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F. G. SMITH

CENTERING MEANS FOR SPINDLES

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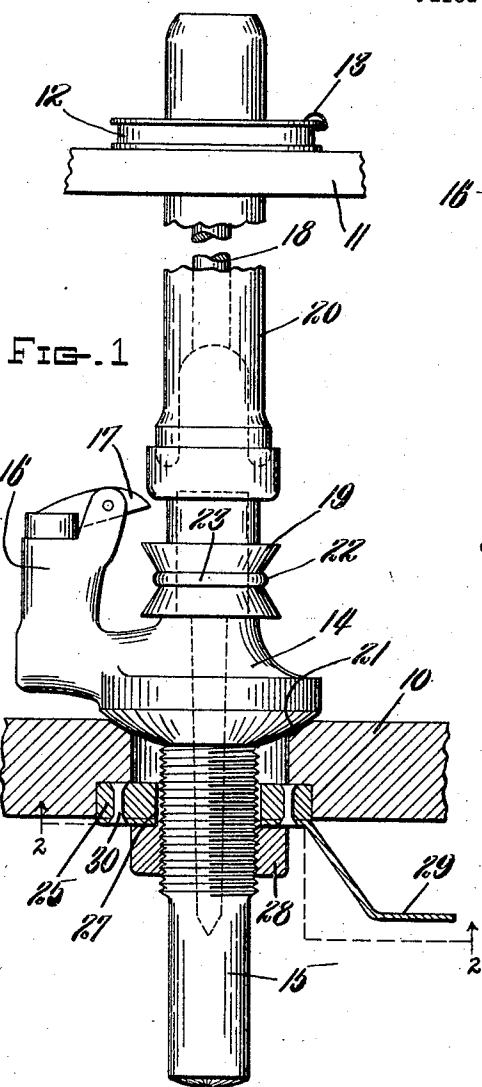


FIG. 1

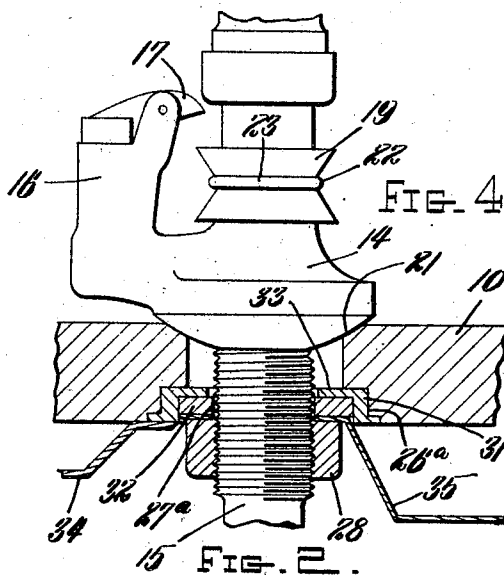


FIG. 2

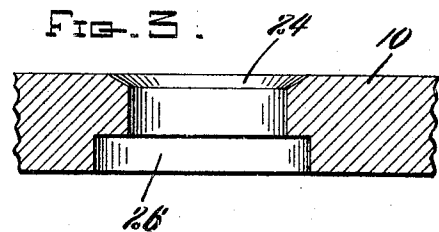


FIG. 3

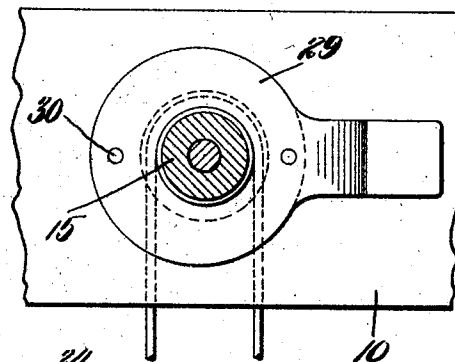


FIG. 4

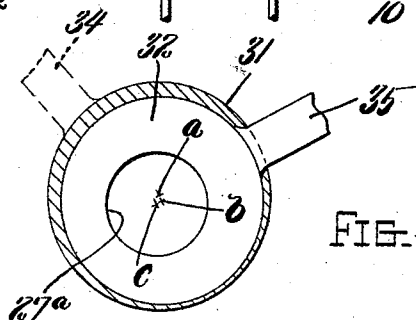


FIG. 5

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CENTERING MEANS FOR SPINDLES.

