No. 875,503. PATENTED DEC. 31, 1907.

C. H. CHAPMAN.

SPINNING SPINDLE AND BEARING THEREFOR.

APPLICATION FILED FEB. 8, 1907.

Fig. 1.

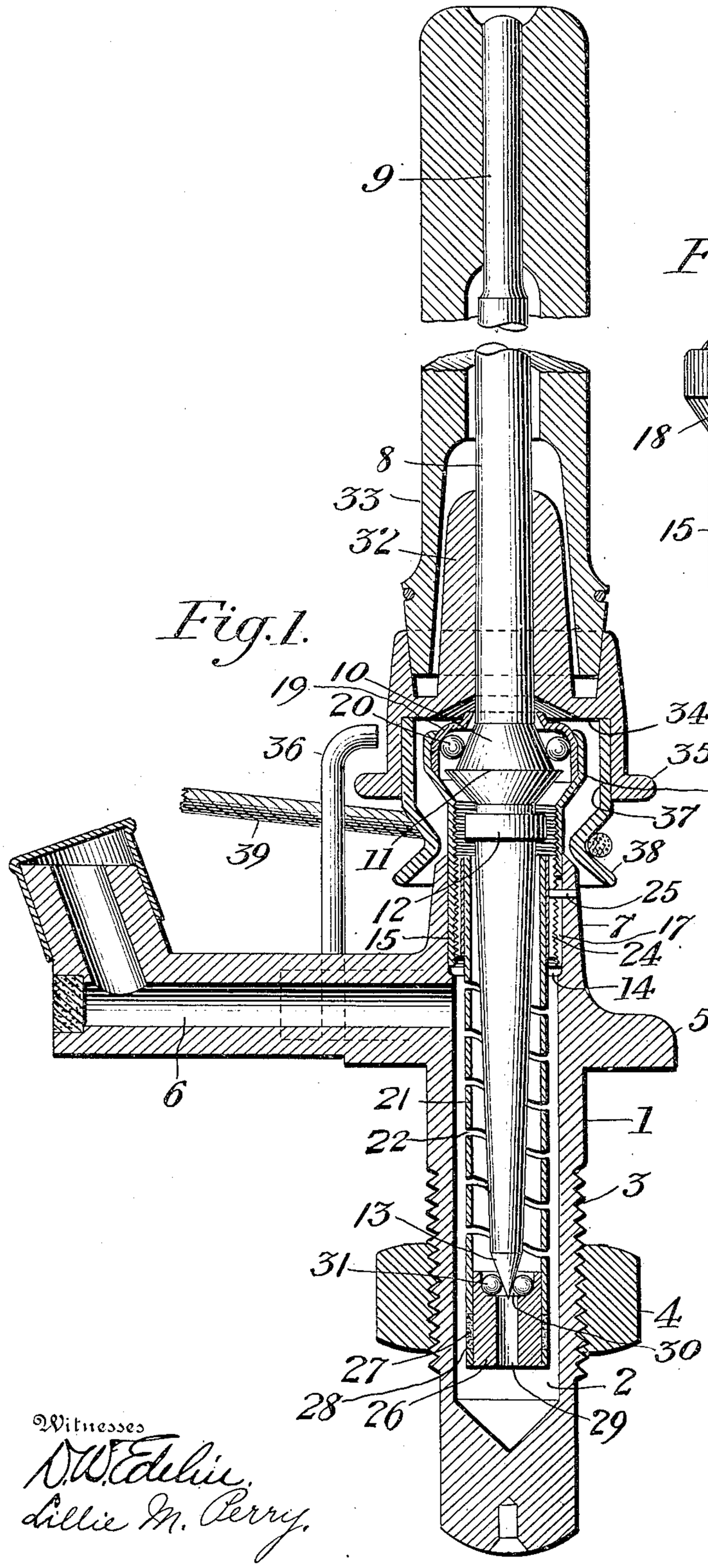


Fig. 2.

