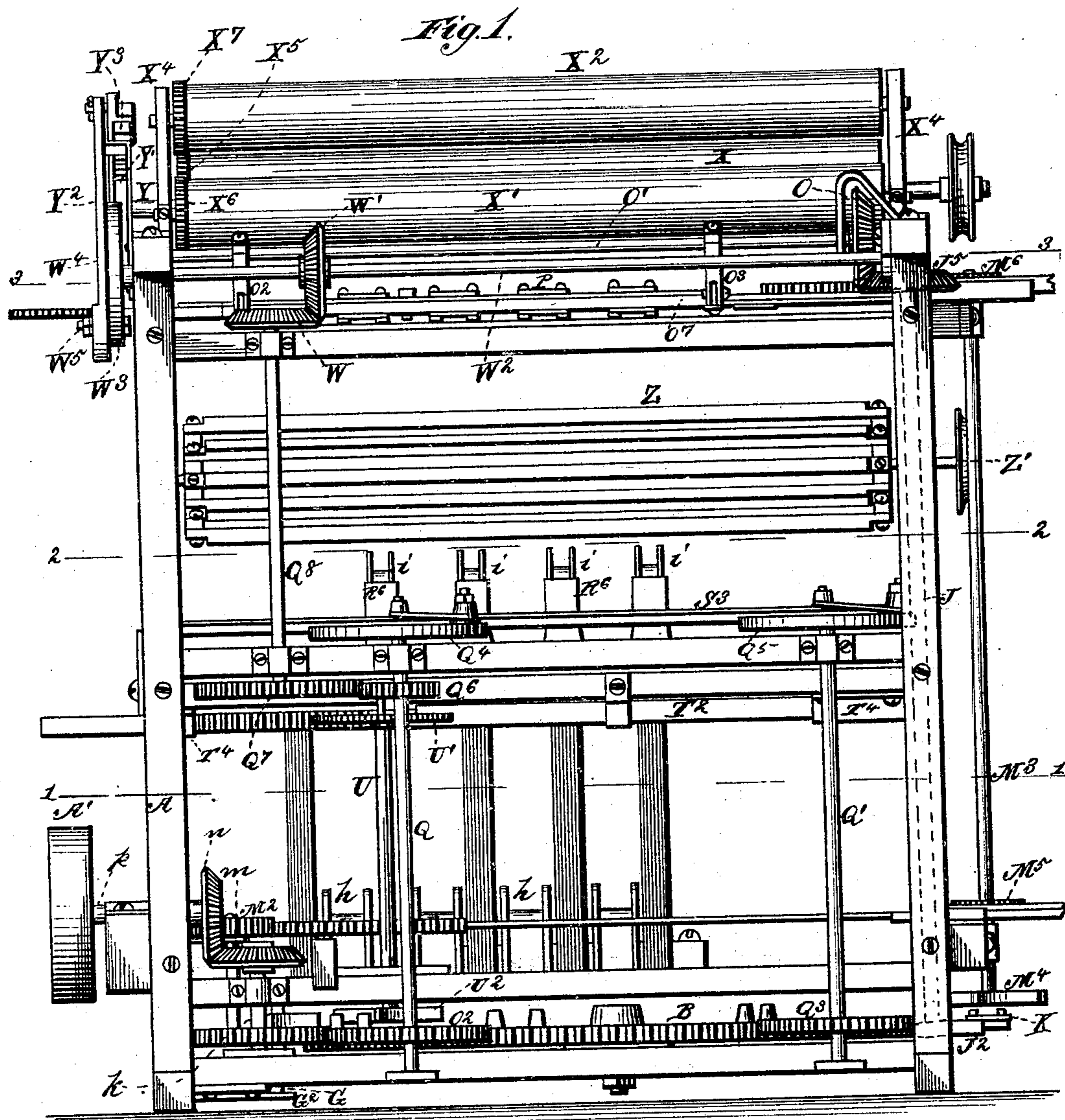


6 Sheets--Sheet 1.

I. SEDGWICK.
Wire Twisting Machine.
No. 233,033. Patented Oct. 5, 1880.



DIFFICULTIES:

Robert Everett
James J. Sheehy.

INVENTOR:

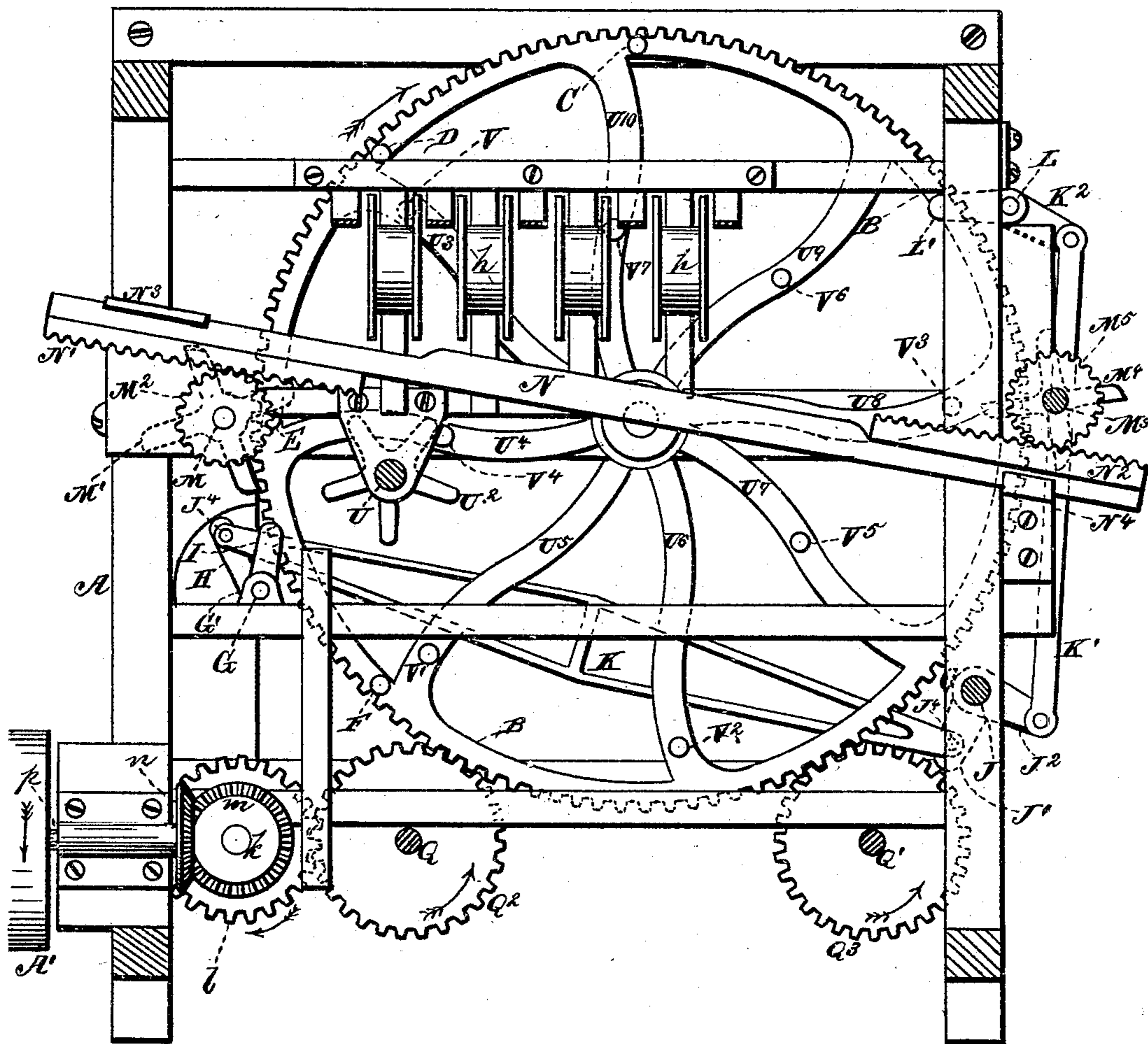
By his Attorney, Isham Sedgwick,
J Clement Smith.

