W. T. SMITH.

SPINDLE FOR SPINNING AND DOUBLING MACHINES.

APPLICATION FILED MAY 7, 1906.

911,170. Patented Feb. 2, 1909.

3 SHEETS—SHEET 1.

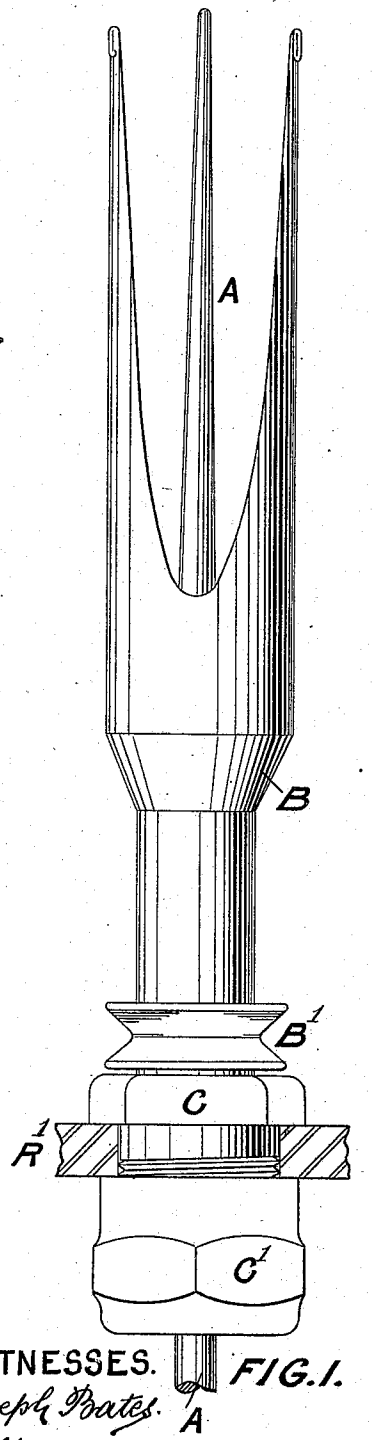


FIG. 1.

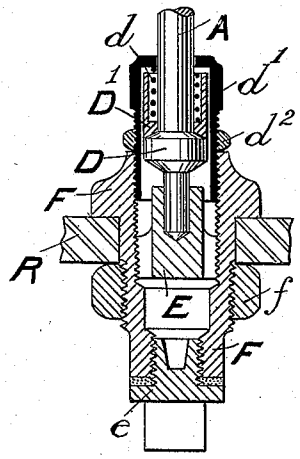


FIG. 4.

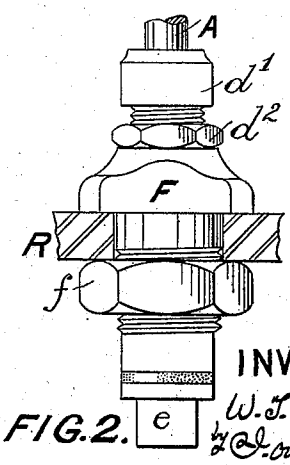


FIG. 2.

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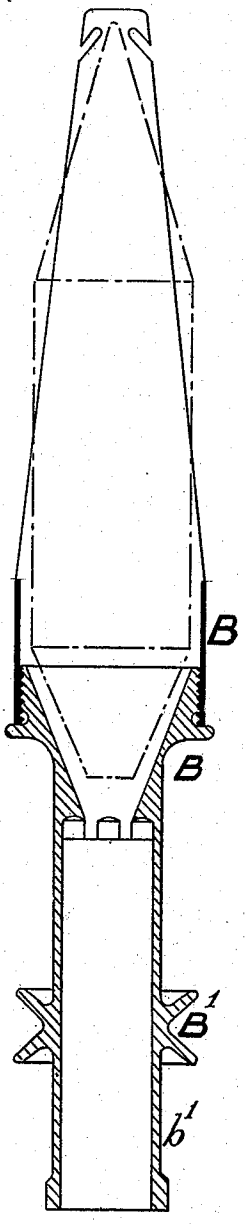


FIG.5.

