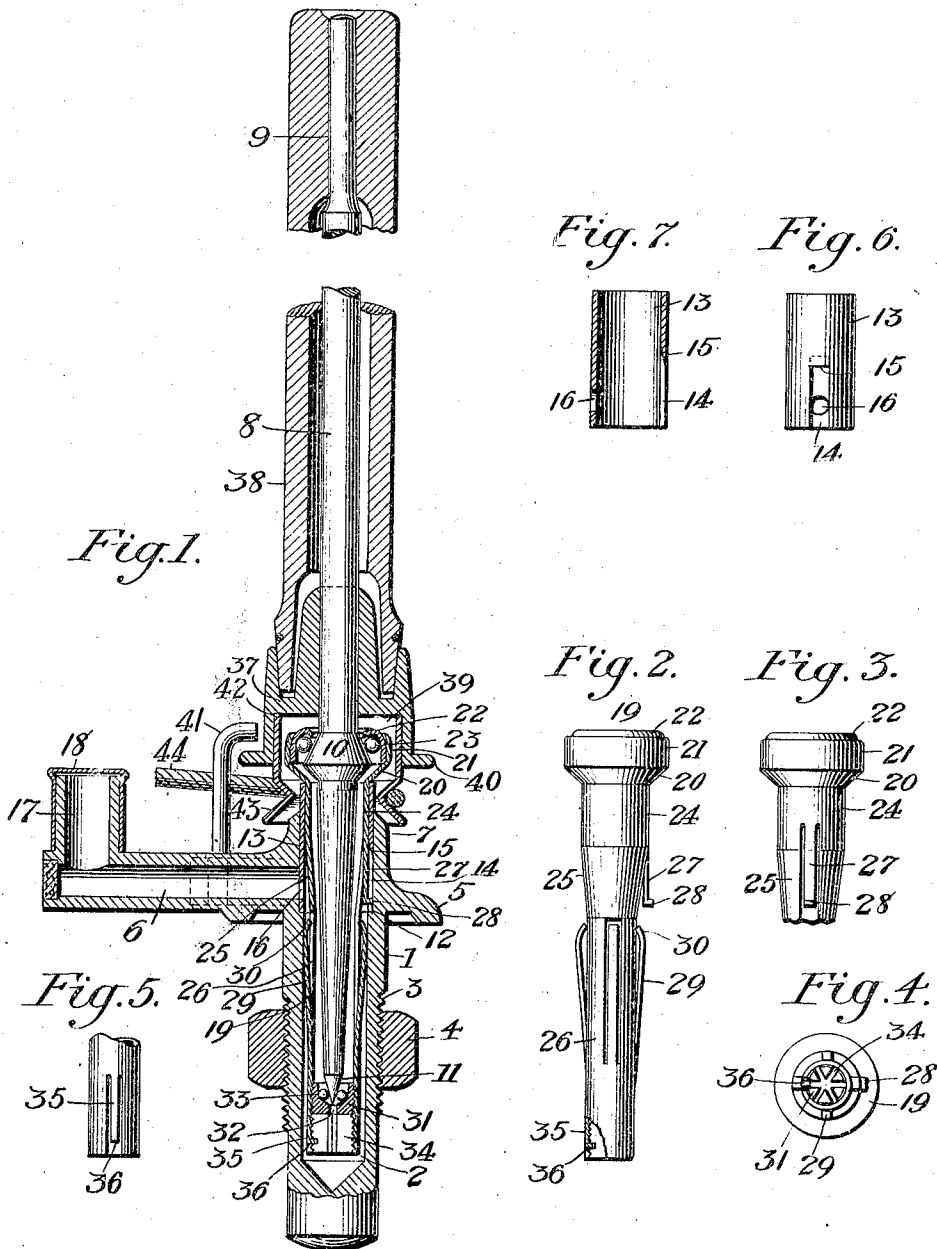


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SPINNING SPINDLE.
APPLICATION FILED APR. 16, 1908.

1,061,267.

Patented May 13, 1913.



Witnesses:
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UNITED STATES PATENT OFFICE.

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SPINNING-SPINDLE.

1,061,267.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed April 16, 1908. Serial No. 427,378.

To all whom it may concern:

Be it known that I, CHARLES H. CHAPMAN, a citizen of the United States, residing at Winchester, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Spinning-Spindles, of which the following is a full, clear, and exact description.

This invention is in the nature of an improvement upon the invention for which I received Letters Patent No. 875,503, dated December 31, 1907.

As in the invention of the patent, so here, the spindle is supported and turns in ball-bearings secured in the upper and lower ends of a bolster, and this bolster is held suspended by its upper cylindrical portion in a bolster-case, and its lower portion is of smaller diameter than its upper portion and admits of a limited lateral movement within the bolster-case.

