J. R. COE.

SPINDLE.

APPLICATION FILED DEC. 22, 1905.

914,794. Patented Mar. 9, 1909.

FIG. 3.

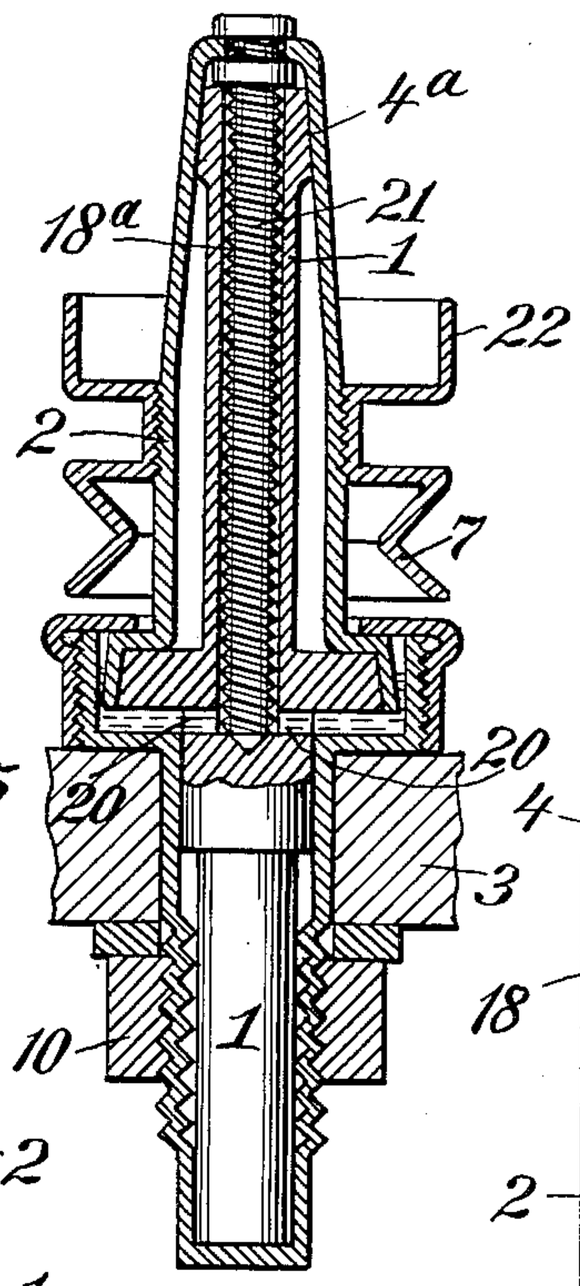


FIG. 4.

