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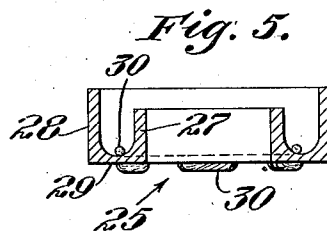
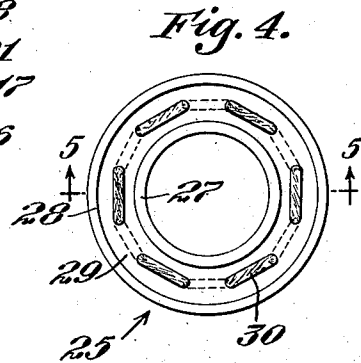
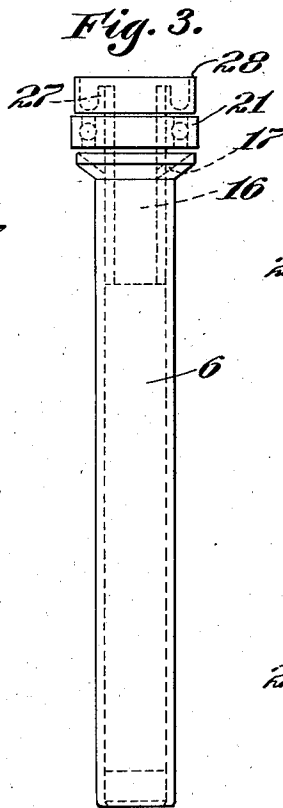
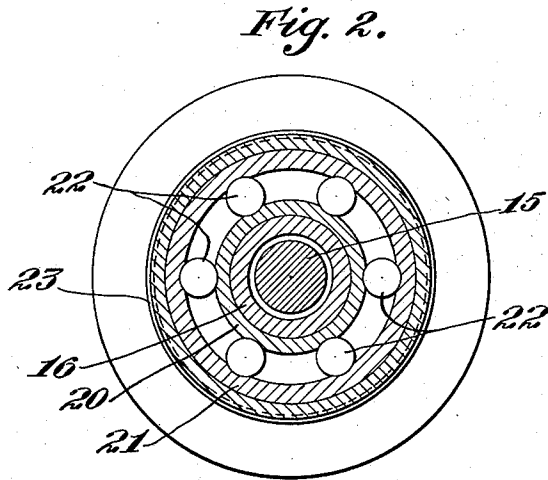
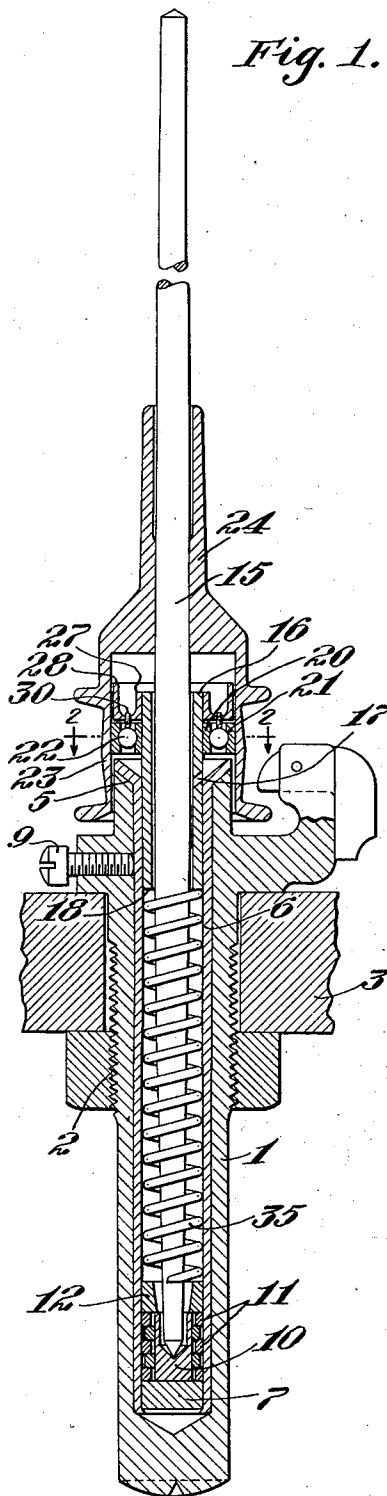
G. H. MAGRATH

