

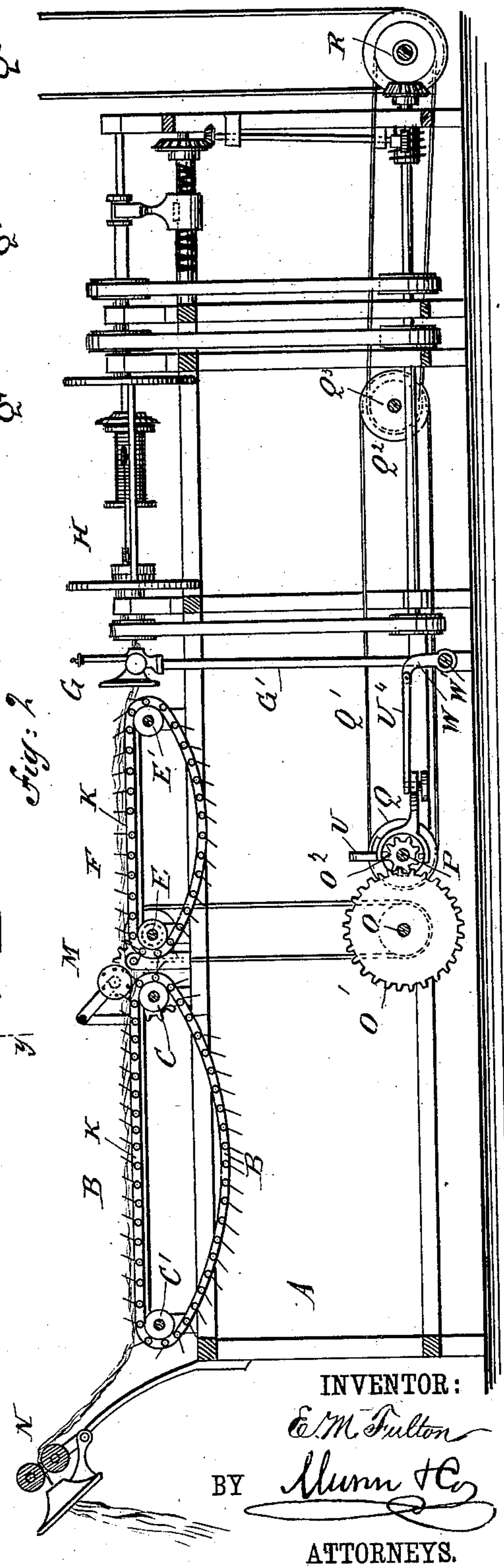
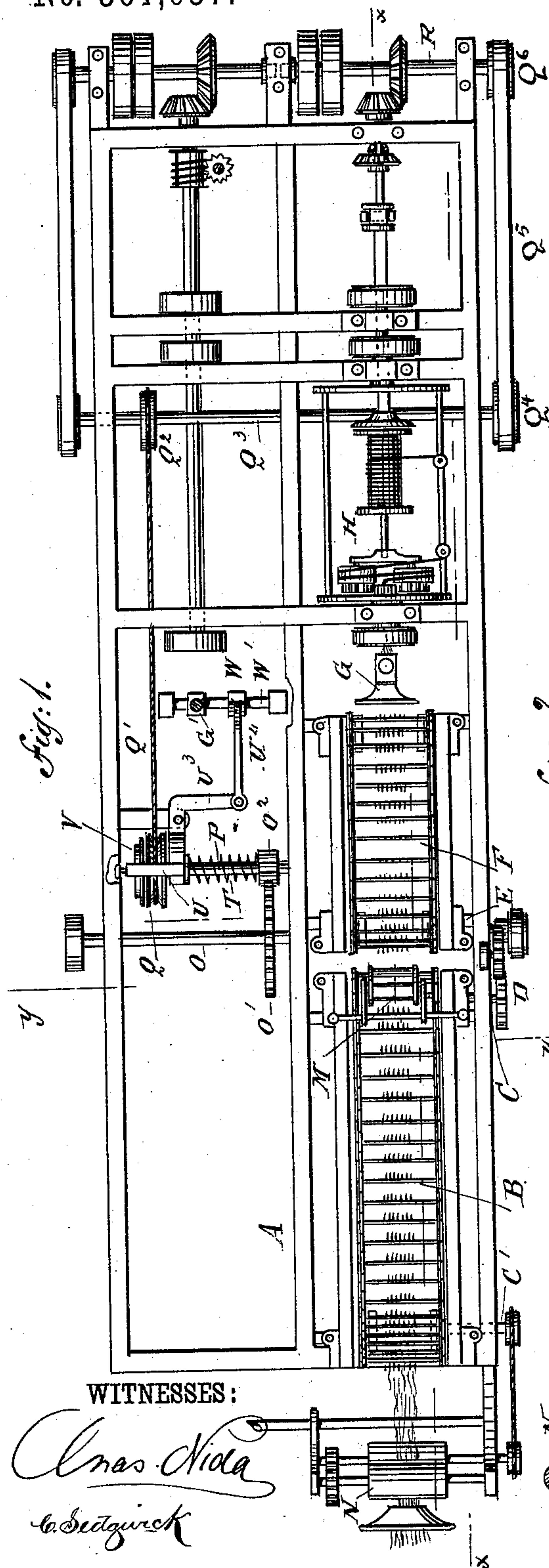
(No Model.)

