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MOLDED RUBBER BUSHING FOR YARN TWISTING SPINDLE MECHANISMS

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Fig. 1.

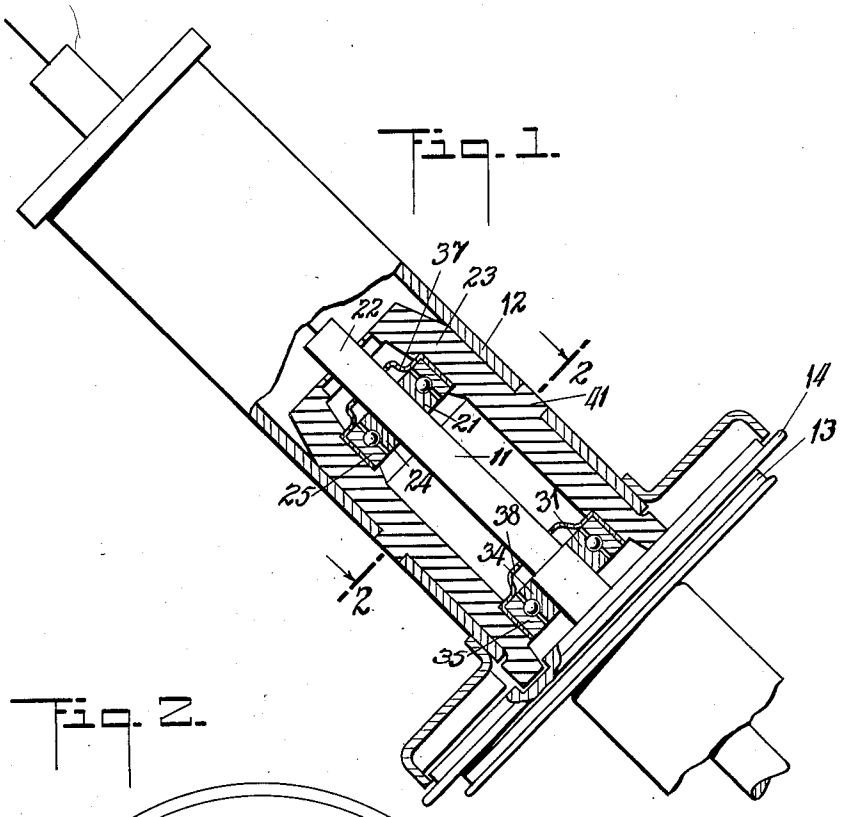
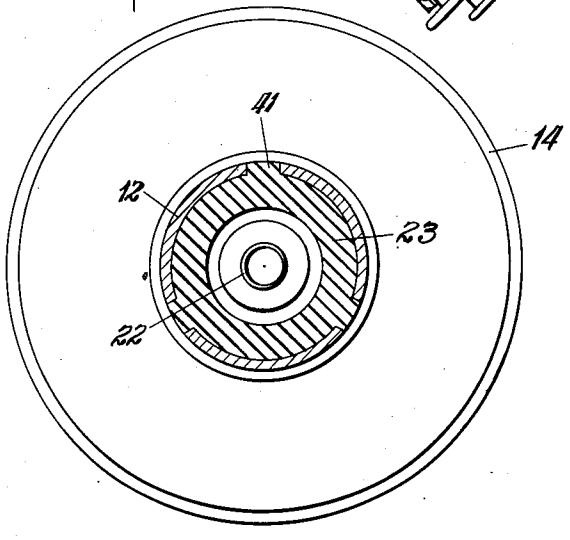


Fig. 2.



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MOLDED RUBBER BUSHING FOR YARN TWISTING SPINDLE MECHANISM

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1 Claim. (Cl. 308—184)

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This invention relates to the spinning and twisting of textile yarns and particularly to the bearing supporting bushing in the spindle assembly used therefor.

In spinning and twisting textile yarns, particularly in imparting double twist to textile yarns strands, a hollowed spindle is used through which the strand of yarn passes in an over end relationship. The yarn is emitted from the lower end of the spindle and thence passes upwardly to a takeup reel located above the spindle. The commercial assembly normally comprises a cylindrical support for the supply spool within which the double twist spindle rotates at high speed, the yarn package and its cylindrical support remaining relatively stationary.

Such a structure necessitates, of course, the use of suitable bearings. The inner race of the bearings is firmly attached to the spindle which is rotatable while the outer race of the bearings is firmly attached to a bushing which is one of the relatively stationary parts. A metal bushing may be machined and it will be apparent that such machining necessitated very close tolerances. The bushing must constitute a sufficiently firm support to prevent the outer race from rotating while at the same time it must not exert an excessive inward pressure on the bearing since such pressure would distort and deleteriously affect the operation of the bearing. Close tolerance manufacture of the bushing, of course, greatly increases the cost of the assembly. Furthermore, close tolerances are not required in the remaining parts of the assembly. The requirements of such a bushing constitute a problem in the industry.

Therefore, it is the object of this invention to provide new and improved apparatus for supporting the bearings in a textile yarn spindle assembly.

Other objects will be apparent after a study of the following description, claim and drawings, in which—

Figure 1 is a side elevational view of a complete spindle assembly with portions thereof partially cut away and in cross-section to illustrate the invention within the assembly; and

Figure 2 is a sectional view through 2—2 of Figure 1.