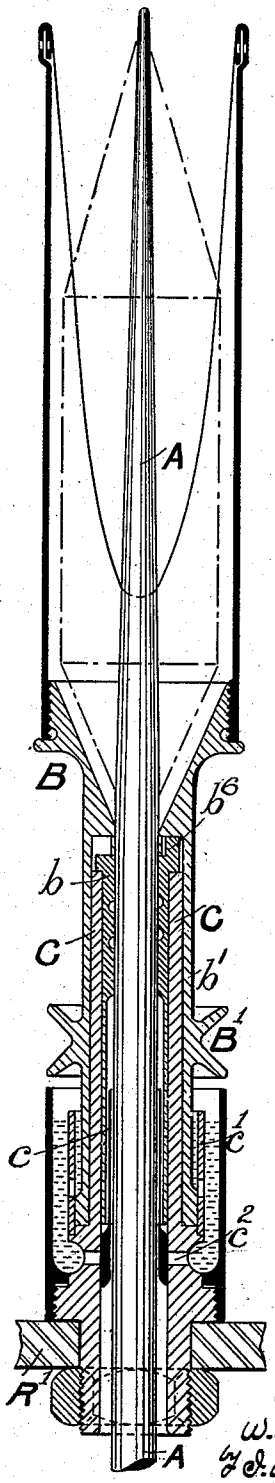


FIG.3.

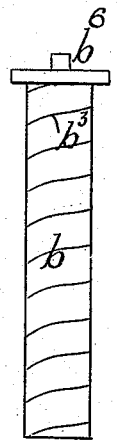


FIG.8.

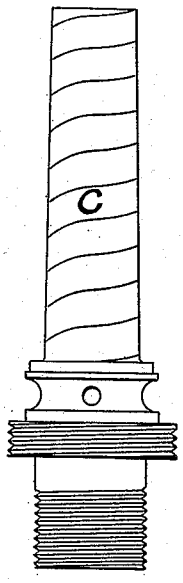


FIG.6.

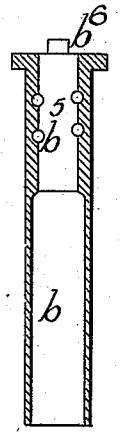


FIG.9.

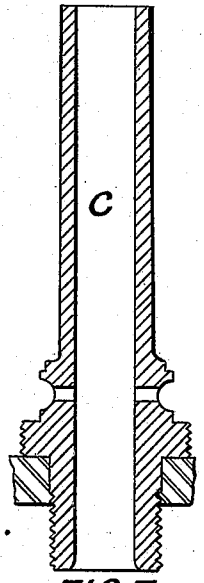


FIG.7.

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SPINDLE FOR SPINNING AND DOUBLING MACHINES.

APPLICATION FILED MAY 7, 1906.

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3 SHEETS—SHEET 3.

