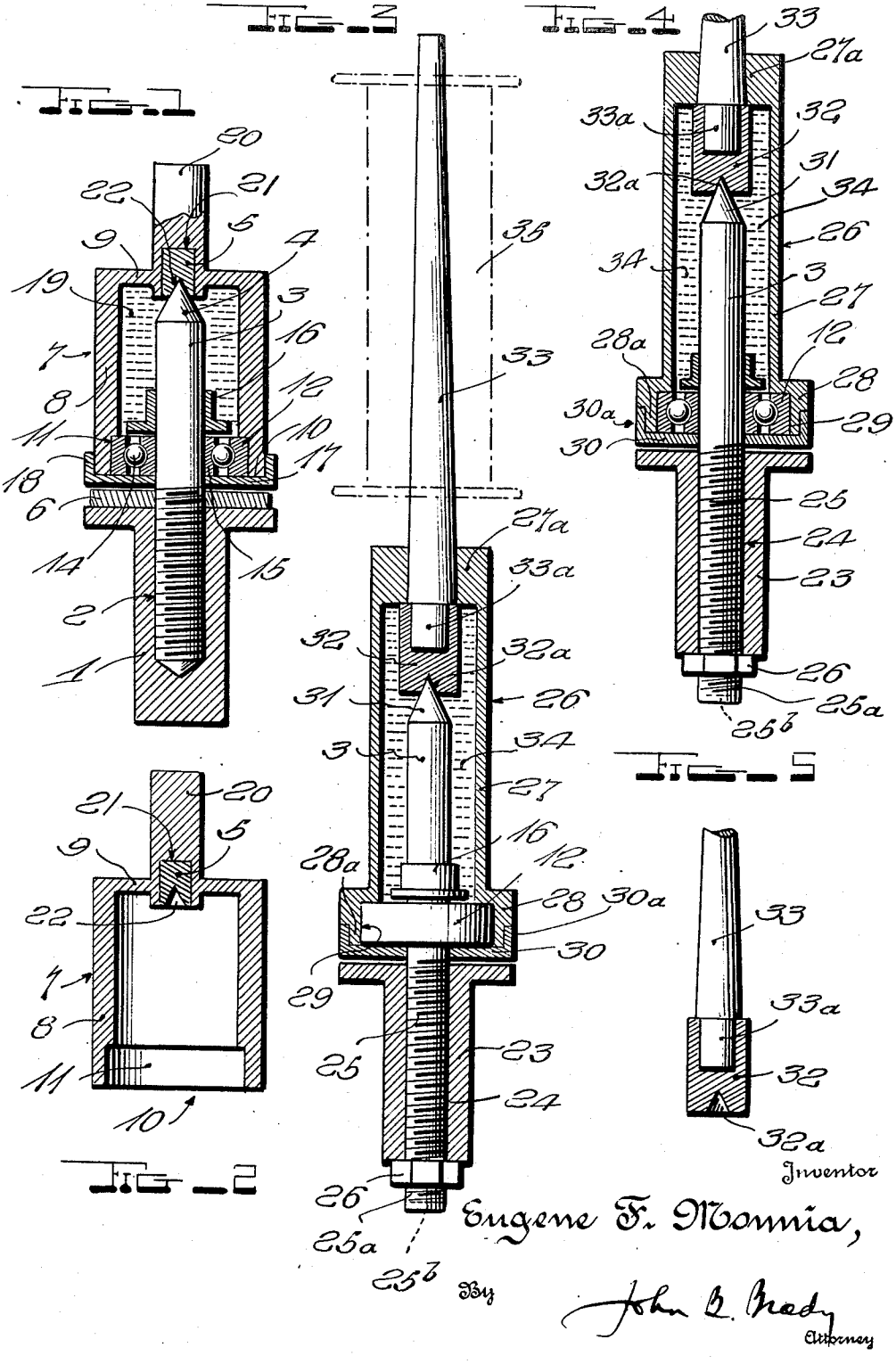
June 5, 1951 E. F. MONNIA 2,555,358

LUBRICATED SPINNING SPINDLE

Filed May 27, 1946 2 Sheets-Sheet 1



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FIG. 6 FIG. 7 FIG. 8

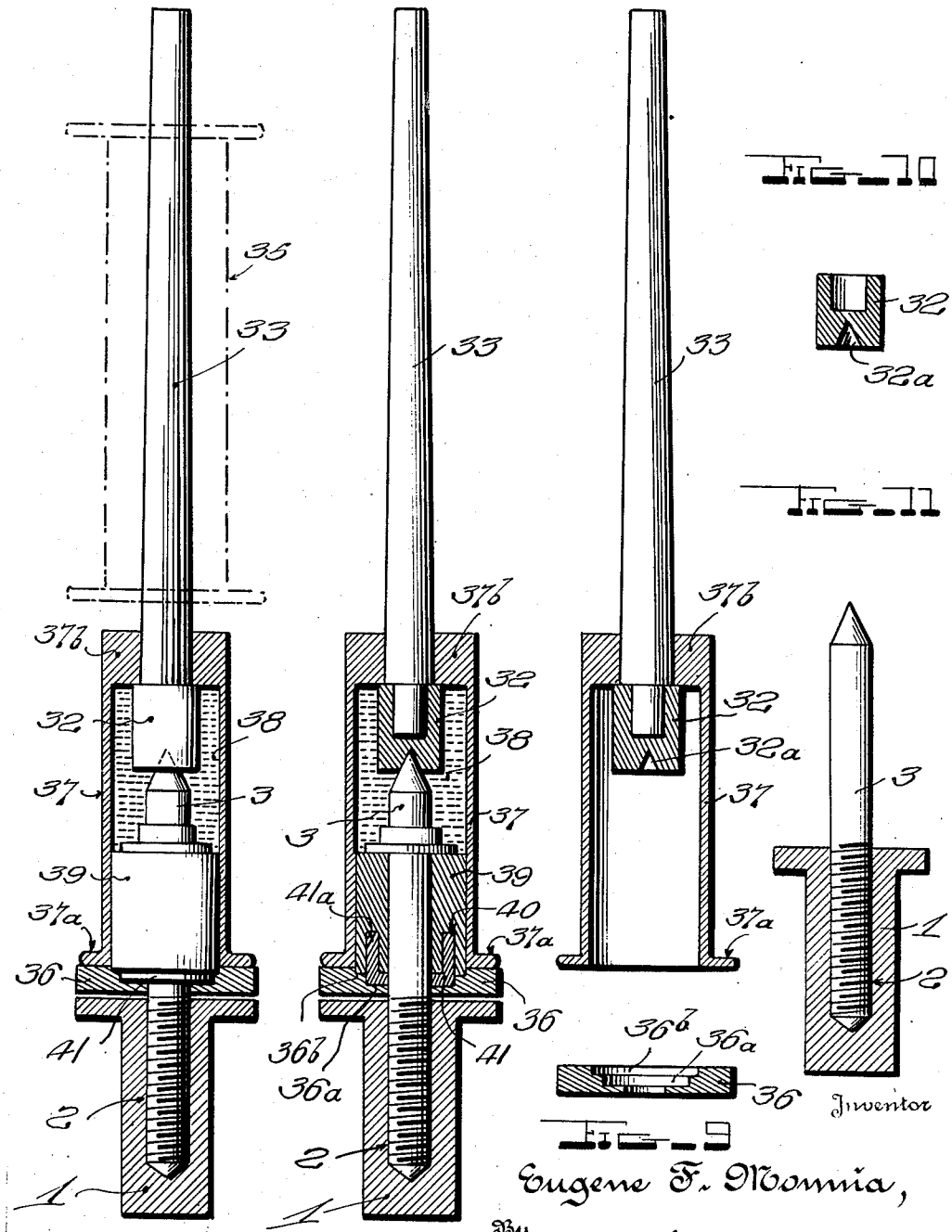


FIG. 10

FIG. 11

FIG. 9

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LUBRICATED SPINNING SPINDLE

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My invention relates broadly to spinning machinery and more particularly to a construction of sealed-in lubricated revolving spindle for spinning machines.

