

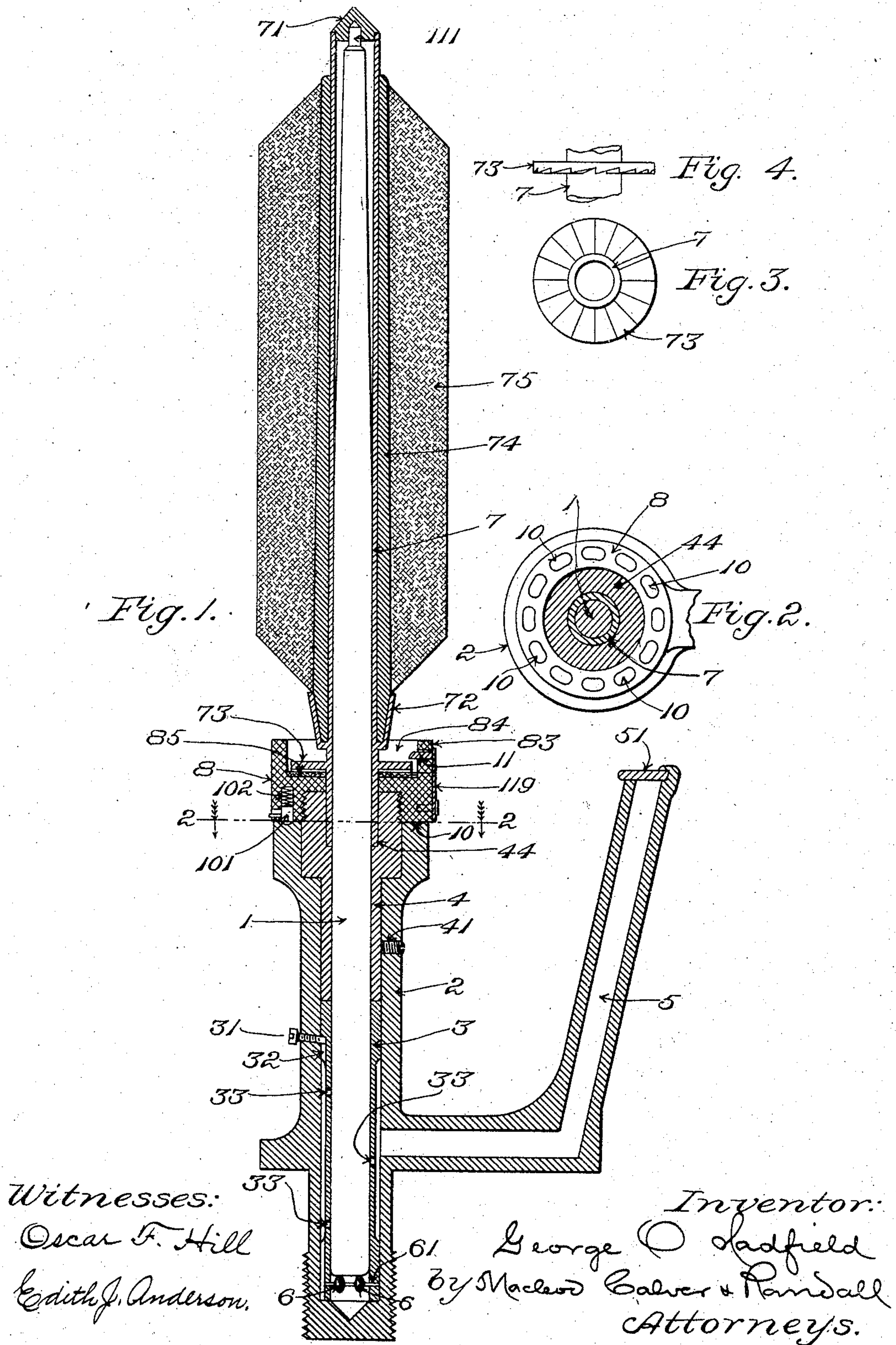
No. 790,203.

PATENTED MAY 16, 1905.

