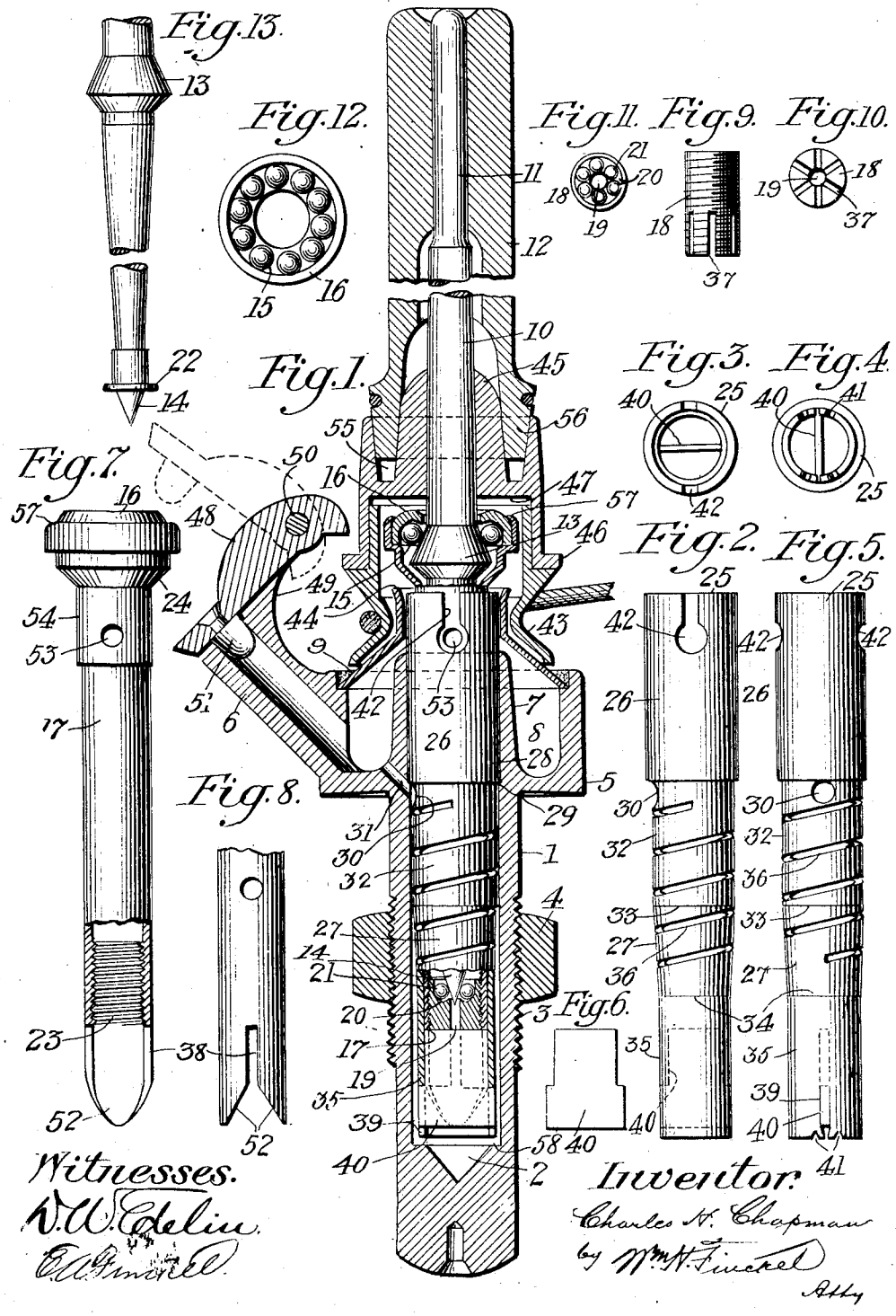
C. H. CHAPMAN.

SPINNING SPINDLE.

APPLICATION FILED AUG. 25, 1913.

