

*J. Rich.*  
*Spinning Mach.*

*N<sup>o</sup> 46,588.*

*Patented Feb. 28, 1865.*

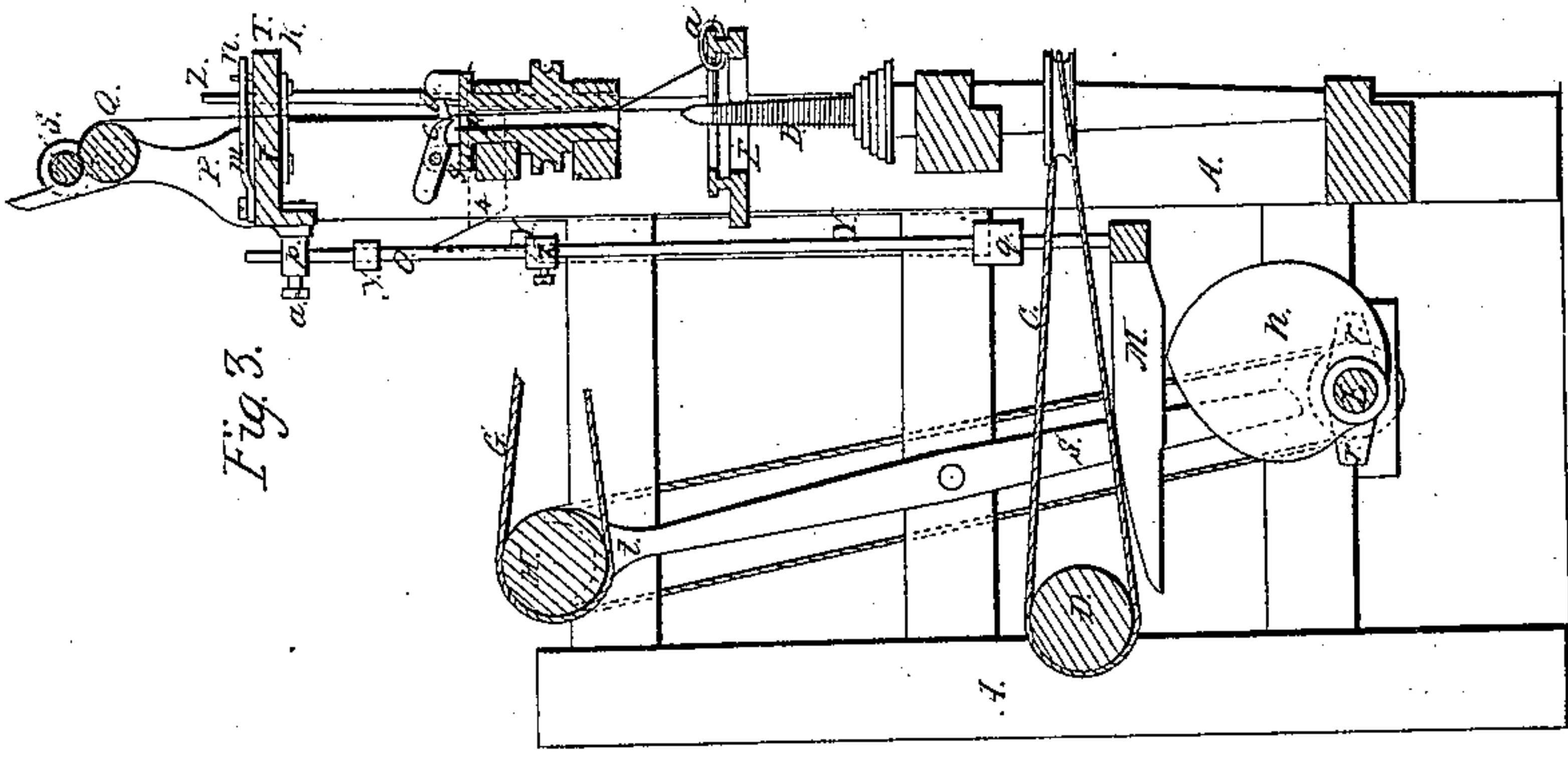


Fig. 3.