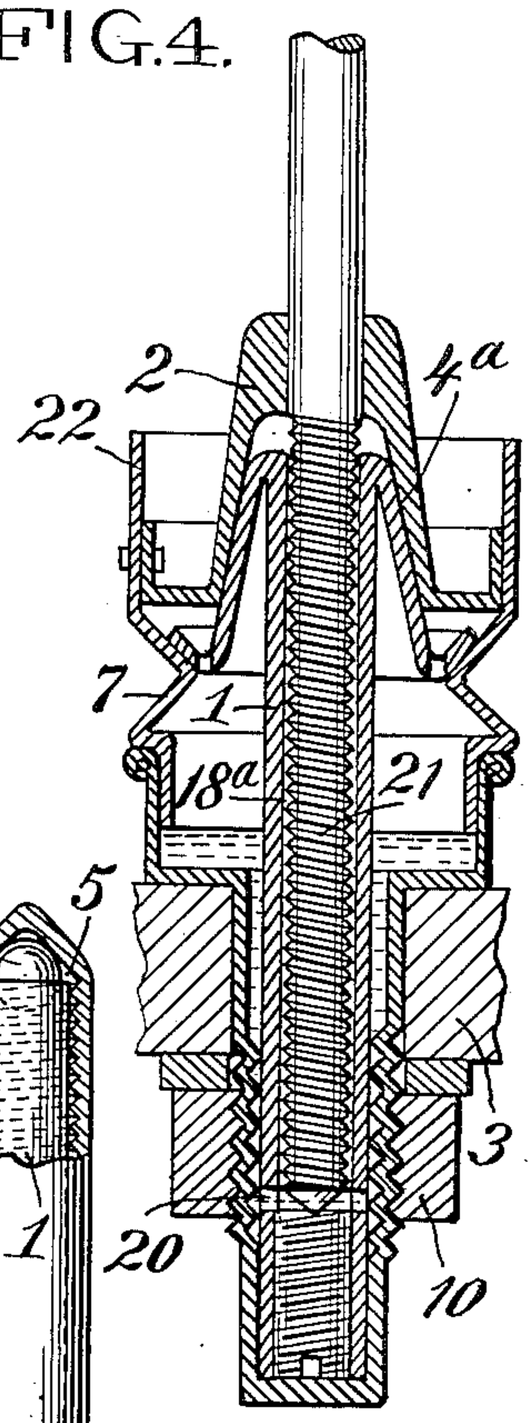


FIG. 1.

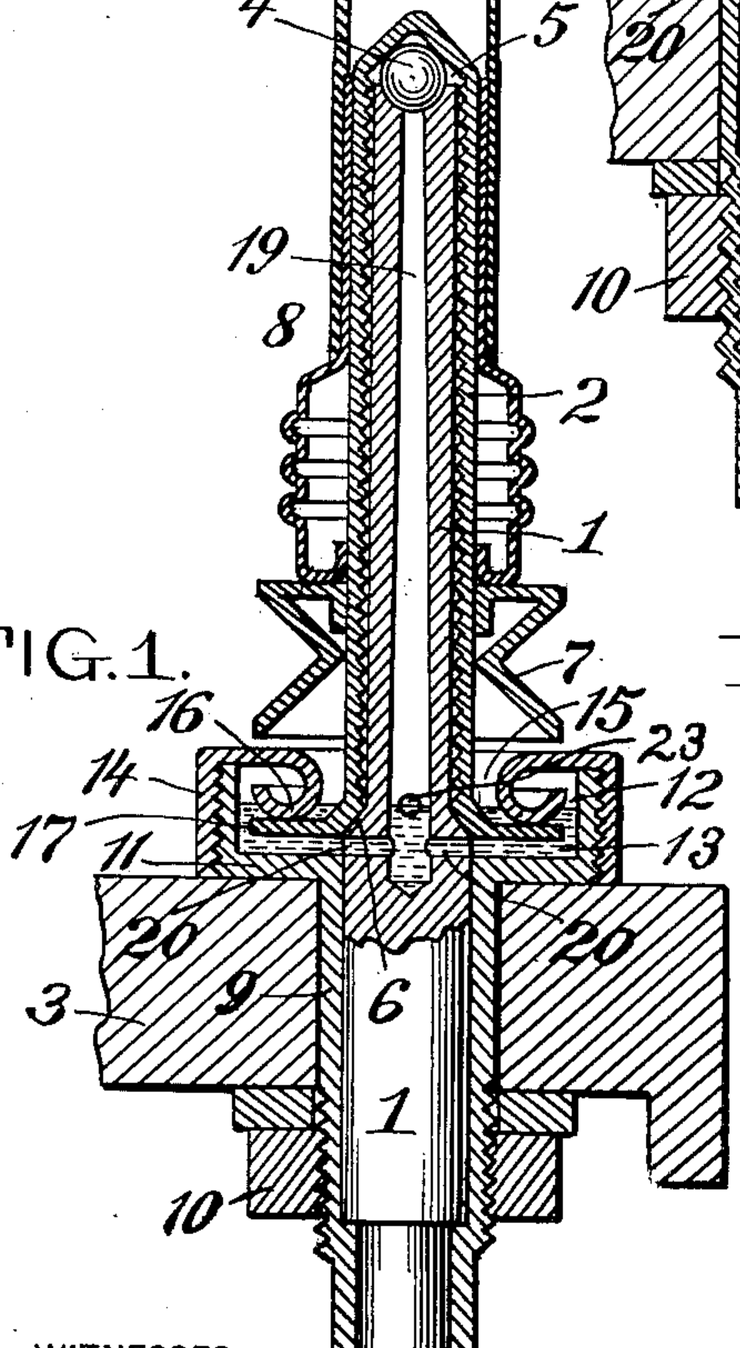
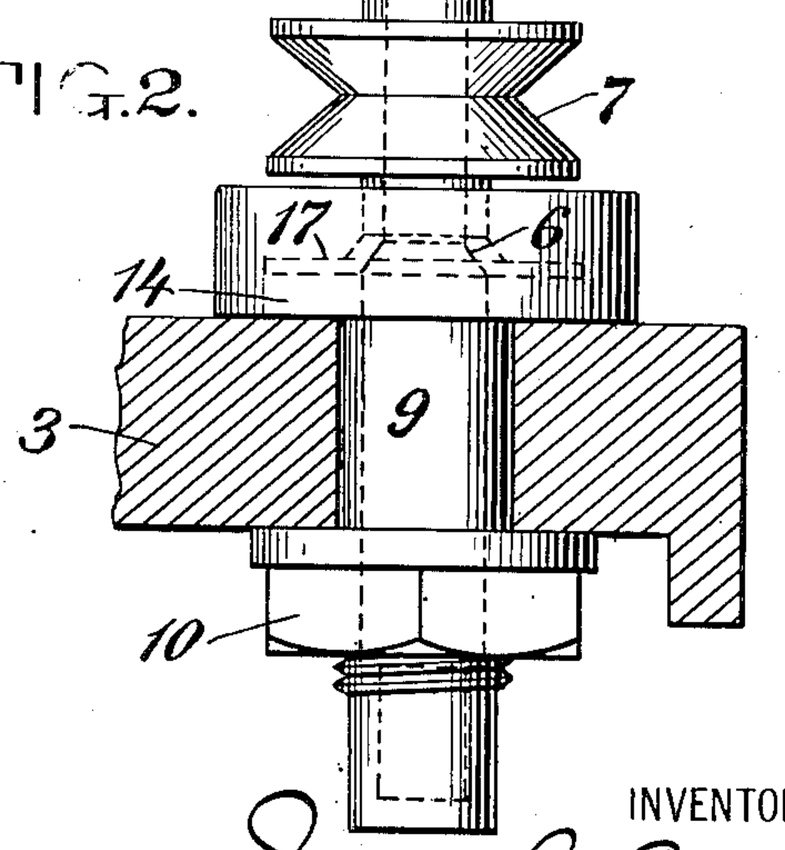


