No. 689,362. Patented Dec. 17, 1901.

# W. G. MORRISON, Dec'd.

H. CLARK, Administrator.

## SPINNING SPINDLE.

(Application filed Sept. 2, 1896.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

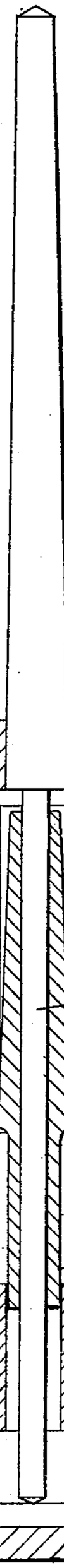


Fig. 2.

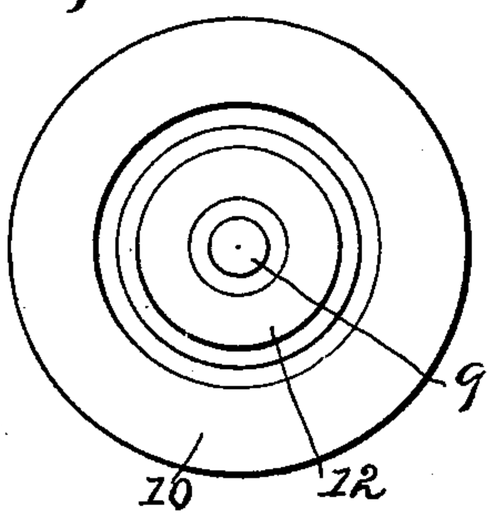


Fig. 3.

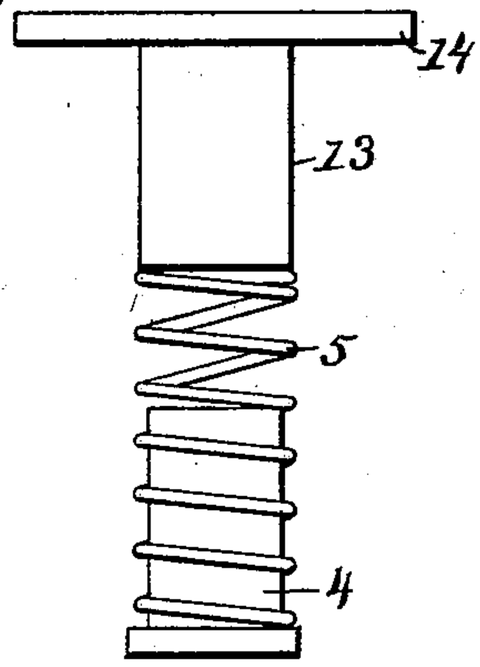


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Fig. 4.