Differing from the spirally-cut flexible bolster of the patent, the bolster of the present invention is nonflexible, but it is provided with laterally projecting springs which control the limited lateral movement referred to.

These and other features, as herein particularly pointed out and claimed, constitute the present invention.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a longitudinal section with the spindle and bobbin broken out. Fig. 2 is an elevation of the bolster detached. Fig. 3 is an elevation of the upper portion of the bolster. Fig. 4 is a bottom plan view of the bolster. Fig. 5 is an elevation of the lower portion of the bolster. Fig. 6 is an elevation of a bolster-supporting tube. Fig. 7 is a longitudinal section of the bolster supporting tube.

The bolster-case 1, has the oil-well 2, and the screwthread 3, nut 4, base 5, oil-reservoir 6, and upright 7, substantially as in the patent referred to, but any or all of these parts may be of other approved construction.

The spindle 8 has a cylindrical portion 9 to fit the top of the bobbin, and the blade of the spindle tapers very slightly to a point indicated by the transverse line below the cone 10, and from this point the spindle

tapers quite rapidly and terminates in an inverted cone 11. The upright 7 is counter-bored and shouldered at 12, to receive the supporting tube 13, which is firmly held in and extends above the upright 7. The inside diameter of the supporting tube 13 is the same as that of the oil-well 2 in the bolster-case 1. The supporting tube 13 is longitudinally slotted at 14, the said slot 14 ending with an inwardly and upwardly tapering shoulder 15 for purposes herein-after set forth. The supporting tube 13 is also provided with a hole 16 which admits the oil from the oil-reservoir 6 into the oil-well 2. The oil-reservoir 6 is supplied with oil through a feed tube 17 which is covered with a cap 18. The bolster 19 is constructed with an enlarged upper end, having a flared or outwardly tapered portion 20, above which is a cylindrical portion 21, to receive and hold the hardened-steel ball-cup 22 which is forced into and down against the tapered portion 20 of the bolster, and thereby the ball-cup 22 is alined concentrically with the bolster. The upper edge of the cylindrical portion 21 of the bolster 19 is set in around the upper and tapered portion of the ball-cup 22 and thereby firmly secures the ball-cup 22 in the enlarged upper end of the bolster 19. Bearing-balls 23 are placed in the ball-cup 22 and around the cone 10, all of which are of hardened-steel and form in the enlarged upper end of the bolster what is known as the bolster-bearing. Below the enlarged upper end of the bolster is a cylindrical portion 24, and next below it is a downwardly tapered portion 25, and below the tapered portion 25 is a cylindrical portion 26 which extends from below the tapered portion 25 to the bottom of the bolster.

27 is a spring having an outwardly turned lip 28. This spring may be made by sawing two fine parallel kerfs through the tapered portion 25 of the bolster and a part of the cylindrical portion 24, as shown in Figs. 1, 2 and 3. The object of the spring 27 and lip 28 is to engage the longitudinal slot 14 in the supporting tube 13 and thereby prevent the bolster 19 from rotating with the spindle. When the bolster is being drawn out of the bolster-case, after the stop-pin is turned from over the horizontal flange of the whirl-

base, the lip 28 is forced inwardly by the tapered end 15 of the slot 14, and thus the bolster is readily released from the supporting tube and bolster-case.

5 In the cylindrical portion 26 of the bolster is a series of lateral springs 29 cut out in a manner similar to that used in the formation of the spring 27, but having inwardly curved upper ends 30, as shown in Figs. 1, 10 2 and 4. These lateral springs 29 bear against the interior of the oil-well 2, as shown in Fig. 1, and yieldingly hold the lower end of the bolster, so that through the action of these springs the bolster may conform to the motion of the spindle when said 15 spindle carries an unbalanced load. The inwardly curved upper ends 30 of the springs 29, and the longitudinal slot 14 in the supporting tube 13, admit of the vertical movement of the bolster with the spindle.

20 The lower end of the bolster 19 is internally screwthreaded to receive the spindle step 31 which is externally screwthreaded to fit said internal screwthread. 25 The step 31 has a hole 32 through its center and is provided with a ball-race in its upper end to receive the balls 33. The conical end 11 of the spindle is stepped in the hole 32 and bears and rotates upon the balls 33. 30 The step 31, as shown in Fig. 4, has a number of notches or nicks 34 cut across its bottom, and a spring 35 cut in the lower end of the bolster in a manner similar to the cutting out of spring 27, see Fig. 5, has an in- 35 turned lip 36 which enters one of the notches in the step 31, when in line with the spring 35, and locks the step from turning in either direction, and so fixes the adjustment of the step in the bolster. The cone 11, balls 33, 40 and step 31 are of hardened-steel.

