J. ARMITAGE.

DOFFING MECHANISM.

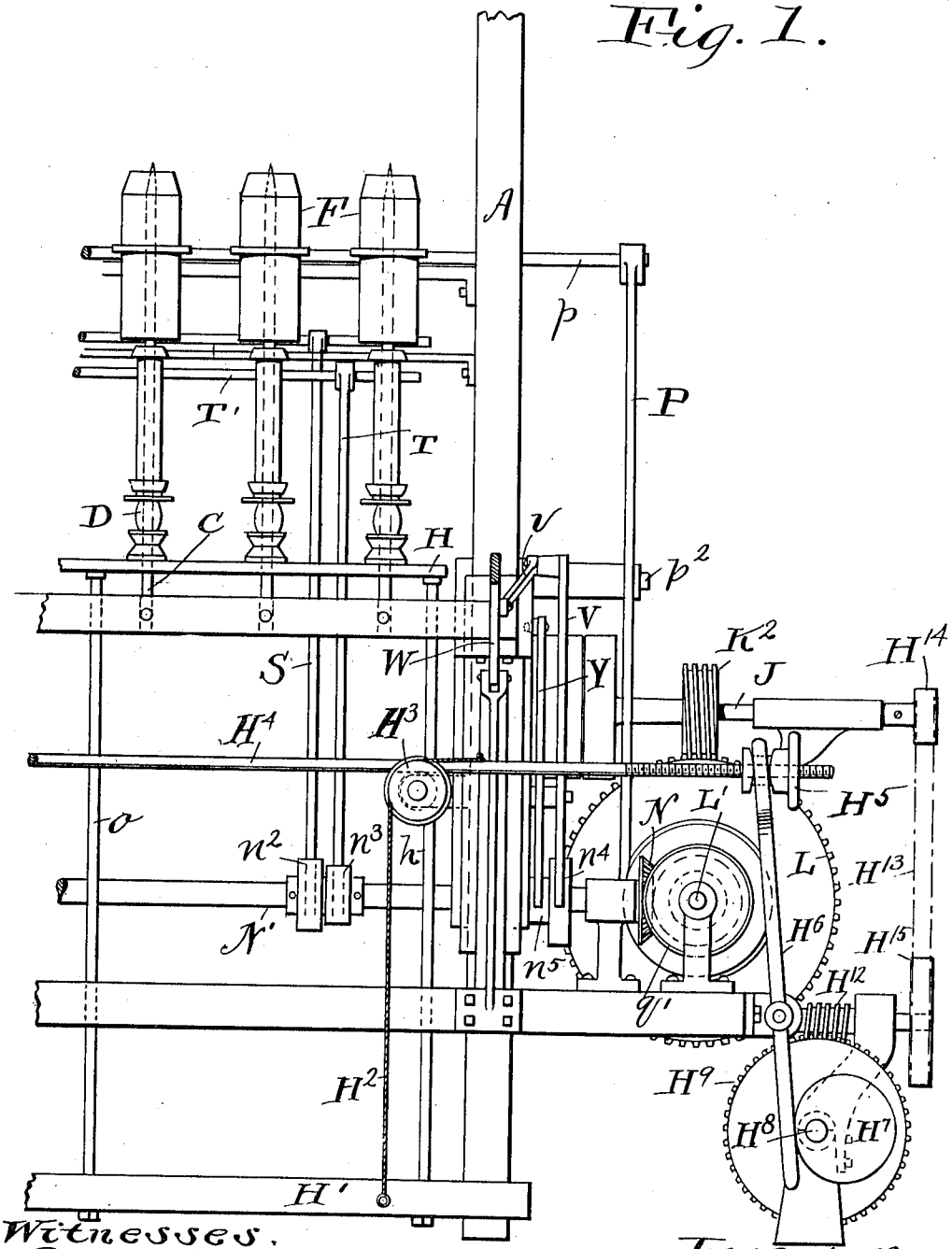
APPLICATION FILED OCT. 21, 1905.

1,035,403.

