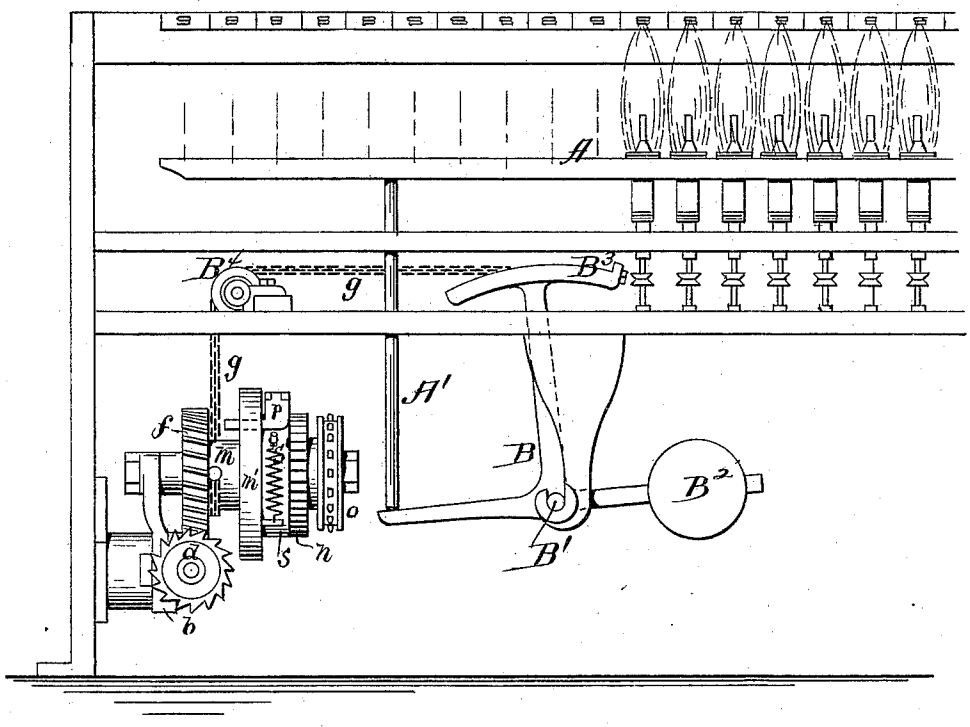
(Model.) 3 Sheets—Sheet 1.

J. F. WORRALL.

RING SPINNING MACHINE.

No. 257,198. Patented May 2, 1882.

Fig. 1.



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(Model.)

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Fig. 1a.