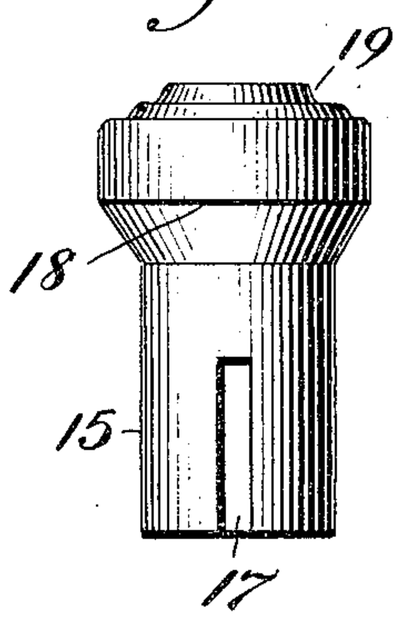


Fig. 3.

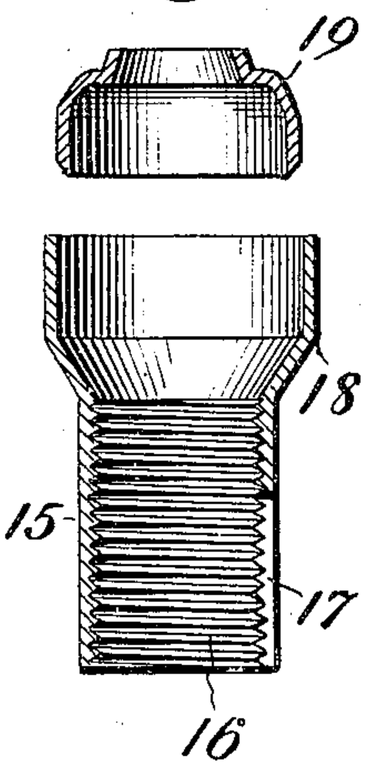


Fig. 4.

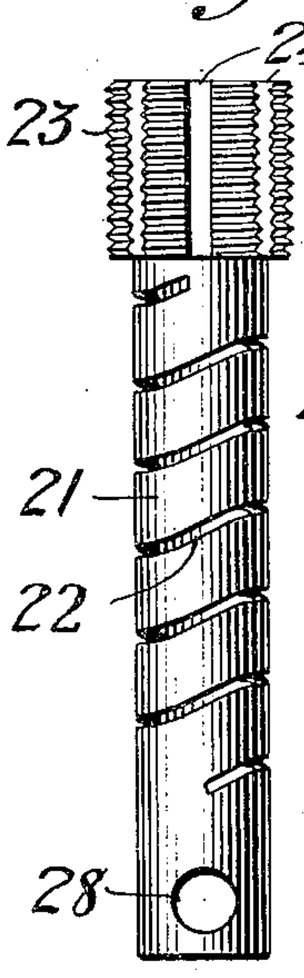
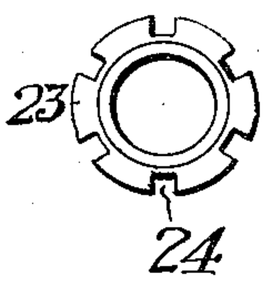


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES H. CHAPMAN, OF WINCHESTER, MASSACHUSETTS.

SPINNING-SPINDLE AND BEARING THEREFOR.

No. 875,503. Specification of Letters Patent. Patented Dec. 31, 1907.

Application filed February 8, 1907. Serial No. 356,470.

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 and Bearings Therefor, of which the following is a full, clear, and exact description.

The present invention is in the nature of an improvement upon the invention for which I received Letters Patent No. 841,485, dated January 15, 1907.

As in the invention of the patent, so here, the spindle is supported in a bolster which is provided with ball-bearings at its bottom and top, and these ball-bearings afford the active bearings in which the spindle turns.

