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TEXTILE SPINDLE AND MOUNTING

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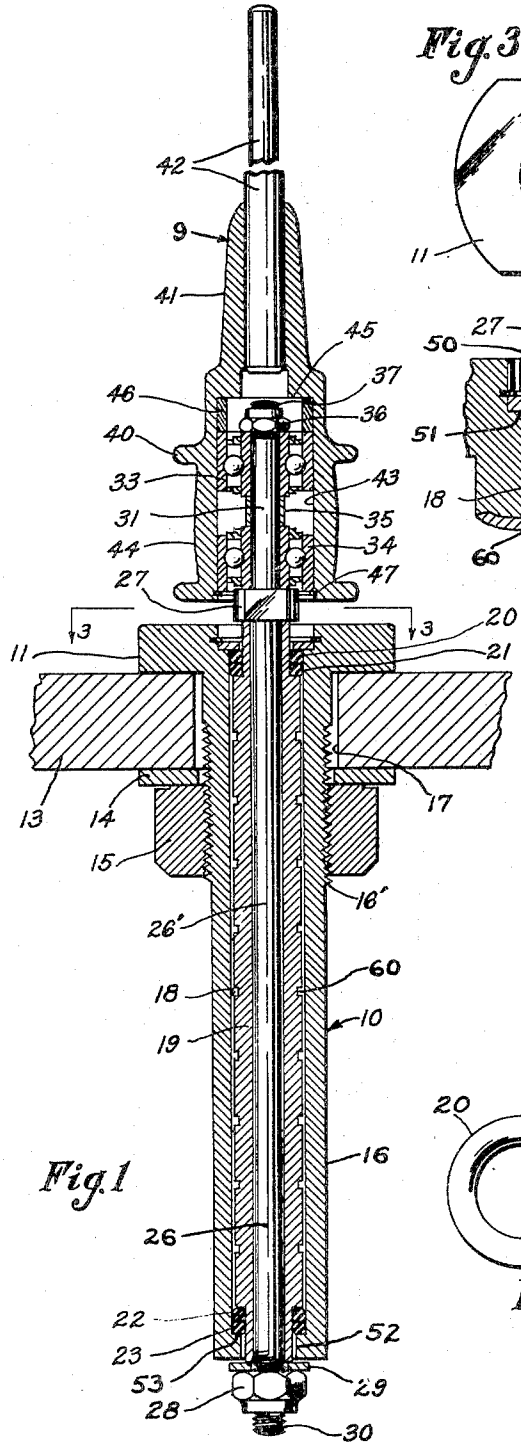


Fig. 1

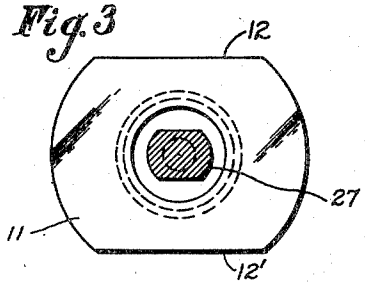


Fig. 3

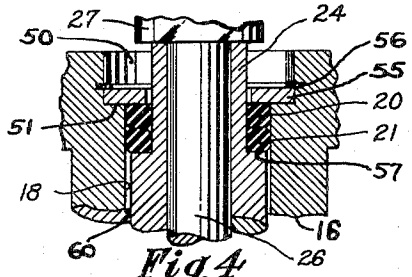


Fig. 4

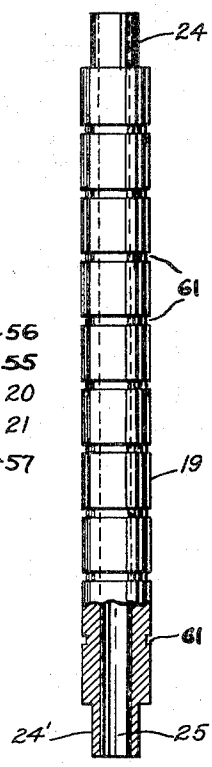


Fig. 2

Fig. 6

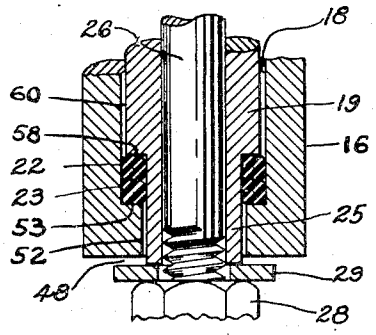


Fig. 5

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TEXTILE SPINDLE AND MOUNTING

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11 Claims. (Cl. 57—130)

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This invention relates to textile spindles, and more particularly to an improved spindle structure and mounting for spindles of the type used in spinning and twister frames.