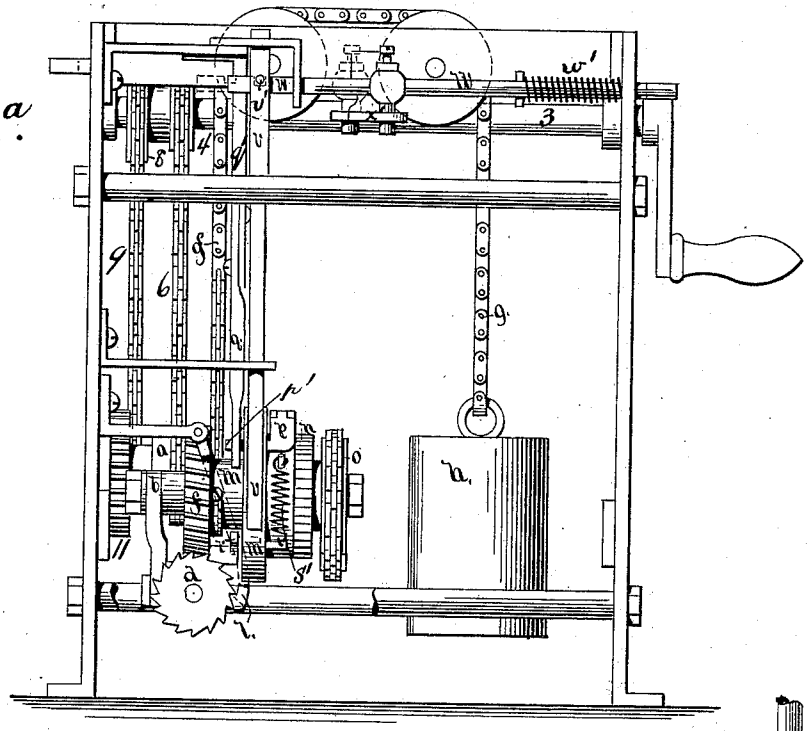
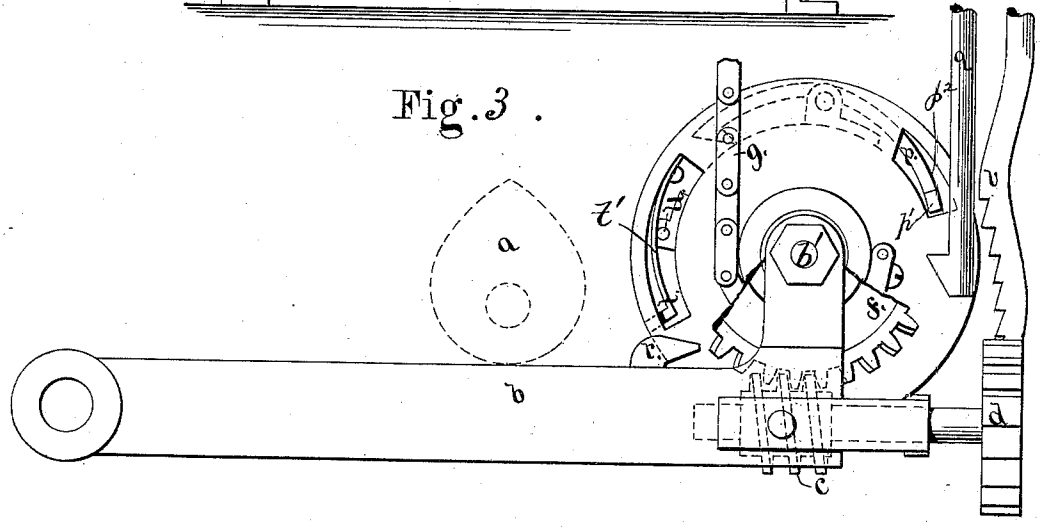


Fig. 3.



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RING SPINNING MACHINE.

No. 257,198. Patented May 2, 1882.

Fig. 2.

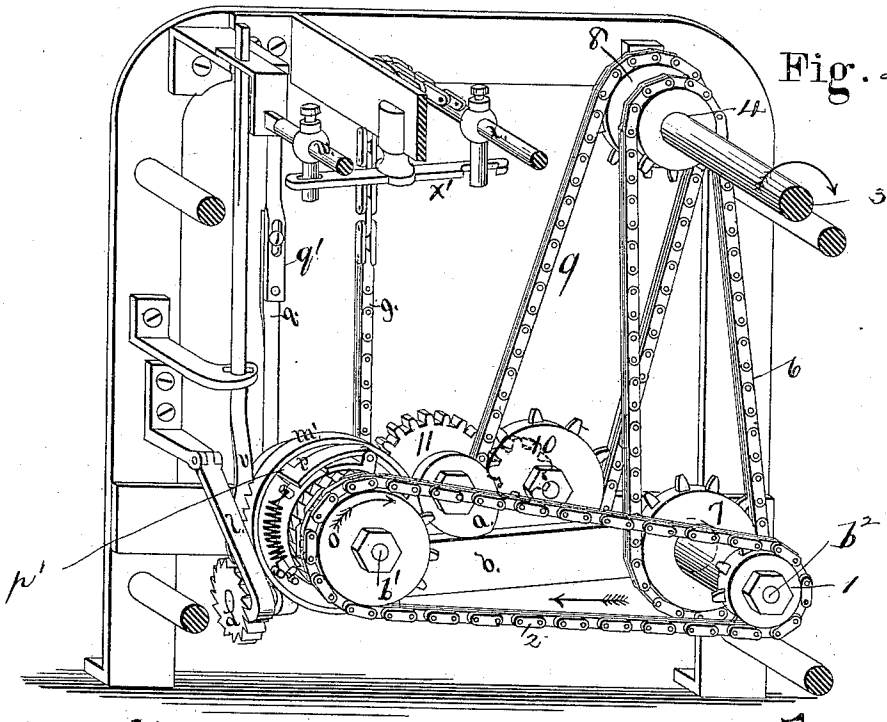


Fig. 4.