A complete yarn twisting spindle assembly is illustrated in Figure 1 except that the yarn supply spool and the takeup spool are not shown. The cylindrical tube 12 comprises the supply spool support. The yarn passes downwardly through the upper portion of the cylindrical member 12 and through the hollowed spindle 11

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and is emitted at the lower portion of the spindle normally at the storage ring 13. The storage ring 13 together with the yarn guide disc 14 are firmly attached to the spindle so as to be rotatable therewith. The spindle 11 rotates at high speed while the cylindrical tube member 12 remains relatively stationary.

Normally two bearings are provided for supporting the cylindrical tube 12 and its associated parts on the rotatable spindle 11. Other bearings might be used if desired. An upper bearing 21, which may be either ball bearing or roller bearings, is provided between the upper end of the shank 22 of the spindle 11 and the bushing 23 mounted within the cylindrical tube 12 for the purpose of supporting the bearings. The inner race 24 of the bearing is firmly attached to the shank 22 of the spindle 11. The outer race 25 of the bearing is firmly supported by the bushing 23.

Similarly, a second bearing 31 is provided near the lower part of the shank 22 of the spindle 11. Like the upper bearing 21 the lower bearing 32 may be roller or ball bearing as desired. The inner race 34 is firmly attached to shank 22 of spindle 11 and the outer race 35 is attached to bushing 23.

Conical grease retainers 37 and 38 may be provided, respectively, for the upper spindle 21 and the lower spindle 31, as desired.

The bushing 23 is cylindrical with the outer diameter thereof conforming to the inner diameter of the supporting tube 12. The particular shape or form of the bushing is not critical and may be varied as desired. There is an opening in the upper end of the bushing for the shank 22 of the spindle 11. Preferably the lower end of the bushing 23 is arranged so as to extend beneath the lower edge of the cylindrical supporting tube 12 to some extent and thus provide a more secure mounting. The bushing 23 may be keyed to the supporting tube 12 by one or more radial projections 41 from the outer surface of the cylinder. A complementary opening is provided in the cylindrical tube 12 to receive the projection 41.

It is apparent that, unless the bushing 23, if it were metal, were to be machined accurately with close tolerances, either undue and distorting pressure on the bearings or slippage of the bearings would result. In either instance the bearings would not operate satisfactorily. In accordance with this invention there is provided a molded rubber bushing. In the interior and upper end of the bushing 23 a suitable shoulder is provided against which the outer race of the bearing 21 abuts. A second shoulder is provided at the lower

end of the bushing for location of the lower bearing 31. The outer diameter of the bushing 23 conforms generally to the inner diameter of the cylindrical tube 12 with a resulting close or pressure fit. With this arrangement there is a slight inward pressure by the tube 12 against the outside of the bushing 23. Since the bushing is made of molded rubber it is resilient and this pressure is transmitted resiliently to the inner shoulders supporting the bearings 21 and 31. If the pressure is too great for the bearings, it is taken up by the resilient inherent characteristics of the molded rubber bushing. Thus there is sufficient pressure to retain the outer race of the bearings in stationary position while at the same time the resiliency of the bushing prevents the pressure from being excessive so that there is no undue or distorting pressure on the bearing which will prevent proper operation thereof. The outer race of the bearing is prevented from rotating. Because of the resilience of the bushing, it need not be maintained to close tolerances in production. With this arrangement each of the bearings 21 and 31 is retained firmly but gently in position. The rubber bushing should be oil resisting in view of the presence of oil and grease for the rotating metal parts.

This arrangement of a molded rubber bushing for the bearings of a rotatable spindle in a yarn twisting assembly has proved to be a satisfactory solution to the bearing supporting problem. While the preferred embodiment has been illustrated and described, it will be apparent to those skilled in the art that modifications are possible without departing from the scope of the invention.

What is claimed is:

Apparatus for spinning and twisting textile yarns comprising a rotatable spindle coaxilly mounted within a relatively stationary cylindrical member, a molded rubber cylindrical bushing positioned coaxially between said spindle and said

cylindrical member, the outer diameter of said bushing conforming to the inner diameter of said cylindrical member forming an inner lining therefor, the inner diameter of said bushing being greater than the outer diameter of said spindle, the longitudinal length of said bushing being more than half the longitudinal length of said spindle and less than the longitudinal length of said cylindrical member, the lower edge of said bushing extending beyond and beneath the lower end of said cylindrical member, said bushing having an opening in the upper end thereof for said spindle, a radial projection from the outer surface of said bushing extending into a complementary opening in said cylindrical member to retain said bushing in position, preventing relative rotation between said bushing and said cylindrical member, the inner surface of said bushing having a first annular supporting surface near the upper end thereof with a shoulder along the edge of said surface, a second annular supporting surface near the lower end of said bushing and with a shoulder along the edge thereof, a first unitary bearing structure having an inner race and an outer race mounted within said bushing and retained by annular resilient pressure of one of said supporting surfaces against said outer race, and a second unitary bearing structure having an inner race and an outer race mounted within said bushing near the other end thereof and retained by annular pressure on the other of said supporting surfaces against the second said outer race.

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