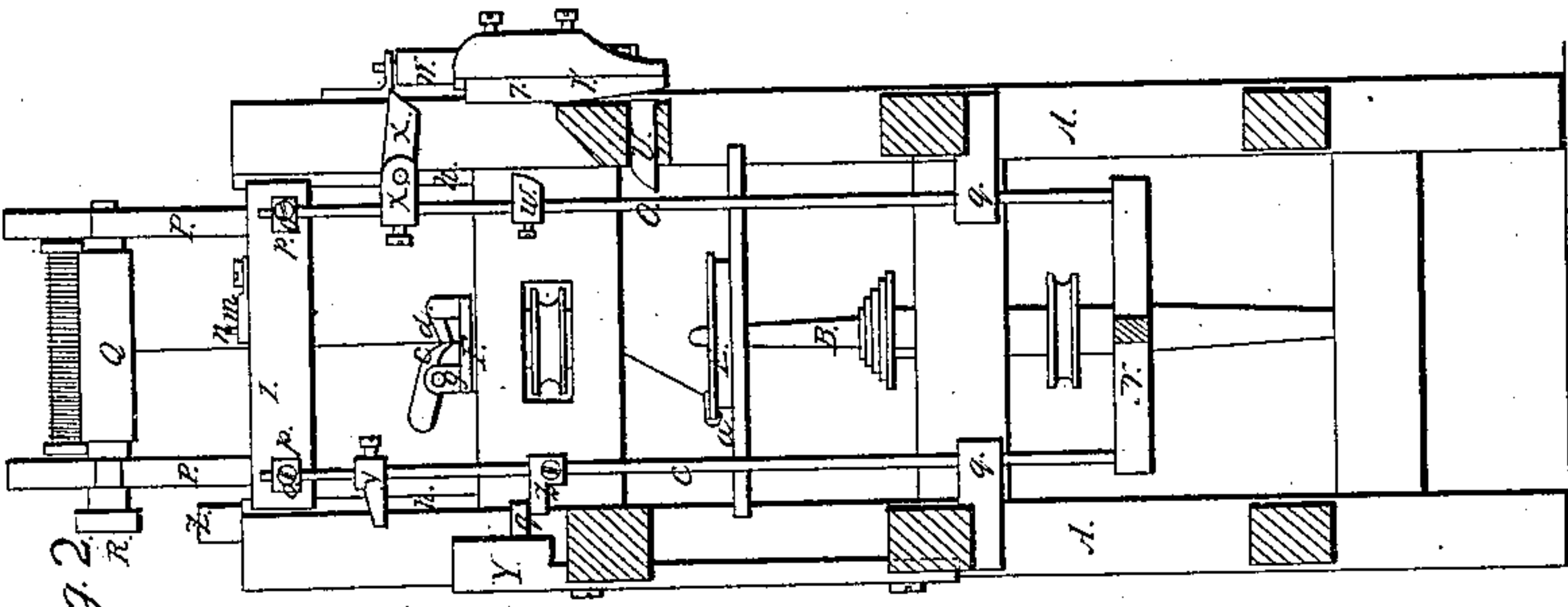


Fig. 2.

