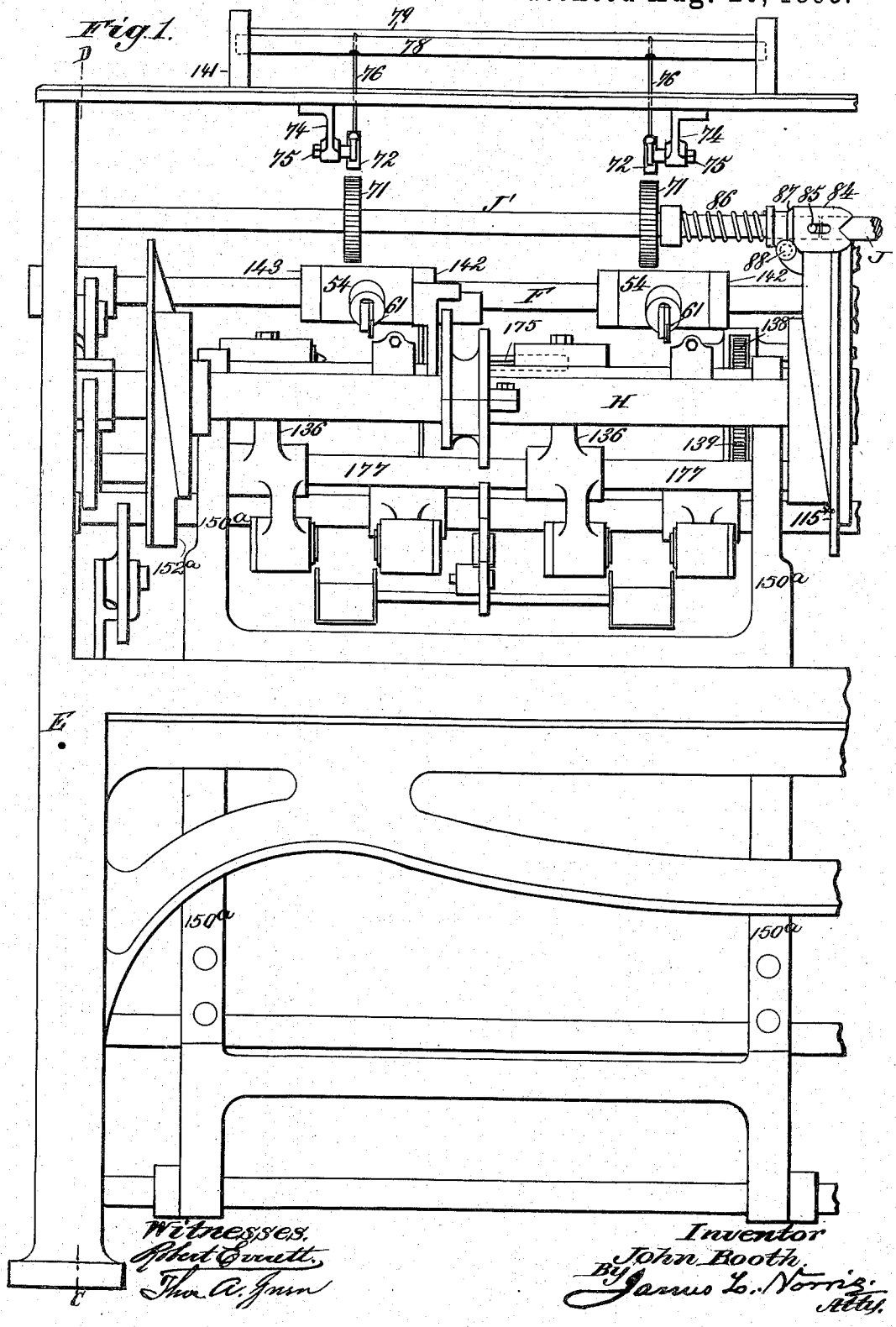
(No Model.) 10 Sheets—Sheet 1.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 1.



Witnesses.
Chas. Everett.
Thos. A. Gunn

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By James L. Norris.
Atty.

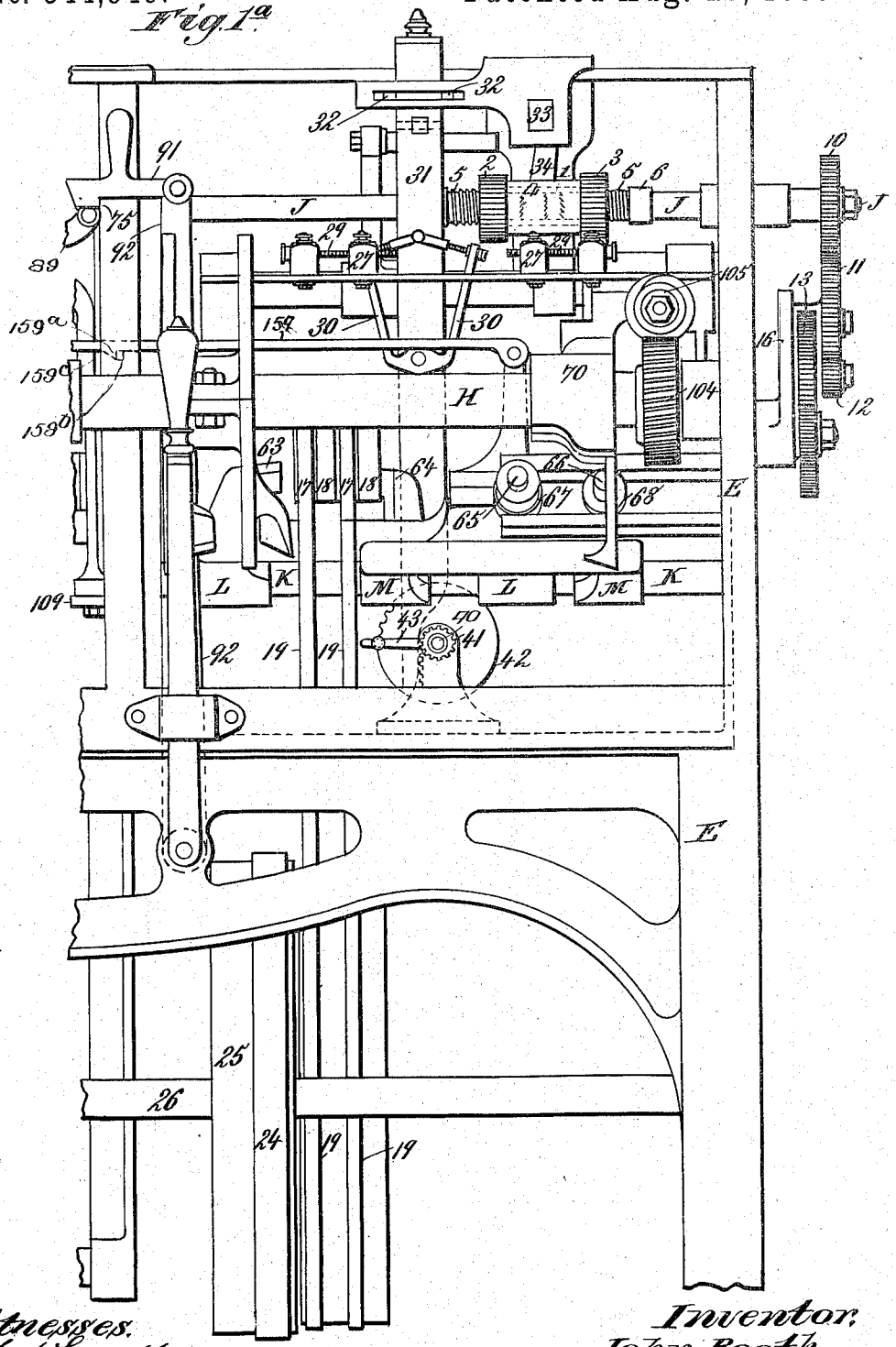
(No Model.) 10 Sheets—Sheet 2.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 1a.



