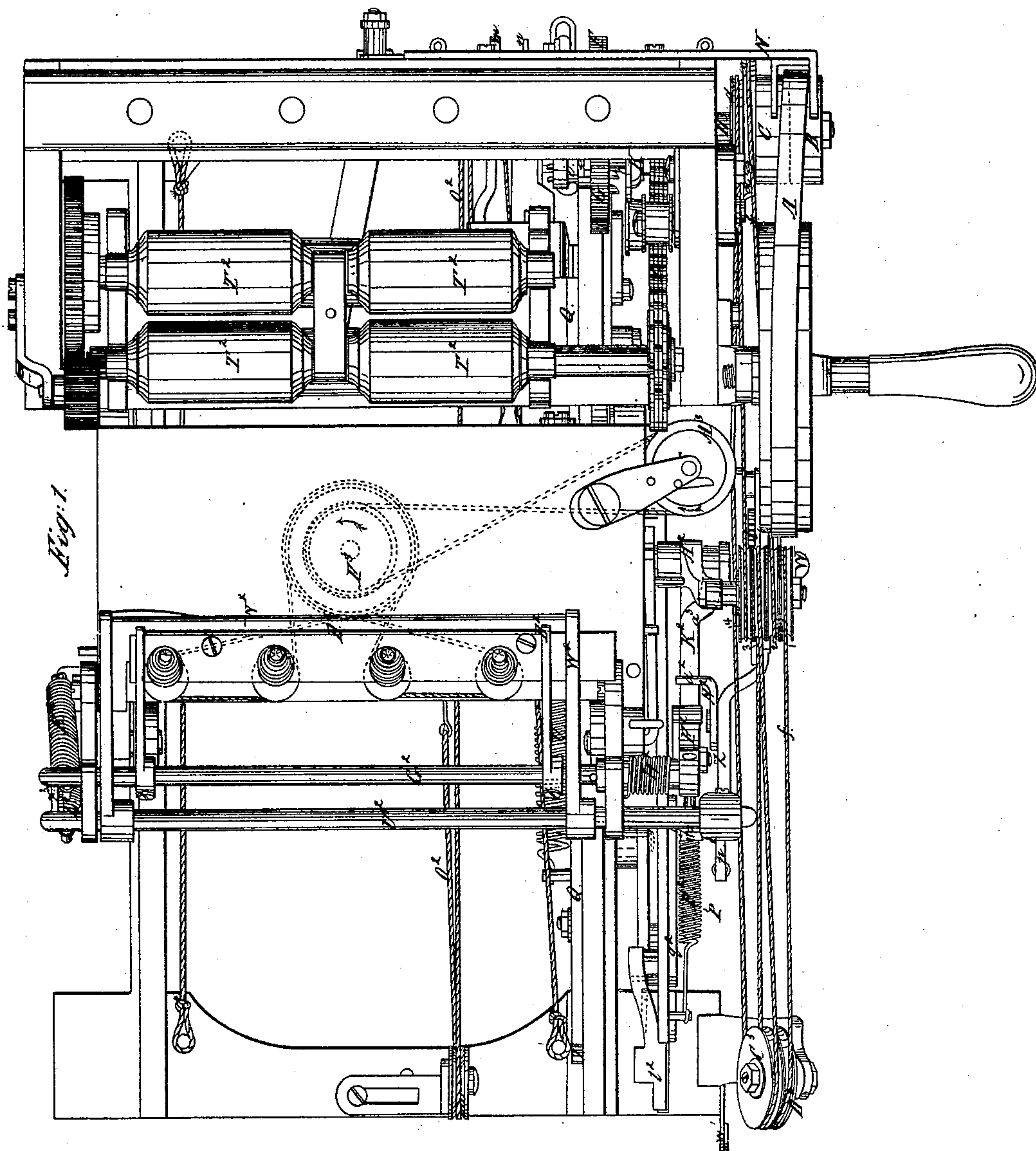


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SELF ACTING MULE FOR SPINNING.