Spindles of this class are employed in considerable numbers mounted in a vertical position in the above mentioned types of textile machines for carrying bobbins, tubes or the like on which are wound the yarn after it has been subjected to its final processing operation in such machines. The yarn is built up usually in a progressive manner into fully wound packages of desired dimensions on the bobbins or tubes carried by the spindles; consequently, the spindles and their mountings are subjected to overhanging loads of varying degrees of unbalance as the increasing amounts of yarn are wound onto the bobbin before the yarn mass reaches its final size and in the course of this winding operation the rotating spindle structure normally passes through one or more of its principal critical speeds. For practical operation, it is preferred that such a spindle be designed to have not more than two principal critical speeds, and that provision be made in the spindle structure for damping oscillations or vibrations of the rotating spindle structure created not only by the variations in unbalance of the yarn package being wound but also those normally encountered in the course of accelerating the spindle from a state of rest to rotation at its normal operating speed well above these critical speeds, and vice versa.

In fact, textile spindles of this class usually require that the entire rotating assembly "per se," without the bobbin and its yarn load, be very accurately balanced dynamically, as any substantial unbalance of these parts may give rise to serious resonance phenomena which may set up excessive vibrations of the rotating blade assembly in passing through its principal critical speeds.

An object of the present invention is to construct a textile spindle of the "self-centering" type, such that vibration and unbalanced loads will be damped and the rotating spindle assembly thereof including the flexible blade member together with its varying yarn load will safely pass through its principal critical speeds.

According to the present invention, the improved spindle structure comprises an upright fixed support or dead spindle upon the upper portion of which is rotatably mounted the rotating spindle structure including the whorl and the blade fast therewith, the fixed support or dead

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spindle being fixedly secured to and supported by a tubular bolster which is telescopically arranged within and axially occupies the bore of a generally tubular base member with a loose fit and is flexibly anchored therewith for accommodating limited lateral and radial movements of the bolster relative to the base member whereby at the usual operating speed of the spindle the parts forming the entire rotating spindle structure will be enabled to rotate with their principal axes in coincidence with the axis of rotation. Under this condition of rotation the unbalanced forces and displacing couples acting on the rotating parts are eliminated. To attain this desirable operating condition, it will be necessary that the mounting for the fixed support or dead spindle be made sufficiently flexible and resilient to permit a certain amount of radial and lateral displacement of the bolster within the base from the axis of rotation of the rotating spindle structure and also that suitable damping be provided to prevent the setting up of excessive vibrations by the rotating spindle assembly when passing its two principal critical speeds.

In order to damp or absorb the aforementioned detrimental vibrations and also to enable the rotating parts to rotate at high speeds with their principal axes in coincidence with the axis of rotation the present invention provides a combined damper, seal, and resilient mount organization flexibly anchoring the bolster with the base member and providing between the bolster and the base a separate oil damper system. To this end the bolster carrying the fixed support or dead spindle is elastically suspended with the tubular base member by means of a plurality of endless deformable annular resilient rubber members or O-rings spaced axially with respect to the bolster and the bore of the base and disposed between the outside of the bolster and the encompassing wall of the base, preferably arranged in pairs near each end of the bolster, and further by providing a separate liquid damping system in the form of an oil reservoir formed by the axial clearance between the base and the bolster and sealed at its opposite ends by the resilient rings. Thus, when the rotating spindle structure with its unbalanced yarn load tends to oscillate about the axis of rotation, the resilient rubber members or O-rings flexibly supporting the bolster and sealingly connecting it with the base will be deformed and compressed and the internal elastic reaction resulting therefrom will supplement the oil damping action set up by the main oil damper system to act conjointly there-

with to produce a centering force, limiting the amplitude of the oscillations of the rotating spindle assembly relative to the base so that the vibrations will be dampened in passing through the principal critical speeds in being brought up to rotation at high speeds, and vice versa.