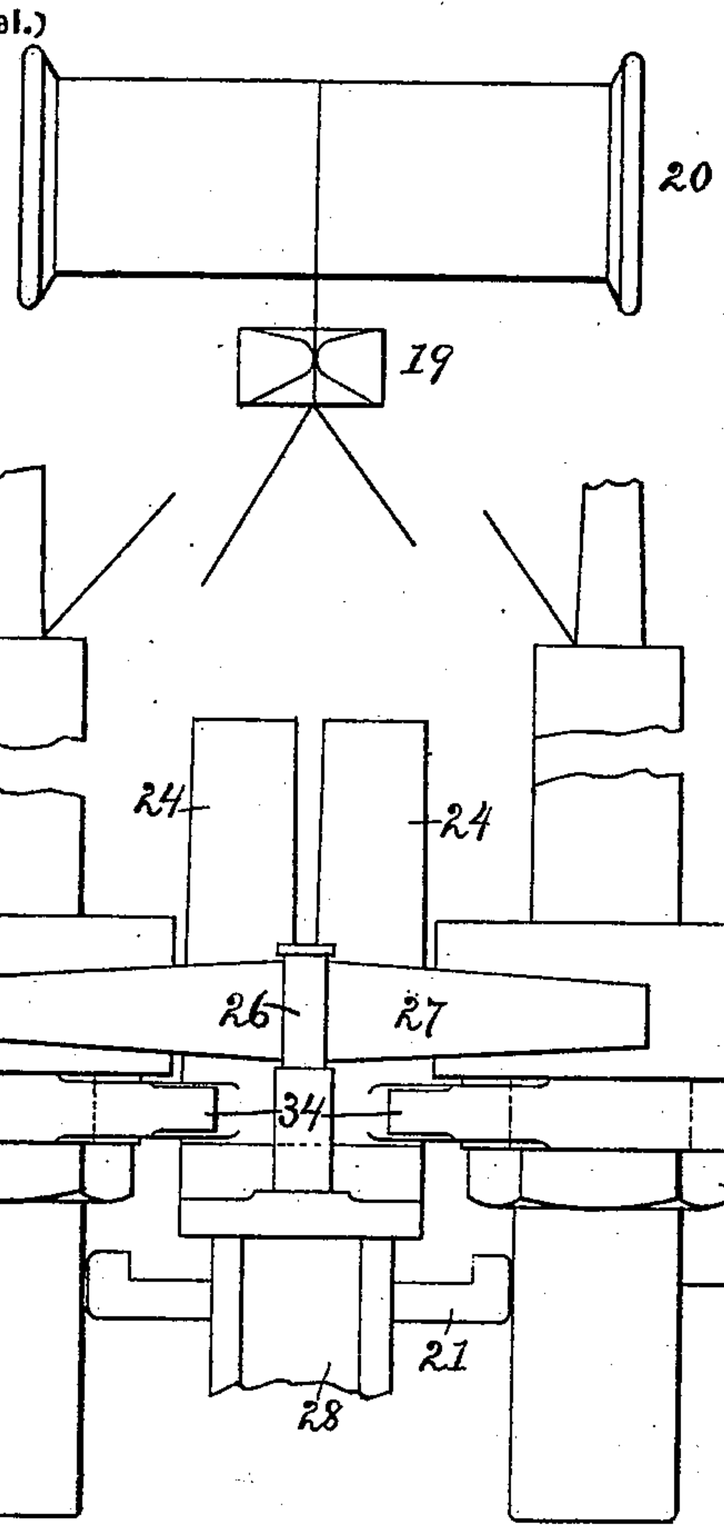



Fig. 5.