(No Model.)

6 Sheets—Sheet 2.

I. SEDGWICK.
Wire Twisting Machine.
No. 233,033. Patented Oct. 5, 1880.

Fig. 2.



WITNESSES:
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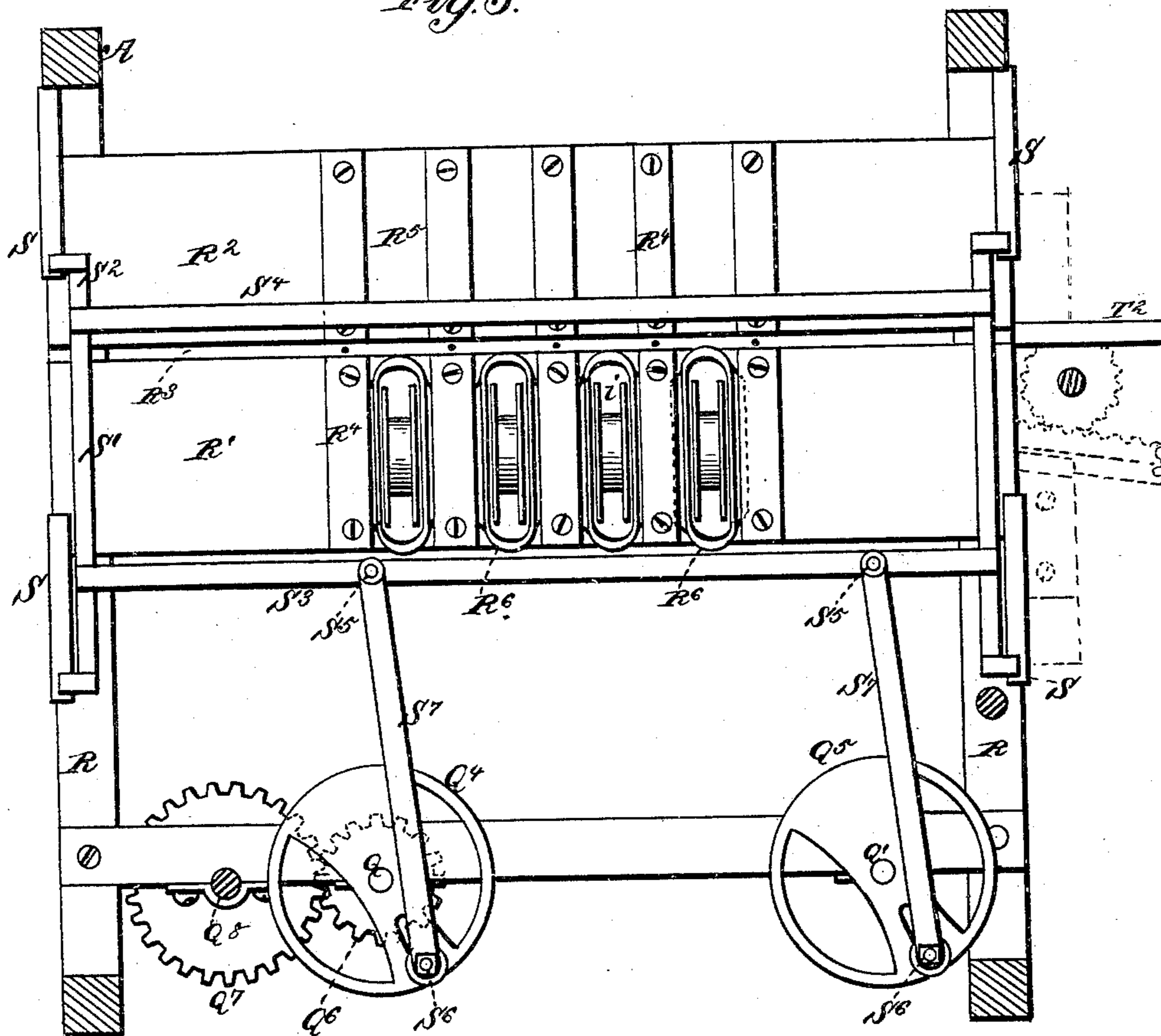
INVENTOR:
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By *his Attorney,* *J. Clement Smith.*

(No Model.)

6 Sheets--Sheet 3.

I. SEDGWICK.
Wire Twisting Machine.
No. 233,033. Patented Oct. 5, 1880.

Fig. 3.