With this arrangement, the annular resilient rubber members or O-rings serve a three-fold purpose, viz., as a suspension means flexibly anchoring the bolster with the base; as a liquid seal for the oil damping fluid in the reservoir of the liquid damping system; and as a mechanical damper system to supplement the main or liquid damping system for the spindle during its rotation.

The invention will be more fully set forth in the following description referring to the accompanying drawings and the features of novelty which characterize the invention will be pointed out with particularity in the claims appended to and forming a part of this specification.

In the drawings:

Fig. 1 is a sectional elevation of a spindle and mounting therefore constructed in accordance with the present invention;

Fig. 2 is an elevation of the tubular bolster, with an end portion shown in section;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary sectional elevation of the upper end portion of the spindle and mounting of Fig. 1;

Fig. 5 is an enlarged fragmentary sectional elevation of the lower end portion of the spindle and mounting of Fig. 1; and

Fig. 6 illustrates one of the O-rings which is employed for flexibly suspending and anchoring the bolster within the base.

Referring to the drawings, the spindle construction shown in Figs. 1, 3, 4 and 5 includes a rotatable blade assembly 9 to be described which rotates upon anti-friction bearings secured to the upper end portion of a stationary upright cylindrical support member or dead spindle shaft 26. The main body of the shaft 26 is fixedly secured in the bore of a bolster or the like tubular member 19 to be described, the tubular bolster being telescopically positioned within and axially occupying the axial bore of a generally tubular base or bolster case 10 to be described and extending therethrough. The bolster 19 is resiliently anchored to the base or bolster case 10 and held from rotation therein by a resilient mounting arrangement to be described.

The spindle base or bolster case 10 is shown generally tubular throughout its length, except that it is provided at its upper end with an enlarged hollow flange 11 of partially circular formation having flattened sides 12 and 12' at diametrically opposite positions thereof (see Fig. 3). The flange portion 11 is integral with the depending tubular body portion or shank 16 of the base and is counterbored inwardly from its upper end to provide the enlarged cylindrical recess 50 coaxial with and communicating with the main cylindrical bore 18 of the body portion or shank 16, the bottom of this recess defining a flat annular shoulder 51 at the upper extremity of the bore of the tubular portion 16, as shown in Fig. 4. The lower end wall of the base 10 is provided with a central aperture 52 which is coaxial with but of smaller diameter than the main bore 18 of the tubular base portion 16 and provides a flat annular shoulder 53 interiorly of the body portion or shank 16 terminating the lower

end of the bore 18 and bordering the central aperture 52.

The base or bolster case 10 is designed to rest on the usual spindle rail 13 of a spinning frame or a twister frame with the tubular body portion 16 of the base projecting downwardly through the usual circular hole 17 in the rail, and to be clamped thereon by a washer 14 and a nut 15 threaded upon the externally screw threaded portion 16' of the body portion or shank 16, as is a well known practice. It is noted that the screw threaded portion 16' of the base or bolster case 10 extends loosely through the hole 17 in the rail 13 and is made sufficiently smaller in external diameter than that of the hole 17 to provide sufficient clearance for performing the usual centering adjustment and the customary plumbing operation of the base or bolster case 10 on the spindle rail to align the rotating spindle assemblage with other associated parts of the textile machine, as is well known practice in the art.

The bolster 19 is of tubular form having an axial bore 25 therethrough, and is telescopically arranged with the bore 18 of the bolster case or base 10 with a loose fit in its operative position, as shown in Figs. 1, 4 and 5. The bolster is provided at its opposite ends with the cylindrical neck portions 24 and 24' of reduced diameter (see Fig. 2). The bolster, as thus assembled, extends entirely through the base or bolster case 10. That is, the neck portion 24 at the upper end of the bolster extends upwardly into and passes through the recess 50 in the flange 11 and has its upper end terminating above the top of the flange 11, while the neck portion 24' at the lower end of the bolster projects downwardly and passes freely through the central aperture 52 at the bottom of the body portion 16 and has its lower end projecting exteriorly beyond the lower end of the bore 18 and terminating a short distance below the exterior bottom face of the bolster case or base 10.