One of the objects of my invention is to provide a construction of high-speed spindle for spinning machines having lubrication means built into the spindle for insuring long and continued operation of the spindle with minimum maintenance attention.

Another object of my invention is to provide a construction of lubricated revolving spindle for spinning machines having a minimum number of parts and in which the spindle member may be removed from time to time without necessarily renewing the bearing structure for the spindle.

Still another object of my invention is to provide a construction of high speed spindle for spinning machines having sealed-in lubricant for reducing friction of the rotating parts to a minimum and insuring precision alignment of the high speed rotating parts.

Still another object of my invention is to provide a construction of sealed-in lubrication cartridge for revolving spindles for permanently supplying lubricant to revolving spindles for insuring high speed operation with minimum friction.

Still another object of my invention is to provide a construction of sealed-in permanently lubricated revolving spindle for installation in multiple arrangement on high speed spinning machines, as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a vertical sectional view of the sealed-in lubrication cartridge for revolving spindle which may function as an idler roll; Fig. 2 is a vertical sectional view of the idler roll or spindle employed in the assembly shown in Fig. 1; Fig. 3 is a vertical sectional view through a high speed spindle of modified form and illustrating the lubricated cartridge of my invention applied thereto with certain of the parts illustrated in side elevation; Fig. 4 is a fragmentary vertical sectional view taken through the spindle mounting and lubricated cartridge of Fig. 3; Fig. 5 is a detailed fragmentary view of the upper bearing of the high speed spindle illustrated in Figs. 3 and 4; Fig. 6 is a vertical sectional view through a modified form of high speed spinning spindle employing a sealed-in lubrication cartridge and oilless bearings for the high speed spindle, certain of the parts being illustrated in side elevation; Fig. 7 is a vertical sectional view taken through the form of the high speed spindle lubrication means illustrated in Fig. 6; Fig. 8 is a cross sectional view showing the lubrication cartridge associated with the high speed spindle which is shown in side elevation for the form of my invention illustrated in Figs. 6 and 7; Fig. 9 is a cross sectional view through the stepped support of the lower seal for the spindle illustrated in Figs. 6 and 7; Fig. 10 is a cross sectional view through the upper bearing structure of the high speed spindle in the form of my invention shown in Figs. 6 and 7; and Fig. 11 is a detailed view illustrating the construction of journaling means for the high speed spindle in the form of my invention shown in Figs. 6 and 7.

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In the high speed operation of spinning spindles it is often necessary to drive such spindles at rates of speed of the order of 10,000 to 15,000 R. P. M. Unless the spindles are journaled with great precision, tendency of vibration is inherent and frictional wear is often excessive. I have developed a spindle for high speed operation of spinning machines in which wear due to friction is reduced to a minimum and in which the moving parts are journaled with such precision that vibration is reduced to a minimum. I provide a construction of sealed-in lubrication cartridge for spindles in which the moving parts are continuously supplied with lubricant. The sealed-in lubrication cartridge may be associated with the ball bearing construction for facilitating high speed operation of the spindle with minimum loss due to friction.

Referring to the drawings in detail, reference character 1 designates a support which may be carried in a bracket extending from the bed of the spinning machine. The support is provided with an internally screw-threaded bore 2 into which the vertically extending shaft 3 is screw-threaded. The shaft 3 is provided with a frusto-conical end 4 which enters a correspondingly shaped recess in an oilless bearing member 5. A spacing member 6 surrounds the shaft 3 and is supported by the support 1. Immediately above the spacing member 6 the sealed-in lubrication cartridge 7 is arranged.