3 Sheets—Sheet 1.

E. M. FULTON.  
CORDAGE SPINNING MACHINE.

No. 361,057.

Patented Apr. 12, 1887.



(No Model.)

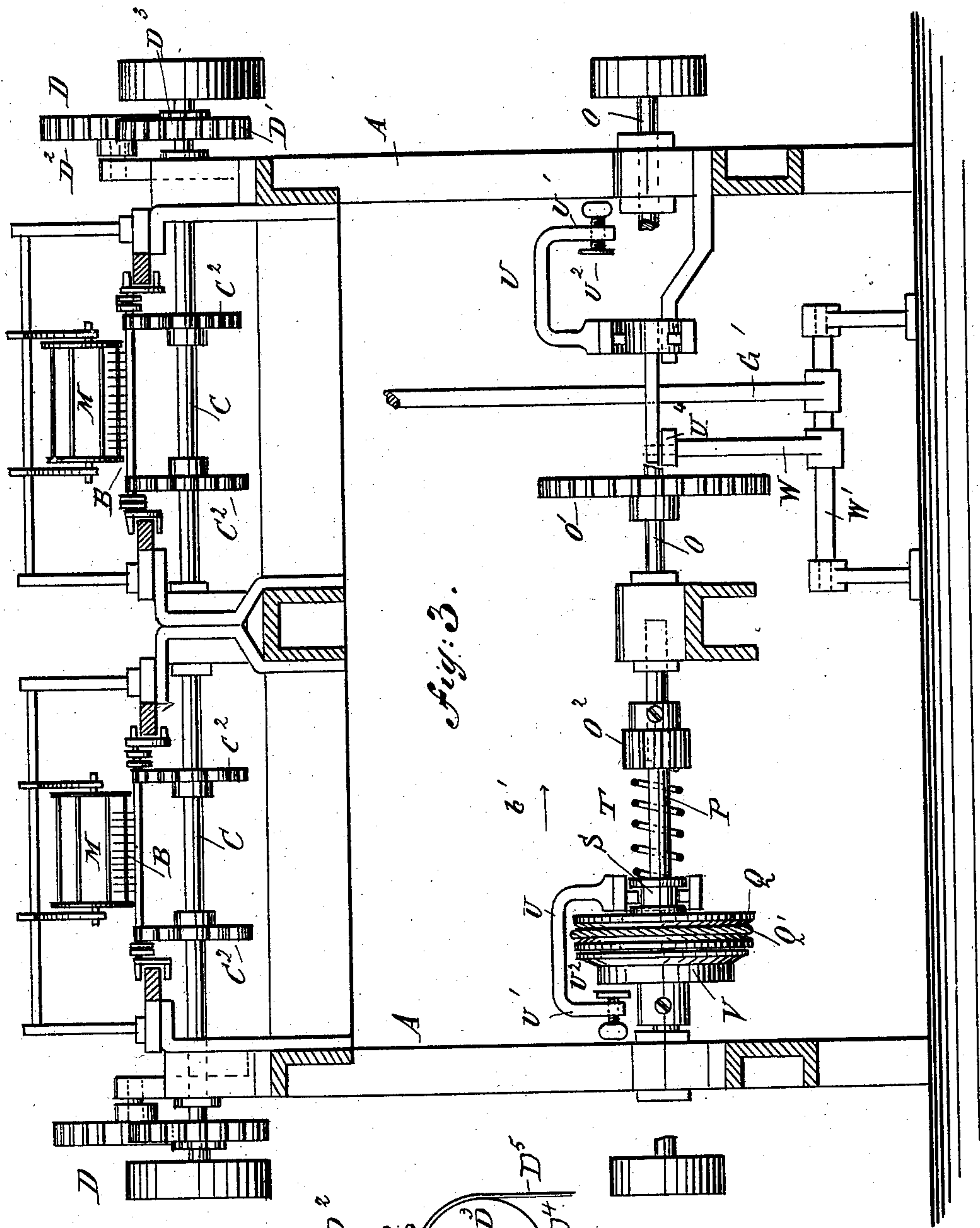
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**WITNESSES:**