2,097,797

SPINNING SPINDLE

Filed Sept. 7, 1934

2 Sheets-Sheet 1



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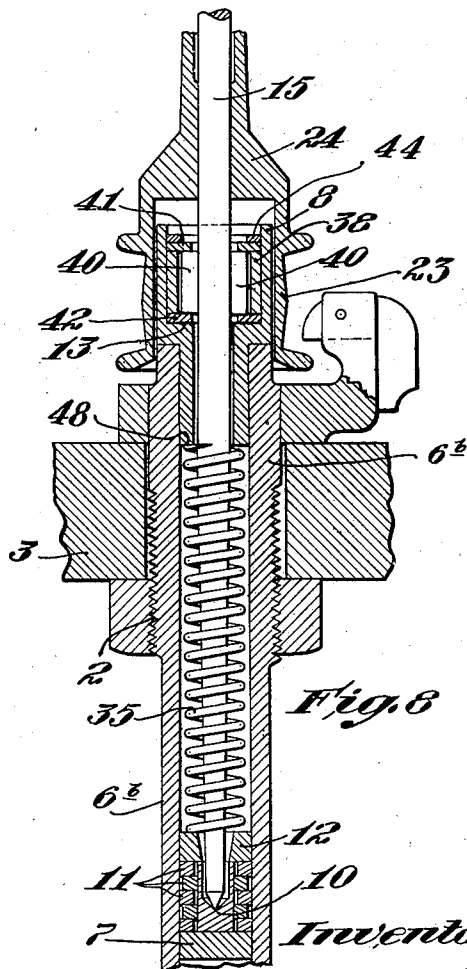
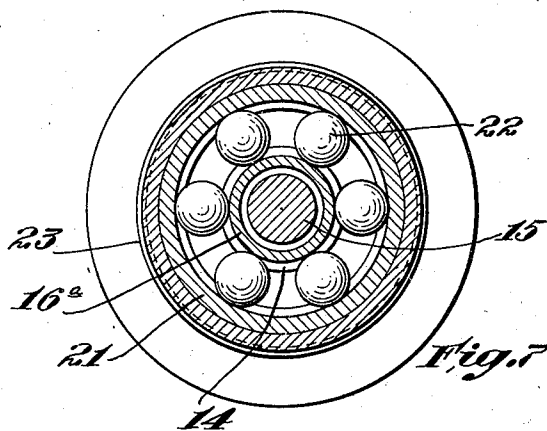
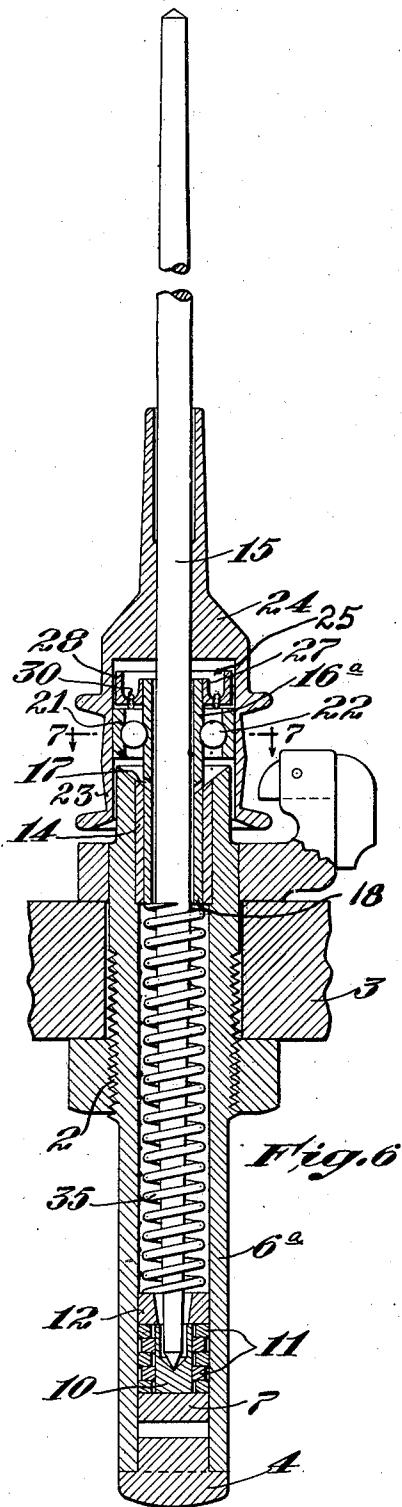
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2,097,797

SPINNING SPINDLE

Filed Sept. 7, 1934

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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SPINNING SPINDLE

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Application September 7, 1934, Serial No. 743,047

7 Claims. (Cl. 308—152)

This invention relates to spinning machines and more particularly to a spindle mounting and associated mechanism.