G. O. HADFIELD.

SPINDLE FOR SPINNING AND TWISTING MACHINES.

APPLICATION FILED FEB. 2, 1903.



UNITED STATES PATENT OFFICE.

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SPINDLE FOR SPINNING AND TWISTING MACHINES.

SPECIFICATION forming part of Letters Patent No. 790,203, dated May 16, 1905.

Application filed February 2, 1903. Serial No. 141,414.

To all whom it may concern:

Be it known that I, GEORGE O. HADFIELD, a citizen of the United States, residing at Fall River, in the county of Bristol, State of Massachusetts, have invented a certain new and useful Improvement in Spindles for Spinning and Twisting Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

In spinning and twisting machines of certain classes the yarn or thread is spun or twisted with the aid of a rotating flier or ring, which is driven by means of suitable power connections at the required rate of speed to effect the spinning or twisting, and the said yarn or thread as fast as it is spun or twisted is wound upon a bobbin or cop-tube mounted upon a suitable spindle or upon the bare blade of the receiving-spindle.

My invention has relation to machines of this general class; and it consists in novel and improved features of construction and arrangement which are embodied in and in connection with a receiving-spindle suitable for use in such machines.

An embodiment of the features of the invention in the best and most complete form which has been devised by me is illustrated in the drawings, in which—

Figure 1 is a sectional view of the said embodiment. Fig. 2 is a view in horizontal section on line 2-2, Fig. 1. Fig. 3 is a bottom view of the sleeve and its flange. Fig. 4 shows in side elevation a portion of the sleeve and its flange.

A spindle proper is shown at 1, and at 2 is shown a support therefor, the latter being bored vertically to receive the bushings, which are marked 3 and 4. The lower portion of the spindle is fitted to the interiors of the said bushings with capacity to turn freely therein, the said bushings constituting bolster-bearings. The lower bushing 3 rests upon a shoulder or surface at or near the bottom of the vertical bore of the support 2, and thereby is supported vertically. It may be held from rotating with the spindle, if desired, by means of a screw or fixed pin 31, projecting inwardly from the vertical shell of the support, the exterior of the bushing 3 be-

ing formed with a longitudinal groove 32 to receive said pin and the inner end of the said screw or pin engaging with the side walls of said groove for the purpose of holding the bushing from rotating. I contemplate omitting the locking means for bushing 3 in some cases, especially when working at very high speeds, in order that by permitting the said bushing to rotate with the spindle the action may be rendered easier and the wear may be divided. The upper bushing 4 is secured in place and held from rotating by means of a screw 41, fitted to a hole tapped through the vertical shell of the support and taking by its inner end against the said bushing. The lower bushing 3 is reduced in diameter intermediate its upper and lower ends to afford space for oil around said bushing, and holes 33 33 are made through the intermediate portion of the shell of the bushing to permit access of the oil to the spindle within the bushing and circulation of the oil. The usual reservoir for oil is provided, as at 5, its interior passage communicating with the vertical bore of the support and said reservoir having the usual hinged cap or cover 51.

The spindle 1 is suitably stepped within the support 2. In the present embodiment of the invention the spindle 1 is furnished with an antifriction-step, its lower end having a plane surface resting upon the edges of two lens-shaped disks 6 6, which latter are mounted side by side upon a pin 61, having its ends mounted in opposite portions of the lower end of bushing 3. Each disk contacts with the bottom end of the spindle at a single point, and as the disks turn freely upon the pin 61 the resistance to the rotation of the spindle that is offered at the step-bearing is reduced to a minimum. The upper portion or blade of the spindle 1 tapers gradually from shortly above the upper end of the support to near the upper end of the spindle. The said upper end of the spindle is shaped as a cylindrical tip 111, having a pointed extremity. To the spindle above the support 2 is applied the sleeve 7. The upper end of the latter is occupied by a plug 71, in the under side of which is formed a socket receiving and fitting the tip of the spindle and forming

