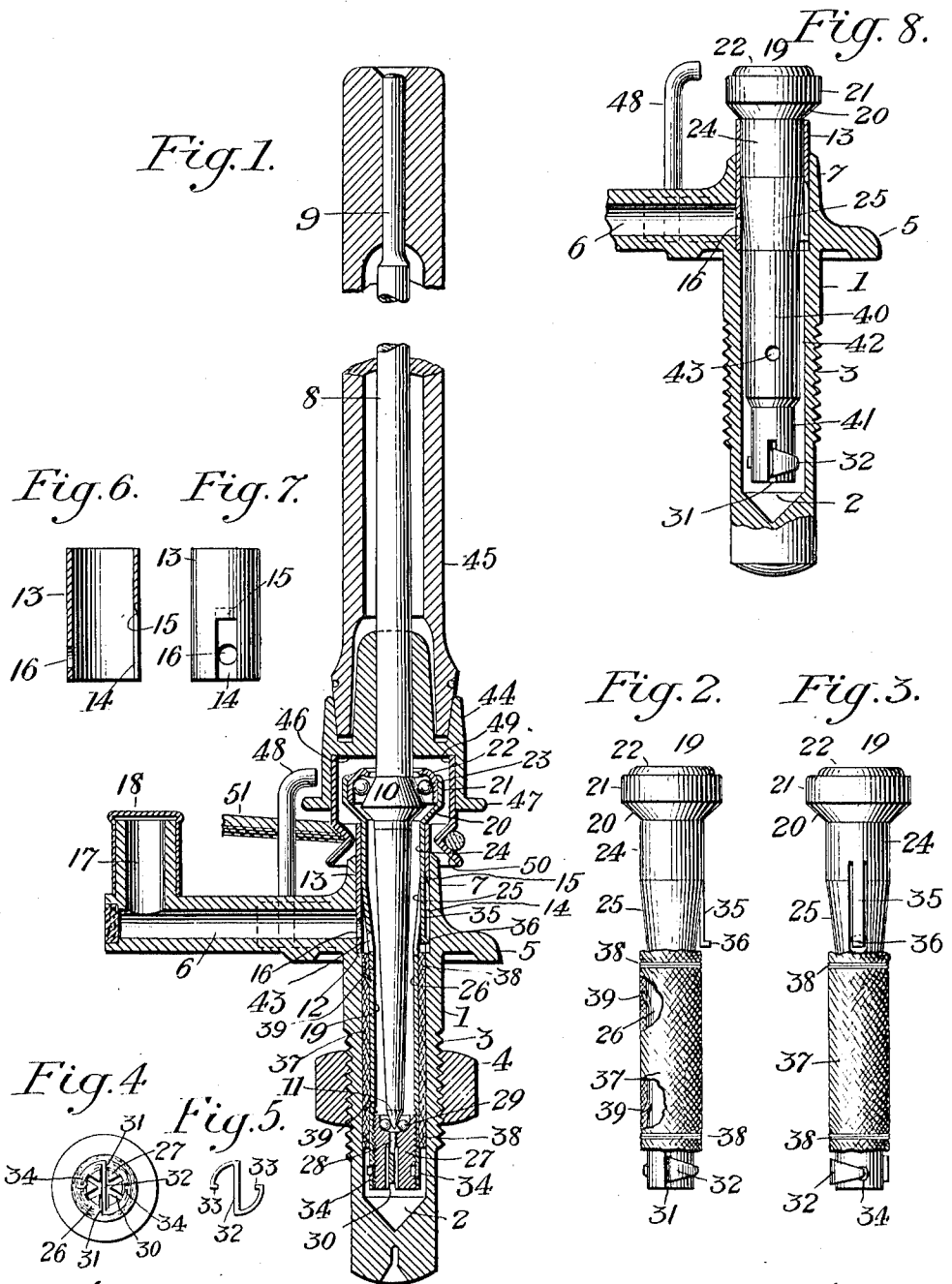


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SPINNING SPINDLE.
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1,061,266.

Patented May 13, 1913.



Witnesses:

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UNITED STATES PATENT OFFICE.

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SPINNING-SPINDLE.

1,061,266.

Specification of Letters Patent.

Patented May 13, 1913.

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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 of the bolster within the bolster-case.

Differing from the spirally-cut flexible bolster of the patent, the bolster of the present invention is non-flexible, and it is provided below its upper cylindrical portion with a cushion to admit of 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 a side elevation of the bolster detached. Fig. 3 is a side elevation of the bolster turned a quarter around from Fig. 2. Fig. 4 is a bottom plan view of Fig. 2. Fig. 5 is a bottom plan view of the locking spring clip detached. Fig. 6 is a central longitudinal section of the supporting tube. Fig. 7 is an elevation of the supporting tube turned a quarter around from Fig. 6. Fig. 8 is an elevation of a modified form of bolster and a longitudinal section of a portion of the bolster-case.