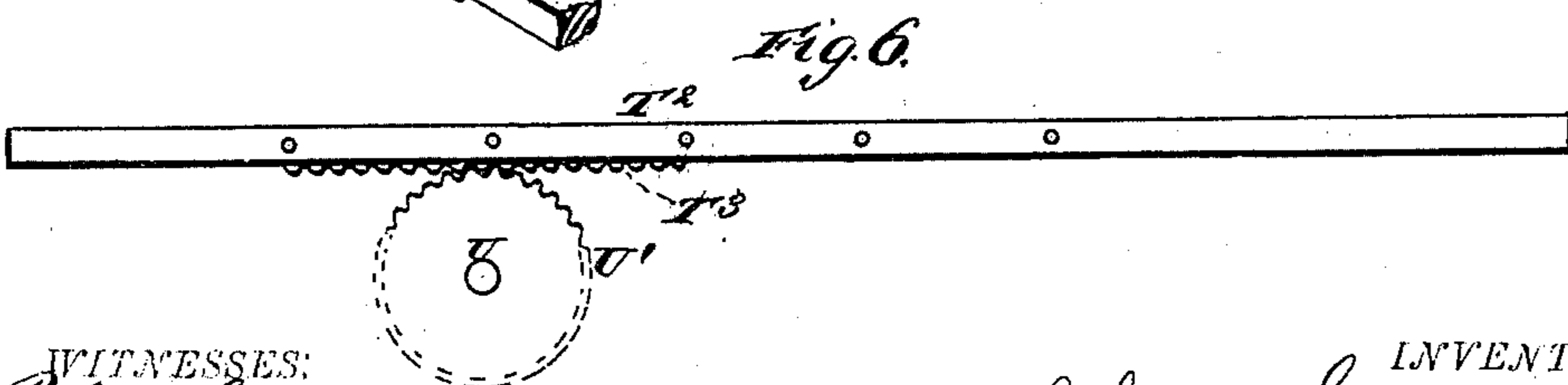
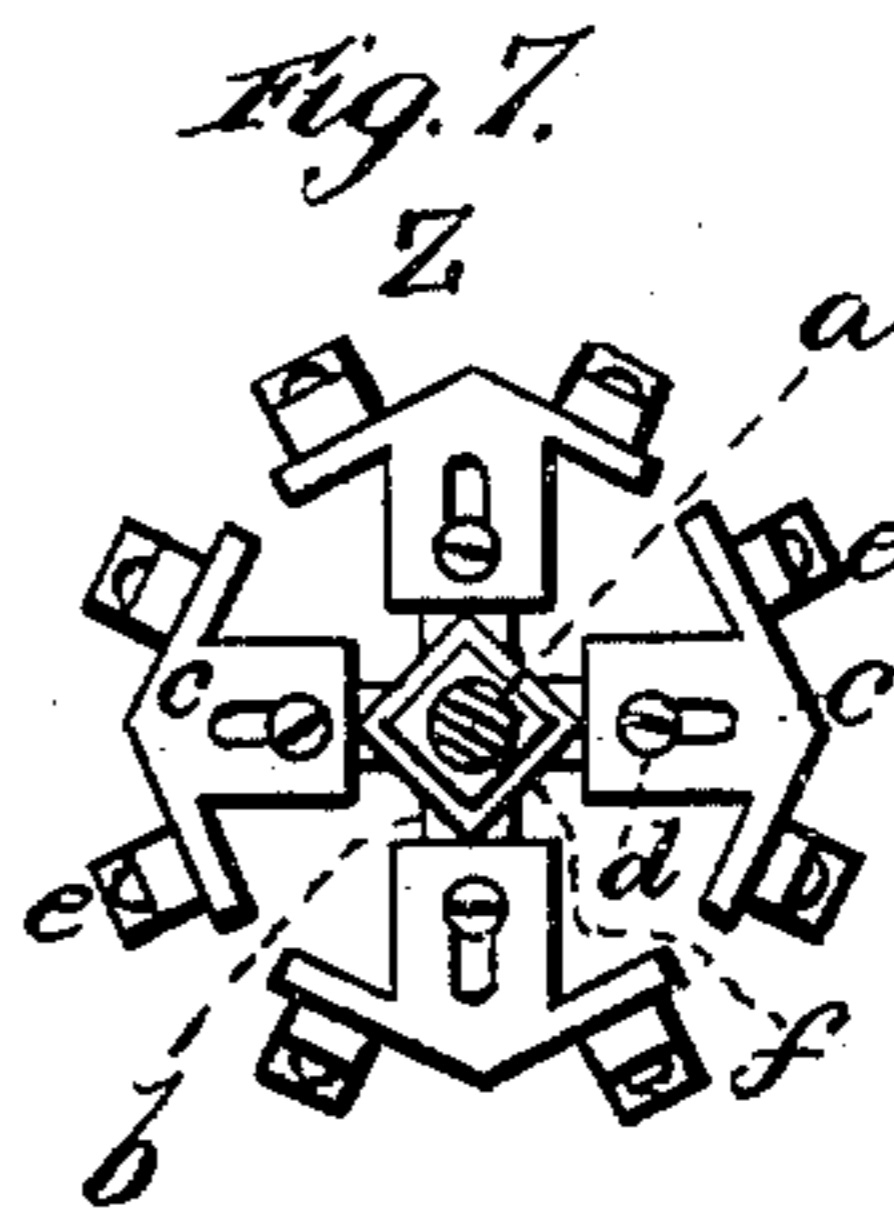