Application filed June 9, 1922. Serial No. 567,037.

To all whom it may concern:

Be it known that I, FREDERICK G. SMITH, a citizen of the United States, residing at New Bedford, in the county of Bristol and State of Massachusetts, have invented new and useful Improvements in Centering Means for Spindles, of which the following is a specification.

The present invention relates to spindles such as are used in ring spinning frames for twisting fibers into roving, yarn or thread.

Its object is to provide a means of mounting such a spindle with capacity for adjustment, while the machine is running, if need be, so as to place the spindle accurately in the center of the traveler ring.

The invention consists in the means for carrying the above stated object into effect described and claimed in the following specification with reference to the accompanying drawings, and in all equivalent constructions containing the same fundamental principles.

Referring to the drawings:—

Figure 1 is an elevation of a spindle in operative relation with the supporting rail and one form of the adjusting means embodying this invention shown in section.

Figure 2 is a plan view of the adjusting means as seen from beneath, with the spindle base shown in cross section.

Figure 3 is a fragmentary section of the spindle rail showing the mounting for the spindle and for the adjuster in detail.

Figure 4 is a fragmentary view, similar to Figure 1, showing a modification in the adjusting means.

Figure 5 is a horizontal section, looking downward, of the adjusting means shown in Figure 4 and illustrating diagrammatically the character of adjustment possible with this form of adjusting means.

Like reference characters designate the same parts in all the figures.

Referring to Figure 1, 10 represents the spindle rail of a spinning machine, such as a ring spinning frame, a roving frame, or any other machine in which spindles are mounted. 11 represents the ring rail of such frame or machine carrying traveler rings

12 on which travelers 13 are arranged to run for twisting the yarn or roving wound on the bobbins. 14 represents a spindle base which is mounted on the spindle rail, such base having a depending socket 15 and a rising arm 16 furnished with an oil well and a doffer guard 17. 18 represents the spindle blade secured to a whirl 19, and mounted in or on suitable bearings in the base; and 20 represents the bobbin mounted on the spindle blade.

As is well understood in the spinning art, it is essential that the spindle be accurately centered with respect to the traveler ring in order to produce yarn of uniform quality as to tension and twist. I have devised a new means of accomplishing this result, which is used in connection with means for rigidly holding the spindle in place after being adjusted and is adapted to be operated to effect the desired adjustments while the machine is running as well as when it is idle.

Part of this means consists in the mode of mounting the base in the spindle rail, and another part consists in means for shifting the base. Two forms of the latter feature of the invention are herein illustrated, but the first part or feature is common to both forms.

In order to permit of the desired adjustment, the hole in the ring rail 10, through which the socket of the base projects, is made substantially larger than such socket, and the part of the base above the socket, which may be called for convenience of this description a "head," is provided with a convex under surface 21 which is spherical in curvature, with its center in the axis of the whirl and in the same plane with the middle of the driving band or tape 22 which surrounds the whirl and gives rotary motion to the spindle. The point 23 in Figure 1 represents the projection in the plane of the drawing of the center of curvature of the spherical zone 21. This curved face 21 rests on a concave seat 24 surrounding the upper end of the hole in the rail. The seat 24 is conical and its surface elements are tangent to the spherical surface 21 of the base. Thus

the entire spindle may be adjusted at any angle within the limits permitted by the hole in the rail, and with all such adjustments the base is seated accurately at the same tangent line on the seating surface 24, and the position of the center of the whirl is not changed. In effect, this construction provides a ball and socket joint between the spindle base and the rail.