The mounting for resiliently supporting and flexibly anchoring the bolster 19 to the tubular base or bolster case 10 consists in the present embodiment of pairs or sets of endless compressible annular resilient members or elastic rings encompassing the outside of the necks 24 and 24' respectively of the bolster and disposed within the bore 18 of the base and bearing against and in liquid-tight sealing contact with the cylindrical internal wall of said bore and the cylindrical exterior of the bolster necks 24 and 24'. In the present embodiment, the endless annular resilient or elastic members are shown as pairs or sets of resilient rubber rings 20, 21 and 22, 23 having their convex ends flattened and with their convex outer peripheral faces compressed radially and flattened against the inner wall of the bore 18 and their respective convex inner peripheral faces compressed radially and flattened against the outside of the bolster necks 24 and 24' respectively. The resilient rubber rings 20, 21, 22 and 23 are composed of either solid vulcanized natural or synthetic rubber compounds having oil-resisting properties and each in its natural state before insertion between the bolster and the base has its body round in cross-section. The rubber rings 20, 21, 22 and 23 employed in the present spindle construction are the rubber rings commonly referred to as O-rings, and are well known and commercially available molded rubber products. The rings 20, 21, 22 and 23 also provide an annular clearance space axially between the bolster and the base for accommodating limited lateral

and radial movements of the bolster relative to the base as well as functioning as seals for sealing the opposite ends of this axial clearance space to form a liquid reservoir containing a quantity of oil and whereof leakage of liquid is to be prevented, this oil functioning as the main damping system to resist and damp the vibrations set up by the rotating blade assembly 9 including its load in passing through a critical speed during its running.

The bolster 19 with the assembled O-rings 20, 21, 22 and 23 is held in the desired operating position within the bore 18 of the base 10 by means of a flat-sided ring or washer 55 and a snap-ring 56 disposed within the enlarged recess 50 of the upper flange 11 for retaining the assembly in assembled relation and the O-rings in a compressed flattened state. It will be observed in Fig. 5 that the bottom O-ring 23 of the lower pair has its convex bottom face pressed into sealing contact with the flat internal annular shoulder 53 at the lower end of the bolster case or base 10, and that in Fig. 4 the top O-ring 20 of the upper pair or set has its convex top end face in direct contact with and pressed in sealing engagement against the flat undersurface of the washer 55. Consequently, radial compression and flattening of the active sealing surfaces of the O-rings 20, 21, 22 and 23 results when axial pressure is applied to the ends of the O-rings as they are distorted by the washer 55 as it is forced downwardly, when subjected to a downward thrust, into firm seating engagement with the flat annular shoulder 51 interiorly of the recess 50 and forming its bottom.

The bolster necks 24 and 24' provide with the adjacent wall of the bore 18 and with the lower internal flat annular shoulder 53 and the washer 55 respectively a generally rectangular groove or chamber formed circumferentially proximate to the opposite ends of the bore 18 between the interior wall thereof and the exterior of the bolster necks 24 and 24' and arranged to be closed and sealed by a pair of O-rings, the radial and axial cross-sectional dimensions of each of said rectangular grooves or chambers being less than the diameter in cross-section of the body of both O-rings therein when in their natural unassembled state.

The resilient rubber O-rings 20, 21, 22 and 23 are alike as to size and composition and each, at their inner and outer points of greatest convexity, circularwise in the median plane of the particular ring, has an inner periphery slightly less in circumference than the circumference of the cylindrical necks 24 or 24' on which it is assembled, while the exterior peripheral circumference of each O-ring is greater than the circumference of the interior cylindrical wall of the bore 18. Consequently, when the O-rings 20, 21, 22 or 23 are forced into the bore 18 of the base 10 the rubber body of each ring will be highly compressed radially from its initial round cross-sectional form into the cross-sectional shape shown in Figs. 4 and 5 of somewhat ellipitical cross-section with flattened inner and outer peripheral face portions respectively abutting the exterior of the respective necks 24 and 24' and the encompassing internal wall of the tubular body portion 16 of the base. In addition, the top and bottom convex end faces of the abutting pairs or sets of O-rings 20, 21 and 22, 23 are subjected to axial compression and become flattened as shown in Figs. 4 and 5, the upper rings 20, 21 being confined between the washer 55 and the flat annular shoulder 57 of the bolster formed where its neck 24 joins with the upper end of the main bolster body, and the lower rings 22, 23 being confined between the flat annular internal shoulder 53 terminating the bore 18 and the flat annular shoulder 58 formed where the bolster neck 24' joins with the lower end of the main bolster body.