1,203,309. Patented Oct. 31, 1916.



Witnesses.

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SPINNING-SPINDLE.

1,203,309. Specification of Letters Patent. Patented Oct. 31, 1916.

Application filed August 25, 1913. Serial No. 786,454.

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.

The present invention is in the nature of an improvement upon the inventions of my Letters Patent No. 841,485, dated January 15, 1907, and No. 875,503, dated December 31, 1907, and No. 1,072,573, dated September 9, 1913.

As in the prior inventions referred to, so here the spindle is supported in a bolster which is provided with ball-bearings at its top and bottom, and these ball-bearings afford the active bearings in which the spindle turns. Differing from the prior inventions mentioned, the bolster case is constructed with an oil reservoir surrounding the tubular upright portion of the bolster case, and is provided with a direct lubricating receptacle through which the reservoir is supplied with oil. In addition the spring sleeve differs in its construction and arrangement from the said prior inventions, and it is also constructed to provide an improved system of lubrication. These and other features, as hereinafter particularly pointed out and claimed, constitute the invention.

In the accompanying drawing, illustrating the invention, in the several figures of which like parts are similarly designated—Figure 1 is a longitudinal section of the parts assembled for use, with the spindle and bobbin broken out and the spring sleeve partly in elevation. Fig. 2 is an elevation of the spring sleeve detached. Fig. 3 is a top and Fig. 4 is a bottom end view of the sleeve. Fig. 5 is an elevation of the spring sleeve turned a quarter way around from Fig. 2. Fig. 6 is an elevation of the locking clip. Fig. 7 is an elevation of the bolster and upper ball-bearing, the lower end being in section, and Fig. 8 is a fragmentary elevation showing a portion of the lower end of the bolster turned a quarter way around. Fig. 9 is an elevation of the step; Fig. 10 is a bottom end view thereof, and Fig. 11 is a top end view with the balls inserted. Fig. 12 is a plan view of the bolster cup containing the bolster balls. Fig. 13 is an elevation of a portion of the spindle, showing the lower end broken just above the conical step end.

The bolster case 1 has the oil well 2, screw-threads 3, nut 4, and base 5, and differs from the prior inventions in having the oil receptacle 6, upright 7, oil reservoir 8, and cover 9.

The spindle 10 has a cylindrical portion 11 to fit into the top of the bobbin 12, and the blade of the spindle tapers very slightly to a point below the cone 13, whence it tapers quite rapidly, and ends in an inverted cone 14, which, preferably, is hardened. The cone 13 turns upon the balls 15 in the bolster cup 16, which surrounds the spindle and cone and is supported by the bolster 17. The cone, balls, cup, and upper portion of the bolster constitute a bolster ball-bearing for the spindle.

The lower end of the bolster is supplied with an externally screwthreaded step 18, perforated vertically at 19, and provided with a ball-race 20, within which are balls 21. Above the inverted cone 14 the spindle is provided with a ball-retaining collar 22. The conical end 14 of the spindle is stepped in the perforation 19, and bears and rotates upon the balls 21. The lower end of the bolster 17 is screwthreaded internally at 23, and the step 18 screwed therein and thus rendered adjustable within the bolster 17.

The conical end 14, step 18, balls 21, collar 22 and the lower portion of the bolster 17, constitute a ball-bearing step for the spindle; and by virtue of the fact that the bolster also has at its top the described ball-bearing, it is herein referred to as a ball-bearing bolster. That portion 24 of the bolster 17, adjacent to the cone 13, is flared to conform to said cone. Through its length the bolster is larger than, and consequently, out of contact with the spindle.