Chas. Vida  
C. Sedgwick

Fig: 4.

INVENTOR: .

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ATTORNEYS.



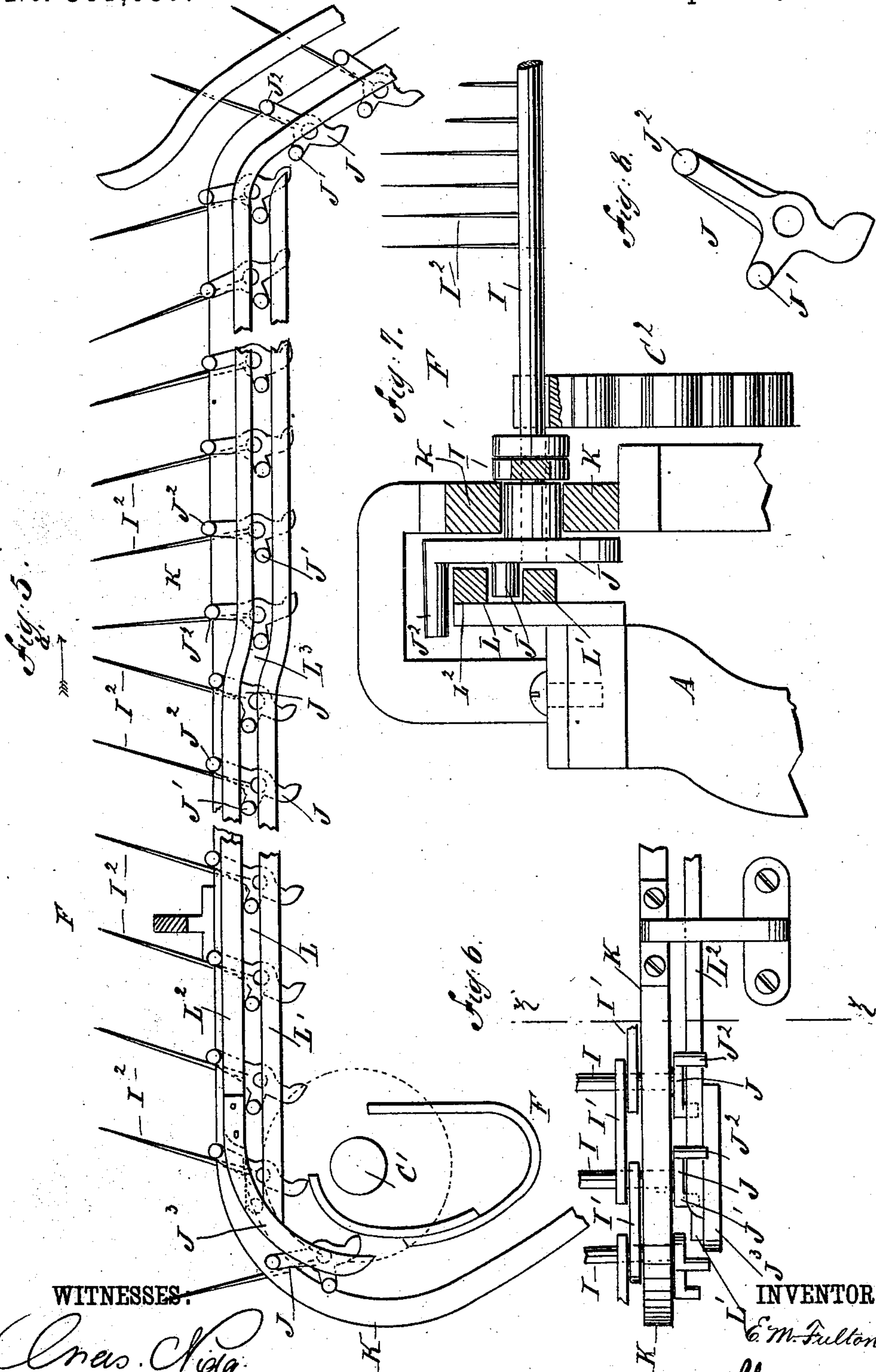
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# UNITED STATES PATENT OFFICE.