The exterior diameter of the bolster 19 is made less than the internal diameter of the bore 18 so that when the bolster and the bolster case are assembled the outer periphery of the bolster is spaced radially from the interior wall of the bore 18 and an annular clearance space 60 is provided axially between the bolster and the base constituting an oil chamber or reservoir holding a supply of oil ample to create an oil damping action sufficient to provide the main damping system for the spindle and which acts conjointly with the mechanical damping action provided by the resilience and expansive characteristics of the resilient rubber O-rings to suppress, damp and cushion the vibratory or oscillatory movements of the bolster imparted thereto by the rotating spindle assembly relative to the base in passing through a critical speed incident to rotation at high speeds.

The oil damping action is facilitated by the fact that this annular clearance space between the bolster 19 and the bore 18 of the base or bolster case forming the oil chamber or reservoir 60 is made very small, and that satisfactory damping action is obtained with a clearance of in the neighborhood of from ten to twenty-thousandths of an inch between the main body of the bolster and the interior wall of the bore 18. Also, this order of clearance prevents too tight squeezing laterally of the elastic O-rings when being adjusted to the desired position within the bore.

As shown in Fig. 2 the body portion of the bolster 19 is of substantially uniform exterior diameter except that at uniformly spaced intervals axially therealong the outside surface of the bolster body is formed with a multiplicity of annular grooves 61 which provide increased capacity to the oil chamber or reservoir 60 between the bolster and the base when assembled. In this construction, there are shown nine such individual circumferential grooves 61 about the bolster body.

Mounted in the bolster 19, after the bolster and base are telescopically arranged in assembled position one within the other and flexibly anchored and sealingly connected by the O-rings, is the non-rotatable support member or dead spindle shaft 26, the main body portion or shank 26' of which is accurately machined to fit snugly into the bore 25 of the bolster. The support member or shaft 26 is shown provided with a shoulder or collar 27 arranged at an intermediate portion, see Fig. 1, while the body portion or shank 26' extending below this shoulder or collar is made of greater length than the bolster bore 25 so that the shank 26' extends entirely through the bore 25 when the spindle shaft 26 is mounted in its operative position within the bolster.

The support member or shaft 26 is held fixed or stationary by being clamped to the ends of the bolster 19 between the underside of the shoulder or collar 27 and a washer 29, as shown in Figs. 1 and 5, and which, in turn, is held clamped against the lower end of the bolster 19 upon tightening of the "elastic" lock nut 28

threaded upon the screw threaded lower extension 30 of shank portion 26'.

The support member or shaft 26 also has integral therewith an upper cylindrical stem portion 31 above the shoulder 27, and mounted upon this stem portion are a pair of ball bearing units 33 and 34, preferably of the double seal type. A spacer 35 is arranged on the stem 31 between the ball bearing units 33 and 34 and the assembly is held clamped together by a lock nut 36 which has threaded engagement with the threaded upper end portion 37 of the stem 31.

A whorl 40 having the usual acorn 41 is fast with the spindle blade 42. The whorl is recessed at its under side, as at 43, to provide a depending annular belt-receiving skirt 44 whereby both ball bearing units 33 and 34 are entirely housed within the interior of the whorl. The lower end of the recess 43 is counterbored to provide the inner annular shoulder 45. The outer race ring of the upper ball bearing 33 engages against a spacer ring 46 abutting the shoulder 45 while a lock ring 47 secures the outer race ring of the lower ball bearing with the whorl. The inner and outer race members of the ball bearing units 33 and 34 respectively preferably are secured by a snug press-fit to the whorl and the stem respectively. If desired, injection lubricated type ball bearing units may be utilized in lieu of the double seal type ball bearing units 33 and 34 illustrated in the drawings by appropriate modification of the whorl to provide convenient apertures for insertion of the hollow grease injecting needle into the bearing lubricating apertures. The whorl 40 and the blade member 42 thus are arranged for free rotation upon the stem portion 31 of the support member or dead spindle shaft 26.