The sealed-in lubrication cartridge 7 comprises a cylindrical case 8 closed at one end as shown at 9, and open at the opposite end as represented at 10. The open end 10 is provided with an annular recess 11 arranged interiorly thereof which receives the outer race 12 for the balls 14. An inner race 15 fits over the shaft 3 and provides

a member around which the outer race 12 is free to revolve. A baffle member 16 fits over the shaft 3 and extends annularly with respect to the races 12 and 15 and balls 14. The case 8 is closed by a shield member 17 which is provided with a skirt 18 which snugly embraces the exterior wall of the case 8. The central portion of the shield 17 fits snugly about the shaft 3 and provides a seal in co-action with the inner race 15 for the fluid lubricant 19 which is contained within the case 8.

The upper end 9 of the case 8 carries a shaft member 20. The end 9 of the case 8 and the end of the shaft 20 are recessed at 21 to receive the oilless bearing 5. The oilless bearing 5, which is recessed at 22, supports the weight which may be imposed upon the shaft member 20 during high speed rotation of the spindle. The shaft member 20 may be an idler or other rotative member used in high speed spinning machinery. The sealed-in lubricant 19 continuously oils the balls 14 between the races 12 and 15, reducing friction to a minimum.

In Fig. 2 I have shown the cartridge 7 removed from the shaft 3. Cartridge 7 is extremely simple in construction in that the case 8 may be readily machined from solid stock by which the idler 20 is integrally related to the case 8 and the socket recess 21 formed therein to receive the oilless bearing 5.

In Figs. 3, 4, and 5, I have illustrated the lubrication cartridge of my invention as applied to a high speed spindle. A support or bracket 23 is arranged for mounting on the bed of the spinning machine and is provided with a vertically extending screw-threaded bore 24 through which the screw-threaded end of the shaft 25 extends and is maintained in a selected position by lock nut 26. The screw-threaded shaft 25 may be adjusted by turning the end 25*a* with a suitable tool engaging the slot 25*b* in the end of the screw-threaded shaft 25 which is surrounded by a ball race of the kind disclosed in Fig. 1, including an annular outer race 12. The lubrication cartridge is illustrated at 26 including a cylindrical casing 27 terminating in the circular flange 28 which is recessed at 29 to receive the outer race 12. The outer race 12 is sealed in position in the end of the cylindrical case 27 by capping plate 30 having an annular skirt 30*a* which fits snugly over the reduced end section 28*a* of the flange 28 of case 27. The screw-threaded shaft 25 carries baffle member 16 arranged in a manner similar to the correspondingly numbered baffle in the structure shown in Fig. 1. The upper end of the screw-threaded shaft 25 is tapered to a conical termius as represented at 31 and enters a correspondingly shaped recess 32*a* in oilless bearing 32. The oilless bearing 32 is attached to the end of reduced section 33*a* of the spindle 33. Spindle 33 extends through the end 27*a* of the cylindrical case 27 forming a revolving unit therewith.

The interior of the cylindrical case 27 is filled with lubricant represented at 34 before the capping plate 30 is secured in position over the flange 28 of cylindrical case 27. When thus filled the outer race 12 of the assembled shaft structure 25, including baffle 16 is introduced into the cylindrical case 27, and the capping plate 30 secured in position thereover, thus completing the sealed-in lubrication cartridge. The high speed bobbin 35 which carries the thread is illustrated in dotted lines supported on the high speed spindle 33. The details of construction of the sealed-in

lubrication cartridge is illustrated in the cross sectional view shown in Fig. 4, while the details of the connection of the oilless bearing 32 with the high speed spindle 33 are shown more clearly in Fig. 5.

