Sheet 1. 2 Sheets.

J. Goulding.

Spinning Mach.

No. 95,580. Patented Oct. 5, 1869.

Fig: 1

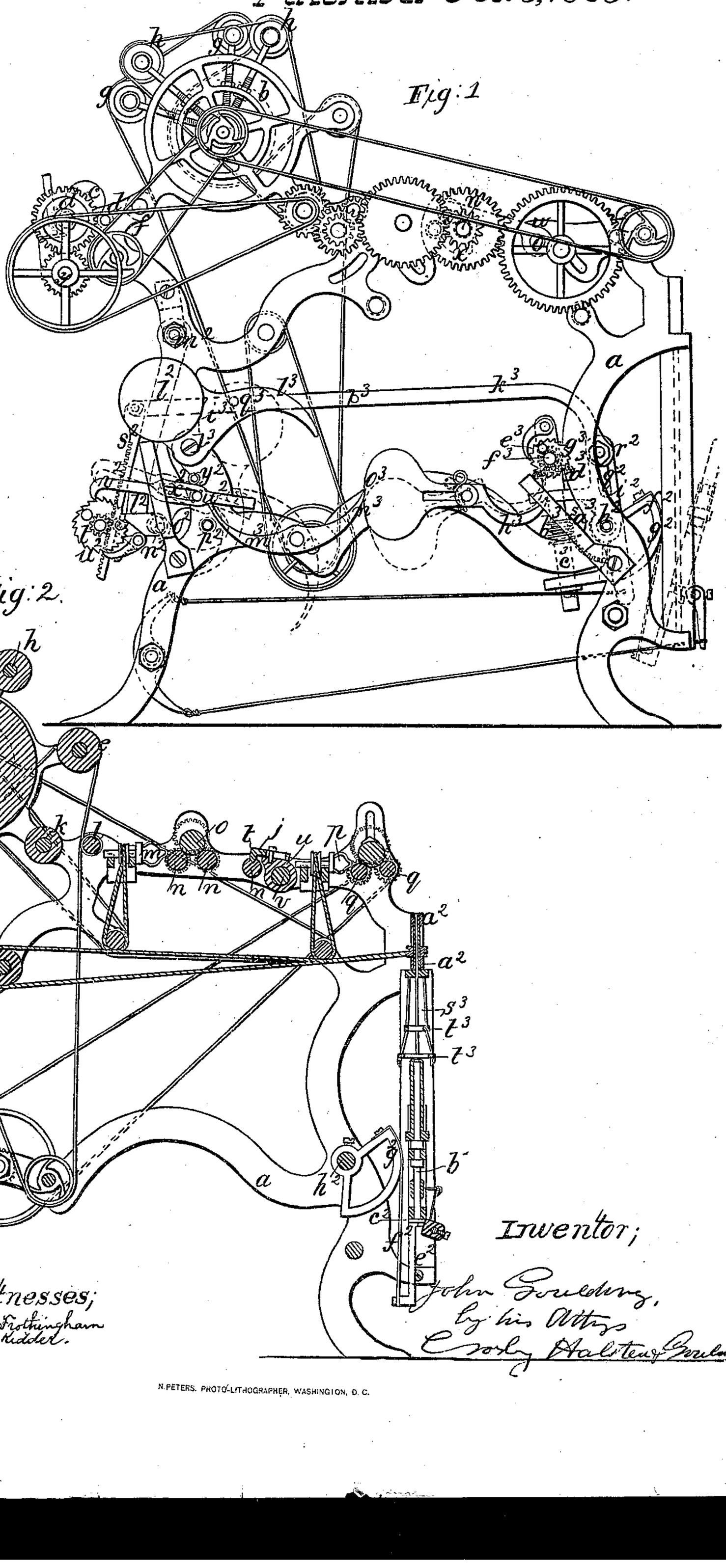

Fig: 2.

Witnesses;
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L. B. Kidder.