The present-day spinning machines are designed to operate at very high speeds, for example, 12,000 to 15,000 R. P. M., and due to the stresses and strains imposed on the rotating parts at such high speeds, the design must be such as to permit a rotating spindle to center itself, and also to insure proper lubrication of the rotating parts. In all commercial constructions a bolster and parts associated therewith support the spindle for rotation at its lower end and at points adjacent to its center, the bolster being secured within a bolster case which serves as a reservoir for lubricating oil. In some constructions the bolster case is provided with an extension or collar so that the bearing members supporting the center of the spindle may run in oil when the proper oil level is maintained in the bolster case, whereas in other constructions the splashing of the oil by the rotating parts is depended upon for lubrication. In either case it is not only absolutely essential that the bolster case be oil-tight and free from any defects which eventually might develop into leaks, but also that means be provided for preventing the lubricating oil from being thrown from the rotating parts and working its way to the outer surface of the case and whirl.

In manufacturing bolster cases in accordance with the established practice, the bolster case is first cast and then reamed, machined and threaded, after which it is for the first time tested by subjecting it to compressed air so as to ascertain whether or not it contains any pinholes, cracks or other defects which would be the source of leakage. Due to the imperfections thus discovered, it is necessary to discard or scrap from 25% to 35% of the bolster cases with the consequent loss of time, labor and materials, which greatly increases the manufacturing cost.

The principal objects of the present invention are to avoid the aforementioned practices and to provide a construction wherein the use of an oil-tight bolster case, in addition to a bolster, is unnecessary, and to provide a spindle mounting which is designed so as to insure an efficient and thorough lubrication of all rotating parts and to avoid any danger of the lubricant being thrown or carried to the outer surface of the case and whirl.

Other objects of the invention are to provide a spindle mounting which is of simple design and of strong and durable construction, embodying

a minimum number of parts which may be dismembered so that repairs and replacements may be quickly made at a slight expense, and which is reliable and efficient in operation; to provide a spindle which is supported on antifriction bearing members which permit the spindle to center itself when in operation and which are constructed and arranged so that the spindle may be readily removed and replaced without dismembering or deranging the associated parts.

Further objects relate to various features of the construction and to the operation of my improved spindle and will be apparent from a consideration of the following description and accompanying drawings which show different embodiments of the invention chosen for the purpose of illustration.

In the drawings:

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

Fig. 2 is an enlarged section on the line 2—2 of Fig. 1;

Fig. 3 is an elevation of the bolster, antifriction bearing members and lubricating cup;

Fig. 4 is an enlarged plan view of the lubricating cup;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig. 6 is a sectional elevation showing a modified construction;

Fig. 7 is a section on the line 7—7 of Fig. 6; and

Fig. 8 is a sectional elevation showing another modified construction.

The embodiment shown in Figs. 1 to 5, inclusive, comprises a bolster case 1 which may be of conventional form and construction, having an exteriorly threaded portion 2 or other suitable means by which it may be securely attached to the frame 3 of a spinning machine. The upper end of the bolster case is preferably provided with a beveled end 5 which slopes inwardly and downwardly as shown in Fig. 1. An elongate tubular member or bolster 6 has a sliding fit within the bolster case and its upper end preferably is flared outwardly so as to seat squarely on the beveled shoulder 5 of the bolster case. The bolster 6 may be of steel tubing and its lower end is closed by a washer or disk 7 which has a forced fit therein, the end of the tubing being turned inwardly to provide an oil-tight seal. The bolster 6 may be secured within the case by any suitable means such as a set screw 9.