Of course the movement given to the upper part of the spindle is opposite to that given to the base and the extent of the movement is greater than that of the base in proportion as the distance from the center 23 of angular movement of the point on the spindle under observation when the adjustment is made, is greater than the distance from the same center of the part of the base to which the adjusting motion is imparted. Usually the adjustments are made when the ring rail is at the top of its movement, and usually also the distance through which the upper end of the spindle and bobbin needs to be adjusted to center it with the traveler ring is comparatively small, wherefore the movement given to the base is even less.

Ordinarily the displacement of the spindle from truly centered position occurs in the direction of pull of the driving band 22, and the form of my adjusting means shown in Figures 1 and 2 is designed to effect the adjustment in approximately the line of this pull. The adjusting means comprises a ring 25 having a cylindrical outer surface which is seated in a complementary recess 26 in the under side of the spindle rail, and having also a circular hole 27 which fits about the depending socket portion of the base with enough freedom to permit slight angular movement of the base. This hole is eccentric to the outer circumference of the ring, whereby rotation of the ring will displace the hole, and with it that part of the base which passes through the hole. Also the socket 26 which receives the ring is eccentric to the axis of the conical seat 24 by an amount substantially equal to the eccentricity of the hole 27, and the direction in which its axis is offset from the axis of such seat is approximately perpendicular to the direction of pull of the driving band. When the adjusting ring is assembled with the spindle, it is placed with the center of the hole 27 diametrically opposite to the axis of the recess 26, or approximately so. Then any rotating movement of the ring will tilt the spindle in the line of the band pull, as is required for adjustment under the conditions set forth.

The spindle is secured in its adjustments by a nut 28 which is screwed upon a thread formed in that part of the spindle base which passes through the ring, and when the nut is set up it forces the ring against the bottom of its seating recess 26 and draws

the head of the base against the conical seat 24, thus clamping the spindle tightly to the rail.

For giving the adjusting movements to the ring I have provided an arm or handle 29, which is suitably attached to the ring, being, in the construction here shown, an integral part of a disk which has the same outlines as the ring 27 and is attached to it by rivets 30. The arm extends clear of the rail and beneath it so that it may be grasped and turned without interference.

Thus, whenever the spindle gets out of center, it can be returned to the correct position by first loosening the nut 28 and then moving the arm 29 in the direction and to the distance necessary for centering it, and finally it is secured by tightening up the nut 28. Such adjustments may be carried out at any time, as well when the machine is running as when it is idle.

The other form of adjusting means, shown in Figures 4 and 5, may be used with a spindle and rail exactly as shown in the figures already described, but differs in that it embodies means for adjusting the spindle in any direction and to any point within the range of adjustment. This adjusting device comprises an outer ring 31, which is seated in a recess 26^a in the rail, and an inner ring 32 which is seated in a recess in the outer ring 31, the latter having an end wall 33 against which the inner ring bears, and having an aperture sufficiently large to permit passage of the base extension, without engaging it. The inner and outer circumferences of the ring 31 are eccentric to one another. The inner ring has a hole 27^a corresponding to the hole in the adjusting ring 25, which surrounds and engages the extension of the spindle base, and is eccentric to the outer circumference of this ring, while such outer circumference fits rotatably in the inner circumference of the outer ring. The two rings have arms 34 and 35 by which they may be turned for adjustment, which arms are preferably so arranged that they may pass each other and permit complete rotation of either ring.

Referring to the diagrammatic plan of the adjusting rings shown in Figure 5, the center of the outer circumference of the outer ring is indicated at *a*; the common center of the inner circumference of the outer ring and of the outer circumference of the inner ring is indicated at *b*, and the center of the hole is indicated at *c*. Evidently by rotating the ring 32 alone, the center *c* may be placed anywhere in the circular path surrounding the center *b*, while by rotating the outer ring 31 alone, the centers *b* and *c* are rotated in circular paths about the center *a*. By a combination of movements of both rings, the center *c*, through which the axis of the spindle passes, may be placed at any point

desired within the area bounded by the circuit of the point c about the center a when c is placed at the maximum distance from a , since the eccentricity of c to b is preferably equal to the eccentricity of b to a ; and the sum of these two eccentricities is greater than the amount of adjustment ever needed for correctly centering the spindle. The center a of the adjusting ring and of its bearing in the spindle rail is preferably coaxial with the seating face 24.