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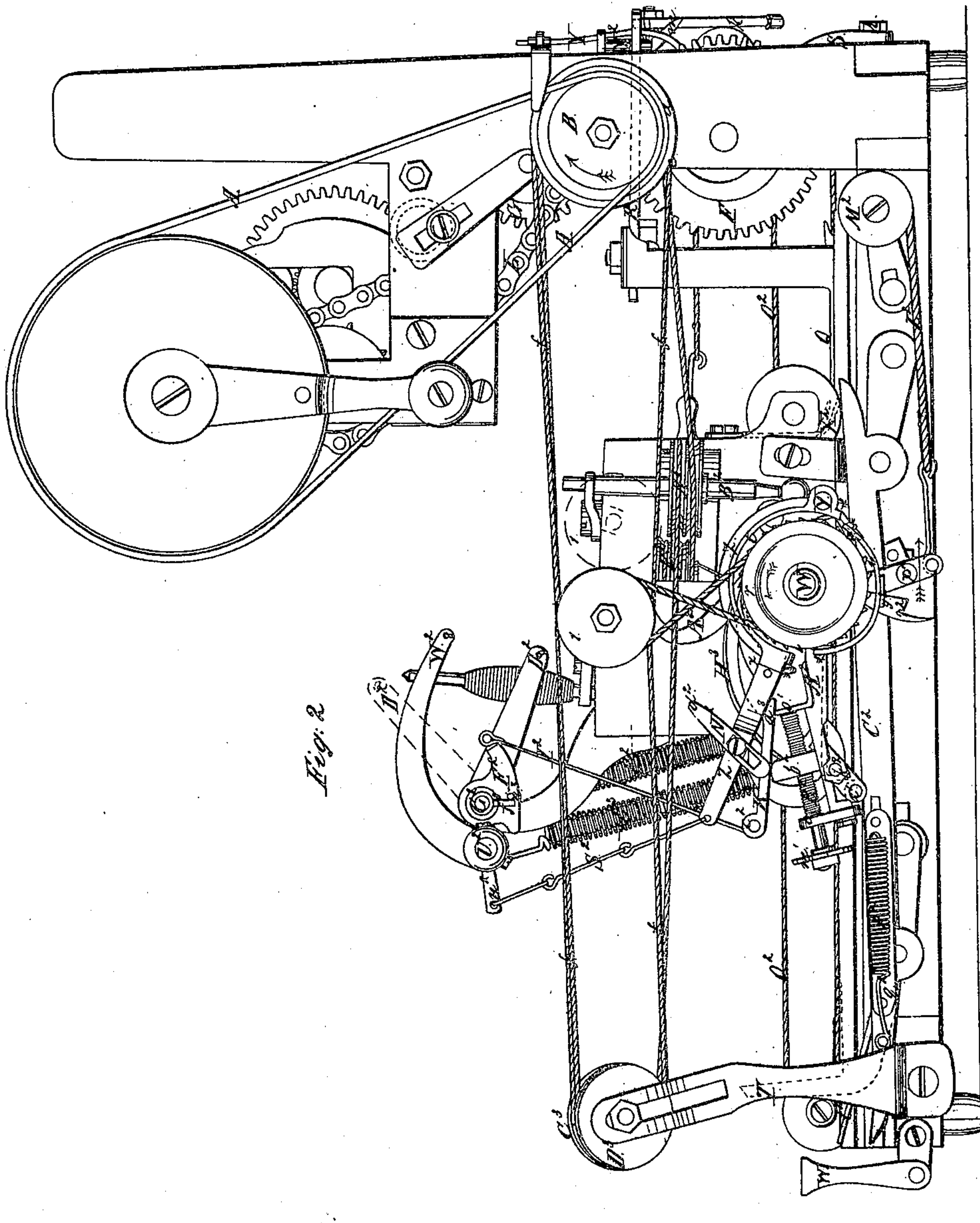
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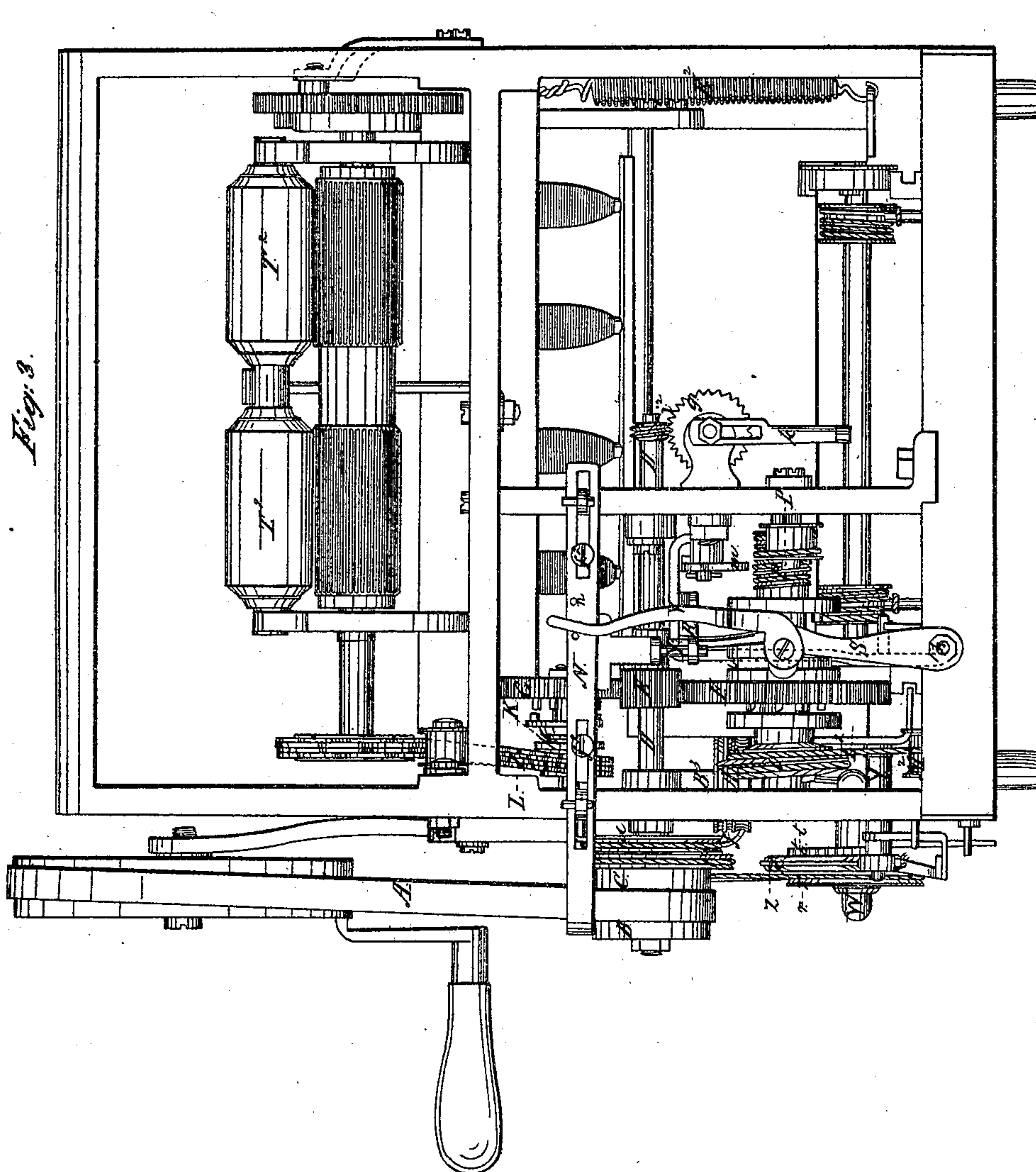