The washer 29 is installed as shown and has the marginal material of its inner end face bounding its central hole in contact with the lower end of the bolster 18, as shown in Fig. 5. Suitable clearance is provided between the lower end of the base 10 and the inner end face of the washer 29, as indicated at 48, to enable limited axial movement of the bolster under conditions of overload for safety purposes or of shock when doffing.

The lock nuts 28 and 36 preferably are of a commercial type known in the trade as "elastic Stop Nuts" incorporating in their structure a locking collar of vulcanized fiber and are a product manufactured by the Elastic Stop Nut Corporation of America, Union, New Jersey.

From the foregoing description it will be seen that the spindle mount organization provides a combined damper, seal and resilient mount for the rotating spindle structure which supplements the oil damping system and acts conjointly therewith to resist and/or damp and suppress the oscillatory and/or gyratory movements of the dead spindle and the bolster imparted thereto and created by the rotating parts of the spindle structure and its yarn load.

What is claimed is:

1. In combination, a pair of coaxial tubular members telescopically arranged one within the other with a loose fit, endless resilient rubber rings disposed between said tubular members, each of said rings in its natural state having its body substantially round in cross-section, said rings upon assembly of said tubular members one within the other flexibly anchoring said members together and providing an annular clearance space axially between the tubular members for accommodating limited lateral movements of the inner member relative to the outer member, said rings also having their convex inner and outer peripheral faces compressed radially and bearing firmly against the outside of said inner tubular member and the internal peripheral wall of the outer tubular member respectively, and means for retaining the assembly in assembled relation and said rings in a radially compressed state.

2. In combination, a pair of coaxial tubular members telescopically arranged one within the other with a loose fit, endless resilient rubber rings disposed between said tubular members, each of said rings in its natural state having its body substantially round in cross-section, said rings upon assembly of said tubular members one within the other flexibly anchoring said members together and providing an annular clearance space axially between the tubular members for accommodating limited lateral movements of the inner member relative to the outer member, said rings also having their convex inner and outer peripheral faces compressed radially and in sealing contact with the outside of said inner tubular member and the internal peripheral wall of the outer tubular member respectively and sealing the opposite ends of said annular clearance space to form a liquid reservoir wherefrom leakage of liquid is to be prevented, a liquid medium in said reservoir, and means for retaining the assembly in assembled relation and said rings in a radially compressed state.

3. In combination, a pair of coaxial tubular members telescopically arranged one within the other with a loose fit, endless resilient rubber rings disposed between said tubular members and flexibly anchoring the inner tubular member with said outer tubular member, each of said rings in its natural state having its body round in cross-section, said rings upon assembly of said tubular members one within the other having their convex ends flattened and their convex inner and outer peripheral faces in contact respectively with said inner and outer tubular members flattened and providing an annular clearance space axially between the tubular members and also sealing the opposite ends of said clearance space to form a liquid reservoir wherefrom leakage of liquid is to be prevented, a liquid medium in said reservoir, and means for retaining the assembly in assembled relation and said rings in a compressed flattened state.

4. A textile spindle comprising a generally tubular base member having an axial bore therethrough, a tubular bolster carried in substantially coaxial relation within the bore of said base member, endless annular resilient members between said bolster and said base member and flexibly anchoring said bolster with said base member and providing an annular clearance space axially therebetween for accommodating limited lateral and radial movements of the bolster relative to the base member, said annular resilient members being compressed radially and bearing against the outside of said bolster and the adjacent wall of the bore of said base member, and means for retaining the assembly in assembled relation and said annular resilient members in a radially compressed state.