ELISHA M. FULTON, OF NEW YORK, N. Y.

## CORDAGE-SPINNING MACHINE.

SPECIFICATION forming part of Letters Patent No. 361,057, dated April 12, 1887.

Application filed July 30, 1886. Serial No. 209,545. (No model.)

*To all whom it may concern:*

Be it known that I, ELISHA M. FULTON, of the city, county, and State of New York, have invented a new and Improved Cordage-Spinning Machine, of which the following is a full, clear, and exact description.

This invention more particularly relates to cordage-spinning machines or jennies in which a chain-feed is used to comb and convey the sliver to the spinning mechanism.

The invention consists in a combination, with a spinning or twisting and spinning mechanism, of a series of chains, arranged one in front of the other, instead of a single chain, as heretofore, for passing the sliver to the spinning mechanism or its flier, said chains, which are armed with pins to comb, draw, and take hold of the sliver, being made to travel at different velocities, and so that the one nearest to the spinning mechanism travels at a higher rate of speed than the chain which precedes it, whereby a heavier sliver may be worked and a more perfect control of the draft on it be obtained; also, whereby the spinning mechanism may be run at a high rate of speed and a uniform cord be produced. In such combination of parts it is preferred to provide the chain which runs at the highest velocity and is nearest to the spinning mechanism, and, if desired, need only move slightly slower than the flier, with pins taking hold on the sliver made to incline in reverse directions during the first and closing portions of their upper course of travel, whereby a better hold is obtained on the sliver as it is drawn from the preceding chain moving at a slower velocity, and an easy or free delivery of the sliver to the spinning devices is secured.

The invention also consists of various parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of a double spinning-machine with the upper mechanism on one side removed. Fig. 2 is a sectional side elevation of the same on the line  $xx$  of Fig. 1. Fig. 3 is a vertical cross-section of the same partly broken

away. Fig. 4 is a sectional side elevation of the gearing for the two chains. Fig. 5 is a side elevation of the second chain and its guideways. Fig. 6 is a plan view of part of the same. Fig. 7 is a vertical cross-section of the same on the line  $zz$  of Fig. 6, and Fig. 8 is a side elevation of one of the guide-arms for the chain-shafts.

Heretofore in hemp-spinning machines one chain was arranged to deliver a sliver from the can to the condenser; but it has been found that the cord produced was of varying thickness, as the pull of the twisting mechanism forced the uneven strands of the sliver from the chain into the condenser, with the result above stated. I obviate this difficulty by placing between the first chain and the condenser one or more chains, which run successively at a greater speed than the first chain; but the chain next to the condenser runs at a lower rate of speed than the spinning mechanism. The strain on the condenser is thus gradually reduced, and an even and uniform strand is obtained, which is twisted into a uniform cord.

In the drawings I represent a double spinning-machine with two chains; but three or more chains may be employed, being placed one in front of the other, as above stated.