In Figs. 6–11, I have shown a further modified form of the spinning spindle of my invention wherein an oilless sleeve bearing is substituted for the inner and outer races with balls therebetween as illustrated in the forms of my invention, shown in Figs. 1–5.

Referring to Figs. 6–11, reference character 1 designates the support or bracket of the type illustrated in Fig. 1, which is provided with the internally screw-threaded bore 2, into which the vertically extending shaft 3 is screw-threaded. A stepped annular member 36 surrounds the screw-threaded vertically extending shaft 3 and coacts with the flange 37*a* of the cylindrical case 37 for sealing lubricant 38 within the lubrication cartridge. The vertically extending shaft 3 carries a cylindrical bushing 39 thereon which serves as a bearing surface around which the interior of the cylindrical case 37 revolves. The cylindrical bushing 39 constitutes a sleeve bearing having a lower end provided with an annular groove or recess 40 into which the annular skirt 41*a* of capping member 41 projects. The capping member 41 surrounds the shaft 3 and serves as an engaging means which seats into the annular recess 36*a* of member 36. The cylindrical bushing 39 serves as a bearing which seats into the annular recess 36*b* in the member 36. The spindle 33 is arranged in a manner similar to the arrangement explained in connection with Figs. 3–5 in that the spindle extends through the end 37*b* of the cylindrical case 37 and is secured to the oilless bearing 32. The oilless bearing 32 has the recess 32*a* thereof journaled on the conical shaped end of the shaft 3. The cylindrical case 37 is filled with lubricant 38 before introduction of the cylindrical bearing 39. After assembly of the bearing structure by introduction of cylindrical bushing 39 through the end of the cylinder 37, the stepped annular member 36 is aligned and applied against the flat annular face of the flange 37*a* of case 37, and by reason of the close machined tolerances maintains a fluid tight seal for the sealed-in lubricant 38 within the cylindrical case 37.

The several forms of idler shaft and high speed spindle of my invention have proven highly practical and successful in operation. I have described my invention in certain preferred embodiments but I realize that modifications in detail may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A lubricated revolving member comprising a support, a pintle extending from said support, a cartridge surrounding said pintle in spaced relation thereto, a spindle member carried by said cartridge and revolving therewith with respect to said pintle, a pair of bearing members disposed within said cartridge at spaced positions with respect to said pintle one of said bearing members being disposed coincidently with the linear axis of said pintle and the other of said bearing members surrounding the linear axis of said pintle, the interior of said cartridge forming a reservoir for fluid lubricant within said cartridge for continuously lubricating both of said bearing

members, one of said bearing members projecting from the lower end of said cartridge in annular step-like arrangement and a complementary shaped annular step-like plate engaging the end of said last mentioned bearing member and closing the reservoir for fluid lubricant within said cartridge for operating said bearing members in a confined body of fluid lubricant.

2. A lubricated revolving member comprising a cylindrical cartridge, a member extending axially from said cartridge and revolving therewith, a bearing member disposed interiorly of one end of said cartridge, a second bearing member disposed adjacent the opposite interior end of said cartridge, a support, a pintle carried by said support and extending into said cartridge and journaled with respect thereto by said bearing members, said first mentioned bearing member being disposed coincidently with the linear axis of said pintle and said second bearing member extending in a circular path around the linear axis of said pintle, the interior of said cartridge forming a reservoir for fluid lubricant within said cartridge for continuously lubricating said pintle and said bearing members, and means for maintaining said reservoir for lubricant within said cartridge fluid-tight for operating said bearing members in a confined body of fluid lubricant.

3. A lubricated spindle comprising a cylindrical case, a spindle projecting from one end of said case, a support, a pintle extending from said support to a position interiorly of said case, said pintle including a cylindrical portion terminating in a frusto conical end portion, a pair of bearing members disposed between said case and said pintle, one of said bearing members comprising a sleeve member interposed between the cylindrical portion of said pintle and the interior wall of said case, and the other of said bearing members comprising a socket for receiving the frusto-conical end portion of said pintle, the interior of said case forming a reservoir for fluid lubricant within said case for continuously lubricating both of said bearing members, said first mentioned bearing member concentrically surrounding said pintle and said second mentioned bearing member being axially aligned with said pintle, and means for sealing said case for maintaining the reservoir for lubricant fluid-tight.