a bearing which coacts with the said tip. The lower portion of the sleeve fits the exterior of the spindle at and adjacent the upper end of the support. The sleeve may receive
 5 directly upon its bare exterior the yarn or thread which is being spun or twisted and wound, or a cop-tube or bobbin may be employed, as usual. A bobbin is shown at 74, and the load of yarn upon the latter is indicated at 75. At 72 is shown a bobbin-cup to receive the lower end or head of the bobbin 74, or a suitable cup may be employed to engage with the lower end of a cop-tube. The pull of the yarn or thread which is being
 15 spun or twisted as such yarn or thread is carried around by the action of the rotating flier or ring communicates movement of rotation to the sleeve. The resistance which is offered to the rotation of the sleeve tends
 20 to cause the sleeve to lag behind the flier or ring in speed, and this tendency to a slower speed of the sleeve causes the yarn to become wound upon the exterior of the sleeve or upon the bobbin or other yarn or thread receiver which is applied thereto in the well-known manner. The sleeve is provided adjacent the cup 72 with a projecting flange, as 73, for use in producing the drag by means of which the retardation of the sleeve in its
 30 rotation as it is drawn around by the tension of the yarn or thread being spun or twisted is regulated.

The drag-collar is shown at 8. It encircles the spindle and lower end of sleeve 7
 35 just above the upper end of upper bushing 4 and is mounted upon said end of said bushing. An internally-threaded rim or skirt depending from said drag-collar fits over and screws upon the upper end of bushing 4, the
 40 said end being enlarged in order that it may constitute a proper support for the drag-collar. The drag-collar is formed with an upwardly-extending rim 83, encircling a chamber 84, in which the flange 73 of the sleeve 7
 45 is received. Between the floor of said chamber and the said flange 73 the drag-washer 85 is placed. The lower end of sleeve 7 projects through the drag-washer and some distance below the same, being received in the enlargement 44 of the bore of the upper bushing 4. The described construction and arrangement of parts protect the drag-washer from access of oil from the bearing-surfaces of the sleeve, spindle, and bushing, and therefore proper and uniform action of the said
 55 drag-washer is insured. For the purpose of increasing the frictional hold or engagement between the flange 73 and the drag-washer the under surface of said flange may be
 60 roughened or grooved radially, as in Fig. 3, if desired. For the purpose of enabling the degree of drag to be varied when required I make provision for raising and lowering the drag-collar relatively to the spindle and the
 65 sleeve 7. This provision is made in the pres-

ent instance by screwing the drag-collar upon the upper end of the upper bushing 4, as already described. By turning the drag-collar in one direction or the other its position vertically may be varied. Adjustment of
 70 the drag-collar upward increases the extent to which the drag-washer is compressed between the drag-collar and the flange 73 of sleeve 7, and such adjustment may be increased until the entire weight of the sleeve
 75 and its load is supported by the said flange resting upon the drag-washer. For the purpose of holding the drag-collar in the desired position after adjustment a suitable locking or latching device is employed in connection
 80 therewith. A convenient device for the purpose is illustrated in the drawings. In the latter the upper surface of the top of the vertical portion or standard of the stationary
 85 spindle-support is formed with a circular series of shallow holes or notches, as at 10. A hole is bored upward into the under side of the drag-collar, near the outer edge thereof, and in said hole is placed a small bolt 101,
 90 which is backed up by a spring 102. The spring projects the lower end of the bolt into one of the holes or notches 10 when the rotary movement of the drag-collar brings the bolt opposite such hole or notch, and thereby the drag-collar is held from accidental loss of
 95 adjustment. When power is applied by the attendant to the drag-collar sufficient to overcome the tension of the spring, the bolt gives way sufficiently to enable the drag-collar to be rotated by hand as required. 100

For the purpose of preventing the sleeve from rising during the operation of doffing a catch is provided for engagement therewith. This catch consists, preferably, of a pin, as 11, working radially inward through a hole in
 105 the upturned rim of the drag-collar and projecting at its inner end above the flange 73 of the sleeve. The said pin is attached to a flat spring, as 119, which is attached to the exterior of the drag-collar. 110

