 12 and the barrel 10 wide enough for the yarn to slip into, that it is inferior to the design shown in the drawing.

The heads 11 and 12 also may be constructed of many materials, but due to the fact that they must take up the pull of the clamp nuts 13 and 14, they are generally made of metal, and for use in bobbins coming in contact with the usual fluids used in the processing of artificial textiles, the heads 11 and 12 are preferably made of a corrosion-resistant alloy, such as the so-called stainless steels. If non-metallic heads 11 and 12 are desired, very satisfactory ones may be made from the same phenol-formaldehyde resins bonded with a base of paper, canvas or linen, as is preferred for the construction of the barrel 10.

Since the clamp nuts 13 and 14, and the centering discs 20 and 21 must not suffer appreciable change in their dimensions over long periods of use, they should be made of a material which will not warp, or corrode appreciably in contact with the fluids ordinarily used in processing synthetic fibers. Therefore, these pieces may also be made of a stainless steel or other corrosion-resistant alloy. The tie rod 19 may be made of any material of sufficient strength to hold the bobbin together, and for this purpose ordinary iron or steel may be used.

Where the bobbin is designed with a barrel of small diameter the construction may be simplified and fabrication costs reduced by making the centering discs integral parts of the clamp nuts. A bobbin of this construction is illustrated in Figs. 3, 4 and 5, wherein a thin-walled cylindrical barrel 30 is held between two heads 31 and 32, which have flat inside surfaces substantially flush with and in contact with the end surfaces of the barrel. In the center of each of the heads 31 and 32 is a hole of the same size as the inside diameter of the ends of the barrel 30. Into these holes are inserted clamp nuts 33 and 34 which have surfaces machined to fit snugly by friction in the ends of the barrel 30, whereby such machined surfaces function as the equivalent of the centering discs 20, 21, and eliminate the necessity of employing centering discs separate from the clamp nuts. Each of the clamp nuts 33 and 34 has a shoulder 35 and 36, respectively. The shoulders 35 and 36 engage portions of the outside surfaces of the heads 31 and 32, respectively, directly in line with the contacting surfaces of the heads and the barrel and urge them directly against the ends of the barrel 30, whereby the heads 31 and 32 are subjected only to compressive stress. This makes possible the use of materials low in tensile and shear strengths for construction of the heads 31 and 32. In particular, phenol-formaldehyde resin laminated with paper was found to be satisfactory. Through the centers of the clamp nuts 33 and 34 pass holes or passages 37 and 38, respectively, each of which forms a bearing for the bobbin toward the shoulder end of the clamp nuts 33 and 34. The oppo-

site ends of the holes 37 and 38 may be threaded or otherwise adapted adjustably to engage a tie rod 39 which passes through the barrel in spaced relation to its inside wall. The tie rod 39 is of tubular construction having a passage therethrough in continuation of the passages 37 and 38 to permit spindle mounting on a vertical axis, in which case only one bearing may be employed and the spindle extends through the entire length of the bobbin. This arrangement frequently is used in textile filament twisting and throwing operations. The clamp nut 33 may be provided with a slot 40 (Fig. 4) to permit positive engagement with a live center having a corresponding ridge or key on the driven pin. It is essential that the joint between the heads 31 and 32 and the ends of the barrel 30 be uniformly tight in order to prevent filaments of the yarn from being caught between these pieces during winding. Although satisfactory joints may be made by carefully machining the ends of the barrel 30 to fit snugly against the heads 31 and 32, it is quite often more satisfactory from the practical standpoint to "feather" the ends of the barrel 30 (taper 41 of Figs. 3 and 5), or taper the ends on the inside of the barrel 30 to provide substantially line contact with the heads 31 and 32, so that the lessened contact surface between the ends of the barrel 30 and the heads 31 and 32 permits greater pressures and uniform contact to be obtained without developing excessive stresses in the other parts of the bobbin. This construction of the ends of the barrel 30, shown in detail in Fig. 5, is equally applicable to bobbins having larger barrels and centering discs, such as taper 22 at the ends of barrel 10 in Fig. 1.

It will be evident that a number of modifications in the construction of the bobbin may be made without departing from the invention. For instance, it may be desirable for some uses to elongate the clamp nuts 13 and 14 and adapt them to engage each other in the center of the bobbin, thus obviating the need for the separate tie rod 19, and the shoulders 15 and 16 of clamp nuts 13 and 14 may be made any desired shape, although with bobbins having large barrels, a hexagonal shape is preferred to facilitate the assembly and disassembly of the bobbin without special tools. Where the bobbin is constructed according to Figs. 3 and 4, the clamp nuts 33 and 34 may even have round shoulders, as shown, since adequate tightening of the assembled parts can be accomplished by turning the heads 31 and 32 by hand. Although the tie rod 19 is shown as a solid member in Fig. 1, it may also be of tubular construction, like the tie rod 39 in Fig. 3, where a spindle mounting is to be employed. If the head 11, (Fig. 1) the centering disc 20 and the clamp nut 13 (or, in Fig. 3, the head 31 and the clamp nut 33) are fabricated as a unit, most of the advantages of the construction described are lost, inasmuch as one of the main features of this construction is the ready and economical replacement of the bearings of the bobbin. In either bobbin design (Figs. 1 or 3), the bearings provided by the clamp nuts may be used on "live centers" where the bobbin is to be driven by a torque applied at its bearings, simply by mounting the bobbin upon pins, at least one of which is "live," or driven, and tapered slightly so as to grip frictionally the clamp nut when inserted in the hole. Of course, in standard practice, both pins rotate with the bobbin, as the actual pivoting takes place within the bearings of the

pins themselves. An alternative method of connecting the bobbin to a driven center pin is to provide a slot or groove in the clamp nut into which a corresponding key or ridge on the driven pin may slide, as is shown in Figs. 3 and 4. However, for some uses it is desirable to mount the bobbin on "dead centers" or free running pins, and to obtain rotation by contact of the barrel (or yarn cake built upon the barrel) with a driving roller in order to secure constant peripheral speed.

Many modifications of the invention, both as to construction and as to the materials used, will be apparent to those skilled in the art, and the invention should not be limited other than as defined by the appended claim.

I claim:

A bobbin comprising, in combination, a cylindrical barrel having internally tapered ends; a head at each end of said barrel having a flat surface engaging the tapered ends of said barrel in substantially line contact; a tie member within said barrel; a clamp means at each end of said barrel bearing against the outside surface of the corresponding head, engaging said tie member, and having a passage therein adapted to provide a bearing for said bobbin; and a disc at each end of said barrel, separate from said heads, frictionally fitting within said barrel for centering said barrel and said heads with respect to the axis of rotation of the bobbin.

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