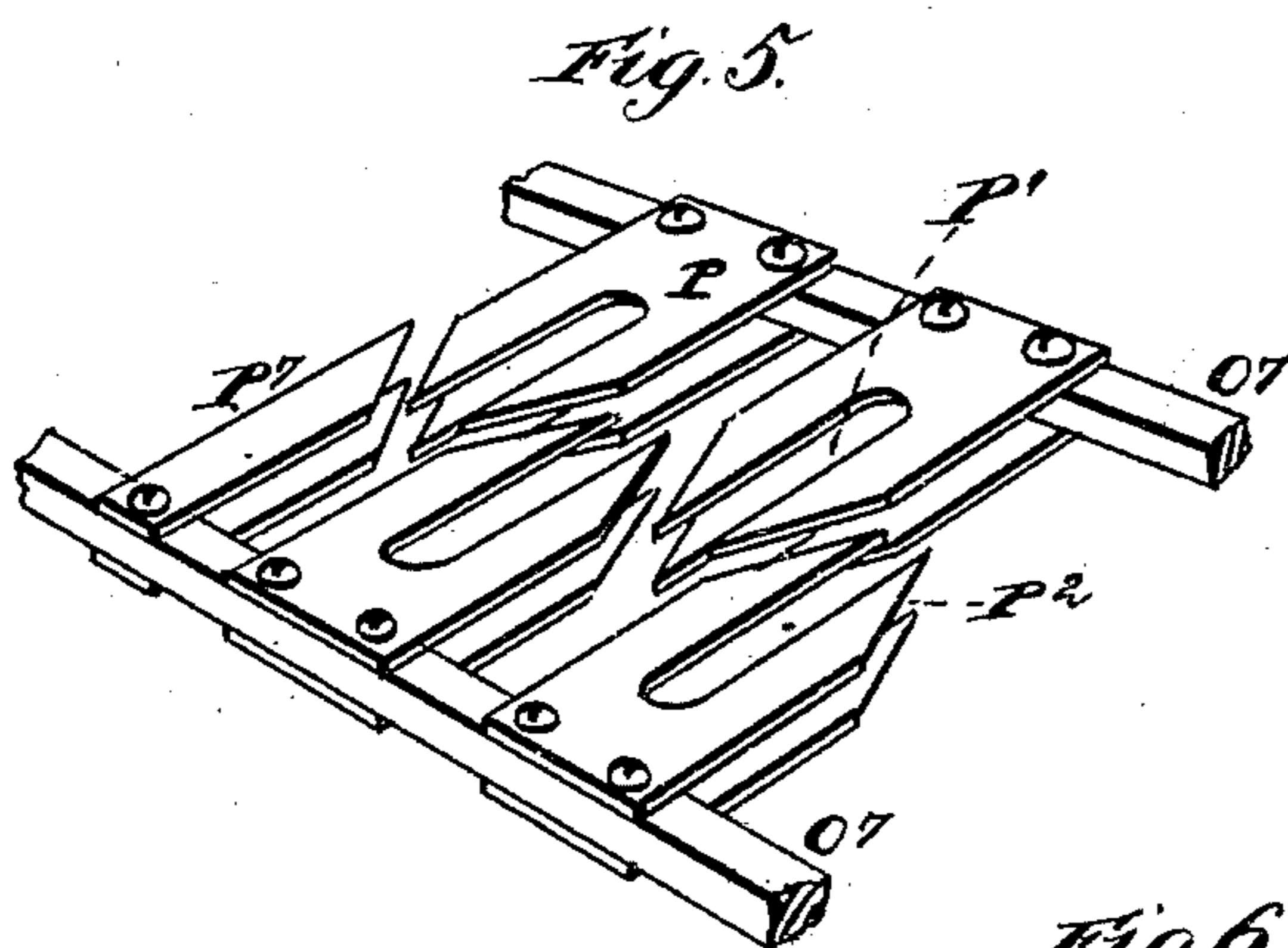
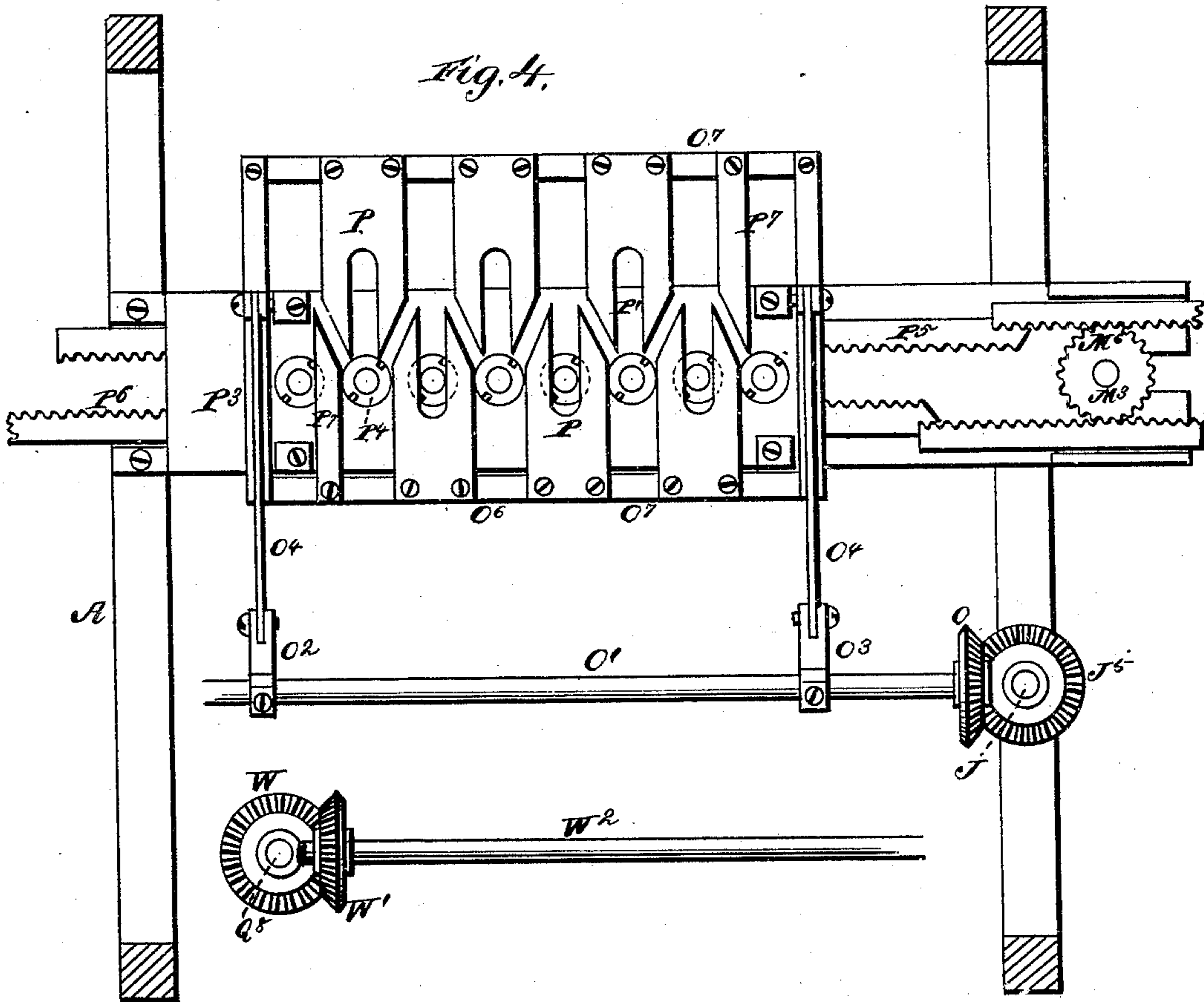
(No Model.)

