June 23, 1936. R. REDDIE 2,044,890

SPINNING SPINDLE AND METHOD OF LUBRICATING SAME

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Fig. 1.

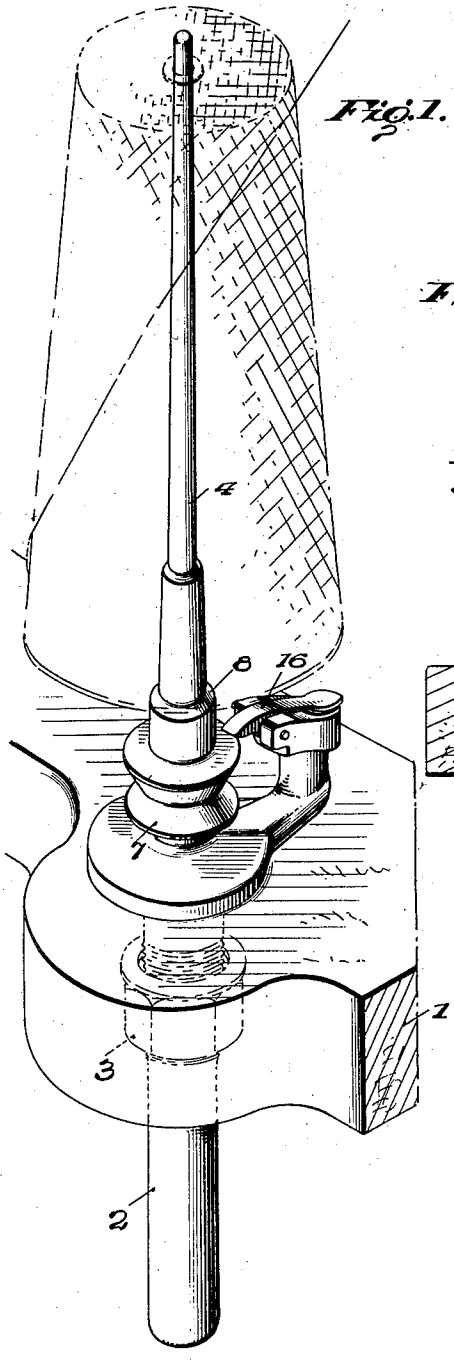


Fig. 4.

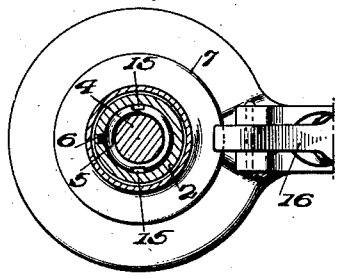


Fig. 2.

Fig. 5.

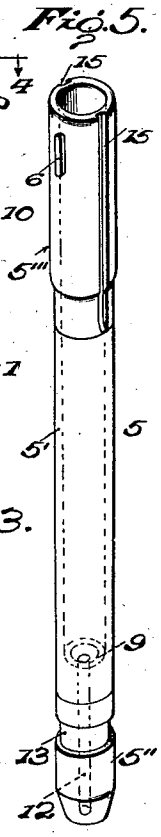


Fig. 3.

Inventor

Roy Reddie

By Cameron, Kerkam & Sutton

Attorneys

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SPINNING SPINDLE AND METHOD OF LUBRICATING SAME

Roy Reddie, Knoxville, Tenn.

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2 Claims. (Cl. 308—169)

This invention relates to spindle bolster assemblies for textile spinning frames, and has for its objects to increase the speed of operation of the spindles, decrease the wear of the parts, and hence the cost for replacement, and decrease the cost of operation of the spindles. It has been proposed heretofore to mount the spindle proper in a bolster having perforated lateral walls and carried by a suitably supported casing, the spindle having a prolonged bearing in the bolster and a bottom step or bearing, also in the bolster, for the lower end of the spindle. With this assembly means have been provided for furnishing a supply of oil from a suitable reservoir from which the oil flows downward around the bolster, and through the perforations to the interior thereof to lubricate the spindle. In some cases it has been proposed to circulate the oil that has reached the spindle in an upward direction between a portion of the spindle and the bolster until the oil overflows the upper end of the bolster and returns to the reservoir. In no case, however, has oil ever been supplied to the bottom of the bearing of the spindle in an imperforate bolster and circulated in an upward direction over the entire bearing portion of the spindle and back to the bottom bearing. Efforts to lubricate the step of the spindle from above by a flow of oil downward between the bolster wall and the spindle have proved highly ineffective, resulting in friction between the lower end of the spindle and the step of the spindle bearing with resulting wear and overheating of the parts. Various means have been proposed for replacing the bearing step and the lower bearing end of the spindle to compensate for such wear. The wear is objectionable not only because of the resulting heating of the parts and the ultimate necessity to replace the worn parts but also because of the prohibition of high speeds. There is a demand today for a material increase in the speed of operation of spindles, to the end that the cost of operation may be reduced, but the resulting friction, wear and overheating of the parts as described above has placed a positive limit on such increase, as well as resulting in an unnecessary consumption of power in the operation of the spindles.