Differing from the invention of the patent, the bolster itself is longitudinally and laterally yielding and has an unyielding portion by which it is suspended within the bolster-case. Thus I am enabled to dispense with the sleeve of the invention of the patent. The sleeve-whirl is frictionally engaged with the interior of the whirl-base, instead of being exteriorly engaged therewith, as in the patent, and the whirl-base instead of the whirl has the flange which coöperates with the stop-pin.

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

In the accompanying drawing, 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 upper section of the bolster. Fig. 3 is a longitudinal section of the upper section of the bolster with its parts disconnected, the section being taken through the slot. Fig. 4 is an elevation of the lower section of the bolster. Fig. 5 is a top plan view of this lower section of the bolster.

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

The spindle 8, has the cylindrical portion 9 to fit into the top of the bobbin, and the blade of the spindle tapers very slightly to a point below the cone 10. This cone has a laterally-projecting, upwardly-flaring ledge 11, and below the cone 10 is a stop-collar 12. From a point below the cone 10 and above the stop-collar 12 the spindle tapers quite rapidly and terminates in an inverted cone 13, which preferably is hardened.

The upright 7 is counterbored and shouldered at 14 to receive the cylindrical portion 15 of the upper section of the bolster. This section is screwthreaded internally at 16 and slotted longitudinally at 17, and above the screwthreaded portion it is flared out and provided with a shoulder 18 to receive and support a ball-race cup 19 of hardened steel which confines within the upper section of the bolster a series of bearing-balls 20 which run upon the cone 10. The cone 10, bearing-balls 20, and ball-race cup constitute the upper ball-bearing or bolster-bearing for the spindle.

The lower section of the bolster is composed of a tube 21, provided with a spirally-cut slot 22 which makes the tube longitudinally and laterally yielding, or in other words, makes it a spring. The upper end of the tube is provided with the screwthread 23, divided by longitudinal grooves 24, and by means of this screwthread 23 the lower section of the bolster is adjustably connected with the upper section thereof, as indicated in Fig. 1. When the proper adjustment has been made, the upper and lower sections of the bolster are fixed by means of the pin 25, passed through the upright 7 and the slot 17 and into one of the grooves 24.

The lower end of the tube 21 is provided with the step 26, which is forced into the said tube and secured therein in any suitable manner, as by soldering at one or more points 27 through the holes 28 in said tube 21. This step 26 has a central aperture 29 for the escape of the lubricant and also for positioning the bearing-balls of the lower ball-bearing. This lower ball-bearing comprises a seat or race 30 made in the upper portion of the step 26, and the bearing-balls 31 placed in said seat or race, and which surround the cone 13 of the spindle.

The whirl-base 32 is secured to the spindle in any suitable way, and is adapted to frictionally receive the bobbin 33. This whirl-base is counterbored or recessed internally

from its bottom, as at 34, and ends in a laterally projecting bottom flange 35 which cooperates with the stop-pin 36.

The sleeve-whirl has its sleeve 37 forced into the cavity 34 in the whirl-base, and is thus securely connected with the whirl-base and by it with the spindle.

38 is the whirl and 39 the driving-band.