On the frame A, of suitable size and shape, is mounted the first endless chain, B, of the usual construction, which passes over pulleys attached to the shafts C and C', of which the former is connected by a train of gear-wheels, D, with the shaft E, which imparts motion to the endless chain F, traveling over pulleys secured to the said shaft E and the shaft E'. At the outer end of the chain F is placed a yielding condenser, G, of any approved construction. Next to the condenser G is mounted the twisting mechanism H, operated from the main driving-shaft, which, being of the usual construction, needs no further description.

The chain F is provided with the shafts I, which are united by the links I', and each of which shafts has a row of radial pins, I<sup>2</sup>. The shafts I travel and have their bearings in the guides K, secured to the main frame A, and which guides extend from the pulleys on the shaft E to the pulleys on the shaft E', near the upper edge of the same. To the outer end of



each shaft I is fastened a guide-arm, J, provided with two pins, J' and J<sup>2</sup>, respectively, of which the pin J' travels in the guideway L, formed by the guides L' and L<sup>2</sup>, secured to the main frame A, and the pin J<sup>2</sup> projects over the upper edge of the guide L<sup>2</sup>, being guided thereto by the short guide J<sup>3</sup>. The guides L' and L<sup>2</sup> are slightly curved near their middle at L<sup>3</sup>, as shown in Fig. 5, so that when the chain F travels in the direction of the arrow a' the pins I<sup>2</sup>, before reaching the bend L<sup>3</sup>, slide toward the condenser G; but this position of the pins I<sup>2</sup> is reversed as soon as the guide-arm J passes into the curve L<sup>3</sup>, whereby the pin J' causes the shaft I to turn, so that the pins I<sup>2</sup> assume a position which is the reverse of that held by them before.

A loose reel, M, is hung in suitable bearings above the chain B, at its rear end. The delivery-rollers N are mounted on the front part of the machine, and are rotated by belts and pulleys driven from the shafts C' of the chain B. The train of gear-wheels D consists of the gear-wheel D', attached to the shaft C and meshing into the intermediate gear-wheel, D<sup>2</sup>, mounted on a stud secured in the frame A and meshing into the pinion D<sup>3</sup>, secured to the shaft E, which is connected by pulley and belt D<sup>4</sup> D<sup>5</sup>, respectively, with the shaft O, carrying the gear-wheel O', which meshes into the pinion O<sup>2</sup>, fastened on the shaft P.

On the shaft P is placed loosely a pulley, Q, connected by a cord or belt, Q', with a pulley, Q<sup>2</sup>, secured to the shaft Q<sup>3</sup>, mounted in the main frame A and rotated in any suitable manner from the main driving-shaft R—as, for instance, by means of a belt, Q<sup>5</sup>, encompassing pulleys Q<sup>4</sup> and Q<sup>6</sup>, secured upon the shafts Q<sup>3</sup> and R, respectively, which shaft R also operates the spinning mechanism H. A grooved pulley, S, is secured to the pulley Q, and against it presses one end of a spring, T, coiled on the shaft P, and having one end resting on the pinion O<sup>2</sup>. The grooved pulley S is engaged by the shifting-fork U, pivoted to a bracket on the main frame A and provided with an arm, U', which carries an adjustable friction-plate, U<sup>2</sup>, held in close proximity to the outer face of the friction-wheel V, secured to the shaft P beside the pulley Q. The shifting-fork U is also provided with a lever, U<sup>3</sup>, connected by a link, U<sup>4</sup>, with an arm, W, attached to the rocking shaft W', on which is fastened an upright arm, G', carrying on its upper end a condenser, G.

The pulley Q is held in frictional contact with the disk V by the force of the spring T, whereby the shaft P is rotated from the main driving-shaft R.