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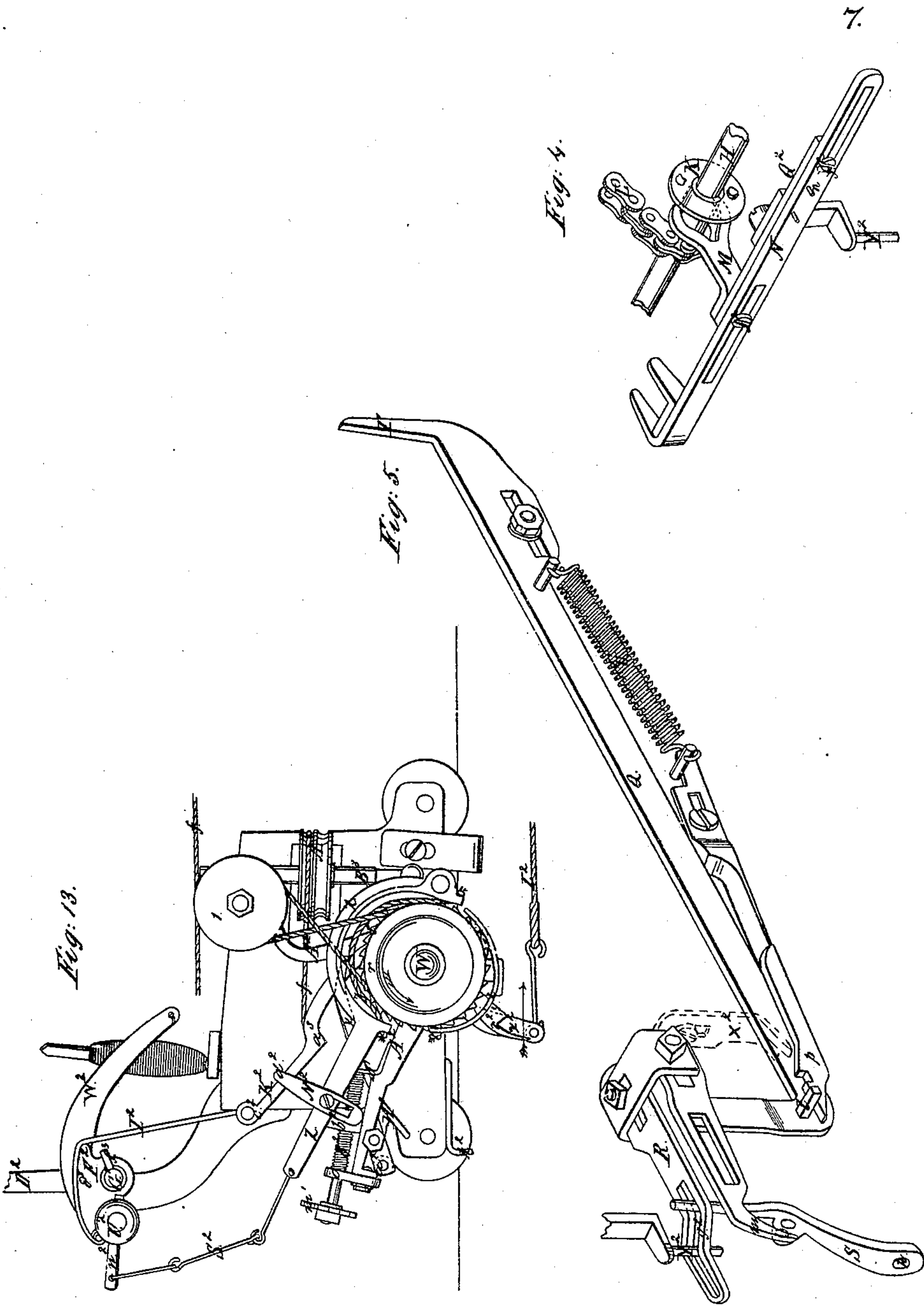
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UNITED STATES PATENT OFFICE.