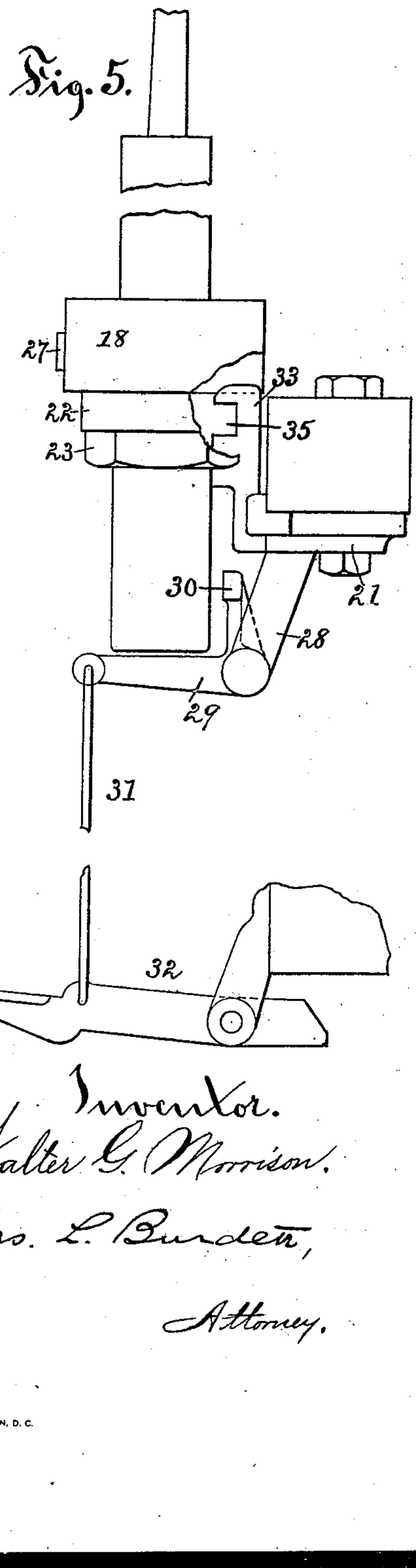
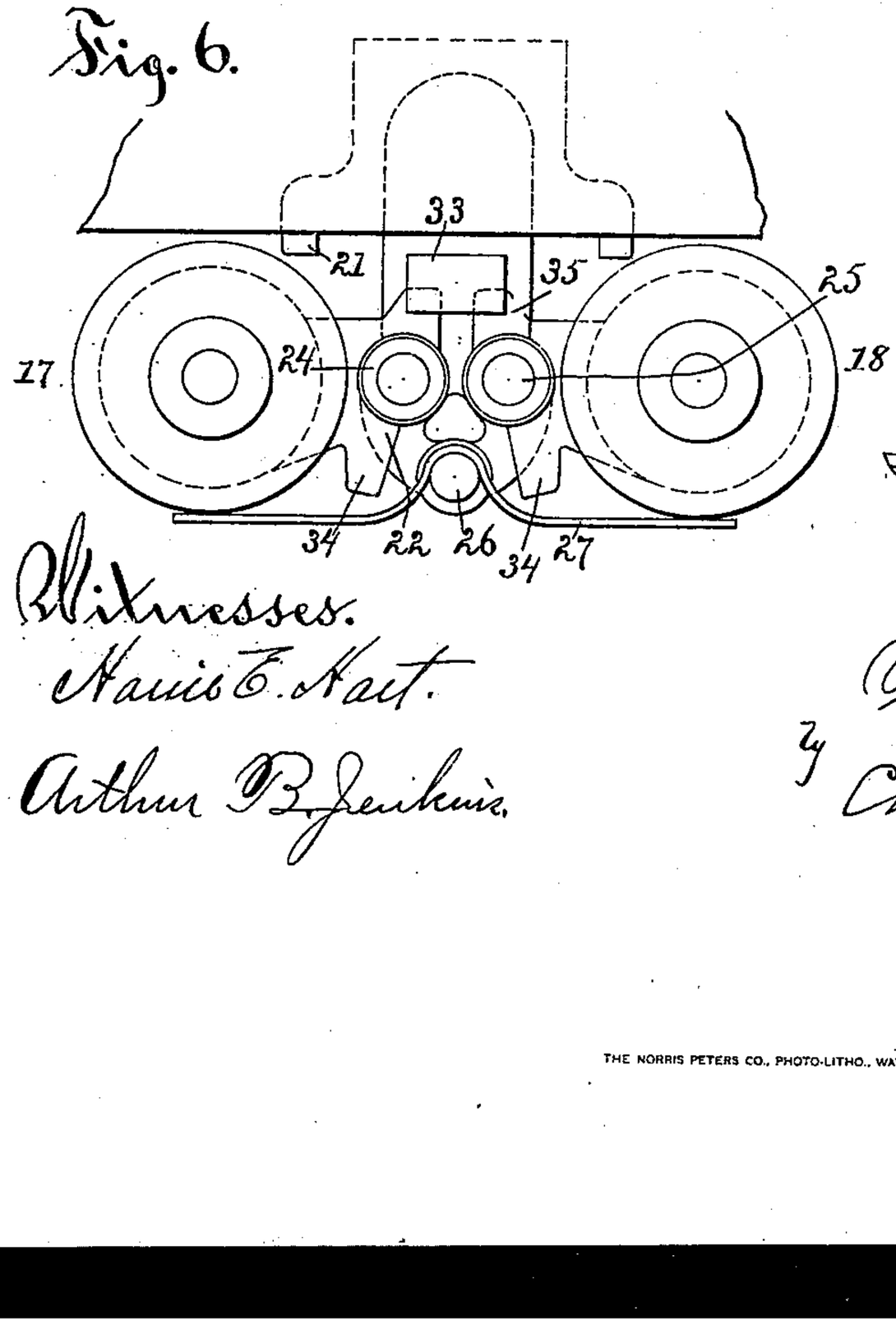



Fig. 6.