The operation is as follows: The main driving-shaft R imparts a rotary motion to the twisting mechanism H, which runs at a very high rate of speed, while the chain F, which also receives its motion from the main shaft R, travels at about half the speed of the twisting mechanism H, and the chain B, which receives

its motion from the chain F by means of the train of gear-wheels D, travels at about one-fourth of the speed of the chain F. The sliver, after leaving the rollers N, passes onto the chain B, and a strong pull is exerted against the sliver from the twisting mechanism H, whereby the several fibers of the sliver are straightened out and placed parallel with each other by the pins of the chain B slanting toward the second chain, F. The sliver is easily transmitted to the second chain, F, and is prevented from rising by the loose reel M. The sliver, as soon as it enters the chain F, is compelled to travel faster as the speed of the chain F is increased, and the pins I<sup>2</sup> of the said chain not only serve to straighten out the fiber, but assist in pulling the sliver forward, and thus relieve the condenser G and the twisting mechanism H of considerable strain, and the sliver passes into the condenser with all its fibers arranged parallel with each other, so that the cord produced by the spinning mechanism is of uniform thickness throughout. As the chain F travels very fast, it is necessary, in order to deliver the sliver easily into the condenser G, to change the position of the pins I<sup>2</sup> before nearing the condenser G. This is accomplished as soon as the pin J' of the guide-arm J of each shaft I enters the bend L<sup>3</sup> in the guideway L, whereby the shaft I is turned and the pins I<sup>2</sup> assume a reverse position from that they had before, so that when very near the condenser they leave the sliver easily. In case too much fiber should pass into the condenser G, the latter would swing toward the spinning mechanism H, so that the shaft W' would be oscillated, which would cause the fork-shifter U to act on the pulleys S and Q, and slide the same on the shaft P in the direction of the arrow b', whereby the friction-wheel V is disengaged from the said pulley Q and the latter rotates on the shaft P. At the same time that the fork-lifter U moves in the direction of the arrow b', as above described, the friction-plate U<sup>2</sup> is brought into contact with the friction-disk V, and thus brakes on the same, whereby the speed of the shaft P is decreased. This reducing of the speed of the shaft P also reduces the speed of the shaft E, and both the chains F and B travel slower until the obstruction in the condenser is removed by the increased pull of the twisting mechanism H. The pull on the sliver increases when the chain F slackens its speed, as the latter does not then assist in drawing the sliver toward the twisting mechanism H. As soon as the obstruction in the condenser is removed the spring T presses against the pulley S and forces the latter and its pulley Q to its former position, so that the pulley Q is again thrown in frictional contact with the disk V, and the shaft P is again rotated at its usual speed. The condenser G also assumes its original position by the shifting of the forked shifter U in the inverse direction of the arrow b'.

By means of the chains B and F moving at



different velocities and arranged in relation with each other and the spinning devices as described, I am enabled to work a much heavier sliver than is practicable with a single chain.

5 Thus the slower-moving chain B acts as a carrier and holds back on the sliver, while the faster-moving chain F reduces the sliver to the proper size for the spinning mechanism. By working a heavier sliver, the machines  
10 usually employed to prepare the sliver before its introduction to the spinning-machine may be largely economized—that is, they may be made to do much more work.

The drawing is mainly done by the fast chain  
15 F, and the silver enters the spinning mechanism at a higher velocity than usual heretofore. Abruptly-quickenened draft in passing to the spinning mechanism is avoided, and very few thin places are made in the cord, bunches striking the regulator acting quicker, and after  
20 stoppage or retardation by a striking bunch the fast-moving chain F rapidly supplies more hemp or material. Consequently thin places in the cord are reduced or avoided.

25 In cordage-spinning machines as now ordinarily constructed and using only a single chain, the yarn is drawn through the spinning mechanism at, say, about eighty feet per minute, while the chain delivers to the spinning  
30 mechanism at about ten feet per minute, more or less. This heavy draft it has only been considered practicable to change by reducing the speed of the spinning mechanism, which of course diminishes the productive capacity of the machine. Such heavy draft necessarily  
35 produces an uneven yarn, a long thin place almost invariably following a swell. This is obviated by my invention. The second or fast chain, which may be run at any desired speed,  
40 gives perfect control of the draft and may reduce it almost to nothing, inasmuch as its speed may, if desired, be nearly equal to that of the spinning mechanism, which it could not be to make cord or twine were it not for the slower-  
45 moving preceding chain, nor could as heavy a sliver to produce a mere cord or twine be worked in the machine, or the same uniformity in size of the cord be obtained. The pins on the chain F, being made to incline first in one  
50 direction and then in the opposite direction during the upper course of said chain's travel constitute an important element in this combination, with the spinning mechanism, of the chains moving at different velocities, as described. Thus they have a firm hold on the  
55 sliver in drawing it from the slower-moving chain and subsequently assume a position which, while holding on the sliver, facilitates its delivery to the condenser and spinning mechanism.  
60