A step bearing 10 loosely fits within the bolster 6 and is supported by the washer 7. Guiding means

for confining the movement of the bearing 10 to paths extending transversely of the axis of the bolster are provided, and, as here shown, comprise a series of superposed centralizing rings 11, alternate rings having their outer peripheries snugly fitting against the inner wall of the bolster and their inner peripheries spaced from the bearing 10, and the other rings snugly fitting about the bearing 10 with their outer peripheries spaced from the wall of the bolster, as shown in Fig. 1. A retaining ring 12 fits snugly within the bolster and is preferably supported by the centralizing rings and/or the step bearing, the inner diameter of the ring 12 preferably being greater than the diameter of the lower end of the blade 15 so as not to interfere with the movement of the end of the blade.

The upper end of the bolster is provided with a sleeve or collar 16 which has a pressed fit within its upper end and which loosely fits about the blade 15, as shown in Fig. 1. The collar 16 projects beyond the upper end of the bolster and its central portion is provided with an opening 17 which communicates with the annular trough defined by the flaring end of the bolster and collar, thus providing a return for lubricant tending to accumulate therein. The lower end of the collar 16 provides an annular abutment 18 about the inner wall of the bolster, the utility of which is pointed out hereinafter.

Between the upper end of the collar 16 and the bolster are antifriction bearing members which may comprise an inner race ring 20 having a pressed fit about the collar 16, an outer race ring 21 having a snug sliding fit against the inner periphery of the driving flange 23 of the whirl 24, and ball bearing members 22 interposed between the inner and outer race rings, the construction and arrangement being such as to permit the whirl and blade to be removed and replaced without the necessity of dismembering parts or making adjustments.

A lubricating cup 25 is carried by the collar 16 and, as shown in Figs. 4 and 5, comprises inner and outer flanges or walls 27 and 28, respectively, connected by an integral web portion 29 which provides the bottom of the cup. The inner flange 27 is preferably of less height than the outer flange 28 and has a pressed fit about the upper end of the collar 16, the upper ends of the flange and collar being flush with each other and the bottom of the cup 25 is spaced from the upper end of the race rings 20 and 21, as shown in Figs. 1 and 3. The diameter of the outer flange 28 is slightly less than that of the inner periphery of the driving flange so that when in assembled relation with the whirl there is a slight clearance between these parts. The bottom wall or web 29 is provided with a series of circumferentially spaced openings and a wick member 30 passes in and out through these openings as shown in Figs. 4 and 5. The openings in the bottom 29 of the lubricating cup are preferably so disposed that the depending portions of the wick 30 overlie the ball bearings 22 as shown in Fig. 1, so that during rotation of the blade lubricant carried or drawn into the cup 25 may seep through the wick and drip down onto the ball bearings 22.

A coil compression spring 35 is disposed within the bolster 6 with its upper end pressing against the abutment 18 and its lower end against the retaining ring 12, the spring 35 being sufficiently compressed yieldingly to restrain the freedom of movement of the step bearing 10 and associated centralizing rings.

In the embodiment shown in Figs. 6 and 7 the general construction and arrangement of certain of the parts are somewhat similar to those of the previously described embodiment and the same numerals are used to designate the corresponding parts. In this embodiment, however, the bolster case is entirely dispensed with and a tubular member or bolster 6^a of modified construction is provided. The bolster 6^a may be of cast iron or steel, or it may be made from a length of tubing, and in either case it is provided with an exteriorly threaded portion 2 or other means by which it may be securely attached to the frame 3 of the spinning machine. The lower end of the bolster is provided with a tight-fitting plug 4 and its upper end is provided with an inwardly inclined bevel portion.

The supporting washer or disk 7 has a pressed fit within the bolster and the step bearing 10, centralizing rings 11, retaining ring 12, and the spring 35 are assembled within the bolster 6^a as in the previously described embodiment.

The bore at the upper end of the bolster may, if desired, be slightly enlarged so as to accommodate a bushing 14 within which a sleeve or collar 16^a has a pressed fit, the lower end of the collar and/or bushing providing an annular abutment 18 against which the upper end of the spring 35 presses. The collar 16^a loosely fits about the blade 15 and its upper end is provided with a hardened surface having a circumferential groove for the reception of ball bearings 22, this end constituting the inner race of an antifriction bearing member which provides a support for the blade and whirl. The outer race ring 21 has a sliding fit against the inner periphery of the driving flange 23 so as to permit the removal and replacement of the blade and whirl without dismembering any of the associated parts.