GEORGE WRIGHT, OF GRAFTON, MASSACHUSETTS.

SELF-ACTING MULE FOR SPINNING.

Specification of Letters Patent No. 18,029, dated August 18, 1857.

To all whom it may concern:

Be it known that I, GEO. WRIGHT, of Grafton, in the county of Worcester and State of Massachusetts, have invented certain Improvements in Self-Acting Mules for Spinning, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—
10 Figure 1 is a plan. Fig. 2 a side elevation. Fig. 3 a rear view of the machine. Figs. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 details to be referred to hereafter.

My improvements are particularly applicable to a self actor mule for which Letters Patent of the United States were granted to me on the 11th day of July 1854, and consist firstly in giving the yarns a second draft after the delivery of the ends has ceased.
20 Secondly, in operating certain motions upon the carriage such as the breaking up of the spindles—the backing off—and the movement of the upper faller by the taking in scroll chain which gives the return motion to the carriage, whereby I am enabled to dispense with much of the complicated and expensive machinery heretofore employed for the purpose of producing these motions.
25 Thirdly, in running the drum band over a vibrating arm upon the carriage and clamping it thereto at intervals for the purpose of backing off and winding up the yarn.

My invention furthermore consists in certain details which will be hereafter more particularly explained and specified.

To enable others skilled in the art to understand my invention I will proceed to describe the manner in which I have carried it out.

40 In the said drawings motion is communicated to the operating parts of the machine through the band A, which runs alternately upon a fast pulley B, and loose pulley C. To the latter is attached the twist pulley a ,
45 which runs loosely with it upon the main driving shaft D. The pulley C, carries a spring click b , Fig. 7, which engages with teeth c in the pulley B, and thus when the latter pulley is driven its teeth slip over the click and the pulley C, is not driven but
50 when the band A, is upon the latter pulley then the click b , engaging with the teeth of the other pulley drives it and the shaft D, which is thus driven constantly in the direction of the arrow Fig. 2, whether the band
55 be upon the pulley B, or C.

d , is a carrying pulley which runs loosely upon the shaft D, as it is driven by the drum band f . This shaft D, carries a pinion E, which engages with and drives a wheel G, 60 upon a short shaft H, (Fig. 4) and also a wheel F upon the scroll shaft I, (Fig. 6,) that will be more particularly referred to hereafter. The wheel G, is clutched and unclutched at intervals with a pulley K, 65 which carries a chain L, by which the draft rolls T^2 are operated. This pulley and clutch are operated by a forked arm M, attached to a piece Q^2 , which slides freely upon the back of the shipper N, to which it 70 is held by the screw f^2 . The wheel F runs freely upon the shaft I, (Fig. 6,) and may be clutched with either the drawing out scroll P, or the take in scroll O, or it may be left intermediate between the two with- 75 out giving motion to either of them. The shifting of the wheel F, upon its shaft is effected in part by the outward motion of the carriage and in part by other means as will now be more fully explained. 80