FIG. 2.



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SPINDLE.

No. 914,794 Specification of Letters Patent. Patented March 9, 1909.

Application filed December 22, 1905. Serial No. 292,953.

To all whom it may concern:

Be it known that I, JAMES ROBERT COE, a citizen of the United States, residing at Ansonia, county of New Haven, State of Connecticut, have invented certain new and useful Improvements in Spindles, of which the following is a specification.

My invention relates to yarn spinning or twisting apparatus and more particularly to forms of such apparatus wherein high spindle speed is attained.

The invention has special reference to the construction, mounting, and lubrication of the spindles, the object being to prevent vibration thereof, reduce friction and the resulting wear upon the moving parts and render the same noiseless in running. To this end, the spindle is mounted in suspended relation to its bearings and is held by the same in perfect balance. Such an arrangement affords many important advantages in that it permits the bobbins to be seated low upon the spindles and the weight thereof to be equalized above and below the main bearing, which is preferably located at the upper end of the spindle. In connection with such a mounting for the spindles, provision is made for a continuous feed and distribution of oil or other lubricant throughout the bearings, the effect of which is to maintain the spindle bearings in an enveloping film of oil, and as a result, all friction, noise, etc. is done away with, permitting the spindles to be driven at the highest possible speed without vibration, heating, or wear of the bearings.

The accompanying drawings will serve to illustrate several forms of spindles embodying my invention.