5. A textile spindle comprising a generally tubular base member having an axial bore therethrough, a tubular bolster carried in substantially coaxial relation within the bore of said base member, a plurality of endless resilient rubber rings arranged in pairs at axially spaced locations

along said bolster between said bolster and said base and providing an annular clearance space axially therebetween for accommodating limited lateral movements of the bolster relative to the base member, each of said rings being compressed radially and bearing against the outside of said bolster and the adjacent wall of the bore of said base member to form a liquid-tight seal therewith, said rings sealing the opposite ends of said annular clearance space to form a liquid reservoir wherefrom leakage of liquid is to be prevented, a liquid medium in said reservoir, and means for retaining the assembly in assembled relation and said rings in a radially compressed state.

6. A textile spindle comprising a generally tubular base member having an axial bore therethrough, a tubular bolster axially occupying said bore and extending therethrough, there being an annular clearance space axially between the exterior of said bolster and the encompassing wall of said base, a plurality of endless annular resilient members disposed within said bore about said bolster and sealingly connecting said bolster with said base, said annular resilient members sealing the opposite ends of said annular clearance space to form a liquid reservoir and wherefrom leakage of liquid is to be prevented, liquid in said reservoir, said annular resilient members being compressed with their active sealing surfaces flattened, and means for retaining the assembly in assembled relation and said annular resilient sealing members in a compressed flattened state, said annular resilient members each functioning as a resilient mount flexibly anchoring said bolster to said base, as a liquid seal for the liquid damping system of the spindle, and as a supplemental damper for the spindle acting conjointly with the liquid damping system to suppress and damp the vibrations or oscillations of the rotating spindle assembly relative to the base in passing through a critical speed incident to rotation at high speeds.

7. A textile spindle comprising a generally tubular base member having an axial bore therethrough, a tubular bolster axially occupying said base and extending therethrough, there being an annular clearance space axially between the exterior of said bolster and the encompassing wall of said base, a plurality of rubber O-rings disposed within said bore about said bolster and sealingly connecting said bolster with said base, said O-rings sealing the opposite ends of said annular clearance space to form a liquid reservoir between said bolster and said base, a quantity of a liquid medium in said reservoir surrounding said bolster, the liquid functioning as the main damping system of the spindle and serving to create a damping action for suppressing or limiting radial and torsional vibrations or oscillatory movements set up by the rotating spindle structure in passing through a critical speed in its rotation at high speeds, said O-rings being compressed with their active sealing surfaces flattened, and means for retaining the assembly in assembled relation and said O-rings in a compressed flattened state, said O-rings functioning as a resilient mount flexibly anchoring said bolster to said base, as a liquid seal for the liquid damping system of the spindle, and as a supplemental damper for the spindle acting conjointly with the liquid damping system to suppress and damp the vibrations or oscillations of the rotating spindle assembly relative to the base in passing through a critical speed incident to rotation at high speeds.

8. In a spinning or twister spindle, the combination with a base having a tubular portion, a tubular bolster axially occupying the bore of said tubular base portion and loosely fitting said bore, of a combined seal and resilient mount organization for flexibly supporting said bolster in said tubular base portion to accommodate relative lateral and axial movements to a limited extent between said bolster and said base and sealing the axial clearance between the bolster and the base at opposite ends of said bore whereof leakage of a liquid medium is to be prevented comprising an internal flat annular shoulder in the bore of said tubular base portion at the lower end thereof, a pair of rubber O-rings encompassing the lower end of said bolster within the bore of said base in sealing engagement with each other and sealingly connecting said bolster and said base, the bottom O-ring being pressed into sealing contact with said internal shoulder, a second pair of O-rings encompassing the upper end of said bolster within the bore of said base and pressed into sealing engagement with each other and sealingly connecting said bolster and said base, a flat-sided ring contacting and in sealing engagement with the upper O-ring of said second pair of rings, and a snap ring for retaining the assembly in assembled relation and said O-rings in a compressed state.