The bolster-case 1 has the oil-well 2 and the screw-thread 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 below the cone 10 indicated by the transverse line in Fig. 1, and from this point the spindle tapers quite rapidly and terminates in an inverted cone 11.

The upright 7 is counterbored 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 made the same diameter as that of the oil-well 2. The supporting-tube 13 is longitudinally slotted at 14, the said slot 14 ending with an inwardly and upwardly tapering shoulder 15, for purposes hereinafter 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, and above said flared portion 20, 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 is set around the upper and tapered portion of the ball-cup 22, and thereby the ball-cup 22 is firmly secured in the enlarged upper end of the bolster.

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 this is a tapered portion 25, and below the tapered portion 25 the bolster has a cylindrical portion 26, which extends to the bottom of the bolster.

The lower end of the bolster 19 is internally screw-threaded to receive the step 27, which is externally screw-threaded to fit the internal screwthread in the bolster 19. The step has a hole 28 through its center, and is provided with a ball-race in its upper end to receive the balls 29. The conical end 11 of the spindle is stepped in the hole 28 and bears and rotates upon the balls 29. The step 27, as shown in Figs. 1 and 4, has a

number of notches or nicks 30 cut across its bottom, and the end of the bolster is slitted longitudinally at diametrically opposite points 31. A Z or S shaped spring locking clip 32 is placed in the slits and alined notches when the step is properly adjusted, and this spring locking clip has lips 33 which enter holes 34 in the lower end of the bolster 19, as shown in Fig. 3, there being a hole on either side of the bolster and thereby the said clip locks the step from turning in either direction. Thus the clip is supported by the bolster itself, and is adapted to move both laterally and vertically with the bolster.

The cone 11, balls 29 and step 27 are of hardened steel.

35 is a spring, having an outwardly turned lip 36. This spring may be made by sawing two fine parallel kerfs through the tapered portion 25 of the bolster and into the cylindrical portion 24, as shown in Fig. 3. The object of the spring 35 and its lip is to engage the longitudinal slot 14 in the supporting-tube 13, and thereby prevent the bolster from rotating with the spindle. When the stop-pin is turned from over the horizontal flange of the whirl-base and the bolster is pulled upwardly, the lip 36 is forced inwardly by contact with the tapered end 15 of the slot, and thus unlocked the bolster is readily withdrawn from the bolster-case.

Around the cylindrical portion 26 of the bolster, below the tapered portion 25, is applied externally a band 37 of suitable material, such as a textile fabric, for example, a braided woolen tube, and said band is held in place by winding a strong thread around it, as at 38. On the cylindrical portion 26, near its upper and lower ends, are beards 39, Figs. 1 and 2, the upper beards pointing upwardly and the lower beards pointing downwardly, and these beards prevent the band from slipping on the cylindrical portion 26 when moving the bolster up and down in the bolster-case.

In the modification shown in Fig. 8, the angle of inclination of the tapered portion 25 is not as great as in the first described construction, and there is below this portion a cylindrical portion 40 of larger diameter than the corresponding part first described, and this part is reduced at 41 to the size first described to receive the step-bearing. Between the walls of the oil-well 2 and the enlarged portion 40 is the space 42 in which is a body of oil, which forms an oil-cushion between the bolster and walls of the oil-well.

When the lower suspended portion of the bolster takes on the movement required to enable the spindle to carry an unbalanced load, the oil in the space 42 has to be displaced by any lateral movement of the bolster, and the displacing of the oil cushions

the bolster and prevents extreme vibration of the bolster.

43 is an oil-hole in the bolster.

The whirl-base 44 is secured to the spindle in any suitable way, and is adapted to receive the bobbin 45. The whirl-base is recessed internally from its bottom, as at 46, and ends in a laterally projecting flange 47, which coöperates with the stop-pin 48 on the base.

The sleeve-whirl has its sleeve 49 forced into the cavity 46 in the whirl-base and is thus securely connected with the whirl-base, and by it with the spindle.

50 is the whirl, and 51 is the driving-band.

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. By this construction of the whirl-base and whirl, I am enabled to use a whirl of the standard 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 to strike a slight blow against the stop-pin in order to loosen the bobbin from the spindle and thereby obviate the necessity of pulling off the bobbin by force. This avoids the possibility of the spindle being sprung out of true, and it also facilitates the work of doffing and of piecing up broken ends.