One of the prime objects of the present invention is to so construct and lubricate the bearings between the spindle and the bolster as to avoid friction, overheating of the parts, and the necessity for repairs, and at the same time greatly increase the speed over anything heretofore attained, at a less consumption of power.

With this object in view, according to the present invention, oil is caused to flow upward, rather than downward, to the bearing step in the bolster for the lower end of the spindle, and then circulate upward around the bearing portion of the spindle at the top of the bolster, where the same overflows the bolster within the casing and returns to be again fed upward as before. Preferably, the bearing step in the bolster is in the form of an inverted cone, and an oil duct leads upward to the bottom of said cone. Oil is supplied from a suitable reservoir mounted at a proper height, to the end that the oil may pass downward between the bolster and the casing from said reservoir and enter the duct leading upward to the lower portion of the bearing step for the spindle. Due to the centrifugal action of the spindle, the oil flows upward in a thin film between the surface of the bearing step and the point of the spindle, and from there continues upward around the spindle and between the latter and the interior surface of the bolster to a point where it flows outward over the top of the bolster and descends around the latter to again be supplied to the duct leading upward to the spindle bearing.

One form which the invention may assume is illustrated in the accompanying drawing, but it is to be expressly understood that such drawing is for the purpose of illustration only and is not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawing—

Fig. 1 is a perspective view of a spindle mounted according to the present invention;

Fig. 2 is a vertical, central section of the assembly;

Fig. 3 is a like view of the lower end of the parts, showing a modification of the form shown in Fig. 1;

Fig. 4 is a horizontal, sectional plan view on the lines 4—4 of Fig. 2;

Fig. 5 is a perspective view of one form of the bolster embodying the present invention.

Referring to said drawing, in which like reference numerals indicate like parts throughout the several views, 1 indicates the usual or any suitable frame on which the spindle assembly is mounted; 2 indicates a supporting casing secured in the frame 1, as by means of a nut 3. The spindle 4 takes bearing in the bolster 5, supported in the casing 2, one form of the bolster being shown in Fig. 5. As here shown, the bolster 5 is cylindrical form and is provided with a key 6, entering a corresponding groove on the interior of the casing, whereby revolution of the bolster is prevented.

As shown, the interior bore of the bolster is also cylindrical, but it may taper slightly downward with a taper slightly less than that of the spindle. The spindle is provided with the usual or any suitable whirl 7 secured to the spindle at a point above the bolster, while the spindle is provided with an annular shoulder 8, at a point

above the bolster and serves to close the top of the casing which casing extends above the top of the bolster. The spindle 4 is also provided with a second annular shoulder 8' of the same outer diameter as the bolster 5, and when the spindle is in position this shoulder rests lightly on the top of the bolster so as to permit a film of oil to pass over the top of the bolster when the spindle is in operation. As shown, this shoulder 8' is formed by a ring 8'' secured to the upper part of the spindle stem 4'. The bearing portion 4' of the spindle is slightly tapered downward, that is, the portion of the spindle within the bolster, and the bolster is provided with a bearing step 9, which is in the form of an inverted cone. The lower bearing point 4'' of the spindle is also in the form of an inverted cone corresponding to the inverted cone 9 forming the bearing step. When the spindle is mounted within the bolster with the point 4'' resting in the bearing 9, the bearing portion 4' is out of contact with the interior of the bolster except near the top thereof, there being a constantly diminishing space between the portion 4' and the bolster from the point 9 to the bolster top. Mounted above the frame 1 is a suitable oil reservoir 10, which at its lower end connects with the annular space 11 between the exterior surface of the bolster 5 and the casing 2. Oil from this reservoir flows downward, under action of gravity, around the bolster to a point below the bearing step 9 of the bolster and may, as shown in Fig. 2, flow downward to the bottom of the bolster and enter a vertical axial duct 12 leading up to and communicating with the lower apex of the bearing step 9. In a modified form (see Fig. 3) the oil flows downward around the bolster 5 to an annular groove 13 formed in the bolster at a point below the bearing step for the spindle, and a duct 14 leads inward from said groove 11 and then upward to the apex of the bearing step 9. Preferably the bolster is provided with a plurality of grooves 15 formed in its exterior surface and leading downward for some distance from the upper end of the bolster, as will be readily understood from an inspection of Fig. 5.