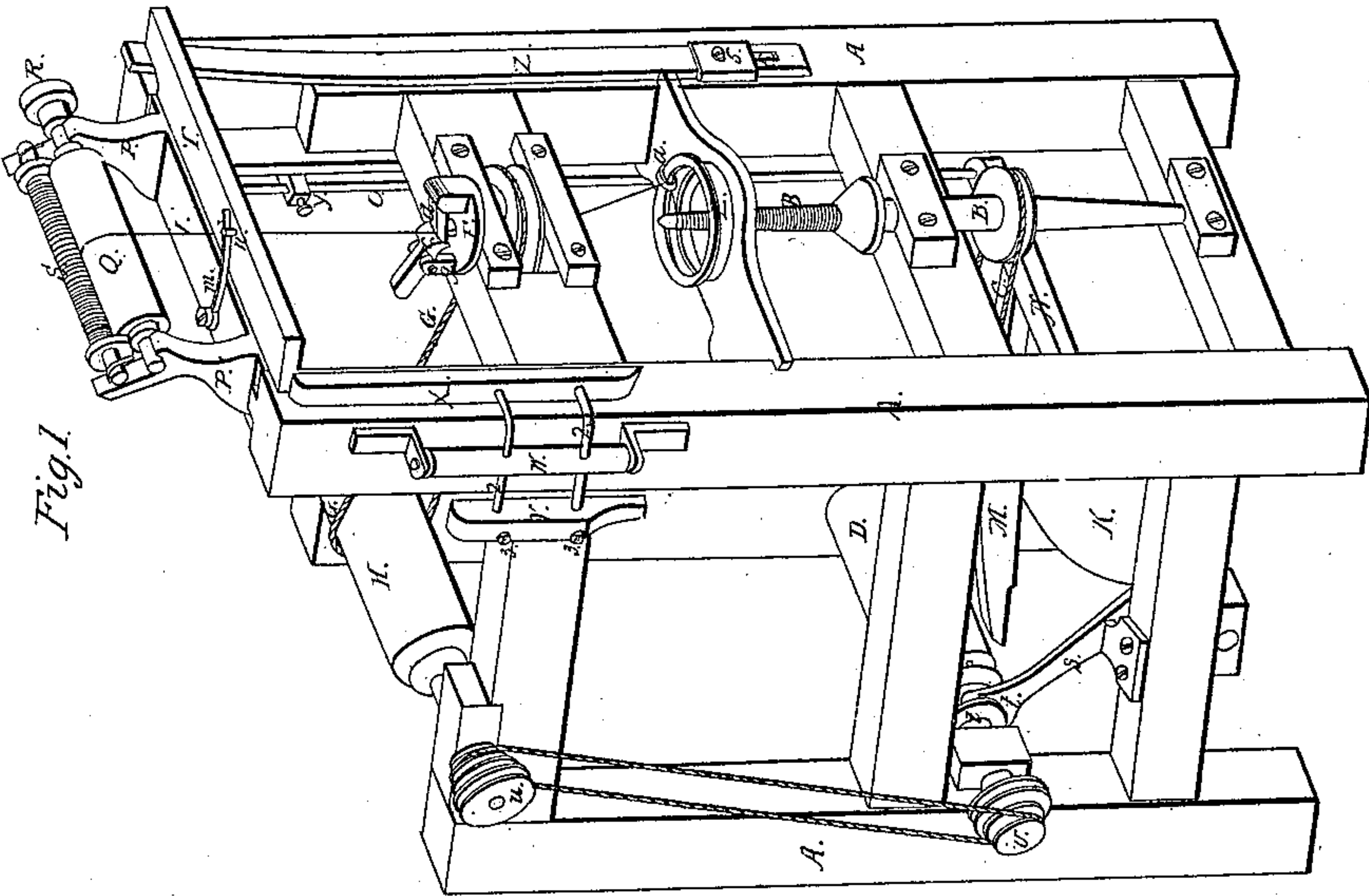


Fig. 7

Witnesses:  
H. L. Fuller  