Witnesses.
Robt Everett.
Thos. A. Grant

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By James L. Norris.
Atty.

(No Model.) 10 Sheets—Sheet 3.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 2.

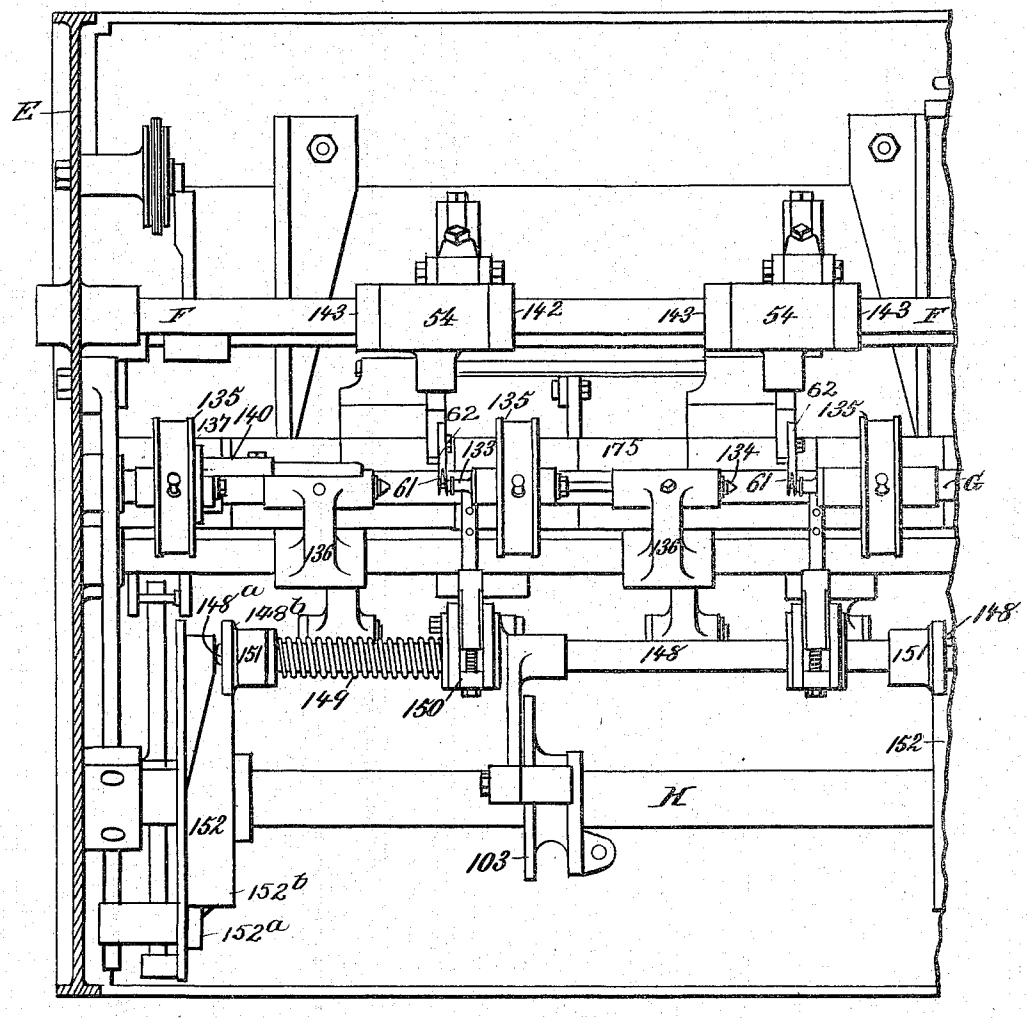


Fig. 3.

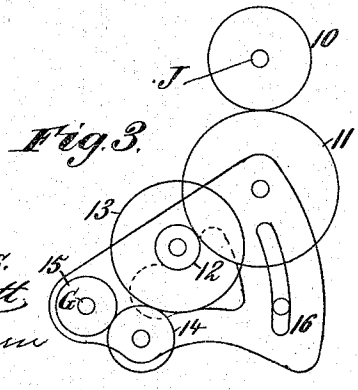
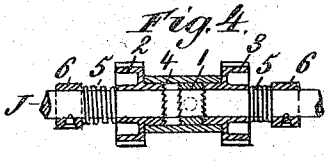


Fig. 4.



Witnesses.
Robt. Smith
Thos. A. Grant

Inventor.
John Booth.
By James L. Norris.
Atty.

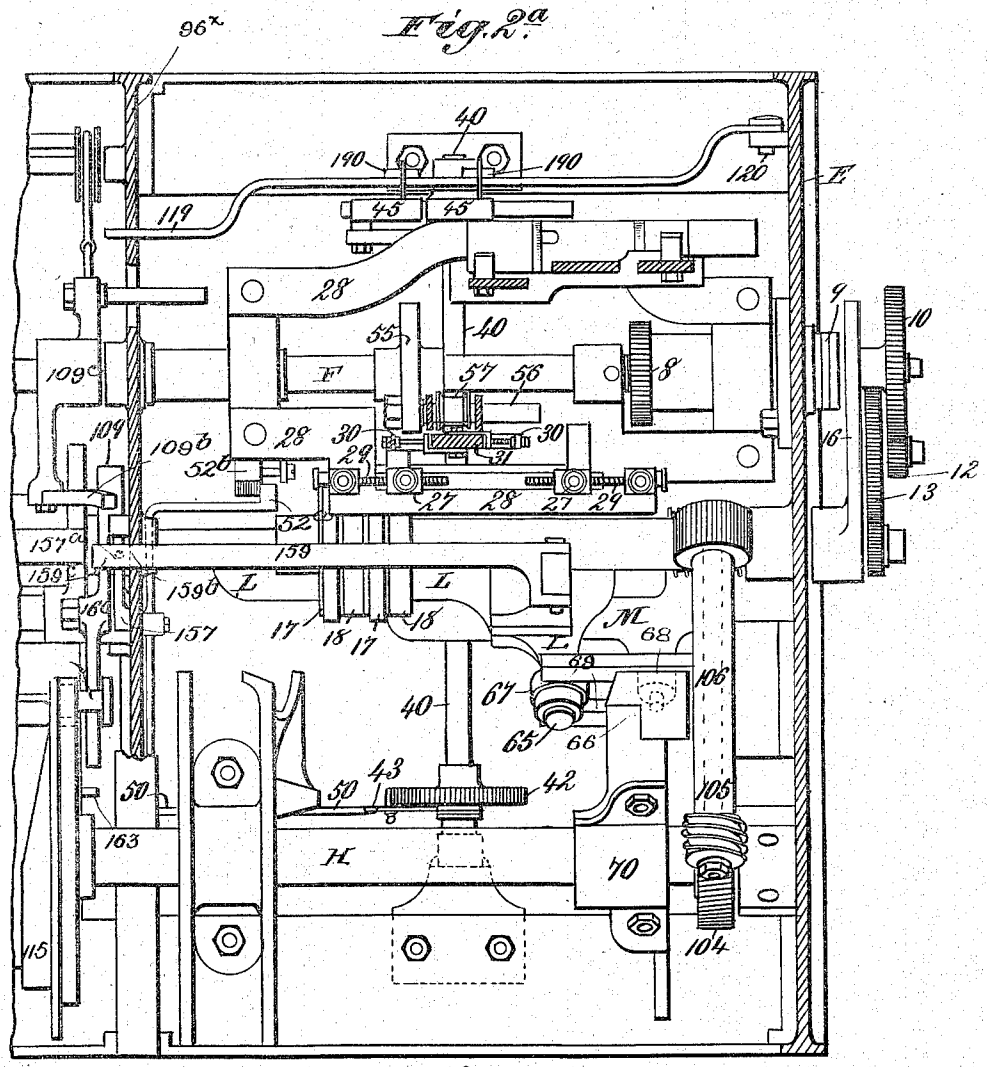
(No Model.) 10 Sheets—Sheet 4.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 2a.