A clamp nut 28, like the nut previously described and engaging the spindle base in the same way, is adapted to secure the adjustments made by the device last described by forcing the inner ring against the back wall of the outer ring and forcing the latter against the ring. With this form also adjustments may be made while the machine is running and completed in an extremely short time.

What I claim and desire to secure by Letters Patent is:

1. The combination, with a spindle including a base having a head and a depending extension, of a supporting rail having a face on which said head is seated and an opening through which said extension passes, and an adjusting means having an external rotative bearing in said rail and an interior rotative bearing on said extension, the two bearings being eccentric to one another, whereby rotation of the adjusting means is effective to incline the spindle with respect to the rail.

2. The combination of a spindle, having a base with a supporting flange or head and a central extension, with a rail having a hole through which such extension passes and a seating element in its upper part around such hole, the head having a spherical surface on its under side forming a ball and socket joint with the rail, and adjusting means engaged with the rail and with said extension below such ball and socket joint, and having provisions for moving the extension laterally.

3. An adjustable spindle mounting for spinning machinery, comprising a rail having a conical seating face in its upper side and a hole passing through it within such seating face, a spindle including a base having a spherical under surface arranged to rest on said conical face, and having an extension passing through the hole, and the spindle also having a whirl adapted for engagement with a driving band and the center of curvature of said conical face being approximately in the middle of the band-engaging zone of the whirl, and rotatable adjusting means mounted in the under side of the rail and having eccentric engagement with the base extension, whereby to shift the spindle angularly about said center of curvature.

4. In a spinning machine, the combination with a spindle having a base and a whirl formed with a band-engaging zone, the base having a head provided with a spherical under surface the center of which is approximately in the axis and mid plane of said band-engaging zone, and the base having also a downward extension below the head, of a rail having a concave seat complementary to the aforesaid spherical surface and arranged to permit angular adjustment of the spindle thereof, and means engaged with the rail and base extension arranged and adapted to give such angular movement to the spindle.

5. The spindle combination as set forth in claim 4 in which said seat is conical and is arranged to make tangent contact with the spherical surface of the base on a circular line

6. A spindle combination as set forth in claim 4 in which said adjusting means comprises a ring having eccentric internal and external circumferences, the internal circumference of which surrounds and engages the extension of the base and the external circumference is arranged to react laterally against the rail.

7. A spindle combination as set forth in claim 4 in which said adjusting means comprises a ring having eccentric internal and external circumferences, the internal circumference of which surrounds and engages the extension of the base and the external circumference is arranged to react laterally against the rail, combined with a nut threaded upon said extension and arranged to bear on the under side of said ring, the ring also having an end thrust engagement with the rail.

8. In a spinning machine, the combination of a spindle and a supporting rail, the spindle and rail having complementary seating faces, of which the face associated with the spindle is spherical, the spindle having also an extension passing through the rail, with adjusting means comprising an outer ring rotatably seated in the under side of the rail, an inner ring rotatably seated in said outer ring and having an inner circumference surrounding and engaging said extension, said inner circumference being eccentric to the outer circumference of the inner ring, and the latter being eccentric to the outer circumference of the outer ring.

9. In a spinning machine, the combination of a spindle and a supporting rail, the spindle and rail having complementary seating faces, of which the face associated with the spindle is spherical, the spindle having also an extension passing through the rail, with adjusting means comprising an outer ring rotatably seated in the under side of the rail, an inner ring rotatably seated in said outer ring and having an

inner circumference surrounding and engaging said extension, said inner circumference being eccentric to the outer circumference of the inner ring, and the latter
5 being eccentric to the outer circumference of the outer ring, said rings having end thrust engagement with each other and the rail, and a nut threaded on the spindle extension and arranged to apply pressure upon the inner ring toward the spherical seating 10 face of the spindle.

In testimony whereof I have affixed my signature.

FREDERICK G. SMITH.