It will be perceived that in the construction which has been described the spindle is free to rotate in unison with the sleeve in consequence of the frictional contact of the sleeve therewith. The sleeve, however, is
 115 capable of rotating independently upon the spindle. This eases the strain upon the yarn or thread being spun or twisted and reduces breakage. For instance, in spinning or twisting with a rotating flier or ring, such as have
 120 been referred to, and a receiver for yarn or thread rotated by the pull of the yarn or thread it is found that as the lower portion of the receiver becomes filled with yarn and the winding on approaches the upper end
 125 thereof there is an increasing tendency to breakage of the yarn or thread. This is due to the fact that the transverse strain of the yarn extending through the guide-eye of the rotating flier or ring to the receiver acts with 130

gradually-increasing leverage upon the blade of the spindle by which the receiver is constituted or upon which it is mounted, and consequently with correspondingly-increased tendency to occasion binding of the lower end of the spindle within the bearing or bearings therefor. This produces a gradually-increasing resistance to the rotation of the spindle under the pull of the yarn or thread. However, by mounting the sleeve upon the spindle, with capacity to turn upon and independently of the latter when the resistance to the rotation of the spindle increases, the sleeve will remain free to rotate upon the spindle, and thereby the tendency to occasion breakage of the yarn or thread will be obviated.

My invention has been designed for general use in spinning and twisting yarns and threads and is especially valuable for fine numbers and high speeds.

What I claim is—

1. In machines for spinning or twisting, in combination, the sleeve rotated by the pull of the yarn or thread being spun or twisted, the spindle upon which the said sleeve is mounted and which is rotated by the frictional contact of the sleeve therewith, the said sleeve remaining permanently in working relation with said spindle, a support for said spindle provided with an antifriction-disk step for the spindle, and means independent of said spindle to apply a drag to the said sleeve, substantially as described.

2. In machines for spinning or twisting, in combination, the sleeve rotated by the pull of the yarn or thread being spun or twisted, the spindle upon which the said sleeve is mounted and which is rotated by the frictional contact of the sleeve therewith, a support for said spindle provided with an antifriction-disk step for the spindle, a drag device coacting with the said sleeve, and means to vary the degree of drag, substantially as described.

3. In machines for spinning or twisting, in combination, a yarn-receiver rotated by the pull of the yarn or thread being spun or twisted and having a frictional surface, a drag-collar having a frictional surface coacting with that of the yarn-receiver to retard the rotation of said yarn-receiver under the pull of the yarn or thread, a support for said drag-collar with which the latter has screw-threaded engagement, whereby by rotating the drag-collar relative to the support the degree of drag may be varied as required, and a latch to hold said drag-collar in adjusted position, substantially as described.

4. In machines for spinning or twisting, in combination, a yarn-receiver rotated by the pull of the yarn or thread being spun or twisted and having a frictional surface, a drag-collar having a frictional surface co-

acting with that of the yarn-receiver to retard the rotation of the said yarn-receiver, a support for said drag-collar, the said drag-collar and support having in connection therewith means to adjust the drag-collar to vary the degree of drag, a latch to retain the adjustment, and means to prevent the sleeve from being lifted in doffing.

5. In machines for spinning or twisting, in combination, a receiver at the exterior of which the yarn or thread is wound as the latter is spun or twisted, the said receiver having a frictional surface or flange, a support for the said receiver, and a drag-collar having a frictional surface coacting with the said frictional surface or flange of the receiver to retard the rotation of said receiver under the pull of the yarn or thread, and also having a raised rim inclosing a chamber within which the said frictional surfaces are contained and protected, the said rim provided with a movable latch to keep the sleeve from being raised in doffing, and the said drag-collar having screw-threaded engagement with its support, whereby by rotating the drag-collar relative to said support the degree of drag may be varied.