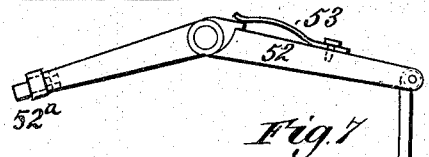


Fig. 7.

Fig. 5.

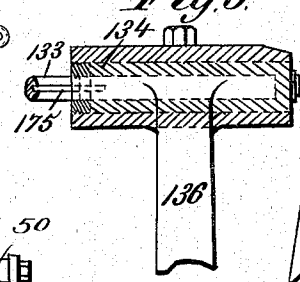
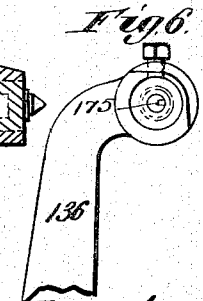


Fig. 6.



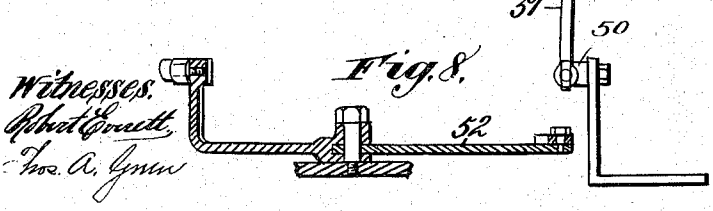


Fig. 8.

Witnesses.
Robt. Ewett.
Thos. A. Lynn

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Atty

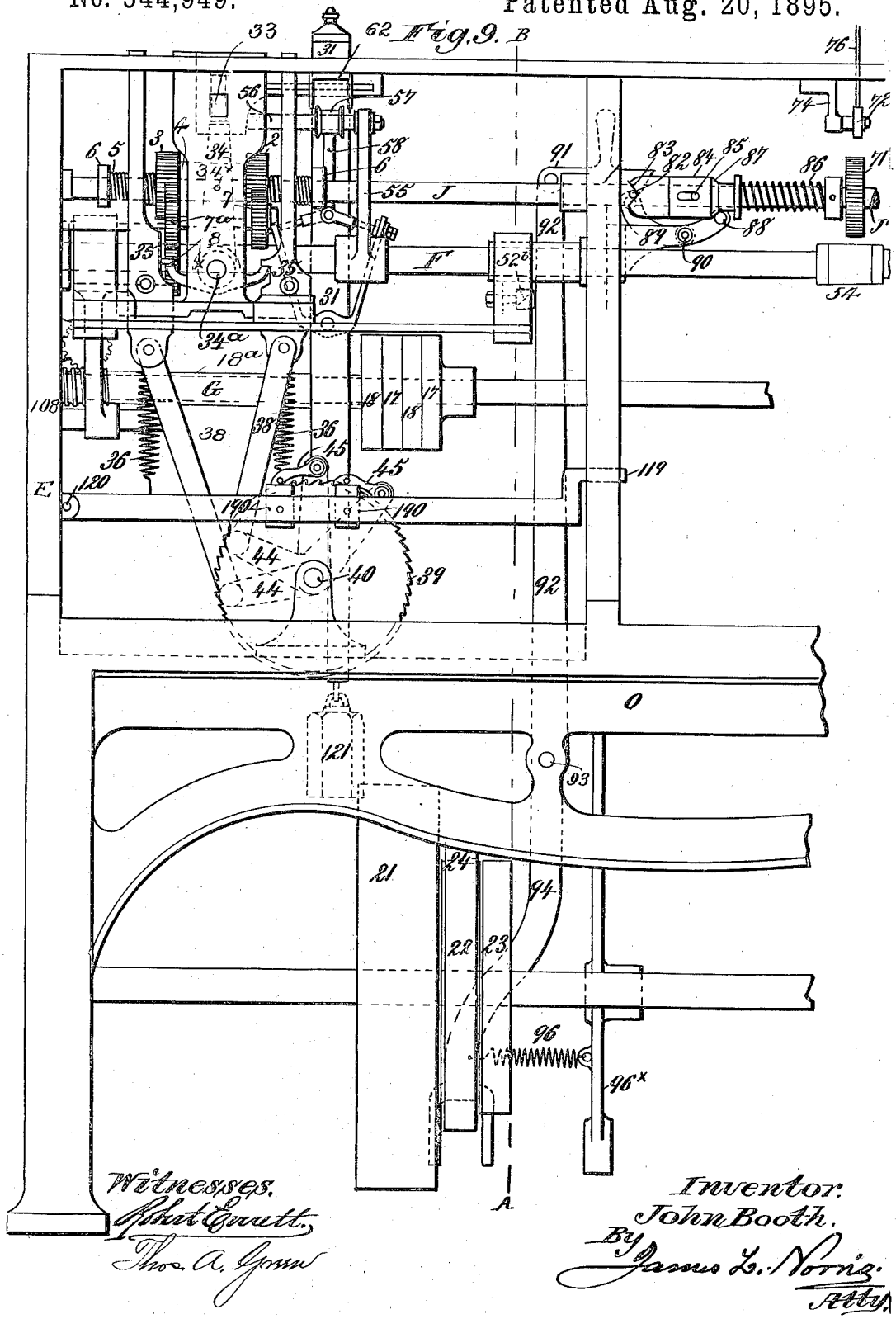
(No Model.) 10 Sheets—Sheet 5.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 9.



Witnesses.
Robt. Ernest.
Thos. A. Goss

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John Booth.
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Atty.

(No Model.) 10 Sheets—Sheet 6.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 10.

