Oct. 20, 1964 J. W. HAMMOND 3,153,314

TEXTILE SPINDLES

Filed Jan. 21, 1963

FIG-1

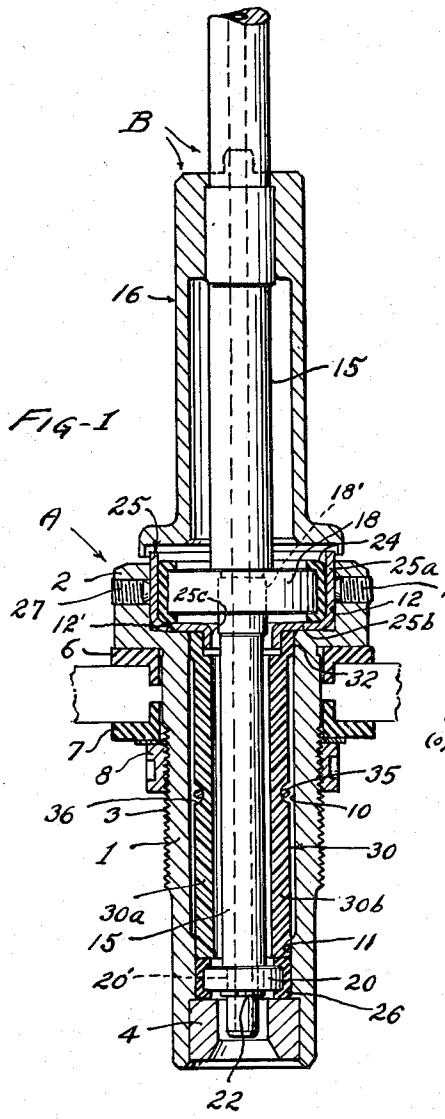
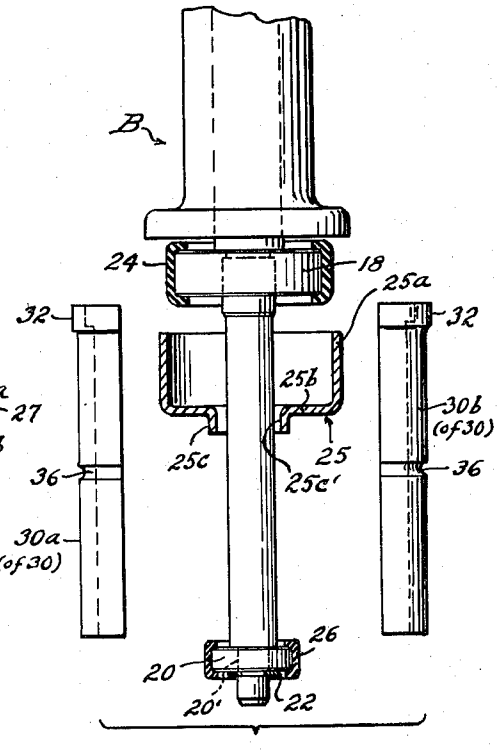


FIG-2



INVENTOR.
JAMES W. HAMMOND
BY George M. Sloan
ATTORNEY

United States Patent Office 3,153,314 Patented Oct. 20, 1964

3,153,314

TEXTILE SPINDLES

James W. Hammond, Mentor, Ohio, assignor to Curtiss-Wright Corporation, a corporation of Delaware

Filed Jan. 21, 1963, Ser. No. 252,740
5 Claims. (Cl. 57—135)

This invention relates to the above-title-indicated equipment and particularly a spindle unit or assembly of the type in which prelubricated and sealed anti-friction bearing units having elastic cushioning or vibration-damping rings or boots snugly embracing the outer bearing race members are suitably contained in fixed axially spaced apart positions in a bolster case and wherein the spindle blade with its bearing units or assemblies tightly secured thereon may be bodily removed from normal working position and inspected, cleaned or replaced if necessary and without having to move the bolster case out of its plumbed and secured position on the spindle rail or other support.

The bearing units or assemblies referred to above must, for proper functioning of the bearings at all speeds, have their inner race rings very tightly secured as by press fitting on respective portions of the spindle blade, the units or assemblies must at all times be in freely working condition without likelihood of rubbing on stationary parts, and the vibration damping or cushioning elastic rings must be snugly supported but without danger of deformation or slipping out of place on the outer bearing races or rings during installation of the blade and bearing unit assembly into the bolster case. Attainment of the above outlined requirements in arrangements such that the bolster case does not have to be moved out of properly installed and plumbed position has heretofor presented serious practical problems especially when economy and simplicity of construction are necessary in order to meet marketing and operational conditions currently demanded in the textile industry.

The spindle assembly generally as herein shown includes a so called hollow blade in which a filament or strand moves through the bore of the blade as for association with another or other strands as in well known twisting or assembly processes, but the invention is fully as applicable to other types of spindles for spinning, twisting and the like having more or less convenional non-tubular blades.

Objects and novel features of the invention not indicated above will become apparent from the following description of a preferred form as shown herewith.