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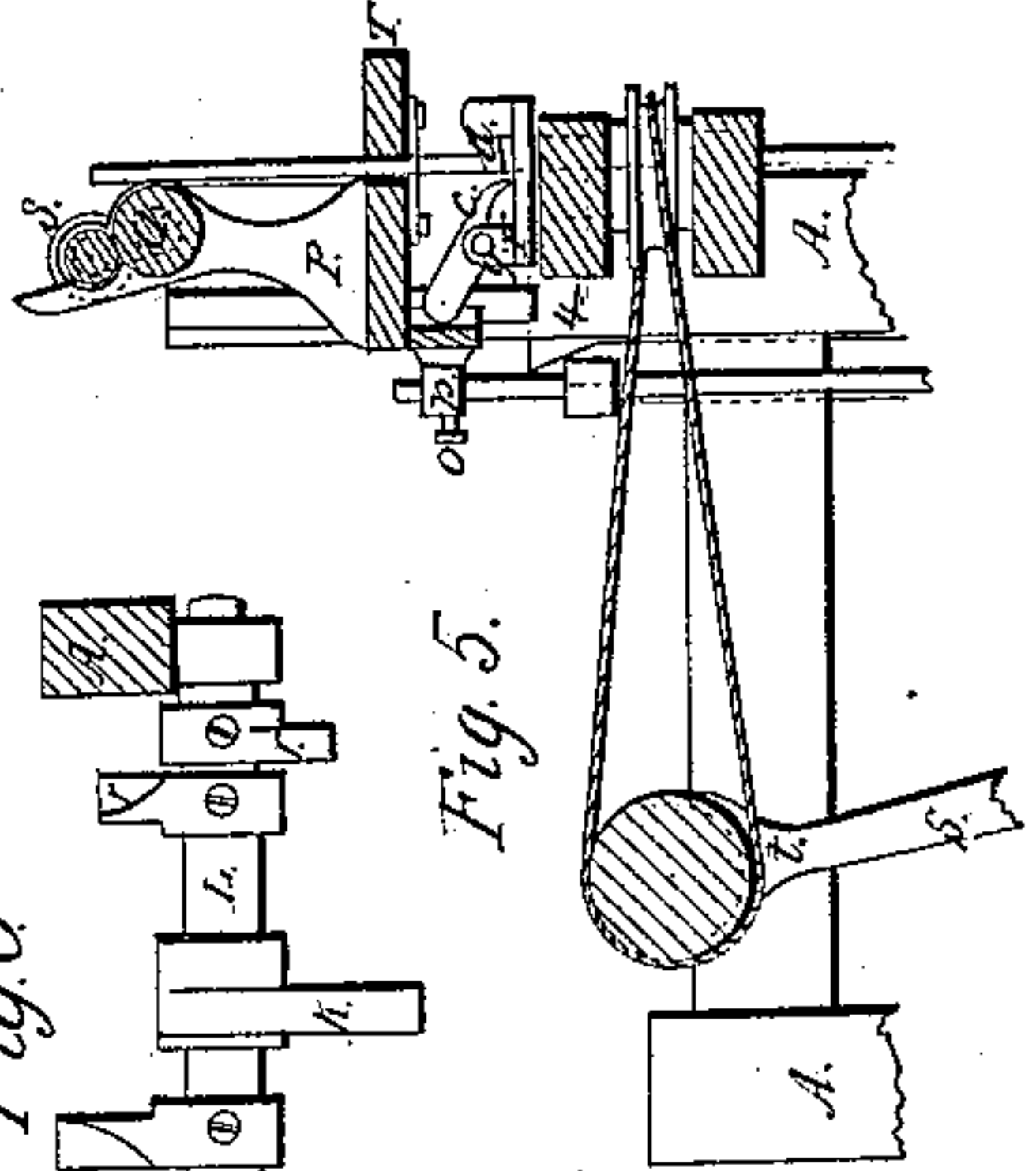


Fig. 5.