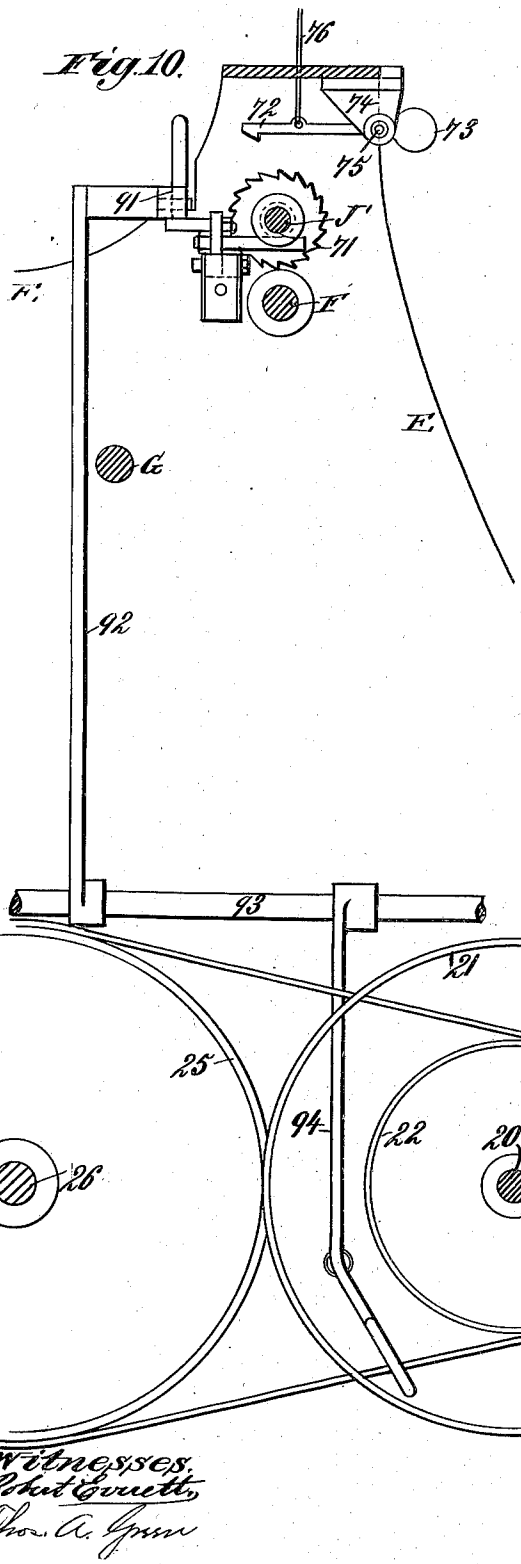

Fig. 12.

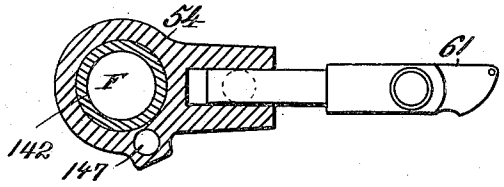

Fig. 13.

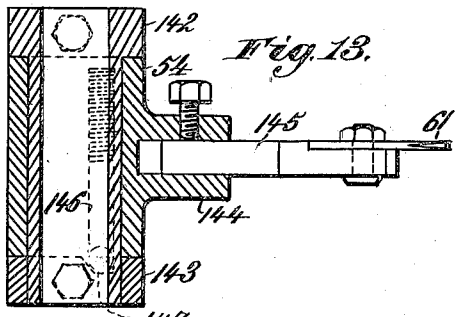

Fig. 13a.

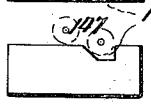

Fig. 18.

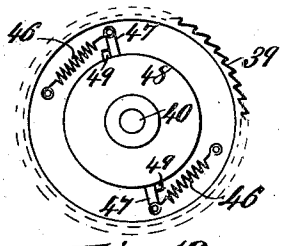

Fig. 19.

Witnesses.
Robt Ewett.
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John Booth.
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Atty.

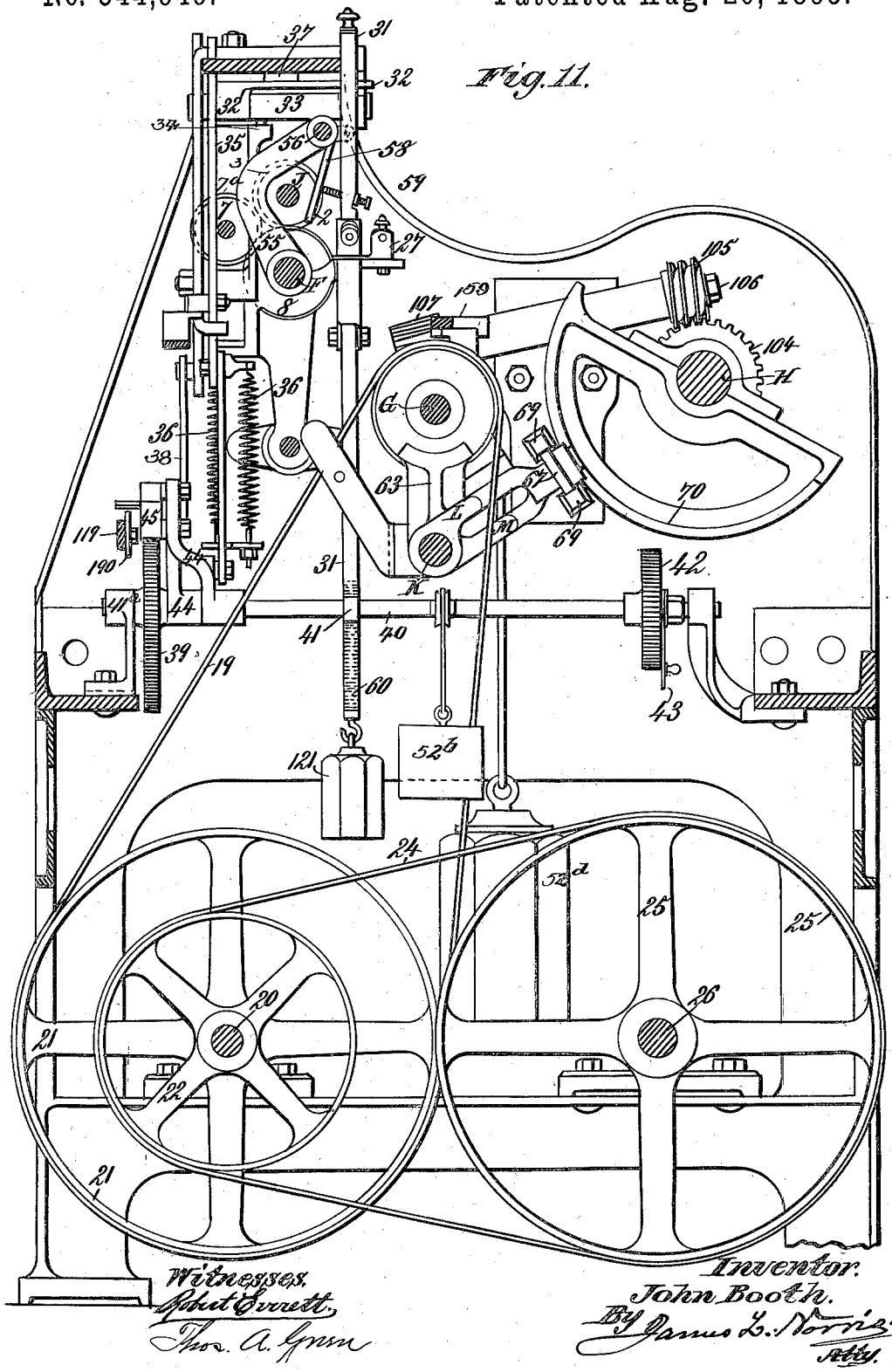
(No Model.) 10 Sheets—Sheet 7.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 11.