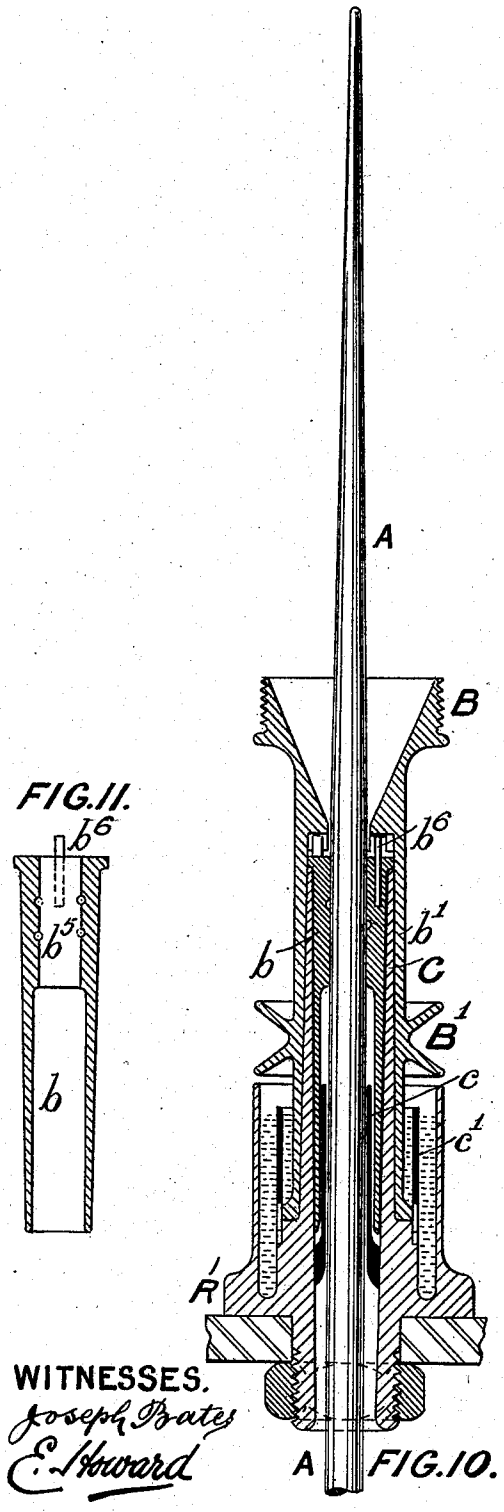
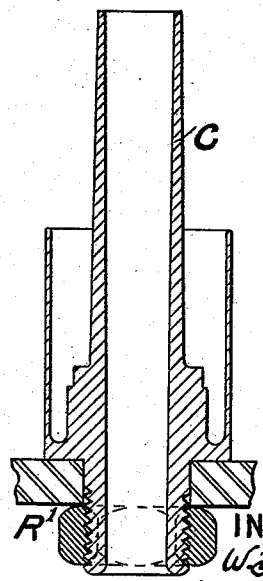


FIG. 10.

FIG. 11.

FIG. 12.



WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM THOMAS SMITH, OF BOLTON, ENGLAND.

SPINDLE FOR SPINNING AND DOUBLING MACHINES.

No. 911,170. Specification of Letters Patent. Patented Feb. 2, 1909.

Application filed May 7, 1906. Serial No. 315,599.

To all whom it may concern:

Be it known that I, WILLIAM THOMAS SMITH, British subject, and resident of Bolton, in the county of Lancaster, England, have invented certain new and useful Improvements in Spindles for Spinning and Doubling Machines, of which the following is a specification.

This invention relates to that type of spindles in which two concentric spindles are arranged one a cop spindle upon which the cop or bobbin is wound, and the other a flier or guide spindle to direct the yarn onto the cop, the flier or guide spindle applying sufficient friction to the cop spindle to drive it positively without relying upon the pull or tension of the yarn to turn or rotate it. The two spindles are set perfectly vertical and concentric the cop spindle rotating within the hollow flier spindle, the cop spindle being set in the bottom rail which lifts to build up the cop and the flier spindle set in the fixed top rail and driven by a band or cord on to a wharve or whirl.

The invention consists essentially in improvements in this type of spindle described in the specification of my former application for patent Serial No. 281682 filed 6th October 1905. It will be fully described with reference to the accompanying drawings.

Figure 1. is a front elevation showing the upper part of cop spindle A and flier spindle B. Fig. 2. is a front elevation without the brake D. Fig. 3. is a sectional elevation of spindle. Fig. 4. is a sectional elevation of brake D. Fig. 5. is a sectional elevation of the flier spindle B detached. Fig. 6. is an elevation of bolster C. Fig. 7. is a section elevation of same. Fig. 8. is an elevation of friction sleeve or tube *b* of the flier spindle detached. Fig. 9. is a section of same. Fig. 10. is a sectional elevation of a modification of the spindles and bolsters. Fig. 11. is a sectional elevation of the friction sleeve or tube *b*. Fig. 12. is a sectional elevation of the bolster C.