Patented Aug. 13, 1912.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

E. B. Gilchrist

H. R. Sullivan

Inventor:

Joseph Armitage

By his Attorneys,

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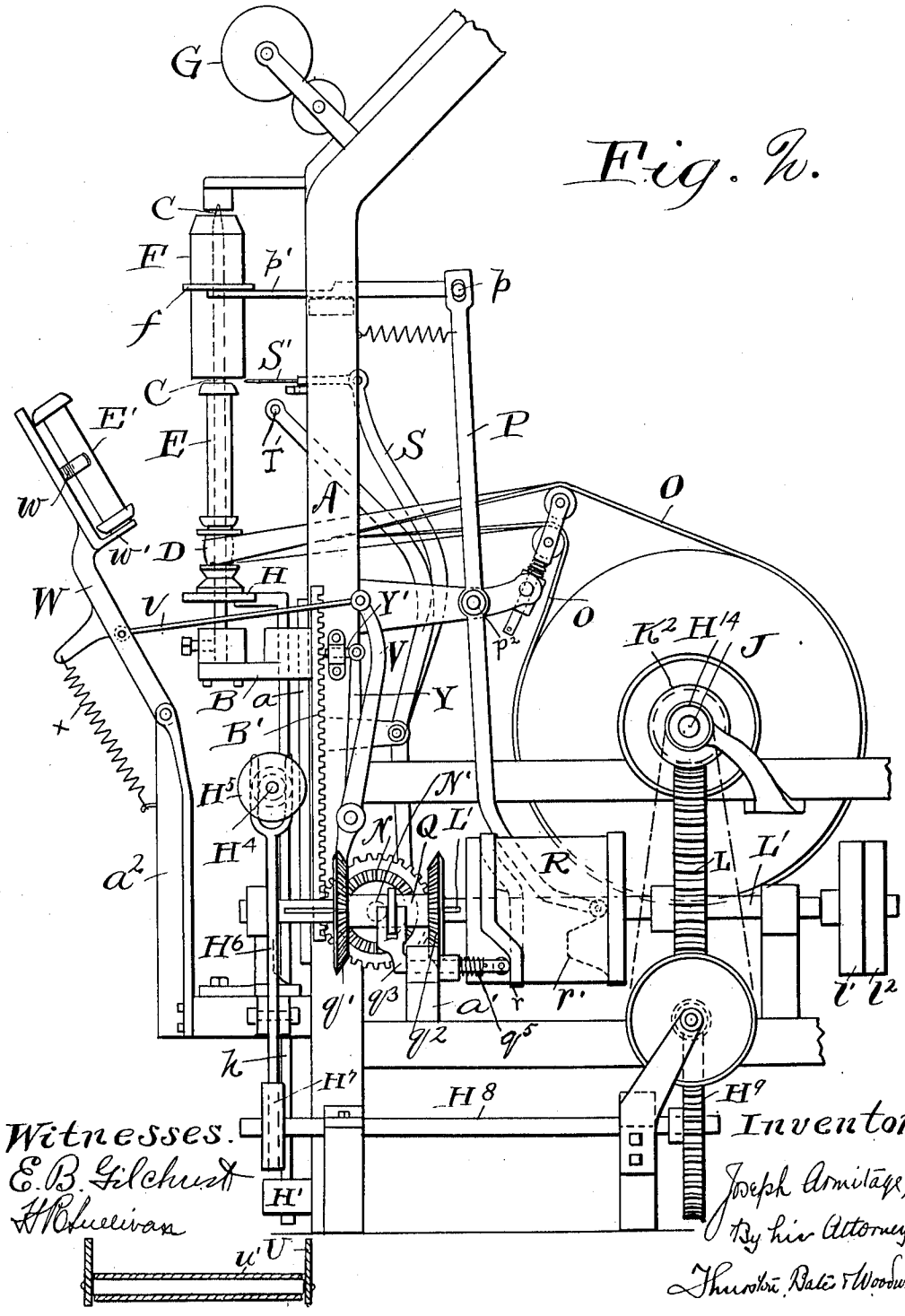
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