Witnesses.
Robt. Ernett.
Thos. A. Lynn

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Atty.

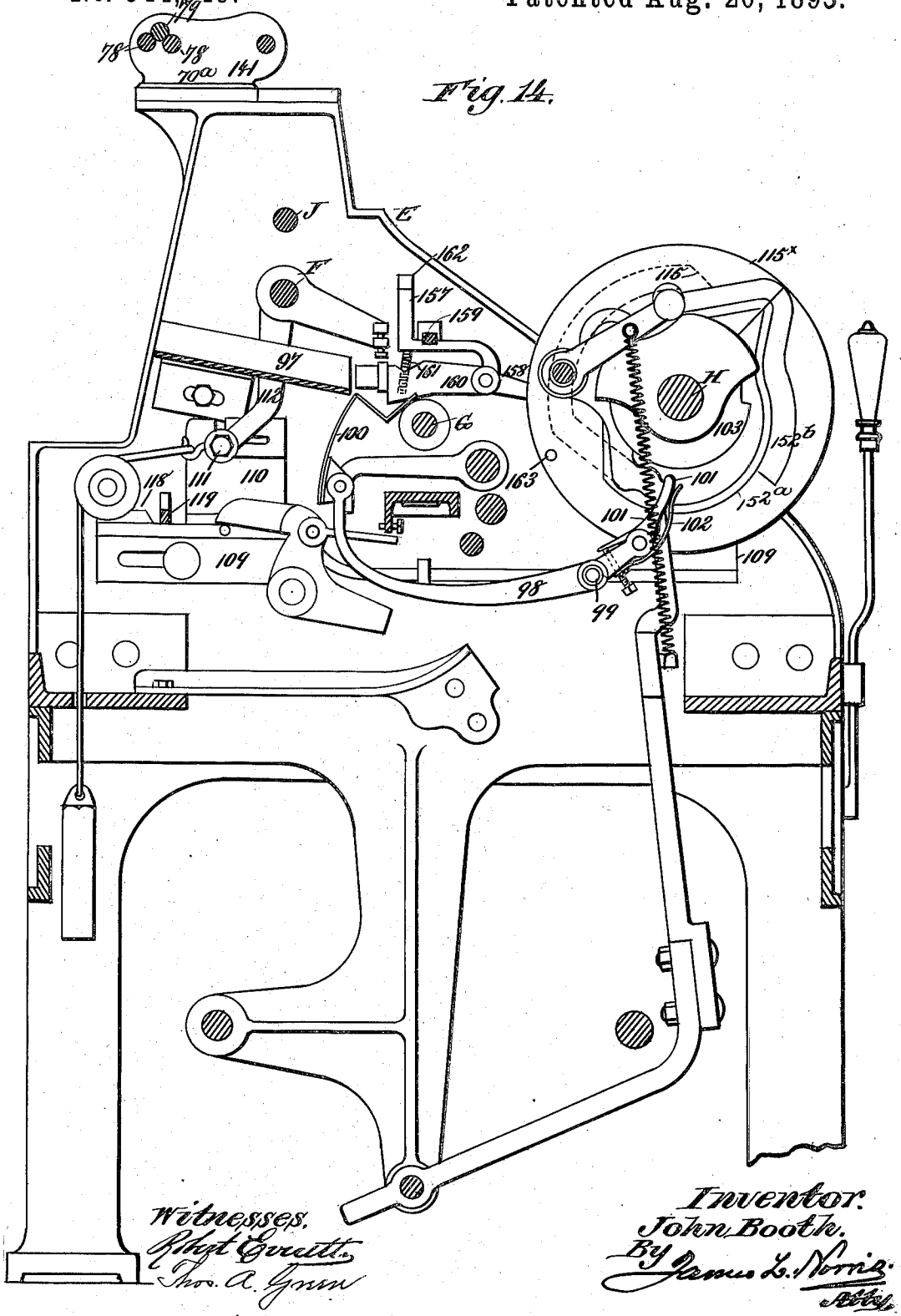
(No Model.) 10 Sheets—Sheet 8.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 14.



Witnesses.
Robt Gwatt.
Thos. A. Gunn

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Atty.

(No Model.) 10 Sheets—Sheet 9.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 15.

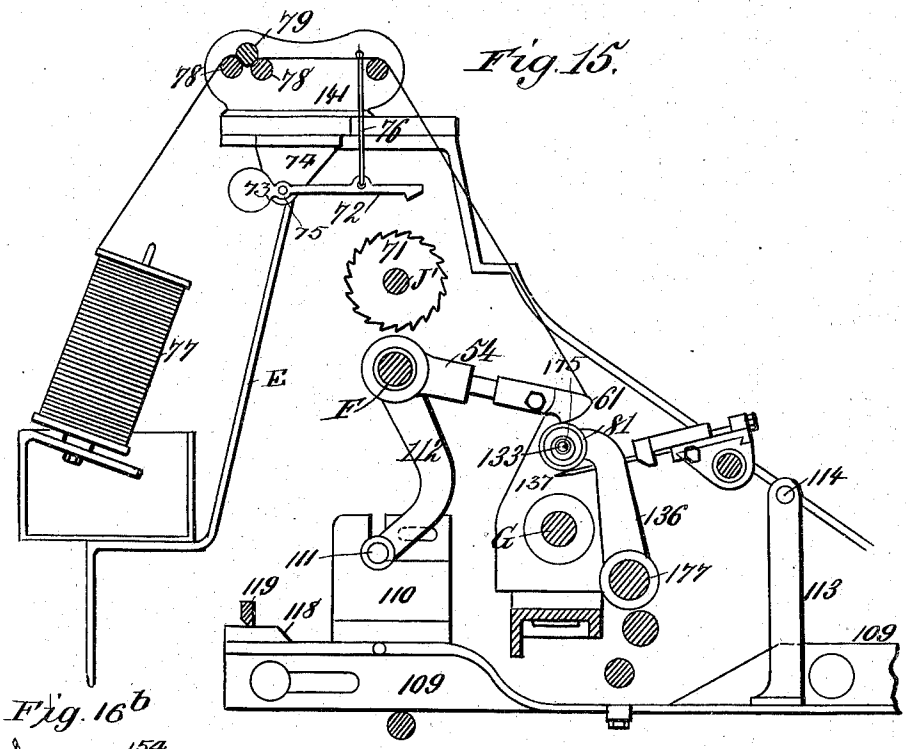
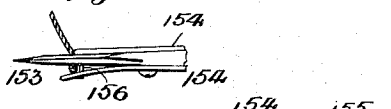


Fig. 16b



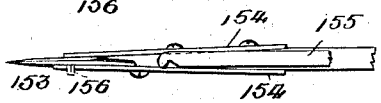


Fig. 16a

Fig. 16.