In the drawing FIG. 1 is a central longitudinal fragmentary sectional view of the present spindle assembly unit, the spindle blade and the anti-friction bearing units being shown in elevation.

FIG. 2 is a fragmentary view showing the blade and bearing assembly partly in central longitudinal section and with the bearing units exposed for inspection and other maintenance operations.

Referring especially to FIG. 1, the bolster case or base A comprises as shown a main tubular body section 1 having an upper thickened flange 2, mounting nut threads 3 and a foot bearing supporting ring 4 suitably force fitted or rigidly attached to the body 1. Mounting parts 6, 7, and 8 below the flange 2 are for securing the bolster case body 1 on a rail or spindle swing, not shown, as already well known in the art. The body 1 has a main central smooth cylindrical bore or cavity 10 which is of reduced diameter at 11 just above the insert 4 and an enlarged cylindrical counterbore 12 within the flange formation 2.

The blade and whorl assembly or unit B comprises a one piece steel blade member 15 with a whorl member

16 tightly fitted thereon, and upper and lower anti-friction bearing assemblies 18 and 20 respectively (e.g. sealed ball bearings) whose inner race members (not shown) are force fitted on respective relatively stepped cylindrical portions 18' and 20' of the blade member 15 against respective axial locating shoulders on the blade member as will be apparent. Additionally the inner race member of the lower bearing unit 20 may be secured to the associated reduced diameter portion 20' of the blade member 15 as by a conventional snap ring 22. The elastic cushioning rings or boots 24 and 26 of respective bearing assemblies 18 and 20 are, as shown, of the usual channel shaped cross section and adapted to be mounted on the outer bearing race members of respective bearing units so that they are removably self-retaining on the units as shown particularly in FIG. 2.

In order to permit the two bearing units 18 and 20 with their cushioning sleeves or boots to be accurately and snugly installable in the bolster case 1 and firmly secured in freely working position without likelihood of displacement out of position especially during installation and so as to enable both bearing units 18 and 20 to be easily and quickly removed with the spindle blade for inspection, cleaning, or replacement of damaged parts when necessary, a stepped diameter upper bearing retainer device 25 (best shown in FIG. 2) and cooperating members to be described later is provided. Retainer device 25 has an upper or rim portion 25*a*, a step or bottom wall portion 25*b* and a lower or neck portion 25*c*. The rim portion 25*a* is in snug slip fitting relationship to the elastic cushioning ring 24 and in easy slip fitting relationship to the counterbore 12 so that the retainer 25 can be inserted by hand into the position of it shown in FIG. 1 and with the bottom portion 25*b* resting upon the shoulder 12' of the counterbore 12. The neck portion 25*c* has its internal bore surface 25*c'* positioned loosely around the associated portion of the blade member 15 so that the retainer 25 can never be in frictional contact with the blade unit B. After installation of the blade unit B the rim portion 25*a* of the retainer 25 is tightly secured in place in the counterbore 12 preferably by means of diametrically opposite self-locking set screws 27 (e.g. Nylok, Trade Mark). Thus in effect the upper or bolster neck bearing assembly 18 including its cushioning ring 24 is as stably supported and positioned by the retainer device 25 as though the cushioning ring 24 of the upper bearing assembly were to be directly supported by a suitable counterbore in the bolster case body 1.

Exposition of the bearing units and associated parts of the blade assembly for inspection and cleaning, and (during installation) application of the necessary axial force on the upper flange of the lower cushioning ring or boot 26 of the lower bearing 20 is enabled by provision of a longitudinally split bearing-spacer tube 30 made in two parts or segments 30*a* and 30*b* dimensioned internally for adequate clearance around the lower portion of the blade member 15. The segments 30*a* and 30*b* hold the lower bearing unit 20 via its elastic cushion ring tightly against the step piece 4 when the upper ends of the segments come into contact with the lower side of the bottom wall 25*b* of the retainer 25 upon installation of the retainer simultaneously with installation of the blade assembly B. The lower external diameter of the composite sleeve 30 is in slip fitting relation to the body 1 at reduced diameter bore portion 11; and the upper ends of the two segments 30*a* and 30*b* are of somewhat enlarged diameter as at 32 for slip fitting relation to the main bore 10 of the case or so as to center the retainer 25 in the counterbore 12 of the case prior to being secured by the screws 27.

The segments 30*a* and 30*b* can conveniently be held in

place by the thumb and fingers of one hand during installation of the blade assembly B (blade, bearings and cushioning rings), the segments and the retainer 25 into the bolster case. However if desired a readily detachable elastic (e.g. wire) ring 35 in groove formations 36 on the segments 30*a* and 30*b* can be provided, or the segments can be detachably held together by adhesive tape (not shown) or other readily demountable means.

It will be evident from inspection of the drawing (FIG. 1) that all parts of the blade assembly B are removably held in axially fixed position in the bolster case solely by seating the screws 27 against the retainer wall 25. Since the spacer segments 30*a* and 30*b* are rigid axially any upward force (as during doffing of a bobbin) on the blade must be transmitted via the lower bearing unit 20 to the spacer assembly 30, and their upward movement is effectually blocked by the transverse wall 25*b* of retainer 25.