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# UNITED STATES PATENT OFFICE.

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## SPINNING-SPINDLE.

SPECIFICATION forming part of Letters Patent No. 689,362, dated December 17, 1901.

Application filed September 2, 1896. Serial No. 604,638. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER G. MORRISON, a citizen of the United States, and a resident of Willimantic, in the county of Windham and State of Connecticut, have invented certain new and useful Improvements in Spinning-Spindles, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My invention relates to the class of spinning-spindles that are constructed with means whereby they readily and automatically adjust themselves to an unbalanced load and more commonly known as "self-centering" spindles.

The object of my invention is to provide a spindle for use in the spinning and doubling or like operations of silk thread that will enable the use of a tension device to be dispensed with; and a further object is to provide a spindle that may be run at a very high rate of speed as compared with the spindles in use at the present time. In a great number of spindles of this class a spiral spring is interposed between a fixed base and a shoulder on the bolster, thrusting against the shoulder to control and limit to a certain extent its tipping movement; but a difficulty has been found in this construction in that the spindle is more sensitive to pressure in certain directions and more easily tipped than in other directions; and my invention has as a further object the production of a spindle that shall obviate this fault by providing a self-adjusting spindle that shall be equally sensitive in all directions to pressure caused by an unbalanced load on the bobbin in the accumulation of the thread being wound thereon. One form of device by the use of which these objects may be attained is illustrated in the accompanying drawings, in which—

Figure 1 is a view in central vertical section through a spindle-mount and in elevation of the spindle-blade, the screw-thread and holding-nut being omitted. Fig. 2 is a top view of the spindle-mount and blade. Fig. 3 is a detail view of the equalizer, spring, and socket-piece. Fig. 4 is a view in front elevation showing my improved spindle-mount. Fig. 5 is a view in side elevation of the same. Fig. 6 is a detail top view.

In the accompanying drawings the numeral 1 denotes an oil cup or base of a spindle, preferably of cylindrical form and having means of attachment to a spindle-rail, a shoulder 2 in the form shown resting on the spindle-rail and that part of the base below the shoulder projecting through a hole in said support, a nut holding the device in place, as shown in Fig. 4 of the drawings. A step 3 is located in the bottom of the oil-cup, forming the end bearing for the spindle. A socket-piece 4 rests on a shoulder in the lower part of the oil-cup, and a spiral spring 5 rests upon a flange at the lower end of the socket-piece. A bolster-bearing tube 6 extends a short distance within the socket-piece 4 and has a limited lateral movement therein. A flange 7 on the bolster-bearing tube is located in an enlargement at the upper end of the oil-cup, and the spindle-blade 9 fits the bolster-bearing tube in the usual manner. A screw-threaded cap 10 fits a screw-threaded surface on the oil-cup and closes the opening in the upper end of the cup, an upward extension 11 projecting within the sleeve-whirl 12 of the spindle. This cap may be employed to adjust the tension of the spring 5.

A spindle constructed substantially as above described, in which the spiral spring in the oil-cup is thrust upward against the flange on the bolster-bearing, is open to the fault hereinbefore set forth. To avoid this fault, I have interposed between the spring 5 and the flange 7 on the tubular bolster an equalizer 13. This equalizer fits quite close within the smaller part of the oil-cup and has a flange 14 at its upper end fitting quite closely within the enlarged recess 8 at the upper end of the oil-cup. This fit between the parts may be termed a "sliding" fit—that is, it is just sufficient to allow the equalizer to freely move vertically in the oil-cup, but to have no lateral movement therein. The lower end of the eqalizer rests upon the spring 5 and the upper surface of the flange against the under side of the flange on the

tubular bolster. It will be seen from this construction that the equalizer having no lateral movement a pressure of the spring upon any point at the lower end of the equalizer will be communicated equally to all parts about the flange of the bolster-bearing, and in consequence the spindle-blade will be equally sensitive to sidewise pressure in all directions.