In the drawings: Figure 1—is a vertical section illustrating a preferred form of spindle with a bobbin thereon. Fig. 2—is a view in elevation of the same, showing the bobbin removed and the upper end of spindle in section. Fig. 3—is a vertical section illustrating a modified form of spindle, and Fig. 4—is a similar view of a further modification.

Referring now to the drawings: The spindle shown consists essentially of two parts or members, 1 and 2. The member 1 is mounted upon the spindle rail 3, and serves as a support for the other member, 2, in the form of a sleeve, which is rotatably mounted thereon with bearings at each end thereof.

The upper or main bearing is preferably in the form of a ball, 4, which is seated in a recess in the end of the supporting member, 1, and serves to hold the member 2 centered and in suspended relation thereto. The member 2 is closed at its upper end; the bore thereof being tapered or coned, as indicated at 5 to coact with the ball 4. The lower bearing, 6, is preferably conical, as shown in Figs. 1 and 3, and combines with the upper bearing to hold the member 2 in perfect balance and centered relatively to the member 1. The bearings 4 and 6 thus constitute terminal bearings for the rotatable member. The member 2 is driven in the usual manner by means of a whirl, 7, fast thereon, around which passes a driving belt (not shown). The whirl serves as a rest for the bobbin 8, which seats thereon when in position upon the spindle.

The spindle at its lower end is inclosed in a supporting case, 9, which is fitted in an opening in the spindle rail 3, and secured by clamp nut, 10, threaded upon the lower projecting end thereof. Above the rail the casing is enlarged to form a base, 11, which is bored out to provide a cup or chamber, 12, suitable for holding a quantity of oil or other lubricant, 13. A screw cap, 14, serves to close the oil cup or chamber in the base and is provided centrally with an opening, 15, through which the spindle projects. Around the opening, 15, in the screw cap, an inturned flange, 16, is formed, which acts as a whirl-down-hold by bearing upon a lower terminal flange, 17, of the sleeve or driven member of the spindle, and at the same time prevents the escape of oil through the opening 15.

In order that the spindle may be self-lubricating throughout its bearings, I provide means for automatically effecting a continuous feed and distribution of oil from the cup or chamber 12 to the upper bearing, by way of a passage provided between the rotating member and its support. This passage is preferably given the form of a helical groove, 18, extending from the lower bearing to the upper one and when the member 2 is rotated operates on the well-known principle of the Archimedean screw, to elevate the liquid and deliver it at the desired point. I have shown the helical groove as a screw thread extending along the wall of the rotatable member, the adjacent grooves being separated merely by the screw threads, whereby a substantially continuous film of oil separates the rotatable member and the

support. By arranging the groove on the rotatable member the film of oil is rotated continuously around the stationary support. An opening 23 serves to deliver oil into the lower end of the groove and also above the conical lower bearing 6. Return for the surplus oil thus delivered is provided by way of a passage, 19, formed centrally of the support 1, which leads downward from the recess therein in which the ball 4 is seated and terminates at its lower end in branches, 20, opening outward into the oil cup or chamber 12. It will thus be seen, that the feed is continuous during rotation of the spindle, and as a complete circulation of the oil takes place a very small quantity will serve in each cup. Frequent renewal of the oil will not be necessary as the casing is practically air tight, to exclude all foreign matter and prevent leakage.

In the modification illustrated in Fig. 3 the direction of flow of the oil is reversed, that is to say, it is fed through the tubular portion of the support 1 to the upper end of the spindle and the surplus oil returns to the cup or chamber 12 by working its way downward through the bearings. For this purpose, there is secured centrally within the driven member of the spindle, a rod, 21, which turns freely in the upper tubular portion of the supporting member 1. The rod 21 extends from the extreme upper end of the spindle, downward to the branch passages 20 opening into the oil cup, and is provided throughout its length with a thread or helical groove, 18[a], by means of which the feed and delivery of oil to the upper bearing is effected. Instead of employing a ball for the upper bearing of the spindle, as in Figs. 1 and 2, I have shown in this instance a cone bearing, 4[a]. The driving whirl is also of a somewhat different type, it being shown threaded upon the member 2 and having in part with it an upturned retaining flange, 22, which forms a circular seat concentric with the spindle to receive the head of the bobbin. Otherwise, the construction is substantially the same as that above described in reference to Figs. 1 and 2.