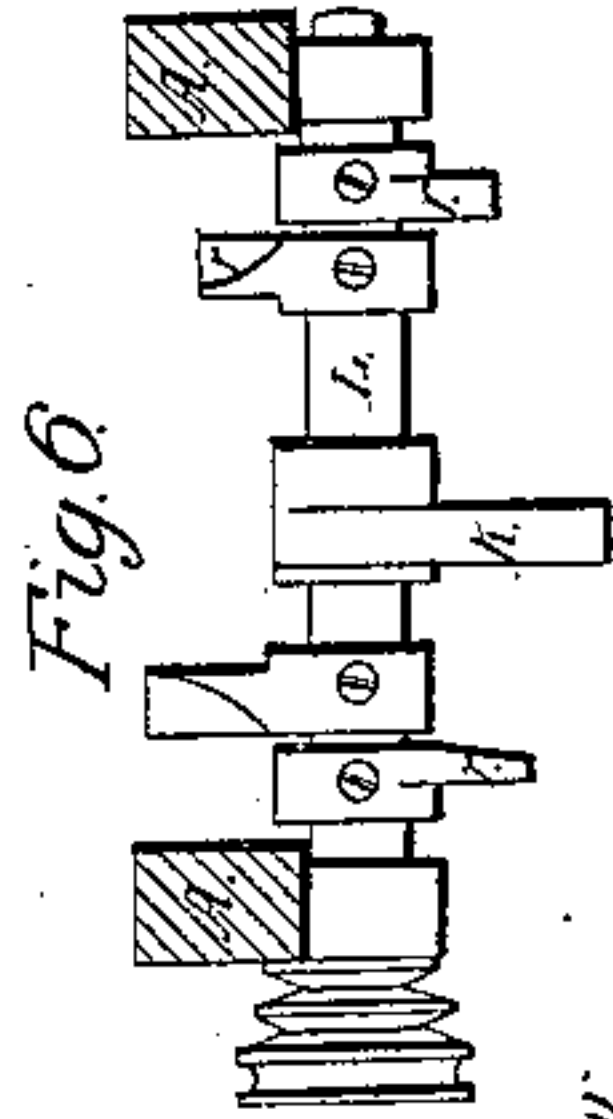


Fig. 6.

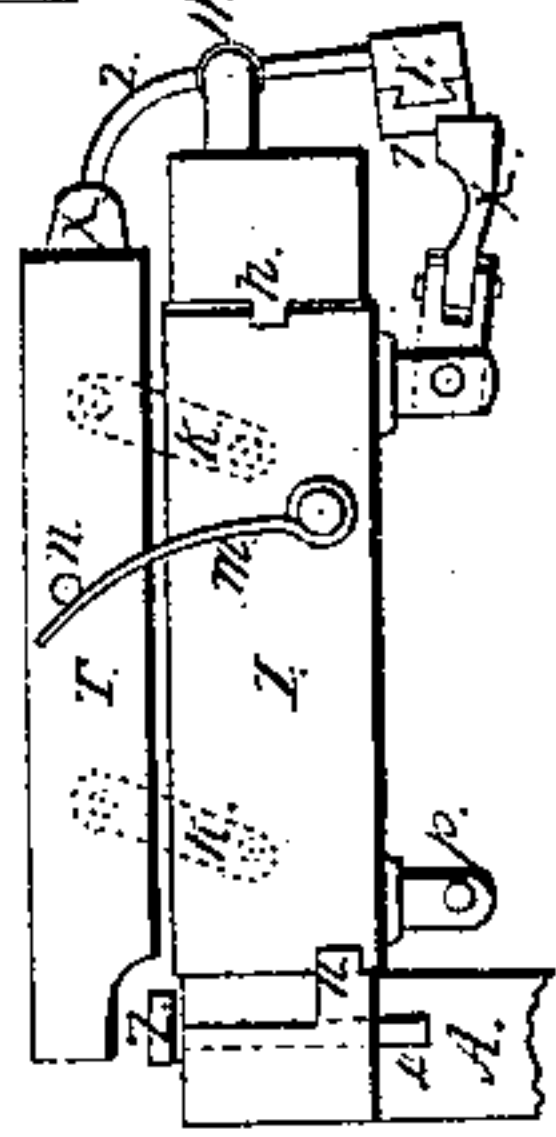


Fig. 4.

Inventor:  
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# UNITED STATES PATENT OFFICE

JOHN RICH, OF CONWAY, MASSACHUSETTS.

## IMPROVEMENT IN SPINNING-MACHINES.

Specification forming part of Letters Patent No. 46,588, dated February 28, 1865.

*To all whom it may concern:*

Be it known that I, JOHN RICH, of Conway, in the county of Franklin and State of Massachusetts, have invented certain new and useful Improvements in Wool-Spinning Machines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a perspective view of said machine. Fig. 2 represents a vertical transverse section. Figs. 3 and 5 represent longitudinal vertical sections through the same. Fig. 4 represents a top view of the front part of the machine. Fig. 6 represents the main shaft and shipping-cams.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A represents the main frame of the machine upon whose lower cross girth rests the spindle B, upon which the finished and twisted yarn is wound. This spindle is driven by a band, C, running upon the drum D, which is supported in the rear part of the frame.