Inventor;
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by his Attys
Crosby Halstead & Gould

Sheet 2. 2 Sheets.

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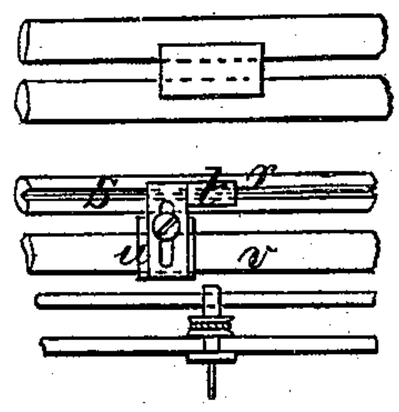
Top view of
Griper Jaw &c.



Detail Shewing
Rack s^2 &c.

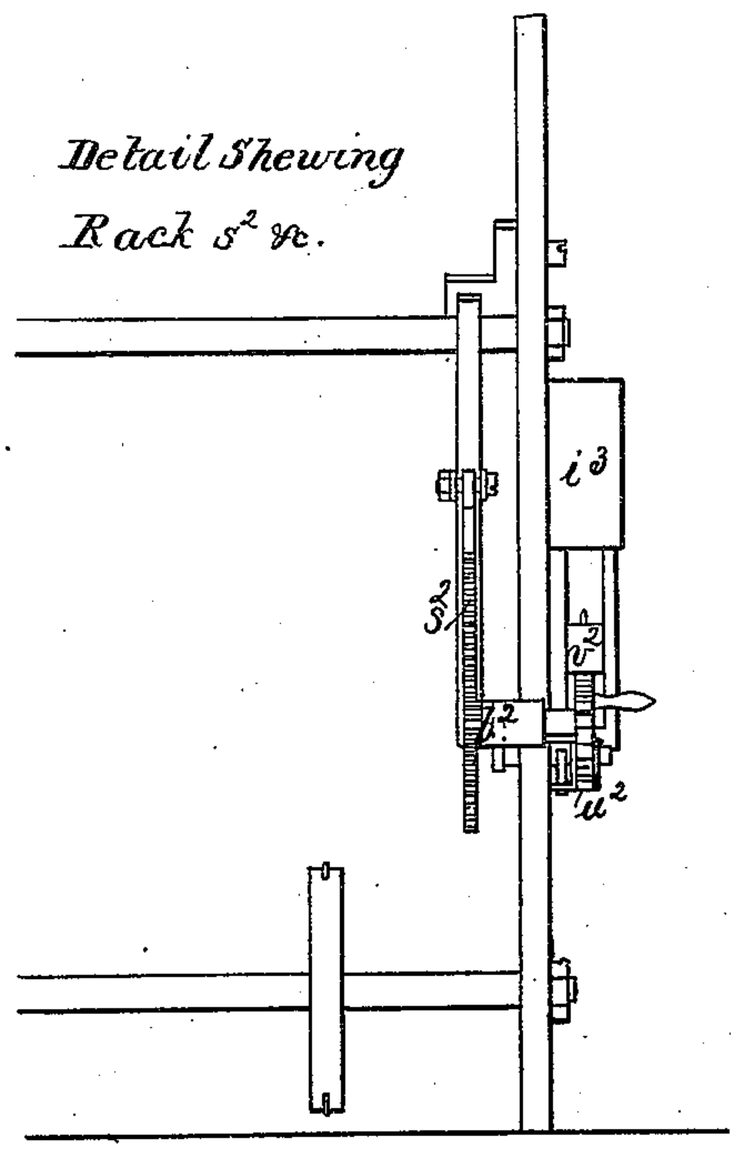
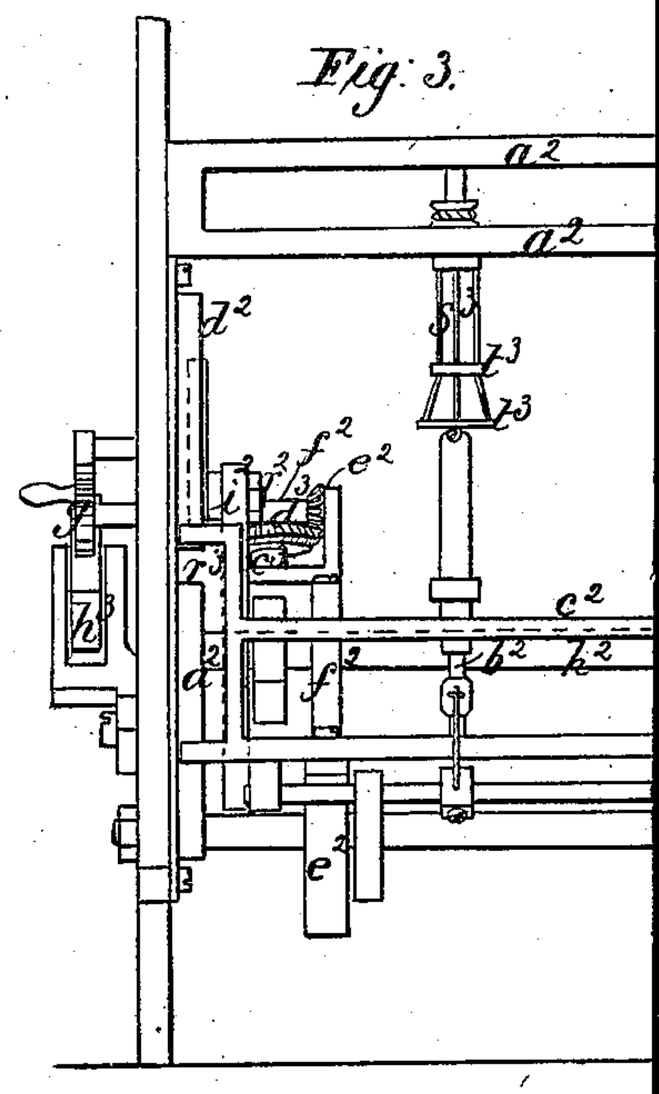