The bolster is supported within the tubular upright 7 of the bolster case 1, by means of the sleeve 25, the upper portion 26 of which is cylindrical, and a lower portion 27 tapering and fitting the bolster with an easy slip fit at top and bottom, and loosely between. This sleeve 25 has its cylindrical portion 26, shown in Figs. 2 and 5, extend-

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ing for a little over a third of its length. The upright 7 of the bolster case 1 is counterbored at 28 as shown in Fig. 1, slightly larger in diameter than the oil well 2, forming a shoulder 29. The cylindrical portion 26 of the sleeve is made to fit this counterbore with a force fit and to rest on the shoulder 29. An oil-hole 30 in the sleeve comes in line with an oil-hole 31 in the bolster case and admits of the passage of oil from the reservoir 8 through the hole 30 in the sleeve to the oil well 2. Below the cylindrical portion 26 is a second cylindrical portion 32, extending down to the line 33 and slightly smaller in diameter than the cylindrical portion 26 and fitting the oil well 2 with an easy slip fit vertically and without lateral movement. Below the line 33 and extending to the line 34 is the tapered portion 27. Extending from the line 34 to the bottom of the sleeve is a cylindrical portion 35 considerably smaller in diameter than the oil well 2, which allows sufficient lateral movement. The cylindrical portion 32 and tapered portion 27 are slotted with a spiral slot 36 which forms these two sections of the sleeve into a straight and tapered spiral spring, respectively.

In practice it has been found difficult to construct a spring sleeve with a proper vertical resiliency, and at the same time maintain the proper lateral yielding resistance to prevent the spindle from taking on a slight vibratory movement when running with an unbalanced load, or in connection with an imperfect ring. The present construction and mounting of the spring sleeve admits of limiting the tension of the lateral movement by varying the length of the cylindrical portion 32 of the spring, and at the same time maintaining the desired vertical movement to enable the spindle to accommodate an unbalanced load which may be caused by an imperfect bobbin or spindle.

The step 18, as shown in detail in Figs. 9, 10, and 11, has a number of notches or slots 37, cut transversely across its lower end, and the bolster 17 also has a transverse slot 38 cut in it, and the spring sleeve 25 likewise has a transverse slot 39, which slots 38 and 39 are adapted to be alined to receive a vertically arranged locking-clip 40 adapted to engage one of the notches in the step when it is alined with the slot in the bolster to prevent the adjustment of the step from changing, and also these parts from turning under the rotation of the spindle. By making a number of these notches in the step a very nice adjustment of the bearing with relation to the spindle may be secured. This locking-clip has its upper portion of a width to fit the bore of the spring sleeve snugly, as shown by dotted lines Fig. 2, while its lower portion is in width the same as the outside diameter of the spring sleeve. The slot 39 extends below the bottom of the locking-clip and its edges are staked in by the nicks 41 so as to partially close the slot, and thereby firmly hold the locking-clip in place.

The upper end of the spring sleeve 25 is provided with opposite keyhole slots 42, which are located above the upright 7, as shown in Fig. 1.

The oil reservoir 8 is inclosed from lint and dirt by means of the cover 9, which extends up between the upper end of the spring sleeve and the whirl 43 and is slightly flared at its upper end 44, there being an open space between the spring sleeve and the cover 9, which latter is also out of contact with the whirl.

The whirl 43 is connected with the spindle by means of a whirl base 45, which is provided with the flange 46, which greatly strengthens the counterbore 47 in the whirl base into which the whirl is forced, and also acts as a stop to prevent the spindle and bolster from being pulled out of the bolster case when doffing or piecing up ends, by striking against the end of the doffer guard 48 which is pivoted to the upwardly extending ears 49, and swings on the pin 50, as shown by dotted lines in Fig. 1. The doffer guard 48 is also provided with a stopple 51, which is loosely connected with the doffer guard and enters and closes the oil receptacle 6, through which the oil is supplied to the reservoir 8.

The bolster of the present invention differs from the bolsters of Patent No. 1,072,573 in the form and length of its cam-like lips 52, which extend below the slot 38 cut across its bottom and form a V-shaped bottom on the bolster, so that when the bolster is placed in the supporting sleeve and drops down into place, the lips 52 when they strike the locking-clip 40 will, if the slot is not in line with the locking-clip, more readily cause the bolster to adjust itself with its slot in perfect alinement with the locking clip, thereby requiring no effort or attention on the part of the operative to aline the slot in the bolster with the locking-clip. Otherwise it has all of the advantages of the prior construction.