E represents a ring which has a traveler, *a*, on its upper flange. They both serve the purpose of twisting and laying the yarn properly upon the spindle B. They are of the ordinary construction, and as they in themselves do not constitute a part of this my present invention, a detailed description of their construction and operation is not deemed necessary.

F represents a draw-twisting whirl. It is driven by a band, G, running back upon a drum, H, which is mounted on the rear end of the frame. The whirl F is provided with two retaining-fingers, *c d*, the former of which is hinged to the standard *g*, while the latter is rigidly secured to its standard. The yarn passes between the two fingers and when the yarn is drawn upward the hinged finger *c* is by means of frictional contact of the yarn pulled upward and binds firmly against the stationary finger *d*, and the two thus grip the yarn firmly between them. When the yarn is drawn downward, the hinged finger *c* is thereby turned downward and thus releases its grip upon the yarn, as represented at Fig. 5, and the yarn can pass freely downward. Thus said fingers act automatically when the yarn is drawn and when, after having been

drawn and twisted, it is to be wound upon the spindle B.

I represents a breast-plate which is set within the ways *h* of the main frame and on which it is made to slide up and down by the action of the cam K on the main driving-shaft L, said cam acting upon a toe, M, which is secured to the cross piece N, which in its turn is connected with the breast-plate I by means of the rods O, in a manner hereinafter more fully to be described. To the top of the breast-plate I are secured two stands, P, which support the feed-roll Q, having at its end a pulley, R. Upon the top of the feed-roll Q rests the spool S of carded-wool roving, which, being in contact with the feed-roll Q, is turned as the latter revolves and thus delivers the roving.

T represents a clamp which is hung in front of the breast-plate I, upon parallel hinged arms *k*. (Shown in a top view at Fig. 4.) To the top of the breast-plate I is secured a spring, *m*, the outer end of which bears against the pin *n* on the clamp T, and which thus presses the latter against the breast-plate I.

As above described, the breast-plate I is supported by two rods, O—one at or near each end—and which are fastened thereto by means of two guides, *p*, and through holes in which the upper ends of the rods O pass, and are held therein by means of the set-screws *o*, by which the position of the breast-plate, and consequently of the clamp T, can be adjusted with great accuracy. The rods O pass down through guides *q*, fastened to the middle side rails of the frame, and are fastened at their lower ends to the cross-piece N, from which projects a toe, M, which is operated by cam K on the main driving-shaft. Upon each side of the cam K is a pair of tappets, *r*, having their sides which face each other beveled and which thus during the revolution of the main shaft act upon and shift to and fro the shipping-levers *s*, which respectively operate the clutches *t* of the drums H D, which respectively drive the spindle and the draw-twisting whirl. The said drums H D are loose upon their shafts on which the sliding clutches *t* and pulleys *u v* are respectively secured, and they thus cause the whirl F and spindle B to revolve and to stop at certain intervals and during certain periods of each revolution of the main driving-shaft.



To each of the rods *O* are fastened two dogs. To one are fastened the dogs *w x*, to the other the dogs *y z*. All of them are adjustable on their rods by means of set-screws, while the dog *x* has a hinged piece attached to it in such a manner that it can turn upward only from a horizontal line.