The cop spindle A is mounted in a footstep bearing E inclosed in a bolster or cover F in the bottom rail R. Upon the lower end of the spindle A a brake or drag block D is fitted with which a brake or drag device D′ in the form of a ring or loose washer engages to regulate the speed of the cop spindle A, relative to the speed of the flier spindle B by which it is driven. The brake or drag block D may be in the form of a collar or washer applied to the spindle with a convex flat or other suitable face preferably convex and inclined to the horizontal against which the brake or drag device D′ engages. The pressure of the brake washer D′ upon the brake block D is adjustable to give the desired amount of drag to the spindle A. The brake washer is preferably cylindrical and incloses a spiral or other spring *d* to give elasticity to the drag adjustment and allow for some little wear until again adjusted. Over the brake washer D′ is fitted a sleeve *d′* which embraces the spindle and at its upper end abuts against the spring *d*. Its lower end is externally screwed and passes down protecting the drag or brake washer D′ and the brake or drag block D of the spindle and is screwed into the interior of the spindle foot-step bolster F. By screwing the sleeve *d′* into the foot-step bolster the drag or brake is increased and by screwing it out the drag or brake is decreased. The brake or drag upon the spindles A is so adjusted as to permit of its being rotated by the flier spindle B at the lowest speed required to wind the yarn onto the bare spindle any acceleration of speed of the cop spindle above this minimum being obtained as required by the pull of the yarn as it is wound upon the cop.

The foot-step comprises a metal bolster sleeve F externally screwed for a nut *f* to hold it in the bottom rail R and internally screwed at both ends. Internally it is fitted with the foot-step bearing E and at the bottom end the plug *e* is screwed into the bolster F to close it and form an oil reservoir or container with a drain tap formed of a split in the end of the plug which does not necessitate its entire removal to drain the footstep of dirty oil.

The flier spindle B is constructed with a friction sleeve *b* bored to accurately fit the cylindrical part of the cop spindle A, the friction sleeve *b* being separate from the flier B and connected in any suitable manner to rotate with it, the wharve B′ being formed in one with the flier B as in Figs. 3 to 5 and 10, or all three parts may be separate.

Around the friction sleeve *b* is an outer or second sleeve *b′* which passes down over the fixed bolster C and acts as a guard to prevent the throwing off of oil by centrifugal force, and delivers the oil back into the base of the fixed bolster. In the construction shown in Figs. 3 and 10 it also forms a bearing upon the exterior surface of the bolster C. This outer sleeve *b′* carries a wharve or whirl B′

by which the spindles are driven by a band or cord.

In the construction shown in Figs. 3 to 9 the friction sleeve b is loose and is connected to the flier spindle by a pin or projection b^6 which causes the two to rotate together. This insures that the cop spindle A will always remain vertical and without shake should any wear take place between the bearing of the flier spindle and the bolster C, the flier having an additional bearing upon the outside of the bolster C. The sleeve b is provided with grooves b^3 on the outside by which the oil is carried up and with tangential holes b^5 near the top which also assist the flow of the oil. The bolster is secured in the top rail R′ by a nut with the oil well above the rail thereby permitting the holes in the top and bottom rails R R′ being of the same size. The inner oil tube c is separate from the oil well and secured by pressure on the inside of the bolster C and an outer splash ring c' is placed around the base of the flier spindle B. The ring c' is nicked or drilled with holes to allow the oil to pass into the outer portion of the oil well. A small hole c^2 allows the oil to flow from the oil well to the inside of the bolster C.

In the construction shown in Figs. 10 to 12 the friction sleeve is made tapering as is also the interior of the bolster C; when constructed in this form with the tangential holes b^5 at the top, the spiral grooves for lifting the oil may if desired be dispensed with. The flier spindle B as it revolves raises the oil from the oil cup and the oil flows through the holes b^5 drilled tangentially and both surfaces of the friction sleeve b of the flier spindle B are thereby lubricated. The internal spiral groove carries the oil to the top of the friction sleeve and it is thrown centrifugally through the holes b^5 and down the inside of the wharve sleeve or tube and down through the bolster to the oil cup complete circulation being thus provided for. Any oil on the spindle below the bottom edge of the bearing is licked off the spindle and thrown to the larger diameter below and back into the oil cup.