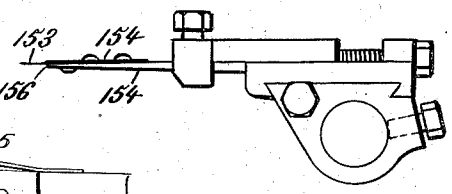


Fig. 17a

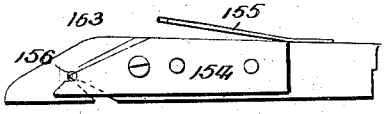
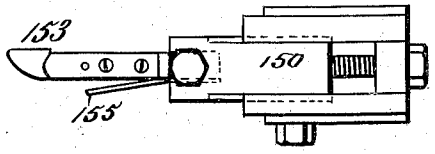


Fig. 17.



Witnesses.
Robert Everett.
Thos. A. Green

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Atty.

(No Model.) 10 Sheets—Sheet 10.

J. BOOTH.

THREAD WINDING OR SPOOLING MACHINE.

No. 544,949. Patented Aug. 20, 1895.

Fig. 20.

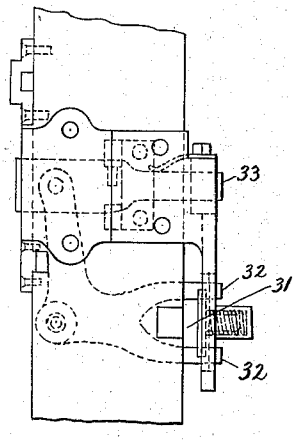


Fig. 21.

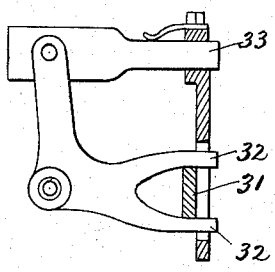


Fig. 22.

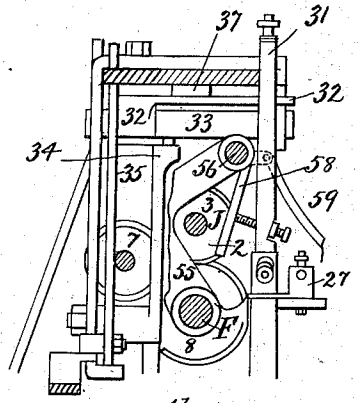


Fig. 23.

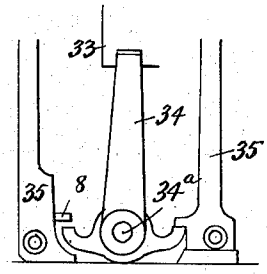
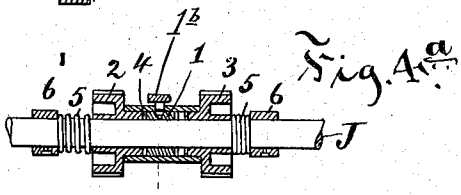


Fig. 4a.



Witnesses.
Thos. A. Brace
Robt Everett.

Inventor.
John Booth.
By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

JOHN BOOTH, OF BOLTON, ENGLAND.

THREAD WINDING OR SPOOLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 544,949, dated August 20, 1895.

Application filed June 1, 1893. Serial No. 476,195. (No model.)

To all whom it may concern:

Be it known that I, JOHN BOOTH, machinist, of Marsden Road Iron Works, Bolton, in the county of Lancaster, England, have invented new and useful Improvements in Thread Winding or Spooling Machines, of which the following is a specification.

This invention relates to improvements in thread winding or spooling machines and in means for nicking the bobbins or spools and fastening thread therein and cutting off the same, at the same time holding the thread ready for the next bobbin or spool.

Figures 1 and 1ª, taken together, show a front elevation of my improved machine. Figs. 2 and 2ª, taken together, show a plan of Figs. 1 and 1ª. Fig. 3 is a side elevation of the quadrant carrying the change-gear for traversing the guide-stock shaft. Fig. 4 is a sectional plan of clutch-box for operating guide-stock shaft. Fig. 4ª is another sectional view of the same, showing a key for securing the clutch-piece to the reversing spindle. Fig. 5 is a part sectional elevation of back center. Fig. 6 is an end view of Fig. 5. Fig. 7 is an end view of safety stopping-lever. Fig. 8 is a sectional plan of Fig. 7. Fig. 9 is a back elevation of Fig. 1ª, showing stopping apparatus. Fig. 10 is a part side elevation through line A B in Fig. 9. Fig. 11 is a sectional elevation through line A B in Fig. 9. Fig. 12 is a sectional end view of adjustable, movable, and compensating guide-stock. Fig. 13 is a sectional plan of Fig. 12. Fig. 13ª is a detail view of collar 143. Fig. 14 is a sectional end elevation through line C D in Fig. 1. Fig. 15 is an end elevation of slide with arm and bowl for lifting guides, tripping front spool-carrier, and resetting ratchet-wheel. Fig. 16 is a side view of improved knife-hook with thread-cutter. Figs. 16ª and 16ᵇ are enlarged detail views of the same. Fig. 17 is a top view of the improved knife-hook and fag-cutter. Fig. 17ª is an under side view of the same. Fig. 18 is a front elevation of ratchet-wheel with concussion-springs. Fig. 19 is a sectional plan of Fig. 18. Figs. 20, 21, 22, and 23 are detail views of the catch-box 33 and accompanying mechanism.

In all the figures the same letters and numerals are employed to indicate corresponding parts.

E are the side frames of the machine, in which are mounted the guide-stock shaft F, driving-shaft G, cam-shaft H, reversing-spindle J, and K the fixed rod on which slide the strap-forks L and M.

In order to traverse the guide-stock shaft F backward and forward to wind thread on bobbins or spools I mount on the reversing-spindle J the clutch-piece 1, (shown in Figs. 1ª and 4,) secured thereon by a pin or key 1ᵇ, Fig. 4ª. The clutch-wheels 2 and 3 are mounted loosely on the spindle J and operated in either direction by the collar 4. The clutch-wheels 2 and 3 are held against the collar 4 by the springs 5, thrusting against the collars 6, secured to the spindle J. The clutch-wheel 2 gears into the wheel 7, and the wheel 3 into the wheel 8 on the guide-stock shaft F. Secured to the wheel 7 is a wheel 7ª gearing into the wheel 8. The wheel 8 is threaded internally and fixed laterally by the nuts 9, Fig. 2ª, to the frame E, so as to traverse the shaft F according to the length of bobbin or spool receiving thread. The clutch-wheel 3 gears directly with the wheel 8. The spindle J is rotated by the change-gears 10 to 15, inclusive, mounted on the adjustable quadrant 16. These gears are operated from the driving-shaft G, provided with the fast and loose pulleys 17 and 18, respectively, the said pulleys being driven by the belt or belts 19 from the counter-shaft 20 and pulley 21. The pulley 18 carries a sleeve 18ª that is provided at one end with a worm 108. On the counter-shaft 20 are mounted the fast and loose pulleys 22 and 23, respectively, being rotated by the belt 24 from the pulley 25 on the shaft 26. The reversing of the guide-stock shaft F is effected by means of the adjustable shaper-blocks 27, mounted on the slide-plate 28, the blocks 27 being operated to and fro from the traverse-spindle. The shaper-blocks 27 are adjustable by means of the screws 29. The shaper-blocks 27, in their traverse to and fro, operate against the adjustable shaper-plates 30, mounted on the shaper-rod 31. When the shaper-rod 31 is pushed by either of the shaper-blocks 27 it operates the bell-crank 32, Figs. 20 and 21, catch-box 33, and lever 34, the latter being connected to the collar 4 by a pin or its equivalent 34ˣ. The lever 34 is pivoted on a stud or center 34ª, Figs. 9 and 23. When the lever 34 is released by