Q, is a sliding bar lying beneath the track of the carriage and having attached to it at its forward end the arm R furnished with a slot g^2 , having two straight and one inclined branches (Fig. 5,) in which plays the end 85 of a lever S, pivoted at h , to the frame work. This lever carries a pin which plays in a grooved hub attached to the wheel F. As the carriage takes out, toward the close of its stretch it strikes against a post T, rising 90 from the bar Q, Fig. 5 (seen also dotted in Fig. 2 and in plan in Fig. 1) and moves this bar longitudinally by which motion firstly the delivery rolls are stopped, the carriage being permitted to proceed still farther to 95 effect a second or after draft upon the yarns. Secondly, the wheel F, is unclutched from the scroll P, by which the outward carriage is arrested.

These operations are performed in order 100 and as follows: As the carriage takes out, the pin Y^2 projecting from the bar Q^2 is in the inclined branch of the slot g^2 in the bar R, and upon the first motion of this bar produced by the carriage striking against the 105 post T, the pulley K, is unclutched from the wheel G, and the delivery rolls are stopped. The carriage now continues to move giving the second draft to the yarns until the bar R, is drawn sufficiently far back to cause 110 the lever S, to enter the inclined branch of the slot g^2 when the wheel F, is immediately

unclutched from the scroll P, and the carriage stops. The wheel F, is not however at this time carried so far as to engage it with the taking in scroll O, and the carriage remains stationary until the bar R, receives a still further longitudinal motion which is imparted to it as follows: It has been stated that the shaft D, revolves continuously in one direction, this shaft carries upon its end a screw i^2 which drives the twist wheel g , upon the shaft of which is an arm h , that strikes as it revolves an inclined dog m , secured to the bar Q, and throws it still farther back carrying the lever S, still farther into the inclined branch of the slot g^2 and clutching the wheel F, with the scroll O, which is thus set in motion and the carriage commences to take in. In this position the bar Q, is locked, the pin l entering a notch in the spring catch p , (Fig. 5) secured to the frame work. The parts remain in this position until the carriage arrives at the inner end of its stretch when a toe X^2 upon the carriage, seen dotted in Fig. 2 and in red in Fig. 5, depresses the spring catch p , and liberates the bar Q, which is drawn back by its spring U, by which means the wheel F, is unclutched from the take in scroll O and clutched with the take out scroll P and the carriage commences to take out. This shifting of the gear F, is effected by the arm R giving motion to the lever S. While the carriage is coming in the band A runs upon the pulley B. When however the lever S, is shifted on the arrival of the carriage as above explained the arm V, attached to the lever S strikes against the pin w , on the shipper N, and moves the band A, onto the pulley C. At the same instant the pin Y^2 (Fig. 4) descending from the bar Q^2 is thrown into the inclined branch of the slot in the bar R, by which means the pulley K, is clutched with the wheel G, and the drawing rolls are set in motion. Thus as the carriage commences to take out, the drawing rolls are set in motion and the spindles are revolved rapidly to put in the twist. This revolution of the spindles is effected by the drum band f , which is driven by the pulley a , upon the shaft D. The arrangement and motions of the drum band together with the details of the carriage in immediate connection therewith will now be explained.

W, is a short shaft projecting from one side of the carriage, upon this shaft runs a pulley r , a brake wheel s , and a ratchet wheel t , (Fig. 11) all cast in one piece or otherwise attached together. Upon the wheel s two brakes are made to bear at intervals one upon the lower and the other upon the upper side. The lower one of these brakes is represented in Fig. 10 and is constructed as follows: X, is a hanger or supporting piece which is suspended from the point q , upon a short shaft Y. To this sup-

port is secured a semi-circular bar or strap u , to the ends of which is united a brake cord or band q which is pressed up at intervals against the brake wheel S for the purpose of breaking up the motion of the spindles as will be presently explained. The other brake Z, is represented in Fig. 11 and carries in addition to its brake band z a panel x , which when the brake lever Z, is dropped enters the teeth of the wheel t and stops it and the pulley r .