The flier or top of the flier spindle is formed of a tube cut away in V shape at the sides at the top to give access to the cop and facilitate finding the broken end of the yarn in piecing up with hardened steel eyelets as thread guides, to direct the yarn onto the spindle. The flier eyes can be made more substantial by turning a short length of the cut tube down so as to give one or more extra thicknesses then pressed solid to receive the holes and slits and then hardened, or loose ends can be slipped onto the tube flier ends by having the loose ends slitted to press onto the thin flier tube an indention which retains the said loose ends which are ready slitted for thread eyes and hardened and save the flier tube which is not then subjected to wear at the ends.

The cop spindle revolves with the flier. To set the drag, the drag adjuster d' is screwed down to tighten the brake or drag washer D′ through its spring upon the brake block D and the spindle is thereby retarded. The drag is set so that the yarn will wind on the spindle point, at the smallest diameter, being so that the yarn is neither too slack nor too tight for stripping the cop when complete. Hitherto in what are known as dead spindles or spindles which have to be drawn round by the pull of the yarn from the driven flier, the difficulty has been to get the spindle to revolve when winding on at a small diameter. With my system of revolving friction sleeve, by which the cop spindle A is driven, and adjustable brake it will be evident that the cop spindle A does not require the assistance of the yarn for its revolutions, but rather that the spindle be held back to something less than the speed required to wind on the yarn as it is delivered from the rollers. The drag or brake should be so set that the speed of the spindle is the slowest required, that at which the yarn will wind onto the smallest diameter, as it is the flier that does the winding on and not the cop spindle. As the cop nose increases in size or the yarn is guided on to a larger diameter of the nose the spindle requires to revolve quicker, a less number of revolutions of the larger diameter being required for the yarn delivered. This increased speed is obtained partly by the pull of the yarn on the nose as the diameter increases, (the extra leverage got by the increased diameter, greatly exceeding proportionately the required increase of spindle speed), further frictional driving is got on the tightening of the yarn in winding which causes the cop and spindle to pull slightly sidewise and so against the sides of the revolving top bearing, which increases the spindle speed and so balances automatically the required differential speed of spindle and flier. The spindle having been set to wind on at the point it will be evident that the yarn cannot be slack or balloon, the speed of the spindle at the slowest being equal to the delivery of the rollers which is constant.

What I claim as my invention and desire to protect by Letters Patent is:—

1. In a spindle for spinning and doubling frames constructed with an inner or cop spindle driven frictionally by a concentric outer or flier spindle, the combination with the cop spindle and the flier spindle of a separate friction sleeve loosely connected with and driven by the flier and a projection thereon engaging with the flier spindle by which it is driven, substantially as described.

2. In a spindle for spinning and doubling frames constructed with an inner or cop

spindle driven frictionally by a concentric flier spindle, the combination with the cop spindle A and the flier spindle B provided with a driving whirl B′ of a top bearing for the cop spindle, comprising a separate sleeve b and projection b^6 thereon by which it is loosely connected with and driven by the flier spindle B and internally in frictional contact with the cop spindle by which the cop spindle is driven substantially as described.

3. In a spindle for spinning and doubling frames constructed with an inner or cop spindle driven frictionally by a concentric flier spindle, the combination with the cop spindle A and the flier spindle B provided with a driving whirl B′ of a top bearing for the cop spindle, comprising a separate sleeve b and projection b^6 thereon by which it is loosely connected with and driven by the flier spindle B, a fixed bolster C and an outer sleeve b' forming a bearing on the exterior surface of the bolster C substantially as described.

4. In a spindle for spinning and doubling frames constructed with an inner or cop spindle driven frictionally by a concentric outer or flier spindle, the combination with the cop spindle of a metal brake or drag block affixed thereto a metal brake or drag washer carried in the foot-step bearing which bears direct against the drag block on the spindle a spring placed above the drag washer to apply pressure thereto and a screw cap to adjust the pressure of the spring and the drag upon the spindle to the desired degree substantially as described.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM THOMAS SMITH.

Witnesses:

J. OWDEN O'BRIEN,

B. TATHAM WOODHEAD.