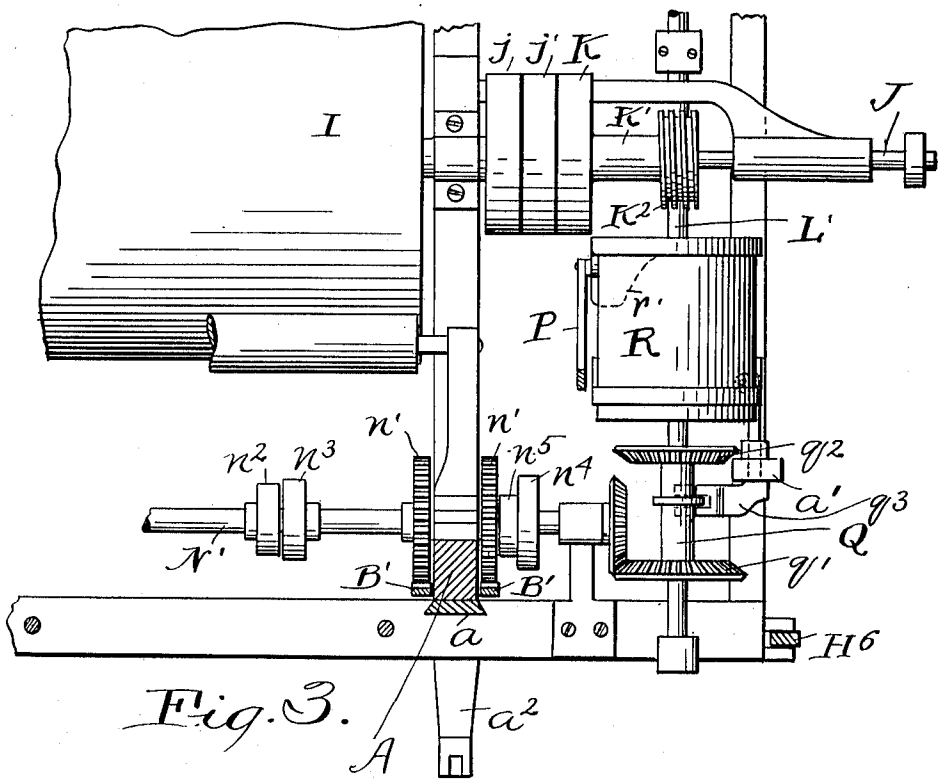

Fig. 3.

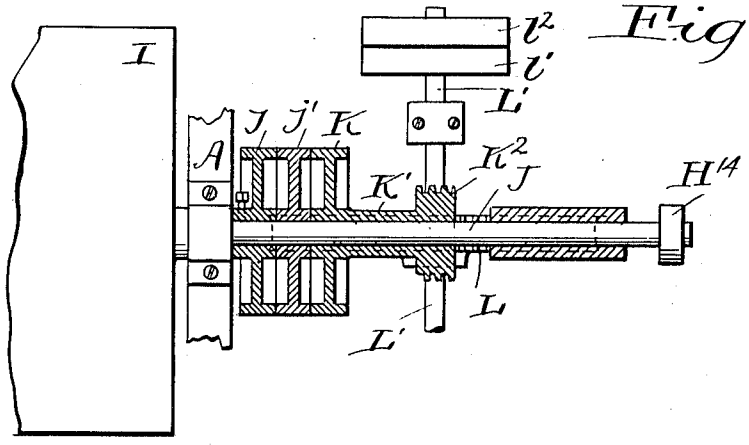

Fig. 4.

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4 SHEETS—SHEET 4.

Fig. 5.