In Fig. 8, is represented a bent lever A^2 , which vibrates upon the shaft W that passes through it at w . The upper branch of this lever carries four pulleys 1, 2, 3, 4, seen in plan in Fig. 1, which run loosely upon a short shaft attached to the lever. To the other branch of the lever A^2 is attached the apparatus by which the building of the cap is regulated, and which consists of the screw B^2 working in the stationary bearings o , o' , and carrying at its outer end the ratchet wheel m' . a^2 is a roll which rests upon the "former" C^2 as the carriage takes in, and b^2 , a block or nut which is gradually moved by the revolution of the screw B^2 from o , to o' as the building of the cap proceeds. D^2 is the upper faller which regulates the building of the cap. When not otherwise depressed it is kept elevated out of the way of the yarns as the spinning proceeds by the spring E^2 , attached to its shaft. It is depressed for the purpose of building the cop as follows: F^2 is a block which moves freely upon the end of the upper faller shaft G^2 . H^2 is a spring which tends constantly to carry the block into the position seen in Fig. 13. This block is connected by a leather strap I^2 , with a lever K^2 , Fig. 9, that vibrates upon the shaft W. To the lower end of this lever is attached the take in cord or chain L^2 , which passes beneath the guide pulley M^2 . The lever K^2 is bent slightly at a^3 so as to come vertically over the lever A^2 , and thus as strain is put upon the cord L^2 to take the carriage in, the end e^2 of the lever K^2 is depressed carrying with it the lever A^2 . A pin e^3 upon the block F^2 strikes against the arm f^3 upon the shaft G^2 and depresses the upper faller as the block revolves. N^2 , is a hook secured to the upper brake lever Z, seen in plan in Fig. 1, the bent end d^2 of which rests upon the lever K^2 , whenever the latter is raised. The operations of all these parts will be more fully explained hereafter.

The drum band f , after it leaves the pulley a at e , Fig. 2, passes around the pulley 4, upon the carriage, thence back over the pulley d , upon the shaft D, thence around the lower one of two horizontal carrying pulleys A^3 , upon the vertical shaft B^3 , thence around the drum F^3 upon the carriage, thence around the upper carrying pulley A^3 thence over the stationary pul-

ley C³, thence over the pulley 3, upon the carriage, thence over the pulley D³, thence over the pulley 1, from which it descends around the pulley *r*, and returning passes
5 over the pulley 2, back to the driving pulley *a*.

Operation: The carriage is taken out by the cord or chain O² in the customary manner, starting at the moment of the arrival
10 of the carriage at the headstock, the foot X² having depressed the spring *p*, and allowed the bar Q, to assume the position represented in Fig. 5. The forward motion thus produced of the bar R, throws the pin
15 Y², into the inclined branch of the slot *g*² by which the drawing rolls T² are set in motion. The lever S also is carried from the inclined to the straight branch of the slot by which the wheel F is clutched with
20 the scroll P, and the carriage commences to take out, at the same instant the arm V, attached to the lever S, moves the shipper N, and throws the band upon the pulley C, whereby the spindles revolve. These three
25 operations, viz., the taking out of the carriage, the delivery of the "ends," and the revolving of the spindles commence at the same instant and continue until the carriage arrives nearly to the outer end of its stretch.
30 While the carriage is thus taking out, the strain upon the band *f* throws the pulley 1 into the position seen in Fig. 13 and in red in Fig. 2. On arriving near the end of its stretch the carriage strikes upon the post
35 T, and as before explained draws back the bar Q sufficiently far to stop the delivery rolls T². This is effected as before explained by the motion of the pin V² in the inclined branch of the slot *g*². The carriage now proceeds a short distance farther
40 out and the "second draft" is given to the yarns. The take out band being actuated by the small portion of the scroll P, (Fig. 6,) that the motion of the carriage may be
45 slower at this time than while the ends are being delivered. This second draft has a twofold object: 1st, the soft portions of the yarns are drawn down and twisted; 2nd, the weak and imperfect threads that are un-
50 fit for use are broken and not wound upon the cop. The yarns are thus rendered more uniform in size, twist, and strength, and the inferior threads are discarded. The top of the lever S, now enters the inclined branch
55 of the slot and unclutches the wheel F from the taking out scroll P, by which the further motion of the carriage is arrested, the motion of the spindles continuing however until the revolution of the twist wheel *g*, has
60 brought the arm *k*, around so that the latter strikes against the incline *m*, by which means the lever S, is caused to clutch the wheel F, with the scroll O, and the carriage commences to take in again. At the in-
65 stant when the carriage reaches the end of

its stretch and its further motion is arrested as before explained, the clutch *k*² depresses and passes over the spring stop *l*² by which the carriage is held from being drawn back
70 by the tension of the yarns, while the after twist is being put in. If the carriage at this time be held perfectly stationary the yarns will be liable to be broken or be strained by the breaking of the fibers, to
75 prevent this and to allow the carriage to yield slightly as the tension of the yarns increases and before they can be subjected to any injury, the stop *l*² is attached to a block *q*² that is held in place by the spring
80 *p*², by the yielding of which the carriage is allowed to advance slightly toward the headstock. (See Fig. 12). After the carriage is thus locked the spindles continue to revolve until the twist wheel *g*, Fig. 3 has
85 thrown back the bar Q, sufficiently far to allow the pin *l* to drop into the notch in the spring catch *p*, and engage the wheel F, with the take in clutch O. A new series of operations now commences.