the catch-box 33 the link 35 is pulled downward by the springs 36 and oscillates the lever 34 to put out of gear the wheel 2, at the same time allowing the spring 5 to put in gear the wheel 3 with the clutch-collar 1, thus reversing the motion of the wheel 8. The lever 34 when released comes in contact with the elastic striking-plate 37, Fig. 11. For operating the ratchet-wheel 39, shaft 40, and their appendages, consisting of the pinion 41, shaper-rod 31, index-wheel 42, and stopping or index finger 43, I provide the links 38, levers 44, and pawls 45. In order to prevent shock and uncertainty, the ratchet-wheel 39 is provided with the springs 46, as shown in Figs. 18 and 19. The springs 46 are connected to the lugs 47 on the boss 48, secured to the shaft 40. The springs 46 maintain the lugs 47 against the stops 49 on the side of the ratchet-wheel 39. For stopping the machine when winding of thread ceases and the nicking of the bobbin or spool is to be performed, the index-finger 34, during the laying of the last layer of thread, operates the lever 50, connected with the link 51 in Fig. 7. The link 51 is coupled to the lever 52, made in halves, and is provided with the spring connection 53 to prevent accidents. The lever 52 is provided at one end with a projection 52^a, Fig. 2^a, which is acted on by an adjustable incline 52^b, Figs. 2^a and 9, to lift the catch-lever 159, Fig. 11, release it from the slot-catch 159^b, and allow the weight 52^d to pull the slides L and M and move the belt or belts 19 from pulleys 17 to pulleys 18.

In order that the guide-stock shaft F may be oscillated to lift the guide-stocks 54, according to the increasing diameter of each layer of thread on the bobbin or spool, I mount thereon the lever 55, Fig. 22, to which is secured the stud 56, carrying the bowl 57. The latter is operated by the adjustable incline 58 on the shaper-rod 31. The incline 58 is adjusted by the screw 59 passing through the shaper-rod 31. The lower end of the shaper-rod 31 is provided with the rack 60, into which gears the pinion 41, and by the movements of the links 38, levers 44, and pawls 45 the shaper-rod 31 is gradually lifted, so as to ease the pressure of the thread-guides 61, to prevent damage to the thread in the process of winding. To insure of the bowl 57 being certain in its action and reset with the incline 58 I provide the guide 62, Fig. 9.

For the purpose of stopping the driving-shaft G when the spool is full of thread I mount on the fixed rod K the slides L and M, to each of which are secured the brakes 63 and 64, which operate with the pulleys 17 and 18. The brakes 63 and 64 are covered on their operating-surfaces with leather or the like. The slides L and M are provided with the arms 65 and 66, carrying the bowls 67 and 68, mounted in the slides 69. The slides L and M with the brake apparatus are operated in either direction by the double cam 70 on the shaft H and by weights 52^d and 52^e or their equivalents.

For automatically stopping the machine when the thread being wound breaks, I provide the spindle J', placed in line with the spindle J. On the spindle J' are fixed the ratchet-wheels 71, one being opposite each guide-stock 54 on the shaft F. Above each ratchet-wheel 71 is pivoted the pawl-lever 72 with the balance-weight 73. The pawl-levers 72 are pivoted to the brackets 74 by the pins 75. To the pawl-levers 72 are attached the wires or links 76, each being provided with an eye or hook at its upper end. The thread to be spooled is supplied from the creel-bobbin 77, from whence it passes over the rods 78 and under the rod 79, and through the eye or hook on the wire or link 76 to the thread-guide 61, by which it is delivered to the spool or bobbin 81 receiving the thread.

The improved thread-tension consists of the fixed rods 78, on which is mounted the rod 79, the rods 78 being held in position by the brackets 141. In case the thread breaks in its passage from the creel-bobbin 77 to the spool or bobbin 81 receiving the same the pawl-lever 72 drops into engagement with the ratchet-wheel 71, and thus arrests the rotation of the spindle J'. The latter is rotated by the pin 82 fitting into the inclined or serrated end 83 of the sliding sleeve 84, held in position by the float key or pin 85 and the spring 86. Immediately the thread breaks the motion of the spindle J' is arrested by the pawl-lever 72, and the pin 82 forces the sliding sleeve on the spindle J' out of engagement in the direction of the ratchet-wheels 71. On the sliding sleeve 84 is formed a conical surface 87, the sliding action of which depresses the pin 88 on the lever 89, mounted on the stud 90. This action causes the other end of the lever 89 to be lifted, which raises the pivoted latch 91 from the catch 75, the latch 91 being attached to the lever 92, mounted on the center or shaft 93, secured to the frame O of the machine and the strap-fork lever 94. After the latch 91 has been released from the catch 95 the lever 92 is operated to remove the strap-fork by the spring 96 secured to the frame 96^x. This apparatus is reset by hand after the end of thread is pieced.

For lifting empty spools from the shoot or trough 97 I provide the compound adjustable lever 98, pivoted at 99 and provided with the adjustable receiver 100. The other end of the lever 98 is fitted with the short-ended lever 101 and spring 102, to allow of a yielding motion in case the receiver 100 is by any means arrested or obstructed in its upward motion. The short-ended lever 101 is operated by the cam 103 on the shaft H. The shaft H is driven by the worm-wheel 104, worm 105, shaft 106, worm-wheel 107, and the worm 108 on the sleeve 18^a surrounding the shaft G.

For lifting the guide-stocks 54, after spool-

ing has ceased or during the change, I provide the slide 109, on which is mounted the bracket 110, carrying the adjustable stop 111. The bracket 110 operates the lever 112 on the shaft F, and thus lifts the guides 61 by means of the lever 112, arm 113, and bowl 114, mounted on the slide 109 and dropping in the cam path 115.

For resetting ratchet-wheel 39 each time a bobbin or spool is filled with thread the slide 109 is fitted with the incline 118, which operates the lever 119 pivoted on center 120, as shown in Fig. 9, by which the pawls 45 are lifted from the ratchet-wheel 39 by means of the plates 190 on the lever 119; the wheel 39 being reset by the weight 121 on the lower end of the shaper-rod 31, shown in Figs. 9 and 11, the position of the latter shown in Figs. 9 and 11 is during the operation of spooling or winding thread on the bobbins or spools.