The dogs *w x* are for the purpose of throwing out the clamp *T* and keeping it out for the proper time to allow a sufficient length of roving to pass between the clamp and the breast-plate *I*. This is effected in the following manner: When the rods *O* descend, the dog *w* acts upon a slide-pin, *U*, Fig. 2, which forces out the short upright incline *V*, supported upon the horizontal rods 2, (represented at Figs. 1 and 4,) and which latter are secured to the vertical reciprocating spindle *W*. This movement will force the vertical arm *X*, which is secured to the other ends of the rods 2, against the end of the clamp *T*, and, overcoming the pressure of the spring *m*, will press the clamp endwise and force it out from the breast-plate *I* to the position represented at Fig. 4. The parallel arms *k* describe arcs of circles, and thus carry the clamp *T* away from, but in a line parallel with, the breast-plate *I*, thus leaving a space between them through which the roving can pass freely, as shown at Fig. 5. When the vertical incline *V* has been forced out by the sliding-pin *U*, as above described, the hinged dog *x* will drop down to a horizontal position, or nearly so, and will then retain the incline *V* in said position until by the upward movement of the rods *O* the said dog has passed the upper edge of the incline *V*. The latter is then released, and the spring *m*, being released from the pressure of the vertical arm *X*, forces the incline *V* inward, and the clamp *T* presses the roving firmly against the edge of the breast-plate *I*, as represented at Fig. 2. The face-plate 7 of the incline *V* is secured to its body by means of a dovetail joint. It can thus be adjusted thereon vertically so as to regulate clamp *T* to suit the feed-motion, and said face is secured in any desired position by the set-screws 3.

The dogs *y z* are for the purpose of regulating the feed of the wool roving, which is effected in the following manner:

*Y* represents a sliding incline, which is connected with the side of the main frames. Its upper face acts upon a horizontal sliding pin, 4, which forces out the adjustable spring feed-arm *Z*, attached to one of the front uprights of the main frame, and holds it out until the upper dog, *y*, descends and forces down the sliding incline by striking against its spur 9, whereby the spring feed-arm *Z* is permitted to spring back.

It will be observed that the spring feed-arm *Z* is forced out when the feed-roll *Q* is at its highest elevation, as represented in Figs. 1 and 3, and that it remains out until said roll descends to its lowest point, when it is allowed to spring back against the pulley *R* of the feed roll in the manner shown in Fig. 5, which

exhibits a cross-section of the feed-roll, thus rendering pulley *R* invisible, and consequently when said feed-roll is elevated it is caused to roll or turn forward by the friction of its pulley *R* against the spring feed-arm *Z*, and will continue to turn until the pulley *R* is elevated above the end of the spring feed-arm *Z*. The spring feed-arm *Z* is adjustable vertically by means of set screw 5, which passes through a slot, 6, and by adjusting its position the length of feed of the roving can be varied—if elevated it will feed more, if lowered it will feed less. The feed-roll, which is intermittently turned by the frictional contact of spring *Z* against pulley *R*, transmits this motion to the spool of roving resting upon it, and consequently no undue strain is thrown upon the roving while in the process of being fed.

The operation of the machine is as follows: The feed-roll being at its lowest position, as represented at Fig. 5, power is applied to the main driving-shaft, and the cam *K* on said shaft elevates the breast-piece *I*, clamp *T*, and feed-roll *Q*, whereby the latter is caused to roll forward by reason of the friction of pulley *R* against the spring feed-arm *Z*, and thus the roving is unwound from the bobbin *S* and passes freely between the clamp *T* and breast-piece *I*. During this operation both the spindle *B* and whirl *F* are stationary. As soon, however, as the hinged dog *x* is raised above the end of the incline *V* the clamp *T* is caused, by its spring *m*, to press closely against the edge of the breast-piece *I*, and at the same time the feed stops, the pulley *R* having passed beyond the spring feed-arm *Z*, but the breast plate *I*, clamp, and feed roll *Q* continue to rise, thereby drawing upon the roving and at the same time the spindle *B* and draw-twisting whirl are put in motion by their respective clutches, whereby as the breast-plate and clamp are raised the yarn above the holding or retaining fingers *c d* is drawn out and twisted just enough to keep it from breaking and parting and permitting it to be properly drawn, while at the same time the thread below the holding-fingers is twisted. The thread is prevented from drawing off of the spindle *B* by the retaining-fingers *c d*, which permit the thread to be drawn down freely when the breast-plate *I* and feed-roll *Q* are lowered, but which close upon the thread whenever any upward strain is given. They also prevent the twist from running up on the thread while it is being drawn, thus enabling the thread already drawn and which is below the holding-fingers *c d* to be twisted by the spindle *B*, in combination with the ring and traveler, while the roving above is being drawn preparatory to being run down to be twisted. When the feed-roll *Q* and breast-plate *I* reach the highest point and commence to descend, the draw-twisting whirl *F* is stopped by the cam *r* acting upon clutch *t*, and the holding-fingers release their grasp upon the thread and allow it to run down and wind upon the spindle *B*, and by which operation the length