It has before been stated that the opera-
90 tion of the band *f* throws the pulleys upon the lever A² into the position seen in Fig. 13 and in red in Fig. 2. When in this position the pin *x*² projecting from the lever K² enters a notch *r*² in a dog *y*² hanging from
95 the support X. As now the band L² is wound up and the lower end of the lever K² is drawn in the direction of the arrow (Figs. 2 and 13) the pin *x*² raises the dog *y*² and applies the lower brake to the wheel *r*—
100 by this stoppage of the wheel *r* the band *f* around this wheel is arrested and the motion of the spindles is broken up. So soon as this is effected the dog *y*² strikes against the edge *v*² of the support X, by which it is
105 thrown off the pin *x*² and the lower brake is taken off. The next instant the yarn is backed off the spindles as follows: As the lever K² continues to move around its shaft W and in the direction of the arrow Figs.
110 2 and 13 its other end strikes the nut *b*² upon the lever A² and depresses it. The upper brake Z up to this point has been held up from the wheel *r* by the lever K², the hook *d*² Figs. 1 and 13, hanging upon this
115 lever as before explained. As however the lever K² continues to descend the brake Z is applied and the pawl *x*, engaging with the teeth of the wheel *t*, again arrests the motion of the wheel *r* and the band *f*. As
120 now the lever A² is depressed by the lever K² the pulleys upon the former lever are carried into the position seen in the black in Fig. 2. While these pulleys are thus moving, the band *f* being clamped to the wheel *r*
125 is turned in the reverse direction and the threads are backed off the spindles. At the same time that the thread is backed off, the upper faller D² is brought down by the connections with the lever K², and as the car-
130

riage takes in and the roller a^2 rides up on the former C^2 , the upper faller D^2 is permitted to rise as usual to form the cone of the cop. At the commencement or bottom of the cop this cone requires to be obtuse, in the center of the cop it is more acute, and at the upper end of the finished cop it is again obtuse, this variation in the acuteness of the cone is effected by the form of the block F^2 , as follows: the general position and lay of the threads on the cone as given by the former C^2 which permits the upper faller D^2 to rise gradually as the carriage takes in. At the commencement of the cop when the block b^2 is next the bearing o , the lever K^2 descends so low that its connecting strap I^2 acts upon the block F^2 at a point the farthest removed from the center of the faller shaft as in Fig. 15, whereby a minimum degree of motion is imparted to the upper faller as the carriage takes in, and the cone is consequently made quite obtuse as required. As the block b^2 advances toward o' the strap I^2 acts upon the block F^2 at points nearer the center of the shaft (Fig. 16) whereby a more extended motion is given to the upper faller and the cone is made less obtuse while the middle portion of the cop is formed, at the upper part of the cop the cone is again made obtuse by the strap I^2 bearing upon the point i^3 of the block (Fig. 17) by which the distance through which the upper faller is allowed to rise during the winding on is again diminished. That the point to which the upper faller descends may rise higher and higher as the size of the cop increases, the device represented in Fig. 8 is employed—at the commencement of a cop the nut b^2 is run back toward o , and the faller descends through the connections already explained to the bottom of the spindle; as the spinning proceeds the nut is gradually moved up toward o' as follows: After the carriage has taken out and before the backing off the lever A^2 being still in the position represented in Fig. 13, as the take in chain or cord commences to wind up, the lever descends and the ratchet wheel m' strikes against a stationary post or "feeding pawl" w' by which the screw B^2 is caused to make a partial revolution after each successive stretch is spun and the nut B^2 arrives at the opposite end o' at the time when the cop is completed. Up to this point the carriage has remained locked by its spring stop l^2 . As however the lever A^2 descends the roll a^2 depresses the stop and releases the catch l^2 and the carriage commences to take in being drawn up by the winding up of the chain L^2 upon the clutch O . While the carriage thus takes in, the threads are worked up by the motion of the band f produced by the taking in of the carriage, this band remaining clamped to the wheel r by the upper

brake Z —the band A running upon the pulley B , the pulley C , and "twist pulley" a being left free to revolve as they are impelled by the band f . It is evident that the whole amount of motion that may be thus communicated will be due to the length of the band f that may be between the carriage and the pulley a when the carriage is out and which is to be transferred to the other side of the carriage during the taking on.