It will be observed that the counterbore of the whirl-base is sufficiently large to receive the upper portion of the bolster containing the upper ball-bearing and the whirl, and the connection of the sleeve with the interior counterbore is sufficiently tight to insure the positive driving of the spindle. By this construction the spindle may be run in either direction, as required, without liability of the whirl becoming loosened from the whirl-base. By providing the whirl-base with the horizontal flange 35, instead of putting this flange on the whirl, said flange not only coöperates with the stop-pin to limit the upward movement of the spindle, but it materially strengthens the lower end of the whirl-base against the outward pressure caused by forcing upward the sleeve of the whirl into the whirl-base with such force as to insure against the possible loosening of the whirl from the whirl-base, and also obviates the objection inhering in the old form, of the tendency to loosen the whirl from the whirl-base by the continual knocking of the flange against the stop-pin. By the present construction, an improved contracted, cylindrical sleeve-whirl is produced, by which a spindle may be run in either direction, and the whirl may be of regular or standard diameter, requiring no change in the diameter or speed of the driving drums of 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 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 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 stop-collar 12 is forced up into place on the spindle. The bearing-balls 20 are arranged in the ball-cup 19 and the upper portion 15 is applied to the spindle, cone, and ball-cup and its flared upper end is set about the rim of the ball-cup, as shown in Fig. 1. The shouldered construction of the upper section serves to aline this portion and the ball-cup in order to form a proper ball-bearing. The ledge 11 on the cone prevents the balls 20 from being displaced while the step and its balls and the lower section are being adjusted. The whirl-base is next placed upon the spindle. The step 26 is next firmly fixed in the lower end of the lower section of the bolster and a tapered pointed pin is passed up through the perforation 29 in the step and the balls 31 of the lower ball-bearing are dropped into the seat 30 provided for them and surround the inserted pin. The lower section of the bolster, with the step and balls therein, are placed up and around the lower end of the spindle and screwed into the upper section of the bolster, until the spindle fits without vertical or lateral movement in its bearing, the temporary pin being withdrawn. The interlocking of the pin 25 and the vertical slot 17 and groove 24, as above described, results in obtaining a very nice adjustment of the spindle in its bearings. The whirl is next placed up and around the bolster and forced into the recess in the bottom of the whirl-base. The spindle, bolster, bolster-bearing and step-bearing must be assembled before the whirl can be forced up and secured to the whirl-base. The spindle, cone, bolster-bearing, whirl-base, step-bearing and whirl having been adjusted and the vertical slot in the upper section of the bolster placed in position with one of the slots in the lower section, the spindle and bolster are placed in the bolster-case and down against the shoulder and the pin 25 is inserted and made fast. This pin engagement prevents the bolster from rotating with the spindle and also locks the adjustment of the bolster. The stop-pin is then turned around until it overhangs the horizontally extending flange 35 on the whirl-base, thereby preventing the spindle and bolster from being pulled out of the bolster-case. The whirl at the point of the hand-pull is smaller in diameter than the bolster-bearing.

The bolster is made to have an easy slip-fit in the upright 7 of the bolster-case, but is smaller below the shoulder 14 and out of contact with the walls of the oil-well of the bolster-case, and this lower section of the bolster being spirally slotted, and therefore flexible laterally and longitudinally, admits of both lateral and vertical movement.

The purpose of the stop-collar 12 is to limit the downward pressure of the spindle on the step and spirally-cut portion of the bolster when tight bobbins are forced down upon the spindle, since in that event it strikes against the top of the lower section of the bolster.

The spindle, cone, bolster, bolster-bearing, step-bearing, whirl-base, and whirl all move laterally and vertically together.

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 center of the band-pull, predomi-

nates over the lower and shorter end of the spindle and the spring-bolster then takes on the gyration and the upper ends of the spindle and bobbin 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 perfect 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 adjustment of the step-bearing and bolster-bearing are quite loose.

The lubrication in the present invention is very thorough, since the reservoir is filled with oil which flows thence into the oil-well 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 extended ledge on the bolster-cone directly onto the balls in the upper bearing, thereby keeping them continually lubricated. This movement of the oil is facilitated by the upwardly flaring construction of the ledge.

The spindle, whirl, cone and collar 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 these may be varied within the spirit of the invention; moreover, the invention is applicable to a bolster and step-bearing of the ordinary journal type.

What I claim is:—

1. A spindle, a bolster, a ball-bearing in the top of said bolster and a ball-bearing step in the bottom of said bolster to receive the spindle, and a bolster-case in which said bolster is supported and mounted to move laterally and vertically with the spindle.

2. A spindle, a bolster, ball-bearings in the top and bottom of said bolster to receive the spindle, the ball-bearing in the bottom being a step or supporting bearing, a bolster-case in which said bolster is supported and mounted to move laterally and vertically with the spindle, and means to fix the bolster in the bolster-case to prevent the bolster from rotating with the spindle.