The lubricating cup 25 has a pressed fit about the end of the collar 16^a and its outer wall 27 is spaced from the inner periphery of the whirl and its bottom spaced from the bearing members as shown in Figs. 6 and 7. The arrangement of the wick 30 and openings in the lubricating cup 25 is such as to register with the ball bearings 22 and the openings 17 in the collar may be provided for the return of lubricant tending to accumulate in the upper end of the bolster, as in the previously described embodiment.

In both embodiments the construction and arrangement of parts is such that the step bearing supporting the lower end of the blade is permitted sufficient freedom of movement to allow the blade to center itself when rotating at high speeds, and the rotating parts are held out of contact with the bolster and associated parts except at their two points of support. In both arrangements an efficient and thorough lubrication is assured as the lubricant contained within the bolster is carried upwardly into the lubricating cup where it is distributed on the rotating bearings, the excess accumulating in the trough at the top of the bolster where it is returned back into the lower part of the bolster.

In Fig. 8 I have shown a further modification wherein the construction of the lower part of the bolster or tubular casing 6^b and the parts associated therewith are substantially identical to that of the embodiment shown in Figs. 6 and 7, the same numerals being used to designate the corresponding parts of like construction. In this embodiment the upper end of the casing 6^b is provided with an extension or neck 8 which projects upwardly within the driving flange 23 of the

whirl and which has a depending inwardly offset skirt portion having a pressed fit within the upper end of the casing 6^b and providing an annular shoulder 13 within the neck 8.

5 The antifriction bearing members which support the blade and whirl comprise an outer ring or sleeve 38 disposed against the inner periphery of the neck 8, a plurality of circumferentially disposed roller bearings 40, the inner faces of which contact directly with the blade 15, and a pair of inwardly directed retaining rings or flanges 41 and 42 at the upper and lower ends of the rollers, respectively. The assemblage is retained within the neck 8 by a ring 44 which has a pressed fit within the neck and is operative to hold the assemblage in place upon the shoulder 13. The lower end of the depending skirt of the neck 8 provides an annular abutment 48 against which the upper end of the compressed coil spring 35 presses, as in both of the previously described embodiments. As above noted, the construction of the lower end of the casing 6^b and parts disposed therein is the same as that shown in Figs. 1 and 6, and likewise permits movement of the step bearing 10 laterally of the axis of rotation of the blade 15.

In this embodiment, as in both of the previously described embodiments, the construction and arrangement are such that the rotating parts are held out of contact with the stationary parts except at their two points of support. This construction is also such that the blade may center itself when operating at high speeds and that both the blade and whirl members may be easily removed and replaced without dismembering or deranging any of the associated parts.

While I have shown and described different embodiments of the invention, it is to be understood that the present disclosure is for the purpose of illustration only, and that various changes in shape, proportion and arrangement of parts, as well as the substitution of equivalent elements for those herein shown and described, may be made without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A spindle construction comprising a fixed support, an elongate tubular member rigidly secured to said support and having a closed lower end, a step bearing loosely mounted in said lower end and movable in paths extending transversely of the longitudinal axis of said tubular member, a blade rotatably supported at its lower end on said step bearing, a cylindrical sleeve, the lower end of which is secured to the upper end of said tubular member and the upper end of which projects beyond the end of said tubular member and surrounds said blade, a whirl secured to said blade and surrounding the upper end of said tubular member and sleeve, antifriction bearing members interposed between the upper end of said sleeve and the inner periphery of said whirl, and a coil compression spring interposed between the lower end of said sleeve and said step bearing, said spring being operative yieldingly to restrain the freedom of movement of said step bearing.

2. A spindle construction comprising a fixed support, an elongate tubular member rigidly secured to said support and having a closed lower end, a step bearing mounted in said lower end and freely movable in paths extending transversely of the longitudinal axis of said tubular member, a blade rotatably supported at its lower end on said step bearing, a cylindrical sleeve, the

lower end of which is secured to the upper end of said tubular member and the upper end of which projects beyond the end of said tubular member and surrounds said blade, a whirl secured to said blade and surrounding the upper end of said tubular member and sleeve, antifriction bearing members comprising an inner race secured to the upper end of said sleeve, an outer race having a sliding fit against the inner periphery of said whirl and bearings secured between said inner and outer race, and a coil compression spring interposed between the lower end of said sleeve and said step bearing, said spring being operative yieldingly to restrain the freedom of movement of said step bearing.