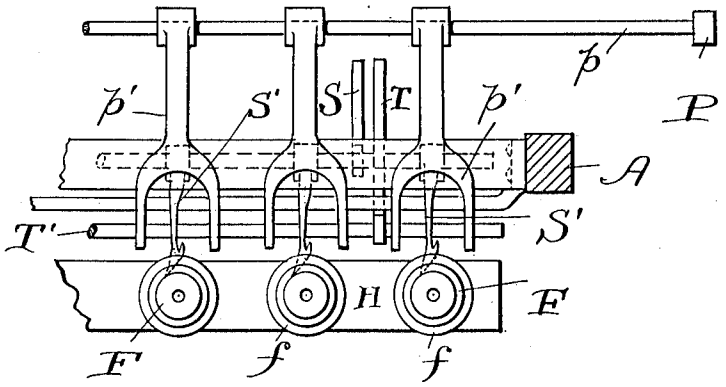
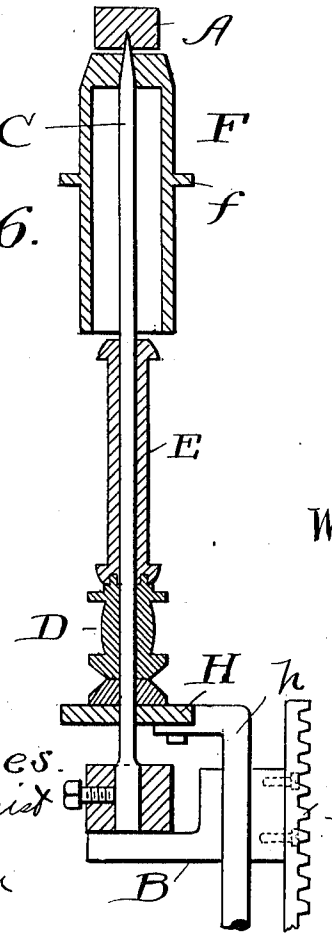


Fig. 6.



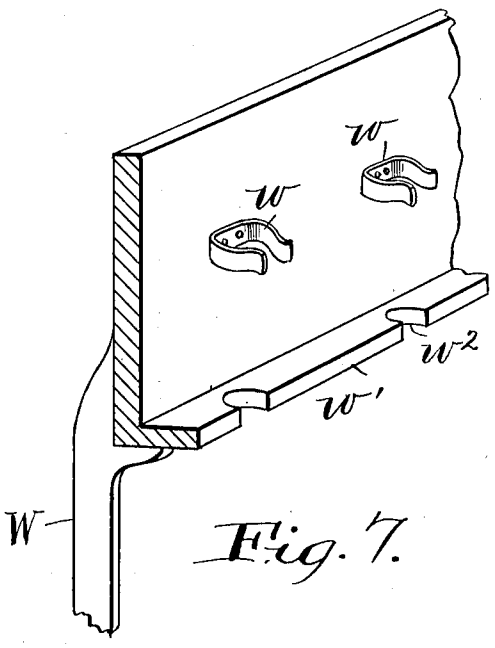


Fig. 7.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOSEPH ARMITAGE, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO PETER SCHNEIDER, OF CLEVELAND, OHIO.

DOFFING MECHANISM.

1,035,403. Specification of Letters Patent. **Patented Aug. 13, 1912.**

Application filed October 21, 1905. Serial No. 283,714.

To all whom it may concern:

Be it known that I, JOSEPH ARMITAGE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Doffing Mechanisms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide a simple and efficient automatic mechanism for removing the filled spools in cap spinning or twisting machines and replacing them by empty spools. My mechanism results in a large saving in the cost of labor; the operation is more rapid, and there is less tangling and breaking of the material wound on the spools.

The invention comprises mechanism for drawing down the spindles, on which the spools are journaled, mechanism for then removing the completed spools, and mechanism then acting to supply empty spools in position so that the returning spindles shall pass through them.

The invention is hereinafter more fully explained and the essential characteristics set out in the drawings hereto.

In the drawings, Figure 1 is a front elevation of a portion of a cap spinning machine having my invention applied thereto,—only so much of the spinning machine proper being shown as is necessary to illustrate my attachment. Fig. 2 is a right hand end view of such mechanism. Fig. 3 is a sectional plan of the lower portion of my attachment. Fig. 4 is a horizontal section along the shaft of the main driving drum. Fig. 5 is a plan showing the caps and their supporting forks. Fig. 6 is a vertical section along one of the spindles. Fig. 7 is a perspective view of the empty spool holder.

Referring by reference letters to the embodiment shown in the drawing, A represents the frame of a usual cap spinning machine. Extending along the front of this machine is a rail B, which carries the upwardly projecting, non-rotating spindles C. Loosely surrounding these spindles are the whirls D which engage with the spools E. Above the spools on the spindles are the caps F. The thread is guided by suitable guide pulleys G around the cap and onto the spool. A suitable belt O leads from the whirls to the main driving drum I whereby the spools are rapidly rotated.