3. A spindle, a ball-bearing bolster therefor, a contracted, cylindrical sleeve-whirl into which the upper portion of the bolster extends, the spindle, bolster and whirl arranged to move together laterally and vertically, and means to limit their vertical movement.

4. A spindle, a bearing therefor, and a whirl-base mounted upon the spindle and provided with a horizontally-extending flange, said whirl-base counterbored, a whirl inserted within the counterbore in the whirl-base, and a stop to engage the flange without contact with the whirl.

5. A spindle, a contracted cylindrical sleeve-whirl, a whirl-base recessed to receive and hold the sleeve-whirl and having a horizontally-extending flange, said whirl being of a smaller diameter than the cylindrical portion of the whirl-base, and a stop to engage the flange independently of the sleeve-whirl.

6. An adjustable bolster, having a bolster-bearing at its upper end and a step-bearing at its lower end, a spindle arranged in said bearings, a bolster-case in which the bolster is arranged to move laterally and vertically with the spindle, and means for positively restraining the bolster from rotating with the spindle.

7. A two-part bolster, whose parts are adjustable to vary the bolster's length relatively to the spindle, and having a bolster-bearing at its upper end and a step-bearing at its lower end, a spindle mounted in said bearings, a bolster-case in which the bolster is mounted to move laterally and vertically with the spindle, and means for positively locking the adjustment of the bolster in said bolster-case.

8. A spindle, a bolster, a ball-bearing arranged in the top of the said bolster and a ball-bearing step in the bottom of said bolster to receive the spindle, a bolster-case, said bolster adapted to move laterally and vertically up and down in said bolster-case, and means independent of the ball-bearings to limit the downward movement of the spindle in said bolster.

9. A spindle, a two-part bolster adjustable to vary its length with relation to the spindle, bearings in said bolster to support said spindle, and a stop-collar on the spindle adapted to come into contact with the lower part of the bolster to limit the downward movement of the spindle in its bolster.

10. A spindle, a bolster-case, a flexible spring bolster suspended in said bolster-case and containing a ball-bearing near its top and a ball-bearing step at its bottom to receive and sustain the spindle, and means for adjusting said bearings and locking the adjustment, said bolster-case provided with means to prevent the bolster from rotating with the spindle.

11. A bolster-case, a flexible spring bolster containing upper and lower ball-bearings for the spindle, the upper bearing taking the upward thrust of the spindle and the lower bearing constituting a step for said spindle, and means for adjusting said bearings, combined with a spindle arranged in said bolster and upon the said bearings.

12. A bolster-case, a flexible spring bolster

suspended in said case and having a ball-bearing at its upper end and a ball-bearing at its lower end in which the spindle is stepped, and means for adjusting the bearings and locking the adjustment, combined with a spindle arranged in said bearings.

13. A spindle, a bolster-case having an oil-well and a counterbore in the upper end of said oil-well, and a bolster having a section seated in said counterbore and containing a bearing for the spindle, and another section made flexible laterally and longitudinally and connected with the section seated in the counterbore.

14. A spindle, a bolster-case, and a bolster composed of an internally screwthreaded section fitted rigidly in the bolster-case, and a flexible, spring, section provided with an external screwthread and fitted to the fixed section, and bearings for the spindle in these two bolster sections.

15. A spindle, a bolster having an enlarged upper end, an upper ball-bearing arranged in said end, a ball-bearing step in the lower end of said bolster, a contracted cylindrical sleeve-whirl encircling and extending below and inclosing the said upper ball-bearing, a spindle mounted and sustained in said bearings, the spindle, whirl, and bolster movable vertically together, and means to limit such movement.

In testimony whereof I have hereunto set my hand this seventh day of February A. D. 1907.

CHARLES H. CHAPMAN.

Witnesses:

B. L. NEWMAN,

J. E. MURPHY.