9. In a textile spindle, the combination with a base having a tubular portion, a tubular bolster axially occupying the bore of said tubular base portion and loosely fitting said bore, there being an enlarged annular recess in said base communicating with the upper end of said bore and coaxial therewith, the bottom of said recess defining a flat annular shoulder at the upper extremity of said bore, of a combined seal and resilient mount organization for flexibly supporting said bolster in said tubular base portion to accommodate relative lateral and axial movements to a limited extent between said bolster and said base and sealing the axial clearance between the bolster and the base at opposite ends of said bore whereof leakage of a liquid medium is to be prevented comprising an internal flat annular shoulder in the bore of said tubular base portion at the lower end thereof, a pair of rubber O-rings encompassing the lower end of said bolster within the bore of said base in sealing engagement with each other and sealingly connecting said bolster and said base, the bottom O-ring being pressed into sealing contact with said internal shoulder, a second pair of O-rings encompassing the upper end of said bolster within the bore of said base and pressed into sealing engagement with each other and sealingly connecting said bolster and said base, a washer contacting and in sealing engagement with the upper O-ring of said second pair of rings and seated upon the shoulder of said enlarged upper recess, and a snap ring for retaining the assembly in assembled relation and said O-rings in a compressed state.

10. A textile spindle comprising a tubular base having an axial bore therethrough and presenting at its upper end an enlarged flange provided with an enlarged cylindrical recess coaxial with and communicating with the upper end of said bore, the bottom of said recess defining a flat annular shoulder at the upper extremity of said bore, the lower end of said base having an internal flat annular shoulder bordering a central

aperture of smaller diameter than said bore and terminating the lower end of said base, a tubular bolster arranged in substantially coaxial relation within the bore of said base, said bolster being provided at its opposite end portions with reduced cylindrical neck portions, the neck at the lower end of said bolster projecting downwardly and passing freely through the central aperture and terminating exteriorly of said base, the neck at the upper end of said bolster extending through said annular recess in the upper flange, annular resilient members spaced axially with respect to said bolster and said bore and disposed between the bolster and the base member, said annular resilient members flexibly anchoring said bolster with said base and in sealing contact with the inner wall of said base and the outside of said bolster, said resilient members being in a state of radial compression with their active sealing faces flattened, the arrangement being such that said annular resilient members provide axial clearance between said bolster and said base to form a liquid reservoir and to seal the opposite ends thereof, and a liquid medium in said reservoir surrounding the bolster and serving to create a damping action which combined with that created by the elastic action of the annular resilient members damp or suppress the vibrations of the rotating spindle assembly relatively to the base in passing through a critical speed incident to rotation at high speeds.

11. A textile spindle comprising a generally tubular base member having an axial bore therethrough and an internal flat annular shoulder at the lower end of said bore, there being an enlarged cylindrical recess in said base at the top end of said bore defining a flat annular shoulder, a tubular bolster axially occupying said bore, said bolster having reduced cylindrical neck portions at its opposite ends and a body portion adapted to have a loose fit in the bore of said base, said upper bolster neck projecting into said enlarged recess and said lower neck projecting exteriorly beyond the lower end of said bore and its internal flat annular shoulder, a flat washer encompassing the upper bolster neck and seated

against the flat annular shoulder in said enlarged top recess, a pair of compressible endless resilient rubber rings mounted on each of said neck portions of said bolster and disposed between the exterior thereof and the internal wall of the bore of said base, each of said rings in its natural state having its body substantially round in cross-section, said rings upon assembly of said bolster in said base providing an annular clearance space axially between said bolster and said base, said bolster necks providing with the adjacent wall of said bore and with said lower internal flat annular shoulder and said washer respectively a generally rectangular groove formed circumferentially proximate to the opposite ends of said bore between the wall thereof and said necks and arranged to be closed by said rings, the radial and axial cross-sectional dimensions of each of said grooves being less than the diameter in cross-section of the body of the rings in their natural unassembled state, said rings being radially and axially compressed during assembly of said bolster in said base and having their convex end faces flattened and their convex inner and outer peripheral faces in contact respectively with the exterior of said bolster and the adjacent inner wall of said bore flattened whereby the rings in tending to return to their natural round cross-sectional form are pressed radially into sealing contact with said base and said bolster, and means in said enlarged recess maintaining said washer in contact with the topmost sealing ring and firmly seated against the shoulder of said recess for retaining the assembly in assembled relation and said sealing rings in a compressed flattened state.

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