of the thread just drawn is allowed to occupy a position between the holding-fingers and the point of the spindle B. Just before the breast-piece I, clamp T, and feed-roll Q descend to their lowest point, the clamp T is forced away from the breast-piece by means above described, and the shifting device to the spindle B stops the motion of the latter, whereby it and the draw-twisting whirl are both stopped until the hinged dog *x* is again raised above the end of the incline V, when the clamp T is closed and holds the thread, and the operation is repeated. On the drawings the yarn and roving are shown in red lines.

In practice it will be advisable to make the frame, feed-roll, and other parts long and wide enough to contain roving for twenty separate threads.

The rings which support the travelers are to have an up-and-down or vertical reciprocating motion, simply to wind the yarn upon the spindle the same as in ordinary cotton-spinning frames, and upon which I do not claim any improvement, and consequently have not fully described the mechanism, it being well known.

A fler could be used instead of the ring and traveler; but in practice I have found the latter preferable.

The motion of the draw-twisting whirls and spindles can be varied at pleasure by means of the cone-pulleys *u v*.

The machine can be so made as to be double—that is, have two full sets of spindles, one on each side.

The motion of the draw-twisting whirl is only sufficient to give the required twist to the roving while it is being drawn out properly. The holding and retaining fingers *c d* grip the yarn, and consequently cause it to be twisted as the whirl F revolves.

In Fig. 6 the shipping-cams are more fully represented. They are fastened by screws to the main driving-shaft, so as to be readily adjusted to operate the shipping-lever *s* at any desired time.

By the use of the friction feed in wool-spinning machines I am able to adjust the amount of roving to be fed at each time with great accuracy, and that, too, without the annoyance of shifting gears, racks, and such heavy and jarring mechanism.

I also obviate in my machine the great objection to twisting the yarn over the point of the spindle, as practiced heretofore in machines for spinning wool.

My machine is compact, as much so as an ordinary frame for spinning cotton yarns, and

it can be tended with almost as much ease. Moreover, no time is lost after the thread is drawn in the twisting operation, since a portion of each thread is twisted, while another portion is being drawn, so that the drawing and twisting operations are carried on simultaneously upon the same thread—that is, a part of the thread is twisted at the same time that another part is being drawn preparatory to being twisted. This great saving of time is of great practical importance in the manufacture of woolen goods.

Having thus fully described the nature of my invention, what I claim herein as new, and desire to secure by Letters Patent, is—

1. The combination in a wool-spinning frame or machine of the twisting-spindle B, ring and traveler E, and a draw-twisting whirl, F, with its holding-fingers *c d*, substantially as and for the purposes herein described.

2. The combination, with the draw-twisting whirl and its holding-fingers *c d*, of the holding-clamp T and feed-roll Q, substantially as and for the purposes described.

3. The combination, with the feed roll, of the feed-pulley R and spring feed-arm Z, substantially as and for the purposes described.

4. The combination of the dogs *y* and *z*, with the incline on the long upright piece Y, and sliding pin 4, for the purpose of operating the feed-arm Z, substantially in the manner herein described.

5. The use and employment in wool spinning machines of a friction-pad acting intermittently on the pulley of the feed-roller for delivering the roving, as and for the purposes set forth.

6. The combination, with the clamp T, of the mechanism described for operating it at the proper time, substantially as set forth.

7. The hinged dog *x*, in combination with the incline on the short upright piece *v*, as and for the purposes set forth.

8. The adjustable face 7, in combination with the upright piece V and hinged dog *x*, or the equivalent thereof, for the purpose stated.

9. The draw-twisting whirl F, constructed and operating as and for the purposes herein described.

10. The combination of mechanism, constructed and arranged substantially as above described, for drawing and twisting woolen threads simultaneously, as herein set forth.

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Witnesses:

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