The whirls D rest upon the rail H which is continuously raised and lowered during the operation of the machine to cause the spools to be elevated into the caps F and drawn down therefrom. Such movement of the rail H may be accomplished by any desired mechanism. As illustrated in the drawing, such mechanism comprises rods h leading downward to a movable rail H′ from which a cable H^2 leads around a pulley H^3 to a longitudinally movable bar H^4. This bar is shown as carrying a hand nut H^5 into which forks a lever H^6 adapted to be engaged by a cam H^7. This cam is continuously rotated. As shown, it is mounted on the shaft H^8 on which is a worm wheel H^9 meshing with the worm H^{12} which is driven by a belt H^{13} running from a pulley H^{14} on the main shaft J onto a pulley H^{15} on the shaft of the worm H^{12}. By this means the spools are caused to travel slowly up and down to make the thread lie properly. To raise or lower the spools independently of the cam H^7, the hand nut H^5 is provided, which by being turned on the threaded end of the bar H^4 may raise or lower the spools.

The parts above described are common in ordinary machines for spinning or twisting cotton or worsted.

In my machine the rail B instead of being stationary is movable up and down, being secured to brackets which have a dovetail engagement with vertical guides a secured to the front legs of the frame. Thus at the proper time the rail may be moved down to withdraw the spindles from the spools and allow their removal and replacement, after which the returning rail restores the spindles. The mechanism for accomplishing this will now be described.

On the main shaft J of the machine, adjacent to the usual fast and loose pulleys j j' thereon, is a third pulley K rigidly mounted on a sleeve K′ which is journaled on the projecting end of the shaft. On this sleeve K′ is a worm K^2. This worm meshes with the worm wheel L on a shaft L′ journaled crosswise at the end of the machine. Splined to the shaft is a sleeve Q having a pair of bevel gears q' q^2. Either gear, according to the position of the sleeve, is adapted to mesh

with a bevel gear N on a shaft N′. Mounted on the shaft are spur gears n' which mesh with racks B′ secured to the rails B.

It will be seen that the rotation of the pulley K which may be caused by shifting the driving belt (not shown) onto this pulley from the loose pulley j' causes, by means of the above described gearing, the depression or elevation of the rail B, according to the position of the sleeve Q. The position of this sleeve is governed by a cam drum R on the shaft L′, a cam r on this drum operating a sliding dog q^3 carried by a bearing a' and having a fork engaging a collar on the sleeve Q, a spring q^5 on the dog maintaining its roller against the cam. This cam r is so formed as to shift the sleeve Q into one extreme position and hold it there for nearly half a rotation of the cam and then shift it into the other extreme position and hold it there for a similar period. The operation of this cam mechanism is therefore for one rotation of the shaft L′ to lower the rail B and then elevate it to its original position. The lowering is sufficient to withdraw the spindles to the lower end of the spools, allowing their removal.

Mounted on a rock shaft p^2 (Fig. 1) extending through the machine is a lever P which carries at its upper end a bar p from which project forks p'. During the operation of winding, this structure, like the rest of my attachment, is idle, but when the pulley K is brought into operation, the cam drum R is caused to revolve, which withdraws the cam projection r' from beneath the lower end of the levers P, thereby allowing the forks p' to move forward beneath the collars f on the caps F. This advance of the forks takes place just preceding the lowering of the spindles. The forks support the caps during the period that the spindles are withdrawn. At the time the spindles are returned, the cam drum R has made a complete revolution, and the projection r' has again engaged the end of the lever P, which withdraws the forks from supporting the caps. The belt is then shifted from the pulley K. The operation so far described is therefore to hold the caps in place and draw down the spindles out of them and out of the spools.