Fig. 3.



Witnesses;
M. W. Frothingham.
S. B. Hilder.

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United States Patent Office.

JOHN GOULDING, OF WORCESTER, MASSACHUSETTS.

Letters Patent No. 95,580, *dated October* 5, 1869.

IMPROVEMENT IN MACHINE FOR DRAWING AND SPINNING WOOL, &c., FROM THE CARDING-MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOHN GOULDING, of Worcester, in the county of Worcester, and State of Massachusetts, have invented certain Improvements in Carding and Spinning; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention, sufficient to enable those skilled in the art to practise it.

These improvements relate particularly to a method of spinning yarn directly from the carding-cylinder, so as to obviate the necessity of employment of a mule, or other separate machine, to operate upon the sliver made by the carding-machine; and

The invention consists, primarily, in the combination, with the carding-mechanism, and the draw-off rolls and twister-tubes, of a stopping-device or brake, which, falling upon the sliver, (after its delivery from the card-cylinder, through the draw-rolls and through the first twister-tube,) pinches it against a bar, and prevents the back sliver from further delivery, until the front draw-rolls have drawn the front part of the sliver, (between them and the bar,) after a second twist has been produced by an additional twister-tube, thus producing a yarn having a uniform and even twist, the yarn passing from the second draw-rolls to the main twister-flier, and thence to the bobbin.

The invention also consists in the mechanism for producing the rise and fall of the bobbins, and graduating the rise and fall, so as to properly fill the bobbins from head to point.

The drawings represent a machine embodying these improvements.

Figure 1 shows the machine in side elevation.