For the purpose of driving both spindles upon which each bobbin or spool rotates during spooling I provide the spindle 133 with the slotted end 175, Figs. 1, 5, 6, and 15, in which engages a feather secured to the back or movable center 134, thus causing the spindle 133 to carry the back center 134 simultaneously with it. The spindles 133 are driven by spur-pinions 138 and 139, under the casings 135, from the shaft G, as shown in Fig. 1. The keyway and feather allows of the free lateral movement of the back center bracket 136. On the back side of the spindle-carrier 137, Figs. 2 and 15, I mount the adjustable stripper 140 for pushing the bobbins or spools off the back center 134, which is effected by the skipper 140 being stationary and the back center 134 moving laterally.

The improved thread-guide holder consists of the sleeve 142, mounted on the shaft F, being provided with the collar 143 and boss 144, the latter being bored to receive the end of the guide-bit holder 145. To allow of the guide holder and bit 61 being raised when necessary by slight variation in size of bobbin or spool, and also when a broken thread is to be pieced, the boss 54 is provided with the spring-plunger 146, fitting into an inclined recess 147, Fig. 13ª, on outside of collar 143. By the employment of the spring-plunger 146 and the inclined recess 147 the guide-holder may be raised out of the way when necessary. To impart a lateral motion to the knife-hook shaft 148 to return it to its original position I provide the spring 149, which operates against the end of knife-hook table 150, the other end operating against the boss 151 on shaft 148. The shaft 148 is moved laterally in the opposite direction by the cams 152 on the shaft H for the purpose of nicking the spool, fastening the thread in the nicked spool, and changing the spool. The cams 152 operate on the spheroidal ends 148ª of the shaft 148. The cams 152 are provided with surfaces 152ª and 152ᵇ, the said surface 152ª of each cam being arranged to operate on one end 148ª of the knife-hook shaft and the surface 152ᵇ on the roller 148ᵇ, carried by the boss 151 on the knife-hook frame 150ª.

For the purpose of nicking the ends of the bobbins or spools on which thread is wound I provide the steel blade 153 with the plates 154, which are so adjusted as to hold the thread when nicking is being performed. On the side of the blade 153 is mounted the fag-cutting blade 155 for removing the piece of thread left in the process of starting. The pin 156 is for the purpose of cutting the thread after nicking the bobbins or spools has taken place and thread has been inserted therein. After the nicking is completed the strap-fork cam 70 replaces the lever 159, to be latched by the engagement of its projection 159ª with a catch-slot 159ᵇ in the head-stock; but as in some adjustments the incline 152ᵇ will not allow the catch-slot 159ᵇ to retain the lever 159, I therefore provide the lever 157, having a retaining catch or part 157ª, which engages a lug or projection 159ᶜ on the lever 159. This lever 157 is pivoted on pin or center 158, secured to middle head-stock 96ˣ, and actuated from cam 115ˣ through pin 163, lever 160, and spring 161, so that the part 157ª is higher than the catch-slot 159ᵇ, and thus the lug 159ᶜ engages catch 157ª and retains the slides L M in position during the winding of the first two layers of thread. As soon as this occurs the slide M is moved by weight 52ᵈ and cam 70, so as to shift the belt or belts 19 onto the winding pulley or pulleys 17, thus causing the shaft F to traverse. Secured to the shaft F is an arm 109ᶜ, having pivoted thereon an incline 109ᵇ, Fig. 2ª, which raises the lever 160. Now, since the lever 157 is prevented from rising by the stop 162, Fig. 14, the lever 160 in rising lifts the latch-lever 159 from the retaining part or catch 157ª and allows the weight 52ᵈ to move the belt or belts 19, by means of the slides L and M, until the said slides are stopped by the cam 70, when halfway on pulleys 17 and 18, thus allowing the cam-shaft H to rotate and cause the fag-cutting blade 155 to cut or remove the starting end of the thread.

What I claim is—

1. In a thread winding or spooling machine, the combination of the traversing guide stock shaft F, a thread guide holder 54 consisting of the sleeve 142 mounted on said shaft and provided with recessed collar 143, boss 144, bit holder 145 and spring plunger 146, the reversing spindle J provided with clutch devices, gearing connecting said clutch devices with the shaft F, and means for shifting the clutch, substantially as shown and described.

2. In a thread winding or spooling machine, the combination with the traversing guide-stock shaft F and the thread guide holder 54, of the reversing spindle J, provided with the clutch piece 1, clutch wheels 2 and 3, collar 4, springs 5, and collars 6, the spur wheel 8 mounted on the guide stock shaft F and gearing with the clutch wheel 3, the connected wheels 7 and 7ª mounted on the same independent

shaft or spindle and gearing respectively, with the wheel 2, and wheel 8, and means for shifting the clutch, substantially as shown and described.

3. In a thread winding or spooling machine, the combination with the traversing guide stock shaft F, the thread guide holder 54, the reversing spindle J provided with clutch devices, the driving shaft G, and the quadrant 16 and connected change gears driven from the shaft G and connected with the spindle J, of the fast and loose pulleys 17 and 18 mounted on the shaft G and provided with brake surfaces, the shaft H driven from the shaft G and having the double cam 70 mounted thereon, the fixed rod K, and the slides L and M supported on said rod and carrying brakes 63 and 64 operated directly from said cam 70, substantially as shown and described.

4. In a thread winding or spooling machine, the combination of the traversing guide stock shaft F provided with thread guide holder 54, the oscillatory and vertically movable shaper rod 31, the catch box 33 actuated from said shaper rod, the lever 34, links 35, springs 36, and reversing mechanism intermediate the lever 34 and guide stock shaft, substantially as shown and described.

5. In a thread winding or spooling machine, the combination of the traversing guide stock shaft F, the thread guide holder 54, the reversing spindle J, the wheel 8 on the guide stock shaft, clutch mechanism mounted on the reversing spindle J and comprising clutch wheels 2 and 3, the connected wheels 7 and 7^a mounted on an independent spindle and gearing respectively with the wheel 2 and wheel 8, the said clutch wheel 3 gearing also into the wheel 8, the lever 34 connected with the clutch mechanism, the catch box 33, and means for actuating said lever when released from the catch box, substantially as shown and described.

6. In a thread winding or spooling machine, the combination of the traversing guide stock shaft F, the thread guide holder 54, the lifting lever 55 on shaft F, the shaper rod 31 provided with incline 58 and rack 60, the shaft 40 provided with ratchet wheel 39 and pinion 41, the latter engaging with the rack on the shaper rod, the catch box 33, lever 34, links 35, springs 36, and the levers 44 mounted on the shaft 40 and carrying pawls 45 engaged with the ratchet wheel 39, substantially as shown and described.

7. In a thread winding or spooling machine, the combination of the traversing guide stock shaft F, the thread guide holder 54 and lifting lever 55 on said shaft, the shaper rod 31 having adjustable incline 58, and means for raising the shaper rod, substantially as shown and described.

8. In a thread winding or spooling machine, the combination with the knife hook frame 150^a provided with bosses 151, the knife hook shaft 148 having spheroidal ends 148^a, the rollers 148^b on the bosses 151, and the knife hook holder 150 mounted on said knife hook shaft, of the shaft H provided with cams 152 having surfaces 152^a and 152^b, substantially as shown and described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

JOHN BOOTH. [L. S.]

Witnesses:
JAS. E. BOND,
EDMUND CHADWICK.