To prevent any vibration at certain times that may occur in the rotation of the spindle, I have interposed between the flange on the bolster-bearing tube and the bearing at each side thereof insulating-washers 15 and 16, these soft cushions reducing to a certain extent the vibration and preventing it from being conducted to the oil-cup and thence to the spindle-rail.

In the process of silk-spinning prior to my invention it has been necessary to employ a tension device located between the spindle and the receiving-bobbin for the purpose of causing the thread to be wound on the bobbin with the required degree of density; but all tension devices are objectionable, for the reasons hereinafter set forth.

In machines of this class prior to my invention the spindles have been revolved at a certain rate of speed—about ten thousand (10,000) revolutions per minute—a higher rate of speed not having been possible from the fact that the velocity of the outer surface of the spindle-blade located within the oil-cup would cause the oil to be thrown out in a fine spray, it being impossible to keep oil enough in the cup to properly lubricate the spindle. By my within improved invention I am enabled to revolve the spindle at a much higher rate of speed—about twenty thousand (20,000) or more revolutions per minute—than has heretofore been possible, and by this high rate of speed I have demonstrated the fact that all tension devices may be done away with, the friction caused between the thread and the air in this high revolution of the spindles winding the thread upon the receiving-spools in a mass of the required density.

It is to be noted that the thread passes from the spindle directly to the receiving-spool without the interposition of any device except such as may be required to traverse or lay the thread on such spool, and by the term "directly" as used in the claims I mean to describe a device in which the thread passes to the receiving-spool without touching any part other than may be required to traverse or lay the thread on such spool.

In Fig. 4 of the drawings there are shown two spindles made after my improvement, the thread from each of the spindles 17 and 18 passing upward between the guide 19 and onto the receiving-spool 20, no tension device whatever being employed. I am enabled to accomplish this result by reducing the size of the spindle-blade at that portion located within the oil-cup and as shown in Fig. 1 of the drawings. By reducing the size of the spindle the speed may be increased in the same ratio without increasing the surface velocity, the oil being retained in the well under this high rate of speed of my improved spindle and the tension devices of the prior art being done away with.

In the operations of spindles at the high rate of speed attainable by the use of my improvement I have found that it is impossible to reunite a broken thread or strand in the running of the spindle, as has heretofore been the custom, and I have provided means herein whereby the spindles may be easily and quickly stopped for this purpose. A base 21 is secured to the under side of the spindle-rail and projects forward therefrom. On this base is pivoted a support 22, having an opening through which projects the spindle to be supported thereby, a nut 23 being employed to hold the spindle in place. The bearing 24 projects upward from the support and is of considerable length in order to prevent any yielding or spring action of the support, the pivot 25 extending upward from the base through this bearing. A post 26 from the base 21 receives a spring 27, which thrusts against the spindle to hold it normally in engagement with a belt or like driving means. A hanger 28 projects downward from the base, in which is pivoted a treadle-lever 29, having a shoe 30 adapted to engage a spindle at the lower part thereof. A treadle 32 is pivoted to the lower part of the frame, and a rod 31 connects the treadle-lever 29 and the treadle 32. As the treadle is pressed downward, as by the foot of an operative, the shoe 30 on the treadle-lever is thrown against the spindle and presses it away from the driving-belt in opposition to the thrust of the spring 27.

The above description refers to a single spindle; but it is understood that it applies equally to a number of spindles, two being shown in the drawings herein, operated by a single treadle and mounted on a single base, and it is evident that by a mere adaptation of the parts within the skill of the ordinary mechanic a greater number of spindles may be so connected with a single treadle or borne on a single base as to be operated simultaneously. Two spindles have been shown, for the reason that this is a common number in use in the doubling of silk, and when a thread breaks on one of the spindles it is necessary to stop the revolutions of both in order to take up the broken strand.