The top of the reservoir 10 is closed by the usual or any suitable doffer guard 16 hinged thereto to enable the oil to be supplied to the reservoir.

Preferably the bolster 5 is made in three parts, consisting of a central seamless steel tube 5', a lower portion 5'' of promet alloy and an upper portion 5''' also of promet alloy. The promet alloy affords an ideal bearing surface, and the use of the central seamless steel tubing connecting these promet alloy parts lessens the cost of the construction. Oil introduced into the reservoir 10 flows down by gravity around the outside of the bolster and between the bolster and the interior surface of the casing 2, and, in the construction shown in Fig. 1, flows to the bottom of the bolster and upward through the axial bore 12 to the apex of the conically shaped bearing step 9. When the spindle is set in operation, the oil is forced upward from the bearing step 9 by centrifugal action and continues upward around the tapered spindle to the top of the bolster, and then flows over the top of the bolster within the casing and downward through the grooves 15 to be again returned to the bottom of the bolster and fed upward by centrifugal action as before. In its course of travel, the oil forms a constant film between the bearing point 4'' of the spindle and the conical bearing step 9, as well as a constant film of oil between the taper of the spindle and the interior surface of the bolster. The result is that friction is practically eliminated, no oil is lost, heating of the parts is avoided and the speed of the spindle may be accordingly increased over that heretofore attainable. It has been demonstrated by months of operation that an increase in speed over that heretofore attained may be as much as 25 per cent. This increase in speed is obtained without wear and consequent deterioration of the parts; without overheating of the parts and burning of the oil; and with consumption of less power than has been heretofore required to operate the spindle at the lower rate of speed with the resulting friction, wear and overheating of the parts.

By the present invention, by feeding the oil to the bottom of the bearing step, either as shown in Fig. 1 or Fig. 3, the oil is circulated in a closed circuit around the bearing portion of the spindle within the bolster and must, of necessity, pass between the bearing step in the bolster and the bearing point of the spindle. The result is that all bearing points are efficiently lubricated, and constantly kept out of contact with the bearings in the bolster by reason of the film of oil interposed between said points and the bearing and hence, friction, wear and overheating are obviated.

It will be readily recognized by those skilled in the art that various modifications of the inventive idea may be employed without departing from the spirit of the invention, that is, without departing from the idea of supplying the oil to the bottom of the bearing seat in an imperforate bolster and feeding it upward in a closed circuit by means of the revolution of the spindle, and such modifications as fall within the terms of the appended claims are intended to be covered thereby.

Having thus described the invention what is claimed is:

1. In a spindle mounting, the combination of a casing, a bolster with imperforate lateral walls mounted within said casing with its top below the top of the casing and with a passage for oil between the interior of the casing and the exterior of the bolster and leading from the top of the bolster to the base portion of said bolster, said bolster having a cone shaped bearing in the base portion thereof and a passage leading upward to the bottom of said bearing and connecting to the bottom of said bearing with the oil passage between the bolster and casing, a spindle taking bearing wholly within said bolster, and means supplying oil to the space between said casing and bolster.

2. In a spindle mounting, the combination of a casing, a bolster with imperforate lateral walls mounted within said casing with its top below the top of the casing and with a passage for oil between the interior of the casing and the exterior of the bolster and leading from the top to the base portion of said bolster, said bolster having a cone shaped bearing in the base portion thereof and a passage leading upward to the bottom of said bearing and connecting the bottom of said bearing with the oil passage between the bolster and casing, a spindle taking bearing wholly within said bolster and provided with a shoulder closing the top of said casing and an annular shoulder within the top of said casing and closely adjacent to the top of the bolster, and means supplying oil to the space between said casing and bolster.

ROY REDDIE.