6. In machines for spinning or twisting, in combination, a receiver adapted to be rotated by the pull of the yarn or thread being spun or twisted and having a frictional surface or flange, a support for the said receiver, and a drag-collar having a frictional surface coacting with the said frictional surface or flange of the receiver to retard the rotation of the said receiver under the pull of the yarn or thread, and also having a raised rim inclosing the said frictional surfaces and protecting the same, the said rim having a movable latch to prevent the sleeve from being raised in doffing, and the said drag-collar also having in connection therewith means for adjusting the degree of drag, substantially as described.

7. In machines for spinning or twisting, in combination, the sleeve adapted to be rotated by the pull of the yarn or thread being spun or twisted and having a frictional surface or flange, a spindle upon which the said sleeve is mounted, a drag-collar having a frictional surface coacting with the said frictional surface or flange of the sleeve to retard the rotation of said sleeve under the pull of the thread or yarn, the said drag-collar having a central opening to receive the lower end of the sleeve and the said lower end of the sleeve extending below the said drag-collar, the drag-collar having also a raised rim encircling and protecting the said frictional surfaces, substantially as described.

8. In machines for spinning or twisting, in combination, the sleeve adapted to be rotated by the pull of the yarn or thread being spun or twisted and having a frictional surface or flange, the spindle upon which the

said sleeve is mounted and which is rotated by the frictional contact of the sleeve therewith, and a drag-collar having a frictional surface coacting with the said frictional surface or flange of the sleeve to retard the rotation of the said sleeve under the pull of the yarn or thread, the said drag-collar having a raised rim encircling and protecting the said frictional surfaces and a central hole to receive the lower portion of the sleeve, and also having in connection therewith means to adjust the same for the purpose of varying the drag, the lower end of the sleeve extending below the drag-collar through the said central opening thereof, substantially as described.

9. In machines for spinning or twisting, in combination, the receiver for yarn or thread, the support having the series of notches or holes and also having the screw-threaded mounting for the drag-collar, and the drag-collar in screw-threaded engagement with the said mounting and provided with the bolt for engagement with the respective holes or notches of the support to secure the drag-collar in the desired position of adjustment, substantially as described.

10. In machines for spinning or twisting, in combination, a spindle, a sleeve rotatably mounted thereon and provided with a frictional surface or flange, a drag-collar having a frictional surface to cooperate with the said frictional surface or flange of the receiver, and also having a bolt or latch, and a support provided with a screw-threaded mounting for the drag-collar and with a series of holes or notches to receive the said bolt or latch to hold the drag-collar in the desired position of adjustment, substantially as described.

11. In machines for spinning or twisting, in combination, the sleeve adapted to be rotated by the pull of the yarn or thread being spun or twisted and having a frictional surface or flange, the spindle upon which the said sleeve is mounted and which is rotated

by the frictional contact of the sleeve therewith, the spindle-support having a bolster-bearing for the lower portion of said spindle, the bore of the said bolster-bearing having the enlarged upper portion, and the drag-collar having a frictional surface coacting with the said frictional surface or flange of the sleeve to retard the rotation of the said sleeve under the pull of the yarn or thread and a central hole to receive the lower portion of the sleeve, the lower end of the said sleeve extending below the drag-collar through the said central opening thereof and into the enlarged portion of the bore of the bolster-bearing, substantially as described.

12. In machines for spinning or twisting, in combination, the sleeve adapted to be rotated by the pull of the yarn or thread being spun or twisted and having a frictional surface or flange, the spindle upon which the said sleeve is mounted and which is rotated by the frictional contact of the sleeve therewith, the spindle-support, a bolster-bearing applied to the said spindle-support and having the bore thereof formed with the enlarged upper portion, and the adjustable drag-collar having a frictional surface coacting with the frictional surface or flange of the sleeve to retard the rotation of the said sleeve under the pull of the yarn or thread, a central hole to receive the lower portion of the sleeve, and a raised rim extending around and protecting the said frictional surface, the lower end of the said sleeve extending through the said central opening of the drag-collar and into the enlarged portion of the bore of the bolster-bearing, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE O. HADFIELD.

Witnesses:

CHAS. F. RANDALL,
WILLIAM A. COPELAND.