The lower end of the bolster is bored out up as far as the slot 38, extending to the screwthreads 23, which enables the step to be pushed up into the bolster and serves to aline the step and prevent cross-threading it, when screwing it into the bolster.

Another and very important feature in the construction of the present bolster is the hole 53 in its upper cylindrical portion 54. This hole 53 serves to relieve the upper pressure of oil in the bolster carried up by the centrifugal force of the spindle, and prevents the oil from overflowing the top of the bolster and being thrown off by the

whirl. This hole registers with one of the holes 42 in the spring sleeve, and thus lets the oil out into the reservoir 8.

The whirl base 45 is applied to the spindle in any usual or approved manner, and is provided with a circular tapering groove 55 to receive the lower end 56 of the bobbin 12, the latter having no connection with the spindle excepting at its upper end, as shown in Fig. 1. The present invention is not limited to any particular form of construction of bobbin, as it is adapted to any of the well-known forms of bobbin now in general use.

The parts of the invention are preferably assembled as follows:—The ball-retaining collar 22 is forced on the spindle above its conical end 14, and the cone 13 is forced down upon the spindle to the desired position. The bolster cup 16 is filled with the balls 15, and then applied to the spindle and upper end of the bolster 17 and the upper end of the bolster is spun or set around the bolster cup, as shown at 57 in Fig. 1, which firmly secures the bolster cup to the bolster. The whirl base 45 is then forced down upon the spindle to its desired position. The balls 21 are then placed in the race-way 20 of the step 18 which is then screwed into the lower end of the bolster and adjusted until the spindle runs freely without any lateral movement in its bearings. The spring sleeve 25 with its locking-clip 40, securely attached in its lower end, is forced into the upright 7 of the bolster case 1, and held firmly in place by its upper portion 26 with the oil-hole 30 in line with the oil-hole 31 in the bolster case, so that its lower cylindrical portion and the tapered portion 27 hang suspended in the oil-well 2, and out of contact with the walls of the bolster case. The bottom of the oil well 2 is partially squared as shown at 58, Fig. 1, to limit the downward movement of the spring sleeve. The oil reservoir cover 9 is then forced in to the counterbore around the upper edge of the oil reservoir 8 and cemented oil-tight in place. The doffer guard 48 is secured in place with the stopple 51 loosely connected through a hole in the doffer guard. The spindle and bolster are now placed in the spring sleeve in the bolster case by raising the doffer guard into the position shown by dotted lines in Fig. 1. The doffer guard then drops into place and overhangs the flange 46 of the whirl base. In practice it has been found desirable to allow a little upward movement of the spindle to permit the flange to strike a slight blow against the doffer guard, so as to tend to loosen the bobbin, and in the present invention, to seat the stopple 51 tight in the oil receptacle 6, to prevent the oil from leaking out of the receptacle, or the possibility of lint or dirt getting into the oil reservoir.

In actual practice it has been demonstrated that the present invention produces a superior quality of yarn, from 12 to 14 per cent. stronger than is produced from the same roving with the ordinary journal bearing spindle, and also saves in power enough to pay several times its initial cost.

When in practical operation spindles are required to run from eight to ten thousand revolutions per minute, a spindle to be of any practical value must have means to carry an unbalanced load at the above speed. In my present invention the band pull is at or near the center of the cylindrical portion 54 of the bolster, which is supported laterally in the upper end of the spring sleeve 25, and the tension of the band tends to hold these parts in perfect alinement with each other and no amount of tension of the band will deflect the spindle out of a perpendicular position. The lower end of the bolster being supported vertically by the locking-clip in the lower end of the spring sleeve, admits of both a vertical and lateral movement of the spindle and bolster. When an unbalanced load is placed upon the spindle, or when the spindle is slightly imperfect, the greater part of the load being above the band pull, predominates over the lower and short end of the spindle, and the spring sleeve takes on the gyration and the upper ends of the spindle and bobbin run quite steadily.