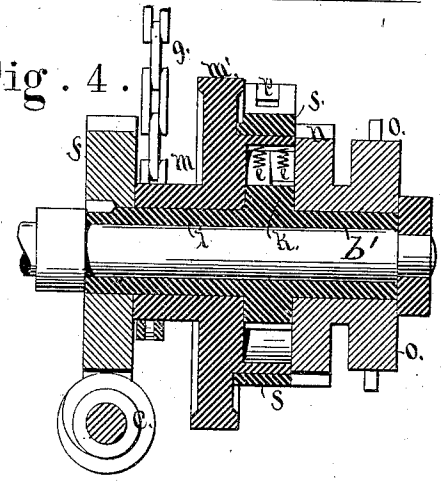
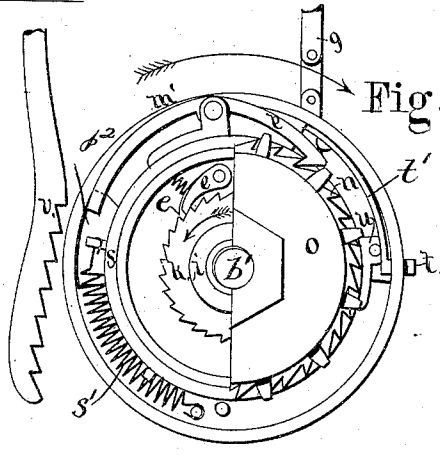


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN F. WORRALL, OF WOONSOCKET, RHODE ISLAND.

RING-SPINNING MACHINE.

SPECIFICATION forming part of Letters Patent No. 257,198, dated May 2, 1882.

Application filed April 8, 1880. (Model.)

To all whom it may concern:

Be it known that I, JOHN F. WORRALL, of Woonsocket, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Ring-Spinning Machines; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

In the ordinary ring-spinning machines the operator determines when the doffing of the cops or bobbins shall take place, and he moves the traversing rail back to the position it must occupy in starting the winding of fresh cops or bobbins.

The object of this invention is to automatically reverse the onward or building movement of the traversing rail at the moment when the cops or bobbins have been completed and return it rapidly to the position for starting fresh cops or bobbins.

To this end my invention consists in the combination, with the winding-drum, of the mechanism for reciprocating and giving an onward or building movement to the traversing rail, of a reversing mechanism automatically connected to and disconnected from the winding-drum for the purpose of reversing the motion of said drum the moment the cops or bobbins have been filled, and return thereby the traversing rail to the position for starting fresh cops or bobbins.

It further consists of combinations arising from certain arrangements of the mechanical devices hereinafter particularly described, which combinations will be set forth in the claims at the close of this specification.

In order that my invention may be clearly understood, I have illustrated in the annexed drawings and will proceed to describe the best form thereof known to me at the date of the filing of the application for this patent.

Figure 1 is a side elevation of so much of a ring-spinning machine as it seems necessary to show for illustrating the application of my reversing-mechanism. Fig. 1ª is a side elevation, in detail, of the mechanism for actuating the traversing rail, the weighted quadrant bell-crank being omitted and represented by a weight. Fig. 2 is a perspective view of the principal parts shown in Fig. 1ª. Figs. 3, 4, and 5 are illustrations of details, drawn on a larger scale than the other figures.

The same letters of reference indicate similar parts in all the figures.

My invention can be applied to any kind of ring-spinning machines, whether used for spinning warp or filling, and whether it operates with a reciprocating or traversing ring-rail or with a stationary ring-rail. I have illustrated it as applied to a ring-spinning machine operating with a traversing ring-rail and arranged to spin filling laid in conical layers on the cops or bobbins.

The stem or rod A′ of the ring-rail A rests upon the horizontal arm of the bell-crank B, fixed to a shaft, B′, which is provided with an arm carrying the weight B^2 for overbalancing the ring-rail, so that the bell-crank constantly tends to lift the ring-rail. The upright arm of the bell-crank is constructed with a quadrant or segment, B^3, to which one end of the chain *g* is connected. The chain is conducted over a sheave, B^4, down to the horizontally-arranged winding-drum *m*, to which its other end is connected. The winding-drum is loosely mounted on the loose sleeve *i* on the long stud pin or journal *b′*, fixed on the lever *b*.