6 Sheets--Sheet 4.

I. SEDGWICK.
Wire Twisting Machine.

No. 233,033.

Patented Oct. 5, 1880.



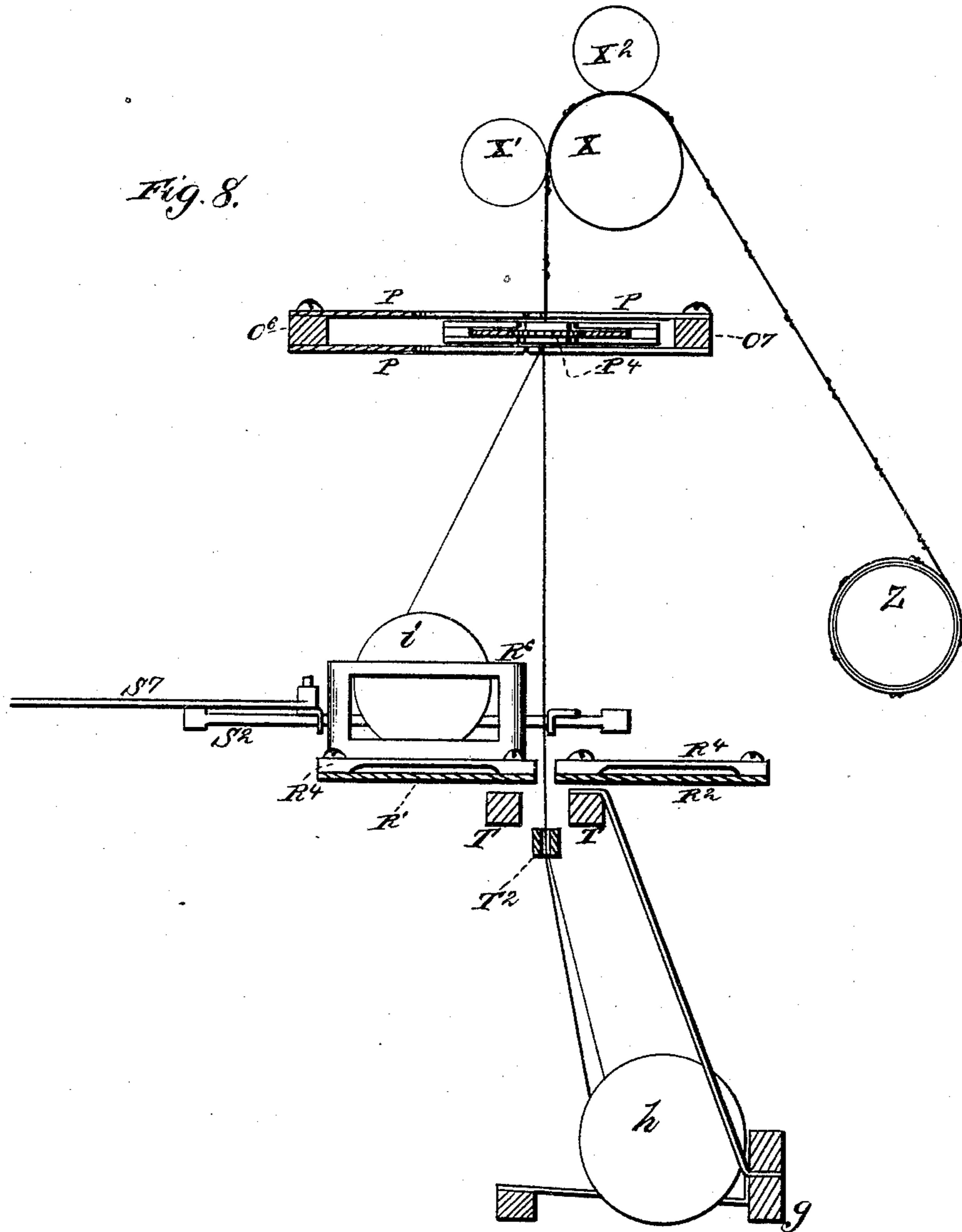
WITNESSES:
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INVENTOR:
Isaac Sedgwick,
By his Attorney, *J. Clement Smith.*

(No Model.)

6 Sheets—Sheet 5.

I. SEDGWICK.
Wire Twisting Machine.
No. 233,033. Patented Oct. 5, 1880.



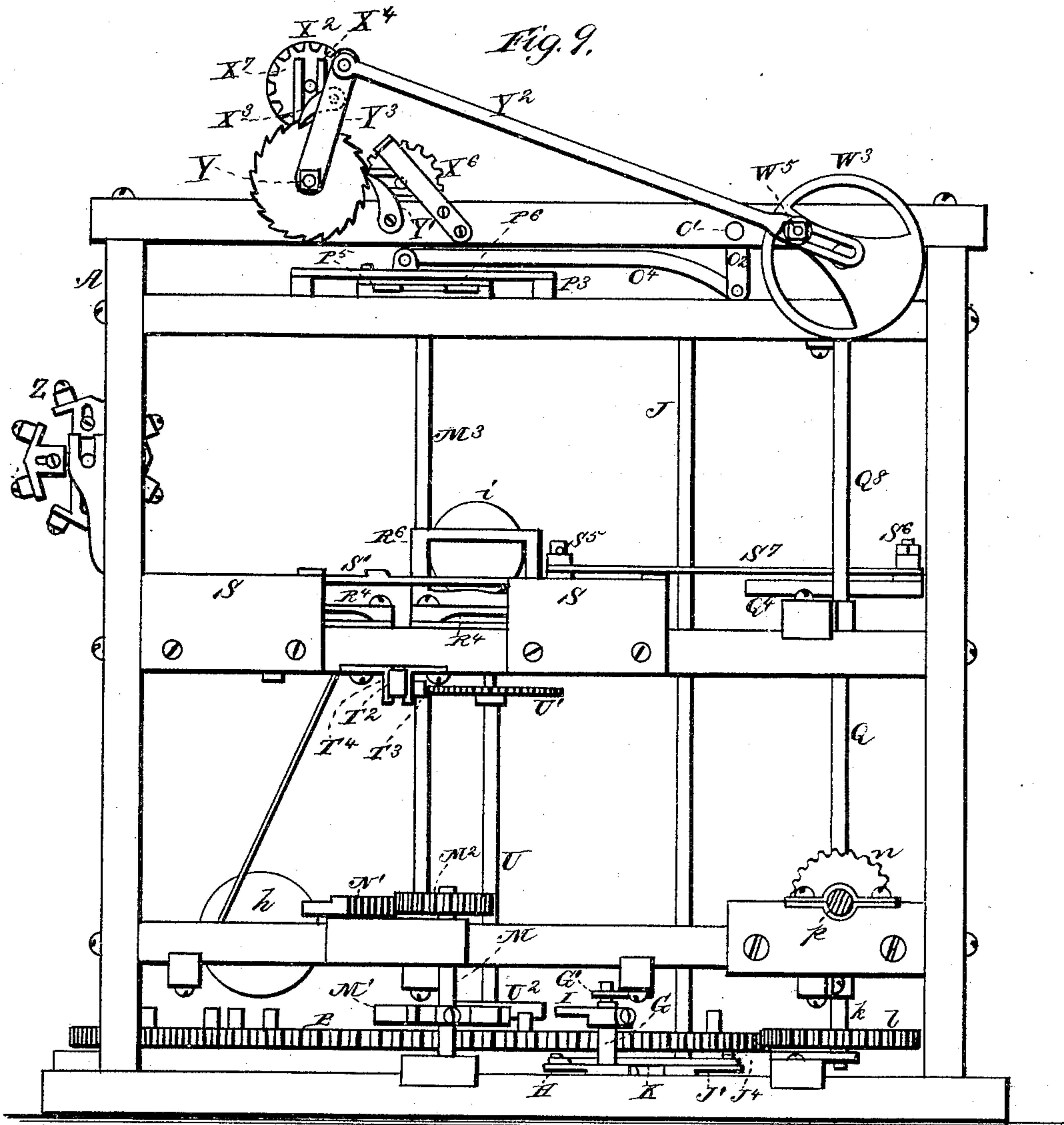
WITNESSES:
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James J. Sherry.