When the wheel r is left free to revolve there will be no motion of the spindles as the accumulated friction upon them all is sufficient to hold the twist drum F^3 from revolving, but when the brake Z is applied to the wheel r the transfer of the band from one side to the other of the carriage is caused to take place through the twist drum which is thus revolved and with it the spindles. That this motion of the spindles may be exactly proportionate to the amount of yarn to be wound and also to the size of the cop I employ the following device: The brake lever Z is connected by the chain S^2 with an arm w^2 projecting from the shaft V^2 of the under faller W^2 ; if now the strain upon the yarns becomes excessive the yarns depress the under faller and the brake Z is raised permitting the drum band to circulate without driving the spindles. As the greatest amount of backing off is required at the commencement of the cop, and this amount continually decreases as the cop progresses, some contrivance becomes necessary by which the backing off may be adjusted to the size of the cop; for this purpose the hook d^2 is so adjusted upon the brake Z , that at the commencement of a cop it shall leave the lever K^2 and apply the brake to the wheel s , at the instant before the lever K^2 strikes the block b^2 ; the drum band f is thus clamped to the wheel r during the whole of the backward vibration of the arm A^2 and its carrying pulleys. As now the block b^2 is moved up toward o' during the progress of the cop, the arm A^2 moves a certain distance in its vibration before the brake is applied, and thus the brake is applied and the backing off commences later and later each succeeding stretch and the yarn is backed off less and less each time till the cop is completed. The arm A^2 and its carrying pulleys are held steady when vibrated one way and the other, by a spring H^3 , which bears upon a pin projecting from the inner side of the lever A^2 . While the spinning is taking place the upper faller is raised into the position seen in red Fig. 2 by its spring E^2 and a pin x^3 , (Fig. 1,) upon its shaft bearing upon a corresponding pin projecting from the shaft V^2 of the under faller W^2 depresses this faller out of the way of the yarn; when however the upper faller is caused to descend the under faller W^2 is

relieved from its control and is elevated by a spring L^3 . By the connections already explained of the under faller W^2 with the brake 2, whenever the tension of the threads in winding up becomes excessive, this faller is depressed and the brake is raised, allowing the band f to circulate as before described without driving the spindles.

In Fig. 14, is seen a modification of my winding on and building apparatus, in which a single brake is made to perform the duties of the two brakes already described; this brake Z^4 is connected with the under faller W^2 by the cord S^4 by means of which the brake is taken off by excessive tension of the yarns as before; and is applied for the purpose of breaking up and backing off in the following manner:

g^4 is a spring attached to the under side of the brake, against which bears a roller x^4 upon the lever K^4 to which the taking in cord L^2 is attached. When the carriage is taking out the pressure of this roller upon the spring is relieved and the brake is allowed to fall. When the strain is first put upon the cord L^2 to take the carriage in, the roller x^4 pressing upon the spring g^4 throws up the brake and stops the spindles, as the arm K^4 continues to move its upper extremity c^4 presses upon the lever A^4 and vibrates its carrying pulleys as before to produce the backing off. Before the carriage commences to take in the roll x^4 has reached a portion of the spring g^4 which is not sufficiently strong to sustain the brake, which is thus left to be regulated by the under faller W^2 . The roll x^4 upon a loose

arm y^4 travels in upon the "former", the block b^4 actuated as before, rests upon the arm y^4 and thus as this block is moved in the upper faller is made to rise higher and higher to build the cop, and the arm A^4 with its carrying pulleys is vibrated less and less each stretch, that the backing off may diminish as the cop increases.

What I claim as my invention and desire to secure by Letters Patent is—

1. Giving a second draft to the yarn after the delivery of the ends has ceased for the purpose and in the manner substantially as set forth.

2. I claim operating certain motions upon the carriage such as braking up the spindles, backing off the yarns, and operating the upper faller, by the taking-in scroll chain as set forth.

3. I claim running the drum band over a vibrating arm upon the carriage and clamping it thereto at intervals for the purpose of backing off and winding up the yarn as set forth.

4. I claim hanging the stop which holds the carriage stationary while the second twist is put in, to a spring so that it may yield in the manner described to prevent injury or breakage of the yarn as set forth.

5. I claim varying the obtuseness of the cone upon different portions of the cop by means of the block F^2 operating in the manner substantially as set forth.

GEORGE WRIGHT.

Witnesses:

J. W. SMITH,
A. D. SHATTUCK.