4. A lubricated spindle comprising a revolvable case, a spindle projecting from one end of said case, an oilless bearing disposed interiorly in the said end of said case opposite the projection of said spindle therefrom, a support, a pintle carried by said support and projecting into said case and engaging the oilless bearing therein, a bearing surrounding said pintle and forming a journal with respect to said case in spaced relation to said oilless bearing, said oilless bearing being disposed coincidently with the axis of said pintle and said bearing surrounding said pintle extending in a circular path around said pintle and spaced from the axis of said pintle for a distance equivalent to the radius of the interior of said case, the interior of said case forming a reservoir for fluid lubricant within said case for continuously lubricating both said oilless bearing and said journal, and means for maintaining the reservoir for lubricant fluid-tight.

5. A lubricated spindle comprising a cylindrical case, a spindle projecting from one end of said cylindrical case, an oilless bearing disposed interiorly of one end of said case adjacent the connection of said spindle therewith, a support, a pintle carried by said support and extending into

said case, said pintle having a terminus engaging said oilless bearing, a sleeve-like bearing surrounding said pintle and extending into the other end of said case, said oilless bearing being disposed coincidently with the axis of said pintle and said bearing surrounding said pintle extending in a circular path around said pintle and spaced from the axis of said pintle for a distance equivalent to the radius of the interior of said case, and a stepped annular member interposed between said support and said last-mentioned bearing and said case and engaging the end of last mentioned bearing and the end of said case, lubricant within said case for continuously lubricating both said bearings.

6. A lubricated spindle comprising a support, a pintle extending from said support and having a frusto-conical terminus thereon, a case, said pintle projecting through one end of said case, an oilless bearing disposed interiorly of the end of said case and secured to the end of said spindle, said oilless bearing having a central frusto-conical recess therein aligned with the frusto-conical terminus on said pintle, a bearing member surrounding said pintle and establishing revolvable connection with the opposite end of said case, said oilless bearing being disposed coincidently with the axis of said pintle and said bearing surrounding said pintle extending in a circular path around said pintle and spaced from the axis of said pintle for a distance equivalent to the radius of the interior of said case, the interior of said case forming a reservoir for fluid lubricant within said case for continuously lubricating both of said bearings, and a closure for said case for continuously maintaining the reservoir for fluid lubricant fluid-tight.

7. A lubricated spindle comprising a support, a pintle extending from said support and having a frusto-conical terminus thereon, a case, said pintle projecting through one end of said case, an oilless bearing disposed interiorly of the end of said case and connected with the end of said spindle, said oilless bearing having a central frusto-conical recess therein aligned with the frusto-conical terminus on said pintle, a bearing member surrounding said pintle and effecting revolvable connection with the interior side walls of the lower extremity of said case, said oilless bearing being disposed coincidently with the axis of said pintle and said bearing surrounding said pintle extending in a circular path around said pintle and spaced from the axis of said pintle for a distance equivalent to the radius of the interior of said case, the interior of said case forming a reservoir within said case for continuously lubricating both of said bearings, a flat annular flange on the lower extremity of said case, an annular plate mounted on said support and surrounding said pintle, said annular plate having a multiplicity of concentric recesses therein of successively different diameter, the flange of said case establishing contacting relation with said plate and said last mentioned bearing member extending into one of the recesses in said plate, said last mentioned bearing member including an annular groove therein and a capping member surrounding said pintle and extending into another of the recesses in said plate, said capping member having a skirt projecting into the annular groove in said last mentioned bearing member.

EUGENE F. MONNIA.

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