INVENTOR:
Isaac Sedgwick,
By his Attorney, *Clement Smith.*

(No Model.)

6 Sheets--Sheet 6.

I. SEDGWICK.
Wire Twisting Machine.
No. 233,033. Patented Oct. 5, 1880.



WITNESSES:
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James J. Sheehy

By his Attorney,

INVENTOR:

Isham Sedgwick,
J. Clement Smith.

UNITED STATES PATENT OFFICE.

ISHAM SEDGWICK, OF RICHMOND, INDIANA.

WIRE-TWISTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 233,033, dated October 5, 1880.

Application filed August 20, 1880. (No model.)

To all whom it may concern:

Be it known that I, ISHAM SEDGWICK, a citizen of the United States, resident at Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Wire-Twisting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to machines for making twisted-wire fabrics; and it consists in certain improvements upon a machine for the same purpose described and shown in Letters Patent No. 218,323, granted to me August 5, 1879, which improvements will be hereinafter fully described, and particularly pointed out in the claims.

Figure 1 is a front elevation of a machine embodying the improvements in my invention. Fig. 2 is a sectional plan view taken below line 1 1 in Fig. 1. Fig. 3 is a sectional plan view taken between lines 2 2 and 1 1 in Fig. 1. Fig. 4 is a sectional plan view taken between lines 3 3 and 2 2 in Fig. 1. Fig. 5 is a detail view of a portion of the wire-shifters. Fig. 6 is a detail view of the perforated shifting-bar, its rack and pinion. Fig. 7 is an end view of the expansible reel, and Fig. 8 is a sectional detail view of a portion of the machine, showing the wires and the fabric formed therefrom. Fig. 9 is a view, in elevation, looking toward the side on which the mechanism for operating the rolls is located.

Referring by letter to the drawings, A designates the frame of the machine; B, the master-wheel, which revolves in a horizontal plane, is toothed in its periphery, and is provided on the upper face of its rim throughout half of its circumference with studs C, D, E, and F at intervals of forty-five degrees.

At the left-hand side of the frame is a short vertical shaft, G, supported in bearings G' G², and provided with an arm, H, and a tappet, I, secured thereto at angles of thirty degrees. On the right-hand side of the frame and nearer the front of the same is a vertical shaft, J, which extends from the bottom to near the top

of the frame A, and is provided near its lower end with arms J' J². The arms H and J' have wrist-pins J⁴, and are connected by a pitman, K. The arm J² has a wrist-pin, and is connected by a rod, K', to wrist-pin of an arm, K², upon a short vertical shaft, L, on the same side of, but near the rear of, the frame. The shaft L also has a tappet, L', secured at an angle of sixty degrees to the arm K². On the left-hand side of the frame, and slightly in the rear of the short vertical shaft G, is another short vertical shaft, M, slightly longer than the shaft G, which is provided near its lower end with a four-pointed star-wheel, M', and at its upper end with a pinion-wheel, M². At the other side of the frame A, and directly opposite the shaft M, is a long vertical shaft, M³, extending from the bottom to near the top of the frame A, provided near its lower end with a four-pointed star-wheel, M⁴, and a pinion, M⁵, corresponding in position with the star-wheel M' and the pinion M² upon the shaft M. The long vertical shaft M³ is also provided at its upper end with a pinion, M⁶.

A rack-bar, N, having racks N' N² on opposite edges at its ends, works in ways N³ N⁴, at opposite sides of the frame A, the racks engaging opposite sides of their respective pinions, as shown.

The upper end of the shaft J is provided with a horizontal miter-gear wheel, J⁵, which engages with a vertical miter-gear wheel, O, upon a horizontal shaft, O', traversing the frame laterally between its girders. Arms O² O³ are keyed to the shaft O', and are connected, by curved pivoted bars O⁴ O⁴, to the frame O⁶ of the wire-shifters P.

The wire-shifters P consist of plates slotted at P' in their inner ends, and beveled at P² upon each side. These plates P are bolted in pairs to the upper and lower faces of the bars O⁷ of the frame O⁶, so that they embrace the bed P³, in which the wire-twisters P⁴ and their operating racks P⁵ P⁶ operate. Half-shifters P⁷ are necessary, one at each of two corners, at opposite ends of the frame O⁶, for convenience.

The construction and operation of the twisting-disks P⁴ and the racks for operating them are the same as those shown and described in my former Letters Patent, hereinbefore mentioned, except that two rack-bars are used to

operate the twisting-disks—viz., one on each side thereof, as shown—and the mechanism for driving the rack-bars is differently arranged. In this instance the pinion M^6 on the long vertical shaft M operates the rack-bars $P^5 P^6$.

Outside of the master-wheel B , and near the front of the frame A , are arranged two vertical shafts, $Q Q'$, provided at their lower ends with pinions $Q^2 Q^3$, the teeth of which engage the teeth of the master-wheel.