The parts are preferably assembled as follows: The cone 10 is forced down upon the spindle into place; the bearing balls 23 are arranged in the ball-cup 22, and the upper portion 21 of the bolster 19 is applied to the spindle, cone, and ball-cup, and the upper end of the portion 21 is set about the ball-cup, as shown in Fig. 1. The whirl-base is next placed upon the spindle; the balls 29 are next placed in the ball-race of the step 27. The step 27 containing the balls 29 is then screwed up into the lower end of the bolster until the balls 29 come up against the conical end 11 of the spindle. The step 27 is then adjusted until the spindle fits freely in its bearings without lateral play, and the spring locking clip 32 is pressed up into one of the nicks 30 in the lower end of the step which is brought in line with the slits 31 cut through the lower end of the bolster 19, and the lips 33 drop into the holes 34 which are opposite to each other in the lower end of the bolster 19, and thus the step is securely locked from turning 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 having been adjusted, the bolster is then placed in

the bolster-case; the spring 35 is forced in toward the spindle until it will enter the supporting-tube 13, and the bolster is forced down into the bolster-case until the tapered portion 20 rests upon the upper end of the supporting-tube 13, and the lip 36 on the spring 35 snaps into the longitudinal slot 14 in the tube 13, which prevents the bolster from rotating with the spindle. The supporting-tube 13 may be dispensed with, and the upright 7 extended to a height and turned in diameter to correspond with the upper end of the tube 13, and a longitudinal slot may 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 base with the upright tube 13. The bolster having been placed in position in the bolster-case, the stop-pin 48 is turned around over the laterally projecting flange 47 of the whirl-base, thereby preventing the 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 supporting-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. 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, and this suspended portion of the bolster is cushioned, which admits of a sufficient lateral yielding movement of the lower portion of the bolster and spindle to enable the spindle to carry an unbalanced load, and this operation 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 by it the vibratory shocks of the spindle are greatly reduced.

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 yield-

ing portion of the bolster conforms to this gyratory movement of the spindle, and the spindle and bobbin 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 by virtue of the fact that 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, and is carried upward 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 tapered portion 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.

Instead of using the textile substance on the bolster or the oil as a cushion, I may use springs, as set forth in a concurrent case of mine.

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

What I claim is:—

1. A spindle, a cushioned non-flexible bolster having transverse slits in its bottom, a ball-bearing in the top of said bolster, and a ball-bearing adjustable step in the bottom of said bolster to receive the spindle, said step having transverse notches, a locking clip engaging said slits and notches and supported by said bolster independently of the surrounding parts, and a bolster-case in which said bolster is mounted and supported to move laterally and vertically with the spindle.

2. A bolster-case, a bolster mounted and supported therein and having a bolster bearing in its top and transverse slits in its bottom, and an adjustable step-bearing in the bottom of said bolster to receive the spindle and provided with notches across its bottom, a locking clip engaging said slits and notches and attached to and supported by

the said bolster independently of the surrounding parts, the spindle, bolster, bolster-bearing, step-bearing and locking clip adapted to move both laterally and vertically together.

3. A bolster, having an enlarged upper end and a cylindrical portion below said upper end, a bolster-case in the upper end of which the bolster is adapted to be loosely sustained, a spring forming a part of the said bolster, a supporting part for said bolster having a longitudinal slot with an inwardly tapered shoulder at its upper end to act upon the spring to facilitate the removal of said bolster from the bolster-case.

4. A bolster, having an enlarged upper end, a bolster-bearing in said upper end, a cylindrical portion below the said upper end, a spring extending from the said cylindrical portion and adapted to enter a longitudinal slot in the upper end of the bolster-case to restrain the bolster from rotating with the spindle, an adjustable step-bearing in the lower end of said bolster, said adjustable step-bearing having transverse nicks across its bottom adapted to be alined with a trans-

verse nick across the bottom of the said bolster, a locking clip adapted to enter the nick in the bolster, and one of the transverse nicks in the step-bearing, said locking clip attached to and supported by the bolster independently of surrounding parts and adapted to move both laterally and vertically with the bolster and spindle.

5. A spindle, a bolster-case, a bolster having bearings at its top and bottom for receiving and supporting the spindle, a supporting tube fixed in the upper end of the bolster-case for suspending the bolster in the bolster-case and having a slot engaged by a spring on the bolster to prevent rotation of the bolster, and a yielding medium interposed between the lower end of the bolster and the adjacent portions of the bolster-case to cushion said bolster as it yields laterally under stress of use.

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. NAULT.