In the modification illustrated in Fig. 4, a combined step and bolster bearing is shown for the driven member of the spindle and provision is accordingly made for drawing oil from a lower point in the supporting case to include both bearings. The arrangement of the feed and direction of flow of the oil is the same as in Fig. 3. The screw cap 14 is dispensed with in this instance as the driving whirl upon the member 2 has a bearing upon the base and serves to close the oil chamber therein.

It will be observed that a spindle constructed in accordance with my invention as above described may be made up largely of parts stamped, pressed, or spun up from sheet metal, and as a result, the cost is greatly reduced over spindles employing cast parts, requiring machine work, careful fitting, etc.

Having thus described my invention, I claim:

1. A spinning spindle comprising a stationary member, a revoluble member having its base surrounded by a lubricant and helical grooves adjacent each other on said revoluble member adapted to raise the lubricant in the form of a continuous film.

2. A spinning spindle comprising a stationary member, a tubular revoluble member having helical adjacent grooves upon its interior surface adapted to raise the lubricant in the form of a continuous film.

3. A spinning spindle comprising a rotatable member and a stationary member, a conical bearing surface at either end of said rotatable member adapted to maintain said member centered and balanced relatively to the support.

4. A spinning spindle comprising a rotatable driven member, a support therefor, and means carried by the rotatable member and operating automatically on rotation of said member to give motion to a body of lubricant forming a continuous film interposed between and separating the driven member and its support.

5. A spinning spindle comprising a case having an oil chamber formed therein, a tubular support projecting from the case and provided with an upper terminal bearing, a tubular rotatable member mounted upon the bearing in suspended relation thereto, and provided with adjacent helical grooves upon its interior surface for effecting a delivery of oil from the chamber to the bearing in a continuous film and the return of the oil by way of the tubular support.

6. A spinning spindle comprising a stationary member, a revoluble member having its lower bearing in a lubricant receptacle, and means co-acting with said revoluble member to hold it on said bearing and close said lubricant receptacle.

7. A spinning spindle comprising a stationary member, a revoluble member having its lower bearing point in a lubricant receptacle, a disk on the base of said revoluble member, and means co-acting with said disk to close said receptacle.

8. A spinning spindle comprising a rotatable driven member, a support therefor, and means carried by the rotatable member and operating automatically on rotation of said member to give motion to a body of lubricant forming a continuous film interposed between and separating the driven member and its support.

9. A spinning spindle comprising a case having an oil chamber formed therein, a tubular support projecting from the case

and provided with an upper terminal bearing, a tubular rotatable member mounted upon the bearing in suspended relation thereto, and provided with adjacent helical grooves upon its interior surface for effecting a delivery of oil from the chamber to the bearing in a continuous film and the return of the oil by way of the tubular support.

10. A spinning spindle comprising a supporting case having an oil chamber formed therein, a rotatable driven member provided with a terminal flange, a main bearing upon which said member is mounted in suspended relation, and a downhold bearing upon the terminal flange of the rotatable member and serving as a closure for the oil chamber in the supporting case.

11. A spinning spindle comprising a supporting case provided with an oil chamber, a rotatable driven member, a main bearing upon which said member is mounted in suspended relation, a helical oil carrier leading from said chamber to the main bearing, and a downhold for the rotatable member serving as a closure for the oil chamber in the supporting case.

12. A spinning spindle comprising a supporting case having an oil chamber formed therein, a rotatable driven member provided with a terminal flange lying within the oil chamber, a main bearing upon which said member is mounted in suspended relation, a downhold engaging the terminal flange and serving as a closure for the oil chamber, and means for feeding oil from said chamber to the bearings.

In testimony whereof, I affix my signature, in the presence of two witnesses.

JAMES ROBERT COE.

Witnesses:

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E. C. WHEELER.