At the upper ends of the shafts $Q Q'$ are crank-wheels $Q^4 Q^5$, and beneath the crank-wheel Q^4 on the shaft Q is a pinion, Q^6 , which engages a gear-wheel, Q^7 , on the lower end of a vertical shaft, Q^8 .

Upon the cross-beams R of the frame A are secured two flat plates, $R' R^2$, placed parallel to each other, and having a space, R^3 , between their inner edges. Upon these plates $R' R^2$ are secured metal cleats R^4 , made concave in their under faces, and beveled inward and downward at the edges, to form ways R^5 , in which the flanged spool-carriers R^6 slide back and forth across the space R^3 .

Flanged plates S are secured to the outer sides of the cross-beams R of the frame A , to form guideways for the carrier-frame S' , composed of the grooved end bars, S^2 , and the connecting side bars, $S^3 S^4$, between which the spool-carriers R^6 ride.

The carrier-frame S' is provided with studs S^5 upon its bar S^3 , which are connected with the wrist-pins S^6 on the crank-wheels $Q^4 Q^5$ by pitmen $S^7 S^8$.

Beneath the plates $R' R^2$ bars T traverse the frame A , between the cross-beams R , and have a space between their inner edges which registers with the space R^3 , between the inner edges of the plates $R' R^2$.

A perforated bar, T^2 , having a rack, T^3 , on its front edge and near one end thereof, works in ways $T^4 T^4$, secured to the under faces of the bars T , directly beneath the space R^3 .

In front of the perforated rack-bar T^2 a vertical shaft, U , provided near its upper end with a gear-wheel, U^1 , which engages with the rack T^3 , is suspended in bearings, and provided at its extreme lower end with a five-pointed star-wheel, U^2 .

The master-wheel B is provided with eight curved radial arms, $U^3 U^4 U^5 U^6 U^7 U^8 U^9 U^{10}$, the arms $U^3 U^5 U^6 U^8$ being provided, respectively, with studs $V V' V^2 V^3$, which travel, when the master-wheel B is revolved, in a circular path outside of the vertical shaft U , and strike the arms of the five-pointed star-wheel U^2 and cause it to turn in the same direction as the master-wheel B , which revolves in the direction of the arrow.

The arms $U^4 U^7 U^9 U^{10}$ are provided, respectively, with studs $V^4 V^5 V^6 V^7$, which travel, when the master-wheel B is revolved, in a circular path inside of the vertical shaft U , and strike the arms of the five-pointed star-wheel U^2 and cause it to turn in a direction the reverse of that in which the master-wheel B is moving.

At the upper end of the vertical shaft Q^8 is a horizontal miter-gear, W , which engages with a vertical miter-gear, W' , on a horizontal shaft, W^2 , at the upper part of the frame A .

Upon the top of the frame A , and directly over the twisting-disks and wire-shifters, is arranged a system of three rollers, $X X' X^2$, supported in bearings $X^4 X^4$, and connected by gear-wheels $X^5 X^6 X^7$.

The shaft Y of the roller X projects beyond the end of the frame A , and is provided with a ratchet-wheel, Y' , and an arm, Y^2 , carrying on its inside a pivoted pawl, Y^3 . A pivoted detent, Y^4 , at the side of the frame A , also engages the ratchet-wheel Y' .

The outer end of the horizontal shaft W^2 carries a crank-wheel, W^3 . A slotted pitman, W^4 , pivoted to the upper end of the arm Y^2 , connects with the wrist-pin W^5 on the crank-wheel W^3 .

An expansible reel, Z , provided with a pulley, Z' , is supported in bearings at the rear side of the frame A . This reel consists of a shaft, a , provided with cross-arms b , to which slotted plates c are secured by screws d . The slats e forming the reel are secured to the slotted plates c , two to each plate, as shown, and the reel is expanded by turning nuts f upon the shaft a , so that the inner ends of the plates c will rest on the corners of the nuts. The wire fabric is wound upon the reel while in its expanded condition, and when the fabric is to be removed the nuts are turned to permit the reel to contract, when it can readily be slipped from within the roll of fabric upon it.

Near the rear of the frame, and beneath and in the rear of the perforated shifting-bar T^2 , is located the spool-rack g , for carrying the supply-spools h , on which are wound the edge wires and a portion of the intermediate wires, of which the fabric is formed. The remainder of the intermediate wires are wound upon the supply-spools i placed in the spool-carriers R^6 .

The wires from the spools h are passed up through the perforations in the shifting-bar T^2 , through the space R^3 between the plates $R' R^2$, the edge wires passed through the eyes in the two outside twisting-disks, P^4 , and the intermediate or mesh wires from both sets of supply-spools carried up and placed in the notches in the opposite sides of each alternate twisting-disk P^4 , thence between the rollers $X X'$, and between the rollers $X X^2$, and down around the reel.

At the left-hand front corner of the frame is a short vertical shaft, k , having a gear-wheel, l , at its lower end, which engages the gear-wheel Q^2 , upon the shaft Q , and at its top with a horizontal miter-gear, m , which engages the vertical miter-gear n upon the inner end of the pulley-shaft p , through which motion is communicated to the machine.

The operation of the machine is as follows: Power being applied at the band-wheel A' , is communicated, through the gear-wheels n, m, l , and Q^2 , to the master-wheel B . Assuming the machine to be in such a position that the