A worm-gear, *f*, is keyed on sleeve *i* and meshes with the worm *c*, the journal of which turns in bearings on lever *b*, and is provided with a fast ratchet-wheel, *d*. A pawl, *l*, pivoted to a fixed part of the machine, engages ratchet-wheel *d* so as to turn it to the extent of one tooth at each depression of lever *b*. Lever *b* is pivoted on counter-shaft b^2, and is intermittingly depressed by the cam *a*, with which it is held in contact by the action of the weight B^2, transmitted through the bell-crank and chain.

Sleeve *i* is provided or constructed with a ratchet-wheel, *k*, between which and the worm-gear *f* the loose winding-drum *m* is seated on the said sleeve. The winding-drum is constructed with a circular flange or disk, *m′*, to the outer side of which a pair of graduated pawls, *e e*, are pivoted, one or the other of which engages the ratchet-wheel *k*, so that the winding-drum can turn only when the ratchet-wheel *k* is turned by the worm-gearing so as to unwind the chain *g* step by step, and thus pro-

vide for the intermittent onward or building movement of the ring-rail at the same time that the oscillations of lever *b* provide for the traverses or reciprocations of the ring-rail. After the chain *g* has been unwound to the extent of allowing the ring-rail to be moved up to its highest traverse the winding-drum is at once automatically reversed to rewind the chain, and thereby return the ring-rail to the position of lowest traverse, in order that the completed cops or bobbins may be doffed and fresh ones started. In reversing the winding-drum its pawls *e e* slip around the ratchet-wheel *k*. The reversal of the winding-drum is effected by a shiftable pawl, *p*, connected therewith and a ratchet-wheel, *n*, which is mounted loosely on sleeve *i*, and is constantly driven in a direction opposite to the step-by-step movement of the sleeve by a drive-chain, 2, driven by chain-wheel 1 on counter-shaft b^2, and driving chain-wheel *o* on the hub of ratchet-wheel *n*. Pawl *p* is at the proper moments thrown in gear with and disconnected from the ratchet-wheel *n*. It is yieldingly connected with the winding-drum to prevent jerks in the mechanism. This yielding connection may be made in various ways. As illustrated it consists of a ring *s*, seated on a ring-flange on the outer side of disk *m'* of the winding-drum, which ring is connected by a spiral spring, *s'*, to the disk *m'*, and carries the pawl *p*, which is pivoted to lugs thereon. Pawl *p* is offset so that its bit will be in alignment with ratchet-wheel *n*. The tail of the pawl *p* is connected with a lateral finger, *p'*, which projects through a slot, p^2, in disk *m'*. The pawl moves with considerable friction on its pivot, so that it will not turn thereon of itself. A hook-headed stop-rod, *q*, is so suspended from a fixed pendant, *q'*, on the frame that its hook-head will be in the path of the finger *p'* of pawl *p*. During the unwinding of chain *g* the pawl remains disengaged from ratchet-wheel *n;* but its finger *p'* finally catches on the hook-head of stop-rod *q*, and the pawl is thereby turned or rocked on its pivot, so as to throw it in gear with ratchet-wheel *n* the moment the last layer has been laid on the cops or bobbins. Ratchet-wheel *n* immediately reverses the winding-drum, so as to rewind the chain *g* and lower the ring-rail. In order to disengage the pawl *p* from the ratchet-wheel *n* the moment chain *g* has been rewound to the required extent, a fixed projection, *r*, is formed on or attached to lever *b* to act on the finger *p'* of the pawl, and turn it on its pivot so as to draw its bit out of the teeth of the ratchet-wheel *n*. The stop-rod *q* is adjustable on pendant *q'*, so that the point at which the reversal of the drum and rewinding of the chain is to commence can be accurately regulated. It will be observed that the first effect of the driving action of ratchet-wheel *n* on pawl *p* will be to turn ring *s* in opposition to the stress of of spring *s'*, until finger *p'* of the pawl reaches the end of slot p^2 in disk *m*. After that the winding-drum is compelled to turn with ratchet-wheel *n*. On the disengagement of the pawl *p* the spring *s'* draws the ring *s* back until the finger *p'* of the pawl reaches the opposite end of slot p^2. Advantage is taken of these movements of ring *s* to operate a hook, *t*, carried by a spring, *t'*, secured under the rim of disk *m'* in a slot of the same, and applied for the purpose of lifting the latch *v* to release the rod *w* with a notch, of which a pin, *v'*, on the latch *v* is adapted to engage. Latch *v* is arranged to move up and down in suitable fixed guides, as shown, and has at its lower end a number of teeth on the edge facing the rim of disk *m'*, with which it is aligned. The hook *t* is arranged to play through a slot in the rim of disk *m'*, so that when it is projected, as shown in Fig. 5, it is in position to catch on one of the teeth of latch *v* on the reversal of the winding-drum. During the unwinding of chain *g* spring *t'* holds hook *t* in the retracted position shown in Fig. 3; but on the engagement of pawl *p* by ratchet-wheel *n* and the partial turning of ring *s* the hook *t* is projected by a pin, *u*, on ring *s* being forced under spring *t'*, and it is held projected thereby until pawl *p* is again disengaged from ratchet-wheel *n* and ring *s* drawn back by its spring *s'*. The hook *t* is so arranged on the disk *m'* of the winding-drum that it will lift the latch *v* at the moment pawl *p* is disengaged from ratchet-wheel *n* by the projection *r* on lever *b*.