3. A spindle construction comprising a fixed support, an elongate tubular member rigidly secured to said support and having a closed lower end, a step bearing mounted in said lower end and freely movable in paths extending transversely of the longitudinal axis of said tubular member, a blade rotatably supported at its lower end on said step bearing, a cylindrical sleeve, the lower end of which is secured to the upper end of said tubular member and the upper end of which projects beyond the end of said tubular member, said sleeve surrounding said blade and having a hardened upper end constituting an inner race, an outer race ring having a sliding fit against the inner periphery of said whirl, a plurality of bearing members interposed between said outer race ring and inner race, and a coil compression spring interposed between the lower end of said sleeve and said step bearing, said spring being operative yieldingly to restrain the freedom of movement of said step bearing.

4. A spindle construction comprising a fixed support, an elongate tubular member rigidly secured to said support and having a closed lower end, a step bearing mounted in said lower end and freely movable in paths extending transversely of the longitudinal axis of said tubular member, a blade rotatably supported at its lower end on said step bearing, a cylindrical sleeve, the lower end of which is secured to the upper end of said tubular member and the upper end of which projects beyond the end of said tubular member and surrounds said blade, a whirl secured to said blade and surrounding the upper end of said tubular member and sleeve, antifriction bearing members interposed between the upper end of said sleeve and the inner periphery of said whirl, a lubricating cup secured to the upper end of said sleeve above said bearing members and operative to distribute lubricant on said bearing members, and a coil compression spring interposed between the lower end of said sleeve and said step bearing, said spring being operative yieldingly to restrain the freedom of movement of said step bearing.

5. A spindle construction comprising a fixed support, an elongate tubular member rigidly secured to said support and having a closed lower end, a step bearing mounted in said lower end and freely movable in paths extending transversely of the longitudinal axis of said tubular member, a blade rotatably supported at its lower end on said step bearing, a cylindrical sleeve, the lower end of which is secured to the upper end of said tubular member and the upper end of which projects beyond the end of said tubular member and surrounds said blade, a whirl secured to said blade and surrounding the upper end of said tubular member and sleeve, antifriction bearing members comprising an inner

race secured to the upper end of said sleeve, an outer race having a sliding fit against the inner periphery of said whirl and bearings secured between said inner and outer race, a lubricating cup secured to the upper end of said sleeve above said bearings and operative to distribute lubricant on said bearings, and a coil compression spring interposed between the lower end of said sleeve and said step bearing, said spring being operative yieldingly to restrain the freedom of movement of said step bearing.

6. A spindle construction comprising a fixed support, an elongate tubular member rigidly secured to said support and having a closed lower end, a step bearing mounted in said lower end and freely movable in paths extending transversely of the longitudinal axis of said tubular member, a blade rotatably supported at its lower end on said step bearing, a cylindrical sleeve, the lower end of which is secured to the upper end of said tubular member and the upper end of which projects beyond the end of said tubular member, said sleeve surrounding said blade and having a hardened upper end constituting an inner race, an outer race ring having a sliding fit against the inner periphery of said whirl, a plurality of bearing members interposed between said outer race ring and the inner race, a lubri-

cating cup secured to the upper end of said sleeve above said bearing members and operative to distribute lubricant on said bearing members, and a coil compression spring interposed between the lower end of said sleeve and said step bearing, said spring being operative yieldingly to restrain the freedom of movement of said step bearing.

7. A spindle construction comprising a fixed support, an elongate tubular member rigidly secured to said support and having a closed lower end, a step bearing mounted in said lower end and freely movable in paths extending transversely of the longitudinal axis of said tubular member, a blade rotatably supported at its lower end on said step bearing, an annular shoulder within said tubular member and spaced from its upper end, antifriction bearing members supported on said shoulder and including roller bearings contacting at their inner faces with the periphery of said blade, an abutment on the inner surface of said tubular member below said antifriction bearing members, and a coil compression spring interposed between said abutment and step bearing, said spring being operative yieldingly to restrain the freedom of movement of said step bearing.

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