Figure 2 is a vertical longitudinal section of the machine.

a denotes the frame, mounted in suitable bearings, at the top of which is the main card-cylinder *b*, to the action of which the sliver is subjected, after leaving the second card, the sliver entering the machine between the top roll *c* and feed-rolls *d d*, thence passing under the "leader," or roll *e*, over the "tumbler" *f*, from which it is taken, by the main card-cylinder *b*, around, and acting with which, are the "clearers" *g g*, "workers" *h h*, "fancy" *i*, and "doffer" *k*, from which doffer the carded sliver or roving is stripped, or wiped by the wiper or take-off roll *l*.

The card-clothing is not shown in the drawings, the arrangement and operation of the carding-mechanism being the same, or much the same, as in other carding-engines.

From the take-off roll, the roving passes to and through a twister-tube, *m*, to and between drawing-rolls, *n*, and a top roll, *o*, the twister imparting a slight temporary twist, sufficient to enable the roving to be drawn along by the drawing-rolls, which rotate at the same velocity with the doffer-roll. From the drawing-rolls *n n*, the roving passes through another twister-tube, *p*, to draw-rolls *q q*, which rotate at an increased velocity, the roving being drawn out or attenuated by these rolls, under the temporary twist imparted by the twister-tube *p*.

Instead, however, of passing the roving directly to the twister-tube *p* and draw-rolls *q q*, a brake or hold-fast mechanism is employed, as follows, to intercept the delivery of the roving, and allow it to be stretched while twisting.

Across the frame extends a stationary bar, *r*, in the top of which is a long groove, *s*. Into this groove drops the tooth *j*, of a jaw, *t*, and when the roving is passing under this tooth or gripe, if the tooth descends, it gripes the roving and arrests its travel, so that the roving, from the gripe to the front draw-rolls, is stretched or attenuated, the twist and stretch extending into the large as well as into the small parts of the roving, and reducing it all to a uniform size, after which the griper is raised, the roving is again drawn along, (its slack being taken up,) until another rotation of the rear draw-rolls, when the griper again descends and nips the roving, and so on, thus imparting a uniform stretch and a uniform size to the roving, and bringing it into condition for the final and permanent twist preparatory to its being wound upon the bobbin.

The griper is worked as follows:

The griper-jaw is attached to a collar, *u*, fixed upon a rocker-shaft, *r*, on the end of which is an arm, *w*, resting upon a cam, *x*, on the shaft of the adjacent draw-roll *n*, and at each rotation of the roll *n*, the cam lifts the arm *w*, and thereby raises the gripe or tooth *j*, and releases the roving, while, as the cam-point passes around, the arm is released, and the gripe or tooth falls and rests by its weight, (and the weight of the arm *w*) upon the roving, holding it while the roving in advance is stretched while being twisted. Thus stretched and made uniform, or nearly uniform in size, the roving is ready for its final or permanent twisting by the flier, that lays the yarn, thus spun and twisted, upon the bobbin.

The rotative movements of the feed-rolls, main card, clearer, worker, &c., and of the draw-rolls, the twisters, and the fliers, are effected by geared and belted connections with the main shaft, as seen in the drawing, or in any other suitable manner.

The fliers are journalled in stationary rails, a^2, and hang below the lower rail, as seen at fig. 2. The bob-

bins stand upon spindles, b^2, mounted in a rising and falling frame c^2, which slides upon vertical ways or guide-rails d^2, and the frame is reciprocated to cause the flier to lay the yarn up and down the bobbin, as follows:

Projecting down from the frame are two toe-pieces, e^2, to which are attached the lower ends of two straps, f^2, whose upper ends are fastened to the tops of two arch-heads or lifters, g^2, fixed upon a rocker-shaft, h^2, at one end of which is an arm, i^2, (fig. 2,) jointed at top to a long link, k^2, through a slot, in the outer end of which passes a swing-bar, l^2, hung on a cross-rod, m^2, and carrying, at its lower end, a roll, n^2, resting against a peripheral cam, o^2, on a rotary shaft, p^2, driven by suitable connection with the main driving-shaft. As the roll is thrown outward by the cam, the link k^2 turns the shaft h^2, and its arch-heads or lifters, which latter lift the bobbin-frame. As the cam completes the last half of its rotation, the roll swings in, by gravity, (or the action of a suitable spring or springs upon the bar l^2,) allowing the bobbin-frame to fall, the alternate rise and fall of the bobbin-frame causing the yarn to be evenly wound upon the bobbin, along a length of the same, corresponding to the extent of vertical movement of the bobbin-frame, and the extent of this reciprocating vertical movement may be varied or adjusted by varying the point of connection of the link k^2 to the arm i^2, by means of a slot, q^2, and nut and screw r^2.

In filling the bobbin, it is necessary to begin to fill at the head, and to work from the head to but a short distance therefrom, (such distance slowly increasing, however, at each successive downward movement of the bobbin,) until the head is filled, and then to gradually work upward until the whole bobbin is evenly filled, and for this purpose a mechanism is necessary for effecting the gradual, permanent fall of the bobbin-frame, so that at each successive downward movement, the bobbins shall descend slightly further than in the previous descent of the bobbin-frame.

The first or short varying reciprocations are effected as follows:

The swing-bar l^2 passes loosely through the connecter k^2, so that the slotted end of the connecter can slide freely in a vertical direction. Jointed to the end of the connecter, is a pendent gear-rack, s^2, with the teeth of which a gear-pinion, t^2, engages, this pinion being on the inner end of a short shaft, journalled in a bearing projecting from the foot of the bar l^2. At the outer end of this shaft is a ratchet-wheel, u^2, with the teeth of which a drag-pawl or hook, v^2, engages, this pawl being pivoted on a pin, w^2, projecting from the main frame. As the bar l^2 is moved out by the cam o^2, the ratchet swinging out with it will be turned by the hook or pawl v^2, thereby effecting a rotative movement of the pinion t^2, and a descent of the rack s^2, such descent letting down the link k^2, bringing the point of its connection with the bar l^2 further from the centre of movement of the bar, and thereby increasing the extent of throw or rocking movement of the arm i^2 and arch-heads, and the extent of vertical movement of the bobbin-frame. When the slotted end of the link is near the rod m^2, the extent of vertical movement of the bobbin-frame is very slight, and this movement increases as the connecter is let down at each outward movement of the swing-bar, thereby laying the yarn over a greater space as the winding progresses. But as this increase of movement of the bobbin-frame would carry it up further, as well as down further, than before, the swing-bar is set at an inclination, (in normal position,) so that as the connecter moves down, it also moves back, and thus keeps the bobbin-frame down, or from ascending too high, that is to say, to such height as would cause the yarn to wind over the head, the increase of movement being wholly in the downward movement of the bobbins.

The extent of increase of movement of the bobbin-frame may be varied by setting the drag-pawl or hook more or less out upon its pivot-pin w^2, by means of a slot, x^2, and pin y^2.

The rack s^2 continues thus to regulate the varying movement of the bobbin-frame, until the head and lower part of the bobbins have become filled, and then a mechanism is brought into operation that causes the bobbin-frame to gradually fall, (at each reciprocation,) until the bobbin is filled, the frame rising less high at each upward movement, and descending lower at each downward movement, this mechanism being automatically brought into operation, and that just described automatically thrown out of operation, when the bobbin is filled at the head. This mechanism is as follows:

The rocker-shaft h^2, which carries the arch-heads, carries, near one end, a worm-wheel or sector, a^3, into the teeth of which engages a worm, b^3, on a shaft, c^3, turning in suitable bearings in projections from the rocker-arm i^2. At the top of this shaft is a bevel-gear, d^3, meshing into and driven by bevel-pinion e^3 on a shaft, f^3, at whose outer end is a ratchet-wheel, g^3, actuated by an impelling-pawl, h^3, which operates (negatively) to turn the ratchet when the top of the arm i^2 moves back or inwardly, that is to say, when the bobbin-frame is rising, the pawl turning on a pin which projects from the frame a. The point of the pawl h^3 is kept in engagement with the ratchet by having its opposite end weighted.