The means herein described for giving a differential speed to the sliver in its way to the twisting or spinning mechanism must not be confounded with cylinders armed with pins  
65 and moving at a differential velocity, as heretofore used, inasmuch as said cylinders have

a carding action on the fiber and the fiber is liable to hug them, while the pins of the chains exert a combing effect while the fibers are straight; nor must my invention be con-  
70 founded with machines for merely spreading or drawing hemp or other fibrous material in which independent chains of hackling-pins arranged one in front of the other, and in some cases the rear chain moving faster than the  
75 preceding chain, have been used, as such chains have no twisting or spinning mechanism combined with them, and such machines are neither intended nor adapted to spin cord or twine.

Having thus described my invention, what I  
80 claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a cordage-spinning machine, of a twisting and spinning mechanism, independent differentially-moving comb-  
85 ing and drawing chains arranged one before the other in advance of the twisting and spinning mechanism, the rear one of said chains traveling at a higher rate of speed than the chain which precedes it, devices for carrying  
90 said chains, and gearing for imparting such differential speeds and endless travel to them, substantially as and for the purposes herein set forth.

2. The combination, in a cordage-spinning  
95 machine, of a twisting and spinning mechanism, a chain of pins traveling at one velocity, another chain traveling at a higher velocity in rear of said first-named chain, but in front of the twisting and spinning mechanism, and  
100 provided with pins, guiding devices, substantially as set forth, adapted automatically to incline said last-named pins in reverse directions during their upper course of travel, de-  
105 vices for carrying said chains, and gearing for imparting differential speeds and endless travel to them, essentially as and for the purposes specified.

3. A cordage-spinning machine containing the following elements arranged and operated  
110 in combination in the manner herein described, namely: a twisting and spinning mechanism, differentially-moving combing and drawing chains, which comb, draw, and deliver the sliver to the twisting and spinning  
115 mechanism, devices for carrying said chains, and gearing for imparting differential speeds and endless travel to them, as set forth.

4. The combination, in a cordage-spinning machine, of a twisting and spinning mechanism, a yielding condenser or regulator placed  
120 in front of said mechanism, two or more chains of pins arranged one in rear of the other in front of the condenser, the rear one of said chains traveling at a higher rate of speed than  
125 the chain which precedes it, but at a less velocity than the twisting and spinning mechanism, devices for carrying said chains, and gearing for imparting differential speeds and endless travel to them, substantially as shown  
130 and described.

5. The chain F, consisting of the shafts I,



the links I', and the pins I<sup>2</sup>, arranged on the top of said shafts I, in combination with the guide-arms J, attached to the said shafts I and having pins J' and J<sup>2</sup>, the guides K, and  
5 the guides L' and L<sup>2</sup>, forming the guideway L, and having the bend L<sup>3</sup> intermediately of their lengths, substantially as shown and described.

6. The chain F, having the shafts I, provided with the arms J, having the pins or  
10 arms J' and J<sup>2</sup> projecting therefrom in combination with the guides L' and L<sup>2</sup>, forming the guideway L and having the bend L<sup>3</sup> about centrally of their lengths, substantially as and  
15 for the purpose set forth.

7. The combination, with the condenser G, of the chain F, having the guide-arms J attached to the shafts thereof and provided with

the pins J' and J<sup>2</sup>, and the guides L' and L<sup>2</sup>, forming the guideway L and having the bend 20 L<sup>3</sup>, substantially as shown and described.

8. The shaft P, the chain F, means for connecting the chain F with the shaft P, the spring T, coiled on the said shaft P, and the friction-disk V, secured to the said shaft P, 25 in combination with the pulleys Q and S, placed loosely on the said shaft P, the shifting-fork U, the condenser, means whereby the condenser is connected with said fork, the main driving-shaft R, and means for rotating the 30 pulleys Q from said shaft R, substantially as and for the purpose set forth.

ELISHA M. FULTON.

Witnesses:

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EDWARD M. FULTON.