Rod *w*, adapted to slide in suitable guides, is encircled by a spiral spring, *w'*, between a cross-pin thereon and a fixed part of the frame. The spring is contracted when the notch of the rod is engaged by the latch-pin *v'*, so that on its release therefrom the rod will be moved endwise by the resilience of the spring. This rod *w* is used for shifting the driving-belt of the machine from the fast pulley onto the loose pulley during its endwise movement by spring *w'*, and thereby stop the machine automatically the moment the ring-rail reaches its position of lowest traverse after completion of the cops or bobbins. If the rod *w* is moved in the right direction by the spring *w'* for shifting the belt from the fast to the loose pulley, the rod itself may be the shifter-rod; but if it should move in the wrong direction, as is supposed in this case, then it must be suitably connected— as, for instance, by a lever, *x'*—to the proper shifter-rod *x*.

Proper motion is transmitted from the main shaft 3 to the shaft of cam *a* by the chain-wheel 8, drive-chain 9, chain-wheel 10, (which turns on a fixed stud and is connected with or fixed to a spur-wheel, shown in dotted lines,) and spur-wheel 11, while counter-shaft b^3 is driven therefrom by chain-wheel 4, drive-chain 6, and chain-wheel 7.

It is obvious that instead of connecting pawl *p* yieldingly with the winding-drum, it may be unyieldingly connected therewith and the desired result effected by connecting the ratchet-wheel *n* yieldingly to the chain-wheel *o*. Other changes in the details of construction may be

made without departing from the leading features of my invention.

It will be readily understood that in the operation of a spinning-machine provided with my reversing-gear the ring-rail is rapidly returned from the point of highest traverse to that of lowest traverse, and that by reason of this rapid descent an open spiral binding-thread will be laid on the cops, and that, furthermore, the machine will be automatically stopped at the proper time for doffing the cops.

Having thus described my invention, what I claim as new is—

1. The combination, substantially as before set forth, of the chain-drum, the continuously-revolving ratchet-wheel, the pawl connected with said drum, the adjustable stop for throwing the pawl in gear with the ratchet-wheel, and the oscillating lever supporting the drum and provided with a projection for disengaging the pawl from the ratchet-wheel.

2. The combination, substantially as before set forth, of the chain-drum, the ring, the spring connecting the ring to the drum, the pawl pivoted on the ring, and the continuously-revolving ratchet-wheel.

3. The combination, substantially as before set forth, of the chain-drum, ring *s*, spring *s'*, pin *u* on said ring, spring-hook *t*, the latch, the slide-rod *w*, and the spring on said rod.

4. The combination, substantially as before set forth, of the chain-drum, ring *s*, spring *s'*, pin *u* on said ring, and spring-hook *t*.

JOHN F. WORRALL.

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