45 The whirl-base 37 is secured to the spindle in any suitable way, and is adapted to receive the bobbin 38. The whirl-base is recessed internally from its bottom, as at 39, and ends in a laterally projecting flange 40, which coöperates with the stop-pin 41 50 mounted upon the bolster-base. The sleeve-whirl has its sleeve 42 forced into the cavity 39 in the whirl-base, and is thus securely connected with the whirl-base and by it with the spindle.

43 is the whirl and 44 the driving-band.

55 It will be observed that the counterbore of the whirl-base is sufficiently large to receive the upper and enlarged portion of the bolster containing the upper ball-bearing, and by this construction of the whirl-base and whirl, it is possible to use a whirl of the standard 60 diameter, thereby requiring no change in the diameter or speed of the driving-drum of the spinning frames now in use.

In practical use it has been found desirable to allow the spindle a slight upward movement to enable the horizontal flange 65 40 to strike a slight blow against the stop-

pin 41 in order to loosen the bobbin from the spindle and thereby obviate the necessity of pulling it off by force. This avoids the possibility of the spindle being sprung out of true, and it also facilitates the work of 70 doffing and of piecing up broken ends of yarn.

The parts are preferably assembled as follows: The cone 10 is forced down upon the spindle into place, the bearing balls 23 are 75 arranged in the ball-cup 22, the upper portion 21 of the bolster is applied to the spindle cone and ball-cup, and the upper end of the portion 21 is set about the ball-cup, all as shown in Fig. 1. The whirl-base is next 80 placed upon the spindle, the balls 33 are next placed in the ball race of the step 31, and the locking spring 35 is forced out and may be held out of contact with the step by placing an ordinary pin between it and the bol- 85 ster; the step 31 containing the balls 33 is then screwed up into the lower end of the bolster until the balls 33 come against the conical end 11 of the spindle. The step 31 is then adjusted until the spindle fits freely 90 in its bearing without lateral play, and the locking spring 35 is allowed to drop into one of the notches 34 in the lower end of the step 31, thereby to lock the adjustment of the step and hence prevent the step from 95 moving in either direction. The whirl is next placed up and around the bolster and forced into the recess in the bottom of the whirl-base. The spindle, cone, bolster-bearing, whirl-base, step-bearing and whirl hav- 100 ing been adjusted, the bolster is then placed in the bolster-case, the spring 27 is forced in toward the spindle until it enters the supporting tube 13, and the bolster is forced down into the bolster-case until the tapered 105 portion 20 rests upon the upper end of the tube 13, and the lip 28 of the spring 27 snaps into the longitudinal slot 14 in the tube 13 and thereby prevents the bolster from rotating with the spindle. The sup- 110 porting tube 13 may be dispensed with, and the upright 7 extended to a height and turned in diameter to correspond with the outside diameter of the straight portion 24 of the bolster, and a longitudinal slot may 115 be made in the interior of the upright 7 to take the place of the slot 14 in the tube 13; but as a matter of economy, it is deemed advisable to construct the bolster-case with the upright tube 13. 120

As hereinbefore stated, the bolster may be readily extracted from the bolster-case, because the tapered end 15 of the slot 14 will 125 cam the lip 28 of the spring 27 out of the slot 14 when the bolster is pulled upwardly. The bolster having been placed in position in the bolster-case, the stop-pin 41 is turned around over the laterally projecting flange 40 of the whirl-base, which prevents the 130 bolster and spindle from being pulled out

of the bolster-case. The spindle, cone, bolster, bolster-bearing, step-bearing, whirl-base and whirl all move laterally and vertically together. The cylindrical portion 24 of the bolster 19 is made to fit with sufficient looseness in the upper end of the tube 13 to enable the lower end of the spindle and bolster to take on the movement required to allow the spindle and bobbin to run steadily. The plane of the band-pull upon the whirl is at or near the center of the cylindrical portion 24 of the bolster and tends, on account of its lateral pressure, to hold the spindle in a vertical position, and the variation of the tension of the band will have no tendency to deflect the spindle out of a perpendicular position.

As already stated, below the cylindrical portion 24 the bolster tapers to a smaller diameter, which hangs suspended in the oil-well 2, and out of contact with the inner walls of the bolster-case. This suspended portion of the bolster has a yielding lateral support against the walls of the oil-well through the intermediate springs 29, and this admits of a sufficient lateral movement of the lower portion of the bolster and spindle to enable the spindle to carry an unbalanced load, that would be impossible with a spindle not having this yielding capacity. The lateral yielding capacity not only serves the purpose to carry an unbalanced load, but it greatly increases the life of the bearings, from the fact that the vibratory shocks of the spindle are greatly reduced thereby.