Each time the bobbin-frame rises, and the movement of the rocker-arm, by the link k^2, to produce such rise, is effected, the ratchet-wheel is rotatively moved by the pawl, and movement is thereby imparted to the shaft c^3 and its worm, and by the worm to the worm-sector a^3, thus effecting a change in the position of the arch-head shaft, causing the arch-heads to turn and to lower the bobbin-frame, so that at each descent such frame will drop lower than at its previous descent, this successive dropping of the frame continuing until the bobbins are filled, causing the yarn to lay in uniform conical strata from head to point.

The change from one mechanism for thus regulating the movement of the bobbin-frame, to the other, may be automatically effected through the mechanism of the weighted pawl h^3, and mechanism connecting it with the pawl v^2, as follows:

Over the pawl v^2 is a weight or weighted block, i^3, hung to the frame by a pin, k^3, and having a tail-piece projecting from it, as seen at l^3, the end of which is in the path of downward movement of a pin, p^3, (projecting from the link k^2,) when the pawl v^2 is in connection with its ratchet. The pawl v^2 also has a tail-piece, under which one arm, m^3, of a tripper-lever extends, the other arm, n^3 of this lever, entering a notch, o^3, in the weighted end of the pawl h^3, as seen in fig. 1. The weight of the pawl holds its notch against the arm n^3, and keeps the point of the pawl h^3 out of connection with its ratchet, as seen in fig. 1. The parts being in position, as seen in such figure, the pin p^3 will strike the tail-piece l^3, (when, in the descent of the link k^2, the head of the bobbin has become filled,) and will carry down the tail-piece, until the preponderance of weight passes over the pin k^3, when the weight will swing down, causing a pin, q^3, (projecting from the tail-piece) to strike the tail-piece of the pawl v^2, throwing it down against the arm m^3, causing such arm to lift the opposite arm n^3, thereby liberating the pawl h^3, the weighted end of which presses the pawl-point up into engagement with its ratchet, the pin q^3 lifting the other pawl v^2 from its ratchet. Thus one regulating-mechanism is thrown out of operation and the other into operation, the position of the mechanism being denoted by the dotted lines in fig. 1.

Each ratchet, when in operation, is kept from back movement by a suitable detaining-pawl.

When the bobbins have been filled, the pawls are

released from their ratchets, which are then rotated back by suitable crank-handles, letting the bobbin-frame down, to bring the bobbins below the flier, for removal, and for application of empty bobbins.

To facilitate such removal and application, the bobbin-frame is arranged to be swung out from the main frame, as follows:

The vertical rails, upon which the frame slides, are cut away, as seen at r^3, in fig. 3, (which is an end view of part of the machine,) and when the bobbin frame is let down to its lowest extent, the top rail of the frame may be tipped forward, as seen in dotted lines at fig. 1, the frame hanging on the straps f^2, and its lower rail being kept upon the vertical guide-rails.

The improvements thus described are intended particularly for wool-spinning, but it will be obvious that they are, to greater or less extent, applicable to cotton and other spinning-mechanism.

What is claimed, is—

1. In combination with a carding-cylinder or main card, and with draw-rolls, and twister-tubes, and main twisting-fliers, the mechanism or devices for intermittently griping the roving between the two sets of draw-rolls, so as to uniformly stretch or draw and spin the yarn, substantially as described.

2. Also, in combination with the bobbin-frame, the mechanism for producing the rise and descent of the frame, substantially as described.

3. Also, in combination with the bobbin-frame, the mechanism for varying the movement of the bobbins while they are filling at the heads, substantially as described.

4. Also, in combination with the bobbin-frame, the mechanism for gradually effecting the descent of the bobbin-frame to fill the bobbins evenly, substantially as described.

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Witnesses:

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