A lock to prevent the lifting of the spindle-support in the doffing of the bobbin is provided, which consists of a projection 33, extending upward from the base 21, having a recess adapted to receive a locking-lug 35 on the swinging support, this lug being so formed that it may be swung clear of the recess, so that the support may be removed, but will lie within the recess with the spindle in its normal position and prevent any accidental removal. Stops 34 are also located on the

front part of the support and adapted to engage the post 26 as the support is swung outward, these stops being provided for the purpose of preventing the spring from being unduly bent to an extent to destroy its elasticity.

In the use of tension devices in the process of silk-spinning a serious objection has been encountered from the fact of the variableness of the tension caused by the action of the atmosphere upon the devices under the different conditions of the former, such atmospheric changes causing within a very few hours such change in the tension as to seriously interfere with the production of satisfactory work. Another serious objection in the doubling of silk is found from the fact that it is almost impossible to get the same degree of tension on each of the threads, and when one of the threads being doubled has less tension than the other it is liable to result in the production of what is known as "corkscrew" work. Another serious objection from the use of tension devices occurs by reason of the different degrees of tension upon the different threads being wound or during the winding operation of a single thread by reason of the difference in tension caused by the unevenness of the thread as to size. A still further objection is encountered in the use of tension devices by reason of the catching of the fibers of the thread on the devices and the consequent breaking of strands resulting in the entanglement of the thread and consequent waste.

I claim as my invention—

1. In combination in a spinning-spindle, a base having a cap, a tubular bolster extending within the base and having a flange exerting pressure against the cap, a spindle-blade supported within the bolster, a spring thrusting with one end against the base, and an equalizer interposed between the opposite end of the spring and the flange on the bolster, all substantially as described.

2. In combination in a spinning-spindle, a base having a cap, a tubular bolster extending within the base and having a flange exerting pressure against the cap, a spindle-blade supported within the bolster, a spring thrusting with one end against the base, an equalizer interposed between the opposite end of the spring and the flange on the bolster, and means for varying the tension of the spring, all substantially as described.

3. In combination in a spinning-spindle, a base having an oil-well located therein and an enlarged opening at its upper end, said oil-well being provided with a shoulder, a cap for the base, a bolster-bearing tube extending within the oil-well and having a flange located in the enlarged opening and exerting pressure against the cap, a cover closing the opening and in engagement with the flange on the bolster-bearing, a spring with one end thrusting against a shoulder in the oil-cup, an equalizer with one end opposing the thrust of the spring and the opposite end supporting the flange of the bolster-bearing tube, and a spindle-blade supported within the bolster-bearing tube, all substantially as described.

4. In a spinning-spindle in combination, a base having an enlarged opening at its upper end, a tubular bolster-bearing extending within the base and having a flange located in the enlarged opening, a screw-cap closing the opening in the base and thrusting against the flange on the bolster-bearing, a step-bearing resting on the bottom of the oil-cup in the base, a socket-piece resting on a shoulder in the base and surrounding the lower end of the bolster-bearing, a spring with its lower end thrusting against a flange on the socket-piece and its upper end against the lower part of an equalizer, the equalizer resting on the spring and with its upper end in pressure on the flange on the bolster-bearing, and a spindle-blade supported within the bolster-bearing tube, all substantially as described.

5. In combination with a base, a swinging spindle-support mounted on the base and adapted to receive a spindle, a locking-recess located in the base, and a locking-lug on the swinging support adapted to enter the recess, all substantially as described.

6. In combination with a base, a plural number of swinging spindle-supports mounted on the base and adapted to receive spindles, a locking-recess located in the base, and lugs located on the spindle-supports adapted to enter said recess, all substantially as described.

7. In combination a base, a swinging spindle-support mounted on the base and adapted to receive a spindle, a spring exerting pressure upon the support, and a stop to prevent excessive swinging movement of the spindle-support, all substantially as described.

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