When the spools are released by the drawing down of the spindles, a cam n^2 on the shaft N′ engaging a lever S shoves forward a hook S′ past the thread, and is then retracted to draw the thread rearward, and at the same time a bar T′, carried by levers T is forced forward against the spools by the action of the cam n^3. This knocks the finished spools off, and an inner cutting edge on the hook S′ severs the thread, and the spools fall into a suitable trough U. Gravity, or a traveling belt u' at the base of this trough, carries the spools to the end of the machine, or other suitable point as desired. As soon as the advancing bar T′ has knocked off the filled spools, a cam n^4 on the shaft N′ acts on the lever V which is connected by a link v with a frame W which is pivoted on a standard a^2 and carries the empty spools E′. This cam operates to swing the frame W rearward so as to bring the empty spools directly over the lowered spindles. The spools are held by the spring clips w and they rest on the flange w' which has slotted openings w^2 for the passage of the spindles. As the empty spools come in place, the cam r operates to shift the sleeve Q and the spindles are elevated, passing through the empty spools into place. Then the cam n^4 allows the return of the empty spool frame actuated by the spring x and the cam r' allows the return of the forks p'. Suitable springs are provided for opposing these cams.

To insure the rail B being held in its elevated position during the normal running of the spinning machine, I provide a bolt Y′ which is adapted to be projected into the space between two adjacent teeth on the rack B′, by means of the cam n^5 engaging the lever Y which is connected with the bolt.

I have shown but one end of the machine and hence but one cam and one lever each for operating the hooks S′, the knock-off bar T′, the empty spool frame W and the lock Y′. It is to be understood, however, that the cams and levers are preferably duplicated at the other end of the machine. Similarly the rock shaft p^2 on which the lever P is journaled preferably has a rigid arm at its other end connecting with the bar p.

If desired the shaft L′ may be rotated directly by an individual belt running onto the fast and loose pulleys l' l^2 thereon, and the worm wheel L and worm K^2, with the sleeve and pulley, dispensed with.

I claim:

1. The combination with spindles, spools rotatable thereon, caps above the spools, means for raising and lowering the spools into and out of the caps, a rail supporting the spindles, whirls for the spools supported independently of said rail and having their movement independent of the spindles, means for reciprocating the whirls, a shaft connected by gearing with said rail, means for rotating said shaft to lower said rail and then raise it, and means acting intermediately to remove the filled spools and replace them by empty spools.

2. The combination of spindles, spools thereon, rotators for said spools, means for withdrawing the spindles from the spools, said spindles being independently movable with respect to said rotators, means for reciprocating the spindles and means for reciprocating the rotators, means for knocking off the spools when the spindles have

been withdrawn, a pivoted frame adapted to carry emptied spools, means for swinging it so as to bring the spools thereon into position for engagement with the spindles, and means for raising the spindles for engaging the emptied spools after they have been swung into position.

3. The combination of a series of spindles, a rail carrying them, a rack secured to the rail, a gear meshing with said rack, a pair of gears adapted to be shifted backward and forward for driving said gear first in one direction and then in another to lower the spindles and then raise them, a cam for controlling such shifting, and means for replacing the filled spools by empty spools when the spindles have been lowered.

4. The combination of a series of spindles, a rack, connections between said spindles and the rack, a gear meshing with said rack, a shaft carrying said gear, a bevel gear on said shaft, a sleeve carrying a pair of bevel gears, automatic means for shifting said sleeve to bring first one of the gears thereon and then the other into engagement with the bevel gear on the shaft, whirls and spools through which said spindles may pass, and means for holding the whirls in position when the spindles are withdrawn.

5. The combination with spools, of means for rotating the spools, a driving mechanism, including fast and loose pulleys, a third pulley adjacent to said pulleys and adapted to be driven by a shifted belt therefrom, mechanism for replacing the filled spools by empty spools, and an operative mechanism between such mechanism and such third pulley.

6. The combination with the fast and loose pulleys of the driving mechanism, of a third pulley alongside thereof and journaled in alinement therewith, a worm driven by said third pulley, a worm wheel and mechanism operated by said worm wheel for supporting the caps and lowering the spindles.

7. The combination in a cap spinning machine, of caps, spindles, spools adapted to be mounted on the spindles below the caps, a rail for supporting said spindles, whirls for driving the spools, an independent rail for supporting the whirls, means for lowering the rail carrying the spindles, said means and whirl rail being independently supported and independently movable, means for reciprocating the whirl rail, a frame adapted to carry empty spools, means for knocking off the filled spool from its whirl, and means for moving said frame to place an empty spool over the whirl in place of the filled spool.

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

JOSEPH ARMITAGE.

Witnesses:

ALBERT H. BATES,

H. R. SULLIVAN.