studs C, D, E, and F on the rim of the master-wheel are nearest the front of the frame and between the star-wheels M' and M⁴ when starting, the stud C will first strike one of the arms projecting inward from the star-wheel M' and turn it one-quarter revolution to the left, which operates the pinion M² at the top of the shaft M, and moves the rack-bar N to the left, which movement of the bar N causes the pinion M⁵ at the opposite side of the frame to be turned to the left, and at the same time turns the pinion M⁶ at the top of the shaft M³, which operates the rack-bars P⁵ P⁶, which engage the twisting-disks P⁴, and turns the twisting-disks to the right. The studs D, E, and F follow, and cause the parts above mentioned to be operated by each stud in like manner until the twisting-disks have made two revolutions to the right. The spool-carriers R⁶ are, at the start, over the plate R', on the front side of the space R³, the shifter-bar T² is at the limit of its movement toward the left of the machine, and the wire-shifters P are shifted to the rear limit of their movement. The stud C on the rim first strikes the arm of the star-wheel M', as above stated. The stud V on the arm U³ then strikes the outer arm of the five-pointed star-wheel U², (the spool-carrier frame having in the meantime carried the spool-carriers R⁶ across the space R³, over to the plate R², through the pinions Q² Q³, crank-wheels Q⁴ Q⁵, and arms S⁷,) and the star-wheel U² makes one-fifth of a revolution to the right, and shifts the shifting-bar T² to the right. The stud D then, and at about the same time, turns the star-wheel M' one-fourth revolution to the left, the spool-carriers R⁶ are drawn back across the space R³, and the stud V⁴ on the arm U⁴ strikes the inside arm of the five-pointed star-wheel U², then in its track, and shifts the shifting-bar T² to the left. The stud E almost immediately thereafter strikes the arm of the star-wheel M', then in its track, and turns said star-wheel M' another fourth-revolution to the left. At the same time the spool-carriers R⁶ are again shifted over the space R³ to the plate R², and the stud V' on the arm U⁵ strikes an outer arm of the five-pointed star-wheel U², and causes the shifter-bar T to be shifted again to the right. The stud F immediately thereafter strikes the fourth arm of the star-wheel M' and turns it again to the left, the stud C striking the tappet L' just as the stud E leaves the star-wheel M', and operating through the arm K², bar K', arms J² J⁴ on shaft J, pitman K, arm H, gearing J⁵ and O, shaft O', and arms O³ O⁴, to operate the shifting-plates P, causing them to shift the mesh-wires from the set of twisting-disks P⁴, that they then occupy, to the notches in the opposite twisting-disks, and at the same time causing the tappet I to be turned inward to come in the track of the stud C. The stud C next strikes the inner arm of the star-wheel M⁴ at the right-hand side of the frame A, and turns the star-wheel M⁴ one-fourth revolution to the right, and carries the rack-bar N to right. The pinion M⁶ at the top of the shaft

M³ is also turned to the right, and operates the racks P⁵ P⁶ in such a manner as to turn the twisting-disks P⁴ to the left. The stud V² on the arm U⁶ next strikes the outer arm of the five-pointed star-wheel U² and a second time shifts the shifting-bar T² to the right, its last movement having been in the same direction, which shifts said bar T² to its limit to the right. The spool-carriers R⁶ are at this time shifted over the space R³ to the plate R², and the stud V⁵ on the arm U⁷ now strikes an inner arm of the five-pointed star-wheel U² and shifts the shifting-bar T² to the left. The stud next follows, striking an arm of the four-pointed star-wheel M⁴, which is again operated to the right, the twisting-disks turned to the left, and the spool-carriers drawn again to the front of the space R³. The stud V³ on the arm U⁸ next strikes an outer arm of the five-pointed star-wheel U² and shifts the shifting-bar T² to the right, where it is a second time at its limit to the right. The stud E next strikes the star-wheel M⁴, the spool-carriers R⁶ are shifted to the plate R², and the stud V⁶ on the arm U⁹ strikes an inner arm of the five-pointed star-wheel U² and shifts the perforated bar T² to the left. The stud F strikes the star-wheel M⁴, turns it the fourth time to the right, the spool-carriers R⁶ are returned to the plate R', the stud V⁷ on the arm U¹⁰ strikes the inner arm of the star-wheel U² and shifts the bar T² to the left to its place of beginning, as herein described, and the stud C strikes the tappet I, throws the tappet L' in the track of the stud C, and shifts the shifters P to the rear of the frame, where they started.

The foregoing describes the operation of the mechanism, except the rollers and reel, during one complete revolution of the master-wheel B. The rollers are operated during this time by the pawl to press the fabric between them, and the reel is operated to wind it up as it comes from the rollers. The reel is operated by a band leading from a pulley on the shaft of the roller X.

The fabric formed on this machine is similar to that formed on my former machine described in the Letters Patent hereinbefore mentioned, and it consists of a fabric having edge-wires and diamond-shape mesh-work, and tension-wires in the mesh-work, if needed. The twisting-disks are the same and operate in the same manner.

The shifting-plates P being placed in pairs, one plate of a pair being above and the other below the twisting-disk, the wires are shifted from one set of disks to the other and back again with greater regularity and precision than where only an upper set of shifters are used, as in my former machine.

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

1. In a wire-twisting machine, the perforated shifting-bar T², provided with the rack T³, supported in ways beneath the space R³, in combination with the shaft U, carrying the pinion

U' at its upper end and the five-pointed star-wheel U² at its lower end, and the master-wheel B, provided with studs V, V', V², V³, V⁴, V⁵, V⁶, and V⁷, constructed and operating substantially as and for the purposes set forth.

2. In a wire-twisting machine, the plates R' R², provided with cleats R⁴, and having the space R³ between their inner edges, in combination with the carrier-frame and flanged spool-carriers R⁶, the arms S⁷ S⁷, crank-wheels Q⁴ Q⁵, and shafts Q Q', provided with gear-wheels Q² Q³ at their lower ends, and operated by the master-wheel B and gear-wheel l, substantially as and for the purposes set forth.

3. In a wire-twisting machine, the wire-shifters P, slotted at P' and beveled on both sides, as at P², and secured in pairs to the upper and lower faces of the bars O⁷ O⁷ of the shifting-frame, in combination with the twisting-disks P⁴, the curved bars O⁴, arms O³ upon the shaft O', provided with the gear-wheel O, and the shaft J, provided with the gear J⁵, and arms J² J⁴, connected with the shafts L and M, provided with the tappets I and L', by the pitmen K K', and operated by the stud C upon the master-wheel B, substantially as and for the purposes set forth.

4. In a wire-twisting machine, the rollers X X' X², connected by gear-wheels X⁵ X⁶ X⁷, and supported in bearings above the wire-

twisting disks P⁴, in combination with the ratchet-wheel Y', pivoted pawl Y³, pivoted to the arm Y², the slotted pitman W⁴, secured to the wrist-pin of the crank-wheel W³ upon the end of the shaft W², the shaft W², having gear W', the vertical shaft Q⁸, having miter-gear W at its top and gear Q⁷ at its bottom, and the shaft Q, geared to the shaft Q⁸ and to the master-wheel B, all constructed and operating substantially as and for the purposes set forth.

5. In a wire-twisting machine, the expandible reel Z, having its slats fixed to slotted sliding plates secured to cross-arms upon the shaft of the reel, and operated by central nuts f' to expand and contract the circumference of the reel, substantially as and for the purposes set forth.

6. In a wire-twisting machine, the combination of the shifting-bar T², the reciprocating spool-carriers R⁶, the twisting-disks P⁴, and the shifting-plates P, and the operating mechanism herein described, substantially as and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ISHAM SEDGWICK.

Witnesses:

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WILLIAM BAXTER.