Another important feature in carrying an unbalanced load, is to keep a perfect adjustment of the lower end of the spindle in the step bearing, and this is accomplished by the present invention, inasmuch as the tension caused by the band-pull acts to force the step bearing into perfect adjustment on account of the contact of the balls 15 on the downward and outward taper of the cone 13.

The lubrication is another important feature in my present invention. The oil-hole 53 in the bolster supplies a means of escape for the oil when the bolster is overloaded with oil. Were it not for such a means of escape of the oil, the bolster would be overflowed and the oil would soon be all thrown out of the bolster case. The provision in the spring sleeve of the holes 42 on opposite sides and located at right angles to the locking-clip as shown in Figs. 2 and 3, and above the level of the oil in the reservoir 8 and the upper end of the upright 7, and the locating of the hole 53 in the bolster at right angles to the transverse slot 38, insures the coming of the hole 53 into line with one of the holes 42 on one side or the other, when the parts are assembled.

When the spindle is in operation, a constant circulation of oil is passing up around the spindle and out through the hole 53 into the oil reservoir 8, and from there back into the bolster through the oil-hole 31, as be-

fore described. By the present construction it is possible to keep a much larger supply of oil in the bolster case and prevent it from being wasted.

The spindle, whirl, cone, and collar are supported and revolve in the bolster bearing and in the step bearing, having no other support or contact.

It is to be distinctly understood that I do not limit my invention to the specific form of construction shown and described, since the details of construction may be modified without departing from the spirit of my invention, and, moreover, the invention is applicable to a bolster and step bearing of the ordinary journal type.

What I claim is:—

1. A spinning spindle, having an extension spring sleeve, and a bolster case having an oil well in which the sleeve is suspended and capable of vertical and lateral movement therein below its point of suspension, said sleeve having a cylindrical portion by which it is suspended, a subjacent cylindrical portion of less diameter than the suspension portion, a tapering portion next to the subjacent cylindrical portion and these two portions of resilient construction, and a bottom cylindrical portion of the same diameter as the smallest diameter of the tapering portion.

2. A spindle, a bolster having a ball-bearing at its top and a ball-bearing step at its bottom to support said spindle, and a suspended sleeve in which said bolster is supported and capable of moving both laterally and vertically with the spindle, and constructed to limit lateral movement of part of the sleeve without changing the vertical resiliency of the said sleeve.

3. A bolster case provided with an oil well, an upright portion, a spring sleeve mounted in the said upright portion, an oil reservoir surrounding the upright portion and provided with a passage for the oil to the oil well, a cover adapted to cover the oil reservoir and extending up around the upper end of the spring sleeve, a spindle and bolster mounted and supported within the said spring sleeve, a sleeve whirl, and a whirl base counter-bored to receive said sleeve whirl, said whirl surrounding the bolster bearing and the upwardly extending portion of the oil reservoir cover and out of contact with the said cover.

4. A spindle, a bolster case having an upright portion in its base, a bolster provided with a ball-bearing at its top and a ball-bearing step at its bottom to receive said spindle, a spring sleeve supported by the upright portion of the bolster case, in which sleeve the said spindle and bolster are mounted to have both vertical and lateral movement, and an oil reservoir surrounding the upright portion and provided with a cover, said ball-bearing in the top of the bolster extending above the cover of the oil reservoir, and said bolster having an opening located at a point below the cover of the reservoir and above the upright portion and the level of the oil in the reservoir to regulate the upward flow of the oil in the bolster.

In testimony whereof I have hereunto set my hand this 20th day of August, A. D. 1913.

CHARLES H. CHAPMAN.

Witnesses:

OSCAR E. STEVENS,

FRED H. CHAPMAN.