In practical operation, spindles of this class revolve at a speed varying from eight to ten thousand revolutions a minute. When an unbalanced load is placed upon a spindle, or when the spindle is slightly out of balance, the spindle will, as it attains its speed, take on a gyratory movement around a center of gravity through the spindle and its unbalanced load, and the laterally yielding portion of the bolster conforms to this gyratory movement of the spindle and the spindle and bobbins will run quite steadily.

In carrying an unbalanced load it is important to keep a perfect adjustment of the lower end of the spindle in the step-bearing, and this is effected in the present invention, since the tension caused by the band-pull acts to force the step-bearing into proper adjustment, on account of the contact of the bolster bearing balls with the downward and outward taper of the cone 10. The tendency of the band-pull is to cause the cone to add a downward pressure sufficient to adjust the spindle in the step-bearing when the adjustments of the step-bearing and the bolster-bearing are quite loose.

The lubrication in the present invention is very thorough, since the reservoir is filled with oil which flows through the hole 16 into the oil-well 2 and is carried upwardly

on the spindle by centrifugal force, owing to the increasing diameter of the spindle, and is spun out and thrown off at the upper end of the lower taper of the cone 10, and on to the balls in the upper bearing, thereby keeping them continually lubricated. This movement of the oil is facilitated by the upward and outward taper of the cone 10. The spindle, cone, whirl-base and whirl are supported and revolve in the bolster-bearing and step-bearing and have no other support or contact.

The invention is not limited to the details of construction shown and described, since any well-known equivalent may be used which comes within the spirit of the invention. Moreover, the invention is applicable to bolster-bearings and step-bearings of the journal type.

What I claim is:—

1. A bolster-case, adapted to receive and sustain a bolster and spindle, said bolster-case having a supporting tube slotted longitudinally and adapted to be engaged by the bolster to prevent rotation of the bolster with the spindle, a bolster having an enlarged upper end, a spring below said end to engage the longitudinal slot in the supporting tube, and a series of laterally projecting springs to engage the interior walls of the bolster-case, all of said springs being cut integrally from the metal of the bolster and adapted to move both laterally and vertically with the spindle and bolster.

2. A spindle, a bolster-case, and a bolster having bearings in it for receiving and supporting the spindle, said bolster loosely connected with and supported at its upper portion by the bolster-case and having its lower portion of less diameter than the interior of the bolster-case and provided with laterally projecting springs cut integrally from the material of the bolster and in contact with the inner surface of the walls of the bolster-case.

3. A spindle, a bolster-case, and a bolster having bearings in it for receiving and supporting the spindle, said bolster loosely connected with and supported at its upper portion by the bolster-case and having its lower portion of less diameter than the interior of the bolster-case and provided with integral laterally projecting springs bulging out upwardly therefrom and in contact with the inner surface of the walls of the bolster-case.

4. A spindle, a bolster-case, and a bolster having bearings in it for receiving and supporting the spindle, said bolster loosely connected with and supported at its upper portion by the bolster-case and having its lower portion of less diameter than the interior of the bolster-case and provided with integral laterally projecting springs bulging out upwardly therefrom and having their

upper ends curved inwardly toward the bolster, said springs in contact with the inner surface of the walls of the bolster-case.

5 5. A spindle, a bolster-case, and a bolster having bearings in it for receiving and supporting the spindle, said bolster having a cylindrical upper portion by which it is sustained in the bolster-case, a next adjacent downwardly tapering portion, and a terminal cylindrical portion next below the tapering portion and having integral laterally projecting springs in contact with the bolster-case.

10 6. A spindle, a bolster-case, and a bolster having bearings in it for receiving and supporting the spindle, said bolster having a cylindrical upper portion by which it is sustained in the bolster-case, a next adjacent downwardly tapering portion having an integral laterally projecting spring for detachably holding the bolster in the bolster-case, and a terminal cylindrical portion next

below the tapering portion and having integral laterally projecting springs in contact with the bolster-case.

25 7. A spindle, a bolster-case, and a bolster having bearings in it for receiving and supporting the spindle, said bolster having a cylindrical upper portion by which it is sustained in the bolster-case, a next adjacent downwardly tapering portion having an integral laterally projecting spring for detachably holding the bolster in the bolster-case and locking it against rotation, and a terminal cylindrical portion next below the tapering portion and having integral laterally projecting springs in contact with the bolster-case.

In testimony whereof I have hereunto set my hand this 13th day of April A. D. 1908.

CHARLES H. CHAPMAN.

Witnesses.

W. E. PUTNEY,
GRACE B. NAULI