It will also be apparent from FIGS. 1 and 2 that the boot or cushioning ring 24 of the upper bearing 18 can be easily forced into the top of the retainer 25 by the pressure applied by a suitable tool to the top flange of the boot, so that the boot does not tend to slip out of place as happens when a considerable axial distance for insertion is involved and/or the inserting force is applied via the outer race of the associated bearing unit. Also it will be seen that the boot 26 of the lower bearing 20 is forced into its short receiving bore (portion 11) by axially applied uniform downward pressure of the spacer segments 30*a* and 30*b* on the top flange of the boot 26 and not, as compared with certain examples of prior practice, by making the bearing unit exert the necessary force on the boot to insert it.

As will be seen in FIG. 2 when the blade, whorl and bearing assembly B is removed from the case 1, as can be done easily by hand after the set screws 27 have been loosened, separation or removal of the segments 30*a* and 30*b* adequately exposes the upper and lower bearing units 18 and 20, assuming the retainer 25 is afterward slipped down away from the bearing unit 18. Partial separation of the components as shown in FIG. 2 permits complete cleaning of all the parts and inspection of the bearing units and relubrication of them if they are fitted with inlet glands. It is usually desirable to replace the elastic cushion rings 24 and 26 after several years of service, and that can be done without having to remove the lower bearing 20 from its stub 20' since the upper ring 24 always has sufficient elasticity to enable it to be expanded over the retainer 25 during replacement.

While the segments 30*a* and 30*b* can be most economically made from inexpensive moulded plastic material the composite spacer 30 can be made from suitable stampings or die castings with suitably formed or finished surfaces for engagement with the land or counterbore surface 11, bore 10 (at 32) and the external surface of the neck portion 25*c* of the retainer 25. Retainer 25 is preferably die-formed from sheet metal.

I claim:

1. A textile spindle assembly, comprising (when disposed vertically) a bolster case having a main generally cylindrical axial bore or cavity having a reduced diameter lower end portion, a rotary spindle blade assembly including a blade member having anti-friction bearing units fixed thereon in the upper end of said cavity and in the reduced diameter portion thereof respectively, each unit including a resilient cushioning ring snugly embracing the

bearing unit peripherally thereof, a retainer shell device detachably fixed in said cavity and having an annular rim portion snugly embracing the cushioning ring of the upper bearing unit and having a transversely extending bottom wall, and an elongated segmental spacer sleeve assembly having mutually complementary radially separable parts of equal length disposed around the blade member out of contact therewith in said bore or cavity, the lower and upper end portions of said parts being disposed operatively in axial abutment respectively with the lower bearing unit and with an under surface of the bottom wall of the retainer shell device.

2. The textile spindle assembly according to claim 1 wherein radially external surface portions of the segmental parts adjacent their upper margins are radially in centering contact with the retainer shell device and an upper wall surface portion of said bore or cavity of the bolster case.

3. The textile spindle assembly according to claim 1 including means demountably securing said segmental parts in mutually assembled relationship prior to installation of the spacer and blade assembly into the bolster case.

4. The textile spindle assembly according to claim 1, wherein the retainer shell assembly bottom wall has a central axial neck portion abutted radially by upper inner marginal surface portions of the segmental parts.

5. A textile spindle assembly, comprising (when disposed vertically) a bolster cast having a main generally cylindrical axial bore or cavity, the cavity having an upper counterbore portion and a bottom reduced diameter portion terminating downwardly in an axially and upwardly facing shoulder, a rotary spindle blade assembly including a blade member having anti-friction bearing units fixed thereon in the counterbore and in the reduced diameter bore portions respectively, resilient cushioning rings of channel-shaped cross section snugly embracing respective bearing units peripherally and axially thereof, the cushioning ring of the lower bearing unit resting upon said upwardly facing shoulder, a bearing retainer shell device having a lower portion of one diameter and having a larger diameter upper annular rim portion which is detachably secured in said counterbore portion and snugly embraces the cushioning ring of the upper bearing unit, and an elongated segmental spacer sleeve assembly having mutually complementary radially separable parts disposed around and in spaced relation to the blade member in said bore or cavity and having upper end portions in radial contact with the smaller diameter portion of the retainer shell, each of said parts having its lower and upper end portions operatively in axial abutment respectively with the cushioning ring of the lower bearing unit and a downwardly facing surface of the retainer shell device.

References Cited in the file of this patent

UNITED STATES PATENTS

2,051,642	Magrath	Aug. 18, 1936
2,421,734	Kennedy	June 3, 1947
2,609,254	Harris	Sept. 2, 1952
2,781,628	Andrews et al.	Feb. 19, 1957
2,781,629	Winslow	Feb. 19, 1957
2,811,824	Sweet	Nov. 5, 1957
2,829,487	Stoddard et al.	Apr. 8, 1958
3,019,591	Cortabarria	Feb. 6, 1962
3,035,402	Westall et al.	May 22, 1962